

easyRelay Programmable Relays



D1 Series General Purpose Relay



D96 Series Solid-State Relay



Universal TR Series Timing Relay



Safety Relay



3.1 Relay Products

Control Relays and Timers Comparison **V7-T3-2**

3.2 XR Series Terminal Block Relays

Standard, OptoCoupler and High Current
Catalog Number Selection **V7-T3-3**

3.3 Programmable Relays

easy500, easy700, easy800, easy802/806 Relays and MFD-Titan Multi-Function Displays
Product Overview **V7-T3-19**

3.4 General Purpose Plug-In Relays

General Purpose Relays—D1, D2, D3, D4, D5, D7, D8 and D9 Series
Product Selection Guide **V7-T3-49**

3.5 General Purpose Open Style Relays

9575H Series 3000 Relay
9575H Series 3000—Type AA, AC and DC **V7-T3-118**

3.6 Solid-State Relays

D93, D96 and D99 Series
Product Overview **V7-T3-122**

3.7 Machine Tool Relays

D15, BF/BFD, AR/ARD and D26 Series
Product Overview **V7-T3-141**

3.8 Timing Relays

Universal TR, TR and TMR Series
Product Selection Guide **V7-T3-167**

3.9 Alternating Relays

D85 Series
Product Description **V7-T3-188**

3.10 Safety Relays

ESR5 Series
Product Description **V7-T3-193**

3.11 easySafety

ES4P Series
Product Description **V7-T3-199**

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

Tab 3—Control Relays and Timers

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



Powering Business Worldwide

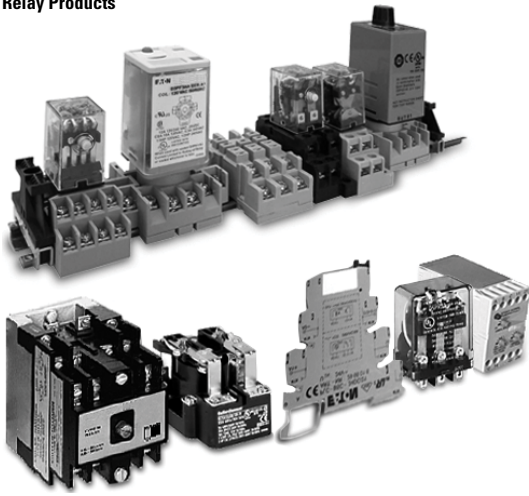
3.1

Control Relays and Timers

Relay Product Overview

3

Relay Products



Contents

Description

| Description | Page |
|--------------------------------|-----------|
| Terminal Block Relays | V7-T3-3 |
| Programmable Relays | V7-T3-19 |
| General Purpose Plug-In Relays | V7-T3-49 |
| General Purpose Type AA Relays | V7-T3-118 |
| Solid-State Relays | V7-T3-122 |
| Machine Tool Relays | V7-T3-141 |
| Timing Relays | V7-T3-167 |
| Alternating Relays | V7-T3-188 |
| Safety Relays | V7-T3-193 |

Control Relays and Timers Comparison

Selection Guide by Catalog Number Prefix

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

Terminal Block Relays



Contents

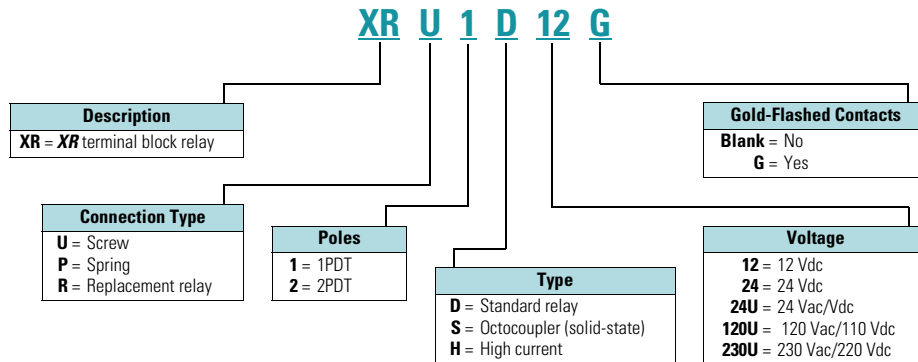
Description

Terminal Block Relays

| | |
|--|-----------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

Catalog Number Selection

XR Series—Overview



Standard Terminal Block Relay



Contents

| <i>Description</i> | <i>Page</i> |
|--|-----------------|
| Standard Terminal Block Relays | |
| Product Selection | V7-T3-5 |
| Technical Data and Specifications | V7-T3-6 |
| Electrical Schematics | V7-T3-11 |
| Dimensions | V7-T3-11 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

Standard Terminal Block Relays

Product Description

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

Application Description

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

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

Features

- Pluggable relay allows for field replacement
- Functional plug-in bridges
- Choice of screw connections or spring-cage connection
- LED status indication
- DIN rail mount
- Only 6.2 mm wide for single-pole versions, 14 mm wide for double-pole
- All common input voltages between 12 Vdc to 120 Vac

- Gold-plated contacts available
- Equipped with a robust, miniature relay:
 - IP67 protection
 - Environmentally friendly, cadmium-free contact material
 - Easy, cost-effective installation and replacement using the engagement lever

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1D 24U



Standard Terminal Block Relays

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

Standard Replacement Relays

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

Note

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

Technical Data and Specifications

Standard 1PDT Screw Connection Terminal Block Relays

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

Note

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

Standard 1PDT Screw Connection Terminal Block Relays with Gold Contacts

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

Notes

- ^① The separating plate, XRAPLCEsk, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.
- ^② If the maximum values are exceeded, the gold layer is destroyed and the values in parentheses apply.

Standard 1PDT Spring Cage Terminal Block Relays

| Catalog Number | XRP1D12 | XRP1D24 | XRP1D24U | XRP1D120U |
|---|--|--|-------------------------------------|-------------------------------------|
| Replacement Relay | XRR1D12 | XRR1D24 | XRR1D24 | XRR1D120U |
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Connection Data | | | | |
| Rigid solid AWG (mm ²) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) |
| Flexible stranded AWG (mm ²) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) |
| Input Data for 1PDT Spring Cage Versions | | | | |
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Permissible range | See Page V7-T3-10 | See Page V7-T3-10 | See Page V7-T3-10 | See Page V7-T3-10 |
| Typical input current | 15.3 mA | 9 mA | 11 mA (24 Vac)/8.5 mA (24 Vdc) | 3.5 mA (120 Vac)/3 mA (110 Vdc) |
| Typical response time | 5 ms | 5 ms | 6 ms | 6 ms |
| Typical release time | 8 ms | 8 ms | 15 ms | 15 ms |
| Input protection | Polarity protection diode, free-wheeling diode | Polarity protection diode, free-wheeling diode | Bridge rectifier | Bridge rectifier |
| Output Data | | | | |
| Contact type | 1PDT | 1PDT | 1PDT | 1PDT |
| Contact material | AgSnO | AgSnO | AgSnO | AgSnO |
| Max. switching voltage | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① |
| Min. switching voltage | 12 Vac/Vdc | 12 Vac/Vdc | 12 Vac/Vdc | 12 Vac/Vdc |
| Limiting continuous current | 6 A | 6 A | 6 A | 6 A |
| Min. switching current | 10 mA | 10 mA | 10 mA | 10 mA |
| Min. switching power | 120 mW | 120 mW | 120 mW | 120 mW |
| Miscellaneous Data | | | | |
| Ambient temp range | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +131 °F (–20 °C to +55 °C) |
| Rated operating mode | 100% operating factor | 100% operating factor | 100% operating factor | 100% operating factor |
| Inflammability class | V0, in accordance with UL 94 | V0, in accordance with UL 94 | V0, in accordance with UL 94 | V0, in accordance with UL 94 |
| Mechanical service life | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles |

Note

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

Standard DPDT Screw Connection Terminal Block Relays

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

Note

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

3.2

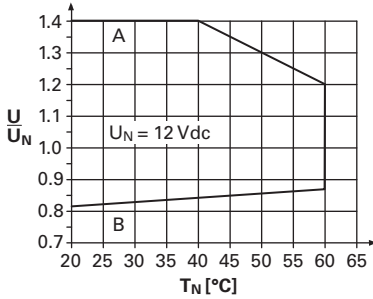
Control Relays and Timers

Terminal Block Relays

Permissible Range Diagrams

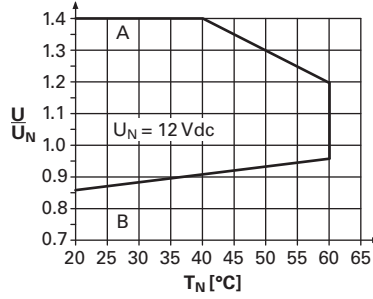
1PDT Relay Modules

Operating Range Voltage for 12 Vdc

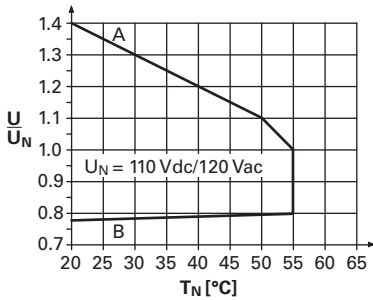


DPDT Relay Modules

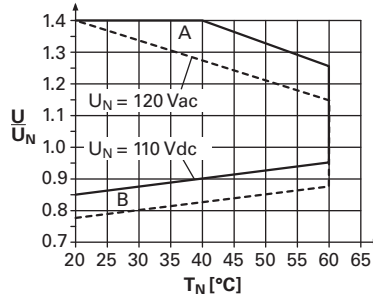
Operating Range Voltage for 12 Vdc



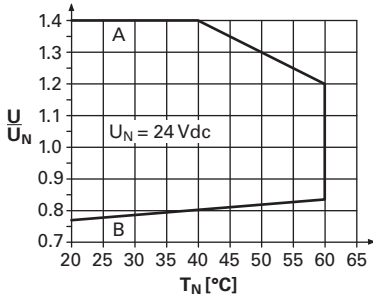
Operating Range Voltage for 120 Vac/110 Vdc



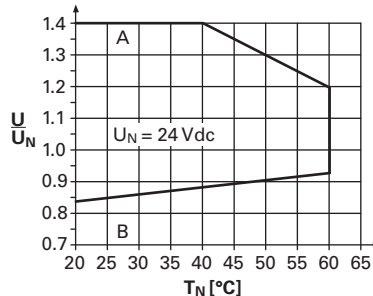
Operating Range Voltage for 120 Vac/110 Vdc



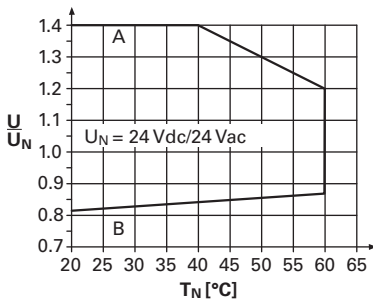
Operating Range Voltage for 24 Vdc



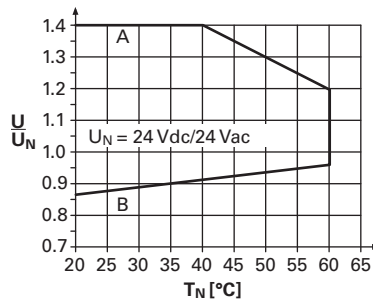
Operating Range Voltage for 24 Vdc



Operating Range Voltage for 24 Vac/Vdc



Operating Range Voltage for 24 Vac/Vdc



Notes

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

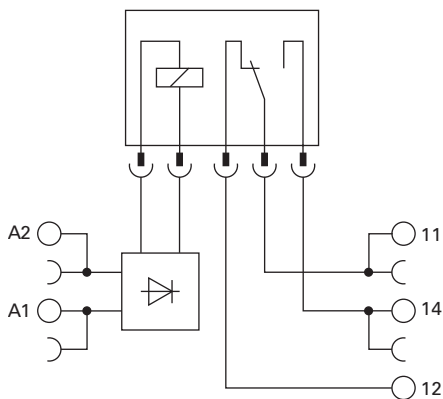
Curve A — Maximum permissible continuous operating voltage U_{max} with limiting continuous current on the contact side (see respective technical data).

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

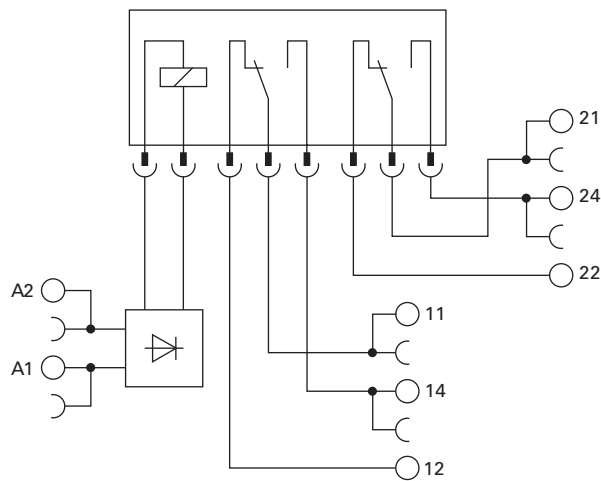
^① Pre-excitation: Relay has been operated in a thermally steady state at the ambient temperature T_U with nominal voltage U_N and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably pick up again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

Electrical Schematics

1PDT Terminal Block Relays



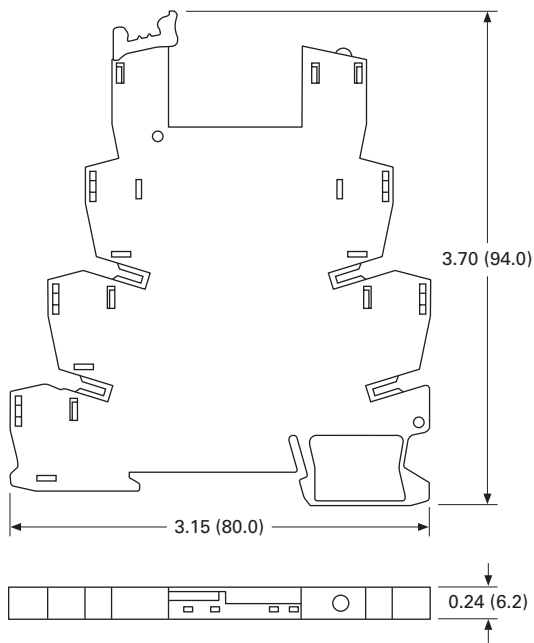
DPDT Terminal Block Relays



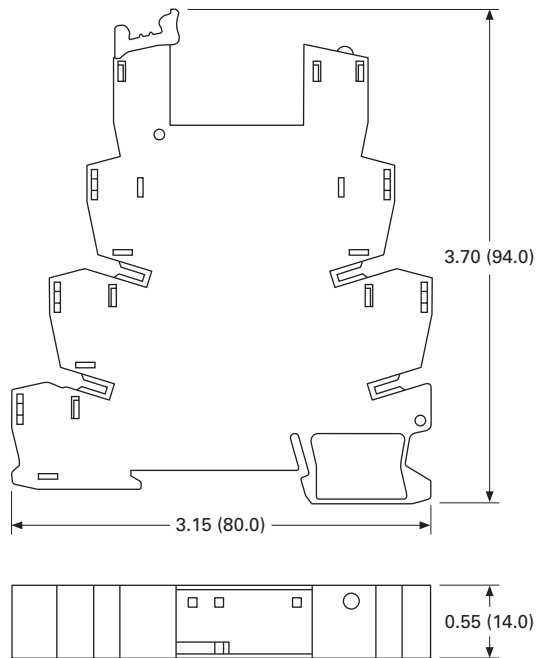
Dimensions

Approximate Dimensions in Inches (mm)

Standard 1PDT Terminal Block Relays



Standard DPDT Terminal Block Relays



OptoCoupler Terminal Block Relay



Contents

| <i>Description</i> | <i>Page</i> |
|--|-----------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | |
| Product Selection | V7-T3-13 |
| Technical Data and Specifications | V7-T3-13 |
| Electrical Schematic | V7-T3-14 |
| Dimensions | V7-T3-14 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

OptoCoupler Terminal Block Relays

Product Description

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

Application Description

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

Features

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

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1S24



OptoCoupler Terminal Block Relays

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

OptoCoupler Replacement Relays

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

Technical Data and Specifications

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays

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

Note

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

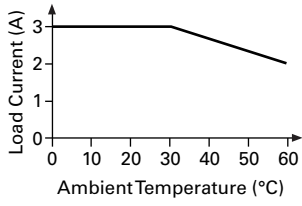
3.2

Control Relays and Timers

Terminal Block Relays

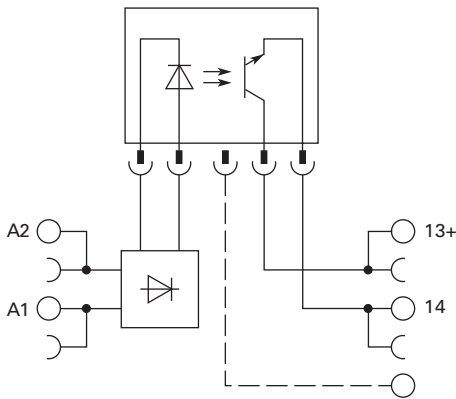
3

Derating Curve OptoCoupler



Electrical Schematic

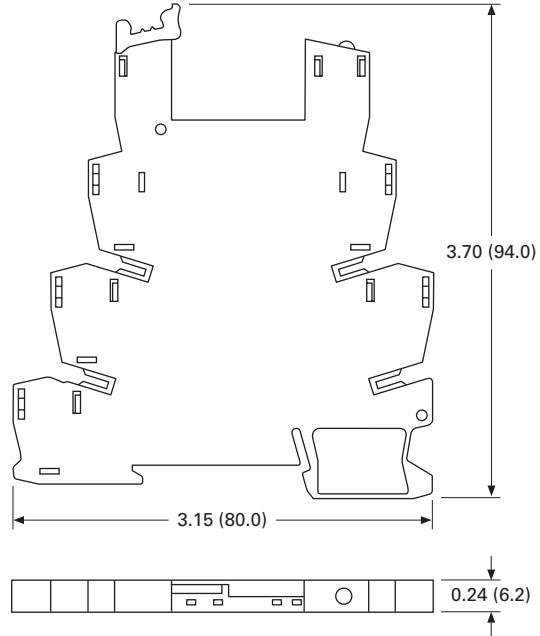
Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



High Current Terminal Block Relay



Contents

| Description | Page |
|---|-----------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | |
| Product Selection | V7-T3-16 |
| Technical Data and Specifications | V7-T3-16 |
| Electrical Schematic | V7-T3-17 |
| Dimensions | V7-T3-17 |
| XR Series Accessories | V7-T3-18 |

High Current Terminal Block Relays

Product Description

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

Application Description

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

Features

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

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1H24



High Current Terminal Block Relays

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

High Current Replacement Relays

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

Technical Data and Specifications

High Current Terminal Block Relays (1PDT)

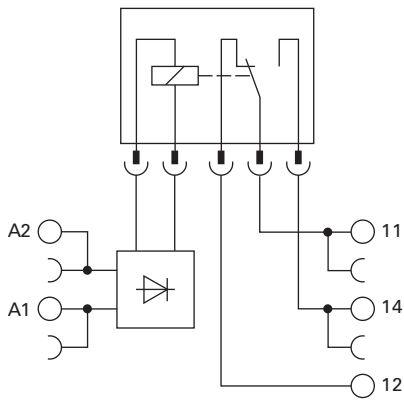
| Catalog Number Replacement Relay | XRU1H12 XRR1H12 | XRU1H24 XRR1H24 | XRU1H24U XRR1H24U | XRU1H120U XRR1H120U |
|---|---|---|-------------------------------------|-------------------------------------|
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Connection Data | | | | |
|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

Notes

- ^① Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.
- ^② The separating plate, XRAPLCEsk, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.
- ^③ The current rating for the normally open contact (#14) is 10 A. The current rating for the normally closed contact (#12) is 6 A and can be increased to 10 A by bridging the two #12 contact connections.

Electrical Schematic

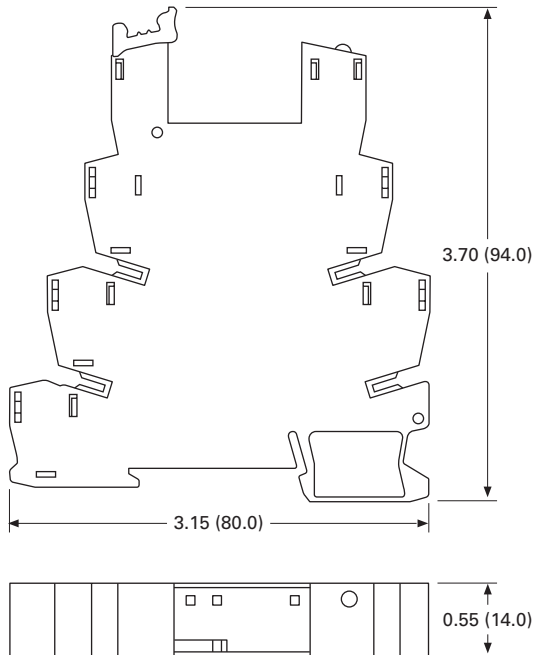
High Current Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

High Current Terminal Block Relays



XR Series Accessories

Product Description

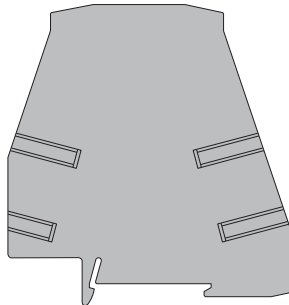
Power Terminal Block

Bridges

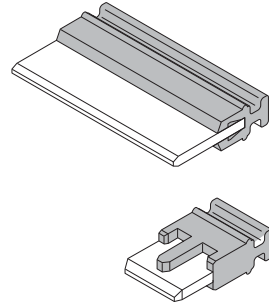


The XRAPLCESK power terminal block has the same shape as the relay modules and is used to feed in the bridging potentials. The nominal current is 32 A. When the total current is less than or equal to 6 A, supply can take place directly at the connecting terminal blocks of one of the connected relays.

End Cover



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



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

Product Selection

XR Series Accessories

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

Technical Data and Specifications

Power Terminal Block

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

Note

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

Programmable Relays



Product Overview

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

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

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

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

Contents

| Description | Page |
|--|-----------------|
| Programmable Relays | |
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Application Description

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

Typical control applications are:

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

See publication no. **AP05013001E** for the easyRelay application guide. Download from www.eaton.com/easyrelays.

easy500/700/800 Programmable Relays



3

easy500/700/800 Programmable Relays

Product Description

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

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

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

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

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

Standards

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

Certifications

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



Shipping Approvals

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

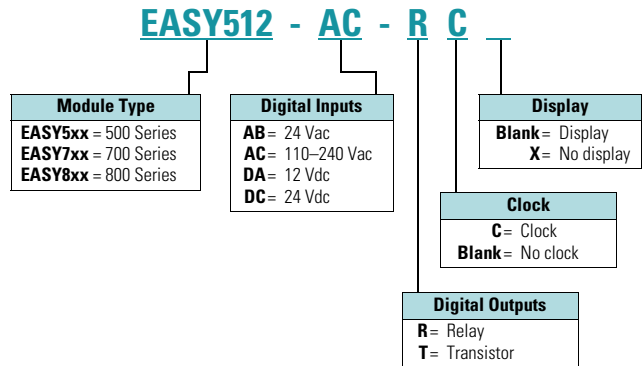
Contents

Description

| Description | Page |
|--|-----------------|
| easy500/700/800 Programmable Relays | |
| System Overview | V7-T3-21 |
| Product Selection | V7-T3-23 |
| Technical Data and Specifications | V7-T3-24 |
| Dimensions | V7-T3-25 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Catalog Number Selection

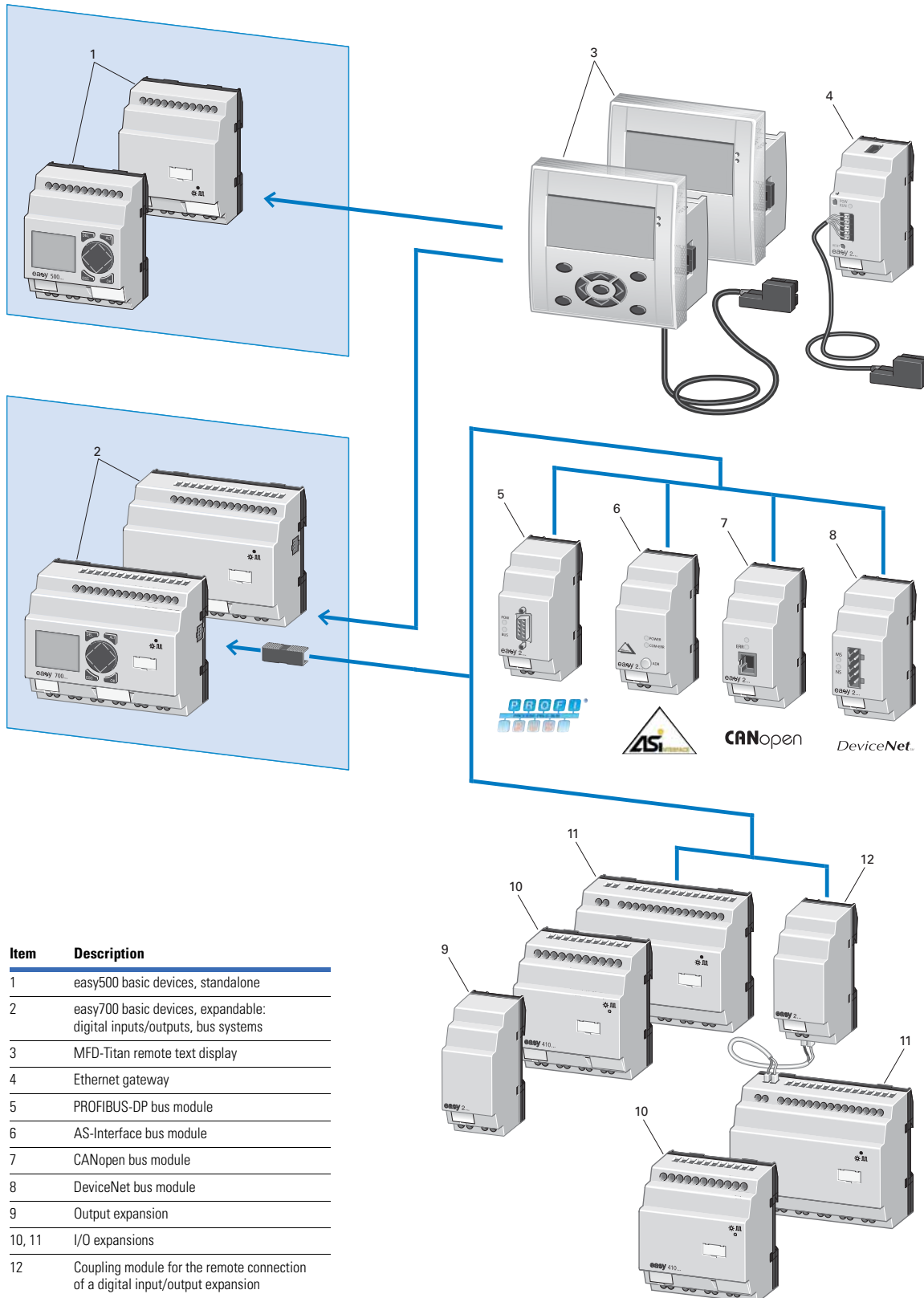
easy500/700/800



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

System Overview

easy500/700 Programmable Relays



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

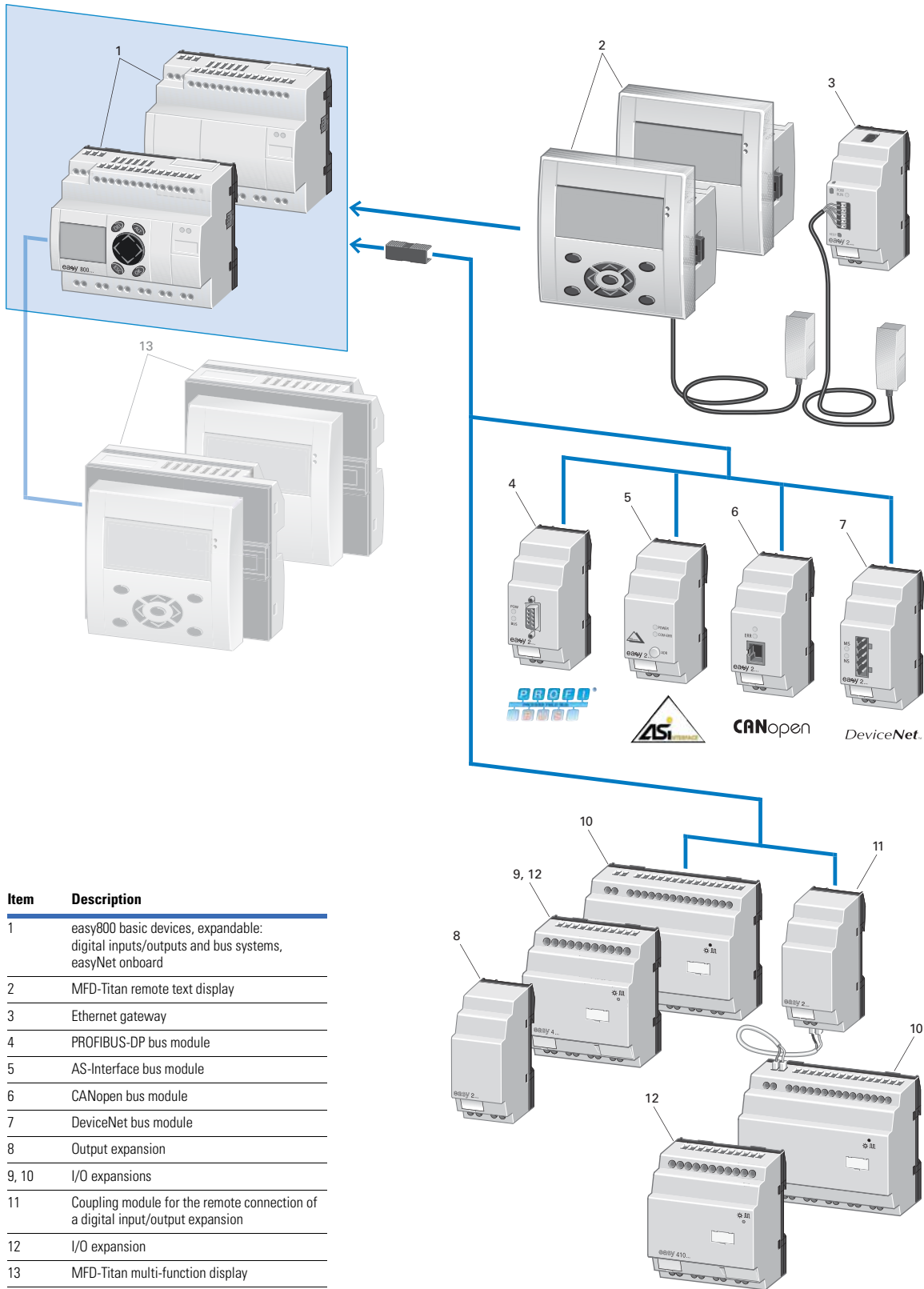
3.3

Control Relays and Timers

Programmable Relays

easy800 Programmable Relay

3



Product Selection

easy500—Display



easy500 Programmable Relays (Standalone)

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

easy500—No Display



easy700—Display



easy700 Programmable Relays (Expandable and Networkable)

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

easy700—No Display



easy800—Display



easy800 Programmable Relays (Expandable and Networkable)

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

easy800—No Display



Note

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

Technical Data and Specifications

easy500 Series

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

easy700 Series

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

easy800 Series

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

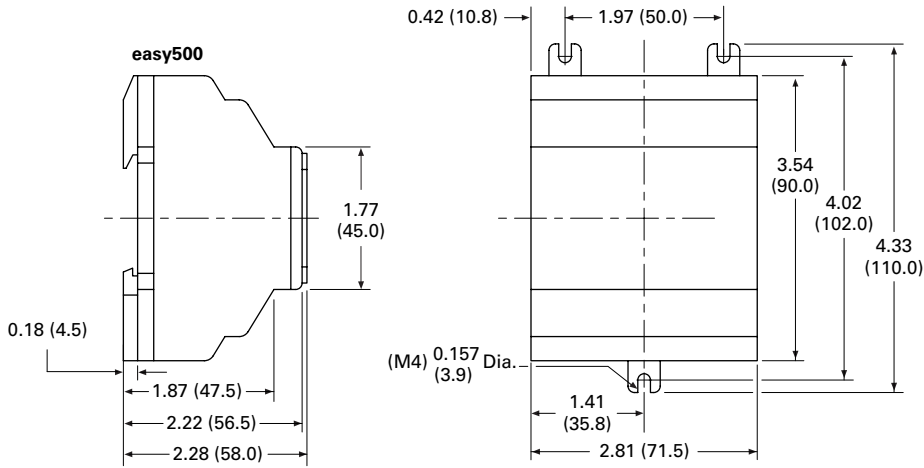
Note

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

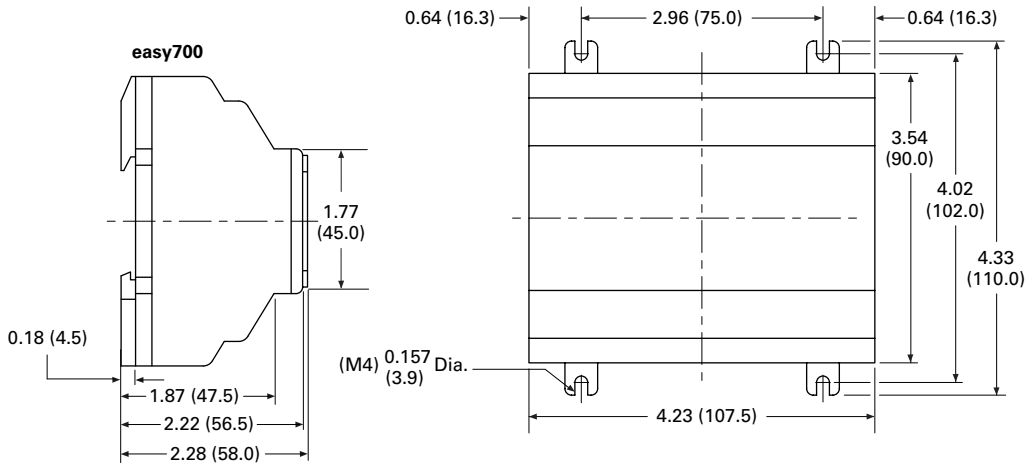
Dimensions

Approximate Dimensions in Inches (mm)

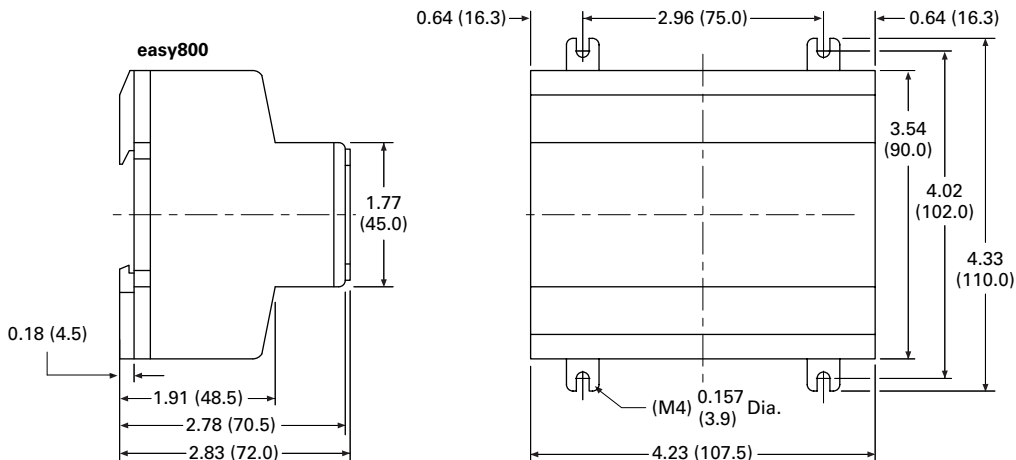
easy500 Series, Drawing Number MD05013001E



easy700 Series, Drawing Number MD05013002E



easy800 Series, Drawing Number MD05013003E



easy802/806 Programmable Relays with SmartWire-DT



easy802/806 Programmable Relays with SmartWire-DT

Product Description

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

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

Contents

Description

| | <i>Page</i> |
|--|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | |
| Product Selection | V7-T3-27 |
| Accessories. | V7-T3-27 |
| Technical Data and Specifications. | V7-T3-28 |
| Dimensions. | V7-T3-29 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Standards

- EN 50178
- IEC/EN 60947
- UL 508

Certifications

- cULus
- CE
- C-Tick



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

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

Note

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

Product Selection

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

EASY802-DC-SWD



easy800 with SmartWire-DT

| Supply Voltage | Description | Catalog Number |
|----------------|---------------------------------|-----------------------|
| 24 Vdc | Control relay with SmartWire-DT | EASY802-DC-SWD |

EASY806-DC-SWD



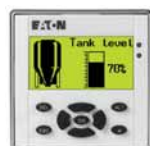
| | | |
|--------|---|-----------------------|
| 24 Vdc | Control relay with SmartWire-DT, four inputs, two of which can be used as outputs (transistor 24 Vdc, 0.1 A), easyNet onboard | EASY806-DC-SWD |
|--------|---|-----------------------|

Remote Displays

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

Accessories

MFD-80



Accessories—easy800

| Description | Catalog Number |
|-----------------------------------|----------------|
| MFD display, NEMA 4X indoor rated | MFD-80 |

MFD-CP4



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

Technical Data and Specifications

easy802/806 Programmable Relays with SmartWire-DT

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

Note

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

easy802/806 Programmable Relays with SmartWire-DT, continued

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

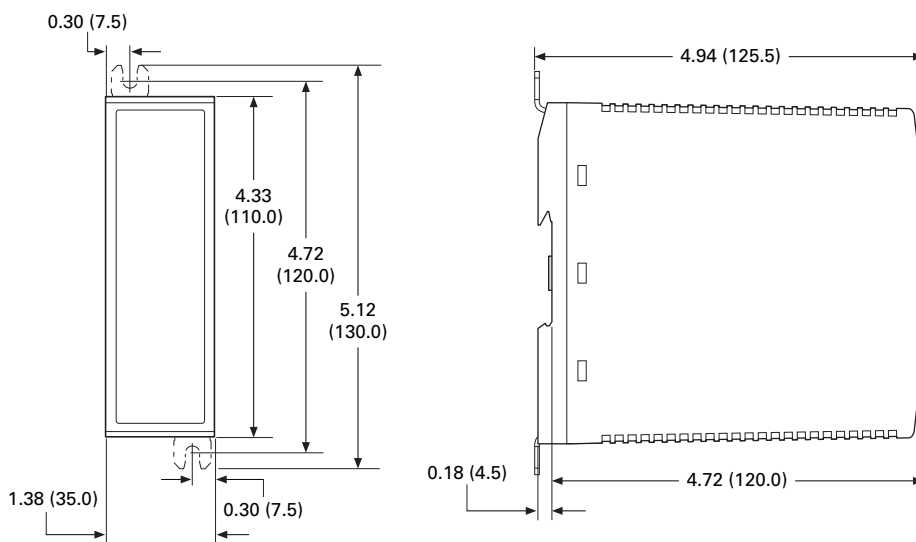
Notes

① If present.

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

Dimensions

Approximate Dimensions in Inches (mm)

easy802 and easy806 Controllers

easyRelay Expansion Modules



Contents

| <i>Description</i> | <i>Page</i> |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | |
| Product Selection | V7-T3-31 |
| Technical Data and Specifications | V7-T3-31 |
| Dimensions | V7-T3-32 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

easyRelay and MFD Expansion Modules

Product Description

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

Standards

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

Certifications

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



Shipping Approvals

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

Product Selection

EASY618_



Digital I/O Expansion Modules

Can be used via easyLink.

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

EASY406_



Analog I/O Expansion Modules

Can be used via easyLink.

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

Technical Data and Specifications

easyRelay I/O Expansion Modules

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

3.3

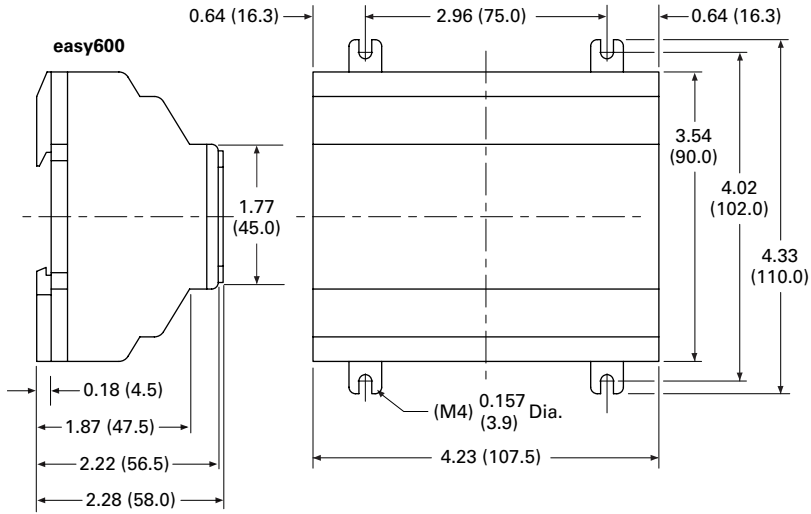
Control Relays and Timers

Programmable Relays

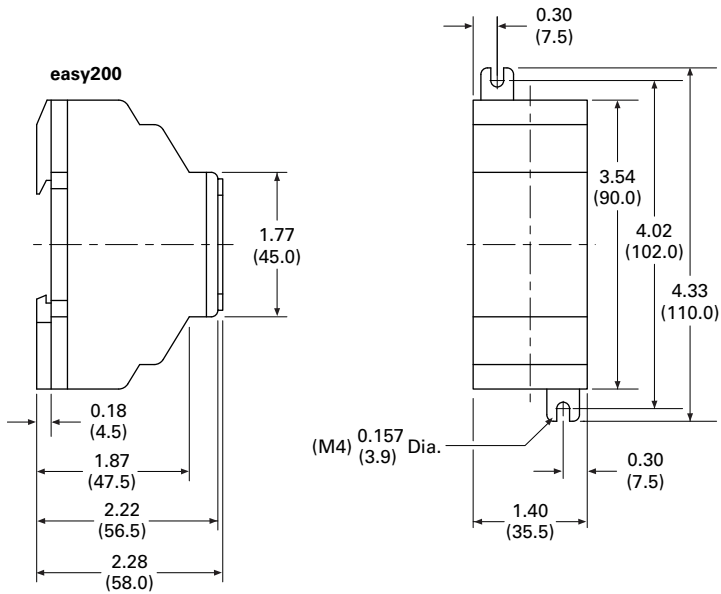
Dimensions

Approximate Dimensions in Inches (mm)

easy600 Series, Drawing Number MD05013002E



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



MFD-Titan Multi-Function Displays**Contents**

| Description | Page |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-33 |
| MFD-Titan Multi-Function Displays | |
| System Overview | V7-T3-34 |
| Product Selection | V7-T3-35 |
| Accessories | V7-T3-36 |
| Technical Data and Specifications | V7-T3-37 |
| Dimensions | V7-T3-38 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

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

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

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

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

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

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

Standards

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

Certifications

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

**Shipping Approvals**

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

3.3

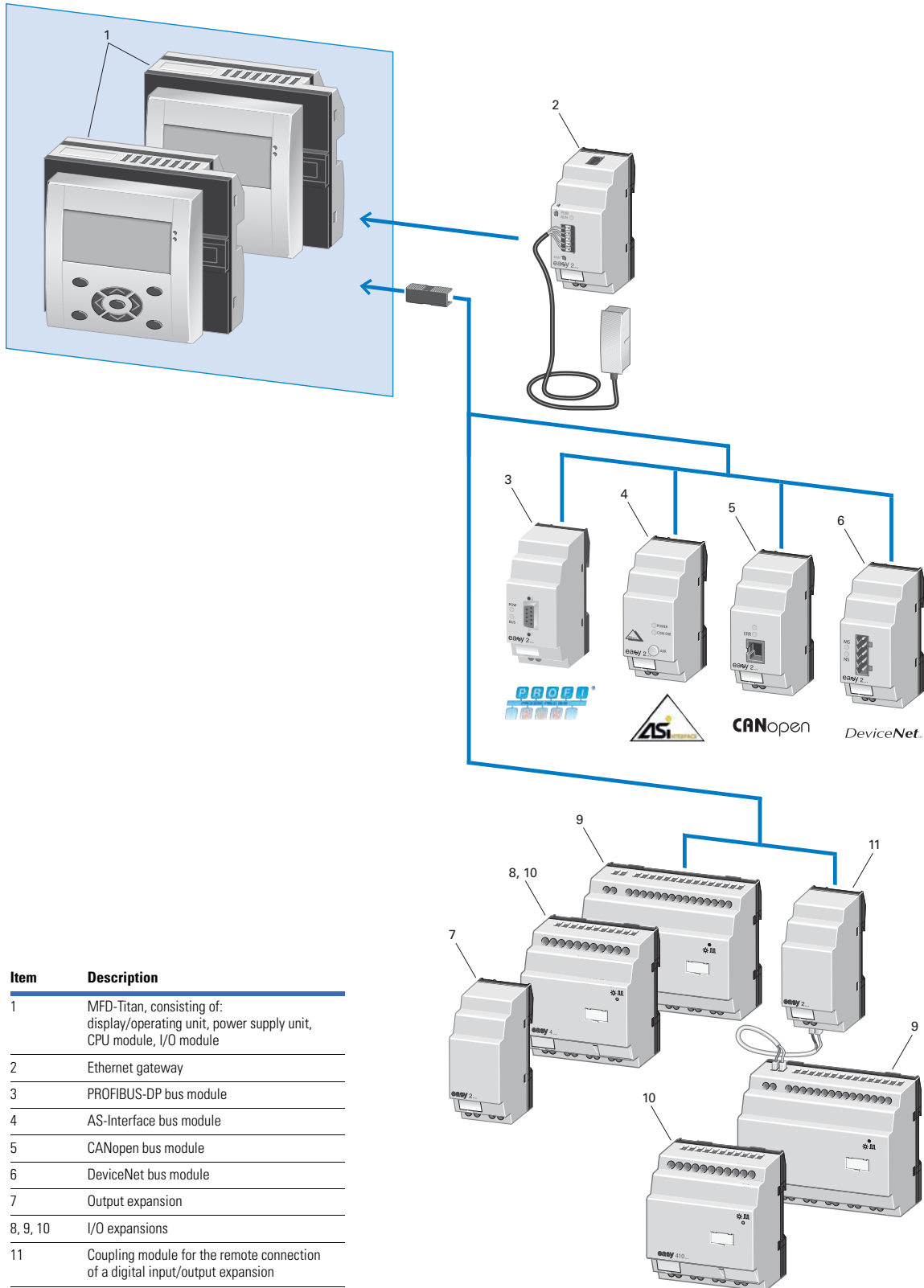
Control Relays and Timers

Programmable Relays

System Overview

MFD-Titan Multi-Function Display

3



Product Selection

MFD-80-B



MFD-Titan Display/Operator Units

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

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

MFD-CP4



MFD-Titan Text/Graphics Display Power Module

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

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

MFD-CP



MFD-Titan Controller Modules

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

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

Notes

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

MFD-R16



MFD-Titan I/O Modules

For use with MFD-Titan controller modules.

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

MFD-TP_



MFD-Titan I/O Modules with Temperature Detection

For use with MFD-CP8_ ^② and MFD-CP10_ MFD-Titan controller modules.

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

Accessories

Miscellaneous Parts

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

Notes

- ① Analog inputs optional. Use of analog inputs will result in a decrease in the same number of available digital inputs
- ② Version 8 and higher MFD-CP8_ controllers are compatible with the temperature detection modules.

Technical Data and Specifications

MFD-80, MFD-CP4, MFD-CP8

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

MFD-Titan I/O Modules

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

MFD-CP4 and CP8 Communication Modules

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

Note

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

3.3

Control Relays and Timers

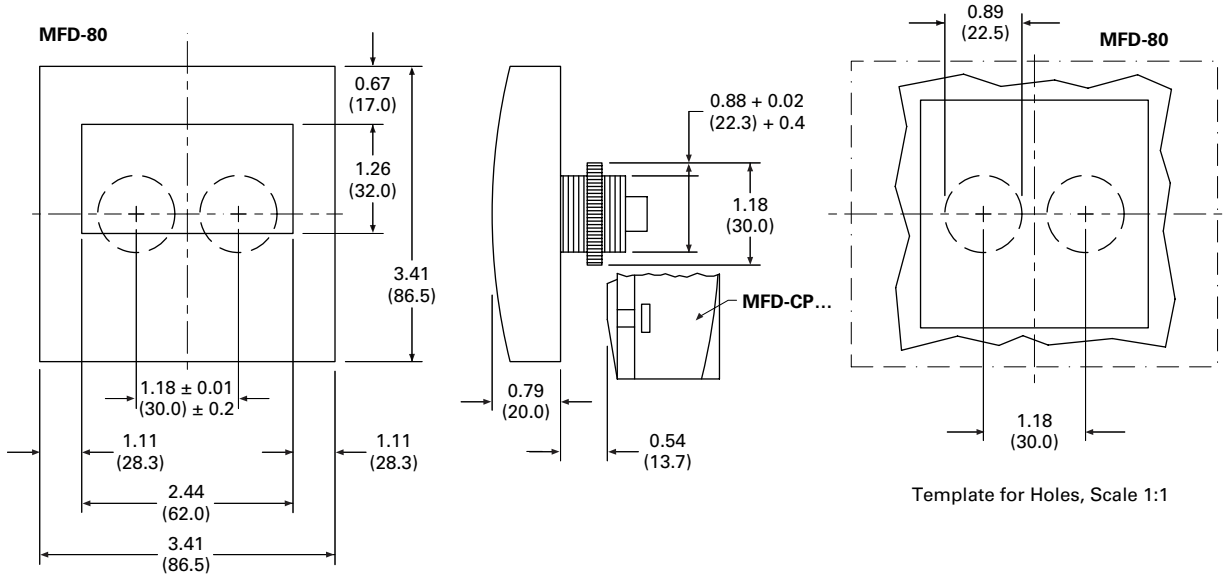
Programmable Relays

Dimensions

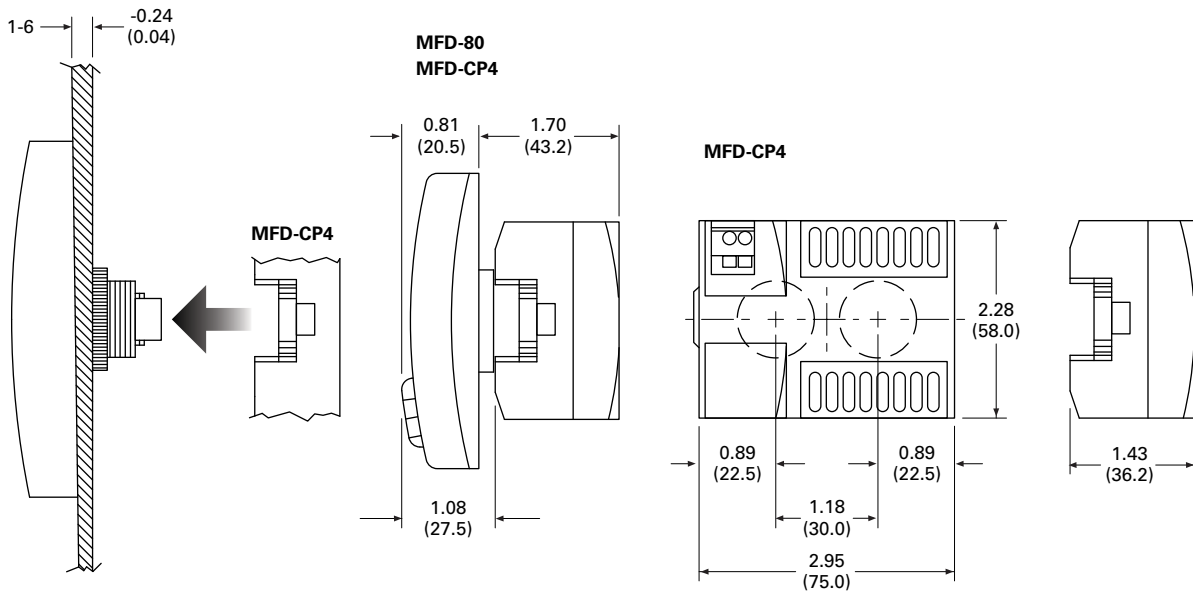
Approximate Dimensions in Inches (mm)

MFD-80 Series, Drawing Number MD05013005E

3

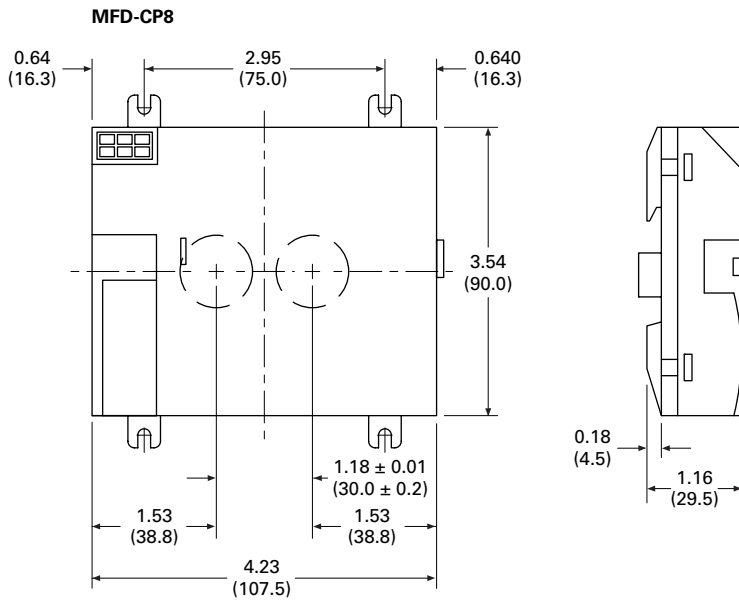


MFD-CP4, MFD-80 and MFD-CP4 Series Combined, Drawing Number MD013013E

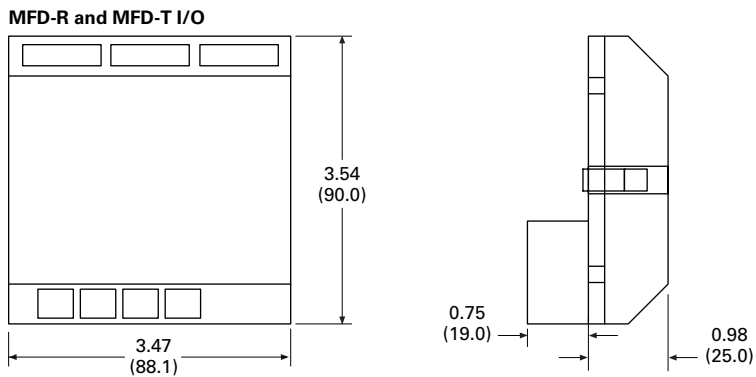


Approximate Dimensions in Inches (mm)

MFD-CP8 Series, Drawing Number MD05013006E



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



easyRelay Communication Modules



Contents

| <i>Description</i> | <i>Page</i> |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-33 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | |
| Technical Data and Specifications | V7-T3-41 |
| Dimensions | V7-T3-41 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

easyRelay Communication Modules

Product Description

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

Available communication modules support:

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

All modules operate exclusively as nodes on the given network.

Product Selection

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

EASY209-SE



Ethernet Gateway Module

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

EASY204-DP



Network Interface Modules

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

Note

① To set up the Ethernet gateway, download the EASY209-SE configuration software at www.eaton.com/easyrelays.

Technical Data and Specifications

easy700/800/MFD Communication Interface Modules

EASY204-DP, EASY205-ASI, EASY221-CO, EASY222-DN, EASY209-SE ①

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

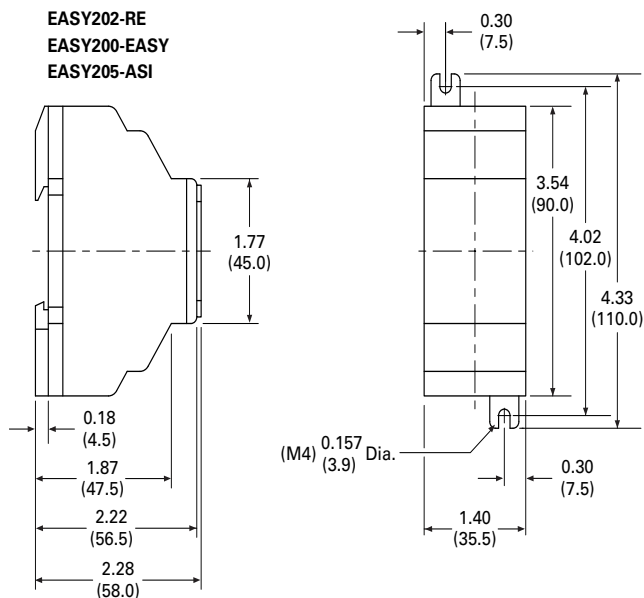
Notes

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

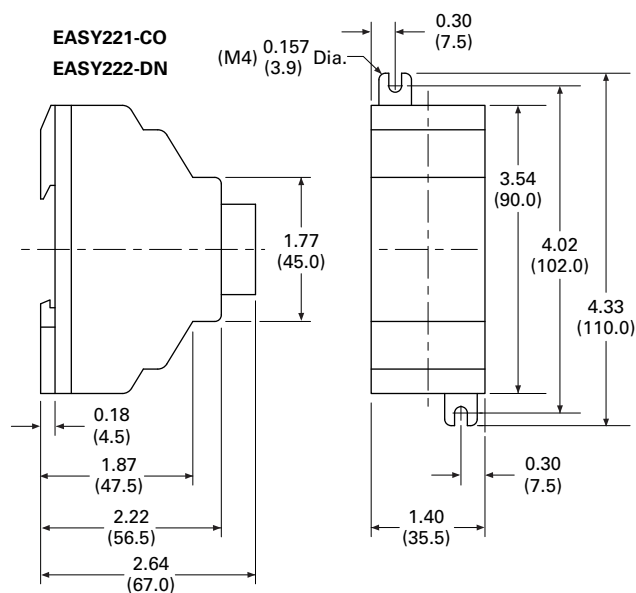
Dimensions

Approximate Dimensions in Inches (mm)

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



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



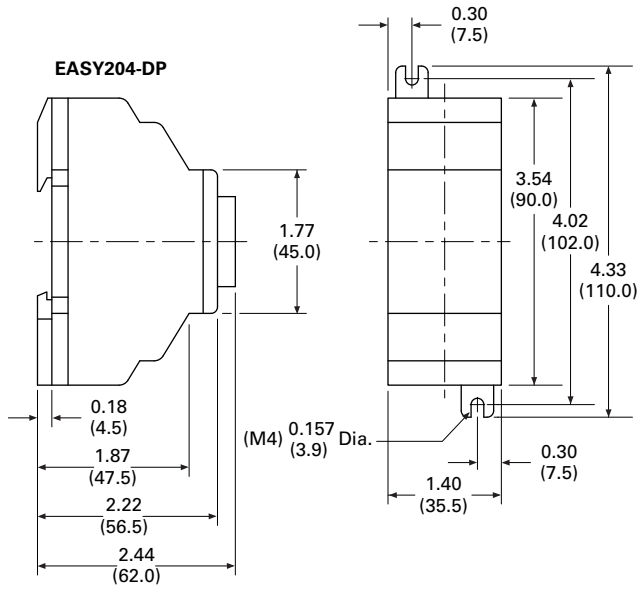
3.3

Control Relays and Timers

Programmable Relays

EASY204-DP Series,
Drawing Number MD05013011E

3



easyRelay Power Supplies, Accessories and Software



easyRelay Power Supplies, Accessories and Software

Product Description

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

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

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

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

Product Selection

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

Contents

| <i>Description</i> | <i>Page</i> |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | |
| Accessories | V7-T3-44 |
| Technical Data and Specifications | V7-T3-46 |
| Wiring Diagram | V7-T3-46 |
| Dimensions | V7-T3-47 |

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

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

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

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

EASY...-POW



Power Supply Units

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

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

Bluetooth Adapter

Conveniently commission and service machines and other equipment remotely.

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

EASY800-BLT-ADP



Bluetooth Adapter

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

Accessories

easySoft



Programming Software

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

EASY-USB-CAB



Programming Cables

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

MFD-CP4-800-CAB5



Cables and Connectors

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

EASY800-MO-CAB



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

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

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

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

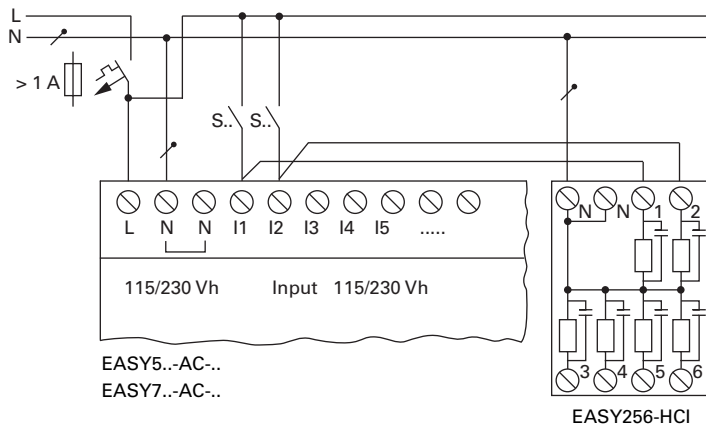
Technical Data and Specifications

easyRelay Power Supplies

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

Wiring Diagram

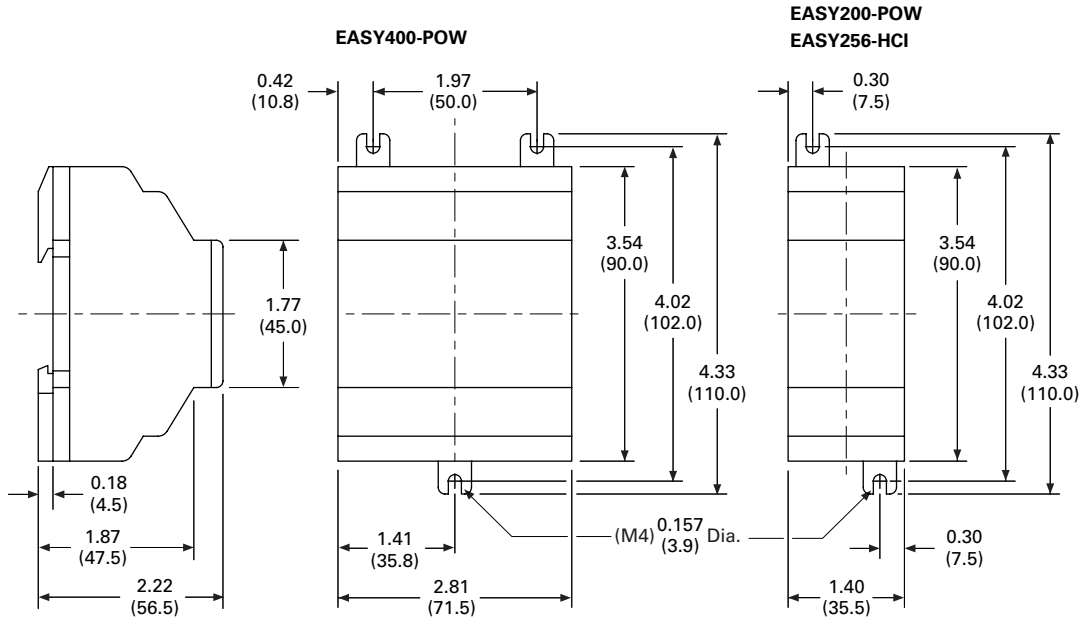
EASY256-HCI



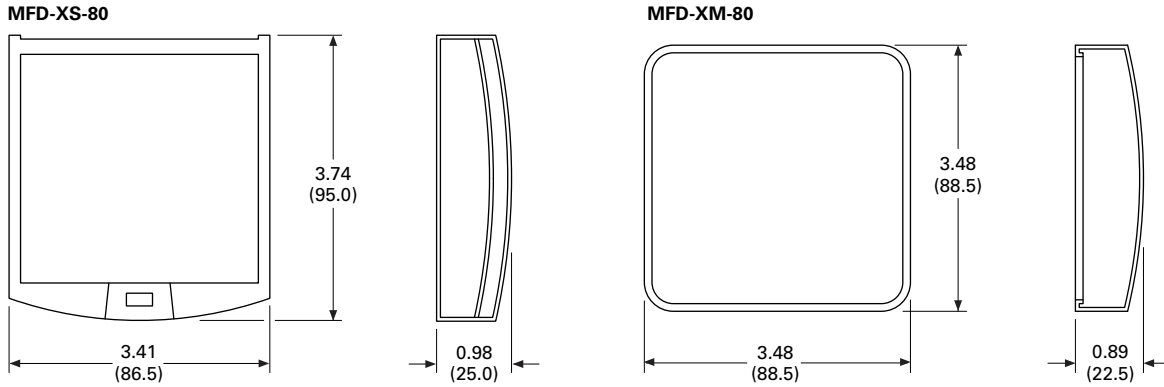
Dimensions

Approximate Dimensions in Inches (mm)

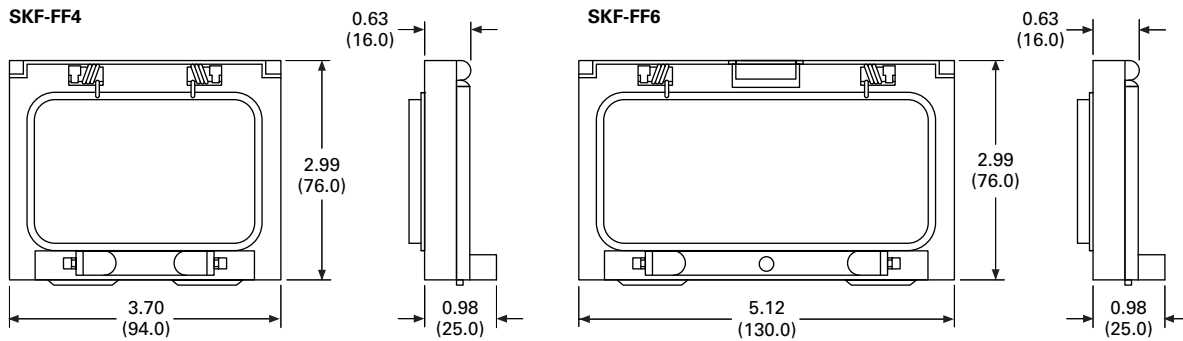
EASY200-POW/EASY256-HCI and EASY400-POW Series, Drawing Number MD05013004E



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



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



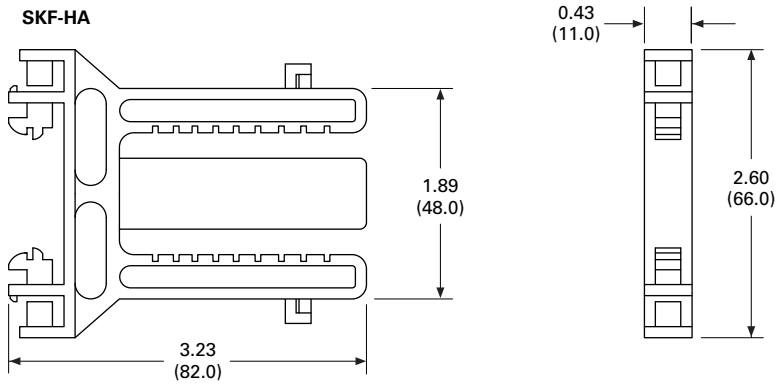
3.3

Control Relays and Timers

Programmable Relays

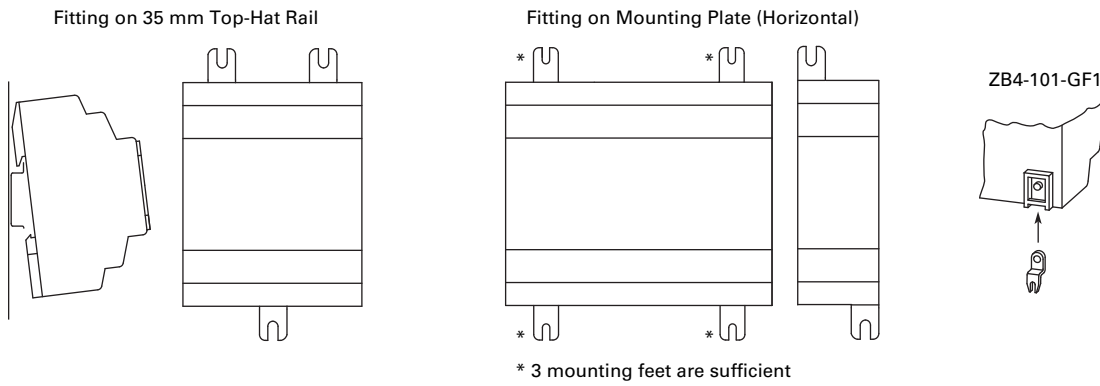
Approximate Dimensions in Inches (mm)

SKF-HA Series, Drawing Number MD05013015E

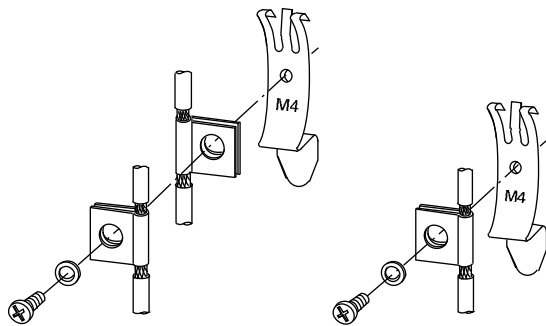


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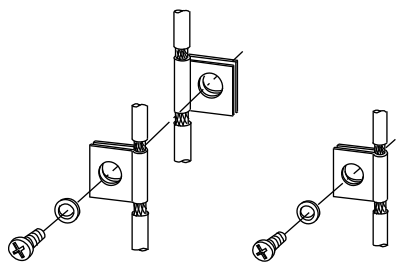
ZB4-101-GF1 Mounting Feet



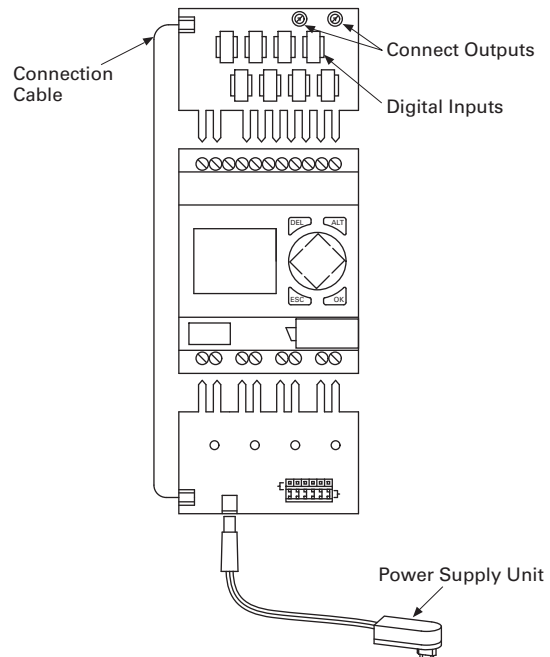
ZB4-102-KS1 Series— Grounding the Screen for Top-Hat Rail



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



EASY412-DC-SIM-NA Series



General Purpose Plug-In Relay



Contents

| <i>Description</i> | <i>Page</i> |
|----------------------------|-------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Product Selection Guide

General Purpose Relay Selection Characteristics

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

General Purpose Plug-In Relays

Relay Series

D1RR/D1RF



D2RR/D2RF



D3RR/D3RF



Approvals



Note: UL when used with the appropriate socket.



Note: UL when used with the appropriate socket.



Note: UL when used with the appropriate socket.

Features

Polycarbonate cover

Indicator lamp and pushbutton available

Panel and DIN mounting

Polycarbonate cover

Indicator lamp and pushbutton available

Panel, DIN and flange mounting

Latching

Polycarbonate cover

Indicator lamp and pushbutton available

Panel and DIN mounting

Contact Data

| Configuration | SPDT | DPDT | 4PDT | DPDT | 3PDT |
|-----------------------------------|--------------|--------------|------|--------------|------|
| Max. allowable load | 15 A | 12 A | 6 A | 10 A | 10 A |
| Material | Silver alloy | Silver alloy | | Silver alloy | |
| Dielectric strength between poles | 1500 V | 1500 V | | 1500 V | |

Coil Data

| | | | | | |
|-------------|--------------|--------------|--|----------------------------|--|
| AC | 6 to 240 Vac | 6 to 240 Vac | | 6 to 240 Vac | |
| DC | 6 to 110 Vdc | 6 to 110 Vdc | | 6 to 110 Vdc | |
| Power | | | | | |
| VA (Vac) | 0.9 VA | 1.2 VA | | 3 VA 1.4 W (D3RR and D3RF) | |
| Watts (Vdc) | 0.7 W | 0.9 W | | — | |

General Data

| | | | | | |
|-----------------------|--------------------------------------|--------------------------------------|--|--------------------------------------|--|
| Ambient temperature | | | | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) | | −40 °F to +185 °F (−40 °C to +85 °C) | |
| Operational | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) | | −40 °F to +131 °F (−40 °C to +55 °C) | |
| Response time | 20 milliseconds | 20 milliseconds | | 20 milliseconds | |
| Life | | | | | |
| Mechanical operations | 10 million | 10 million | | 5 million (D3RR and D3RF) | |
| Electrical operations | 100,000 | 200,000 | | 100,000 | |
| Page Numbers | V7-T3-53 to V7-T3-56 | V7-T3-57 to V7-T3-66 | | V7-T3-67 to V7-T3-75 | |

General Purpose Plug-In Relays, continued

Relay Series

D4



D5RR/D5RF



D7PR/D7PF



Approvals



Note: UL when used with the appropriate socket.

Note: UL when used with the appropriate socket.

Features

Polycarbonate cover

Polycarbonate cover

Polycarbonate cover

Indicator lamp available

Indicator lamp and pushbutton available

Indicator lamp and pushbutton available

Panel and DIN mounting

Panel, DIN and flange mounting

Panel and DIN mounting

Socket has built-in hold-down spring

Contact Data

| Configuration | SPDT | DPDT | DPDT | 3PDT | DPDT | 3PDT | 4PDT |
|---------------------|-----------------|----------------|--------------|------|--------------|--------|--------|
| Max. allowable load | 10 A at 250 Vac | 5 A at 240 Vac | 10 A | 10 A | 15 A | 15 A | 15 A |
| Material | AgCdO | | Silver alloy | | Silver alloy | | |
| Dielectric strength | 5000 V | | 1500 V | | 1500 V | 2500 V | 2500 V |

Coil Data

| | | | | | | | |
|-------------|--------------|--|--------------|--|--------------|--------|--------|
| AC | 6 to 240 Vac | | 6 to 240 Vac | | 6 to 240 Vac | | |
| DC | 6 to 110 Vdc | | 6 to 110 Vdc | | 6 to 110 Vdc | | |
| Power | | | | | | | |
| VA (Vac) | 0.9 VA | | 3 VA | | 1.2 VA | 1.5 VA | 1.5 VA |
| Watts (Vdc) | 0.5 W | | 1.4 W | | 0.9 W | 1.4 W | 1.5 W |

General Data

| | | | | | | | |
|-----------------------|--------------------------------------|--|--------------------------------------|--|--|---------|---------|
| Ambient temperature | | | | | | | |
| Storage | −40 °F to +158 °F (−40 °C to +70 °C) | | −40 °F to +185 °F (−40 °C to +85 °C) | | −40 °F to +185 °F (−40 °C to +85 °C) | | |
| Operational | −40 °F to +158 °F (−40 °C to +70 °C) | | −40 °F to +131 °F (−40 °C to +55 °C) | | −40 °F to +131 °F (−40 °C to +55 °C) | | |
| Response time | 15 milliseconds | | 20 milliseconds | | 20 milliseconds (30 milliseconds for latching) | | |
| Life | | | | | | | |
| Mechanical operations | 10 million | | 5 million | | 10 million | | |
| Electrical operations | 100,000 | | 100,000 | | 100,000 | 200,000 | 200,000 |

Page Numbers

V7-T3-76 to V7-T3-79

V7-T3-80 to V7-T3-88

V7-T3-89 to V7-T3-102

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

General Purpose Plug-In Relays, continued

Relay Series

D8

D9



Approvals



Features

| | |
|-----------------------------------|----------------------|
| Dust cover | Dust cover |
| Panel, DIN and flange mounting | Pushbutton available |
| Quick-connect and screw terminals | Panel mounting |
| | Screw terminals |

Contact Data

| Configuration | 4PST | | | |
|---------------------|-----------------|-----------------|-----------------|----------------|
| | SPST-NO | DPST-NO | NO | NC |
| Max. allowable load | 30 A at 220 Vac | 25 A at 220 Vac | 25 A at 220 Vac | 8 A at 220 Vac |
| Material | AgCdO | | AgCdO | |
| Dielectric strength | 4000 V | | 4000 V | |

Coil Data

| | | |
|-------------|--------------|---------------|
| AC | 6 to 240 Vac | 24 to 240 Vac |
| DC | 12 to 24 Vdc | 12 to 110 Vdc |
| Power | | |
| VA (Vac) | 2.5 VA | 2.6 VA |
| Watts (Vdc) | 1.9 W | 2.0 W |

General Data

| | | |
|-----------------------|-------------------------------------|--------------------------------------|
| Ambient temperature | | |
| Storage | -4 °F to +185 °F (-20 °C to +85 °C) | -13 °F to +140 °F (-25 °C to +60 °C) |
| Operational | -4 °F to +131 °F (-20 °C to +55 °C) | -13 °F to +140 °F (-25 °C to +60 °C) |
| Response time | 30 milliseconds | 50 milliseconds |
| Life | | |
| Mechanical operations | 5 million | 1 million |
| Electrical operations | 100,000 | 100,000 |
| Page Numbers | V7-T3-103 to V7-T3-107 | V7-T3-108 to V7-T3-111 |

D1 Series Relay



D1RR/D1RF Series

Product Description

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

Features

D1RR

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

D1RF

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


Contents

Description

| | <i>Page</i> |
|---|------------------|
| D1RR/D1RF Series | |
| Product Selection | V7-T3-54 |
| Accessories | V7-T3-54 |
| Technical Data and Specifications | V7-T3-55 |
| Wiring Diagram | V7-T3-56 |
| Dimensions | V7-T3-56 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

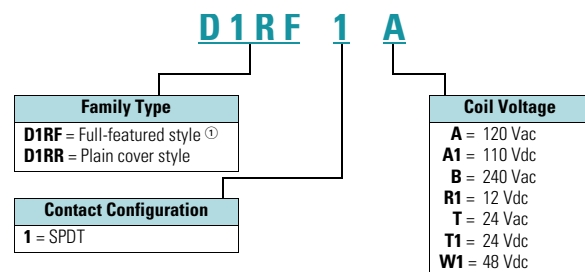
Standards and Certifications



 When used with accompanying Eaton screw terminal socket.

Catalog Number Selection

D1RF/D1RR Series



Note

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

Product Selection

D1RR/D1RF Relay/Socket Quick Reference

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

D1RF Series Relay



D1RR/D1RF Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------|-----------------------|------------------------|----------------|
| Full Featured | | | |
| 12 Vdc | SPDT | 188 | D1RF1R1 |
| 24 Vac 50/60 Hz | SPDT | 180 | D1RF1T |
| 24 Vdc | SPDT | 750 | D1RF1T1 |
| 110 Vdc | SPDT | 13,800 | D1RF1A1 |
| 120 Vac 50/60 Hz | SPDT | 4430 | D1RF1A |
| 240 Vac 50/60 Hz | SPDT | 15,720 | D1RF1B |
| Plain Cover | | | |
| 12 Vdc | SPDT | 188 | D1RR1R1 |
| 24 Vdc | SPDT | 750 | D1RR1T1 |
| 48 Vdc | SPDT | 2600 | D1RR1W1 |
| 110 Vdc | SPDT | 13,800 | D1RR1A1 |
| 120 Vac 50/60 Hz | SPDT | 4430 | D1RR1A |
| 240 Vac | SPDT | 15,270 | D1RR1B |

Accessories

D1RR/D1RF Sockets and Accessories

| Type | Module Size | Nominal Voltage (Max. for Sockets) | Nominal Current | Mounting Style | Wire Size | Wire Connection | Standard Pack | Catalog Number |
|---------------------------|-------------|------------------------------------|-----------------|----------------|--|-----------------|---------------|-------------------|
| Socket | B | 300 | 20 | Panel/DIN rail | 12 /14 (2) AWG, 4 /2.5 (2) mm ² | Screw clamping | 10 | D1RAA ① |
| Flange mount adapter | — | — | — | Flange | — | — | 25 | PFC-D11 |
| Metal spring clip | — | — | — | — | — | — | 25 | PMC-1781 |
| Protection diode | B | 6 to 250 Vdc | — | — | — | — | 20 | MOD-BD250 |
| LED indicator | B | 24 Vac/Vdc | — | — | — | — | 20 | MOD-BLG24 |
| | B | 120/240 Vac/Vdc | — | — | — | — | 20 | MOD-BLG240 |
| MOV suppressor | B | 120 Vac/Vdc | — | — | — | — | 20 | MOD-BMV120 |
| | B | 24 Vac/Vdc | — | — | — | — | 20 | MOD-BMV24 |
| | B | 240 Vac/Vdc | — | — | — | — | 20 | MOD-BMV240 |
| Plastic DIN rail end stop | — | — | — | — | — | — | 25 | PPF-P |

Note

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

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

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

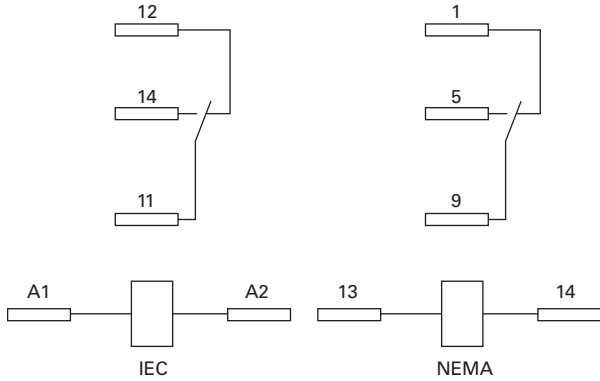
3.4

Control Relays and Timers

General Purpose Plug-In Relays

Wiring Diagram

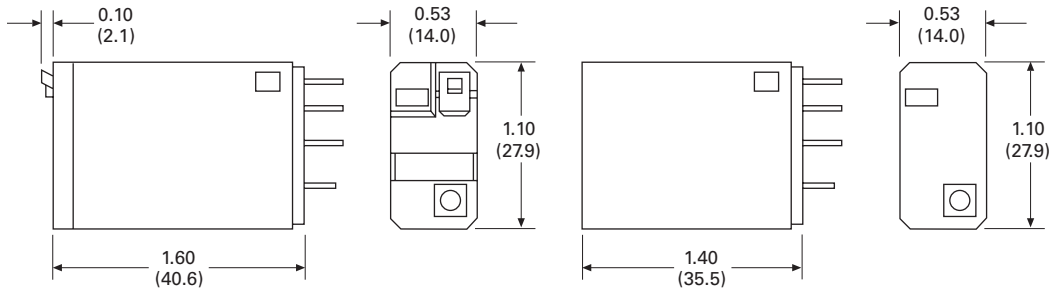
D1RF/D1RR



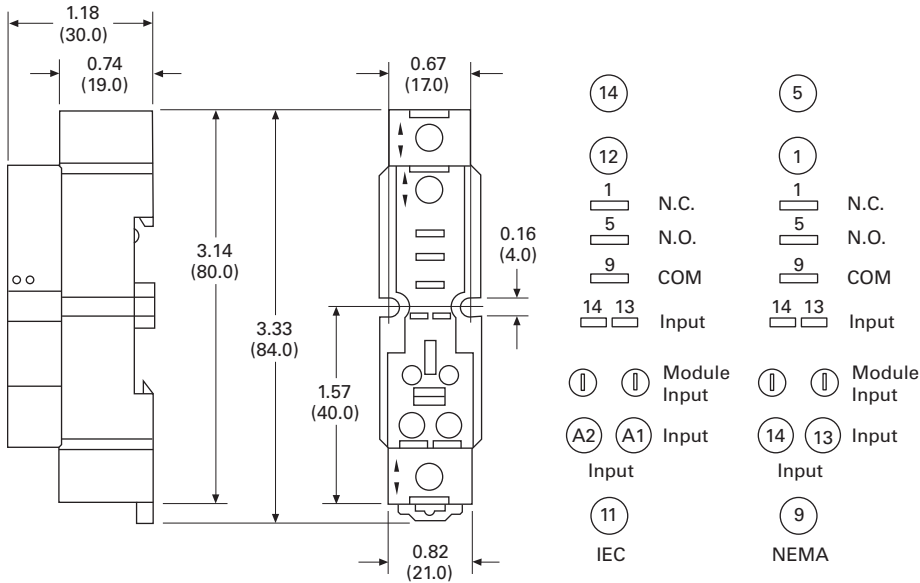
Dimensions

Approximate Dimensions in Inches (mm)

D1RF/D1RR



D1RAA



D2 Series Relay



D2RR/D2RF Series

Product Description

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

Features

D2RR

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

Contents

Description

| | Page |
|---|------------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | |
| Catalog Number Selection | V7-T3-58 |
| Product Selection | V7-T3-58 |
| Accessories | V7-T3-60 |
| Technical Data and Specifications | V7-T3-61 |
| Wiring Diagrams | V7-T3-62 |
| Dimensions | V7-T3-63 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications



When used with accompanying Eaton screw terminal socket.

D2RF

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

3.4

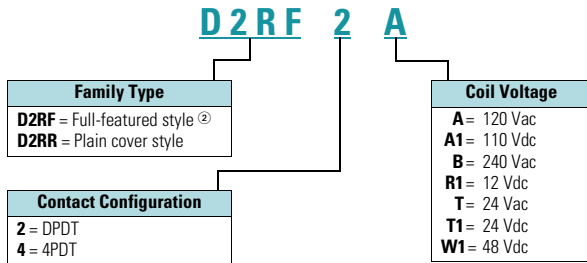
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D2RF/D2RR ①

3



Product Selection

D2RF/D2RR Relay/Socket Quick Reference

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Full-featured, LED test button, flag indicator, lock-down door, finger-grip cover, ID tag.

D2RF Series Relay



D2RF/D2RR Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------------|-----------------------|------------------------|----------------|
| Full Featured Style | | | |
| 12 Vdc | DPDT | 160 | D2RF2R1 |
| 24 Vac | DPDT | 180 | D2RF2T |
| 24 Vdc | DPDT | 650 | D2RF2T1 |
| 48 Vdc | DPDT | 2600 | D2RF2W1 |
| 110/125 Vdc | DPDT | 11,000 | D2RF2A1 |
| 120 Vac | DPDT | 4430 | D2RF2A |
| 220/240 Vac | DPDT | 15,720 | D2RF2B |
| 12 Vdc | 4PDT | 160 | D2RF4R1 |
| 24 Vac | 4PDT | 180 | D2RF4T |
| 24 Vdc | 4PDT | 650 | D2RF4T1 |
| 48 Vdc | 4PDT | 2600 | D2RF4W1 |
| 110/125 Vdc | 4PDT | 11,000 | D2RF4A1 |
| 120 Vac | 4PDT | 4430 | D2RF4A |
| 220/240 Vac | 4PDT | 15,720 | D2RF4B |
| Plain Cover Style | | | |
| 12 Vdc | DPDT | 160 | D2RR2R1 |
| 24 Vac | DPDT | 180 | D2RR2T |
| 24 Vdc | DPDT | 650 | D2RR2T1 |
| 120 Vac | DPDT | 4430 | D2RR2A |
| 220/240 Vac | DPDT | 15,720 | D2RR2B |
| 12 Vdc | 4PDT | 160 | D2RR4R1 |
| 24 Vac | 4PDT | 180 | D2RR4T |
| 24 Vdc | 4PDT | 650 | D2RR4T1 |
| 110/125 Vdc | 4PDT | 11,000 | D2RR4A1 |
| 120 Vac | 4PDT | 4430 | D2RR4A |
| 220/240 Vac | 4PDT | 15,720 | D2RR4B |

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D2RF/D2RR Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D2RF/D2RR Relay Specifications

| Description | D2RR2/D2RR4 | D2RF |
|--|--------------------------------------|---|
| Contact Characteristics | | |
| Contact rating | 12 A / 6 A | 6 A |
| Terminal style | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | 10 A at 120 Vac 50/60 Hz | 10 A at 277 Vac 50/60 Hz |
| | 8 A at 277 Vac 50/60 Hz | 8 A at 120 Vac 50/60 Hz |
| | 8 A at 28 Vdc | 8 A at 28 Vdc |
| Switching current at voltage | 1/3 hp at 120 Vac 1 hp at 277 Vac | 1/3 hp at 120 Vac 1 hp at 277 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 1.2 VA | 1.2 VA |
| | 0.9 W | 0.9 W |
| Dropout voltage threshold | 15% (AC) | 15% (AC) |
| | 10% (DC) | 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 200,000 | 200,000 |
| Mechanical life operations unpowered | 10,000,000 | 10,000,000 |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 rms | 1500 rms |
| Between poles Vac (rms) | 1500 rms | 1500 rms |
| Environment | | |
| Ambient air temperature around the device | | |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Plain cover | Full featured |
| Features | Mechanical flag indicator | Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

3.4

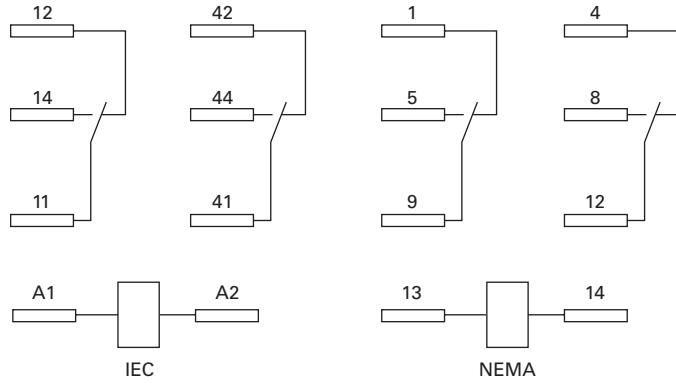
Control Relays and Timers

General Purpose Plug-In Relays

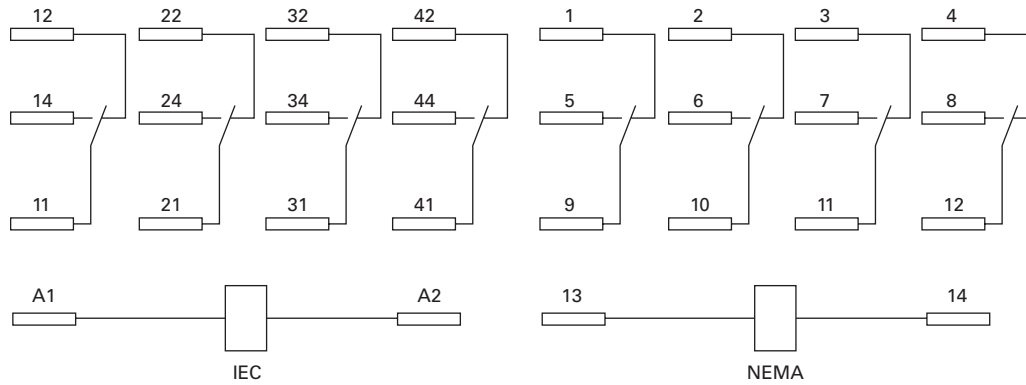
Wiring Diagrams

D2RF2/D2RR2

3



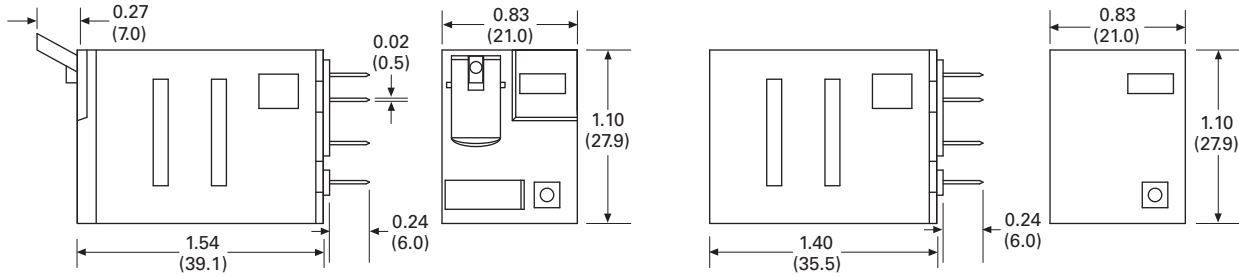
D2RF4/D2RR4



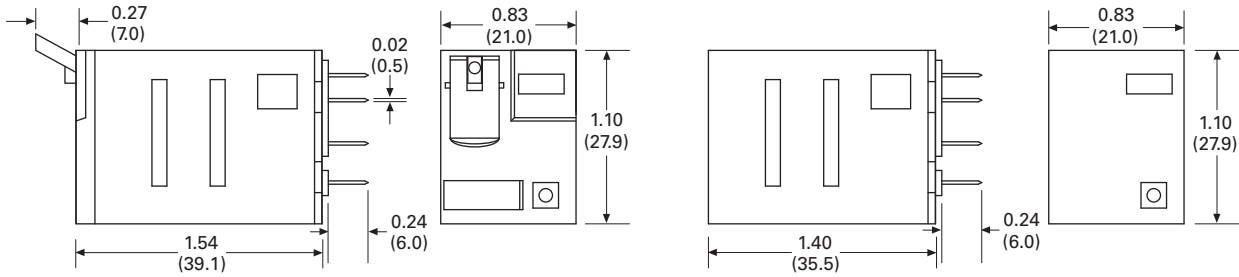
Dimensions

Approximate Dimensions in Inches (mm)

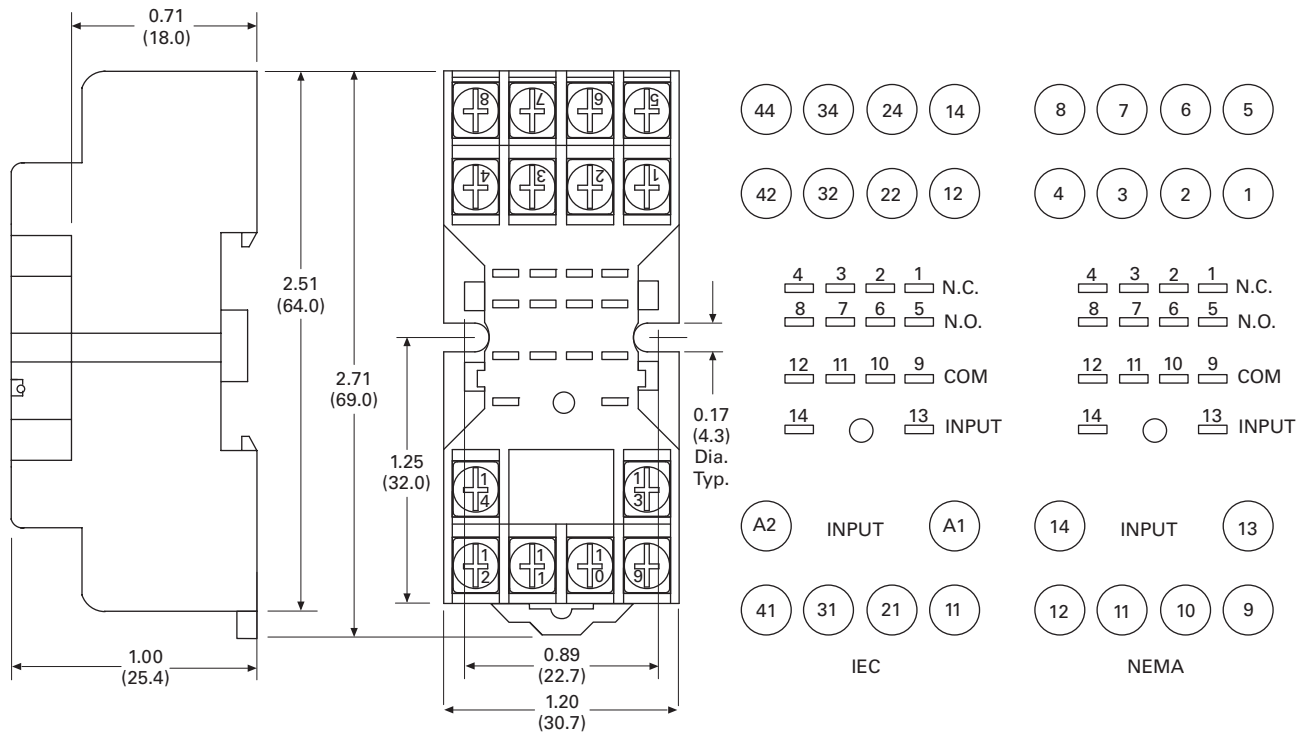
D2RF2/D2RR2



D2RF4/D2RR4



D2PA6



3.4

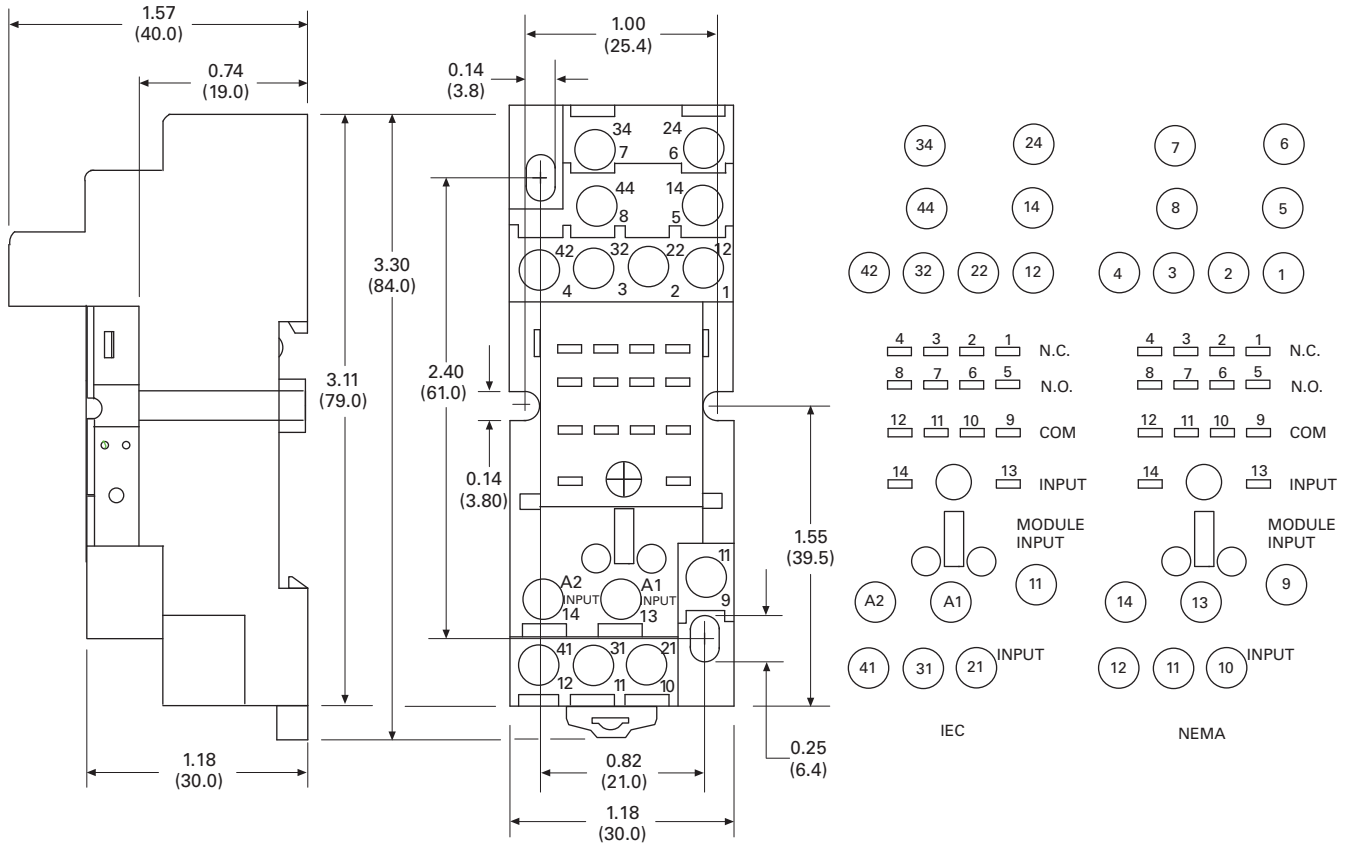
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

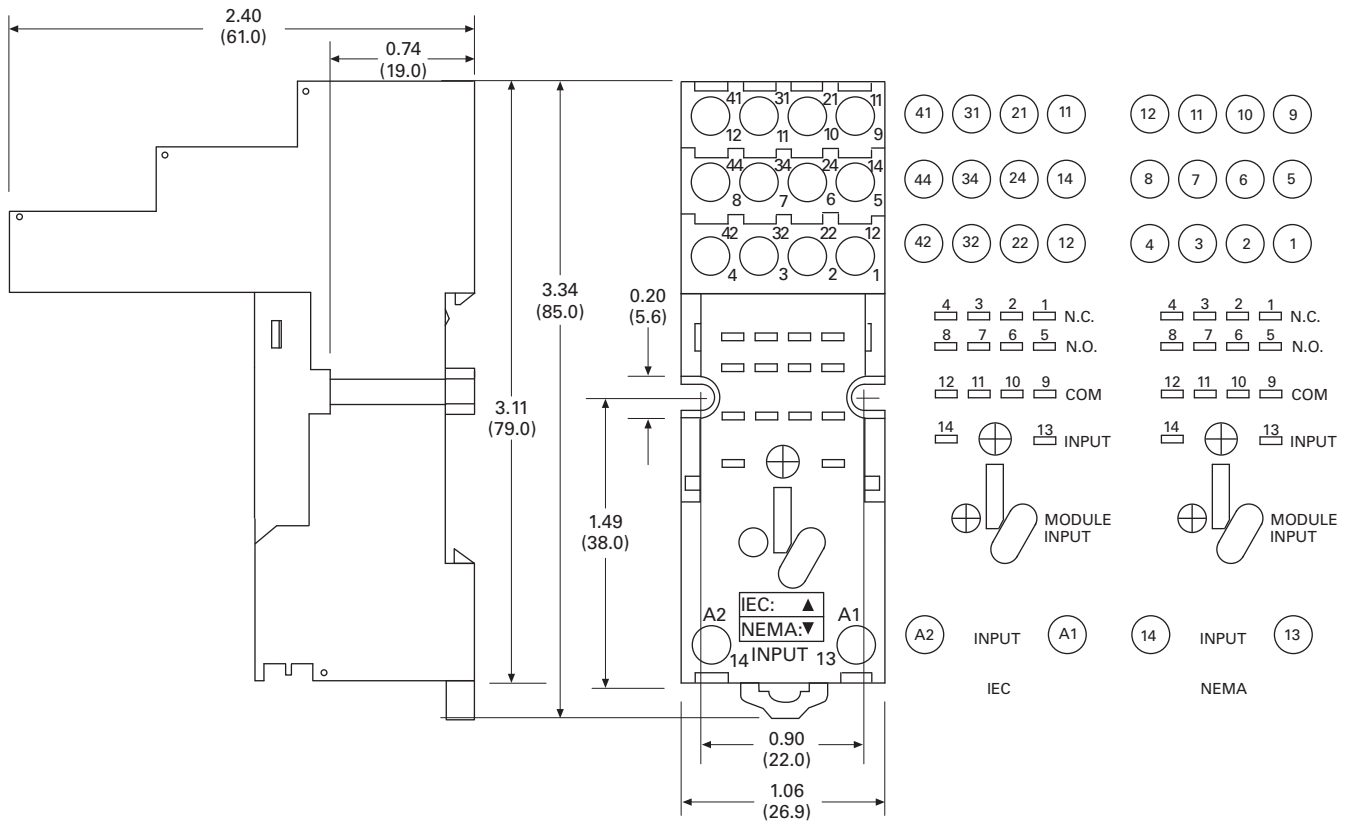
D2PA7

3



Approximate Dimensions in Inches (mm)

D2PAP



3.4

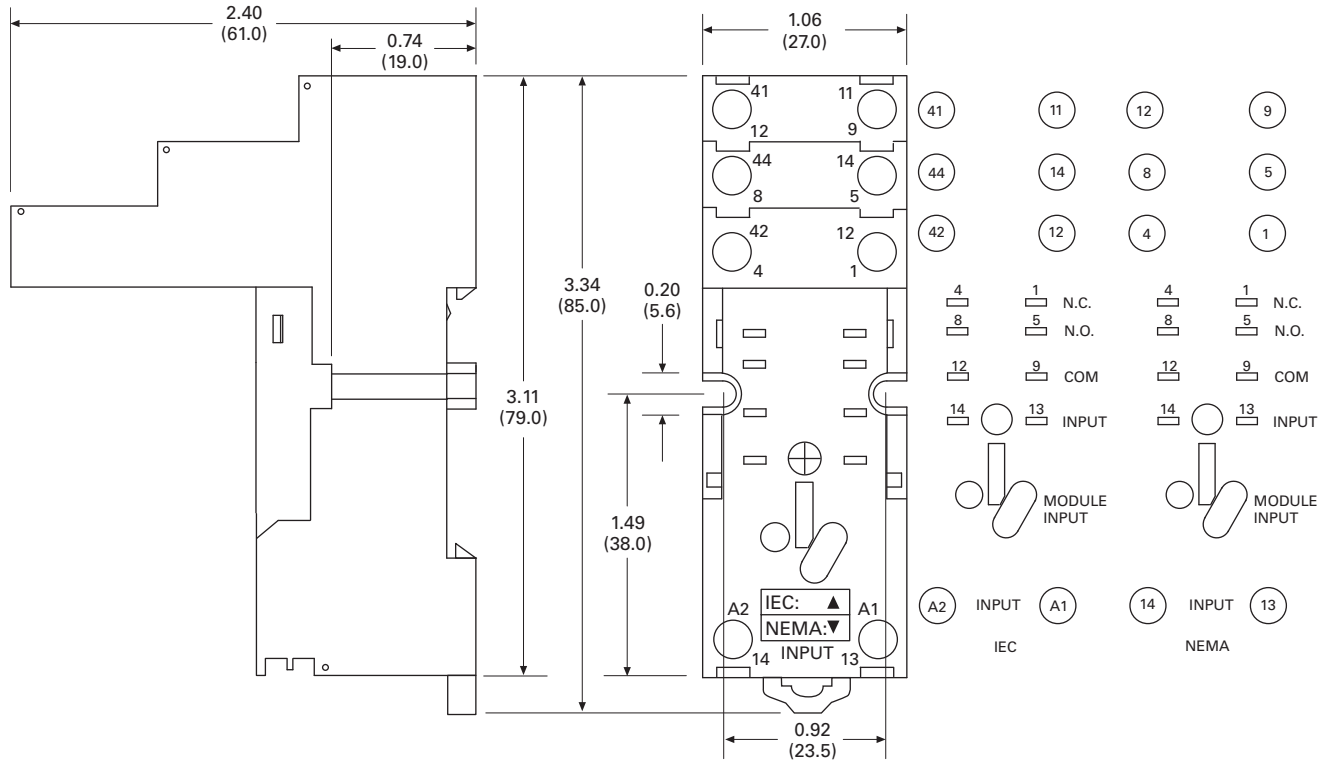
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D2PAL

3



D3 Series Relay



D3RR/D3RF Series

Product Description

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

Features

D3RR

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

Contents

Description

| | Page |
|---|------------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | |
| Catalog Number Selection | V7-T3-68 |
| Product Selection | V7-T3-68 |
| Accessories | V7-T3-70 |
| Technical Data and Specifications | V7-T3-71 |
| Dimensions | V7-T3-72 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications



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

D3RF

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

3.4

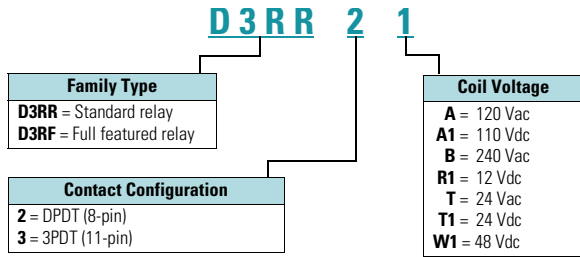
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D3RR/D3RF Series ①

3



Product Selection

D3 Relay/Socket Quick Reference

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

Notes

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

D3 Series Relay



D3RR/D3RF Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------------|-----------------------|------------------------|----------------|
| Full Featured Style | | | |
| 120 Vac | DPDT | 1700 | D3RF2A |
| 240 Vac | DPDT | 7200 | D3RF2B |
| 12 Vdc | DPDT | 120 | D3RF2R1 |
| 24 Vdc | DPDT | 470 | D3RF2T1 |
| 120 Vac | 3PDT | 1700 | D3RF3A |
| 220/240 Vac | 3PDT | 7200 | D3RF3B |
| 24 Vac | 3PDT | 72 | D3RF3T |
| 24 Vdc | 3PDT | 470 | D3RF3T1 |
| Plain Cover Style | | | |
| 120 Vac | DPDT | 1700 | D3RR2A |
| 110/125 Vdc | DPDT | 10,000 | D3RR2A1 |
| 220/240 Vac | DPDT | 7200 | D3RR2B |
| 12 Vdc | DPDT | 120 | D3RR2R1 |
| 24 Vac | DPDT | 72 | D3RR2T |
| 24 Vdc | DPDT | 470 | D3RR2T1 |
| 48 Vdc | DPDT | 1800 | D3RR2W1 |
| 120 Vac | 3PDT | 1700 | D3RR3A |
| 110/125 Vdc | 3PDT | 10,000 | D3RR3A1 |
| 220/240 Vac | 3PDT | 7200 | D3RR3B |
| 12 Vdc | 3PDT | 120 | D3RR3R1 |
| 24 Vac | 3PDT | 72 | D3RR3T |
| 24 Vdc | 3PDT | 470 | D3RR3T1 |

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D3RR/D3RF Series Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D3RR/D3RF Series Relay Specifications

| Description | D3RR | D3RF |
|--|--------------------------------------|---|
| Contact Characteristics | | |
| Contact rating | 10 A | 10 A |
| Terminal style | Octal | Octal |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | 16 A at 277 Vac 50/60 Hz | 16 A at 277 Vac 50/60 Hz |
| | 16 A at 120 Vac 50/60 Hz | 16 A at 120 Vac 50/60 Hz |
| | 16 A at 28 Vdc | 16 A at 28 Vdc |
| Switching current at voltage | 1/2 hp at 240 Vac | 1/2 hp at 240 Vac |
| | 1/3 hp at 120 Vac | 1/3 hp at 120 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 3 VA | 3 VA |
| | 1.4 W | 1.4 W |
| Dropout voltage threshold | 15% (AC) | 15% (AC) |
| | 10% (DC) | 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 100,000 operations | 100,000 operations |
| Mechanical life operations unpowered | 5,000,000 operations | 5,000,000 operations |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Between poles Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Environment | | |
| Ambient air temperature around the device | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Plain cover | Full Featured |
| Features | Mechanical flag indicator | Bipolar LED/ Locking pushbutton/ Removable ID tag/ Mechanical flag indicator |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

3.4

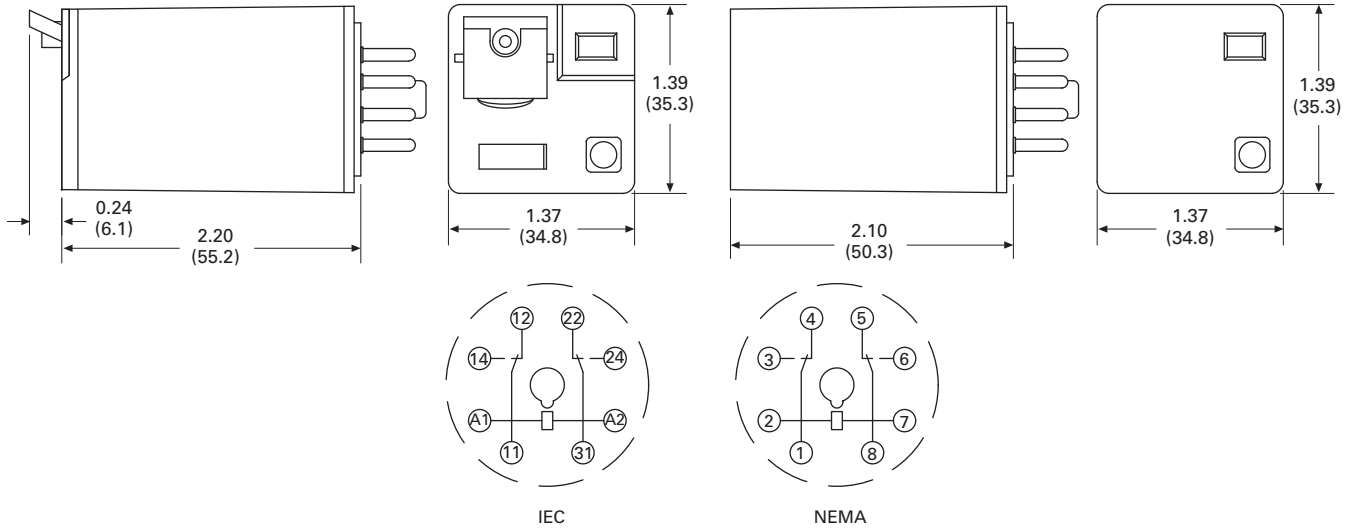
Control Relays and Timers

General Purpose Plug-In Relays

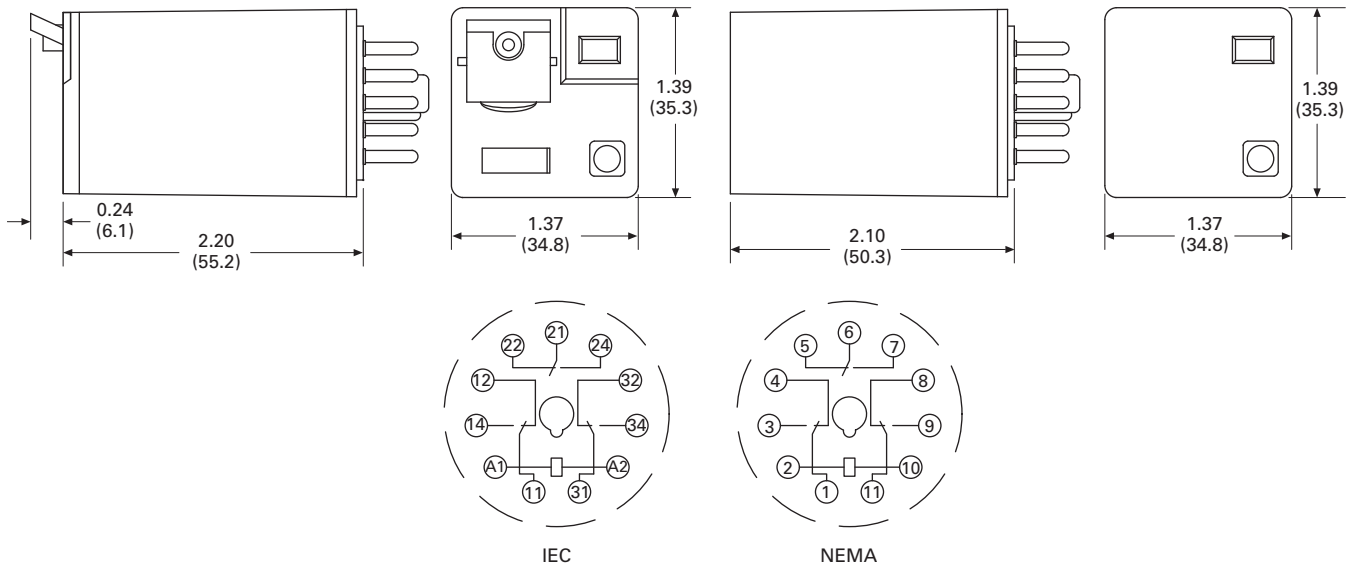
Dimensions

Approximate Dimensions in Inches (mm)

D3RR2/D3RF2

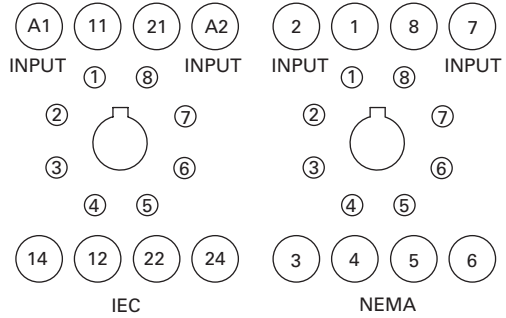
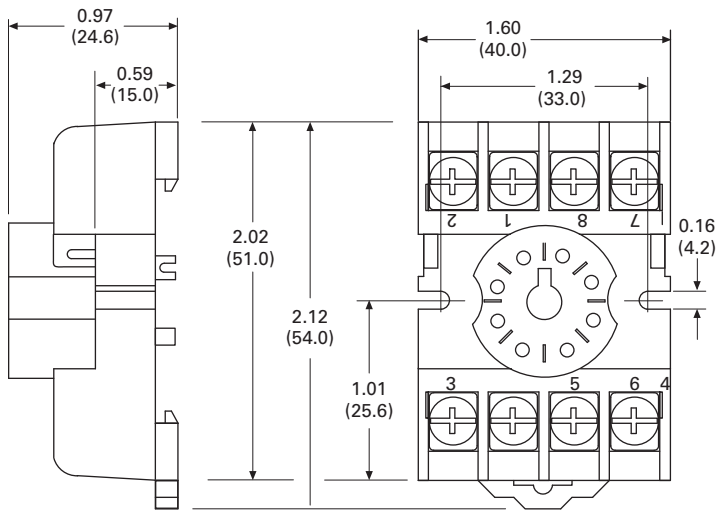


D3RR3/D3RF3

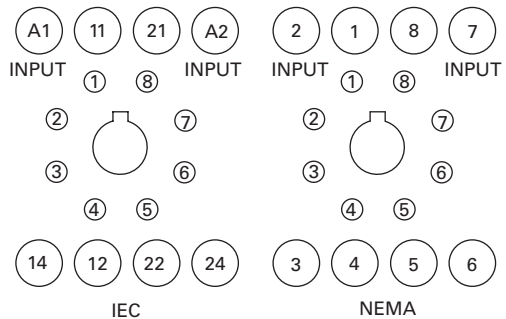
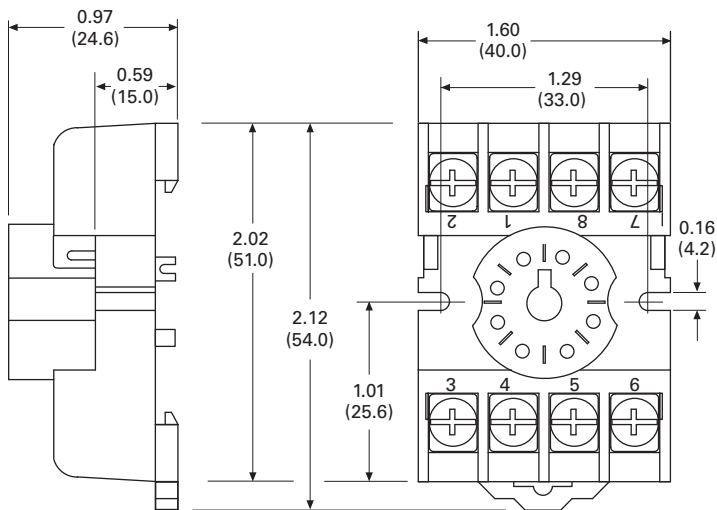
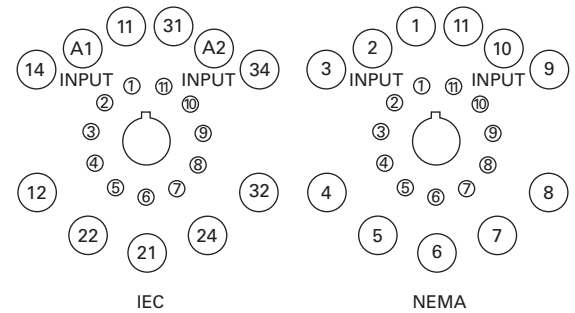
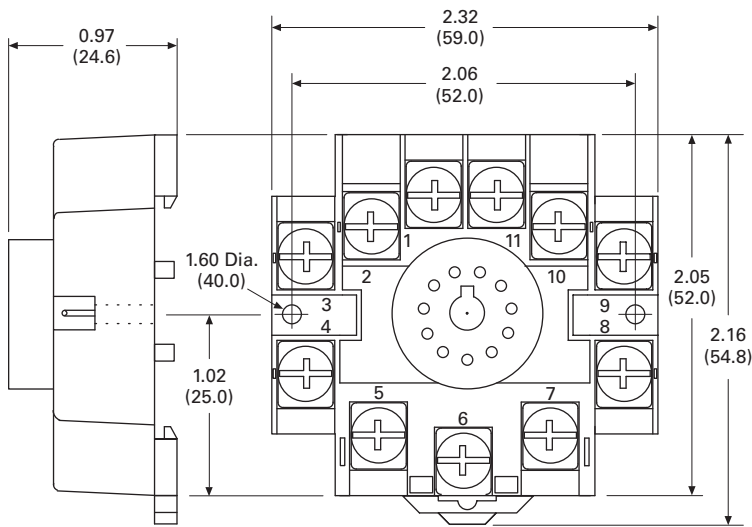


Approximate Dimensions in Inches (mm)

D3PA2



D3PA3



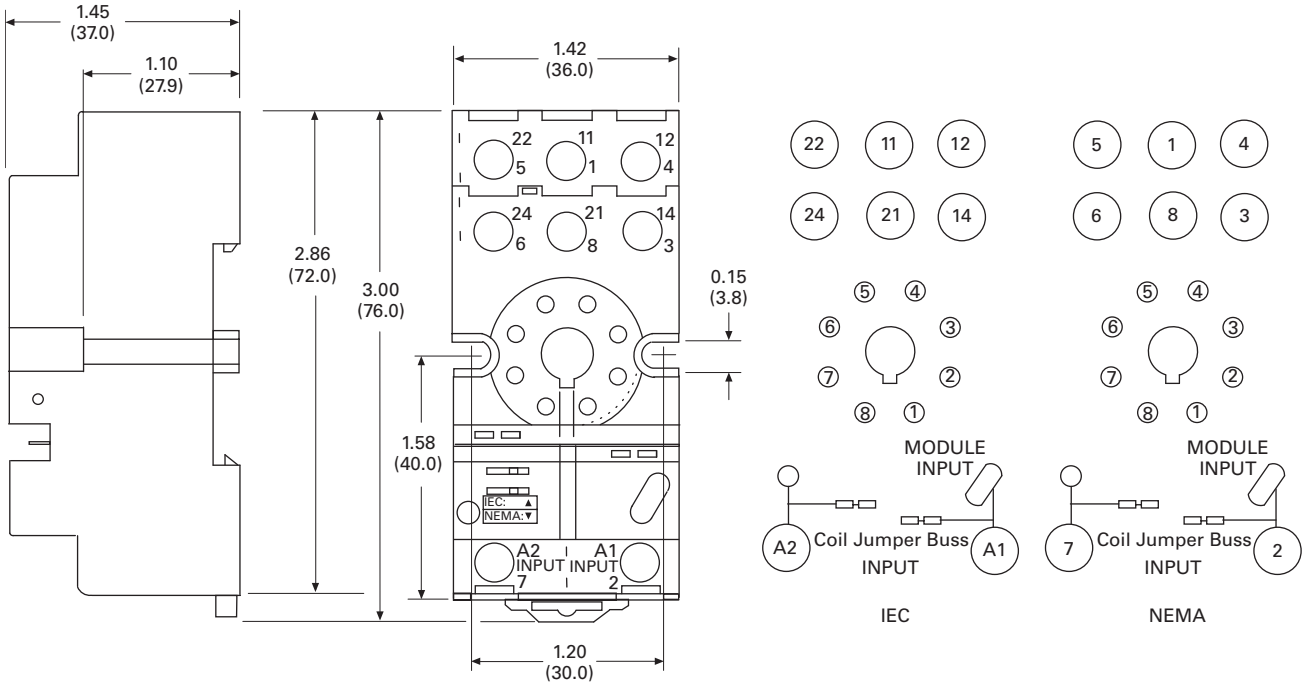
3.4

Control Relays and Timers

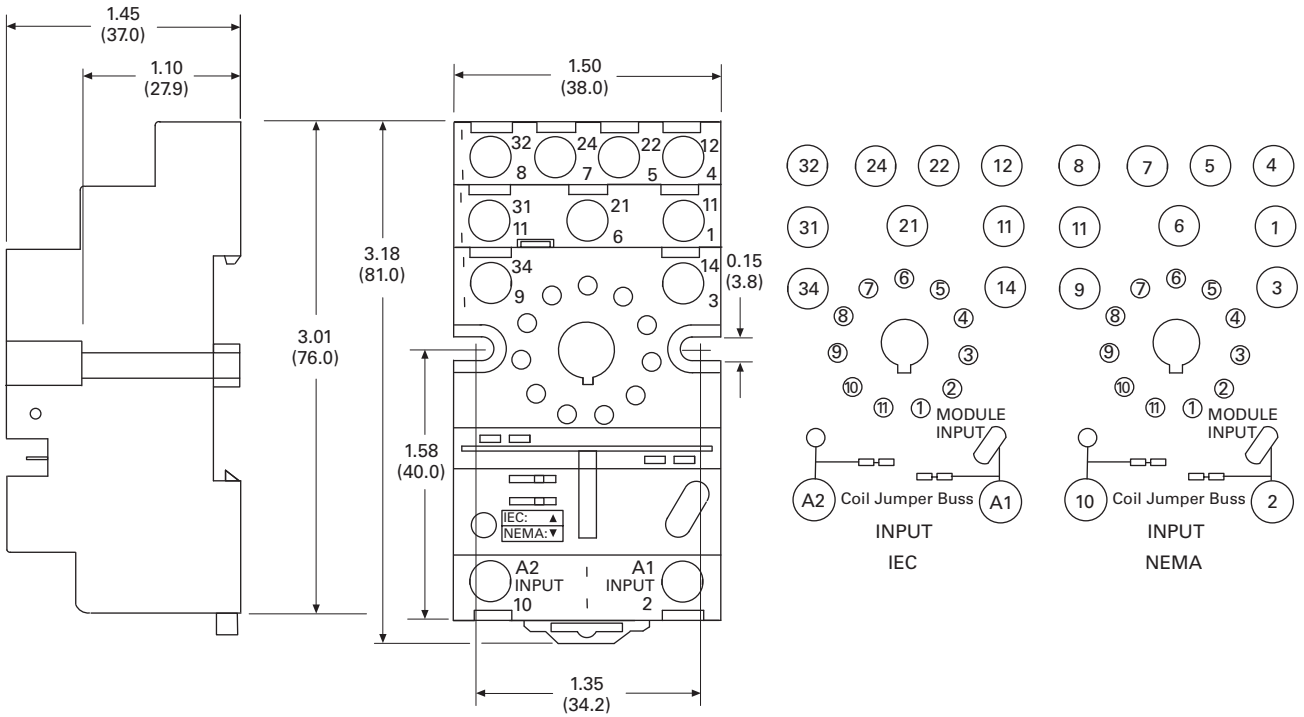
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D3PA6

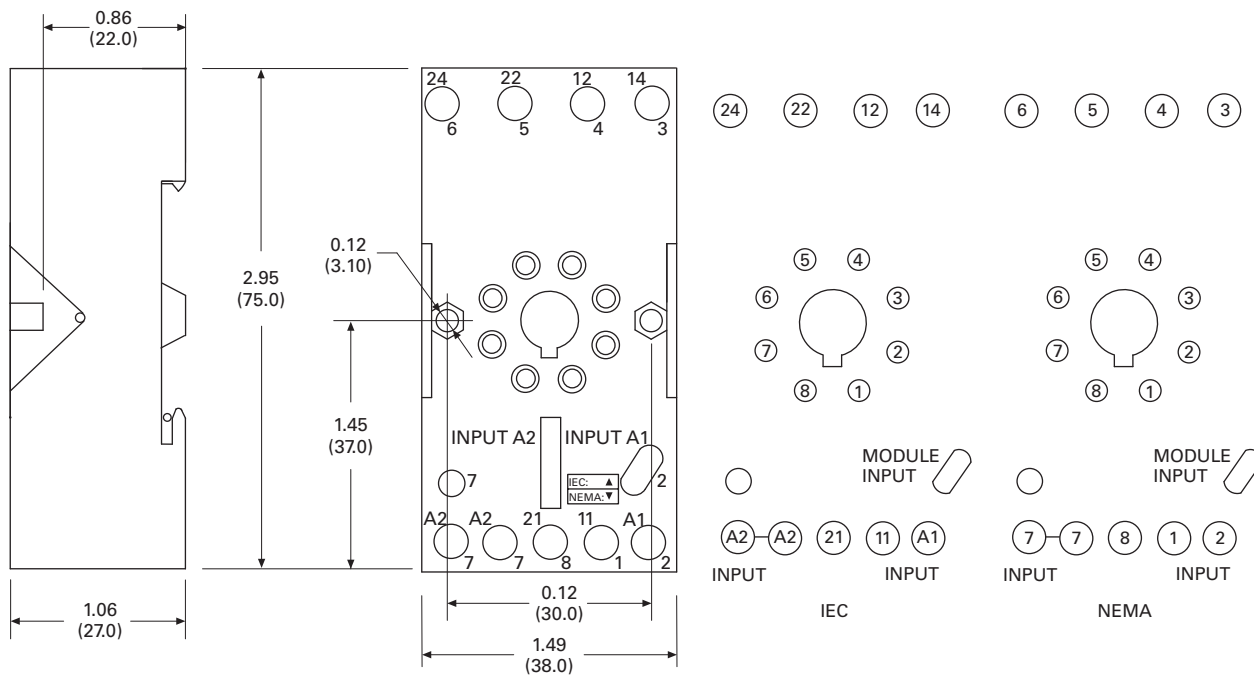


D3PA7

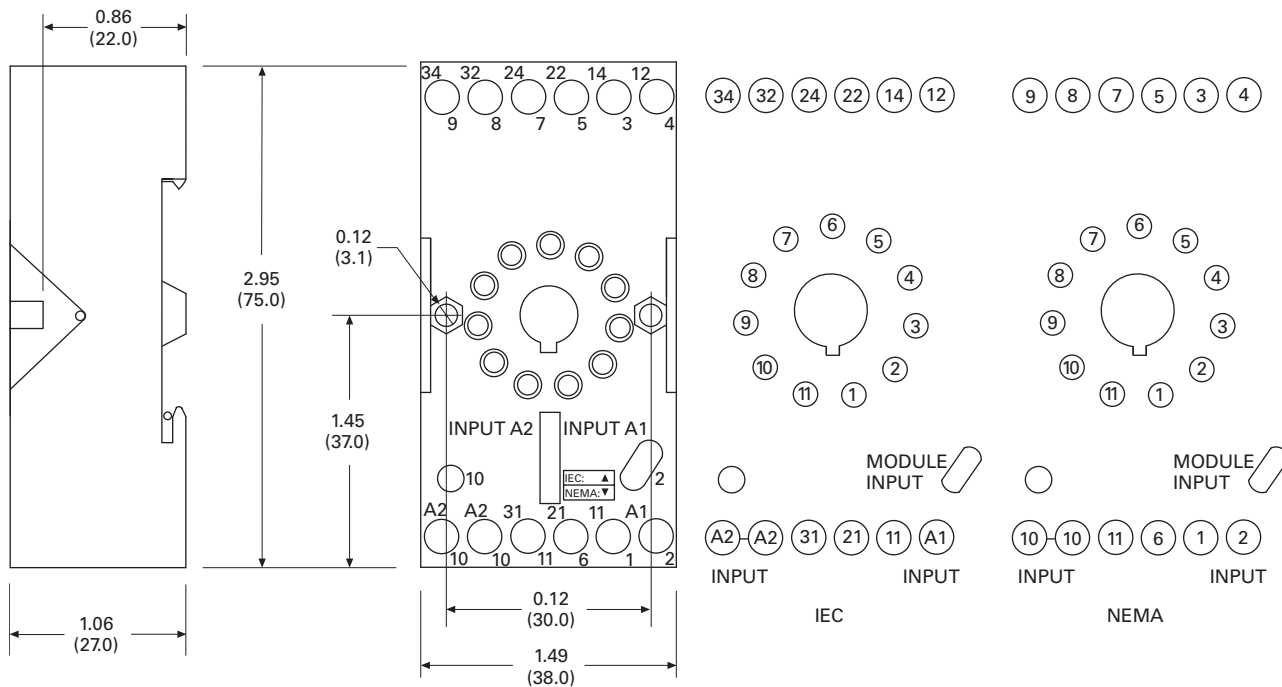


Approximate Dimensions in Inches (mm)

D3PAL8



D3PAL11



D4 Series Relay



D4 Series

Product Description

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

Features

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

Standards and Certifications

File # E1491, E65657

File # LR701519

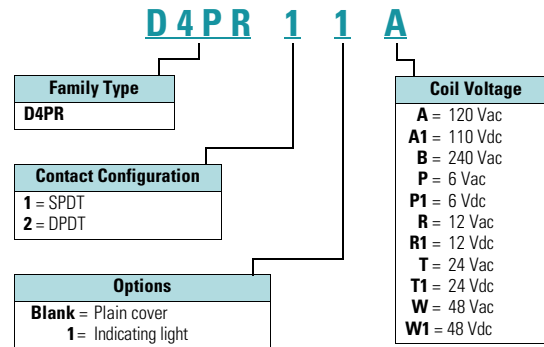


Contents

| Description | Page |
|-----------------------------------|-----------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | |
| Technical Data and Specifications | V7-T3-78 |
| Dimensions | V7-T3-79 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Catalog Number Selection

D4 Series ^①



Product Selection

D4 Relay/Socket Quick Reference

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Socket has built-in hold-down spring.

D4 Series Relay



D4 Series

| Voltage/Poles | Standard Pack | Catalog Number |
|-----------------------------------|---------------|-------------------|
| DIN Rail Sockets | | |
| Single-pole | 10 | D4PA1 |
| Two-pole | 10 | D4PA2 |
| SPDT with Indicating Light | | |
| 120 Vac | 1 | D4PR11A |
| 110 Vdc | 1 | D4PR11A1 |
| 240 Vac | 1 | D4PR11B |
| 6 Vac | 50 | D4PR11P |
| 6 Vdc | 50 | D4PR11P1 |
| 12 Vac | 50 | D4PR11R |
| 12 Vdc | 1 | D4PR11R1 |
| 24 Vac | 1 | D4PR11T |
| 24 Vdc | 1 | D4PR11T1 |
| 48 Vdc | 50 | D4PR11W1 |
| Standard SPDT | | |
| 120 Vac | 1 | D4PR1A |
| 110 Vdc | 50 | D4PR1A1 |
| 240 Vac | 50 | D4PR1P |
| 6 Vac | 1 | D4PR1P1 |
| 6 Vdc | 50 | D4PR1R |
| 12 Vac | 1 | D4PR1R1 |
| 12 Vdc | 1 | D4PR1R1-A2 |
| 24 Vac | 1 | D4PR1T |
| 24 Vdc | 1 | D4PR1T1 |
| 48 Vdc | 1 | D4PR1W1 |

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

Technical Data and Specifications

D4 Series

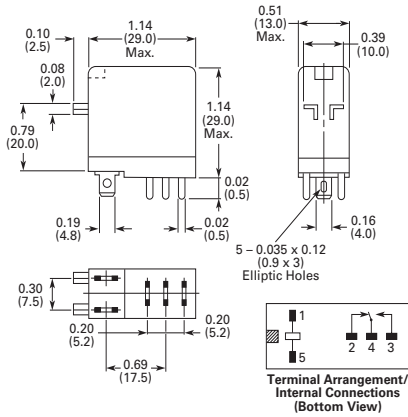
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| Description | Resistive Load (p.f. = 1) | Inductive Load (p.f. = 0.4, L/R = 7 ms) |
|---|------------------------------|--|
| D4PR1 | | |
| Rated load | 250 Vac 10 A | 250 Vac 7.5 A |
| | 30 Vdc 10 A | 30 Vdc 5 A |
| Carry current | 10 A | 10 A |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

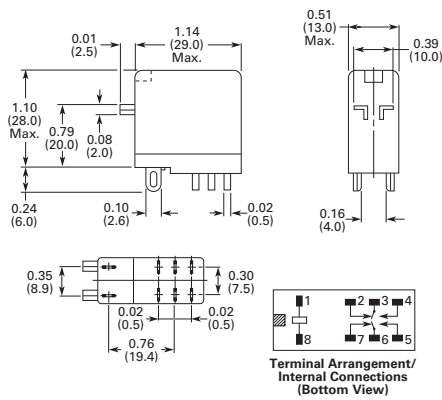
Dimensions

Approximate Dimensions in Inches (mm)

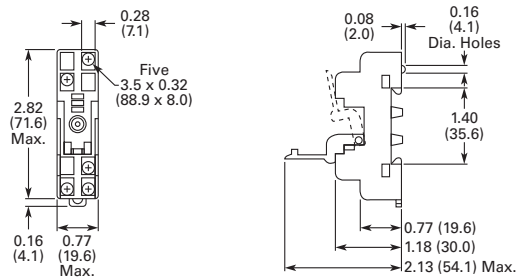
D4PR1



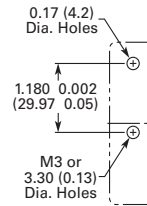
D4PR2



D4PA1

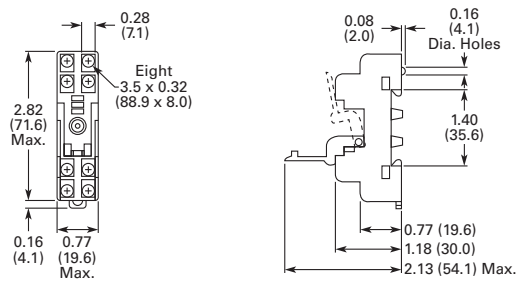


Terminal Arrangement

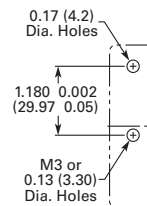


Mounting Holes

D4PA2



Terminal Arrangement



Mounting Holes

D5 Series Relay



D5RR/D5RF Series

Product Description

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

Features

D5RR

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

Contents

Description

| <i>Description</i> | <i>Page</i> |
|--|------------------|
| D1RR/D1RF Series..... | V7-T3-53 |
| D2RR/D2RF Series..... | V7-T3-57 |
| D3RR/D3RF Series..... | V7-T3-67 |
| D4 Series..... | V7-T3-76 |
| D5RR/D5RF Series | |
| Catalog Number Selection..... | V7-T3-81 |
| Product Selection..... | V7-T3-81 |
| Accessories..... | V7-T3-83 |
| Technical Data and Specifications..... | V7-T3-84 |
| Wiring Diagrams..... | V7-T3-85 |
| Dimensions..... | V7-T3-86 |
| D7PR/D7PF Series..... | V7-T3-89 |
| D8 Series..... | V7-T3-103 |
| D9 Series..... | V7-T3-108 |
| Accessories..... | V7-T3-112 |

D5RF

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

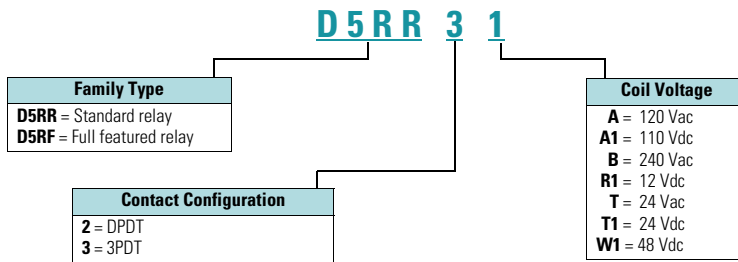
Standards and Certifications



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

Catalog Number Selection

D5 Series



Product Selection

D5 Relay/Socket Quick Reference

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

D5 Series Relay



D5 Series

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

Accessories

D5 Sockets and Accessories

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

Note

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

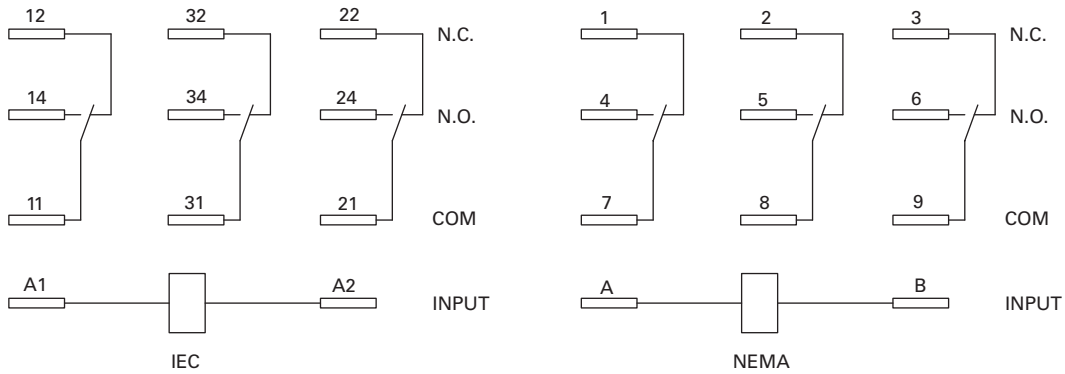
Technical Data and Specifications

D5 Series

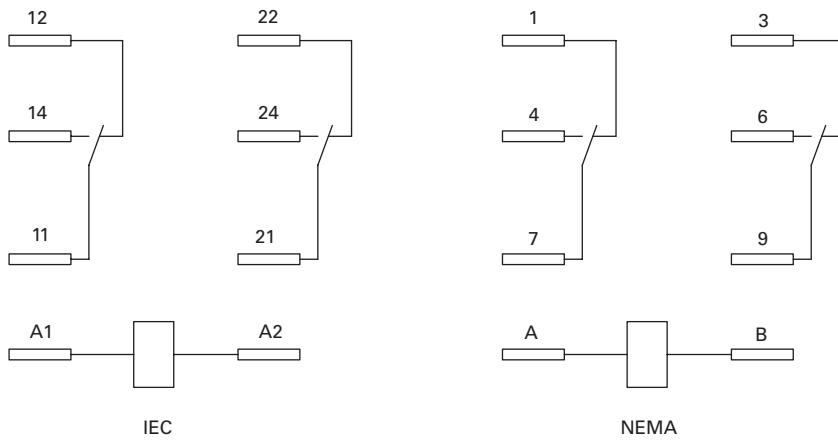
| Description | D5RR | D5RF |
|--|---|---|
| Contact Characteristics | | |
| Contact rating | 10 A | 10 A |
| Terminal style | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | | |
| | 16 A at 277 Vac 50/60 Hz | 16 A at 277 Vac 50/60 Hz |
| | 16 A at 120 Vac 50/60 Hz | 16 A at 120 Vac 50/60 Hz |
| | 16 A at 28 Vdc | 16 A at 28 Vdc |
| Switching current at voltage | 1/2 hp at 240 Vac | 1/2 hp at 240 Vac |
| | 1/3 hp at 120 Vac | 1/3 hp at 120 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 3 VA 1.4 W | 3 VA 1.4 W |
| Drop-out voltage threshold | 10%/15% (AC) 10% (DC) | 10%/15% (AC) 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 100,000 operations | 100,000 operations |
| Mechanical life operations unpowered | 5,000,000 operations | 5,000,000 operations |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Between poles Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Environment | | |
| Ambient air temperature around the device | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Flange/plain cover with LED | Full featured |
| Features | Mechanical flag indicator (LED optional) | Bipolar LED/ Mechanical flag indicator/ Locking pushbutton/ Removable ID tag |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

Wiring Diagrams

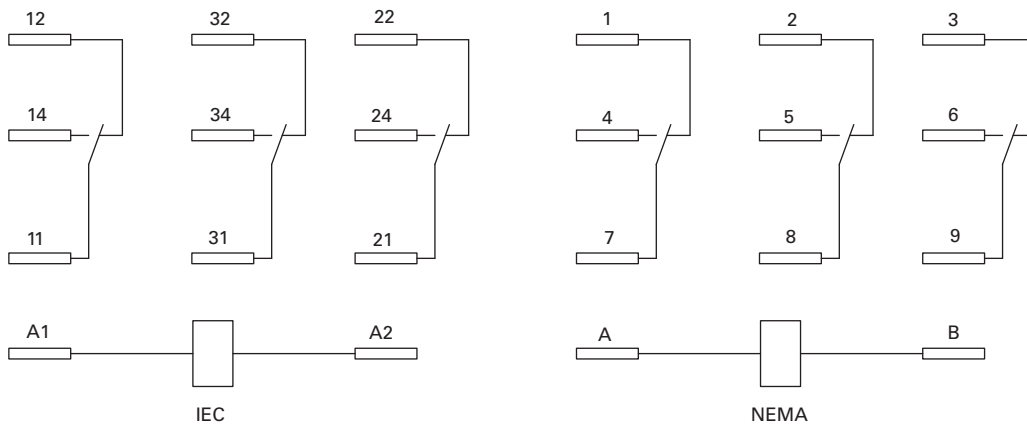
D5PA3L and D5PA3S



D5RR2/D5RF2 DPDT



D5RR3/D5RF3 3PDT



3.4

Control Relays and Timers

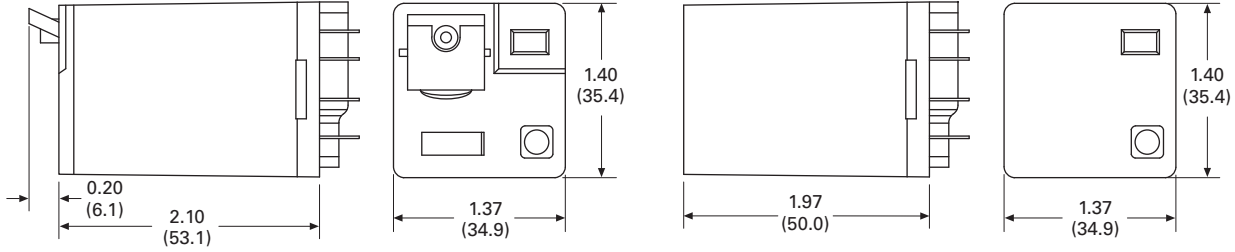
General Purpose Plug-In Relays

Dimensions

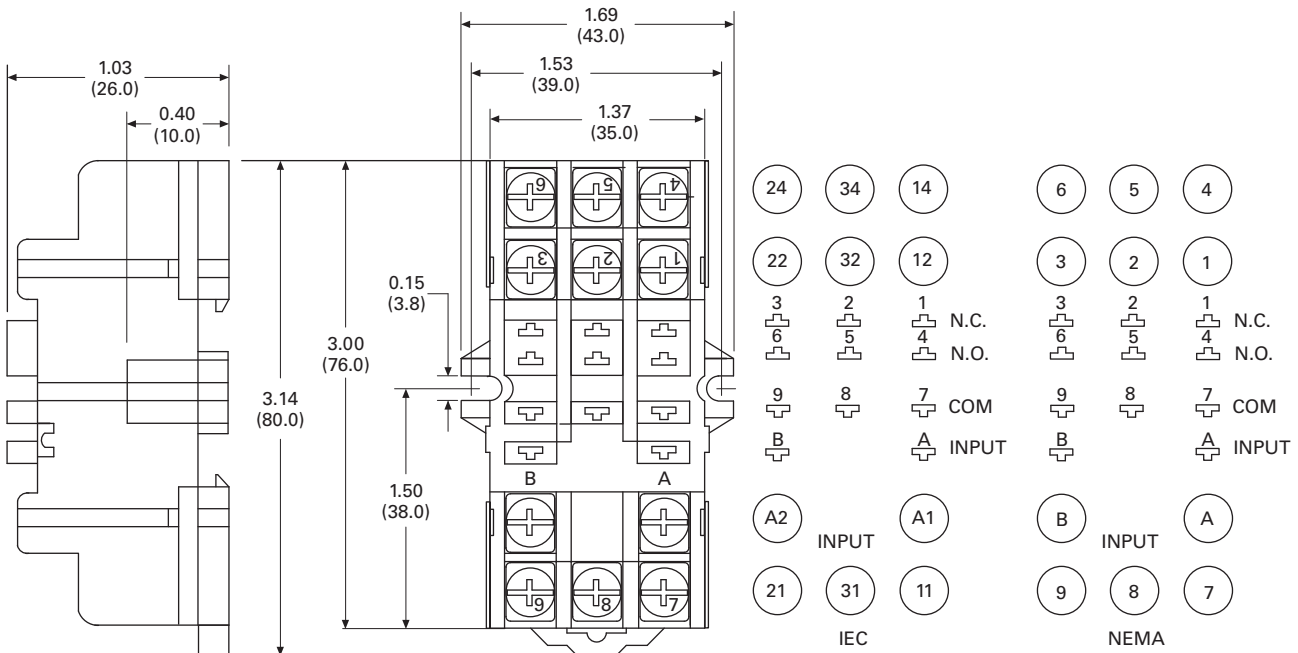
Approximate Dimensions in Inches (mm)

D5RR and D5RF

3

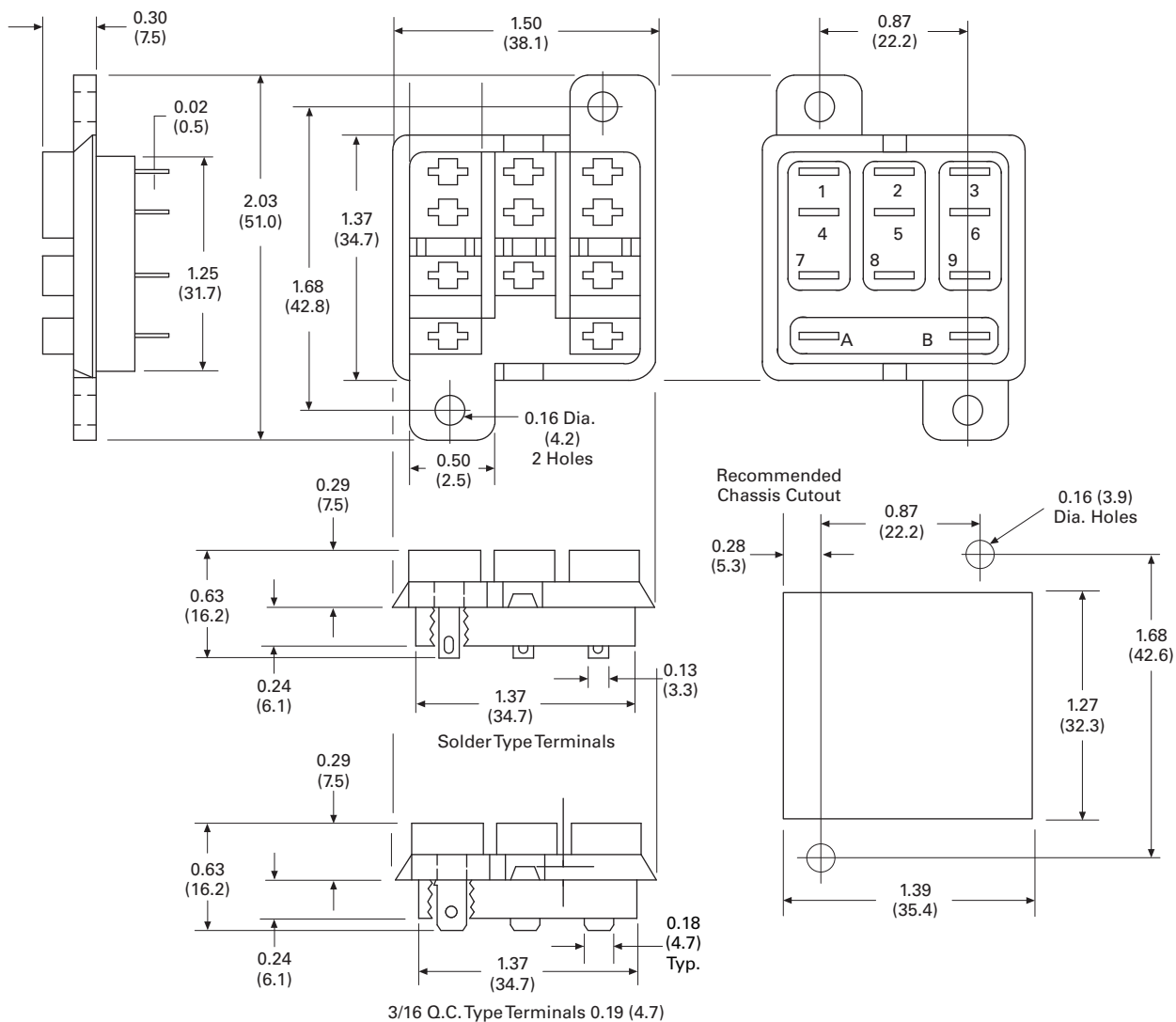


D5PA2



Approximate Dimensions in Inches (mm)

D5PA3L and D5PA3S



3.4

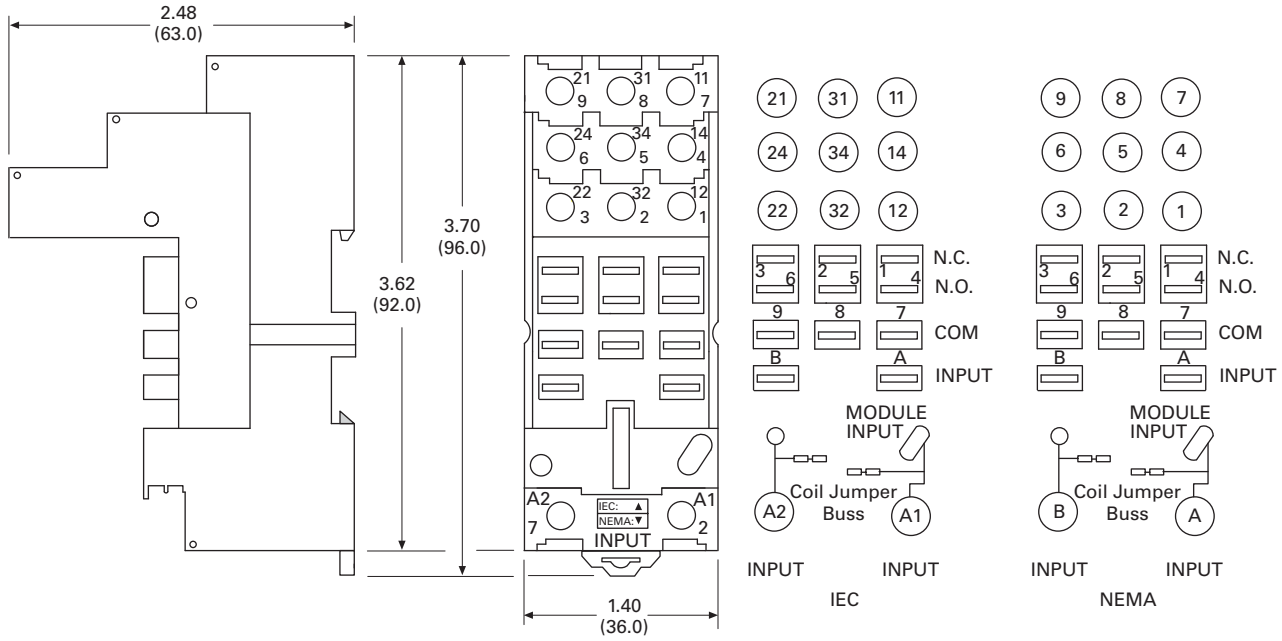
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D5PAL

3



D7 Series Relay



D7PR/D7PF Series

Product Description

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

Features

D7PR


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


Contents

Description

| Description | Page |
|-----------------------------------|-------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | |
| Catalog Number Selection | V7-T3-90 |
| Product Selection | V7-T3-90 |
| Accessories | V7-T3-92 |
| Technical Data and Specifications | V7-T3-93 |
| Wiring Diagrams | V7-T3-95 |
| Dimensions | V7-T3-96 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications

 File # E37317, E65657

 File # LR217017, LR217069



 RoHS COMPLIANT

D7PF

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

3.4

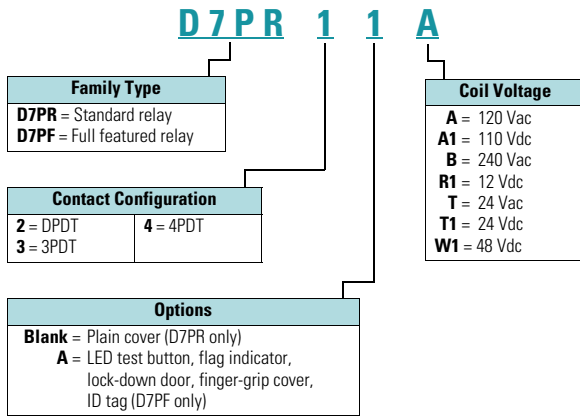
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D7 Series

3



Product Selection

D7 Relay/Socket Quick Reference

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

D7 Series Relay



D7 Series

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D7 Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D7PR Relay

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

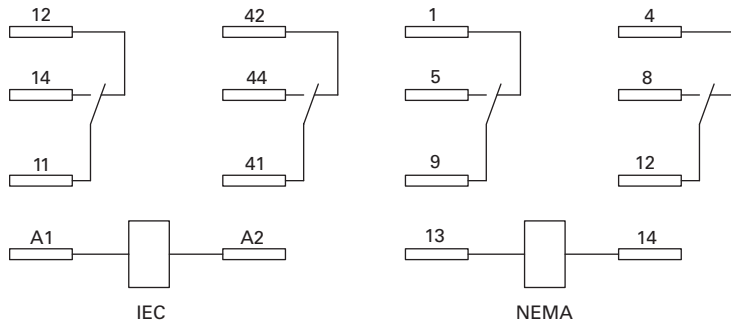
3

D7PF Relay

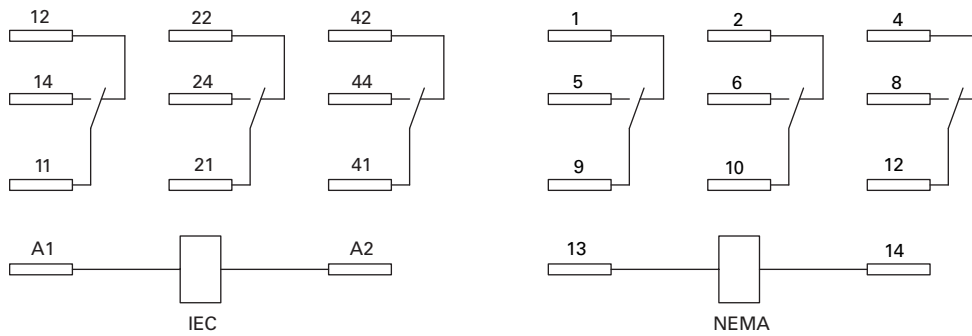
| Description | D7PF (DPDT) | D7PF (3PDT) | D7PF (4PDT) |
|--|---|---|---|
| Contact Characteristics | | | |
| Contact rating | 15 A | 15 A | 15 A |
| Terminal style | Plug-in | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V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

Wiring Diagrams

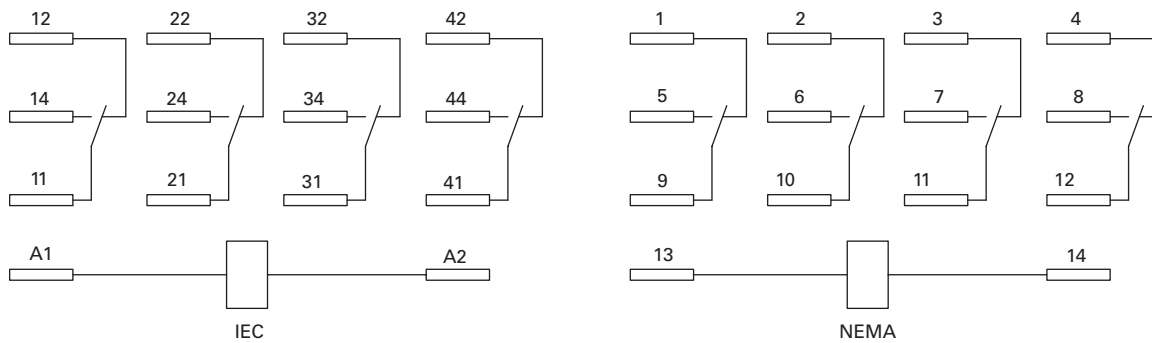
D7PR2/D7PF2



D7PR3/D7PF3



D7PR4/D7PF4



3.4

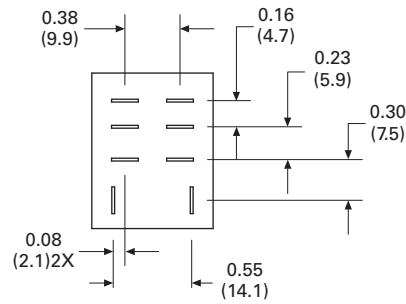
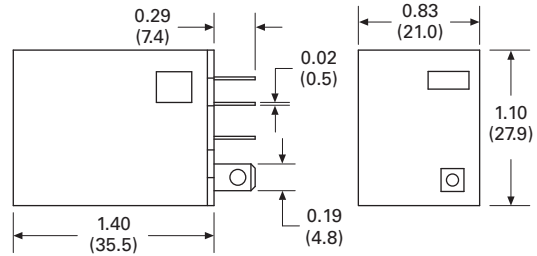
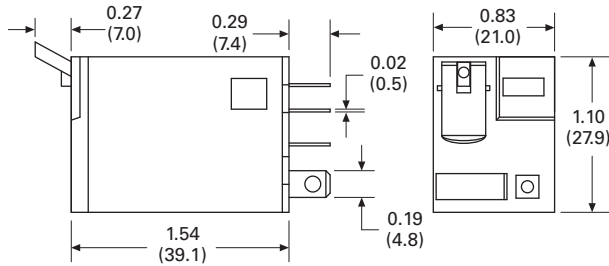
Control Relays and Timers

General Purpose Plug-In Relays

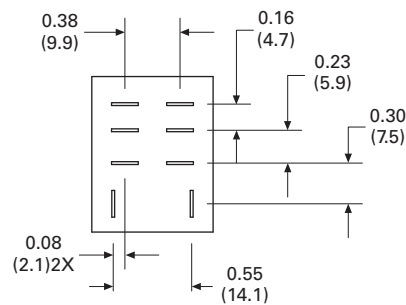
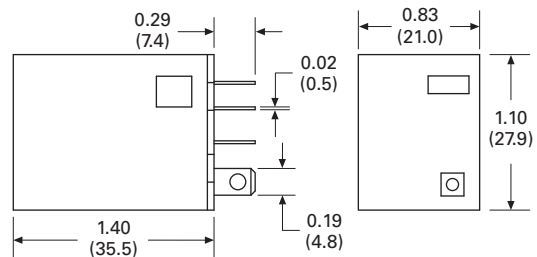
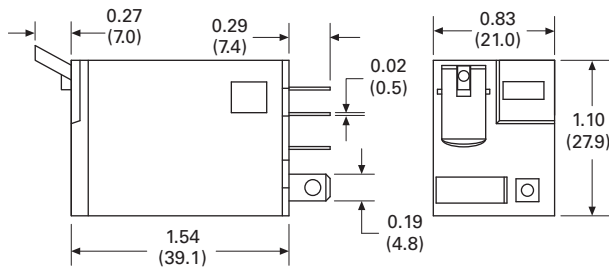
Dimensions

Approximate Dimensions in Inches (mm)

D7PR1/D7PF1

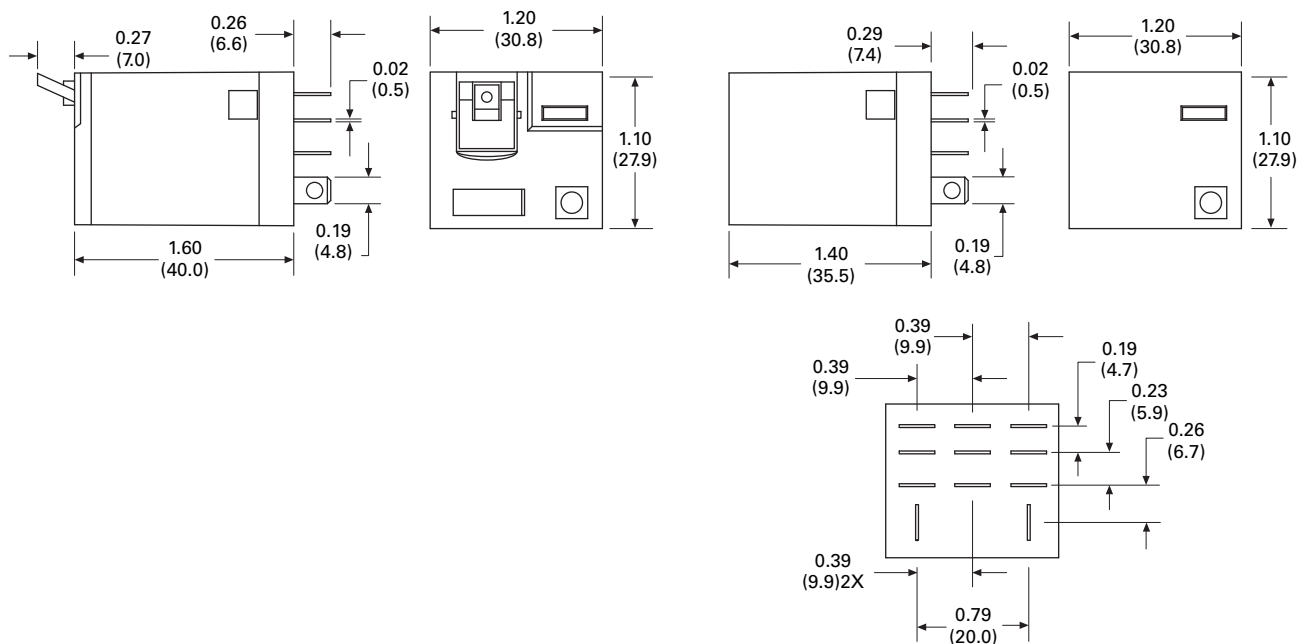


D7PR2/D7PF2

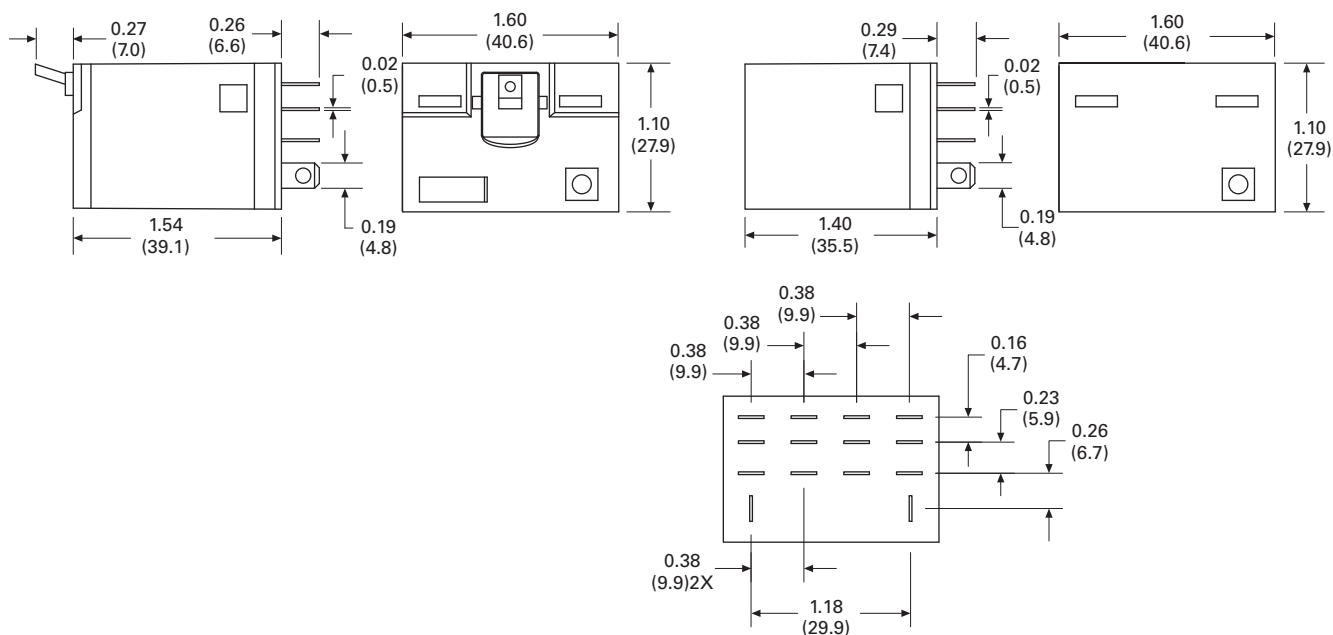


Approximate Dimensions in Inches (mm)

D7PR3/D7PF3



D7PR4/D7PF4



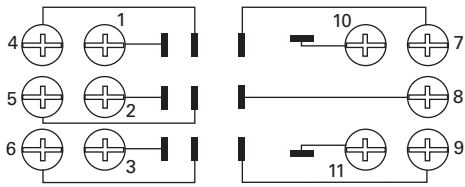
3.4

Control Relays and Timers

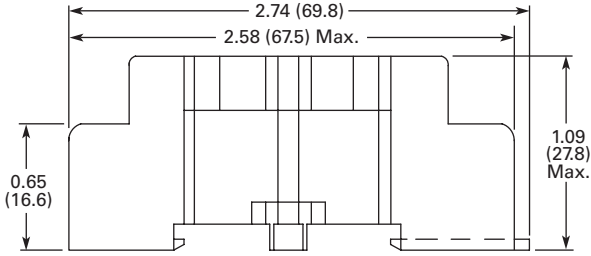
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

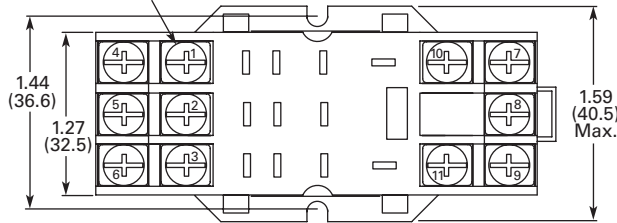
D7PA3



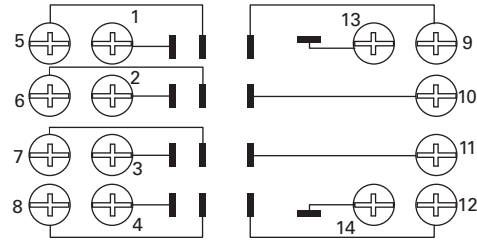
Wiring Diagram (Top View)



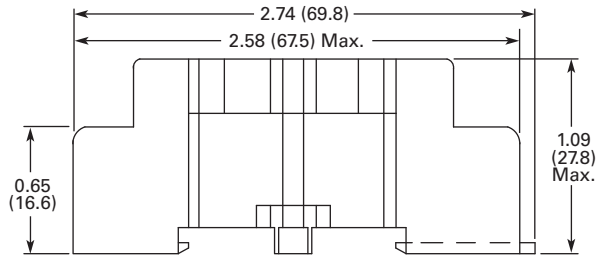
Combination Slotted/Phillips
Head Screws 6-32 x 5/16"



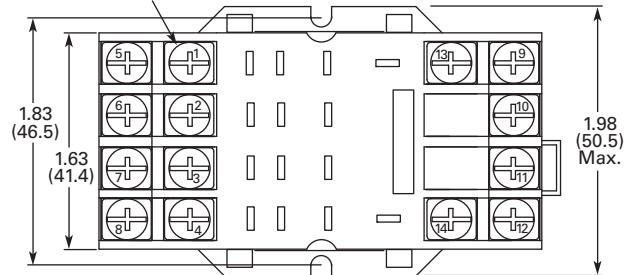
D7PA4



Wiring Diagram (Top View)

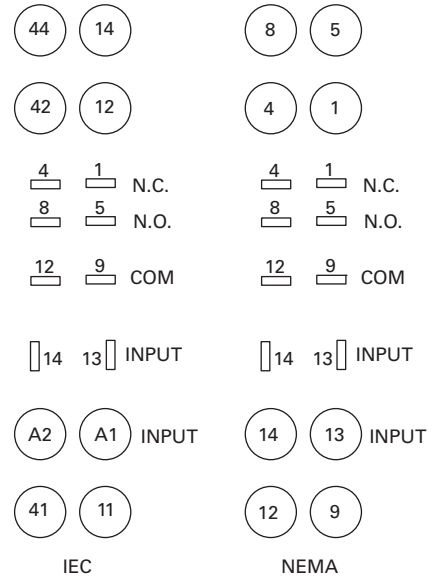
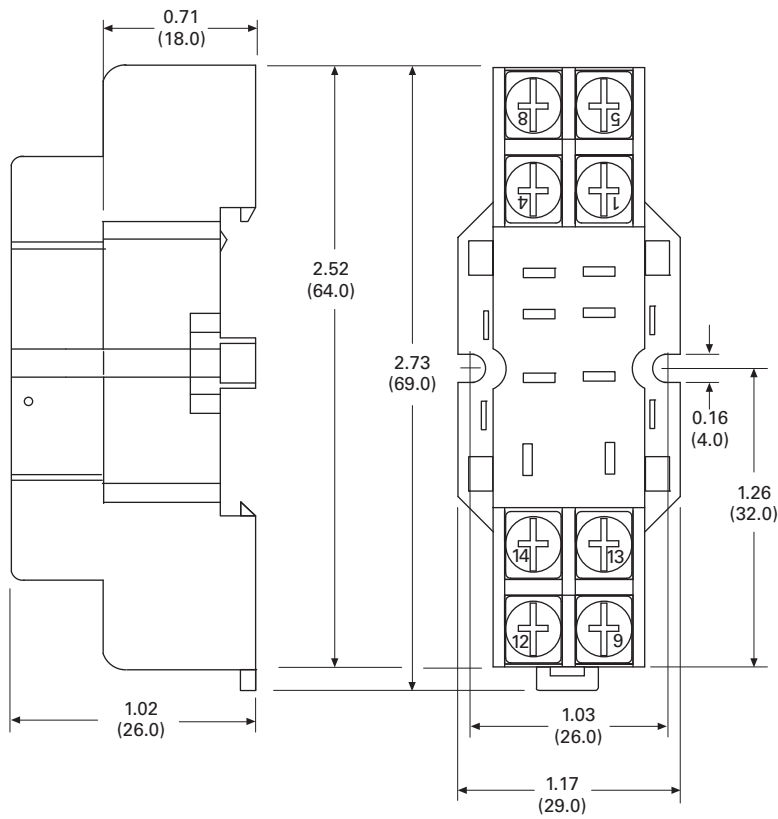


Combination Slotted/Phillips
Head Screws 6-32 x 5/16"



Approximate Dimensions in Inches (mm)

D7PA9 Standard Mount



3.4

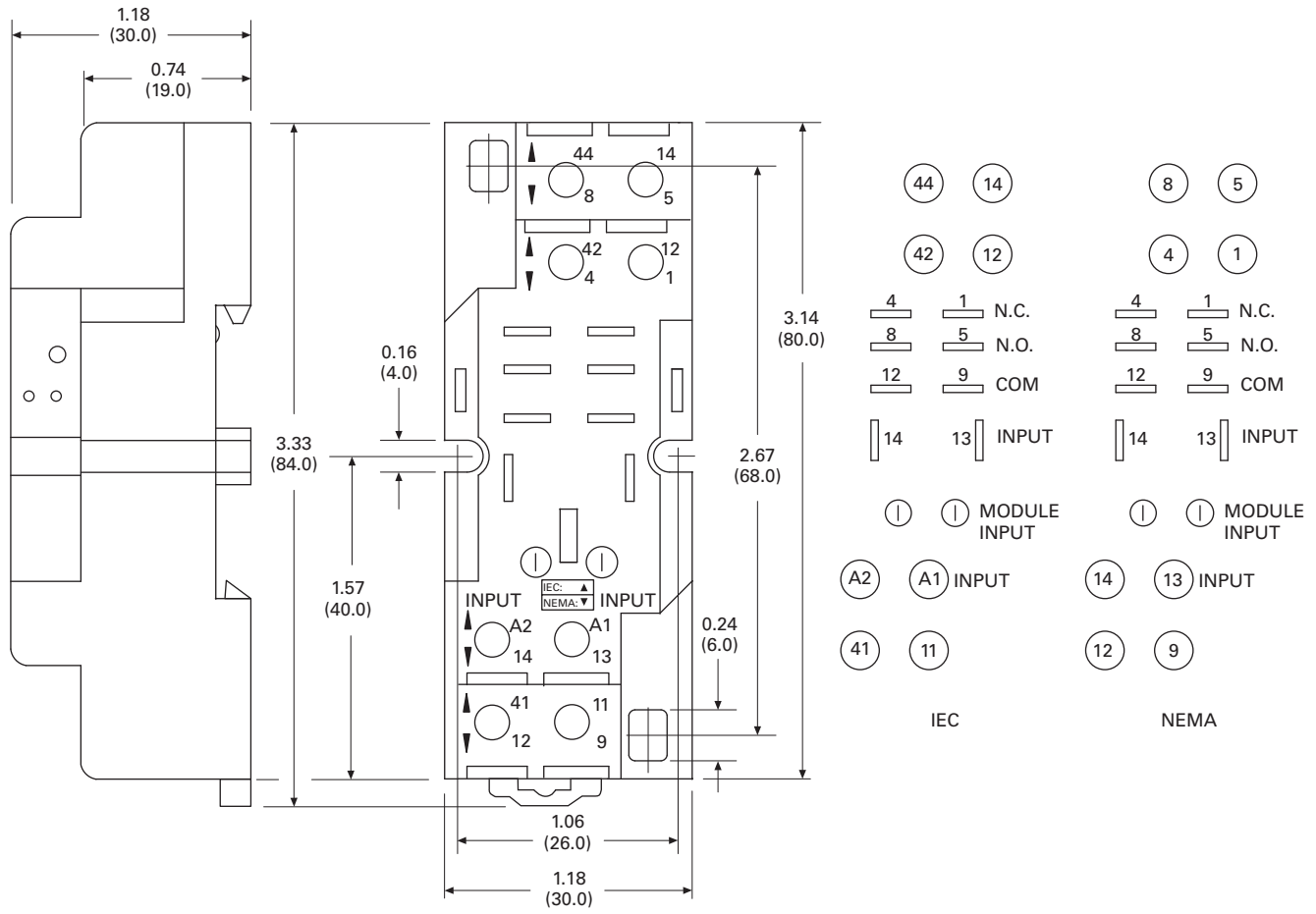
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

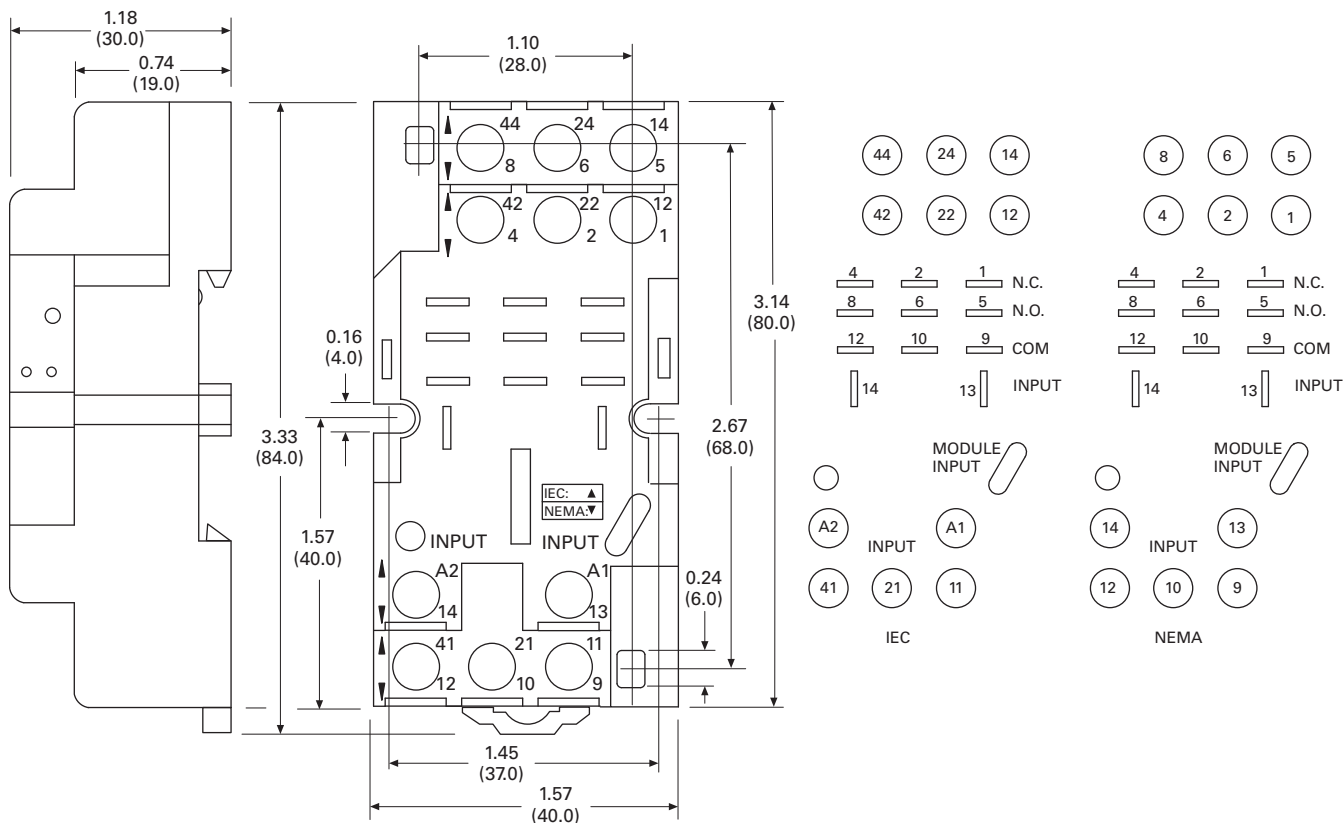
D7PAA

3



Approximate Dimensions in Inches (mm)

D7PAB



3.4

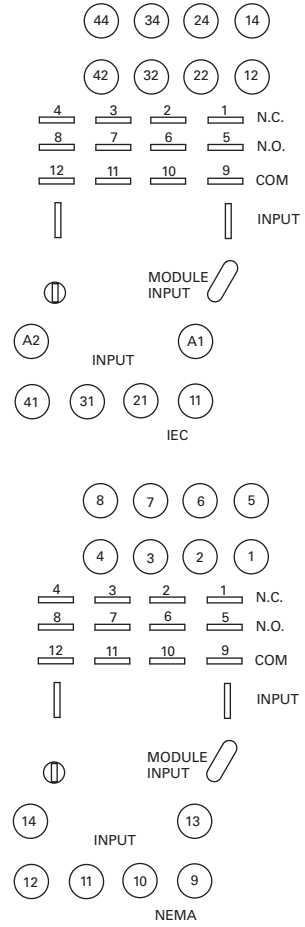
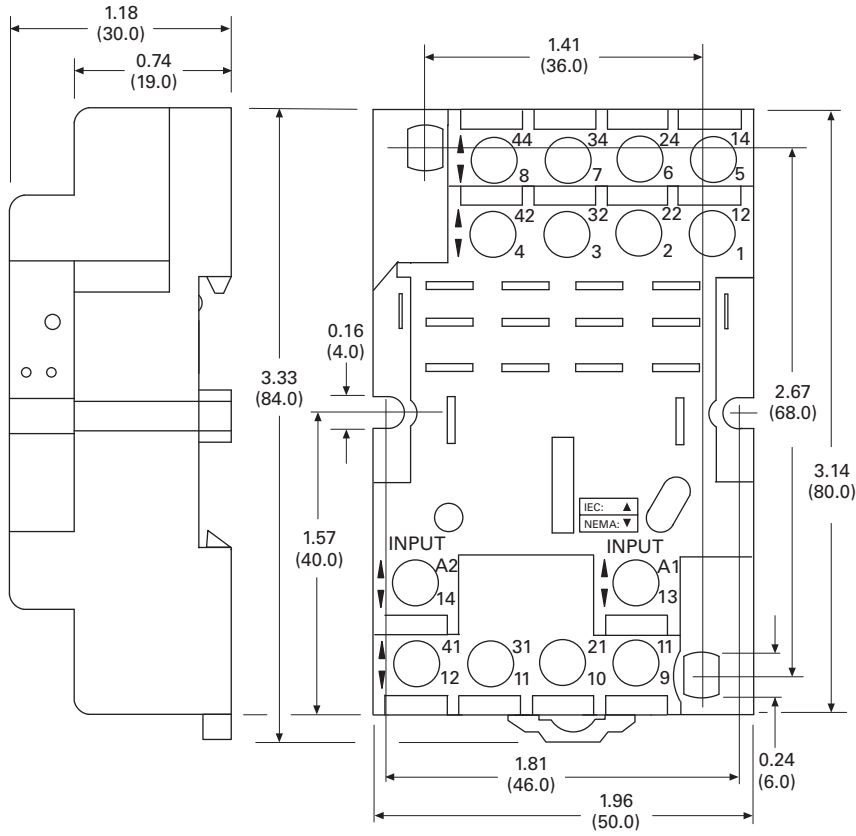
Control Relays and Timers

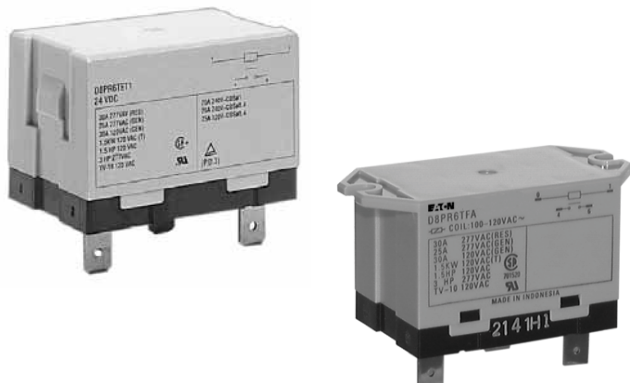
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D7PAD

3



D8 Series Relay**D8 Series****Product Description**

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


Features

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

Contents**Description**

| Description | Page |
|---|-------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | |
| Catalog Number Selection | V7-T3-104 |
| Product Selection | V7-T3-104 |
| Technical Data and Specifications | V7-T3-105 |
| Dimensions | V7-T3-105 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications

 File # E1491

 File # LR701520



3.4

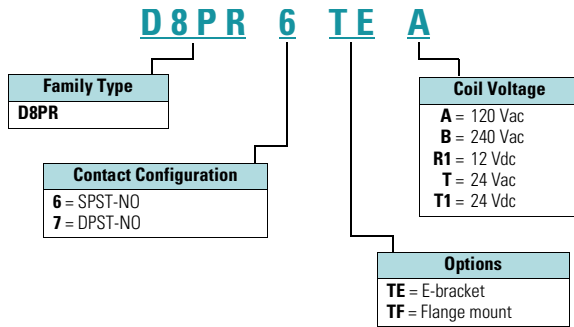
Control Relays and Timers

General Purpose Plug-In Relays

3

Catalog Number Selection

D8 Series ①



Product Selection

D8 Relay/Socket Quick Reference

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

D8 Series Relay



D8 Series ②

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Additional coil voltages available—consult Sales Office or Customer Support Center.

Technical Data and Specifications

Coil Resistance

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

D8 Relays

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

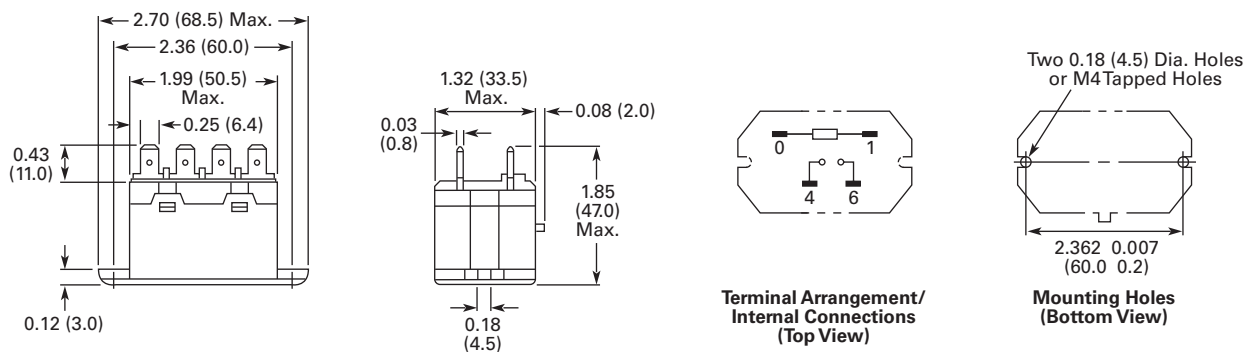
Coil Data

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

Dimensions

Approximate Dimensions in Inches (mm)

D8PR6TF



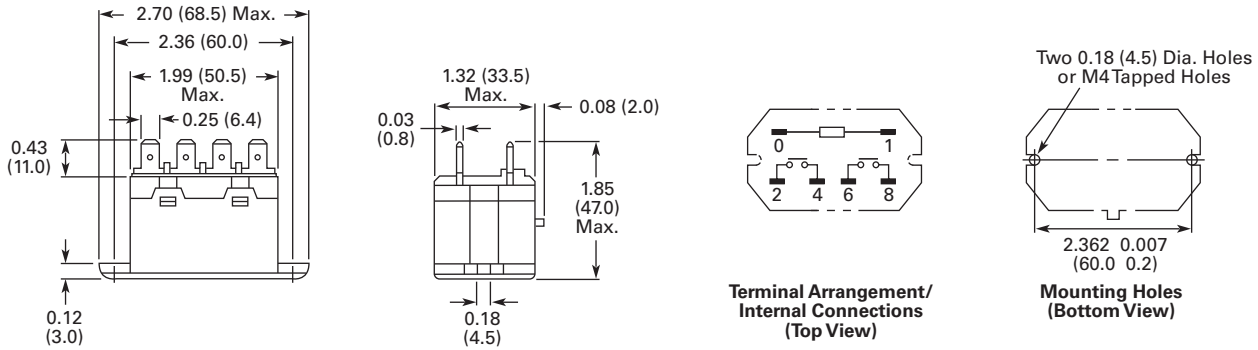
3.4

Control Relays and Timers

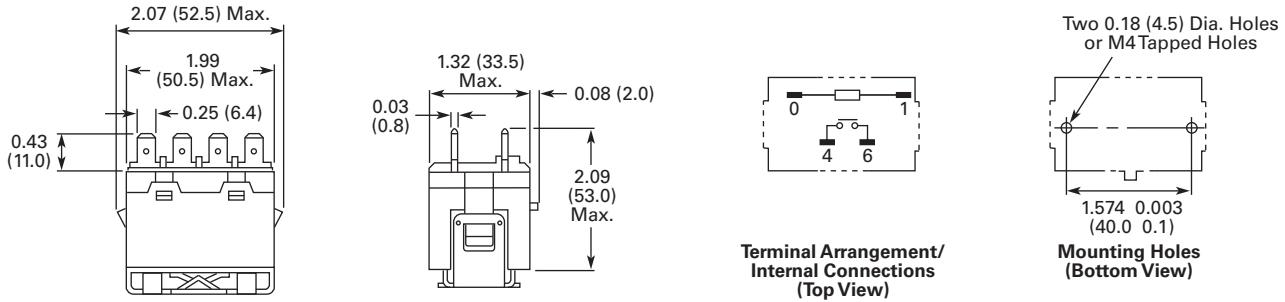
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

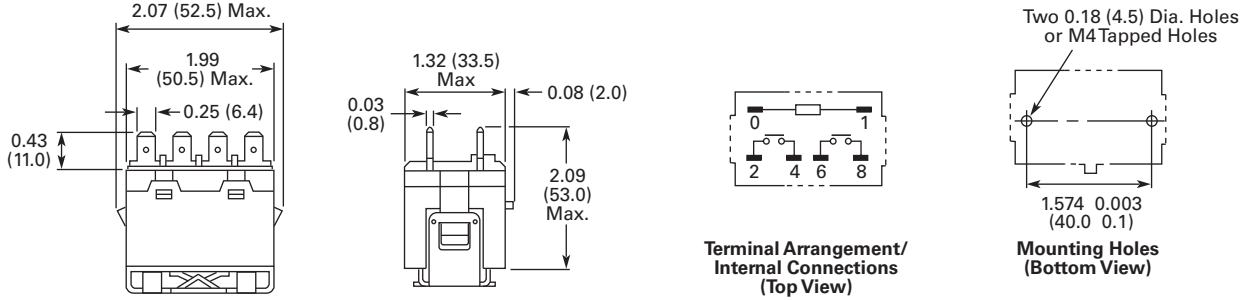
D8PR7TF



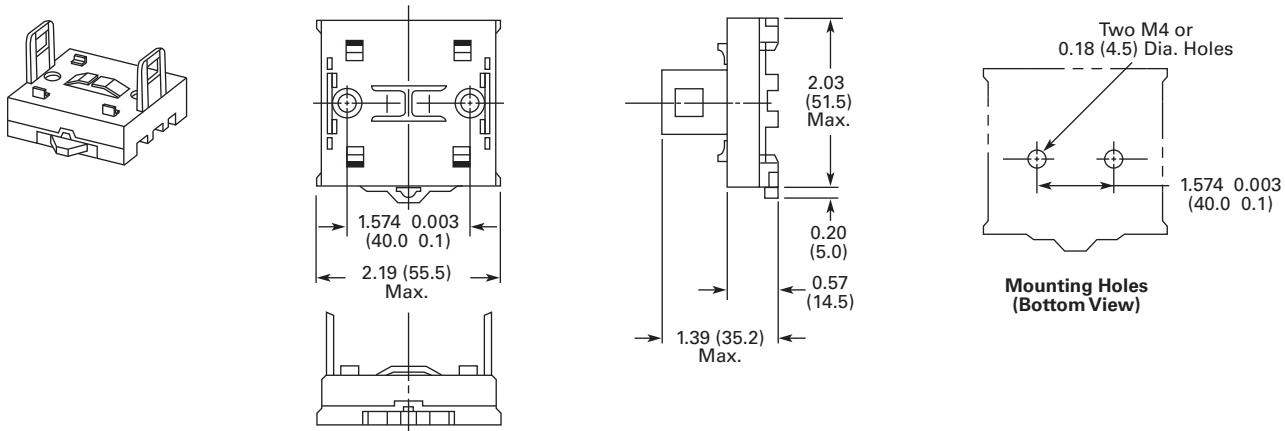
D8PR6TE with D8PA5 Bracket Attached



D8PR7TE with D8PA5 Bracket Attached



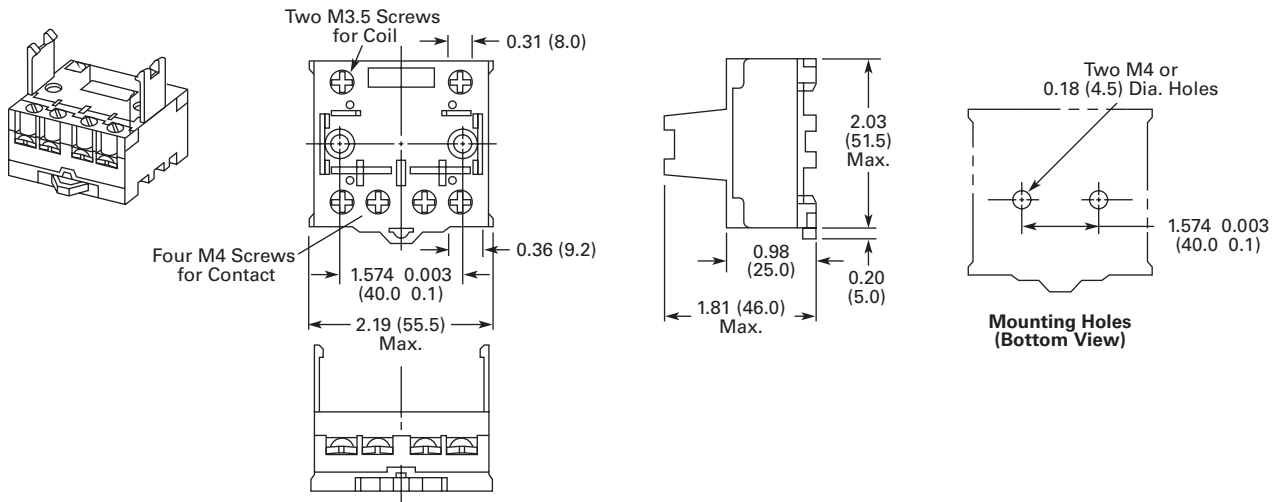
D8PA1



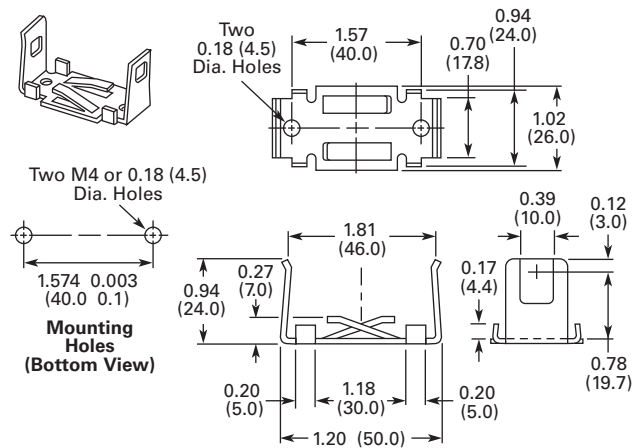
Note: Minimum spacing around relay = 0.20 inches (5 mm).

Approximate Dimensions in Inches (mm)

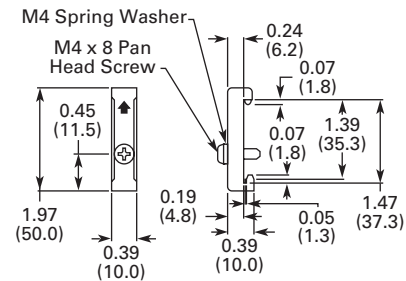
D8PA2



D8PA5



PFP-M DIN Rail End Stop



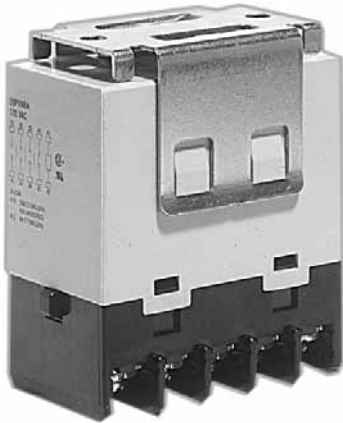
3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

D9 Series Relay



Contents

| Description | Page |
|--|-----------|
| D1RR/D1RF Series..... | V7-T3-53 |
| D2RR/D2RF Series..... | V7-T3-57 |
| D3RR/D3RF Series..... | V7-T3-67 |
| D4 Series..... | V7-T3-76 |
| D5RR/D5RF Series..... | V7-T3-80 |
| D7PR/D7PF Series..... | V7-T3-89 |
| D8 Series..... | V7-T3-103 |
| D9 Series | |
| Product Selection..... | V7-T3-109 |
| Technical Data and Specifications..... | V7-T3-109 |
| Dimensions..... | V7-T3-110 |
| Accessories..... | V7-T3-112 |

D9 Series

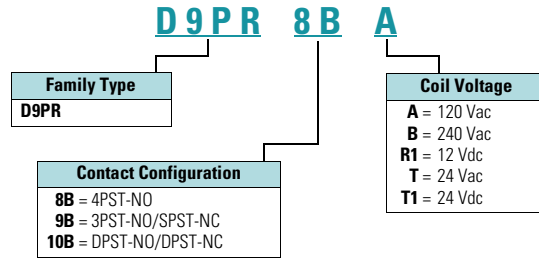
Product Description

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



Features

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

Catalog Number Selection



Standards and Certifications

-  File # E1491
-  File # LR701520

Product Selection

D9 Series

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

Technical Data and Specifications

Coil Resistance

| Coil Voltage | Ohms | mA | Coil Voltage | Ohms | mA |
|--------------|------|------|--------------|------|-----|
| 24 Vac | — | 75 | 12 Vdc | 72 | 167 |
| 120 Vac | — | 21.6 | 24 Vdc | 288 | 83 |
| 240 Vac | — | 10.8 | 110 Vdc | 6050 | 18 |

D9PR Specifications

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

3.4

Control Relays and Timers

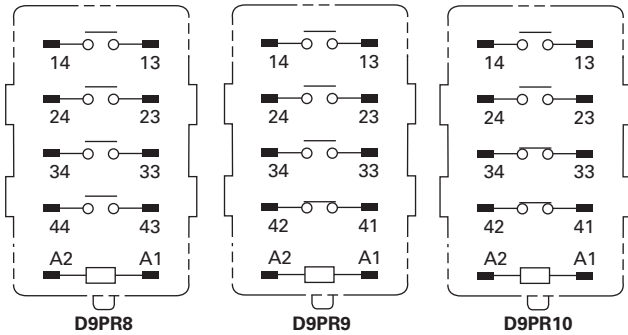
General Purpose Plug-In Relays

3

Coil Data

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

Terminal Arrangements

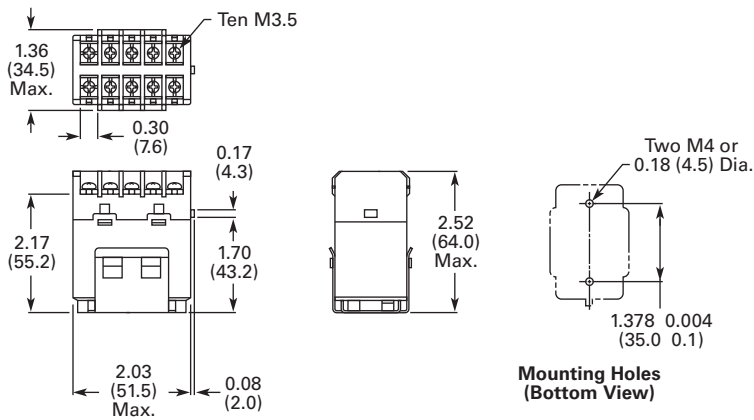


Dimensions

Approximate Dimensions in Inches (mm)

D9PR

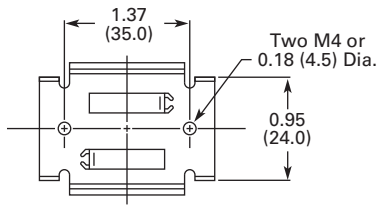
Screw Terminal Brackets



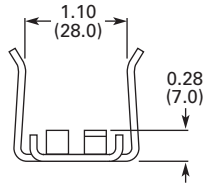
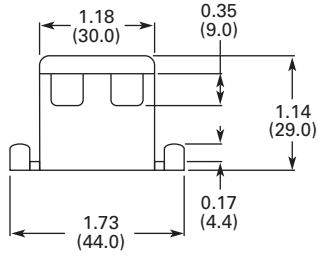
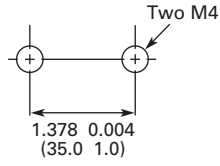
Mounting Holes
(Bottom View)

Approximate Dimensions in Inches (mm)

Mounting Bracket



Mounting Holes



3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories



3

Contents

| Description | Page |
|---------------------------------|-----------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | |
| MOD Modules | V7-T3-113 |
| Relay Clips | V7-T3-114 |
| Coil Bus Jumpers | V7-T3-116 |
| Write-On Plastic Labels/ID Tags | V7-T3-116 |
| Flange Mount Adapters | V7-T3-117 |

Accessories

Accessories Selection Guide

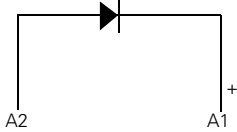
Eaton offers a variety of simple-to-install relay accessories that allow you to customize the features of a relay system to meet your exact needs.

The MOD Module System

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

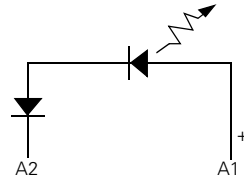
Circuit Diagrams

Diode Circuit



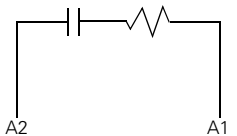
The diode module protects external drive circuitry from inductive voltages generated when removing coil voltages.

LED Circuit



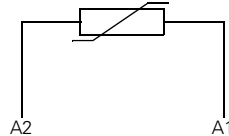
The LED status lamp verifies that power is being supplied to the coil. Ideal for both AC and DC applications. Polarity sensitive for DC applications.

RC Circuit



Snubs back EMF of relay coil.

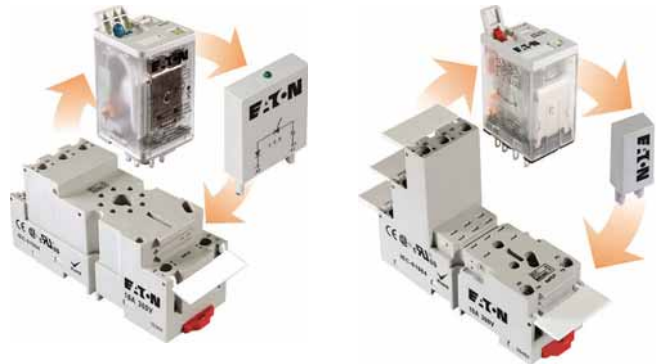
Metal Oxide Varistor (MOV) Circuit



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

System Diagrams








The MOD Module System



MOD Modules

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

MOD Modules

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3




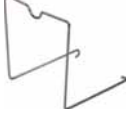




Relay Clips

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

Metal Hold-Down Clips

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

Metal Hold-Down Clips

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

**Plastic Ejector/
Hold-Down Clips**

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

PWC-D24**Plastic Ejector/Hold-Down Clips**

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

Plastic ID Clips

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

PQC-1349**Plastic ID Clips**

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

PMC-1783

| | | |
|-----------------|-------|--------------|
| PMC-1783 | D7PAB | D7PF1, D7PF2 |
|-----------------|-------|--------------|

PMC-1784

| | | |
|-----------------|-------|-------|
| PMC-1784 | D7PAD | D7PF4 |
|-----------------|-------|-------|

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

Coil Bus Jumpers

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



System Diagrams

Coil Bus Jumpers ①



Write-On Plastic Labels/ID Tags

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

Coil Bus Jumpers

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

Write-On Plastic Labels/ID Tags

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

Note

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

Flange Mount Adapters

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

Unit with Flange Mount Adapter



Flange Mount Adapters

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

9575H Series 3000 Relay



9575H Series 3000—Type AA, AC and DC

Product Description

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

Application Description

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

Contents

Description

9575H Series 3000—Type AA, AC and DC

| | |
|---|------------------|
| Product Selection | V7-T3-119 |
| Accessories | V7-T3-119 |
| Technical Data and Specifications | V7-T3-120 |
| Dimensions | V7-T3-121 |

Page

Standards and Certifications

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



Product Selection

When Ordering, Specify

Catalog number and magnet coil code letter. Example: for DPDT relay with auxiliary

switch and a 120 V 50/60 Hz coil, order Catalog Number 9575H3A010.

9575H Series 3000 Relay



Type AA Relays ^①

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

Coil Voltage Selection

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

Accessories

Enclosure ^③

| Description | Catalog Number |
|------------------|----------------|
| NEMA 1 Enclosure | 9575H2449 |

Notes

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

Technical Data and Specifications

Relay Specifications

3

Coil

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

Contacts

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

Dielectric Withstanding Voltage

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

Miscellaneous

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

Auxiliary Switch Specifications

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

Average Operating Times (Milliseconds)

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

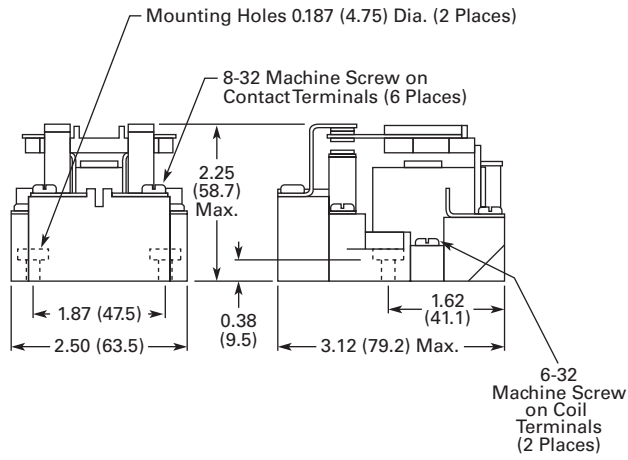
Temperature Ranges

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

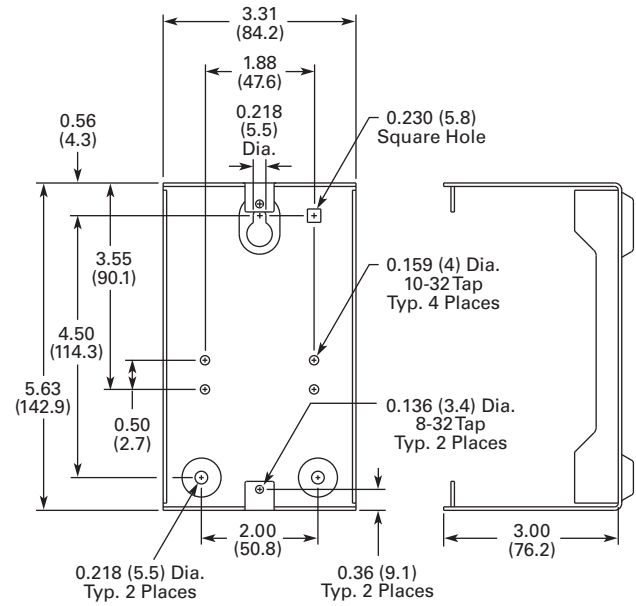
Dimensions

Approximate Dimensions in Inches (mm)

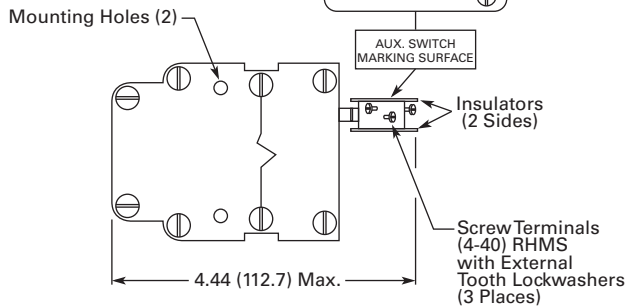
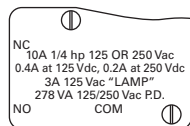
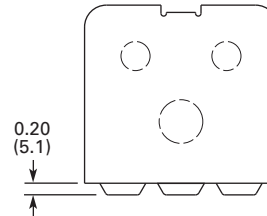
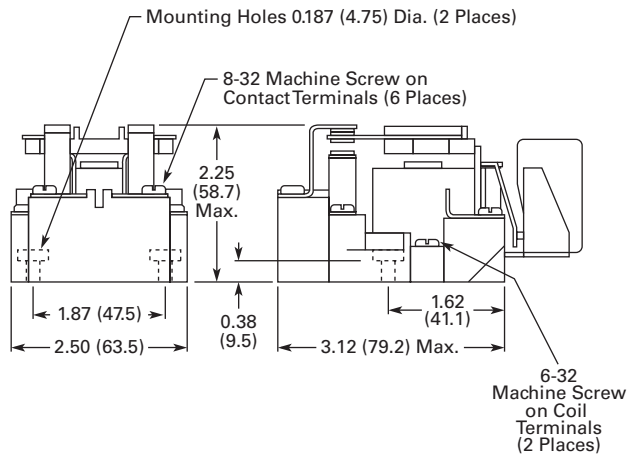
9575H3 DPDT Relay



9575H2449



9575H3 DPDT Relay with Auxiliary SPDT Switch



RELAY TOP VIEW

3.6

Control Relays and Timers

Solid-State Relays

3

Solid-State Relays



Contents

Description

Solid-State Relays

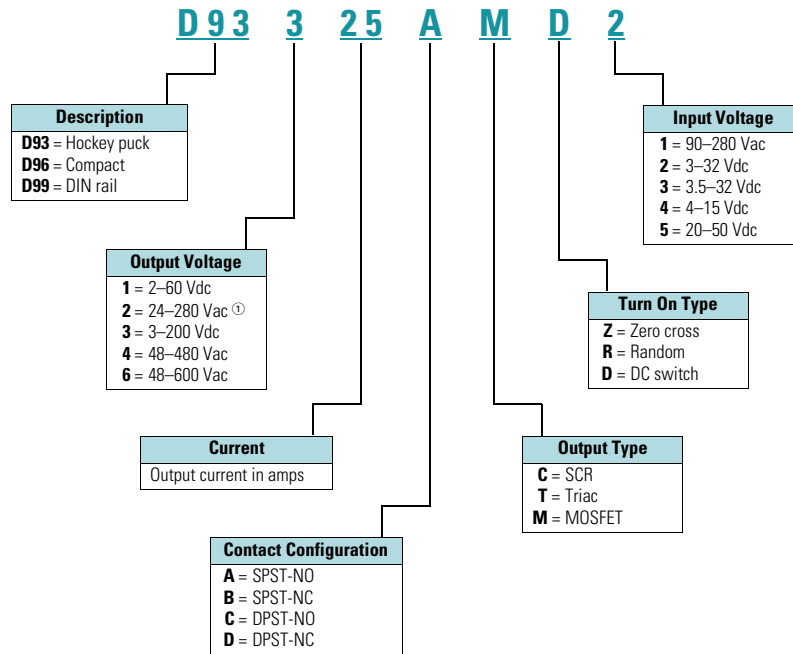
| | |
|------------------|-----------|
| D93 Series | V7-T3-123 |
| D96 Series | V7-T3-130 |
| D99 Series | V7-T3-135 |

Page

Product Overview

Catalog Number Selection

Solid-State Relays—D93, D96 and D99 Series



Note

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

D93 Series—Solid-State Relays



D93 Series

Product Description

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

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

Application Description

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

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

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

Contents

Description

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

Features and Benefits

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

Standards and Certifications

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



3.6

Control Relays and Timers

Solid-State Relays

Product Selection

D93210ACZ1

D93 Series

3



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

Accessories

D93HS1



D93 Series—Heat Sink

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

Heat Sink Accessory

| Description | Catalog Number |
|-------------|----------------|
| Heat sink | D93HS1 |

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

D93TP1



D93 Series—Thermal Transfer Pad

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

Technical Data and Specifications

D93 Series

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

3.6

Control Relays and Timers

Solid-State Relays

3

D93 Series, continued

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

D93 Series, continued

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

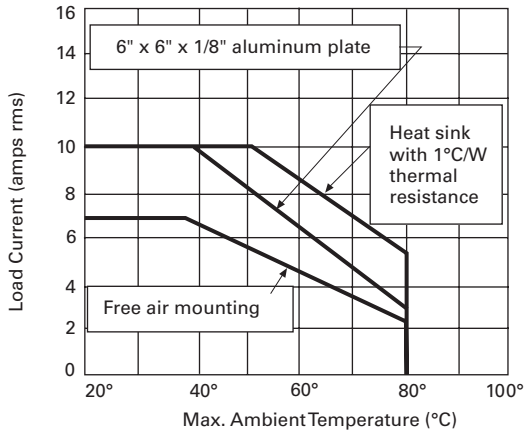
3.6

Control Relays and Timers

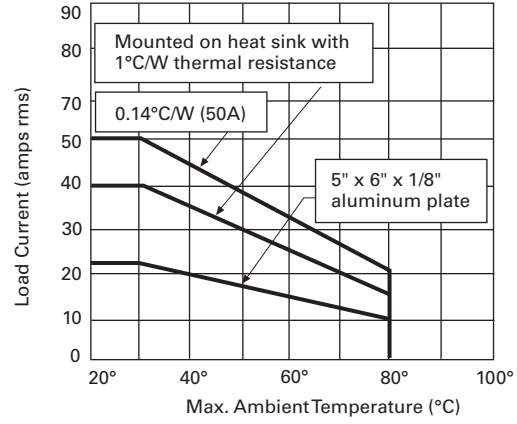
Solid-State Relays

Temperature Derating Curves

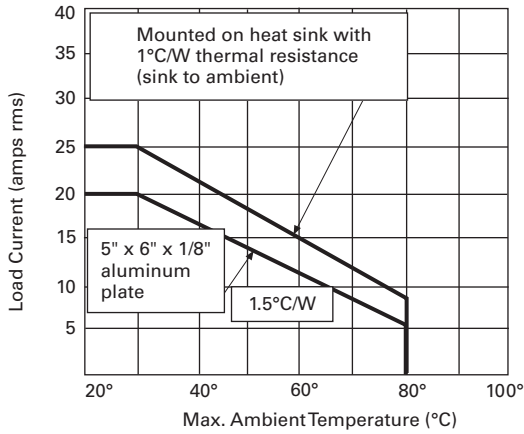
10 Amp Styles



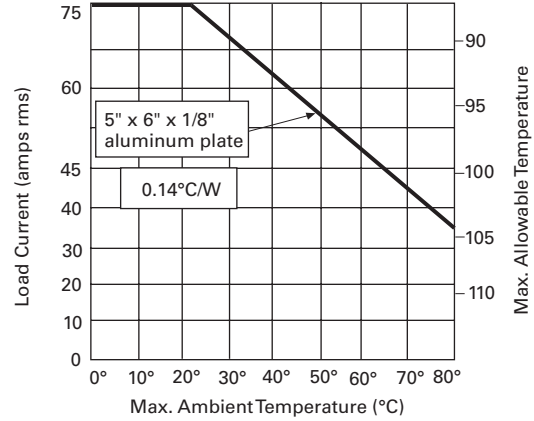
40 and 50 Amp Styles



25 Amp Styles



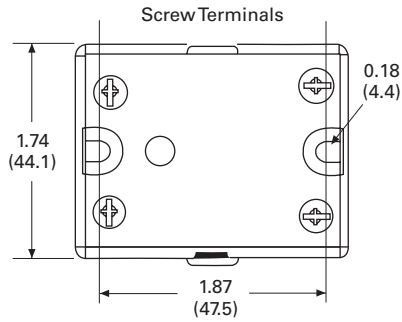
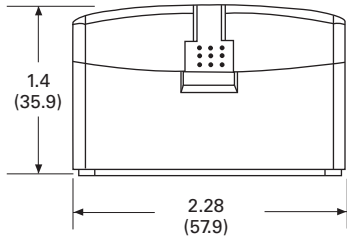
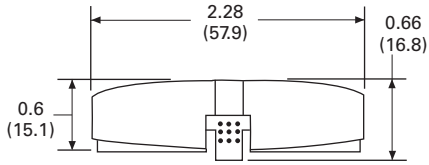
75 Amp Styles



Dimensions

Approximate Dimensions in Inches (mm)

D93 Series



D96 Series—Solid-State Relays



Contents

| Description | Page |
|---|------------------|
| D93 Series | V7-T3-123 |
| D96 Series | |
| Product Selection | V7-T3-131 |
| Technical Data and Specifications | V7-T3-132 |
| Dimensions | V7-T3-134 |
| D99 Series | V7-T3-135 |

D96 Series

Product Description

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

Application Description

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

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

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

Features and Benefits

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

Standards and Certifications

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



Product Selection

D96115ACZ3

D96 Series



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

Technical Data and Specifications

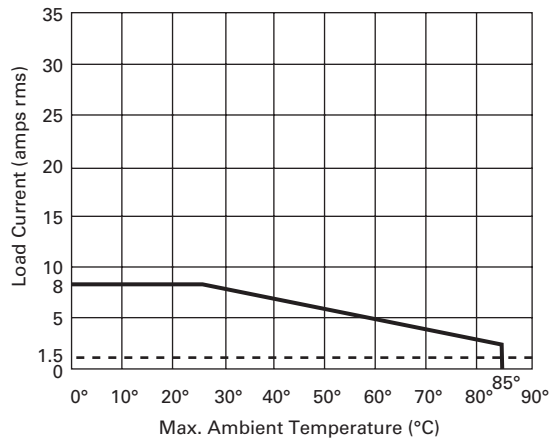
D96 Series

3

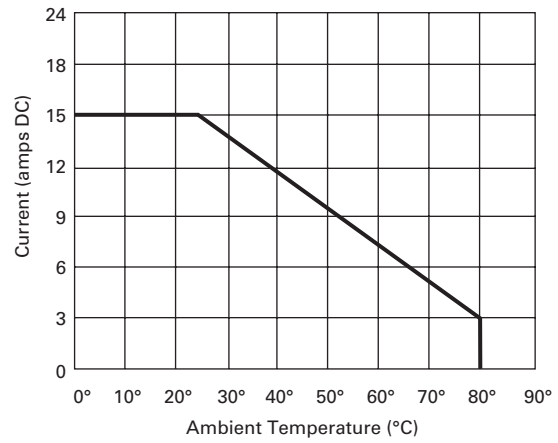
| Description | Units | D96210ACZ1 | D96210ACZ2 | D96210ACR1 | D96210ACR2 | D96115ACZ3 | D96208ACZ3 | D96210BCR2 |
|--|------------------------|-------------|-------------------|----------------|----------------|-------------------|-------------------|----------------|
| Output Characteristics | | |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

Temperature Derating Curves

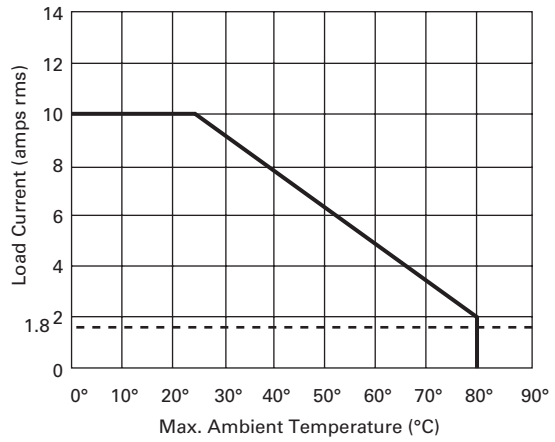
8 Amp Style



15 Amp Style



10 Amp Style



3.6

Control Relays and Timers

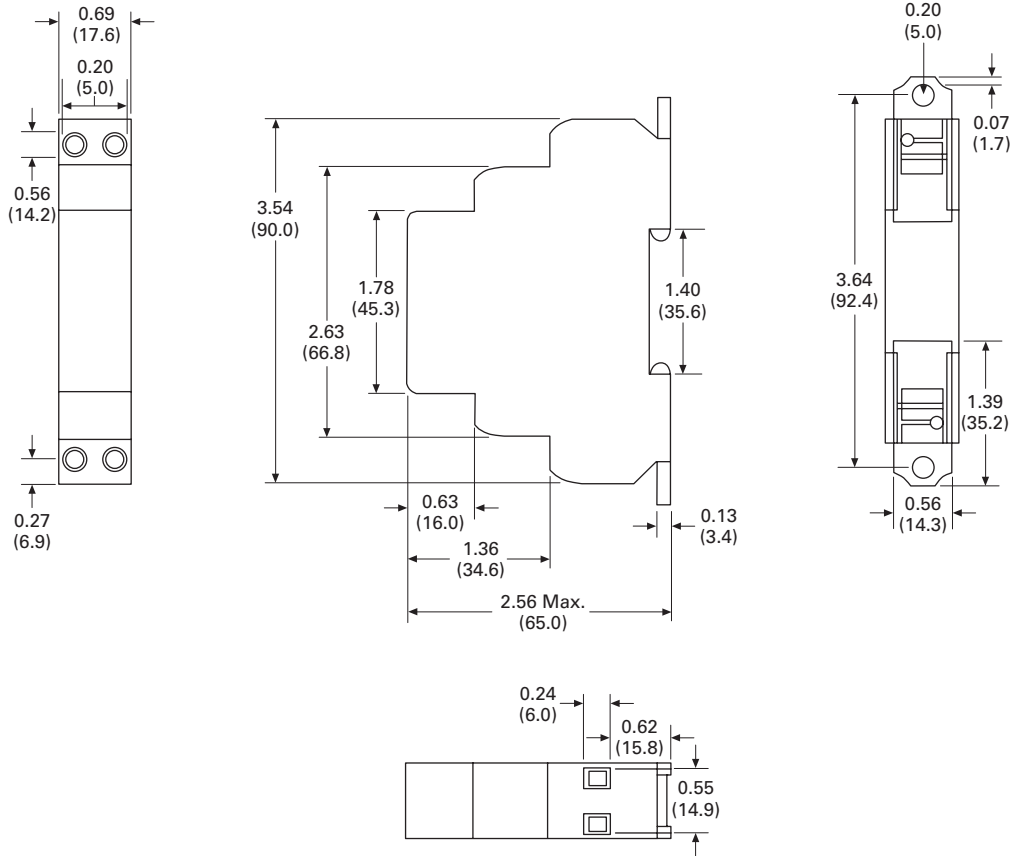
Solid-State Relays

Dimensions

Approximate Dimensions in Inches (mm)

D96 Series

3



D99 Series—Solid-State Relays



D99 Series

Product Description

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

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

Application Description

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

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

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

Contents

| Description | Page |
|---|-------------|
| D93 Series | V7-T3-123 |
| D96 Series | V7-T3-130 |
| D99 Series | |
| Product Selection | V7-T3-136 |
| Technical Data and Specifications | V7-T3-137 |
| Dimensions | V7-T3-140 |

Features and Benefits

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

Standards and Certifications

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



3.6

Control Relays and Timers

Solid-State Relays

Product Selection

D99210ACZ1

D99 Series

3



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

Technical Data and Specifications

D99 Series

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

3.6

Control Relays and Timers

Solid-State Relays

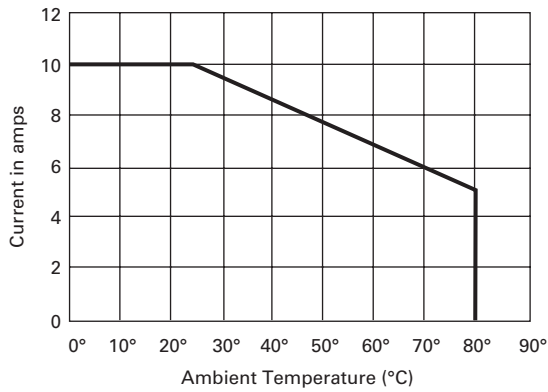
3

D99 Series, continued

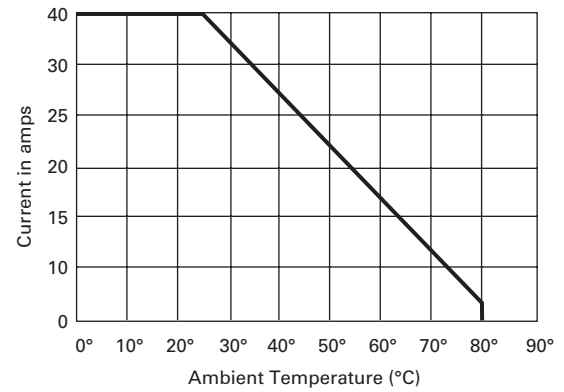
| Description | Units | D99610ACZ1 | D99610ACZ2 | D99625ACZ1 | D99625ACZ2 | D99640ACZ1 | D99640ACZ2 |
|--|------------------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|
| Output Characteristics | | | | | | | |
| Contact configuration |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

Temperature Derating Curves

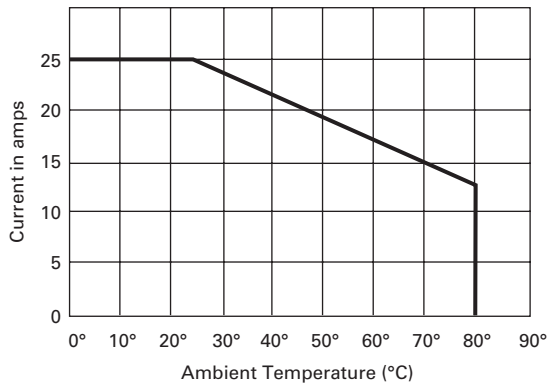
10 Amp Styles



40 Amp Styles



25 Amp Styles



3.6

Control Relays and Timers

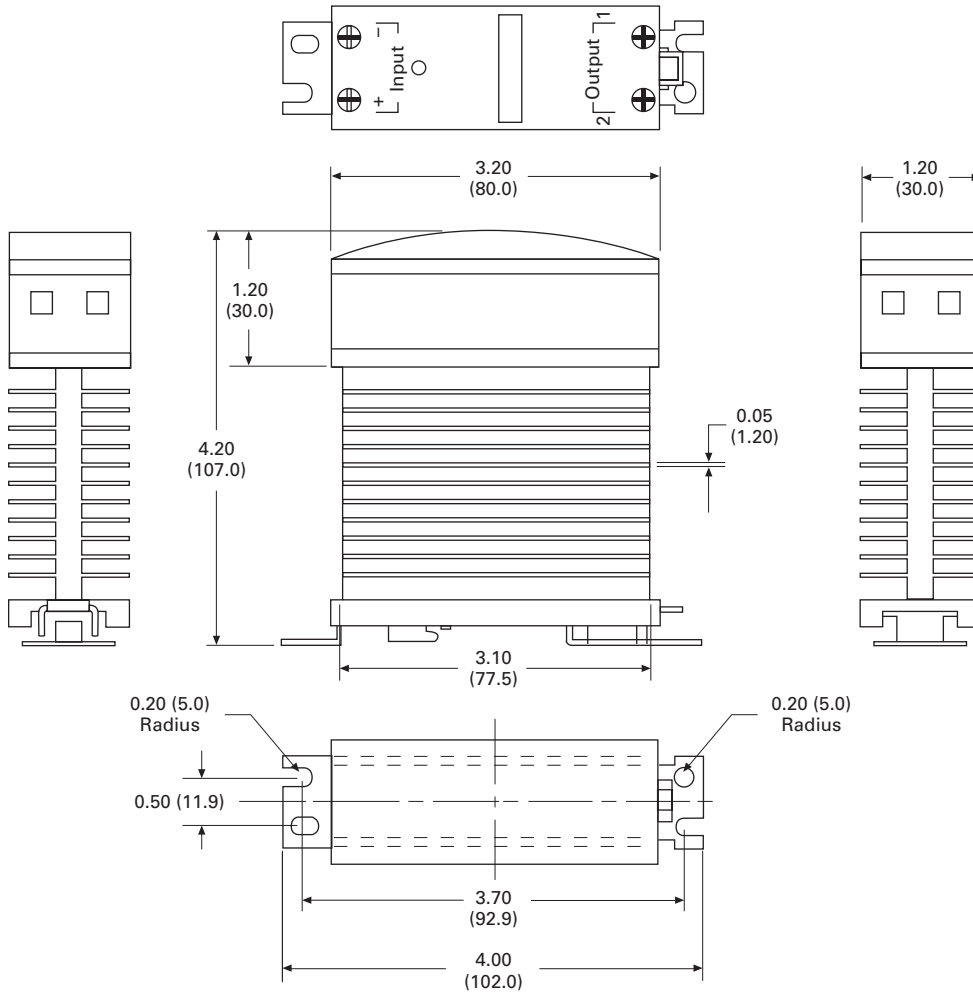
Solid-State Relays

Dimensions

Approximate Dimensions in Inches (mm)

D99 Series

3



Machine Tool Relays



Product Overview

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

Contents

| Description | Page |
|---|------------------|
| Machine Tool Relays | |
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

D15 Series—Freedom 600 V Multipole



Contents

| <i>Description</i> | <i>Page</i> |
|---|------------------|
| D15 Series—Freedom 600 V Multipole | |
| Product Selection | V7-T3-143 |
| Accessories | V7-T3-144 |
| Technical Data and Specifications | V7-T3-145 |
| Dimensions | V7-T3-146 |
| BF/BFD Series—Fixed Contact | |
| Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact | |
| Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole | |
| with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole | |
| with Convertible Contacts | V7-T3-163 |

D15 Series—Freedom 600 V Multipole

Product Description

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

Application Description

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

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

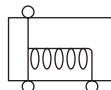
Relays with DC coils are supplied with a coil clearing NC contact mounted on the side of the relay.

Features and Benefits

- 600 V, 10 A continuous thermal current
- State indicator visually shows relay ON or OFF status
- Relay base has mounting holes on 35 x 60 mm centers, permitting direct replacement of competitive relays
- Relay also mounts on 35 mm DIN rail as standard
- Magnet coil has three terminals, permitting either top or diagonal wiring—easy to replace European or U.S. relays without changing wiring layout
- Contact pole terminals have captive, backed-out, self-lifting pressure plates with ± screws—reduced wiring time
- All terminals are shrouded or “finger-proofed” to reduce possibility of electrical shock

Standards and Certifications

- UL
- CSA certified


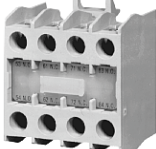



Product Selection

When Ordering, Specify

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

Factory-Assembled Multipole Relays

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

Additional Contact Poles

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

Notes

- ① Underscore indicates missing code suffix for magnet coil—see Magnet Coil Selection table above.
 ② Not all suffix codes available: consult Customer Support Center.

Magnet Coil Selection

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

Accessories

C320 Pneumatic Timer Attachment



Pneumatic Timer Attachment

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

| Description | Maximum Ampere Ratings | | | |
|-------------|------------------------|-----|------|-----|
| | Volts AC | | | |
| | 120 | 240 | 480 | 600 |
| Make | 30 | 15 | 7.5 | 6 |
| Break | 3 | 1.5 | 0.75 | 0.6 |

Attachment mounts on top of any Freedom Series relay (top-mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has DPST

timed contacts—circuits in each pole must be the same polarity. Units are convertible from OFF to ON delay or vice-versa.

Finger Protection Shields

| Application | Catalog Number |
|-------------|----------------|
| D15 | C320LS1 |

Snap-on shields for both contactors and starters provide IEC Type IP20

Finger Protection. Prevents accidental contact with line/load terminals.

Adhesive Dust Cover

| Description | Catalog Number |
|-----------------|-------------------|
| 25 to a package | C320DSTCVR |

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom D15. Adhesive covers are easily

applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

Solid-State Timer



Solid-State ON DELAY Timer ①

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

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

C321MP1



Metal Mounting Plate

| Description | Catalog Number |
|----------------------|----------------|
| Metal mounting plate | C321MP1 |

Fits all D15 multipole relays.

DIN Rail



Mounting Channel (DIN Rail)

| Description | Catalog Number |
|----------------|-------------------|
| 1 meter length | XBANS3575P |

Designed for DIN rail mounting of Freedom Series relays.

C320TS2



Transient Suppressor Kits

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

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24–120 V, 208–240 V or 27–480 V coils respectively.

These devices mount directly to the coil terminals.

Notes

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

C320DC



AC/DC Interface Module— Controller Coil Voltage Ranges

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

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

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

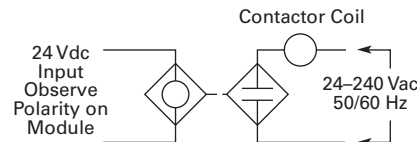
provisions for DIN rail mounting.

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

Design Characteristics

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

Typical Application—Solid-State Switch



Technical Data and Specifications

Contact Ratings—NEMA A600

Continuous Thermal Rating: 10 A

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

Contact Ratings—NEMA P300

Continuous Thermal Rating: 5 A

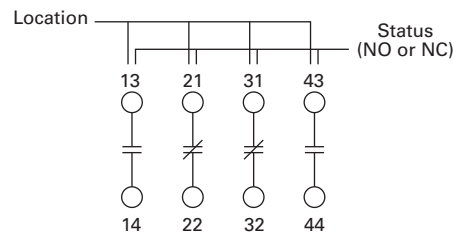
| DC Volts | Make/Break Amperes |
|----------|--------------------|
| 125 | 1.1 |
| 250 | 0.55 |

Magnet Coil Data

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

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

Example of Terminal Marking with 2NO and 2NC Contacts



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

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

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

3.7

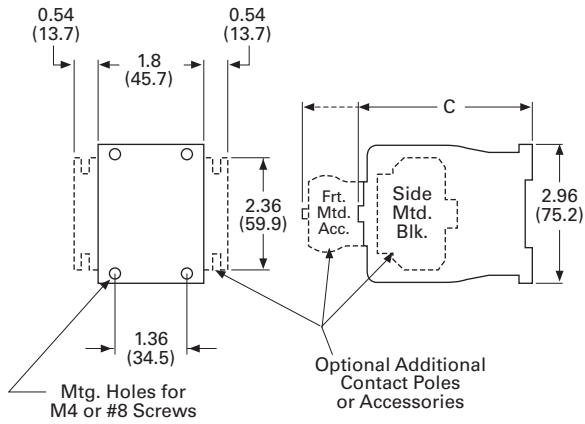
Control Relays and Timers

Machine Tool Relays

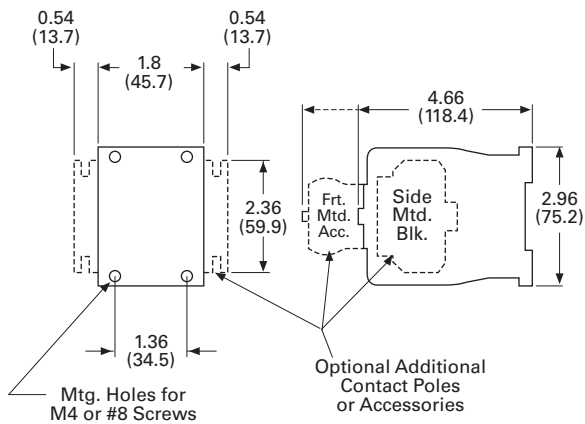
Dimensions

Approximate Dimensions in Inches (mm)

D15 Four-Pole Relay



D15 Six- and Eight-Pole Relays



Dimensions and Shipping Weights

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

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

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

Features and Benefits**Wiring to Relay**

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

Permanent Magnet Latch

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

Contents

| Description | Page |
|--|------------------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | |
| Product Selection | V7-T3-148 |
| Options | V7-T3-150 |
| Technical Data and Specifications | V7-T3-151 |
| Dimensions | V7-T3-152 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

Standards and Certifications

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



Product Selection

When Ordering, Specify

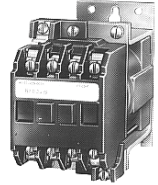
- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

3

Type BF



Type BFD



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

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

Coil Voltage

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

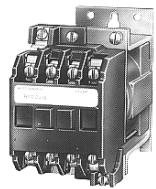
| BFD Coils | |
|-----------|-------------|
| Volts DC | Suffix Code |
| 6 | C |
| 12 | D |
| 24 | L |
| 38 | N |
| 48 | M |
| 72 | E |
| 95 | B |
| 120 | S |
| 130 | U |
| 240 | T |

Notes

- ^① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.
- ^② Consult Customer Support Center for availability.

When Ordering, Specify

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

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

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

Coil Voltage

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

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

Notes

- ^① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.
- ^② Consult Customer Support Center for availability.

3.7

Control Relays and Timers

Machine Tool Relays

3

Permanent Magnet Latch, Relay Mounted



Permanent Magnet Latch

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

Options

FASTON Push-On Terminals

| Description | Code Letter | Catalog Number |
|--|-------------|----------------|
| Insert letter F after relay type designation in listed catalog number. Example: BFF20F or BFDF20S | F | — |

Overlapping Contacts

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

NEMA 1 Enclosure for Relay Types

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

Notes

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

Technical Data and Specifications

General Specifications

BF Relay Electrical Ratings—NEMA A300

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

Horsepower Ratings (UL Recognized)

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

Resistive Rating

| | |
|---------|-------|
| 125 Vdc | 3 A |
| 250 Vdc | 1.5 A |

Coil Power Requirements

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

Permanent Magnet Latch Specifications

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

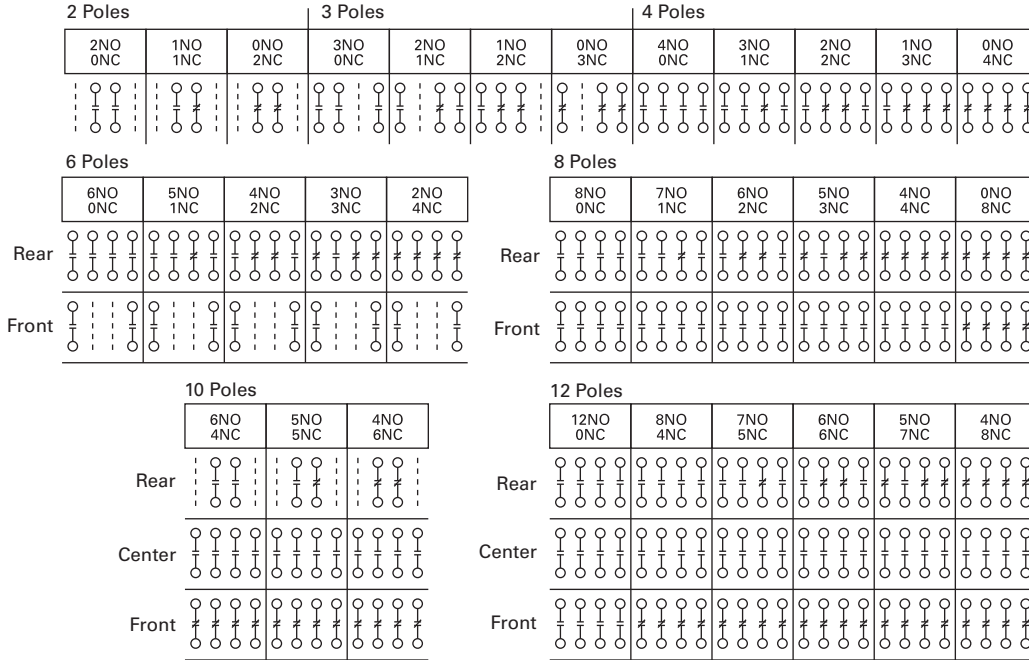
3.7

Control Relays and Timers

Machine Tool Relays

3

Contact Arrangements—BF and BFD Relays

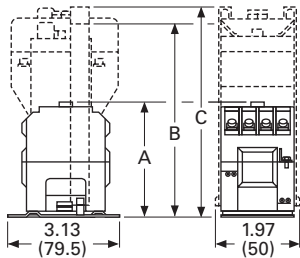


Note: NO = Normally Open NC = Normally Closed

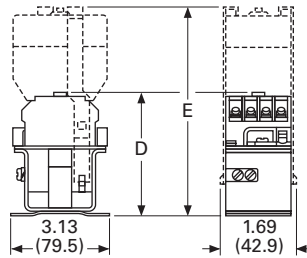
Dimensions

Approximate Dimensions in Inches (mm)

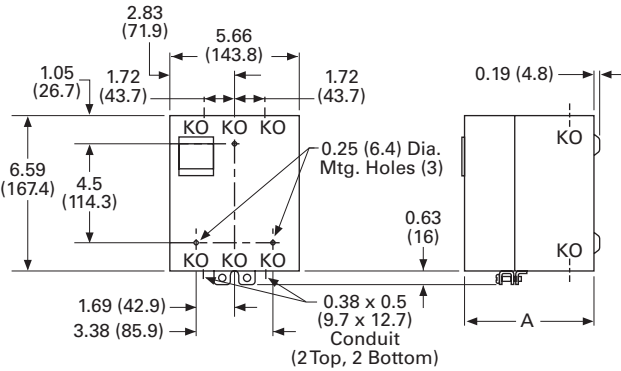
BF Relay with Permanent Magnet Latch and Solid-State Timer



BFD Relay with Solid-State Timer



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



BF and BFD Relay Dimensions

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

NEMA 1 for BF, BFD, AR and ARD Dimensions

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

AR/ARD Series—Convertible Contact Industrial Control



AR/ARD Series—Convertible Contact Industrial Control

Product Description

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

Application Description

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

Features and Benefits

Permanent Magnet Latch

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

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

Contents

| <i>Description</i> | <i>Page</i> |
|--|-------------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | |
| Product Selection | V7-T3-154 |
| Accessories | V7-T3-155 |
| Options | V7-T3-155 |
| Technical Data and Specifications | V7-T3-156 |
| Dimensions | V7-T3-157 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

Operation

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

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

Standards and Certifications

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



Reference Information

- ART, ARTD: IL 14510, IL 14485

Product Selection

When Ordering, Specify

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

3

AR/ARD Relays



AR/ARD Relays

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

Coil Voltage

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

Contact Cartridges—600 V

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

Notes

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

ARML Permanent Magnet Latch for AR/ARD Relays



Permanent Magnet Latch

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

Accessories

Four-Pole Top Deck Adder

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

Four-Pole Top Deck Adder



Four-Pole Top Deck Adder

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

Options

Convertible Contacts

| Description | Code Letter | Catalog Number |
|--|-------------|----------------|
| AR and ARD relays listed are supplied with NO contacts that are easily converted to NC. If both NO and NC poles are required, order by catalog number. Example: four-pole relay with 1NO and 3NC contacts, order AR413A. | ① | — |

Screw Terminals

| Description | Code Letter | Catalog Number |
|--|-------------|----------------|
| For ring-type connectors, add suffix R to the catalog number. Example: AR420AR. | R | — |

Surge Suppressor

ARSS Surge Suppressor for AR Relays



| | Catalog Number |
|------------------|----------------|
| Surge Suppressor | ARSS |

Overlapping Contacts

| Description | Code Letter | Catalog Number |
|---|-------------------------|----------------|
| NO contact closes before corresponding NC contact opens — supplied as NO/NC sets of two cartridges. Insert letter S after relay type designation in listed catalog number. Example: AR402AS. Specify the number of sets required: S for one set and S2 for two sets. | S or S2 ① | — |

Note

① Consult Customer Support Center for availability.

Technical Data and Specifications

General

Contact Ratings—600 Vac Cartridge NEMA A600

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

DC Cartridges—NEMA P600

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

Resistive Rating

| | |
|---------|-------|
| 125 Vdc | 3 A |
| 250 Vdc | 1.5 A |

Coil Power Requirements

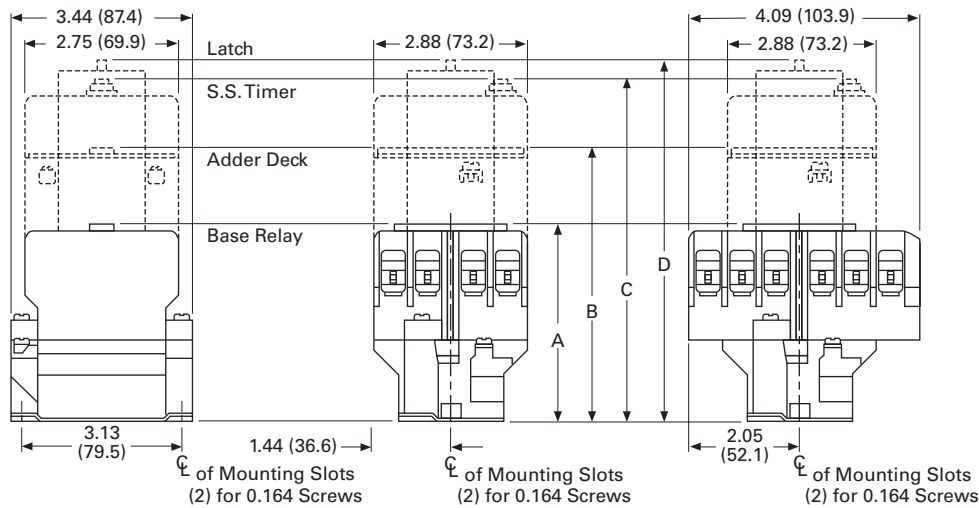
| | |
|----|---------------------------|
| AC | 96 VA open, 14 VA closed |
| DC | 14 watts open, 250 V max. |

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

Dimensions

Approximate Dimensions in Inches (mm)

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



End View, 4- and 6-Pole

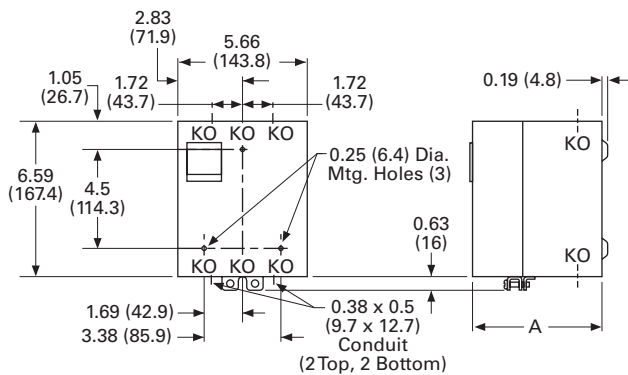
Side View, 4-Pole

Side View, 6-Pole

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

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

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



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

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

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



Contents

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

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

Product Description

Relays can be ordered as complete devices in any pole combination up to a maximum of 12NO or 8NC and 4NO poles, or can be assembled from components shown on **Page V7-T3-160**.

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

Features

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

Options

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

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

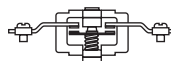
Relays with mechanical latch are available in any convertible pole combination up to eight poles maximum.

Standards and Certifications

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



Normally Closed Contact



Normally Open Contact

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

Product Selection

Complete AC Relays

When Ordering, Specify

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

4-Pole Complete AC Relays—Open Type

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



4-Pole with Latch



4-Pole with Pneumatic Timer Attachment



Magnet Coil Selection

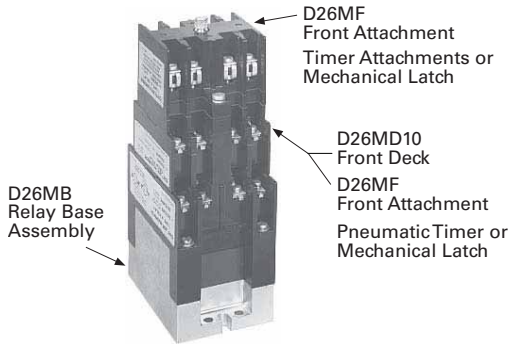
| Volts/Hertz | Suffix Code | Volts/Hertz | Suffix Code |
|---------------------|-------------|-------------------------------|-------------|
| 120/60–110/50 | A | 32/60 ^② | V |
| 240/60–220/50 | B | 12/60 ^② | R |
| 208/60 ^② | E | 6/60 | P |
| 24/60 | T | 380/50 ^② | L |
| 277/60 | H | 480/60 or 440/50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

Notes

^① **10- and 12-Poles:** The 6 and 8 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For a 12 contact relay, order **D26MR804A**.

^② Consult Customer Support Center for availability.

Relay Component Parts Location



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

| Contact Positions ^① | Timer Operation | Catalog Number ^② |
|--------------------------------|-----------------|-----------------------------|
| 4 | ON delay | D26MR005 |
| 4 | OFF delay | D26MR006 |

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

For additional information on timer attachment, see **Page V7-T3-161**.

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

Rear Pole



Front Pole



Separate Contacts

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

Relay Base Assembly



Relay Base Assembly (without Poles)

| Description | Catalog Number |
|---------------------|---------------------------|
| Relay base assembly | D26MB ^④ |

Basic four-pole D26 relay without contacts. Provision for adding one to four poles

as needed, **D26MPR**, **D26MPL** and/or **D26MPS** rear pole type.

Rear Pole



Front Deck (Convertible Contact Poles)

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

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

Four-Pole Front Attachment



Four-Pole Front Attachment (4NO Fixed Circuit)

| Description | Catalog Number |
|------------------|----------------|
| Front attachment | D26MF |

Can be added to any two- to eight-pole Type M, D26 relay to provide up to a 12-pole

relay. Four NO, non-convertible contacts are included in this assembly.

Notes

- ① Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).
- ② Consult Customer Support Center for availability.
- ③ To obtain overlapping contacts, these two special poles must be used in related circuits.
- ④ Add magnet coil suffix letter, see **Page V7-T3-159**. Example: D26MBA.

Relay State Indicating Light



Relay State Indicating Light

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

Light provided with leads and bracket for mounting on two-to 12-pole relays. May be

used to monitor state of magnet coil or relay contact operation.

Pneumatic Timer Attachment



Pneumatic Timer Attachment

| Description | Catalog Number |
|-------------|----------------|
| ON delay | D26MTE |
| OFF delay | D26MTD |

Attachment mounts on any 0-to four-pole D26 relay without latch. Timer unit has DPDT timed contacts (circuits in each pole must be the same polarity). Adjustable timing

range—0.1 to 180 seconds, repeat accuracy $\pm 10\%$. Units are convertible from OFF delay to ON delay or vice versa.

Mounting Channel



Mounting Channel

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

Pre-spaced mounting for adjacent relay installation. Indexed for cutting to desired

length. Captive mounting screws provided in channel for easier installation.

Manual Test Accessory



Manual Test Accessory

| Description | Catalog Number |
|-----------------------|----------------|
| Manual test accessory | D26MTA |

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

panel. (10 per box, order in multiples of 10.)

Transient Suppressor



Transient Suppressor

| Description | Catalog Number |
|----------------------------------|----------------|
| Magnet coil transient suppressor | D26MAS1 |
| Latch coil transient suppressor | D26MAS2 |

May be mounted on any 120 Vac relay magnet coil or latch coil or 120 Vdc latch coil—connects directly across coil terminals. All DC magnet coils have a built-in varistor for transient suppression.

Limits high voltage transients produced in the circuit when power is removed from the coil.

Technical Data and Specifications

General

Contact Ratings (Amperes) A600

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

Coil Power

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

Note

^① For DC contact ratings, see **Page V7-T3-165**.

3.7

Control Relays and Timers

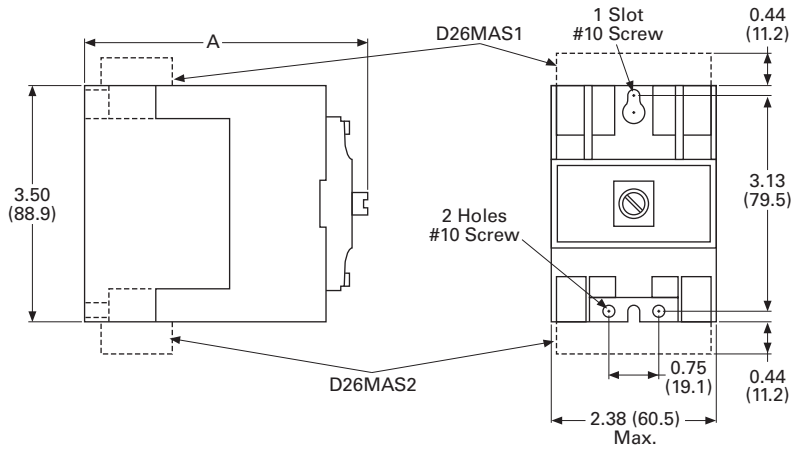
Machine Tool Relays

Dimensions

Approximate Dimensions in Inches (mm)

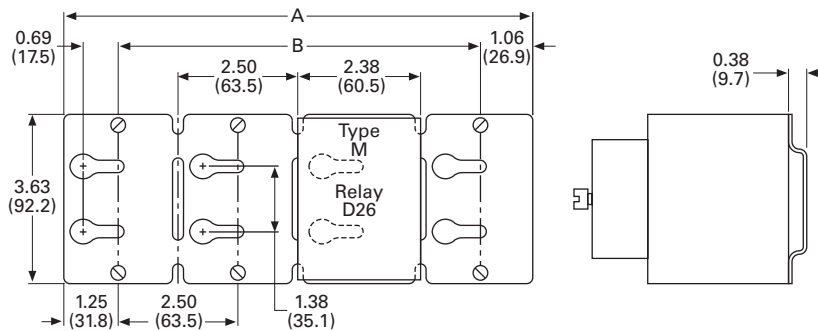
AC and DC D26 Relays

3



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

Mounting Channel



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

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

D26 Series—Type M, DC Multipole with Convertible Contacts



Contents

| Description | Page |
|--|-----------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | |
| Product Selection | V7-T3-164 |
| Technical Data and Specifications | V7-T3-165 |
| Dimensions | V7-T3-166 |

D26 Series—Type M, DC Multipole with Convertible Contacts

Product Description

Type M, DC multipole relays are physically and mechanically similar to the (D26) Type M AC relays described on **Page V7-T3-159**. They differ only in the electrical ratings and available pole combinations due to the use of a normally closed late opening, coil clearing contact, factory wired to the pickup winding of the magnet coil. (Contact is shown as L in figure to the right.) Magnet coil has built-in varistor for transient suppression.

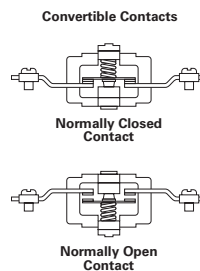
The mechanically latched relay has one extra contact, normally open early closing, factory wired in series with the winding of the intermittent rated latch coil. (Contact is shown as S in figure to the right.)

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

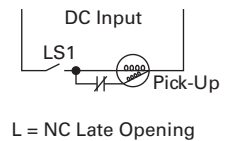
Contact poles D26MPR and D26MPF in 2- to 7-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180° (in either direction).

Latch Operation

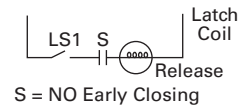
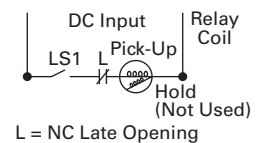
With the latch coil de-energized, energizing the relay coil will pick up the relay and mechanically latch it in the pickup position. With the relay coil de-energized, energizing the latch coil will allow the relay to drop out.



DC Type M Relay



DC Type M Relay with Latch



Product Selection

Complete DC Relays

When Ordering, Specify

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

3

3-Pole



3-Pole with Latch



Complete DC Relays—Open Type

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

Magnet Coil Selection

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

Notes

- ^① Relay has additional factory wired normally closed coil clearing contact (see diagram).
- ^② **10- and 11-Poles:** The 6 and 7 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For an 11 contact relay, order D26MRD70**4A1**.

3-Pole with Timer Attachment**Relay with Pneumatic Timer Attachment (without Relay Contacts)**

| Contact Positions ^① | Timer Operation | Catalog Number |
|--------------------------------|-----------------|----------------|
| 3 | ON delay | D26MRD005 |
| 3 | OFF delay | D26MRD006 |

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

Order contacts separately. For additional information on timer attachment, see **Page V7-T3-161**.

Technical Data and Specifications**General****Contact Ratings (Amperes) ^②**

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

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

Notes

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

3.7

Control Relays and Timers

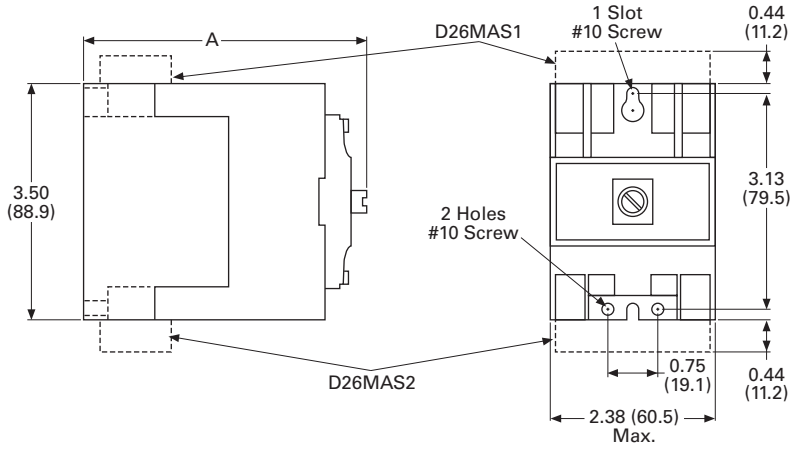
Machine Tool Relays

Dimensions

Approximate Dimensions in Inches (mm)

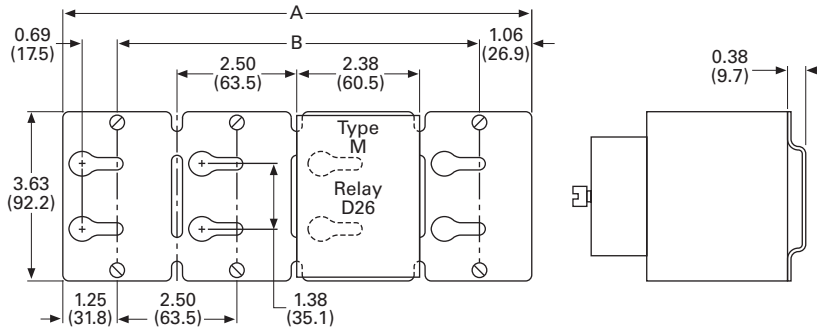
AC and DC D26 Relays

3



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

Mounting Channel



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

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

Timing Relays



Contents

| Description | Page |
|---------------------|-----------|
| Timing Relays | |
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Product Selection Guide

Function Code Cross-Reference Guide

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

Notes

^① Applies to TRN model only.

^② Applies to TRF model only.

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

Product Overview

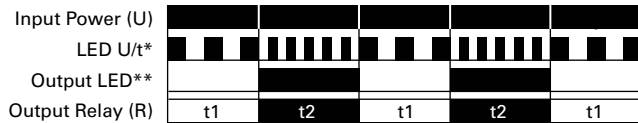
Timer Function Descriptions

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

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

When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins.

After the interval t2 has expired, the output relay switches into OFF position. The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.

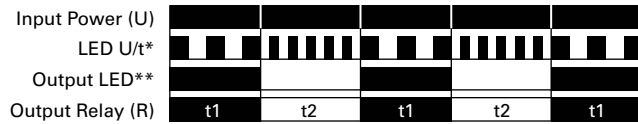


Function #2—Universal TR, TMR5, E5-248

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

When the supply voltage U is applied, the output relay R switches into the ON position and the set interval t1 begins. After the interval t1 has expired, the output relay R switches into OFF position

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

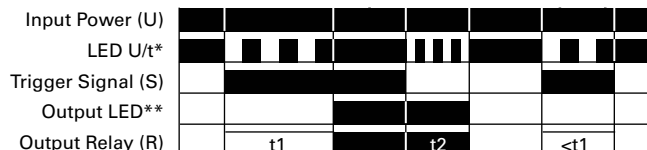


Function #3—Universal TR

ON Delay and OFF Delay with Control Contact

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position. If the control contact is opened, the set

interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. If the control contact is opened before the interval t1 has expired, the interval already expired is erased and is restarted with the next cycle.



Function #4—Universal TR

ON Delay and Single Shot Leading Edge Voltage Controlled

When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins. After the interval t2 has expired, the output relay

switches into OFF position. If the supply voltage is interrupted before the interval t1 + t2 has expired, the interval already expired is erased and is restarted when the supply voltage is next applied.

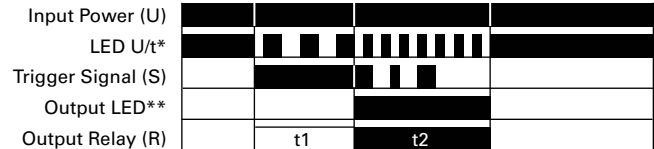


Function #5—Universal TR

ON Delay and Single Shot Leading Edge Control Contact

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set

interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. A new cycle can only be initiated when the control has been completed.

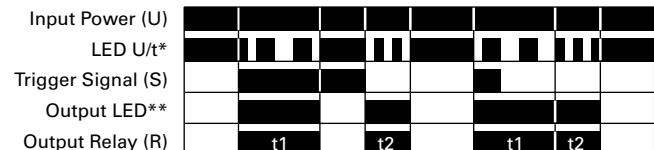


Function #6—Universal TR

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

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

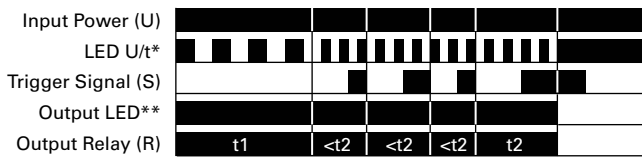
output relay again switches to the ON position and the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. During the interval, the control contact can be operated any number of times.



Function #7—Universal TR Pulse Sequence Monitoring

When the supply voltage U is applied, the set interval t1 begins and the output relay R switches to the ON position. After the interval t1 has expired, the interval t2 begins. As long as the control switch S is closed and opened within the

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



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

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay

R switches to the ON position. The relay will remain in that position until supply voltage U is interrupted.



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

When the supply voltage U is applied, the output relay R switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position.

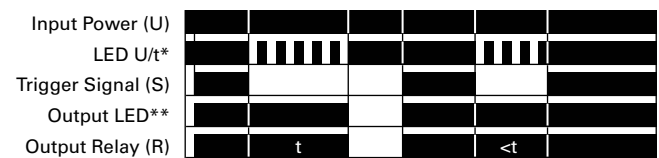
The relay will remain in that position until supply voltage U is interrupted. If the supply voltage is interrupted prior to interval t timing out, the relay will immediately switch to the OFF position.



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

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position. When the control contact is opened, interval t begins. After the interval t has expired, the

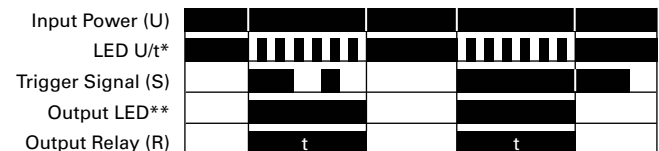
output relay R switches to the OFF position. If the control contact S is closed before interval t expires, the output relay will remain in the ON position until the control switch opens, at which time the interval t will begin again.



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

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position and the set interval t begins. After the

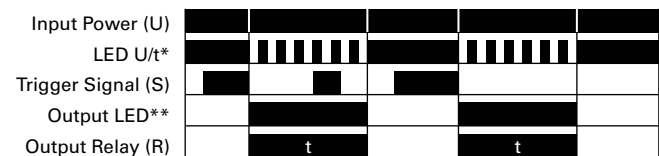
interval t has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle cannot be started until the set interval t has timed out.



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

The supply voltage U must be constantly applied to the device. When the control contact S is closed and reopened, the output relay R switches to the ON position and the set interval t begins. After the interval t

has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle must be started after the set interval t has timed out.



3.8

Control Relays and Timers

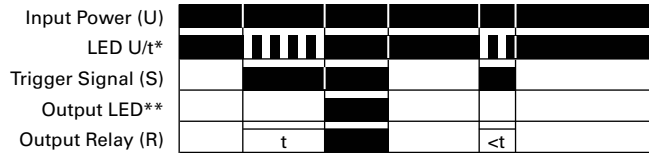
Timing Relays

3

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

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay

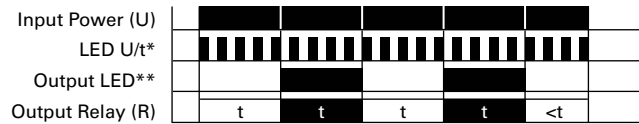
will remain in that position until the control switch opens. If the control switch is opened prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



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

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again. After interval t

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



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

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the relay switches to the ON position and the set interval t begins. After the interval t has expired, the output relay R

switches to the OFF position. Closing the control switch during interval t will reset the time. Continuous cycling of the trigger signal at a rate faster than the preset time will cause the relay to remain in the ON position.



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

When the supply voltage U is applied, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin again.

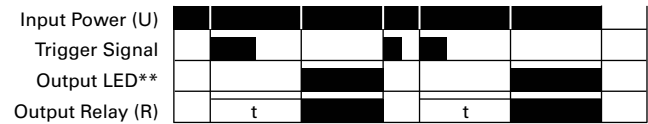
After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.



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

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay will remain in that position

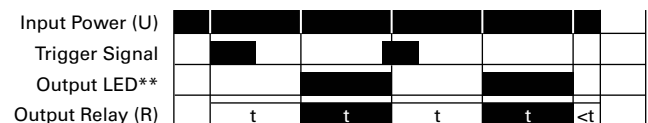
until the control switch has opened and closed. If the control switch is opened and closed prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



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

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again.

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

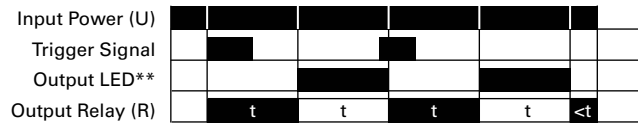


Function #19—TRF, E5-248

Flasher—Control Signal Start, ON First

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin

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



Function #22—TMRP, E5-248

Single Pulse Generator, Voltage Controlled

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the relay will switch to the ON position for

0.5 seconds before returning to the OFF position. Supply voltage U must be removed and reapplied to repeat the pulse.

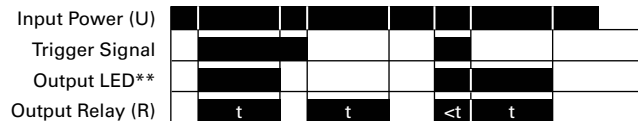


Function #20—TRF

Signal ON/OFF Delay

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired with the control switch still closed, the output relay R switches to the OFF

position. When the control switch is opened, the relay will switch to the ON position again and the interval t will begin. If the control switch is closed and opened within the interval t, the relay will remain in the ON position until interval t has timed out after the control switch is opened.

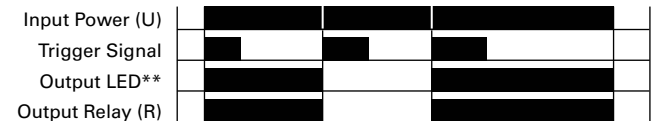


Function #23—N/A

Memory Latch Control Switch Make

The supply voltage U must be constantly applied to the device. Output changes state

with every closure of the control switch S (leading edge).

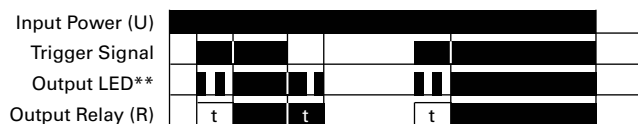


Function #21—TMRP

ON/OFF Delay Make/Break with Control Switch Trigger

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. When the

control switch is opened, interval t will begin again. After interval t has timed out, the relay will switch to the OFF position. If supply voltage U is removed at any time, the relay will return to the OFF position.



Function #24—TMR6

True OFF Delay

When the supply voltage U is applied, the relay switches to the ON position. When supply power is removed, set time interval t begins. After

interval t has expired, the relay switches to the OFF position and will remain there until supply power U is applied again.



Universal TR Series



Universal TR Series

Product Description

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

Application Description

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

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

Contents

Description

| | <i>Page</i> |
|-----------------------------------|-------------|
| Universal TR Series | |
| Product Selection | V7-T3-173 |
| Technical Data and Specifications | V7-T3-173 |
| Wiring Diagrams | V7-T3-174 |
| Dimensions | V7-T3-175 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Features

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

Standards and Certifications

- cULus listed
- CE marked
- RoHS compliant
- IEC/EN 61812



Product Selection

Single-Pole Model

Universal TR Timing Relays



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

Technical Data and Specifications

Universal TR Timing Relays

| Description | TRL04 | TRL07 | TRL27 | TRW27 |
|------------------------------|--|--|--|--|
| Functions ^① | E, R, Wu, Bp | E, R, Wu, Bp, Ws, Wa, Es | E, R, Wu, Bp, Ws, Wa, Es | li, lp, ER, Ewu, Ews, WsWa, Wt |
| Time range | 0.05 sec to 100 hours | 0.05 sec to 100 hours | 0.05 sec to 100 hours | 0.05 sec to 100 hours |
| Input | | | | |
| Supply voltage | 24–240 Vac/Vdc | 24–240 Vac/Vdc | 12–240 Vac/Vdc | 12–240 Vac/Vdc |
| Rated supply frequency | +10% /–15% | +10% /–15% | ±10% | ±10% |
| Rated consumption | 4 VA (1.5 W) | 4 VA (1.5 W) | 6 VA (2 W) | 6 VA (2 W) |
| Duty cycle | 100% | 100% | 100% | 100% |
| Reset time | 100 ms | 100 ms | 100 ms | 100 ms |
| Residual ripple for DC | 10% | 10% | 10% | 10% |
| dropout voltage | >30% of rated supply voltage | >30% of rated supply voltage | >30% of rated supply voltage | >30% of rated supply voltage |
| Overvoltage category | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) |
| Rated surge voltage | 4 kV | 4 kV | 4 kV | 4 kV |
| Output | | | | |
| Contact configuration | SPDT (one changeover contact) | SPDT (one changeover contact) | DPDT (two changeover contacts) | DPDT (two changeover contacts) |
| Rated voltage | 250 Vac | 250 Vac | 250 Vac | 250 Vac |
| Switching capacity | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) |
| Fusing | 8 A fast acting | 8 A fast acting | 8 A fast acting | 8 A fast acting |
| Mechanical life | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations |
| Electrical life | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive |
| Switching frequency | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) |
| Overvoltage category | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) |
| Rated surge voltage | 4 kV | 4 kV | 4 kV | 4 kV |
| Control Signal | | | | |
| Loadable | Yes | Yes | Yes | Yes |
| Maximum cable length | 10m | 10m | 10m | 10m |
| Trigger level (sensitivity) | Automatic adaption to supply voltage | Automatic adaption to supply voltage | Automatic adaption to supply voltage | Automatic adaption to supply voltage |
| Minimum control pulse length | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms |

Note

^① Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

Universal TR Timing Relays, continued

| Description | TRL04 | TRL07 | TRL27 | TRW27 |
|-----------------------|---|---|---|---|
| Accuracy | | | | |
| Base accuracy | ±1% of maximum scale value | ±1% of maximum scale value | ±1% of maximum scale value | ±1% of maximum scale value |
| Adjustment accuracy | <5% of maximum scale value | <5% of maximum scale value | <5% of maximum scale value | <5% of maximum scale value |
| Repetition accuracy | <0.5% or ±5 ms | <0.5% or ±5 ms | <0.5% or ±5 ms | <0.5% or ±5 ms |
| Temperature influence | ≤0.01% / °C | ≤0.01% / °C | ≤0.01% / °C | ≤0.01% / °C |
| Physical | | | | |
| Ambient temperature | -25 to 55 °C | -25 to 55 °C | -25 to 55 °C | -25 to 55 °C |
| Storage temperature | -25 to 70 °C | -25 to 70 °C | -25 to 70 °C | -25 to 70 °C |
| Relative humidity | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) |
| Pollution degree | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) |
| Housing material | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating |
| Mounting | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position |
| Terminal rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating |
| Tightening torque | Max. 1 Nm | Max. 1 Nm | Max. 1 Nm | Max. 1 Nm |

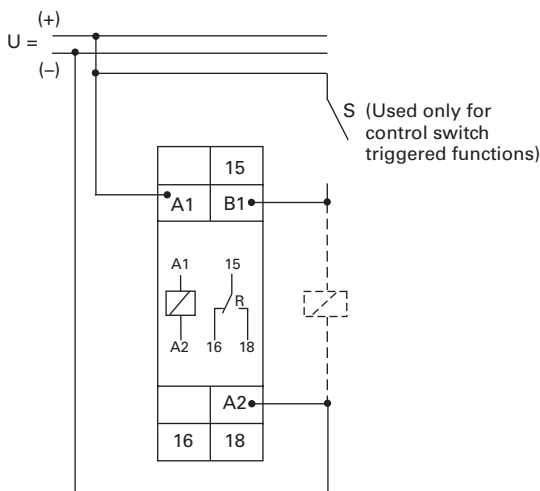
Terminal Capacity

Description

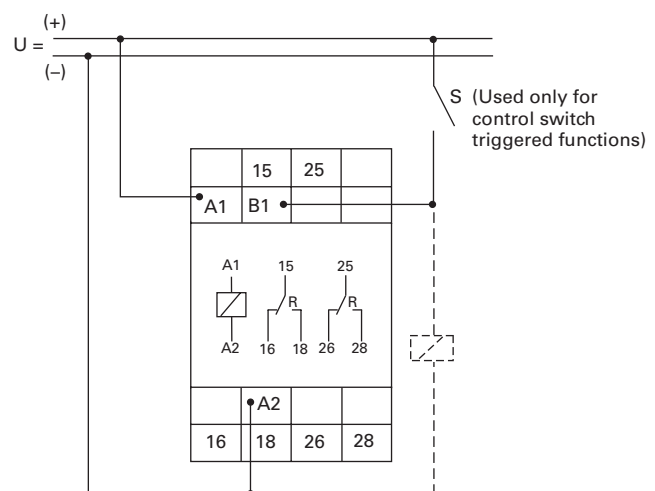
- 1 x 0.5 to 2.5 mm² with/without multicore cable end
- 1 x 4 mm² without multicore cable end
- 2 x 0.5 to 1.5 mm² with/without multicore cable end
- 2 x 2.5 mm² flexible without multicore cable end

Wiring Diagrams

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



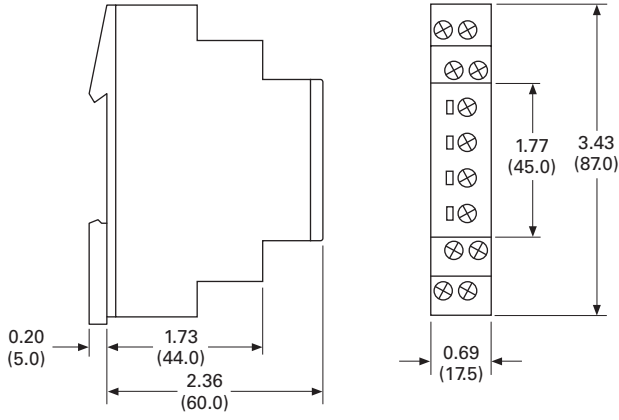
Double-Pole, Double-Throw Units (DPDT)—TRL27 and TRW27



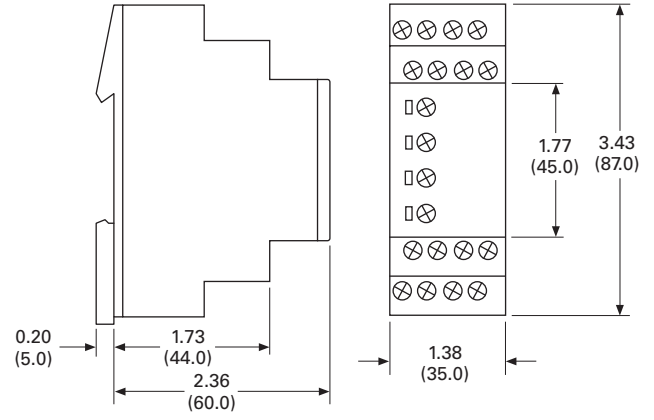
Dimensions

Approximate Dimensions in Inches (mm)

17.5 mm (TRL04 and TRL07)



35 mm (TRL27 and TRW27)



TR Series

3



TR Series

Product Description

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

Features

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

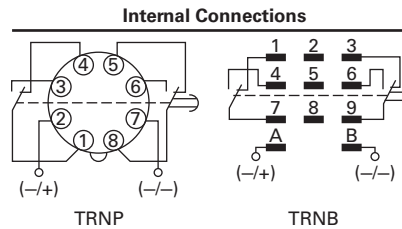
Contents

Description

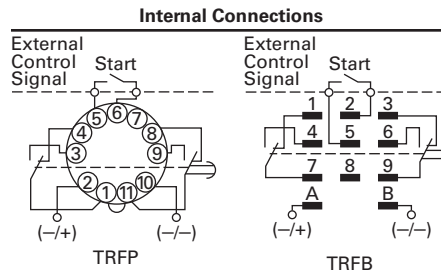
| | <i>Page</i> |
|---|------------------|
| Universal TR Series | V7-T3-172 |
| TR Series | |
| Catalog Number Selection | V7-T3-177 |
| Product Selection | V7-T3-177 |
| Accessories | V7-T3-177 |
| Technical Data and Specifications | V7-T3-178 |
| Dimensions | V7-T3-178 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Operation

TRNP and TRNB



TRFP and TRFB

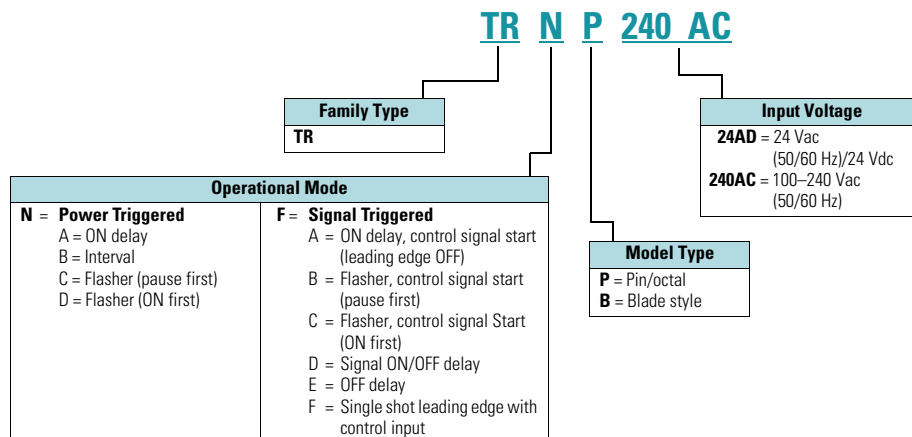


Standards and Certifications

- cULus listed
- CSA
- CE marked
- TUV



Catalog Number Selection



Product Selection

TR Plug-In Timing Relays—Power Triggered

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

TR Plug-In Timing Relays—Signal Triggered

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

Accessories

Sockets for Use with TR Timers—Standard Pack of 10

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

Technical Data and Specifications

General

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

TR Series Contact Ratings

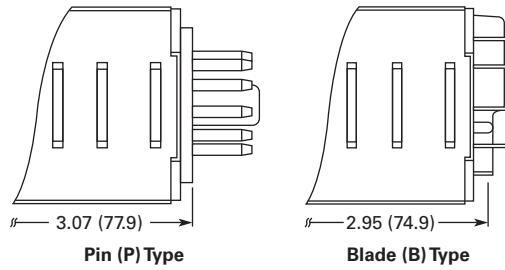
| Description | Specification |
|--------------------------------------|--|
| Contact configuration | 2 Form C, DPDT (delayed output) |
| Allowable voltage/current | 240 Vac, 30 Vdc/10 A |
| Max. permissible operating frequency | 1800 cycles per hour |
| Rated load | |
| Resistive | 10 A, 240 Vac/30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

Dimensions

Approximate Dimensions in Inches (mm)

TR Series Dimensions and Weights

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



Note

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

TMR5 Series



TMR5 Series

Product Description

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

Features

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

Contents

Description

| Description | Page |
|-----------------------------------|-----------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | |
| Catalog Number Selection | V7-T3-180 |
| Product Selection | V7-T3-180 |
| Accessories | V7-T3-180 |
| Technical Data and Specifications | V7-T3-181 |
| Wiring Diagrams | V7-T3-181 |
| Dimensions | V7-T3-182 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Standards and Certifications

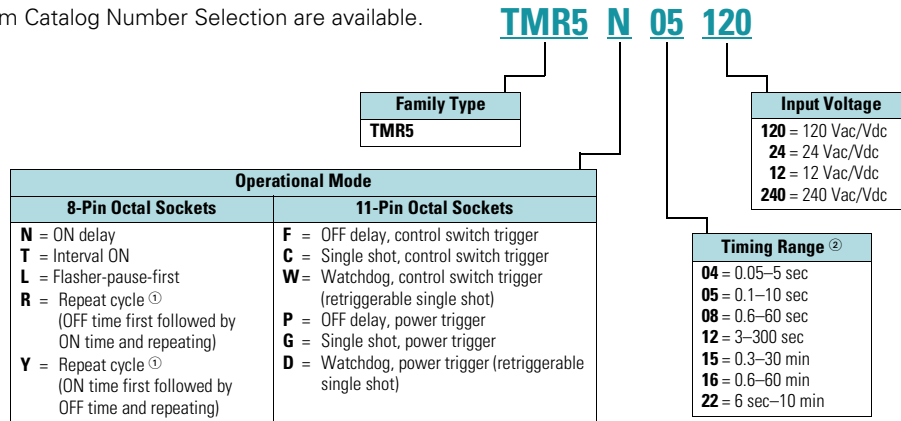
- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked

cRUUS

ROHS
COMPLIANT

Catalog Number Selection

All configurations from Catalog Number Selection are available.



Product Selection

TMR5 Time Delay Relays

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

Accessories

Accessories for Use with TMR5 Time Delay Relays

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

Notes

- Indicates DUAL knob unit. All dual knob units can have independently selectable and adjustable ON and OFF times. If different ON and OFF times are desired, add two codes for time ranges in the part number. The first code listed indicates the first timing range of the unit (OFF time for R, ON time for Y) and the second code indicates the second timing range (ON time for R, OFF Time for Y).
- Fixed time delay settings are available for orders of 50 pieces or more. Contact EatonCare for additional information at 877-ETN-CARE (386-2273).

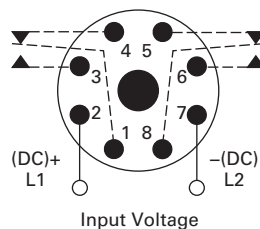
Technical Data and Specifications

TMR5 Time Delay Relays

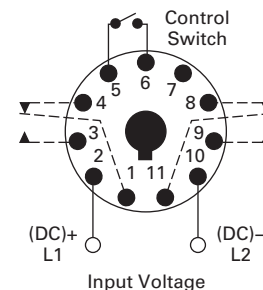
| Description | Specification |
|---|---|
| Voltage tolerance | |
| AC operation | +10/–15% of nominal at 50/60 Hz |
| DC operation | +10/–15% of nominal |
| Load burden | 2 VA |
| Setting accuracy | |
| Maximum setting (adjustable) | +5%, –0% |
| Minimum setting (adjustable) | +0%, –50% |
| Fixed time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

Wiring Diagrams

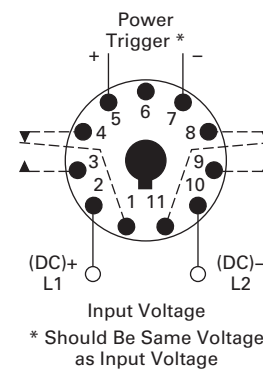
Wiring for 8-Pin Units



Wiring for 11-Pin Control Switch Trigger Units



Wiring for 11-Pin Power Trigger Units



3.8

Control Relays and Timers

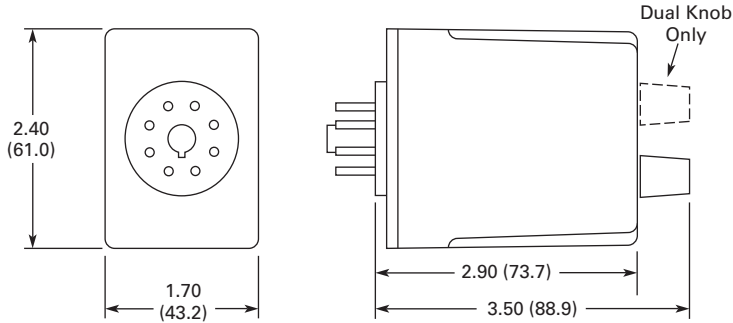
Timing Relays

Dimensions

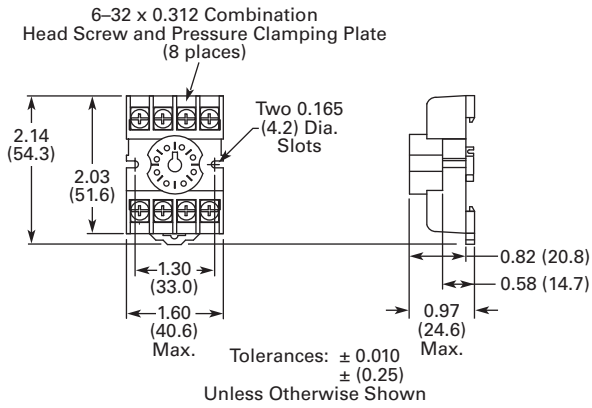
Approximate Dimensions in Inches (mm)

TMR5

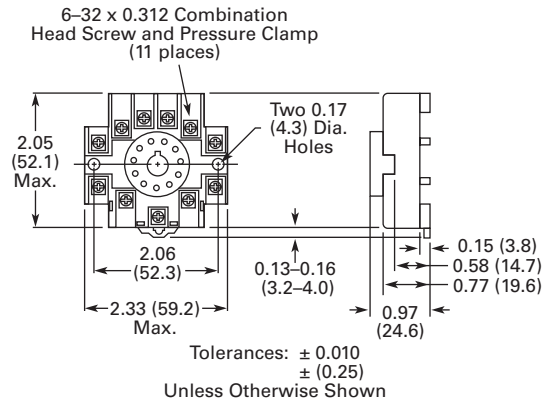
3



D3PA2 Socket



D3PA3 Socket



TMR6 Series



TMR6 Series

Product Description

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

Features

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

Timing Ranges

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

Timing Ranges

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

Contents

Description

| | Page |
|-----------------------------------|-----------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | |
| Catalog Number Selection | V7-T3-184 |
| Product Selection | V7-T3-184 |
| Accessories | V7-T3-184 |
| Technical Data and Specifications | V7-T3-184 |
| Wiring Diagram | V7-T3-184 |
| Dimensions | V7-T3-184 |
| TMRP Series | V7-T3-185 |

Operation

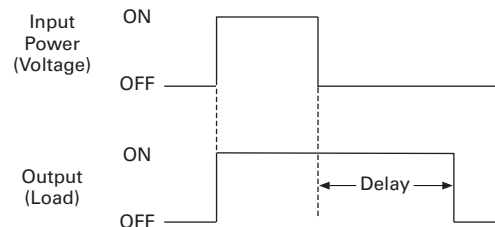
True OFF Delay

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

Voltage must be applied for a minimum of 0.1 second to assure proper operation.

Any application of the input voltage during the preset time will keep the relay energized and reset the time delay. No external trigger switch is required.

True OFF Delay



Standards and Certifications

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



3.8

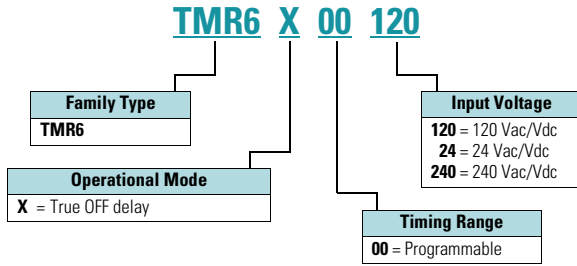
Control Relays and Timers

Timing Relays

3

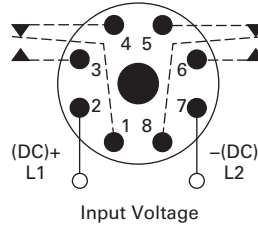
Catalog Number Selection

All configurations from Catalog Number Selection are available.



Wiring Diagram

Wiring for 8-Pin Units



Product Selection

TMR6 True OFF Delay Relays

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

Accessories

Accessories for Use with TMR6 Time Delay Relays

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

Technical Data and Specifications

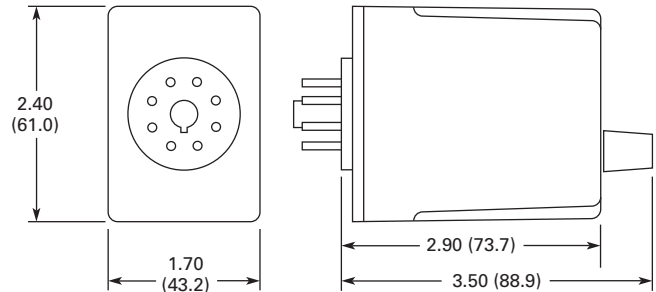
TMR6 Time Delay Relays

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

Dimensions

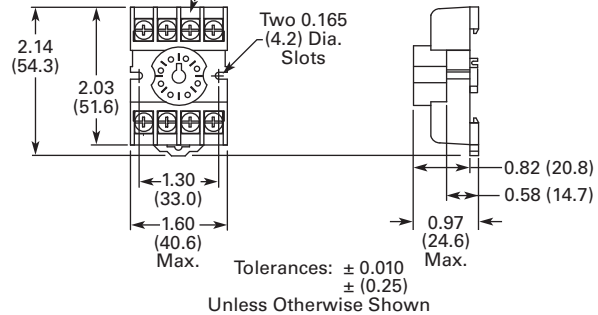
Approximate Dimensions in Inches (mm)

TMR6



D3PA2 Socket

6–32 x 0.312 Combination Head Screw and Pressure Clamping Plate (8 places)



TMRP Series



TMRP Series

Product Description

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

Application Description

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

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

Contents

| Description | Page |
|---|-------------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | |
| Product Selection | V7-T3-186 |
| Technical Data and Specifications | V7-T3-186 |
| Wiring Diagrams | V7-T3-187 |
| Dimensions | V7-T3-187 |

Features

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

LED Indicator

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

Standards and Certifications

- UL recognized
- CE marked
- RoHS compliant



Product Selection

TMRP5100

TMRP Timing Relays



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

Technical Data and Specifications

TMRP Timing Relays

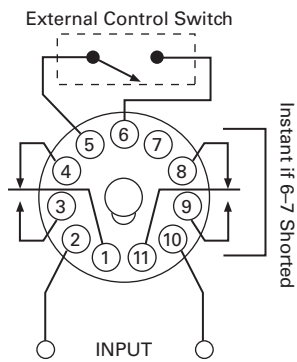
| Description | TMRP5100 | TMRP5101 | TMRP5102 |
|------------------------------|---|---|---|
| Functions ^① | A, B, C, D, E, F, G, H, I, J | A, B, C, D, E, F, G, H, I, J | A, B, C |
| Time range | 0.1 sec to 9,990 hours | 0.1 sec to 9,990 hours | 0.1 sec to 9,990 hours |
| Input | | | |
| Supply voltage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

Note

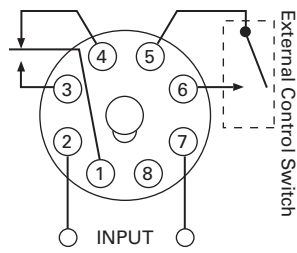
^① Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

Wiring Diagrams

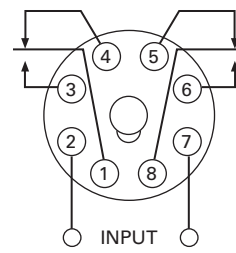
TMRP5100



TMRP5101



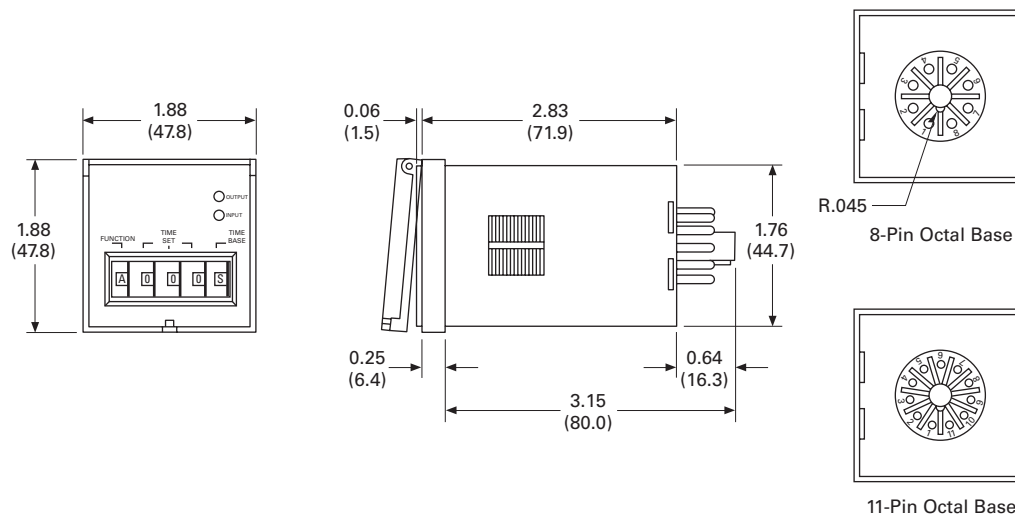
TMRP5102



Dimensions

Approximate Dimensions in Inches (mm)

TMRP Series



D85 Series—Alternating Relays



3

Product Description

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

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

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

Contents

Description

| | <i>Page</i> |
|---|------------------|
| D85 Series—Alternating Relays | |
| Product Selection | V7-T3-189 |
| Accessories | V7-T3-189 |
| Technical Data and Specifications | V7-T3-190 |
| Wiring Diagrams | V7-T3-190 |
| Dimensions | V7-T3-192 |

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

Features

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

Standards and Certifications

- CE
- cRUus
- UL listed ①
- RoHS compliant



Note

① When used with appropriate Eaton socket.

Product Selection

D85 Series—Alternating Relays ^①

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

Accessories

D85 Series—Alternating Relays

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

Note

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

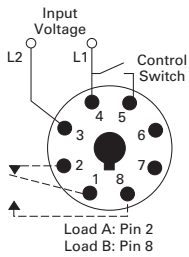
Technical Data and Specifications

D85 Series—Alternating Relays

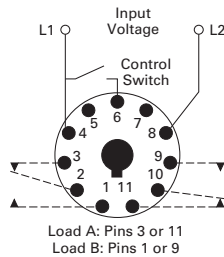
| Description | Specification |
|-----------------------------------|--|
| Voltage tolerance | +10%/-15% of control voltage at 50/60 Hz |
| Load (burden) | Less than 3 VA |
| Output contacts | 10 A resistive at 240 Vac / 30 Vdc, 1/2 hp at 120/240 Vac (NO), 1/3 hp at 120/240 Vac (NC) |
| Mechanical life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

Wiring Diagrams

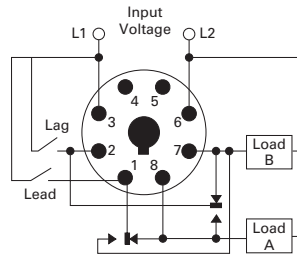
D851 Series Relays, SPDT



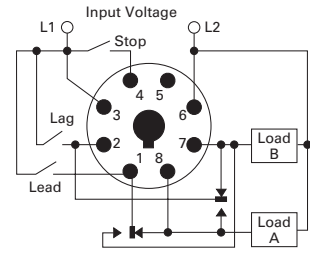
D852 Series Relays, DPDT



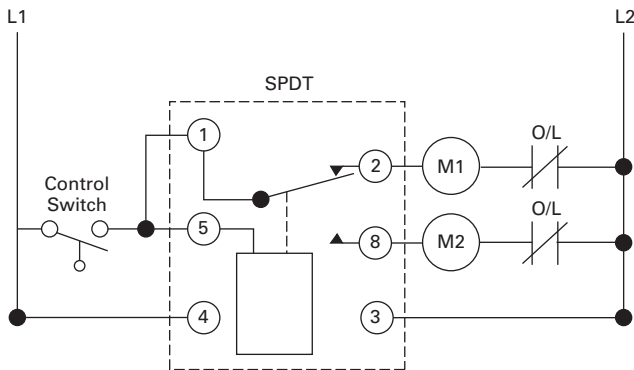
D852X Series Relays, DPDT Cross-Wired



D853 Series Relays, Three-Switch Applications



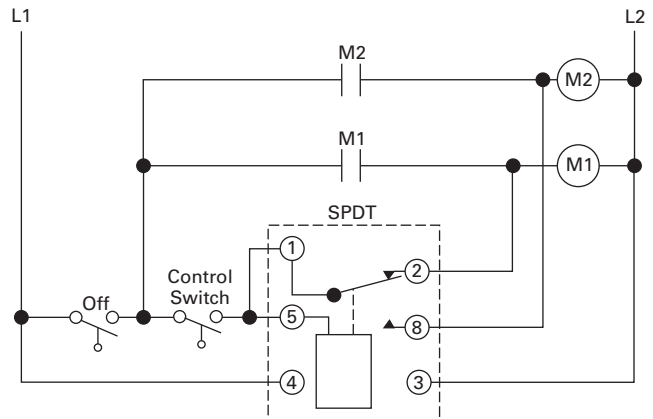
Typical Installations for SPDT and DPDT Alternating Relays, Standard Installation



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

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

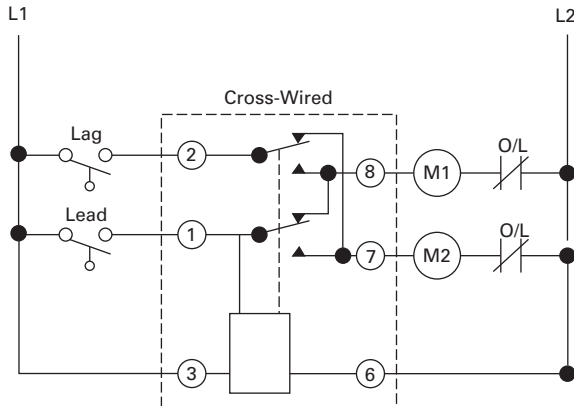
Typical Installations for SPDT and DPDT Alternating Relays, Anti-Bounce Installation



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

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

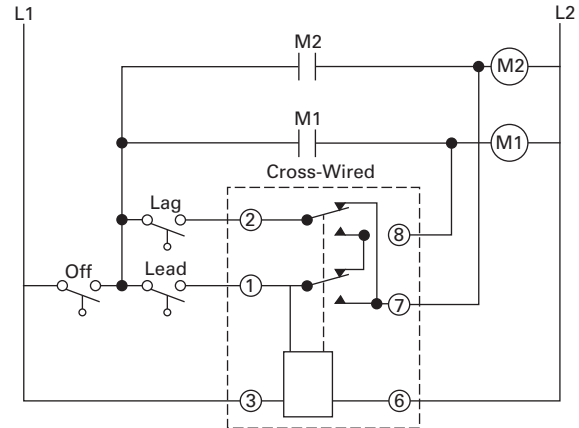
Typical Installations for DPDT Cross-Wired Alternating Relays, Standard Installation



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

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

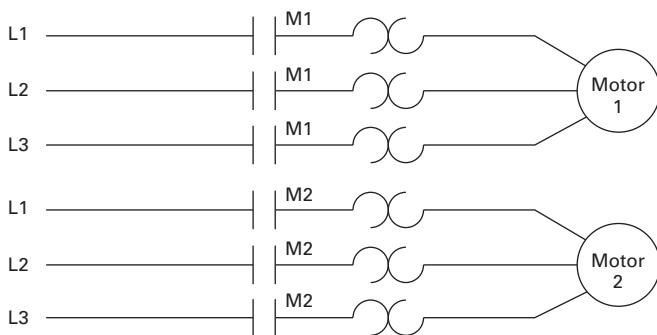
Typical Installations for DPDT Cross-Wired Alternating Relays, Anti-Bounce Installation



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

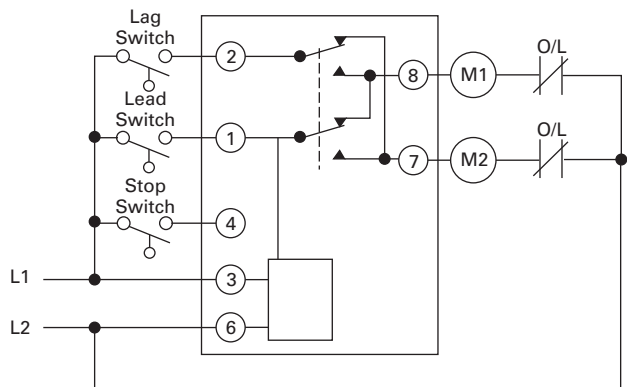
To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

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



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

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



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

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

3.9

Control Relays and Timers

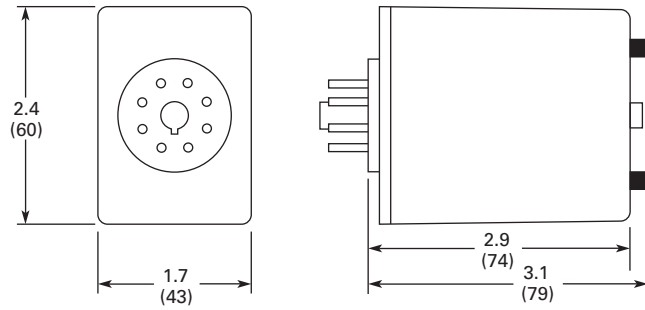
Alternating Relays

Dimensions

Approximate Dimensions in Inches (mm)

D85 Series—Alternating Relays

3



Safety Relays



Product Description

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

Application Description

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

Compatible with a wide variety of safety devices:

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

Contents

Description

Safety Relays

| | <i>Page</i> |
|---|-------------|
| Product Selection | V7-T3-194 |
| Technical Data and Specifications | V7-T3-195 |
| Dimensions | V7-T3-198 |

Features

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

Standards and Certifications

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



Product Selection

Safety Relays

Technical Overview

3



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

Application Overview

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

Application Overview, continued

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

Notes

- ① Laser scanners or light curtains with OSSD outputs.
- ② All main units can also be reset automatically or manually.

Technical Data and Specifications

Safety Relay

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

3.10

Control Relays and Timers

Safety Relays

Safety Relay, continued

| Description | Unit | ESR5-N0-21_ | ESR5-N0-41_ | ESR5-N0-31-24VAC-DC | ESR5-NZ-21_ |
|--|-------|--|---------------------------|--|---------------------------|
| Power Supply Circuit | | | | | |
| Actuating voltage 50/60 Hz | Vac | 24 | 24 | 24 | 24 |
| Actuating voltage— U_s | Vdc | 24 | 24 | 24 | 24 |
| Voltage tolerance pick-up voltage | x_e | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 |
| Power consumption | | | | | |
| AC operated 50/60 Hz | VA | — | — | — | — |
| AC operated 50/60 Hz | W | 3.4 | 3.4 | 3.4 | 3 |
| DC operated | W | 1.6 | 1.6 | 1.6 | 1.5 |
| Fuse for control circuit supply | | | | | |
| 24 V | | Short-circuit proof | Short-circuit proof | Short-circuit proof | Short-circuit proof |
| 115/230 V | | — | — | — | — |
| Control Circuit | | | | | |
| Rated output voltage | Vdc | 24 | 24 | 24 | 24 |
| Rated operational current | mA | S12, S22: 30, S34: 45 | S12: 65, S34: 40 | S12, S22: 30, S34: 45 | S11, S21: 60, Y2: 45 |
| Resistance—R | | 50 | 22 | 50 | 22 |
| Short-circuit current | A | 2.3 | 2.3 | 2.3 | 2.3 |
| Response time | ms | 100 | 65 | 100 | 50 |
| Recovery time | ms | — | — | — | — |
| Response time with reset monitoring— t_{A1} | ms | — | — | — | — |
| Response time without reset monitoring— t_{A2} | ms | 100 | 65 | 100 | 50 |
| Reset time— t_R/t_{R1} | ms | Single-channel 45; dual-channel 10 | 45 | Single-channel 45; dual-channel 10 | 20 |
| Minimum on duration— t_M | ms | — | — | — | — |
| Recovery time— t_W | ms | Approx. 1000 | Approx. 1000 | Approx. 1000 | Approx. 1000 |
| Synchronous monitoring time— t_S | ms | — | — | — | 500 |
| Electromagnetic Compatibility (EMC) | | | | | |
| Emitted interference | | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 |
| Interference immunity | | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 |

Safety Relay, continued

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

3.10

Control Relays and Timers

Safety Relays

3

Safety Relay, continued

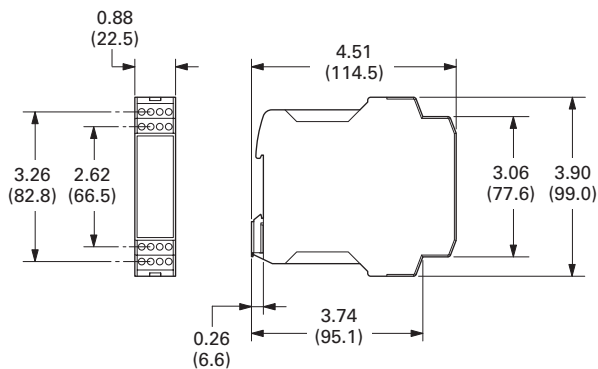
| Description | Unit | ESR5-NO-31-230VAC | ESR5-NO-31-24V-230 VAC-DC | ESR5-NV3_ | ESR5-VE3_ | ESR5-NE-51_ |
|--|-------|---------------------------------|---------------------------------|--|---------------------------|---------------------------|
| Power Supply Circuit | | | | | | |
| Actuating voltage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

Dimensions

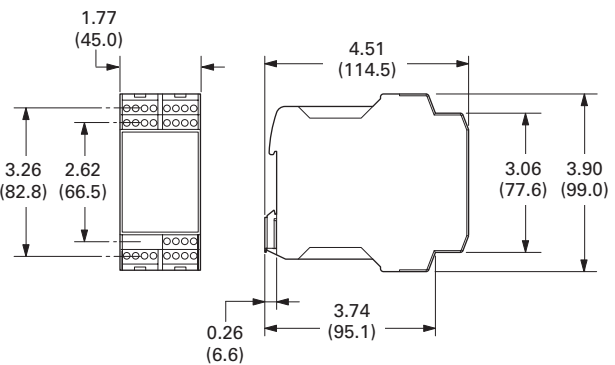
Approximate Dimensions in Inches (mm)

Safety Relays, Contact Expansion Modules

ESR5_ 24 Vac/Vdc



ESR5_ 230 Vac



easySafety



Product Description

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

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

Application Description

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

Contents

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

Features

Safety function blocks:

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

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

Standards and Certifications

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



Product Selection

easySafety

easySafety Relays ①



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

Accessories

easySoft



Programming Software

| Description | Catalog Number |
|--|-----------------|
| easySoft-Safety (including easySoftPro) ② | ESP-SOFT |

Memory Card



Memory Card

| Description | Catalog Number |
|---------------|-----------------------|
| 256 kB module | ES4A-MEM-CARD1 |

Programming Cables

| Description | Catalog Number |
|------------------------------|-----------------------|
| SUB-D, nine-pole, serial, 2m | EASY800-PC-CAB |

SUB-D Cable

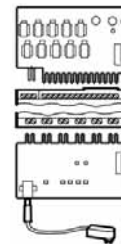


| Description | Catalog Number |
|-------------|------------------------|
| USB, 2m | EASY800-USB-CAB |

USB Cable



Input/Output Simulator



Input/Output Simulator

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

Notes

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

Technical Data and Specifications

easySafety Relay

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

easySafety Relay, continued

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

easySafety Relay, continued

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

3.11

Control Relays and Timers

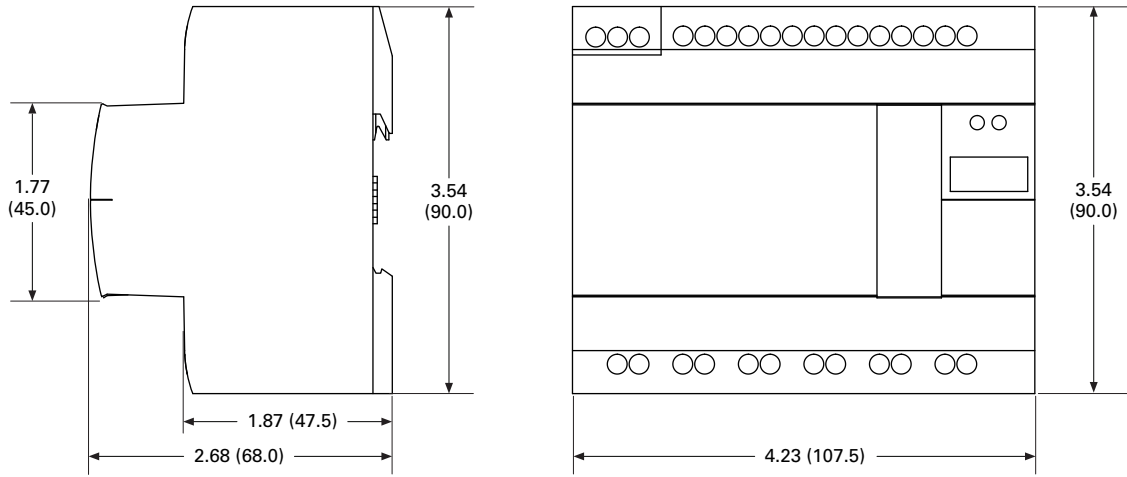
easySafety

Dimensions

Approximate Dimensions in Inches (mm)

ESR5_

3



easyRelay Programmable Relays



D1 Series General Purpose Relay



D96 Series Solid-State Relay



Universal TR Series Timing Relay



Safety Relay



3.1 Relay Products

Control Relays and Timers Comparison **V7-T3-2**

3.2 XR Series Terminal Block Relays

Standard, OptoCoupler and High Current
 Catalog Number Selection **V7-T3-3**

3.3 Programmable Relays

easy500, easy700, easy800, easy802/806 Relays and MFD-Titan Multi-Function Displays
 Product Overview **V7-T3-19**

3.4 General Purpose Plug-In Relays

General Purpose Relays—D1, D2, D3, D4, D5, D7, D8 and D9 Series
 Product Selection Guide **V7-T3-49**

3.5 General Purpose Open Style Relays

9575H Series 3000 Relay
 9575H Series 3000—Type AA, AC and DC **V7-T3-118**

3.6 Solid-State Relays

D93, D96 and D99 Series
 Product Overview **V7-T3-122**

3.7 Machine Tool Relays

D15, BF/BFD, AR/ARD and D26 Series
 Product Overview **V7-T3-141**

3.8 Timing Relays

Universal TR, TR and TMR Series
 Product Selection Guide **V7-T3-167**

3.9 Alternating Relays

D85 Series
 Product Description **V7-T3-188**

3.10 Safety Relays

ESR5 Series
 Product Description **V7-T3-193**

3.11 easySafety

ES4P Series
 Product Description **V7-T3-199**

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

Tab 3—Control Relays and Timers

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



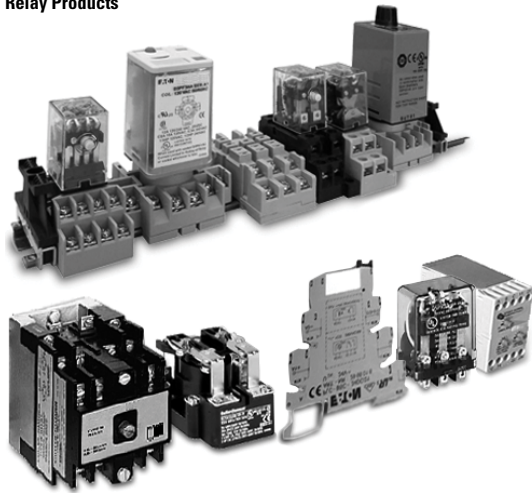
Powering Business Worldwide

3.1

Control Relays and Timers

Relay Product Overview

Relay Products



3

Contents

| <i>Description</i> | <i>Page</i> |
|--------------------------------------|------------------|
| Terminal Block Relays | V7-T3-3 |
| Programmable Relays | V7-T3-19 |
| General Purpose Plug-In Relays | V7-T3-49 |
| General Purpose Type AA Relays | V7-T3-118 |
| Solid-State Relays | V7-T3-122 |
| Machine Tool Relays | V7-T3-141 |
| Timing Relays | V7-T3-167 |
| Alternating Relays | V7-T3-188 |
| Safety Relays | V7-T3-193 |

Control Relays and Timers Comparison

Selection Guide by Catalog Number Prefix

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

Terminal Block Relays



Contents

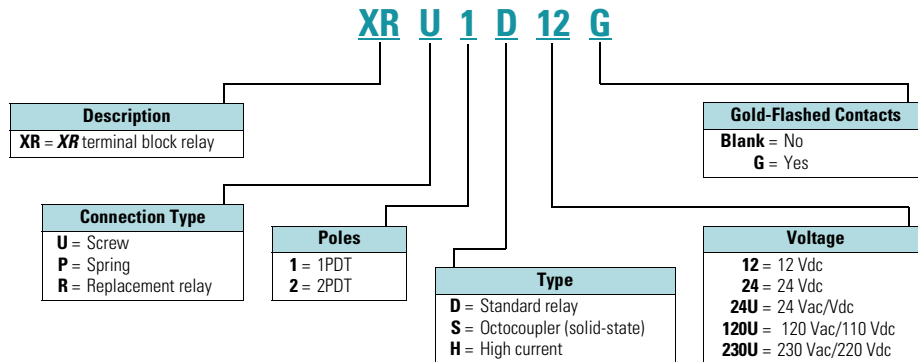
Description

Terminal Block Relays

| | |
|--|-----------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

Catalog Number Selection

XR Series—Overview



Standard Terminal Block Relay



Contents

| <i>Description</i> | <i>Page</i> |
|--|-----------------|
| Standard Terminal Block Relays | |
| Product Selection | V7-T3-5 |
| Technical Data and Specifications | V7-T3-6 |
| Electrical Schematics | V7-T3-11 |
| Dimensions | V7-T3-11 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

Standard Terminal Block Relays

Product Description

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

Application Description

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

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

Features

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

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1D 24U



Standard Terminal Block Relays

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

Standard Replacement Relays

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

Note

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

Technical Data and Specifications

Standard 1PDT Screw Connection Terminal Block Relays

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

Note

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

Standard 1PDT Screw Connection Terminal Block Relays with Gold Contacts

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

Notes

- ^① The separating plate, XRAPLCEsk, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.
- ^② If the maximum values are exceeded, the gold layer is destroyed and the values in parentheses apply.

Standard 1PDT Spring Cage Terminal Block Relays

| Catalog Number | XRP1D12 | XRP1D24 | XRP1D24U | XRP1D120U |
|---|--|--|-------------------------------------|-------------------------------------|
| Replacement Relay | XRR1D12 | XRR1D24 | XRR1D24 | XRR1D120U |
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Connection Data | | | | |
| Rigid solid AWG (mm ²) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) |
| Flexible stranded AWG (mm ²) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) | 26–14 (0.14–2.5) |
| Input Data for 1PDT Spring Cage Versions | | | | |
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Permissible range | See Page V7-T3-10 | See Page V7-T3-10 | See Page V7-T3-10 | See Page V7-T3-10 |
| Typical input current | 15.3 mA | 9 mA | 11 mA (24 Vac)/8.5 mA (24 Vdc) | 3.5 mA (120 Vac)/3 mA (110 Vdc) |
| Typical response time | 5 ms | 5 ms | 6 ms | 6 ms |
| Typical release time | 8 ms | 8 ms | 15 ms | 15 ms |
| Input protection | Polarity protection diode, free-wheeling diode | Polarity protection diode, free-wheeling diode | Bridge rectifier | Bridge rectifier |
| Output Data | | | | |
| Contact type | 1PDT | 1PDT | 1PDT | 1PDT |
| Contact material | AgSnO | AgSnO | AgSnO | AgSnO |
| Max. switching voltage | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① | 250 Vac/Vdc ^① |
| Min. switching voltage | 12 Vac/Vdc | 12 Vac/Vdc | 12 Vac/Vdc | 12 Vac/Vdc |
| Limiting continuous current | 6 A | 6 A | 6 A | 6 A |
| Min. switching current | 10 mA | 10 mA | 10 mA | 10 mA |
| Min. switching power | 120 mW | 120 mW | 120 mW | 120 mW |
| Miscellaneous Data | | | | |
| Ambient temp range | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +140 °F (–20 °C to +60 °C) | –4 °F to +131 °F (–20 °C to +55 °C) |
| Rated operating mode | 100% operating factor | 100% operating factor | 100% operating factor | 100% operating factor |
| Inflammability class | V0, in accordance with UL 94 | V0, in accordance with UL 94 | V0, in accordance with UL 94 | V0, in accordance with UL 94 |
| Mechanical service life | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles | 2 x 10 ⁷ cycles |

Note

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

Standard DPDT Screw Connection Terminal Block Relays

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

Note

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

3.2

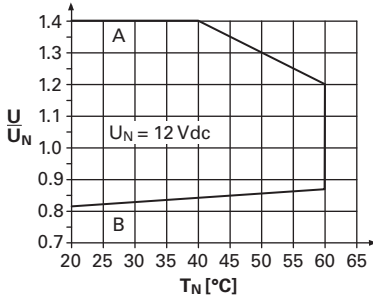
Control Relays and Timers

Terminal Block Relays

Permissible Range Diagrams

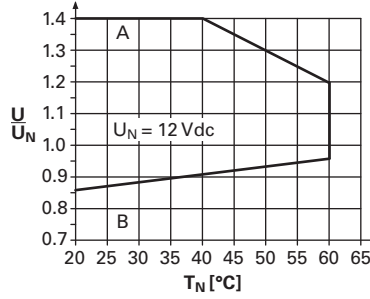
1PDT Relay Modules

Operating Range Voltage for 12 Vdc

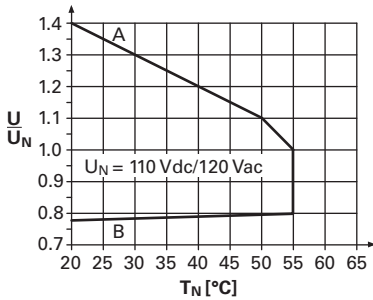


DPDT Relay Modules

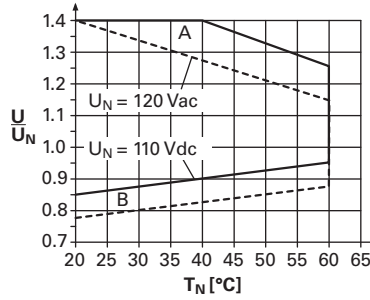
Operating Range Voltage for 12 Vdc



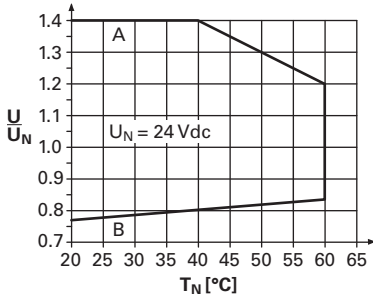
Operating Range Voltage for 120 Vac/110 Vdc



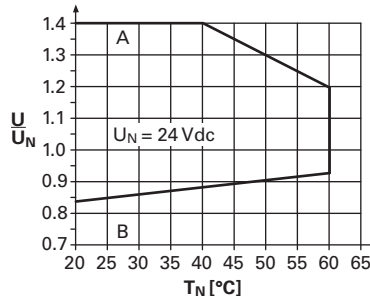
Operating Range Voltage for 120 Vac/110 Vdc



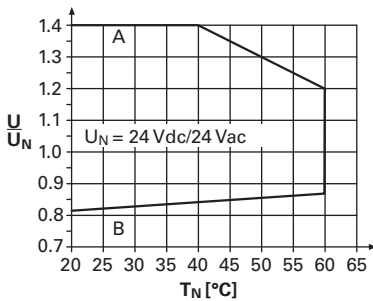
Operating Range Voltage for 24 Vdc



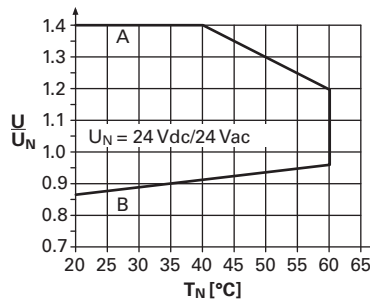
Operating Range Voltage for 24 Vdc



Operating Range Voltage for 24 Vac/Vdc



Operating Range Voltage for 24 Vac/Vdc



Notes

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

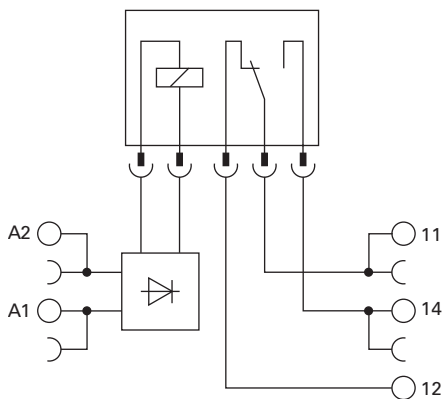
Curve A — Maximum permissible continuous operating voltage U_{max} with limiting continuous current on the contact side (see respective technical data).

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

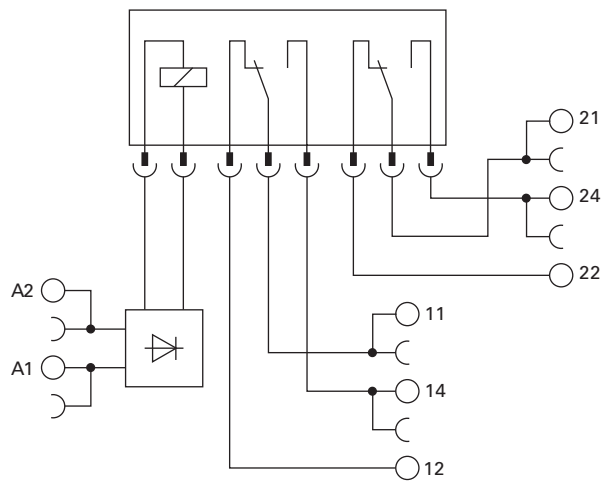
^① Pre-excitation: Relay has been operated in a thermally steady state at the ambient temperature T_U with nominal voltage U_N and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably pick up again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

Electrical Schematics

1PDT Terminal Block Relays



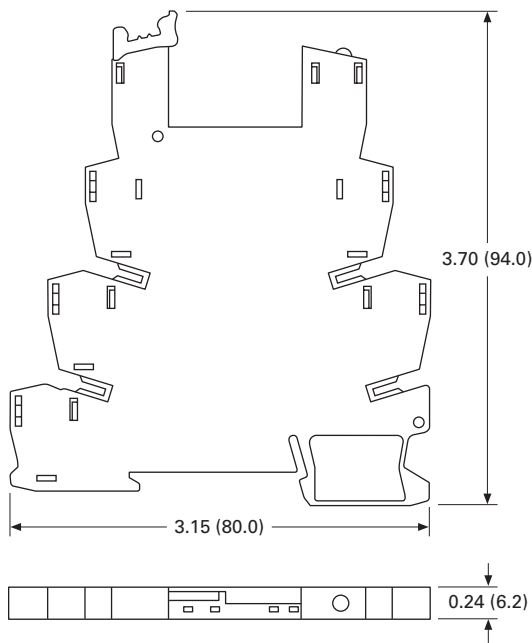
DPDT Terminal Block Relays



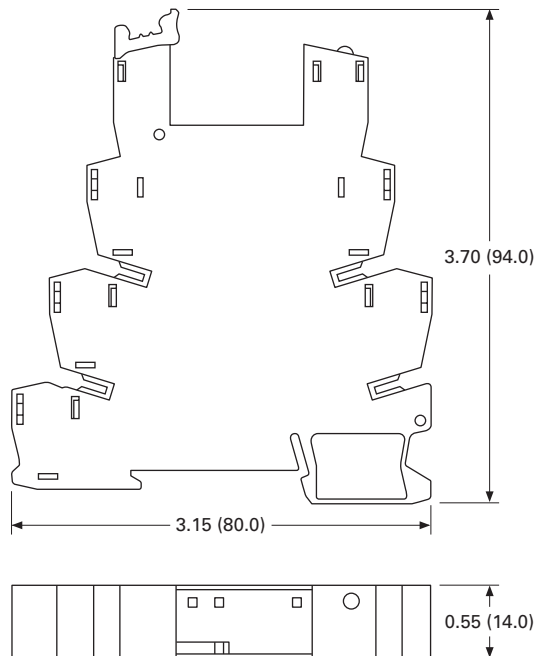
Dimensions

Approximate Dimensions in Inches (mm)

Standard 1PDT Terminal Block Relays



Standard DPDT Terminal Block Relays



OptoCoupler Terminal Block Relay



3

Contents

| <i>Description</i> | <i>Page</i> |
|--|--------------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | |
| Product Selection | V7-T3-13 |
| Technical Data and Specifications | V7-T3-13 |
| Electrical Schematic | V7-T3-14 |
| Dimensions | V7-T3-14 |
| High Current Terminal Block Relays | V7-T3-15 |
| XR Series Accessories | V7-T3-18 |

OptoCoupler Terminal Block Relays

Product Description

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

Application Description

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

Features

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

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1S24



OptoCoupler Terminal Block Relays

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

OptoCoupler Replacement Relays

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

Technical Data and Specifications

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays

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

Note

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

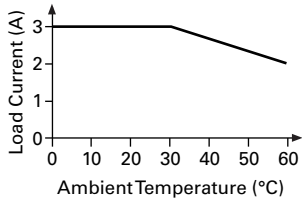
3.2

Control Relays and Timers

Terminal Block Relays

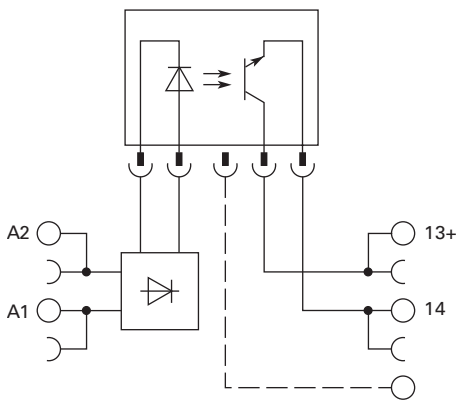
3

Derating Curve OptoCoupler



Electrical Schematic

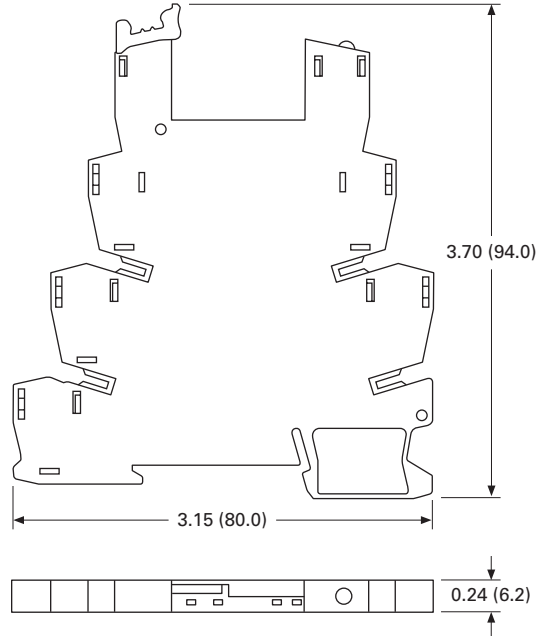
Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



High Current Terminal Block Relay



Contents

| Description | Page |
|---|-----------------|
| Standard Terminal Block Relays | V7-T3-4 |
| OptoCoupler Terminal Block Relays | V7-T3-12 |
| High Current Terminal Block Relays | |
| Product Selection | V7-T3-16 |
| Technical Data and Specifications | V7-T3-16 |
| Electrical Schematic | V7-T3-17 |
| Dimensions | V7-T3-17 |
| XR Series Accessories | V7-T3-18 |

High Current Terminal Block Relays

Product Description

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

Application Description

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

Features

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

Standards and Certifications

- cULus listed
- CE



Product Selection

XRU1H24



High Current Terminal Block Relays

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

High Current Replacement Relays

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

Technical Data and Specifications

High Current Terminal Block Relays (1PDT)

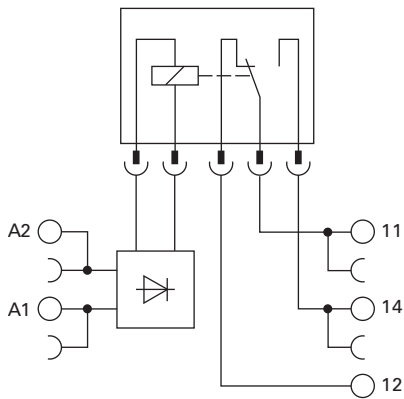
| Catalog Number Replacement Relay | XRU1H12 XRR1H12 | XRU1H24 XRR1H24 | XRU1H24U XRR1H24U | XRU1H120U XRR1H120U |
|---|---|---|-------------------------------------|-------------------------------------|
| Input voltage | 12 Vdc | 24 Vdc | 24 Vac/Vdc | 120 Vac/110 Vdc |
| Connection Data | | | | |
|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

Notes

- ^① Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.
- ^② The separating plate, XRAPLCEsk, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.
- ^③ The current rating for the normally open contact (#14) is 10 A. The current rating for the normally closed contact (#12) is 6 A and can be increased to 10 A by bridging the two #12 contact connections.

Electrical Schematic

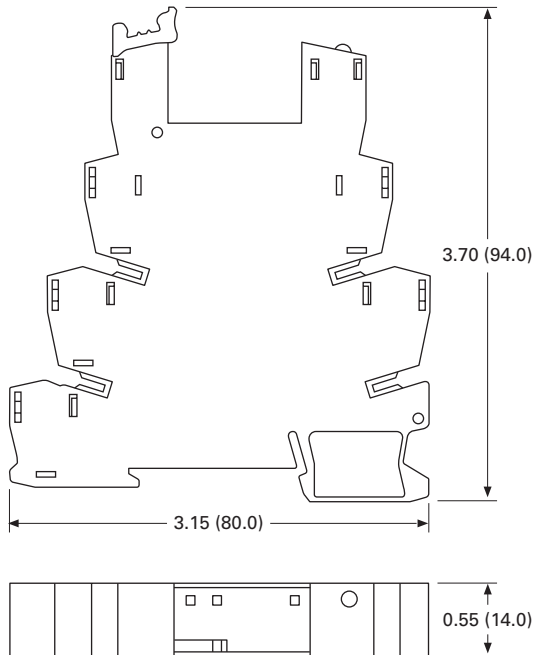
High Current Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

High Current Terminal Block Relays



XR Series Accessories

Product Description

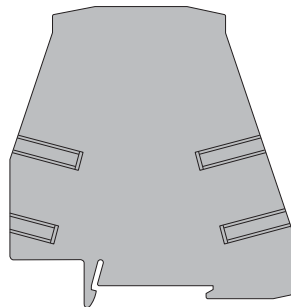
Power Terminal Block

Bridges

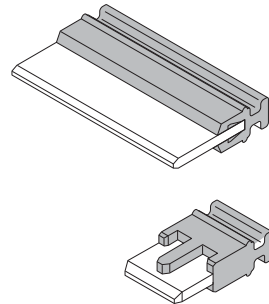


The XRAPLCESK power terminal block has the same shape as the relay modules and is used to feed in the bridging potentials. The nominal current is 32 A. When the total current is less than or equal to 6 A, supply can take place directly at the connecting terminal blocks of one of the connected relays.

End Cover



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



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

Product Selection

XR Series Accessories

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

Technical Data and Specifications

Power Terminal Block

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

Note

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

Programmable Relays



Product Overview

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

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

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

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

Contents

| Description | Page |
|--|-----------------|
| Programmable Relays | |
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Application Description

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

Typical control applications are:

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

See publication no. **AP05013001E** for the easyRelay application guide. Download from www.eaton.com/easyrelays.

easy500/700/800 Programmable Relays



3

easy500/700/800 Programmable Relays

Product Description

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

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

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

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

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

Standards

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

Certifications

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



Shipping Approvals

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

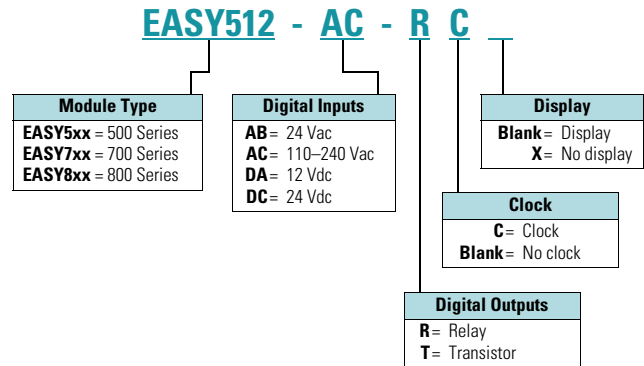
Contents

Description

| Description | Page |
|--|----------|
| easy500/700/800 Programmable Relays | |
| System Overview | V7-T3-21 |
| Product Selection | V7-T3-23 |
| Technical Data and Specifications | V7-T3-24 |
| Dimensions | V7-T3-25 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Catalog Number Selection

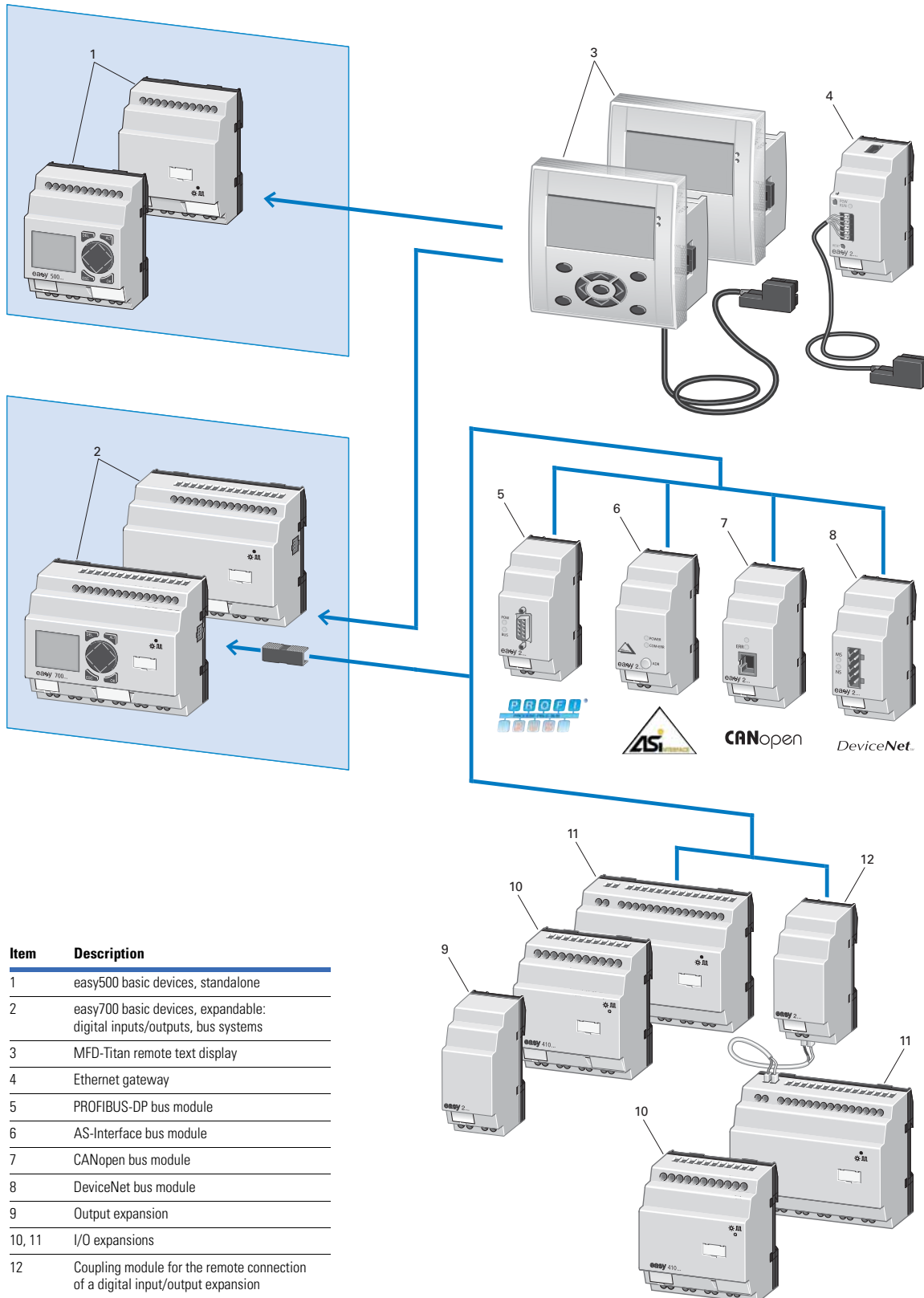
easy500/700/800



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

System Overview

easy500/700 Programmable Relays



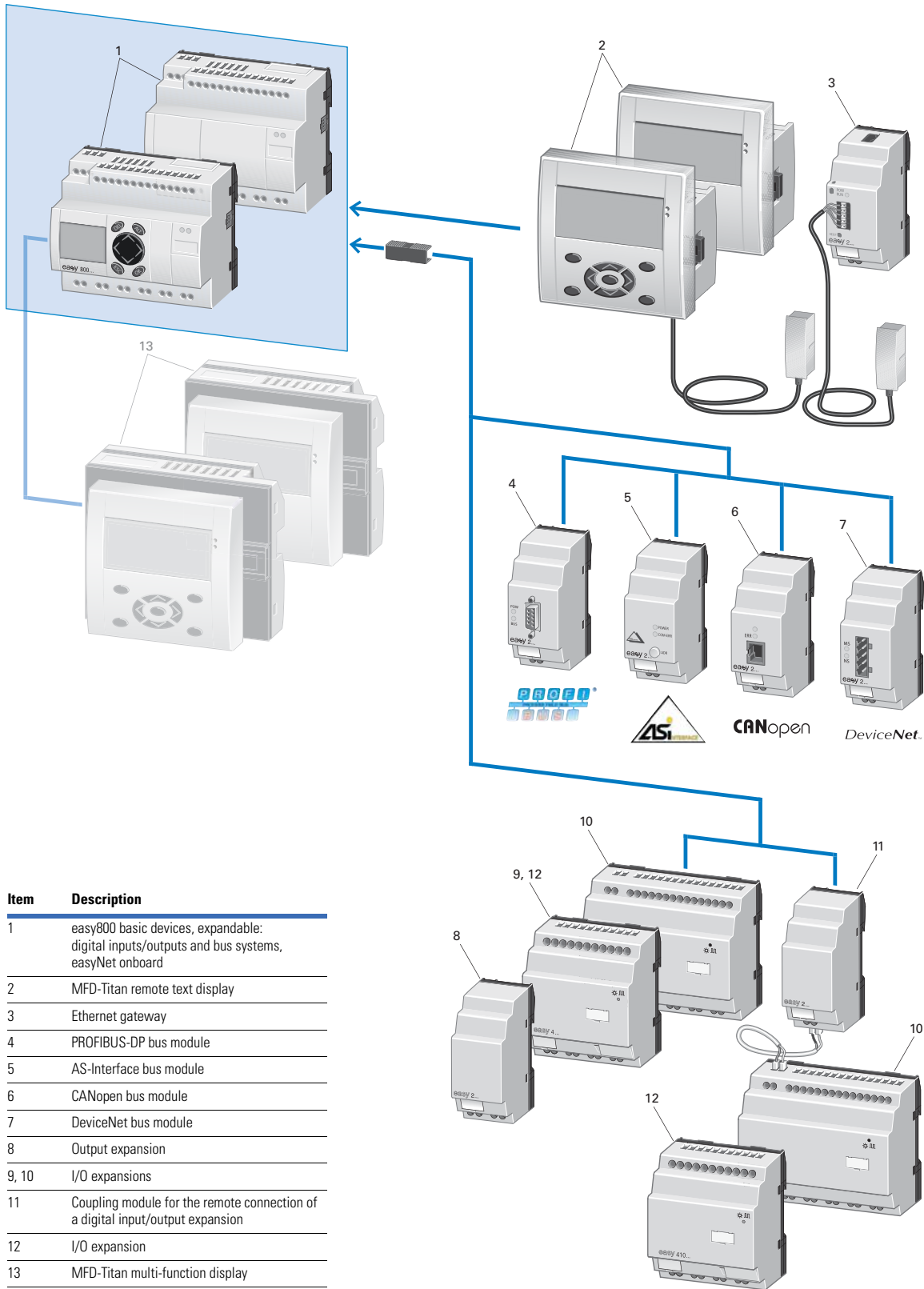
3.3

Control Relays and Timers

Programmable Relays

easy800 Programmable Relay

3



Product Selection

easy500—Display



easy500 Programmable Relays (Standalone)

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

easy500—No Display



easy700—Display



easy700 Programmable Relays (Expandable and Networkable)

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

easy700—No Display



easy800—Display



easy800 Programmable Relays (Expandable and Networkable)

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

easy800—No Display



Note

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

Technical Data and Specifications

easy500 Series

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

easy700 Series

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

easy800 Series

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

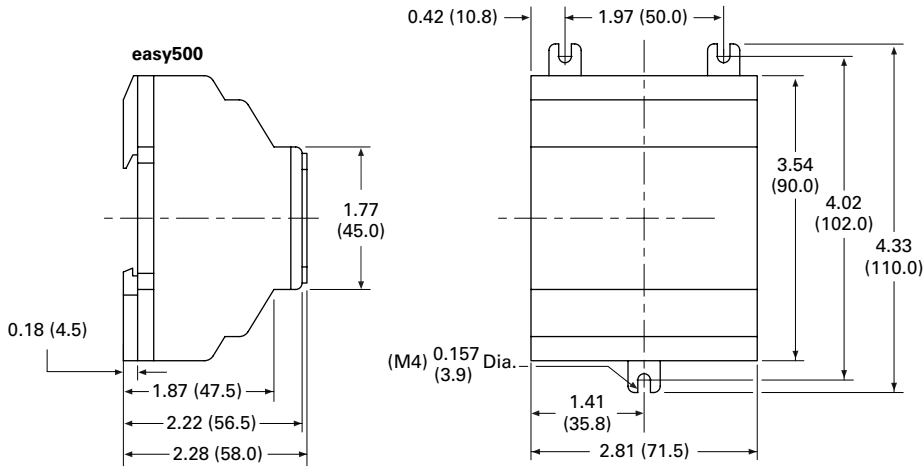
Note

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

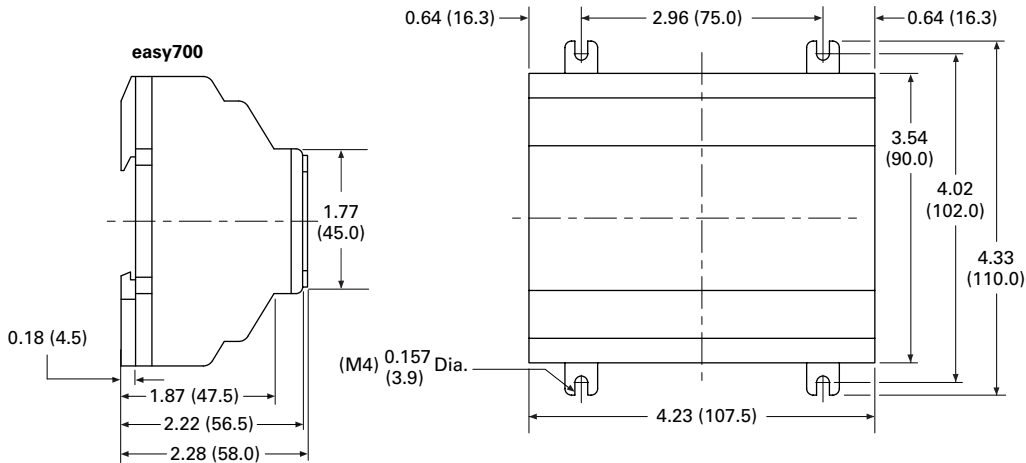
Dimensions

Approximate Dimensions in Inches (mm)

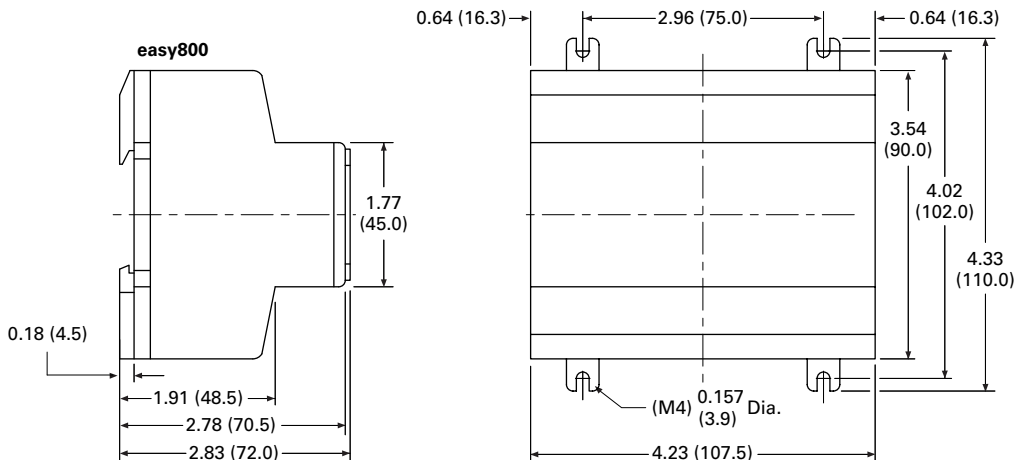
easy500 Series, Drawing Number MD05013001E



easy700 Series, Drawing Number MD05013002E



easy800 Series, Drawing Number MD05013003E



easy802/806 Programmable Relays with SmartWire-DT



easy802/806 Programmable Relays with SmartWire-DT

Product Description

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

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

Contents

Description

| <i>Description</i> | <i>Page</i> |
|--|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | |
| Product Selection | V7-T3-27 |
| Accessories. | V7-T3-27 |
| Technical Data and Specifications. | V7-T3-28 |
| Dimensions. | V7-T3-29 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

Standards

- EN 50178
- IEC/EN 60947
- UL 508

Certifications

- cULus
- CE
- C-Tick



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

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

Note

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

Product Selection

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

EASY802-DC-SWD



easy800 with SmartWire-DT

| Supply Voltage | Description | Catalog Number |
|----------------|---------------------------------|-----------------------|
| 24 Vdc | Control relay with SmartWire-DT | EASY802-DC-SWD |

EASY806-DC-SWD



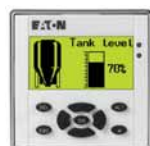
| | | |
|--------|---|-----------------------|
| 24 Vdc | Control relay with SmartWire-DT, four inputs, two of which can be used as outputs (transistor 24 Vdc, 0.1 A), easyNet onboard | EASY806-DC-SWD |
|--------|---|-----------------------|

Remote Displays

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

Accessories

MFD-80



Accessories—easy800

| Description | Catalog Number |
|-----------------------------------|----------------|
| MFD display, NEMA 4X indoor rated | MFD-80 |

MFD-CP4



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

Technical Data and Specifications

easy802/806 Programmable Relays with SmartWire-DT

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

Note

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

easy802/806 Programmable Relays with SmartWire-DT, continued

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

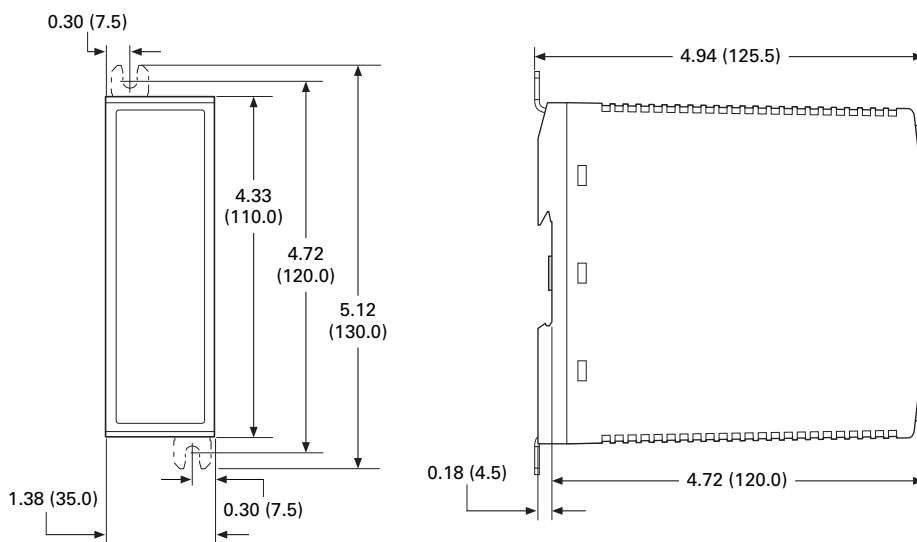
Notes

① If present.

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

Dimensions

Approximate Dimensions in Inches (mm)

easy802 and easy806 Controllers

easyRelay Expansion Modules



3

Contents

| <i>Description</i> | <i>Page</i> |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | |
| Product Selection | V7-T3-31 |
| Technical Data and Specifications | V7-T3-31 |
| Dimensions | V7-T3-32 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

easyRelay and MFD Expansion Modules

Product Description

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

Standards

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

Certifications

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



Shipping Approvals

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

Product Selection

EASY618_



Digital I/O Expansion Modules

Can be used via easyLink.

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

EASY406_



Analog I/O Expansion Modules

Can be used via easyLink.

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

Technical Data and Specifications

easyRelay I/O Expansion Modules

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

3.3

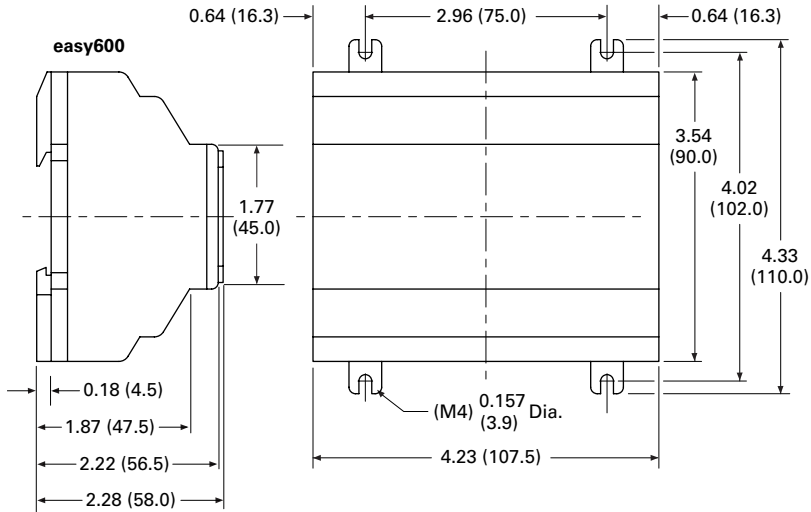
Control Relays and Timers

Programmable Relays

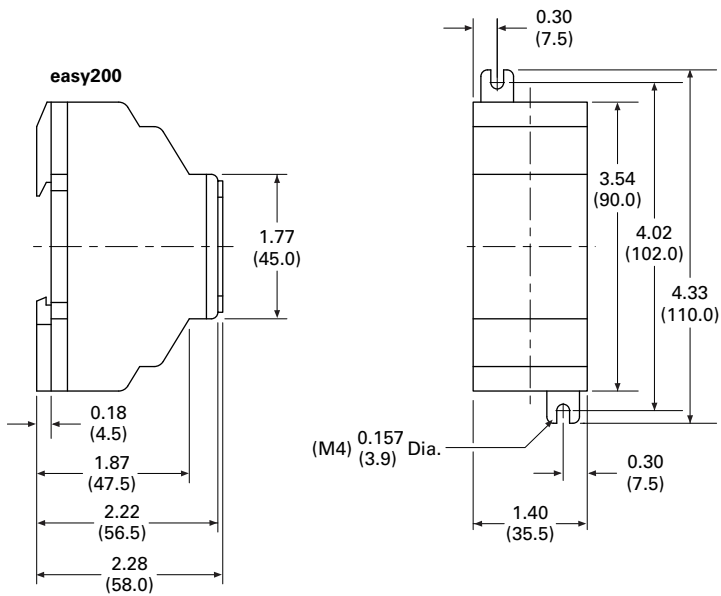
Dimensions

Approximate Dimensions in Inches (mm)

easy600 Series, Drawing Number MD05013002E



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



MFD-Titan Multi-Function Displays**Contents**

| Description | Page |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-33 |
| MFD-Titan Multi-Function Displays | |
| System Overview | V7-T3-34 |
| Product Selection | V7-T3-35 |
| Accessories | V7-T3-36 |
| Technical Data and Specifications | V7-T3-37 |
| Dimensions | V7-T3-38 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

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

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

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

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

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

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

Standards

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

Certifications

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

**Shipping Approvals**

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

3.3

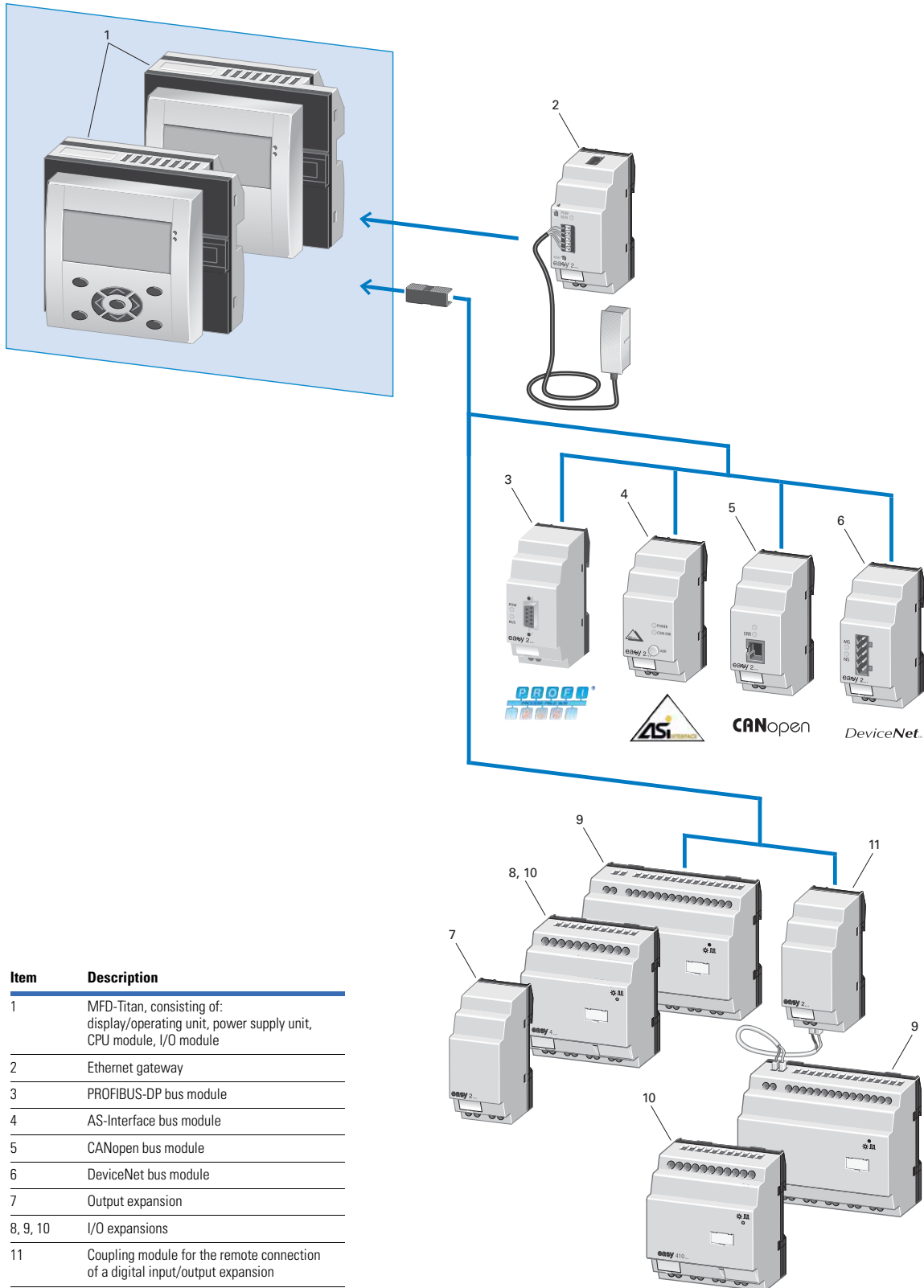
Control Relays and Timers

Programmable Relays

System Overview

MFD-Titan Multi-Function Display

3



Product Selection

MFD-80-B



MFD-Titan Display/Operator Units

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

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

MFD-CP4



MFD-Titan Text/Graphics Display Power Module

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

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

MFD-CP



MFD-Titan Controller Modules

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

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

Notes

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

MFD-R16



MFD-Titan I/O Modules

For use with MFD-Titan controller modules.

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

MFD-TP_



MFD-Titan I/O Modules with Temperature Detection

For use with MFD-CP8_ ^② and MFD-CP10_ MFD-Titan controller modules.

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

Accessories

Miscellaneous Parts

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

Notes

- ^① Analog inputs optional. Use of analog inputs will result in a decrease in the same number of available digital inputs
- ^② Version 8 and higher MFD-CP8_ controllers are compatible with the temperature detection modules.

Technical Data and Specifications

MFD-80, MFD-CP4, MFD-CP8

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

MFD-Titan I/O Modules

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

MFD-CP4 and CP8 Communication Modules

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

Note

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

3.3

Control Relays and Timers

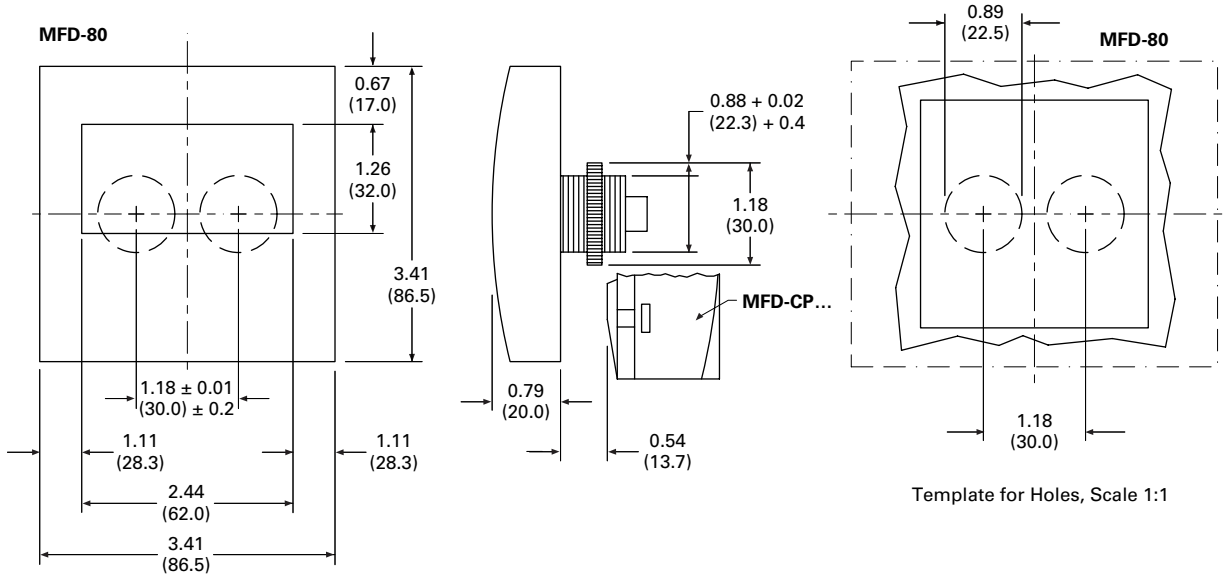
Programmable Relays

Dimensions

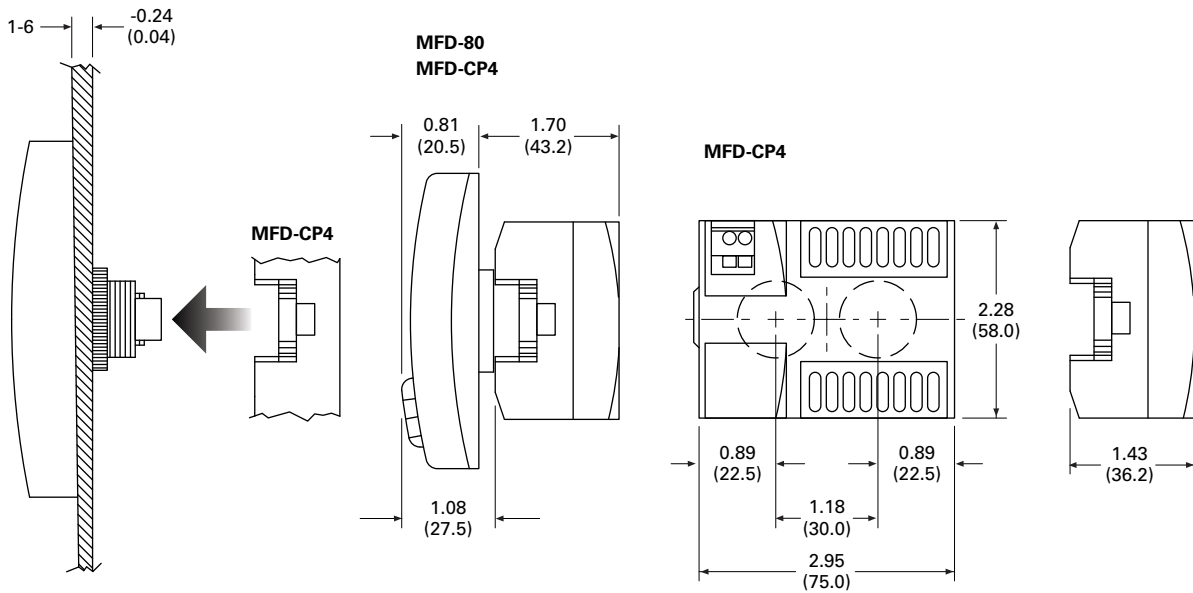
Approximate Dimensions in Inches (mm)

MFD-80 Series, Drawing Number MD05013005E

3

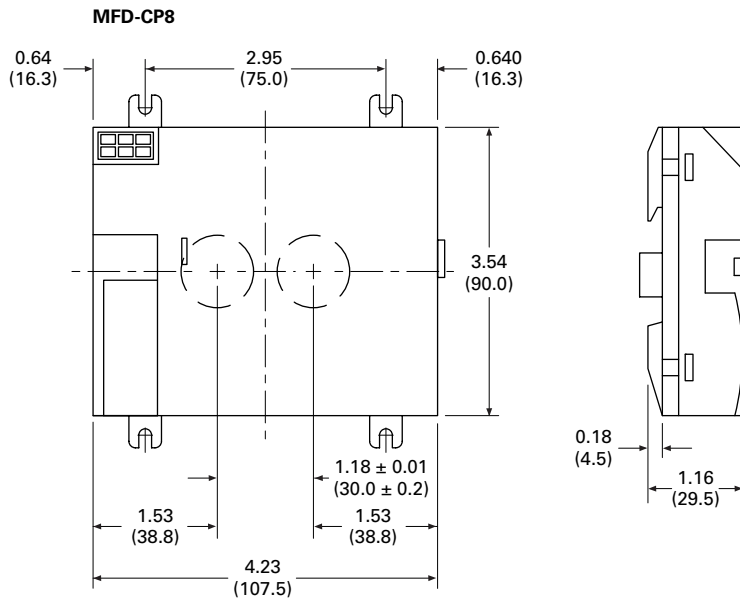


MFD-CP4, MFD-80 and MFD-CP4 Series Combined, Drawing Number MD013013E

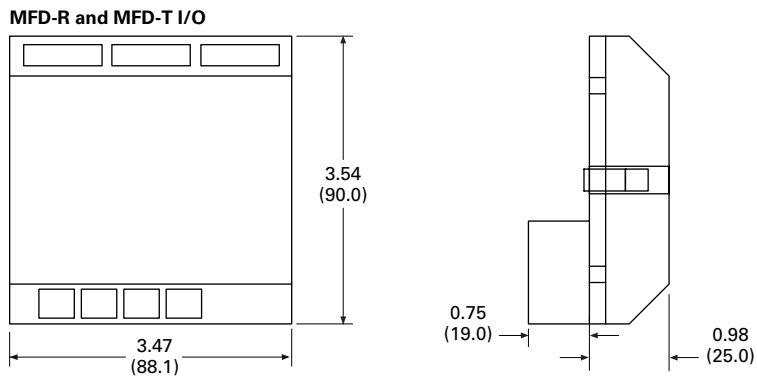


Approximate Dimensions in Inches (mm)

MFD-CP8 Series, Drawing Number MD05013006E



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



easyRelay Communication Modules



Contents

| <i>Description</i> | <i>Page</i> |
|--|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-33 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules Technical Data and Specifications | V7-T3-41 |
| Dimensions | V7-T3-41 |
| easyRelay Power Supplies, Accessories and Software | V7-T3-43 |

easyRelay Communication Modules

Product Description

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

Available communication modules support:

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

All modules operate exclusively as nodes on the given network.

Product Selection

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

EASY209-SE



Ethernet Gateway Module

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

EASY204-DP



Network Interface Modules

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

Note

① To set up the Ethernet gateway, download the EASY209-SE configuration software at www.eaton.com/easyrelays.

Technical Data and Specifications

easy700/800/MFD Communication Interface Modules

EASY204-DP, EASY205-ASI, EASY221-CO, EASY222-DN, EASY209-SE ①

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

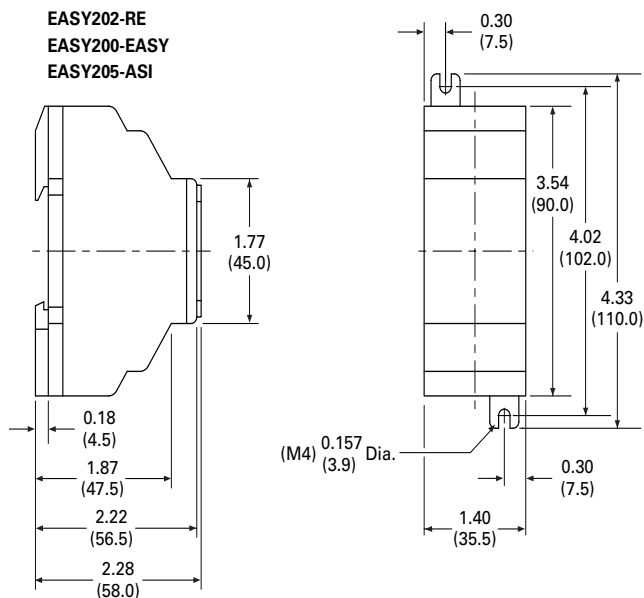
Notes

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

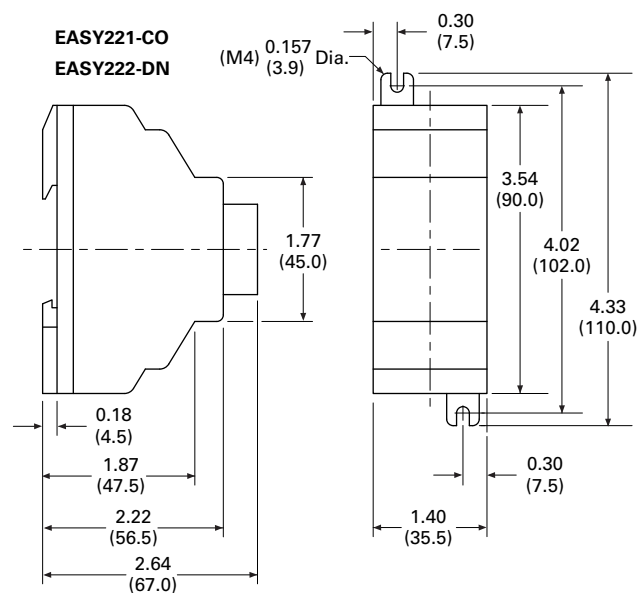
Dimensions

Approximate Dimensions in Inches (mm)

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



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



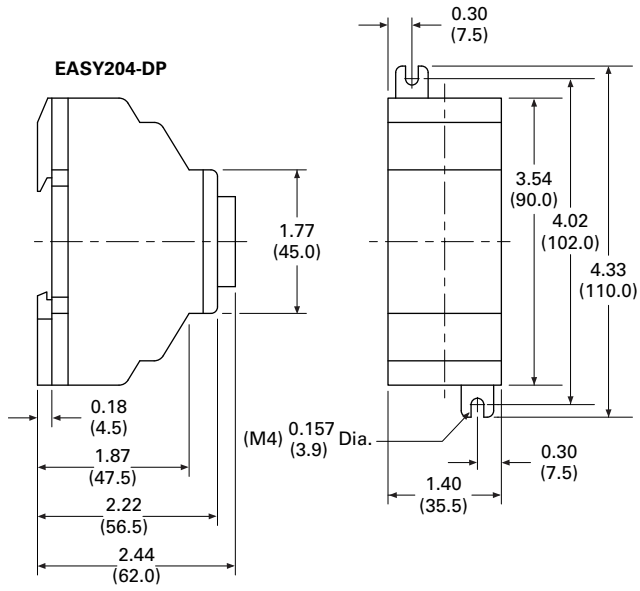
3.3

Control Relays and Timers

Programmable Relays

EASY204-DP Series,
Drawing Number MD05013011E

3



easyRelay Power Supplies, Accessories and Software



Contents

| <i>Description</i> | <i>Page</i> |
|---|-----------------|
| easy500/700/800 Programmable Relays | V7-T3-20 |
| easy802/806 Programmable Relays with SmartWire-DT | V7-T3-26 |
| easyRelay and MFD Expansion Modules | V7-T3-30 |
| MFD-Titan Multi-Function Displays | V7-T3-33 |
| easyRelay Communication Modules | V7-T3-40 |
| easyRelay Power Supplies, Accessories and Software | |
| Accessories | V7-T3-44 |
| Technical Data and Specifications | V7-T3-46 |
| Wiring Diagram | V7-T3-46 |
| Dimensions | V7-T3-47 |

easyRelay Power Supplies, Accessories and Software

Product Description

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

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

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

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

Product Selection

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

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

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

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

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

EASY...-POW



Power Supply Units

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

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

Bluetooth Adapter

Conveniently commission and service machines and other equipment remotely.

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

EASY800-BLT-ADP



Bluetooth Adapter

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

Accessories

easySoft



Programming Software

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

EASY-USB-CAB



Programming Cables

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

MFD-CP4-800-CAB5



Cables and Connectors

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

EASY800-MO-CAB



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

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

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

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

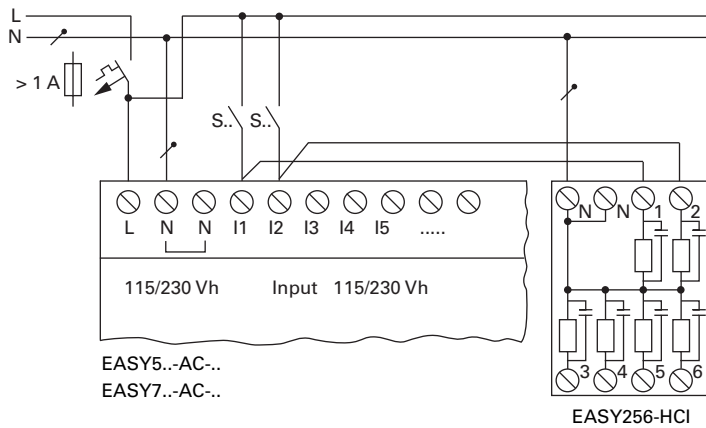
Technical Data and Specifications

easyRelay Power Supplies

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

Wiring Diagram

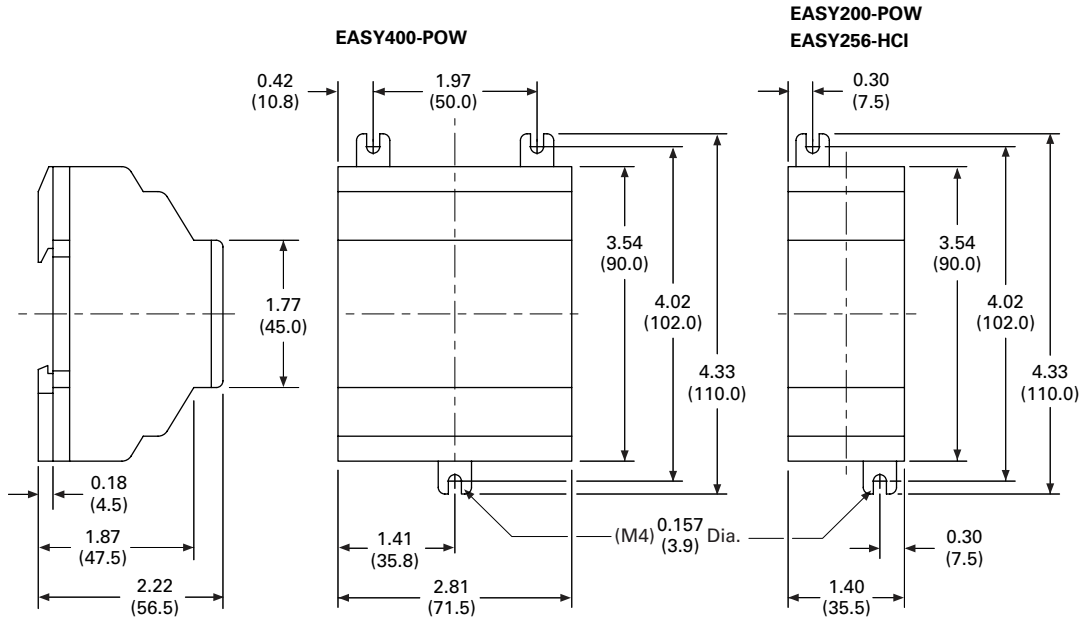
EASY256-HCI



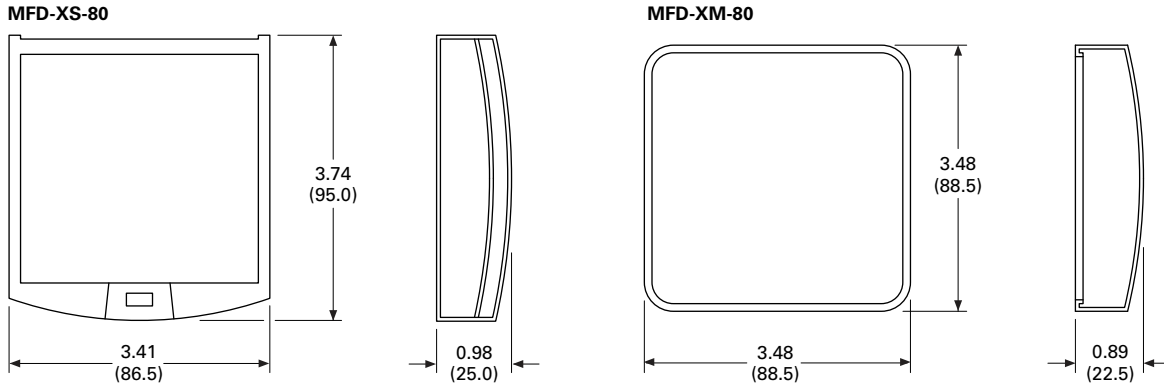
Dimensions

Approximate Dimensions in Inches (mm)

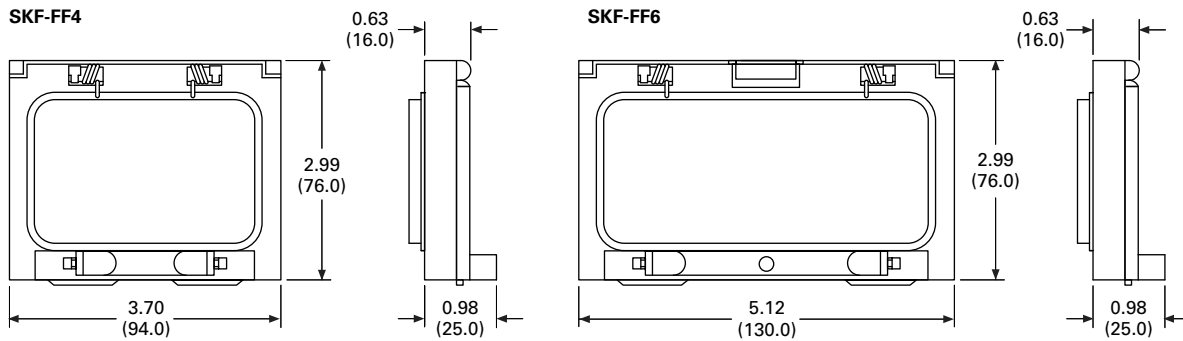
EASY200-POW/EASY256-HCI and EASY400-POW Series, Drawing Number MD05013004E



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



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



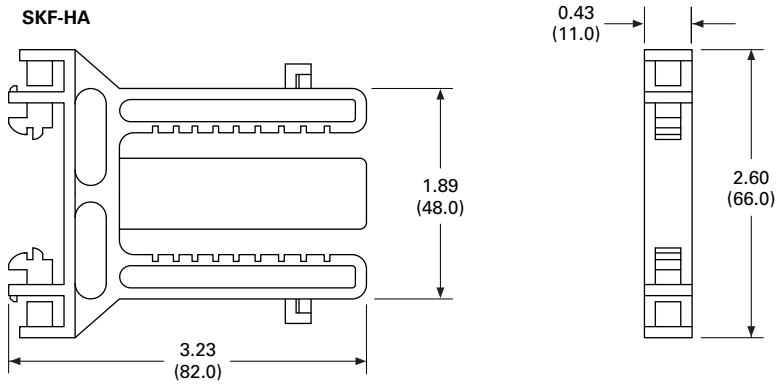
3.3

Control Relays and Timers

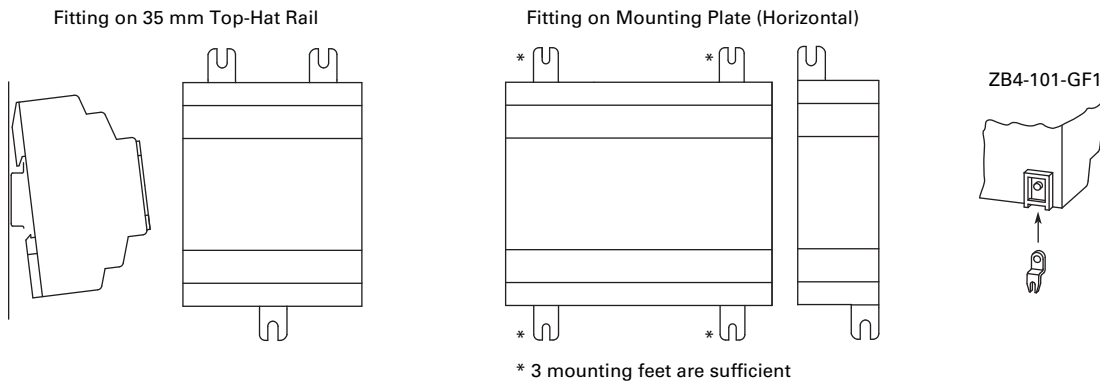
Programmable Relays

Approximate Dimensions in Inches (mm)

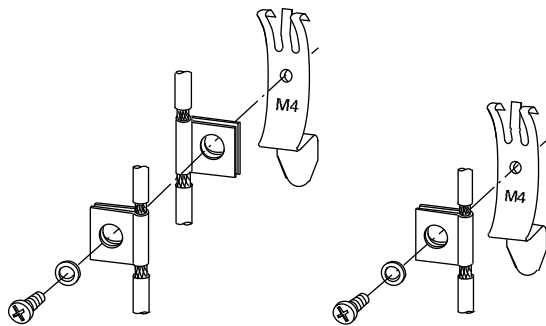
SKF-HA Series, Drawing Number MD05013015E



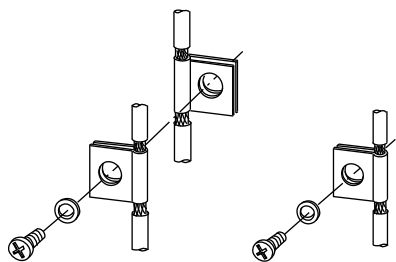
ZB4-101-GF1 Mounting Feet



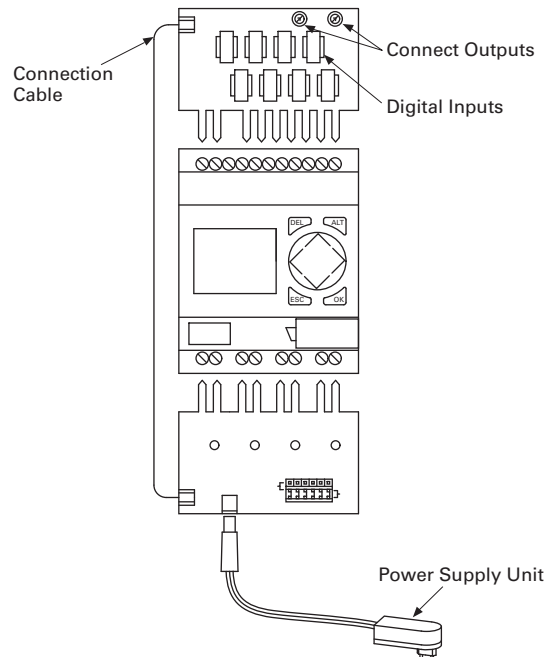
ZB4-102-KS1 Series— Grounding the Screen for Top-Hat Rail



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



EASY412-DC-SIM-NA Series



General Purpose Plug-In Relay



Contents

| <i>Description</i> | <i>Page</i> |
|----------------------------|-------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Product Selection Guide

General Purpose Relay Selection Characteristics

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

General Purpose Plug-In Relays

Relay Series

D1RR/D1RF

D2RR/D2RF

D3RR/D3RF



Approvals



Note: UL when used with the appropriate socket.



Note: UL when used with the appropriate socket.



Note: UL when used with the appropriate socket.

Features

| | | |
|---|---|---|
| Polycarbonate cover | Polycarbonate cover | Polycarbonate cover |
| Indicator lamp and pushbutton available | Indicator lamp and pushbutton available | Indicator lamp and pushbutton available |
| Panel and DIN mounting | Panel, DIN and flange mounting | Panel and DIN mounting |
| | Latching | |

Contact Data

| Configuration | SPDT | DPDT | 4PDT | DPDT | 3PDT |
|-----------------------------------|--------------|--------------|------|--------------|------|
| Max. allowable load | 15 A | 12 A | 6 A | 10 A | 10 A |
| Material | Silver alloy | Silver alloy | | Silver alloy | |
| Dielectric strength between poles | 1500 V | 1500 V | | 1500 V | |

Coil Data

| | | | |
|-------------|--------------|--------------|----------------------------|
| AC | 6 to 240 Vac | 6 to 240 Vac | 6 to 240 Vac |
| DC | 6 to 110 Vdc | 6 to 110 Vdc | 6 to 110 Vdc |
| Power | | | |
| VA (Vac) | 0.9 VA | 1.2 VA | 3 VA 1.4 W (D3RR and D3RF) |
| Watts (Vdc) | 0.7 W | 0.9 W | — |

General Data

| | | | |
|-----------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Ambient temperature | | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Operational | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Response time | 20 milliseconds | 20 milliseconds | 20 milliseconds |
| Life | | | |
| Mechanical operations | 10 million | 10 million | 5 million (D3RR and D3RF) |
| Electrical operations | 100,000 | 200,000 | 100,000 |
| Page Numbers | V7-T3-53 to V7-T3-56 | V7-T3-57 to V7-T3-66 | V7-T3-67 to V7-T3-75 |

General Purpose Plug-In Relays, continued

Relay Series

D4



D5RR/D5RF



D7PR/D7PF



Approvals



Note: UL when used with the appropriate socket.

Note: UL when used with the appropriate socket.

Features

Polycarbonate cover

Polycarbonate cover

Polycarbonate cover

Indicator lamp available

Indicator lamp and pushbutton available

Indicator lamp and pushbutton available

Panel and DIN mounting

Panel, DIN and flange mounting

Panel and DIN mounting

Socket has built-in hold-down spring

Contact Data

| Configuration | SPDT | DPDT | DPDT | 3PDT | DPDT | 3PDT | 4PDT |
|---------------------|-----------------|----------------|--------------|------|--------------|--------|--------|
| Max. allowable load | 10 A at 250 Vac | 5 A at 240 Vac | 10 A | 10 A | 15 A | 15 A | 15 A |
| Material | AgCdO | | Silver alloy | | Silver alloy | | |
| Dielectric strength | 5000 V | | 1500 V | | 1500 V | 2500 V | 2500 V |

Coil Data

| | | | | | | | |
|-------------|--------------|--|--------------|--|--------------|--------|--------|
| AC | 6 to 240 Vac | | 6 to 240 Vac | | 6 to 240 Vac | | |
| DC | 6 to 110 Vdc | | 6 to 110 Vdc | | 6 to 110 Vdc | | |
| Power | | | | | | | |
| VA (Vac) | 0.9 VA | | 3 VA | | 1.2 VA | 1.5 VA | 1.5 VA |
| Watts (Vdc) | 0.5 W | | 1.4 W | | 0.9 W | 1.4 W | 1.5 W |

General Data

| | | | | | | | |
|-----------------------|--------------------------------------|--|--------------------------------------|--|--|---------|---------|
| Ambient temperature | | | | | | | |
| Storage | −40 °F to +158 °F (−40 °C to +70 °C) | | −40 °F to +185 °F (−40 °C to +85 °C) | | −40 °F to +185 °F (−40 °C to +85 °C) | | |
| Operational | −40 °F to +158 °F (−40 °C to +70 °C) | | −40 °F to +131 °F (−40 °C to +55 °C) | | −40 °F to +131 °F (−40 °C to +55 °C) | | |
| Response time | 15 milliseconds | | 20 milliseconds | | 20 milliseconds (30 milliseconds for latching) | | |
| Life | | | | | | | |
| Mechanical operations | 10 million | | 5 million | | 10 million | | |
| Electrical operations | 100,000 | | 100,000 | | 100,000 | 200,000 | 200,000 |

Page Numbers

V7-T3-76 to V7-T3-79

V7-T3-80 to V7-T3-88

V7-T3-89 to V7-T3-102

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

General Purpose Plug-In Relays, continued

Relay Series

D8

D9



Approvals



Features

| | |
|-----------------------------------|----------------------|
| Dust cover | Dust cover |
| Panel, DIN and flange mounting | Pushbutton available |
| Quick-connect and screw terminals | Panel mounting |
| | Screw terminals |

Contact Data

| Configuration | 4PST | | | |
|---------------------|-----------------|-----------------|-----------------|----------------|
| | SPST-NO | DPST-NO | NO | NC |
| Max. allowable load | 30 A at 220 Vac | 25 A at 220 Vac | 25 A at 220 Vac | 8 A at 220 Vac |
| Material | AgCdO | | AgCdO | |
| Dielectric strength | 4000 V | | 4000 V | |

Coil Data

| | | |
|-------------|--------------|---------------|
| AC | 6 to 240 Vac | 24 to 240 Vac |
| DC | 12 to 24 Vdc | 12 to 110 Vdc |
| Power | | |
| VA (Vac) | 2.5 VA | 2.6 VA |
| Watts (Vdc) | 1.9 W | 2.0 W |

General Data

| | | |
|-----------------------|-------------------------------------|--------------------------------------|
| Ambient temperature | | |
| Storage | -4 °F to +185 °F (-20 °C to +85 °C) | -13 °F to +140 °F (-25 °C to +60 °C) |
| Operational | -4 °F to +131 °F (-20 °C to +55 °C) | -13 °F to +140 °F (-25 °C to +60 °C) |
| Response time | 30 milliseconds | 50 milliseconds |
| Life | | |
| Mechanical operations | 5 million | 1 million |
| Electrical operations | 100,000 | 100,000 |
| Page Numbers | V7-T3-103 to V7-T3-107 | V7-T3-108 to V7-T3-111 |

D1 Series Relay



D1RR/D1RF Series

Product Description

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

Features

D1RR

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

D1RF

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


Contents

Description

| | <i>Page</i> |
|---|------------------|
| D1RR/D1RF Series | |
| Product Selection | V7-T3-54 |
| Accessories | V7-T3-54 |
| Technical Data and Specifications | V7-T3-55 |
| Wiring Diagram | V7-T3-56 |
| Dimensions | V7-T3-56 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

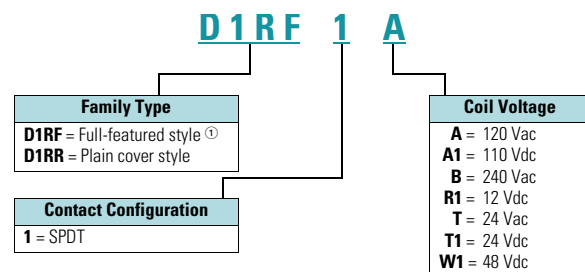
Standards and Certifications



 When used with accompanying Eaton screw terminal socket.

Catalog Number Selection

D1RF/D1RR Series



Note

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

Product Selection

D1RR/D1RF Relay/Socket Quick Reference

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

D1RF Series Relay



D1RR/D1RF Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------|-----------------------|------------------------|----------------|
| Full Featured | | | |
| 12 Vdc | SPDT | 188 | D1RF1R1 |
| 24 Vac 50/60 Hz | SPDT | 180 | D1RF1T |
| 24 Vdc | SPDT | 750 | D1RF1T1 |
| 110 Vdc | SPDT | 13,800 | D1RF1A1 |
| 120 Vac 50/60 Hz | SPDT | 4430 | D1RF1A |
| 240 Vac 50/60 Hz | SPDT | 15,720 | D1RF1B |
| Plain Cover | | | |
| 12 Vdc | SPDT | 188 | D1RR1R1 |
| 24 Vdc | SPDT | 750 | D1RR1T1 |
| 48 Vdc | SPDT | 2600 | D1RR1W1 |
| 110 Vdc | SPDT | 13,800 | D1RR1A1 |
| 120 Vac 50/60 Hz | SPDT | 4430 | D1RR1A |
| 240 Vac | SPDT | 15,270 | D1RR1B |

Accessories

D1RR/D1RF Sockets and Accessories

| Type | Module Size | Nominal Voltage (Max. for Sockets) | Nominal Current | Mounting Style | Wire Size | Wire Connection | Standard Pack | Catalog Number |
|---------------------------|-------------|------------------------------------|-----------------|----------------|--|-----------------|---------------|-------------------|
| Socket | B | 300 | 20 | Panel/DIN rail | 12 /14 (2) AWG, 4 /2.5 (2) mm ² | Screw clamping | 10 | D1RAA ① |
| Flange mount adapter | — | — | — | Flange | — | — | 25 | PFC-D11 |
| Metal spring clip | — | — | — | — | — | — | 25 | PMC-1781 |
| Protection diode | B | 6 to 250 Vdc | — | — | — | — | 20 | MOD-BD250 |
| LED indicator | B | 24 Vac/Vdc | — | — | — | — | 20 | MOD-BLG24 |
| | B | 120/240 Vac/Vdc | — | — | — | — | 20 | MOD-BLG240 |
| MOV suppressor | B | 120 Vac/Vdc | — | — | — | — | 20 | MOD-BMV120 |
| | B | 24 Vac/Vdc | — | — | — | — | 20 | MOD-BMV24 |
| | B | 240 Vac/Vdc | — | — | — | — | 20 | MOD-BMV240 |
| Plastic DIN rail end stop | — | — | — | — | — | — | 25 | PPF-P |

Note

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

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

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

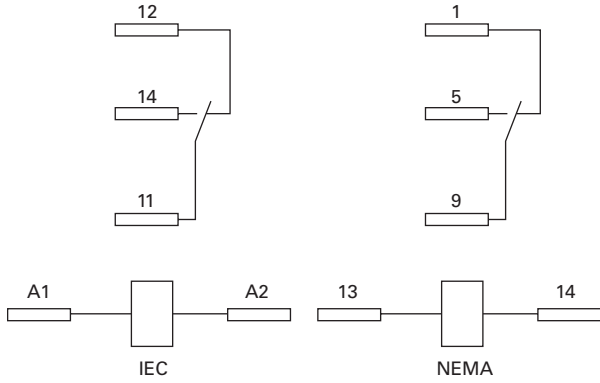
3.4

Control Relays and Timers

General Purpose Plug-In Relays

Wiring Diagram

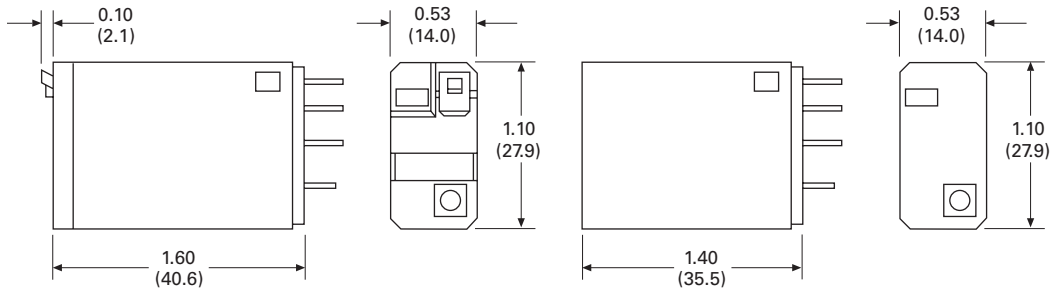
D1RF/D1RR



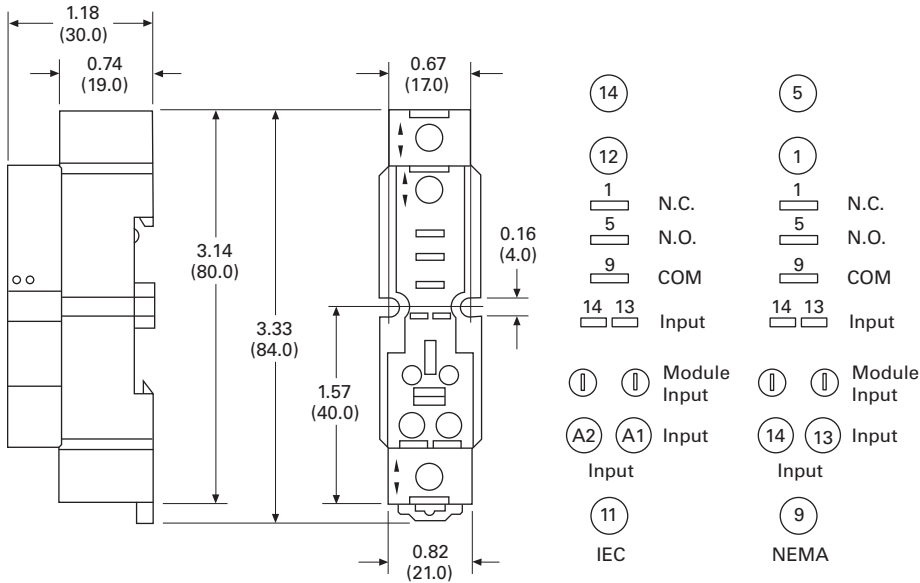
Dimensions

Approximate Dimensions in Inches (mm)

D1RF/D1RR



D1RAA



D2 Series Relay



D2RR/D2RF Series

Product Description

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

Features

D2RR

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

Contents

Description

| | Page |
|---|------------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | |
| Catalog Number Selection | V7-T3-58 |
| Product Selection | V7-T3-58 |
| Accessories | V7-T3-60 |
| Technical Data and Specifications | V7-T3-61 |
| Wiring Diagrams | V7-T3-62 |
| Dimensions | V7-T3-63 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications



When used with accompanying Eaton screw terminal socket.

D2RF

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

3.4

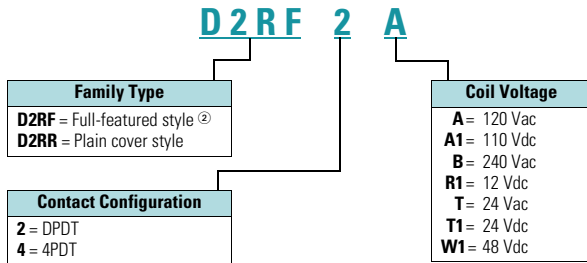
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D2RF/D2RR ①

3



Product Selection

D2RF/D2RR Relay/Socket Quick Reference

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Full-featured, LED test button, flag indicator, lock-down door, finger-grip cover, ID tag.

D2RF Series Relay



D2RF/D2RR Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------------|-----------------------|------------------------|----------------|
| Full Featured Style | | | |
| 12 Vdc | DPDT | 160 | D2RF2R1 |
| 24 Vac | DPDT | 180 | D2RF2T |
| 24 Vdc | DPDT | 650 | D2RF2T1 |
| 48 Vdc | DPDT | 2600 | D2RF2W1 |
| 110/125 Vdc | DPDT | 11,000 | D2RF2A1 |
| 120 Vac | DPDT | 4430 | D2RF2A |
| 220/240 Vac | DPDT | 15,720 | D2RF2B |
| 12 Vdc | 4PDT | 160 | D2RF4R1 |
| 24 Vac | 4PDT | 180 | D2RF4T |
| 24 Vdc | 4PDT | 650 | D2RF4T1 |
| 48 Vdc | 4PDT | 2600 | D2RF4W1 |
| 110/125 Vdc | 4PDT | 11,000 | D2RF4A1 |
| 120 Vac | 4PDT | 4430 | D2RF4A |
| 220/240 Vac | 4PDT | 15,720 | D2RF4B |
| Plain Cover Style | | | |
| 12 Vdc | DPDT | 160 | D2RR2R1 |
| 24 Vac | DPDT | 180 | D2RR2T |
| 24 Vdc | DPDT | 650 | D2RR2T1 |
| 120 Vac | DPDT | 4430 | D2RR2A |
| 220/240 Vac | DPDT | 15,720 | D2RR2B |
| 12 Vdc | 4PDT | 160 | D2RR4R1 |
| 24 Vac | 4PDT | 180 | D2RR4T |
| 24 Vdc | 4PDT | 650 | D2RR4T1 |
| 110/125 Vdc | 4PDT | 11,000 | D2RR4A1 |
| 120 Vac | 4PDT | 4430 | D2RR4A |
| 220/240 Vac | 4PDT | 15,720 | D2RR4B |

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D2RF/D2RR Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D2RF/D2RR Relay Specifications

| Description | D2RR2/D2RR4 | D2RF |
|--|--------------------------------------|---|
| Contact Characteristics | | |
| Contact rating | 12 A / 6 A | 6 A |
| Terminal style | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | 10 A at 120 Vac 50/60 Hz | 10 A at 277 Vac 50/60 Hz |
| | 8 A at 277 Vac 50/60 Hz | 8 A at 120 Vac 50/60 Hz |
| | 8 A at 28 Vdc | 8 A at 28 Vdc |
| Switching current at voltage | 1/3 hp at 120 Vac 1 hp at 277 Vac | 1/3 hp at 120 Vac 1 hp at 277 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 1.2 VA | 1.2 VA |
| | 0.9 W | 0.9 W |
| Dropout voltage threshold | 15% (AC) | 15% (AC) |
| | 10% (DC) | 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 200,000 | 200,000 |
| Mechanical life operations unpowered | 10,000,000 | 10,000,000 |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 rms | 1500 rms |
| Between poles Vac (rms) | 1500 rms | 1500 rms |
| Environment | | |
| Ambient air temperature around the device | | |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Plain cover | Full featured |
| Features | Mechanical flag indicator | Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

3.4

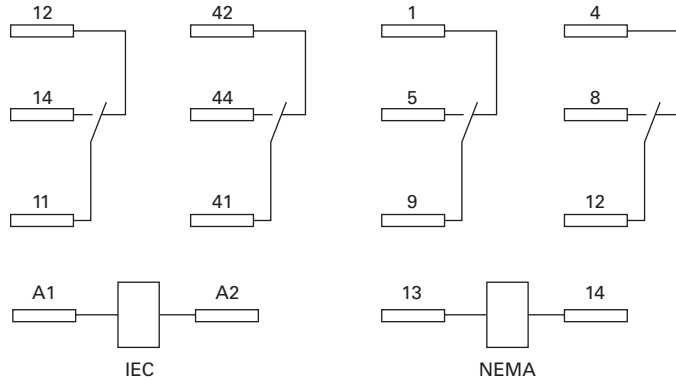
Control Relays and Timers

General Purpose Plug-In Relays

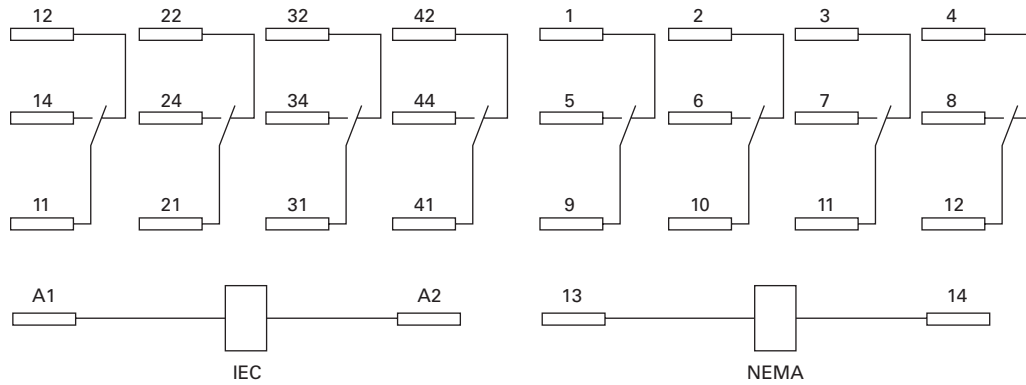
Wiring Diagrams

D2RF2/D2RR2

3



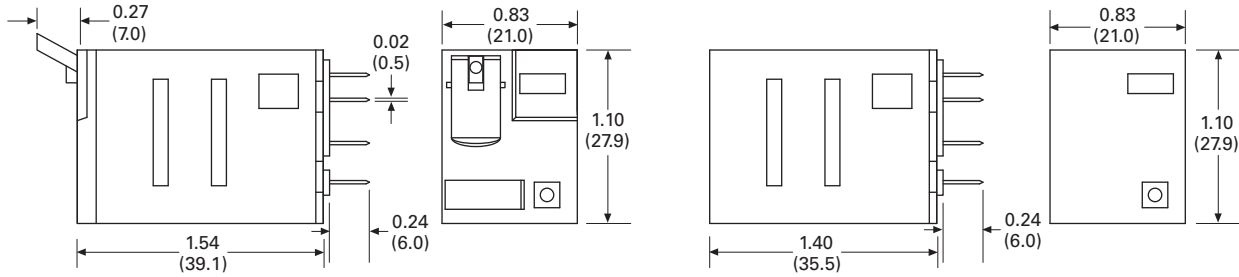
D2RF4/D2RR4



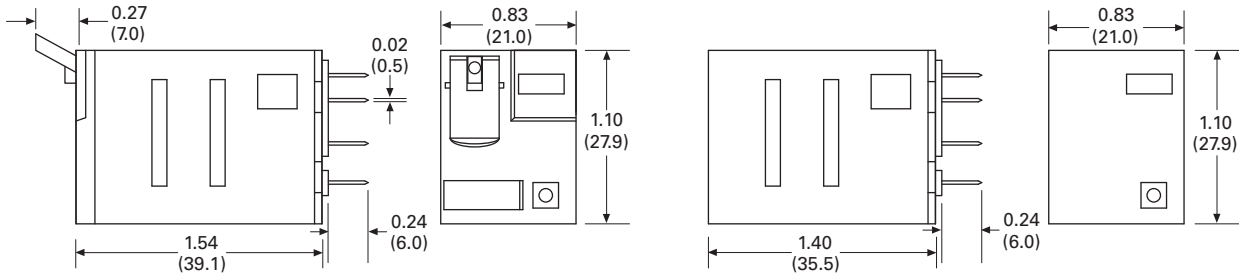
Dimensions

Approximate Dimensions in Inches (mm)

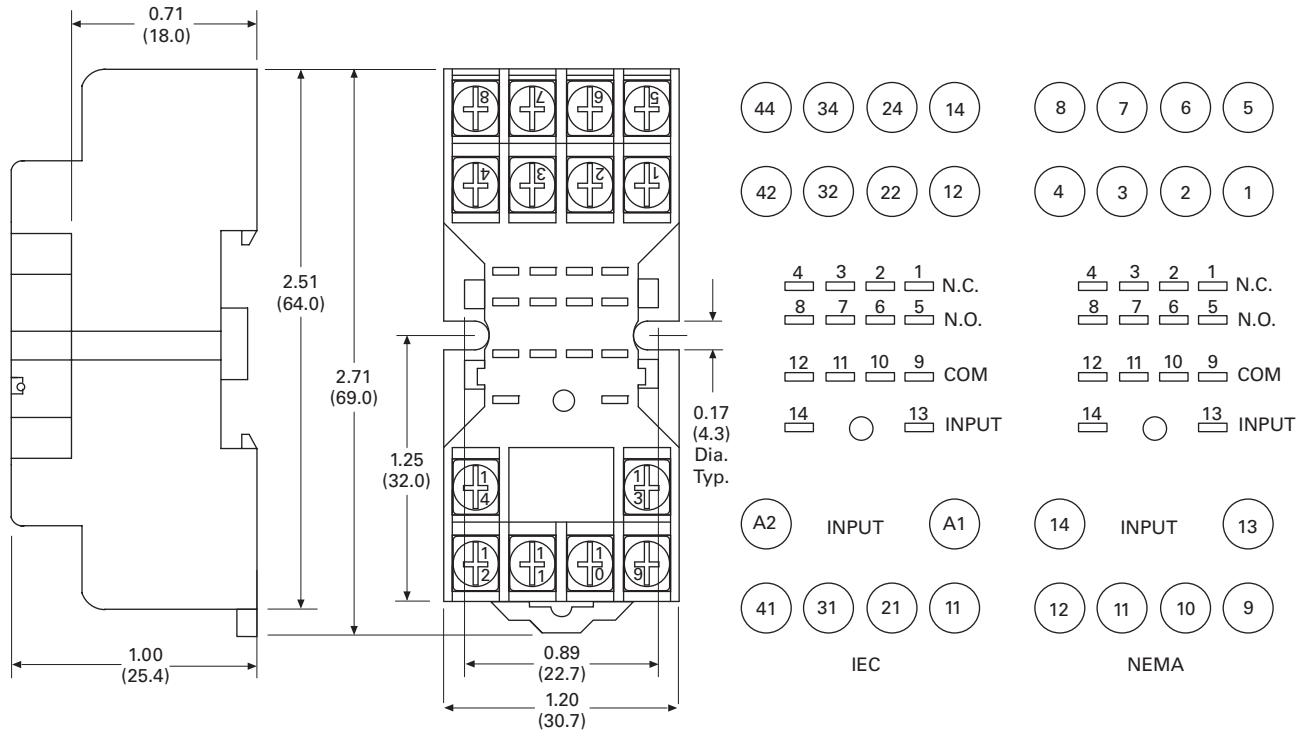
D2RF2/D2RR2



D2RF4/D2RR4



D2PA6



3.4

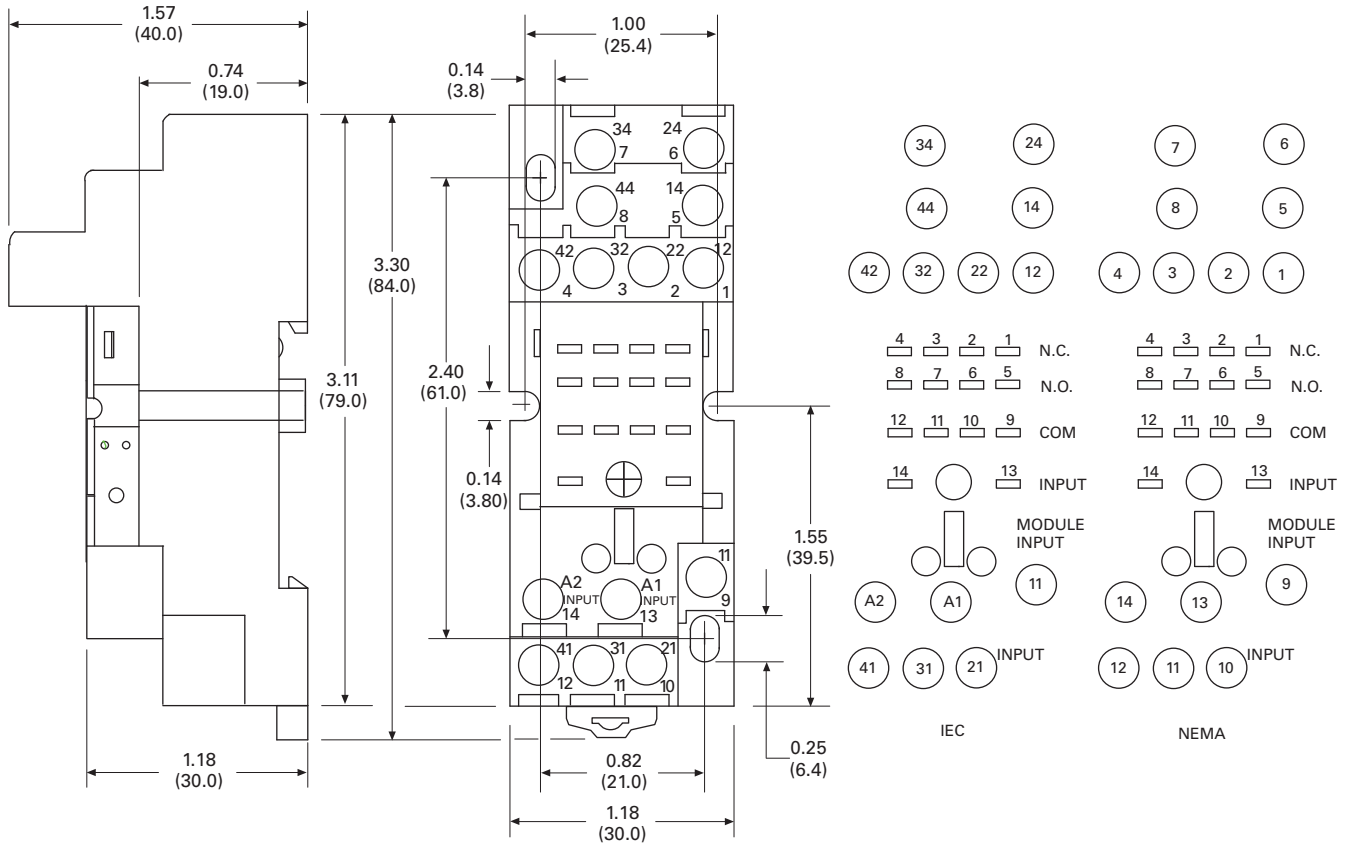
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

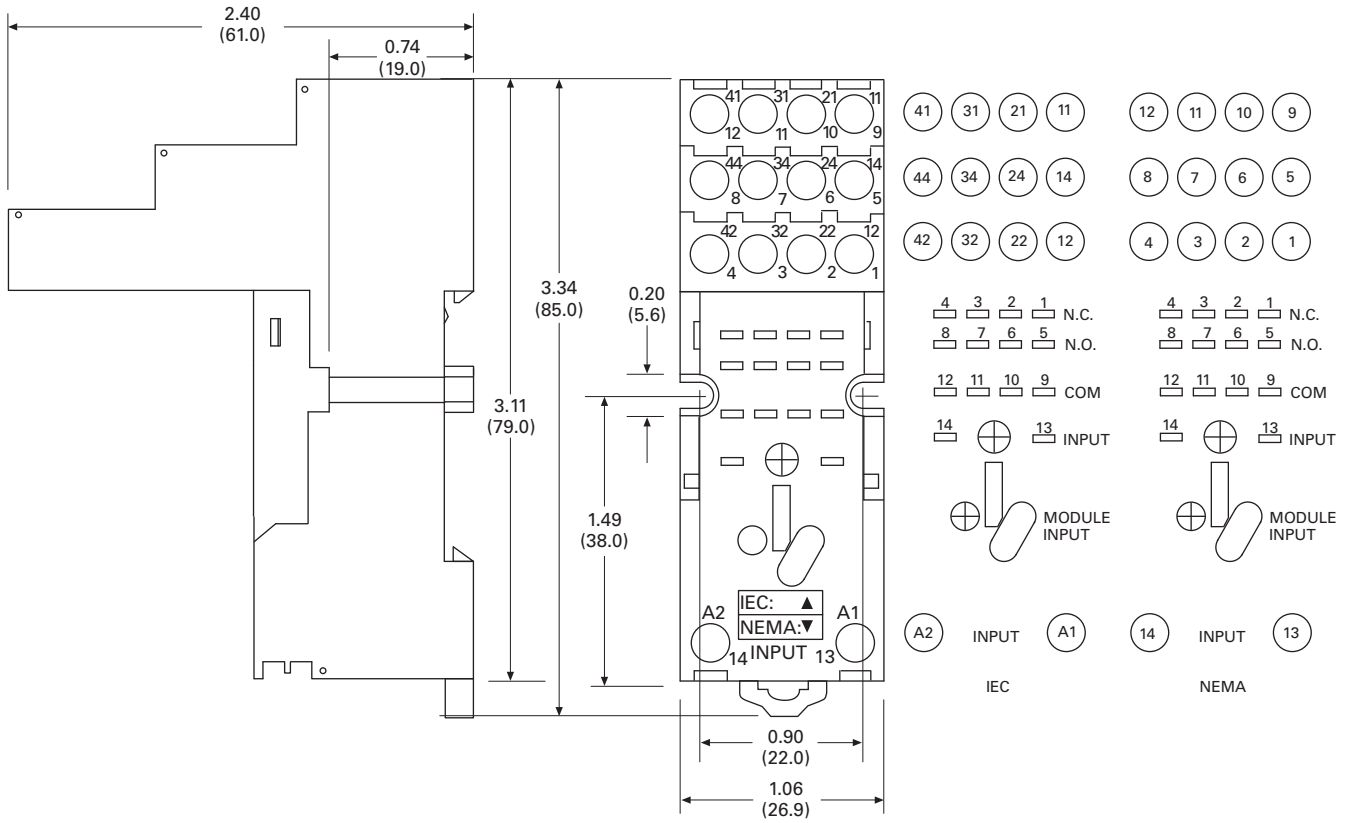
D2PA7

3



Approximate Dimensions in Inches (mm)

D2PAP



3.4

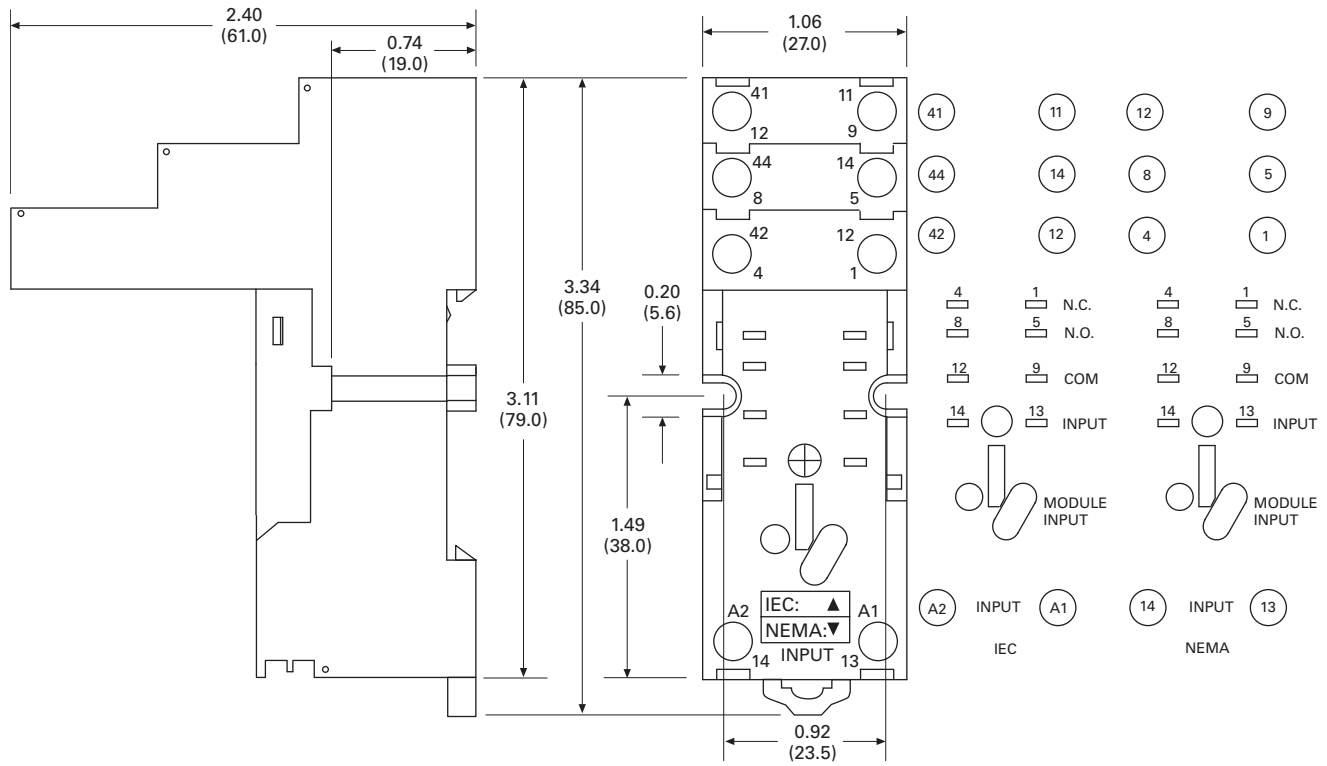
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D2PAL

3



D3 Series Relay



D3RR/D3RF Series

Product Description

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

Features

D3RR

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

Contents

Description

| | Page |
|---|------------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | |
| Catalog Number Selection | V7-T3-68 |
| Product Selection | V7-T3-68 |
| Accessories | V7-T3-70 |
| Technical Data and Specifications | V7-T3-71 |
| Dimensions | V7-T3-72 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications



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

D3RF

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

3.4

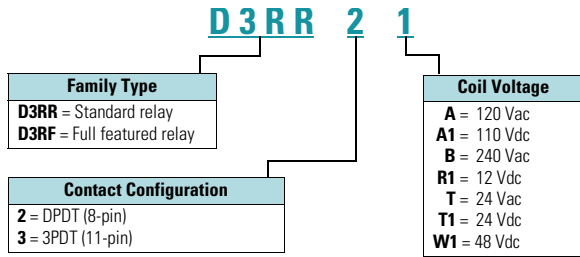
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D3RR/D3RF Series ①

3



Product Selection

D3 Relay/Socket Quick Reference

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

Notes

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

D3 Series Relay



D3RR/D3RF Series

| Coil Voltage | Contact Configuration | Coil Resistance (Ohms) | Catalog Number |
|----------------------------|-----------------------|------------------------|----------------|
| Full Featured Style | | | |
| 120 Vac | DPDT | 1700 | D3RF2A |
| 240 Vac | DPDT | 7200 | D3RF2B |
| 12 Vdc | DPDT | 120 | D3RF2R1 |
| 24 Vdc | DPDT | 470 | D3RF2T1 |
| 120 Vac | 3PDT | 1700 | D3RF3A |
| 220/240 Vac | 3PDT | 7200 | D3RF3B |
| 24 Vac | 3PDT | 72 | D3RF3T |
| 24 Vdc | 3PDT | 470 | D3RF3T1 |
| Plain Cover Style | | | |
| 120 Vac | DPDT | 1700 | D3RR2A |
| 110/125 Vdc | DPDT | 10,000 | D3RR2A1 |
| 220/240 Vac | DPDT | 7200 | D3RR2B |
| 12 Vdc | DPDT | 120 | D3RR2R1 |
| 24 Vac | DPDT | 72 | D3RR2T |
| 24 Vdc | DPDT | 470 | D3RR2T1 |
| 48 Vdc | DPDT | 1800 | D3RR2W1 |
| 120 Vac | 3PDT | 1700 | D3RR3A |
| 110/125 Vdc | 3PDT | 10,000 | D3RR3A1 |
| 220/240 Vac | 3PDT | 7200 | D3RR3B |
| 12 Vdc | 3PDT | 120 | D3RR3R1 |
| 24 Vac | 3PDT | 72 | D3RR3T |
| 24 Vdc | 3PDT | 470 | D3RR3T1 |

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D3RR/D3RF Series Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D3RR/D3RF Series Relay Specifications

| Description | D3RR | D3RF |
|--|--------------------------------------|---|
| Contact Characteristics | | |
| Contact rating | 10 A | 10 A |
| Terminal style | Octal | Octal |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | 16 A at 277 Vac 50/60 Hz | 16 A at 277 Vac 50/60 Hz |
| | 16 A at 120 Vac 50/60 Hz | 16 A at 120 Vac 50/60 Hz |
| | 16 A at 28 Vdc | 16 A at 28 Vdc |
| Switching current at voltage | 1/2 hp at 240 Vac | 1/2 hp at 240 Vac |
| | 1/3 hp at 120 Vac | 1/3 hp at 120 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 3 VA | 3 VA |
| | 1.4 W | 1.4 W |
| Dropout voltage threshold | 15% (AC) | 15% (AC) |
| | 10% (DC) | 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 100,000 operations | 100,000 operations |
| Mechanical life operations unpowered | 5,000,000 operations | 5,000,000 operations |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Between poles Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Environment | | |
| Ambient air temperature around the device | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Plain cover | Full Featured |
| Features | Mechanical flag indicator | Bipolar LED/ Locking pushbutton/ Removable ID tag/ Mechanical flag indicator |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

3.4

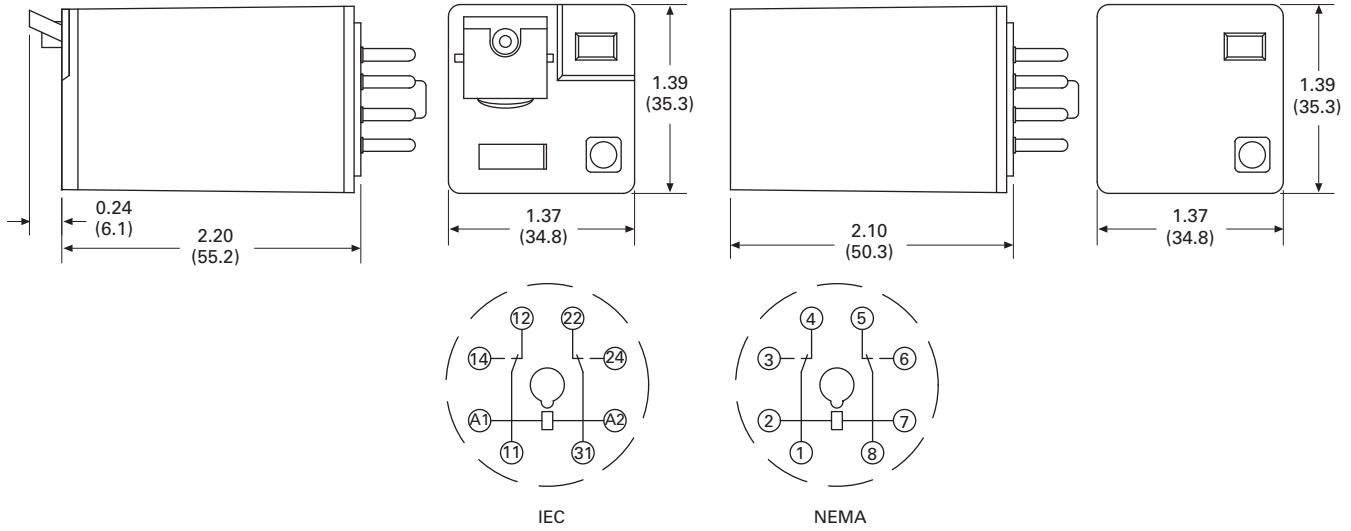
Control Relays and Timers

General Purpose Plug-In Relays

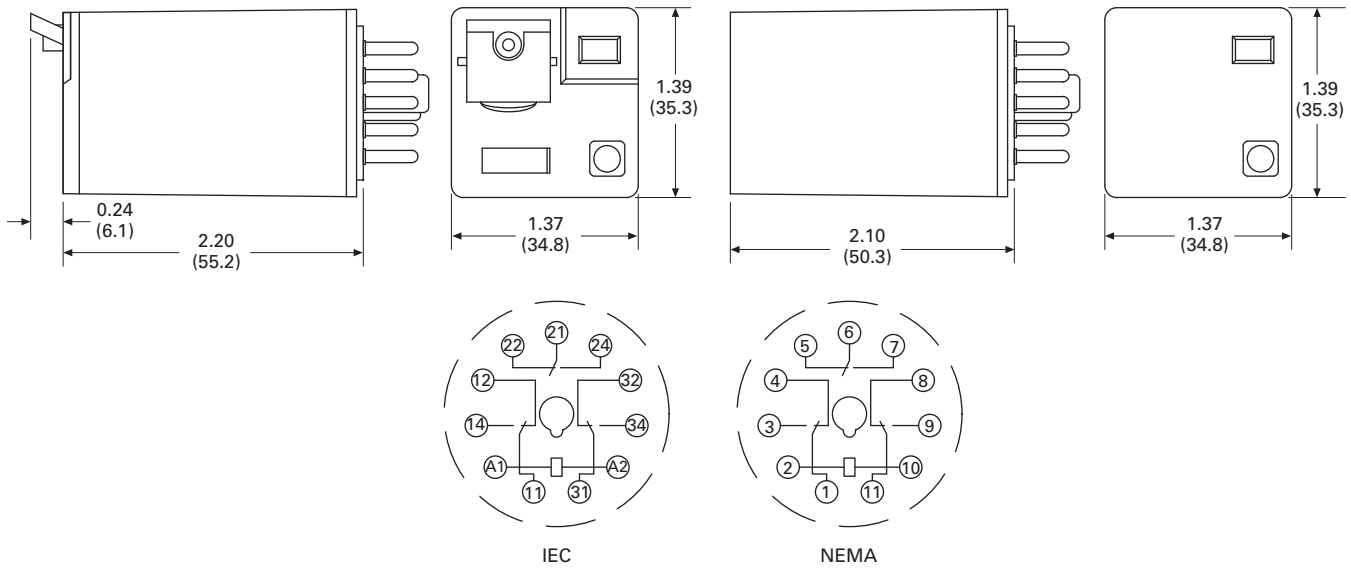
Dimensions

Approximate Dimensions in Inches (mm)

D3RR2/D3RF2

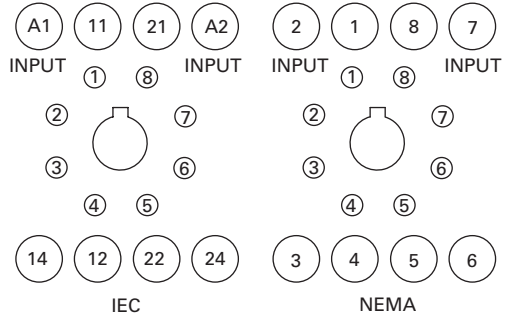
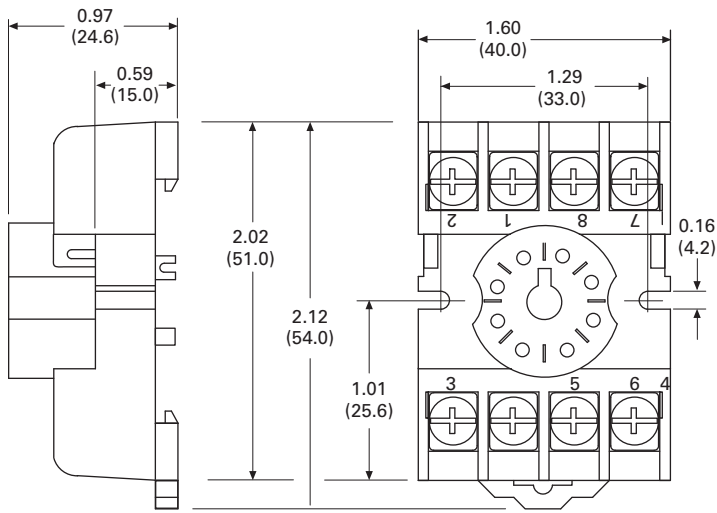


D3RR3/D3RF3

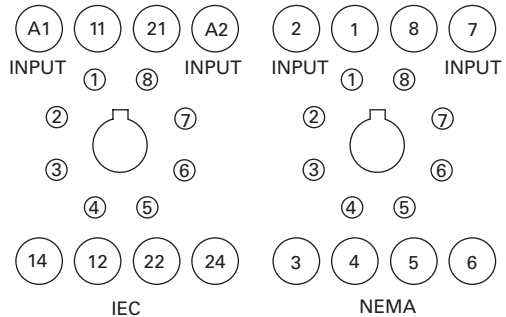
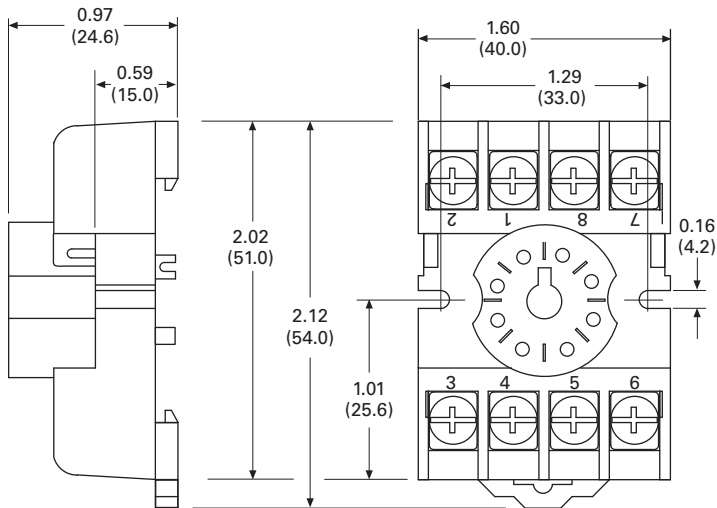
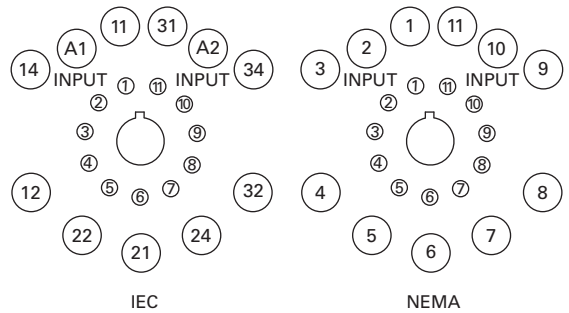
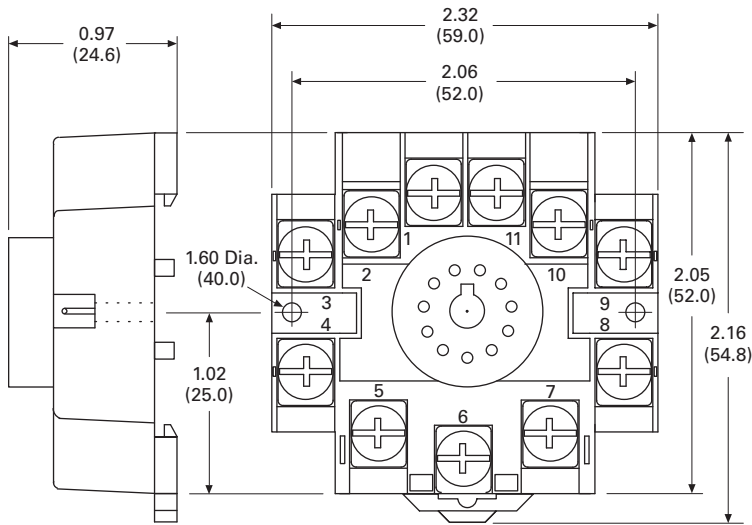


Approximate Dimensions in Inches (mm)

D3PA2



D3PA3



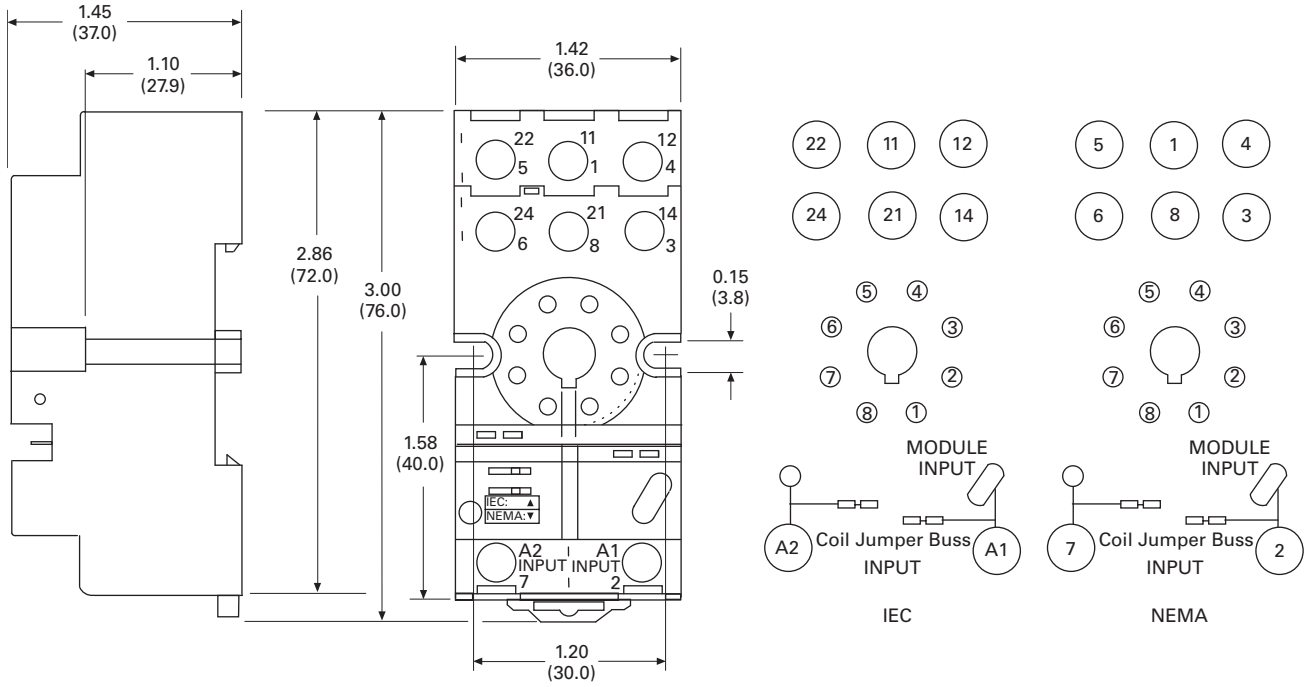
3.4

Control Relays and Timers

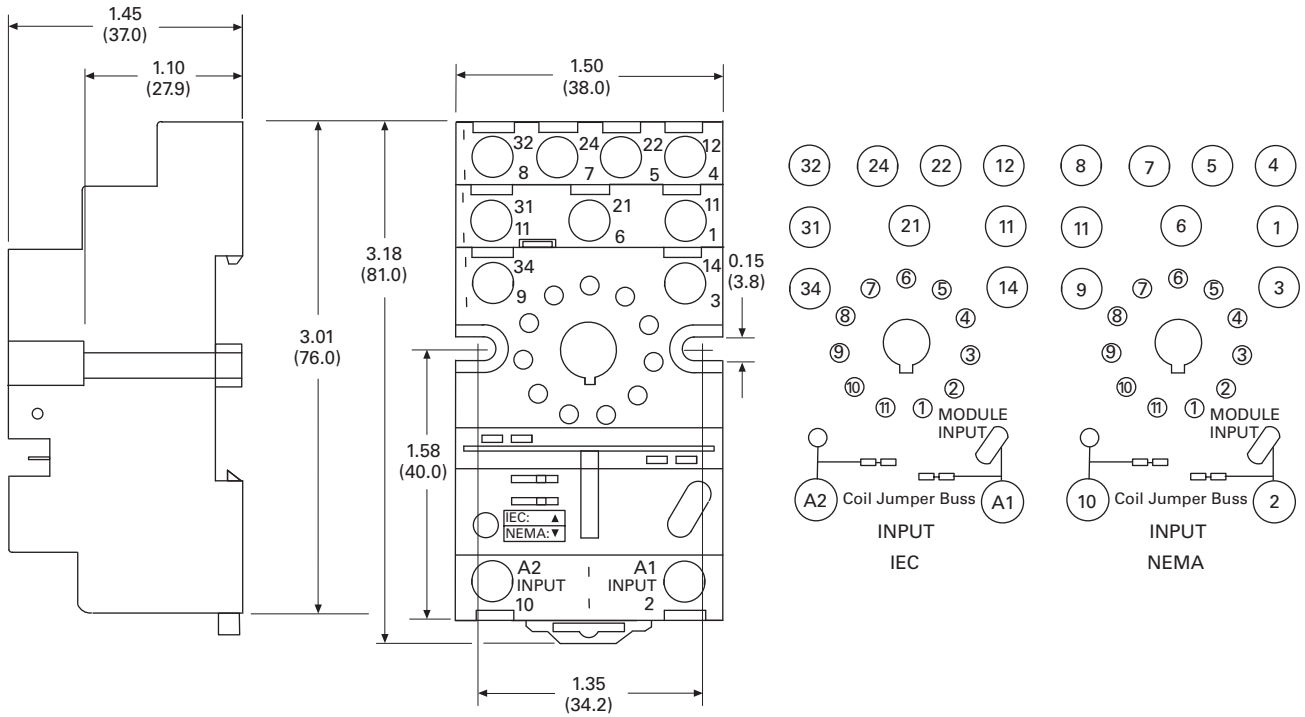
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D3PA6

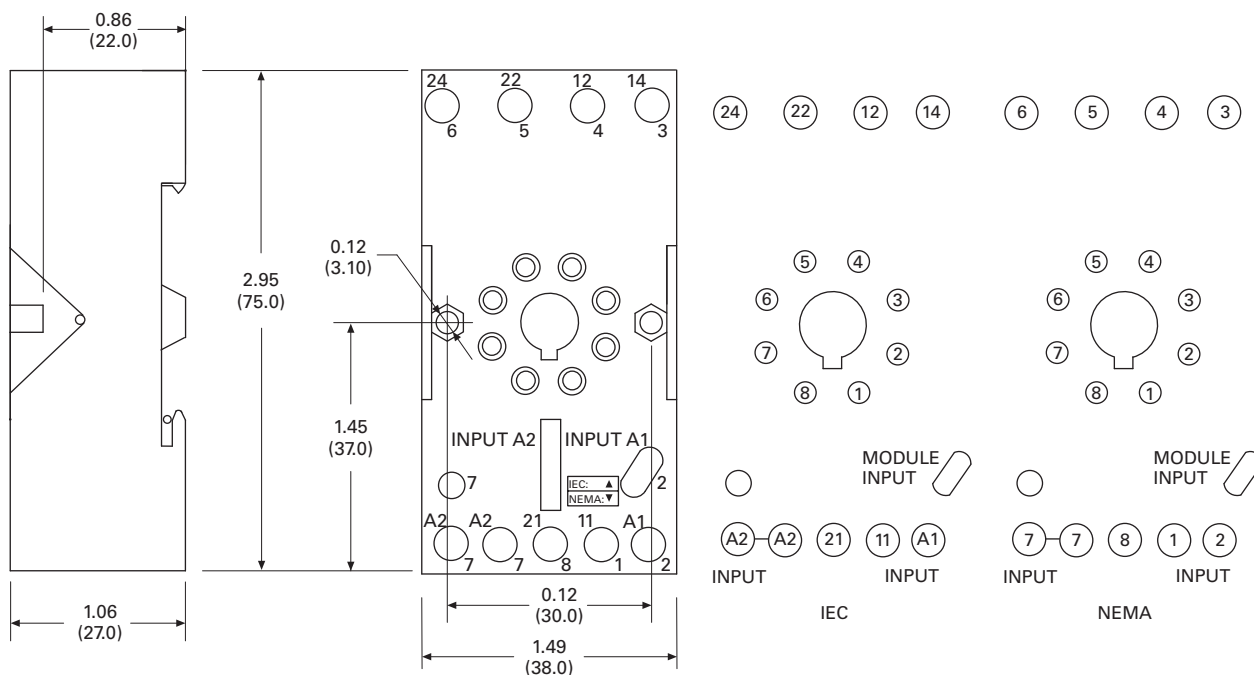


D3PA7

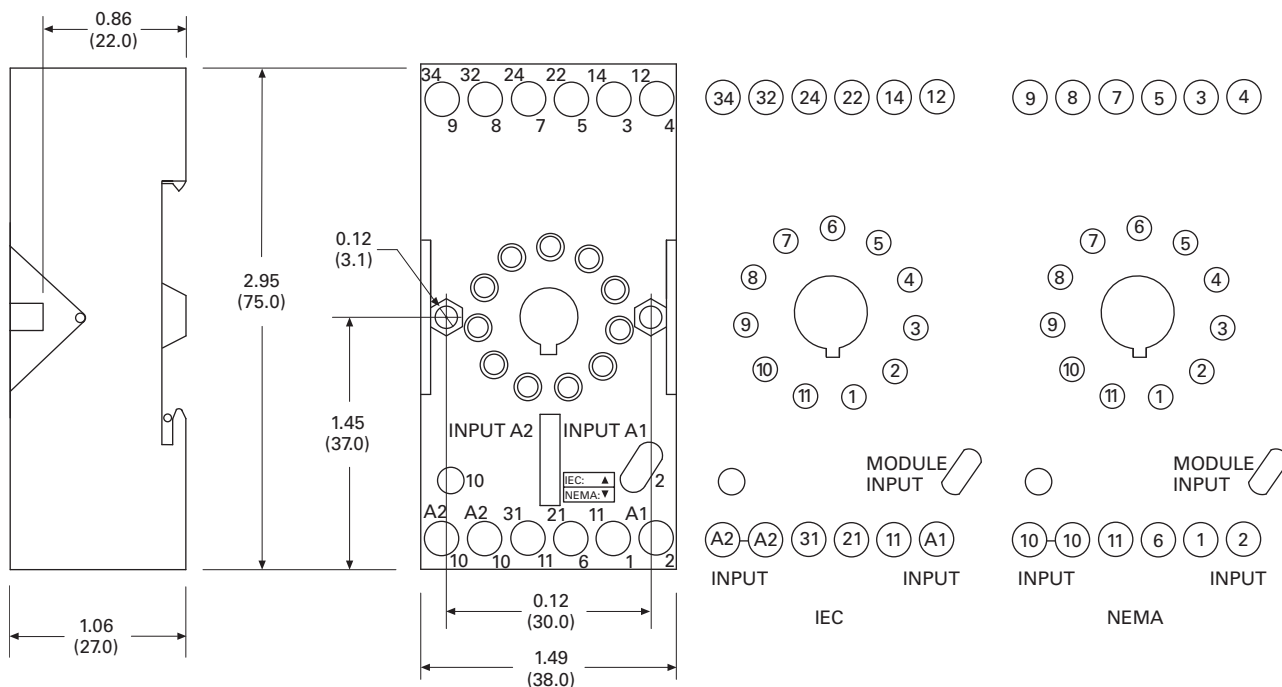


Approximate Dimensions in Inches (mm)

D3PAL8



D3PAL11



D4 Series Relay



D4 Series


Product Description


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

Features

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

Standards and Certifications

 File # E1491, E65657

 File # LR701519



 COMPLIANT

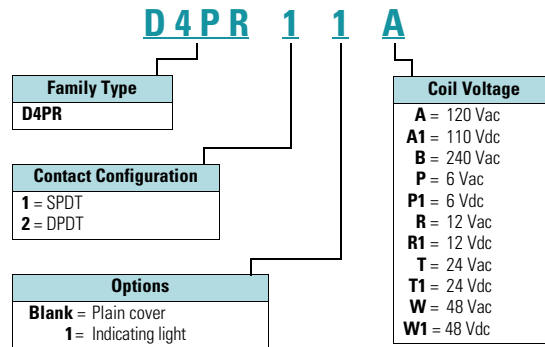
Contents

Description

| | <i>Page</i> |
|--|------------------|
| D1RR/D1RF Series..... | V7-T3-53 |
| D2RR/D2RF Series..... | V7-T3-57 |
| D3RR/D3RF Series..... | V7-T3-67 |
| D4 Series | |
| Technical Data and Specifications..... | V7-T3-78 |
| Dimensions..... | V7-T3-79 |
| D5RR/D5RF Series..... | V7-T3-80 |
| D7PR/D7PF Series..... | V7-T3-89 |
| D8 Series..... | V7-T3-103 |
| D9 Series..... | V7-T3-108 |
| Accessories..... | V7-T3-112 |

Catalog Number Selection

D4 Series ^①



Product Selection

D4 Relay/Socket Quick Reference

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Socket has built-in hold-down spring.

D4 Series Relay



D4 Series

| Voltage/Poles | Standard Pack | Catalog Number |
|-----------------------------------|---------------|-------------------|
| DIN Rail Sockets | | |
| Single-pole | 10 | D4PA1 |
| Two-pole | 10 | D4PA2 |
| SPDT with Indicating Light | | |
| 120 Vac | 1 | D4PR11A |
| 110 Vdc | 1 | D4PR11A1 |
| 240 Vac | 1 | D4PR11B |
| 6 Vac | 50 | D4PR11P |
| 6 Vdc | 50 | D4PR11P1 |
| 12 Vac | 50 | D4PR11R |
| 12 Vdc | 1 | D4PR11R1 |
| 24 Vac | 1 | D4PR11T |
| 24 Vdc | 1 | D4PR11T1 |
| 48 Vdc | 50 | D4PR11W1 |
| Standard SPDT | | |
| 120 Vac | 1 | D4PR1A |
| 110 Vdc | 50 | D4PR1A1 |
| 240 Vac | 50 | D4PR1P |
| 6 Vac | 1 | D4PR1P1 |
| 6 Vdc | 50 | D4PR1R |
| 12 Vac | 1 | D4PR1R1 |
| 12 Vdc | 1 | D4PR1R1-A2 |
| 24 Vac | 1 | D4PR1T |
| 24 Vdc | 1 | D4PR1T1 |
| 48 Vdc | 1 | D4PR1W1 |

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Technical Data and Specifications

D4 Series

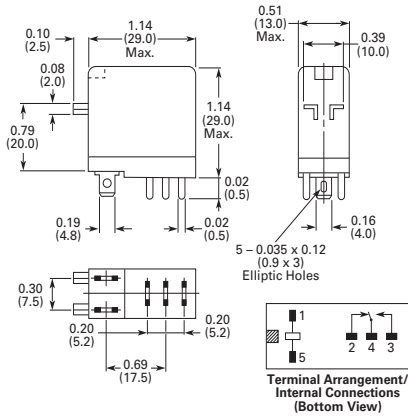
3

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

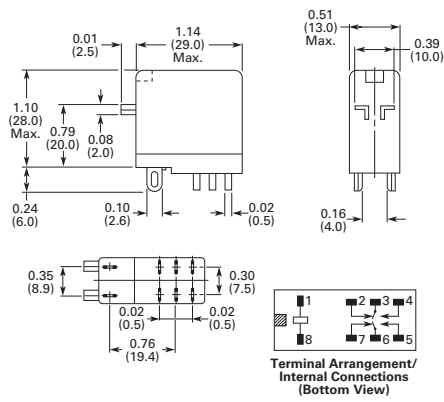
Dimensions

Approximate Dimensions in Inches (mm)

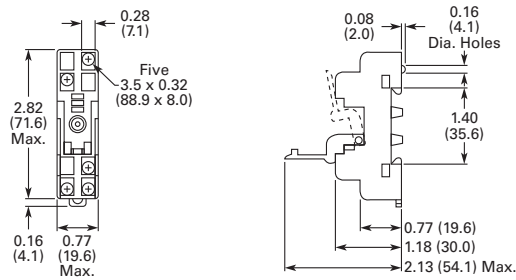
D4PR1



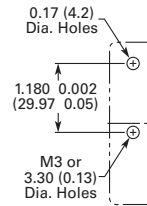
D4PR2



D4PA1

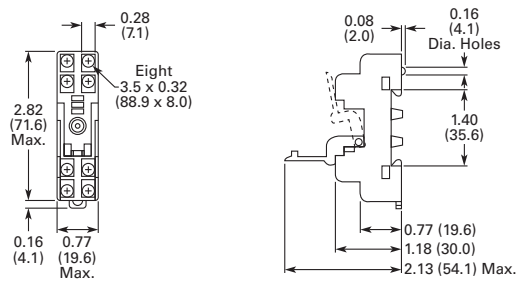


Terminal Arrangement

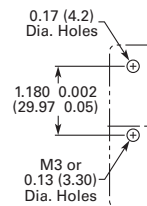


Mounting Holes

D4PA2



Terminal Arrangement



Mounting Holes

D5 Series Relay



D5RR/D5RF Series

Product Description

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

Features

D5RR

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

Contents

Description

| <i>Description</i> | <i>Page</i> |
|--|------------------|
| D1RR/D1RF Series..... | V7-T3-53 |
| D2RR/D2RF Series..... | V7-T3-57 |
| D3RR/D3RF Series..... | V7-T3-67 |
| D4 Series..... | V7-T3-76 |
| D5RR/D5RF Series | |
| Catalog Number Selection..... | V7-T3-81 |
| Product Selection..... | V7-T3-81 |
| Accessories..... | V7-T3-83 |
| Technical Data and Specifications..... | V7-T3-84 |
| Wiring Diagrams..... | V7-T3-85 |
| Dimensions..... | V7-T3-86 |
| D7PR/D7PF Series..... | V7-T3-89 |
| D8 Series..... | V7-T3-103 |
| D9 Series..... | V7-T3-108 |
| Accessories..... | V7-T3-112 |

Standards and Certifications



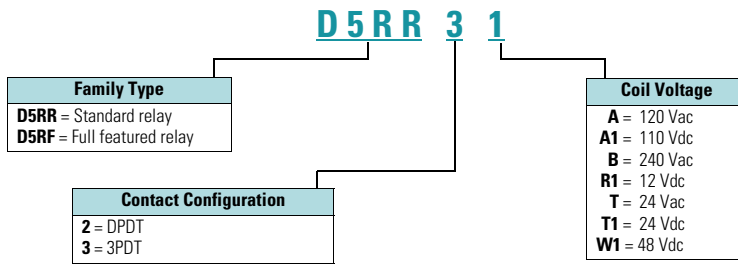
When used with accompanying Eaton screw terminal socket (D5RF only)

D5RF

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

Catalog Number Selection

D5 Series



Product Selection

D5 Relay/Socket Quick Reference

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

D5 Series Relay



D5 Series

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

Accessories

D5 Sockets and Accessories

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

Note

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

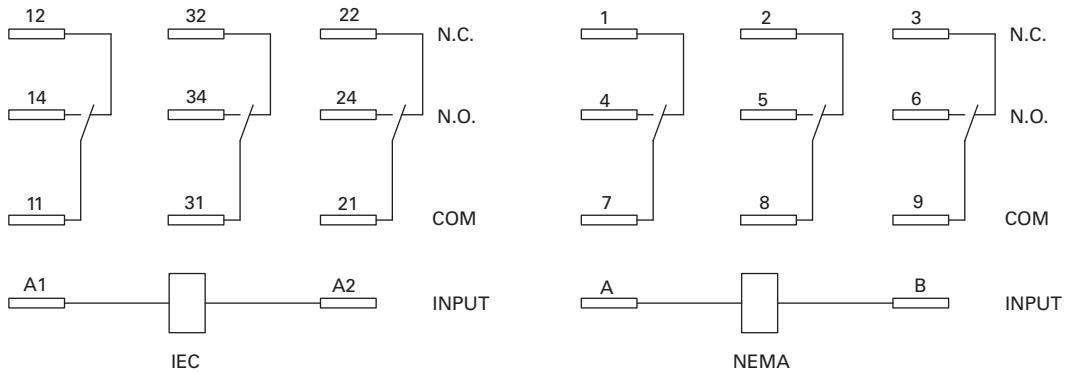
Technical Data and Specifications

D5 Series

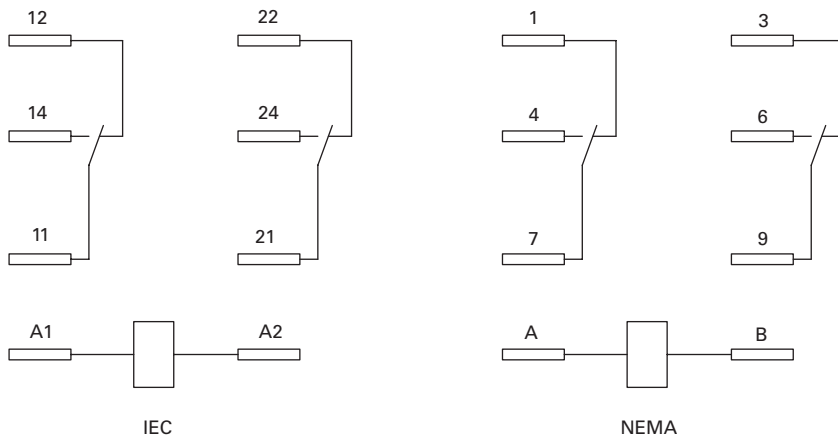
| Description | D5RR | D5RF |
|--|---|---|
| Contact Characteristics | | |
| Contact rating | 10 A | 10 A |
| Terminal style | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V | 300 V |
| Switching current at voltage—resistive | | |
| | 16 A at 277 Vac 50/60 Hz | 16 A at 277 Vac 50/60 Hz |
| | 16 A at 120 Vac 50/60 Hz | 16 A at 120 Vac 50/60 Hz |
| | 16 A at 28 Vdc | 16 A at 28 Vdc |
| Switching current at voltage | 1/2 hp at 240 Vac | 1/2 hp at 240 Vac |
| | 1/3 hp at 120 Vac | 1/3 hp at 120 Vac |
| Pilot duty | B300 | B300 |
| Minimum switching requirement | 100 mA at 5 Vdc (0.5 W) | 100 mA at 5 Vdc (0.5 W) |
| Coil Characteristics | | |
| Operating range | | |
| % of nominal (AC) | 85 to 110% | 85 to 110% |
| % of nominal (DC) | 80 to 110% | 80 to 110% |
| Average consumption | 3 VA 1.4 W | 3 VA 1.4 W |
| Drop-out voltage threshold | 10%/15% (AC) 10% (DC) | 10%/15% (AC) 10% (DC) |
| Performance | | |
| Electrical life (UL 508) operations at rated current | 100,000 operations | 100,000 operations |
| Mechanical life operations unpowered | 5,000,000 operations | 5,000,000 operations |
| Response time | 20 ms | 20 ms |
| Dielectric strength | | |
| Between coil and contact Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Between poles Vac (rms) | 1500 V (rms) | 1500 V (rms) |
| Environment | | |
| Ambient air temperature around the device | | |
| Storage | −40 °F to +185 °F (−40 °C to +85 °C) | −40 °F to +185 °F (−40 °C to +85 °C) |
| Operation | −40 °F to +131 °F (−40 °C to +55 °C) | −40 °F to +131 °F (−40 °C to +55 °C) |
| Vibration resistance—operational | 3 g-n at 10–55 Hz | 3 g-n at 10–55 Hz |
| Shock resistance | 10 g-n | 10 g-n |
| Degree of protection | IP40 | IP40 |
| Features | | |
| Cover options | Flange/plain cover with LED | Full featured |
| Features | Mechanical flag indicator (LED optional) | Bipolar LED/ Mechanical flag indicator/ Locking pushbutton/ Removable ID tag |
| Product certifications | RoHS/UL/CE/CSA | RoHS/UL/CE/CSA |

Wiring Diagrams

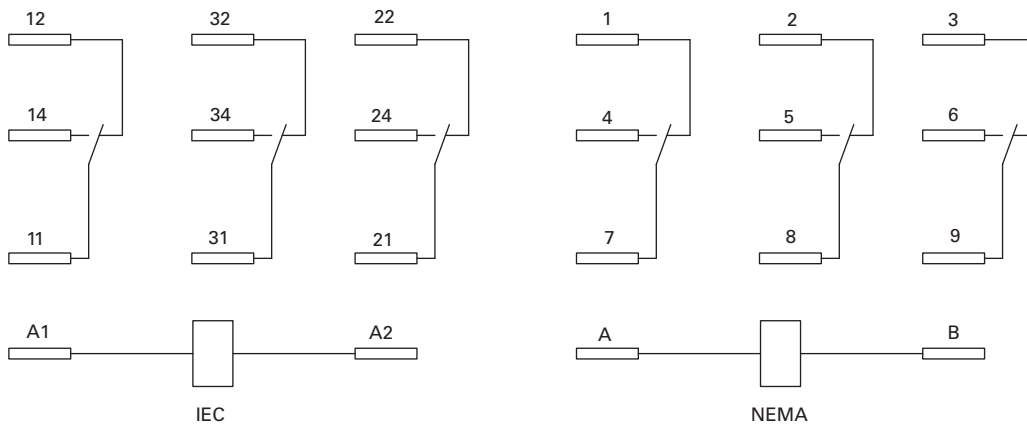
D5PA3L and D5PA3S



D5RR2/D5RF2 DPDT



D5RR3/D5RF3 3PDT



3.4

Control Relays and Timers

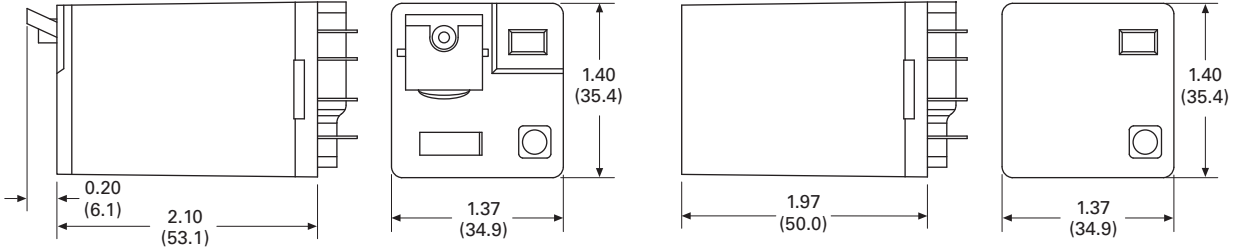
General Purpose Plug-In Relays

Dimensions

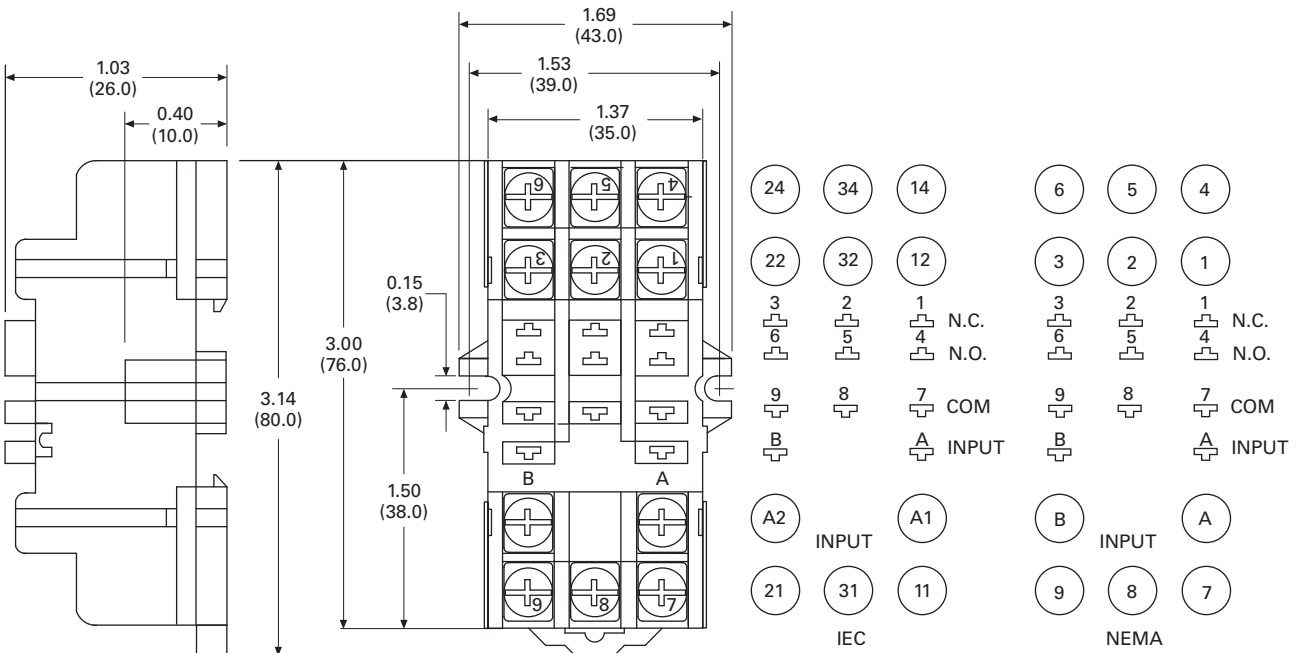
Approximate Dimensions in Inches (mm)

D5RR and D5RF

3

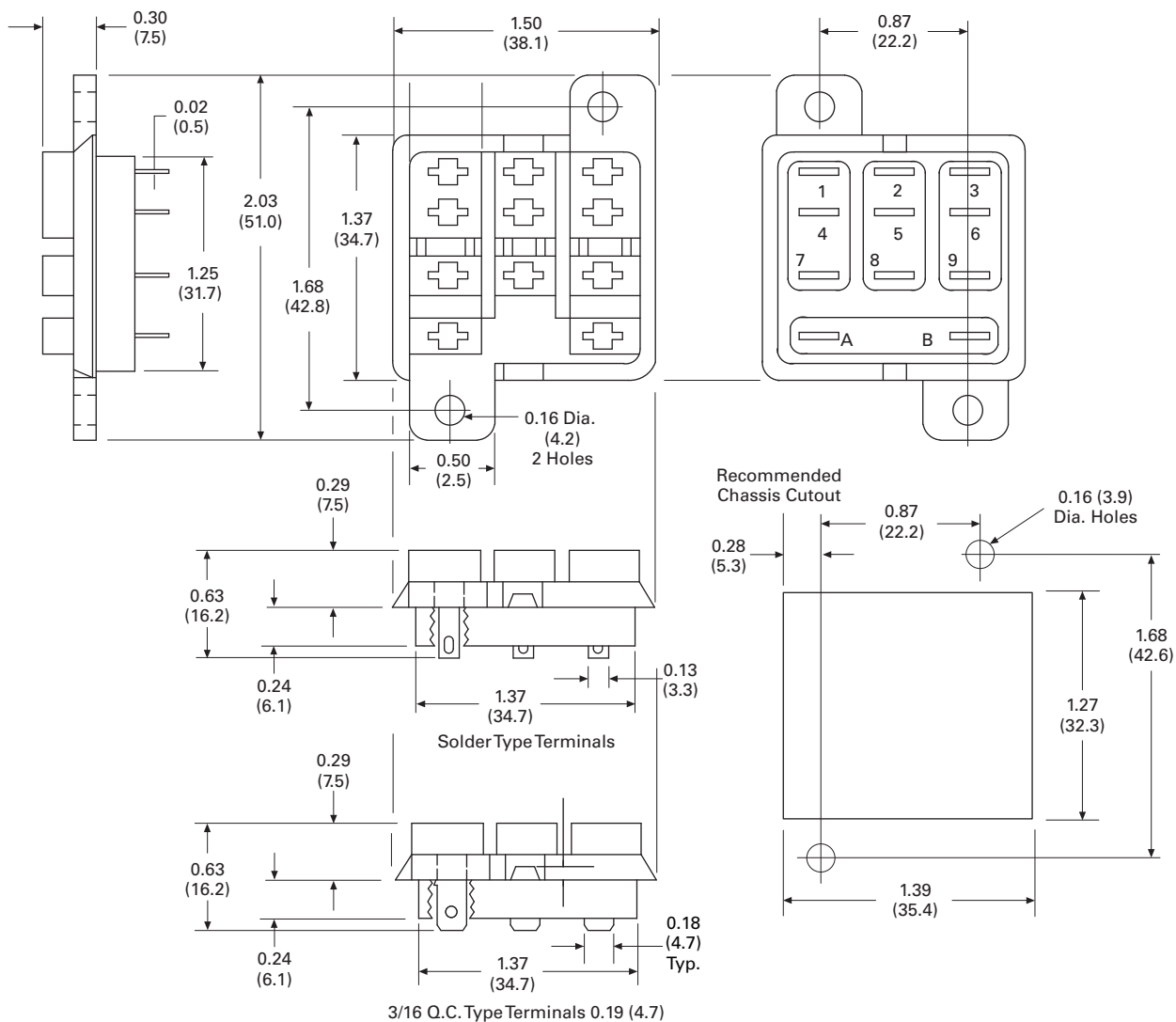


D5PA2



Approximate Dimensions in Inches (mm)

D5PA3L and D5PA3S



3.4

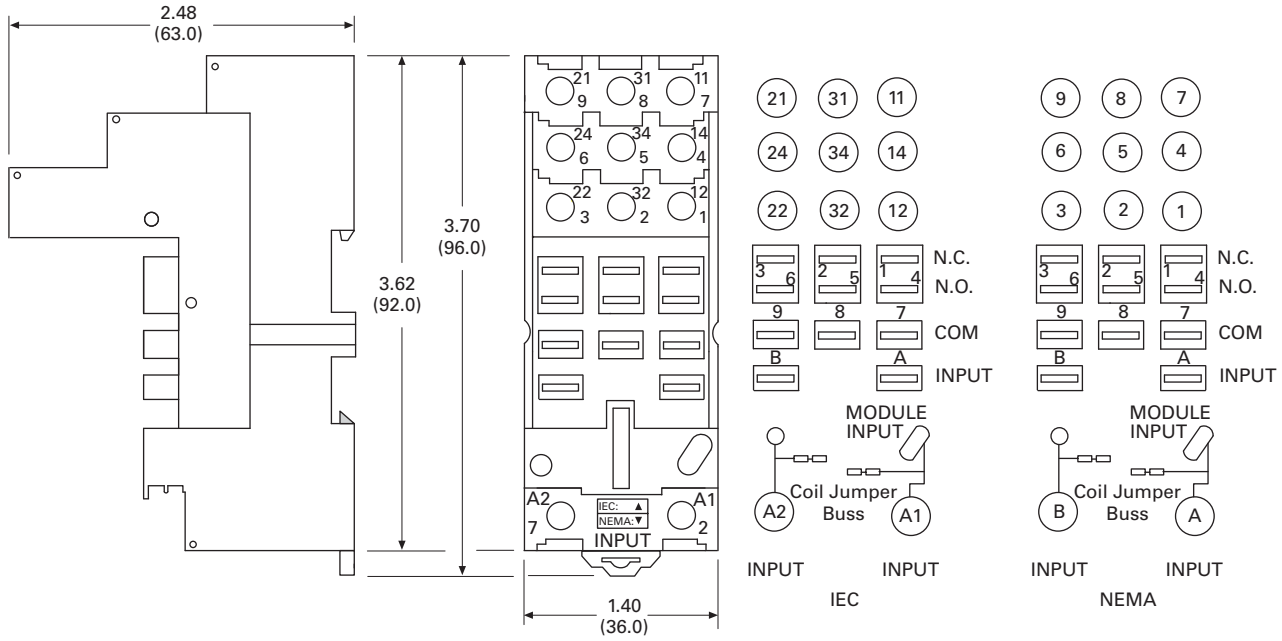
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D5PAL

3



D7 Series Relay



D7PR/D7PF Series

Product Description

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

Features

D7PR

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

Contents


Description


| Description | Page |
|---|------------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | |
| Catalog Number Selection | V7-T3-90 |
| Product Selection | V7-T3-90 |
| Accessories | V7-T3-92 |
| Technical Data and Specifications | V7-T3-93 |
| Wiring Diagrams | V7-T3-95 |
| Dimensions | V7-T3-96 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

D7PF

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

Standards and Certifications

 File # E37317, E65657

 File # LR217017, LR217069



 RoHS COMPLIANT

3.4

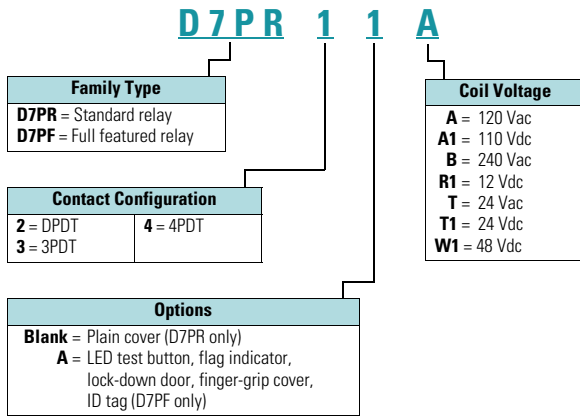
Control Relays and Timers

General Purpose Plug-In Relays

Catalog Number Selection

D7 Series

3



Product Selection

D7 Relay/Socket Quick Reference

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

D7 Series Relay



D7 Series

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories

D7 Sockets and Accessories

3

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

Note

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

Technical Data and Specifications

D7PR Relay

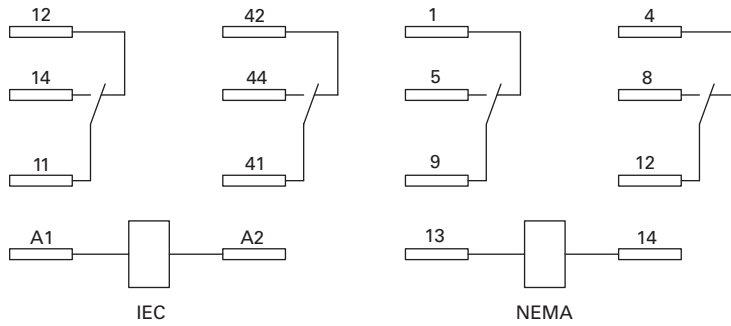
| Description | D7PR (DPDT) | D7PR (3PDT) | D7PR (4PDT) |
|--|---|---|---|
| Contact Characteristics | | | |
| Contact rating | 15 A | 15 A | 15 A |
| Terminal style | Plug-in | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V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

D7PF Relay

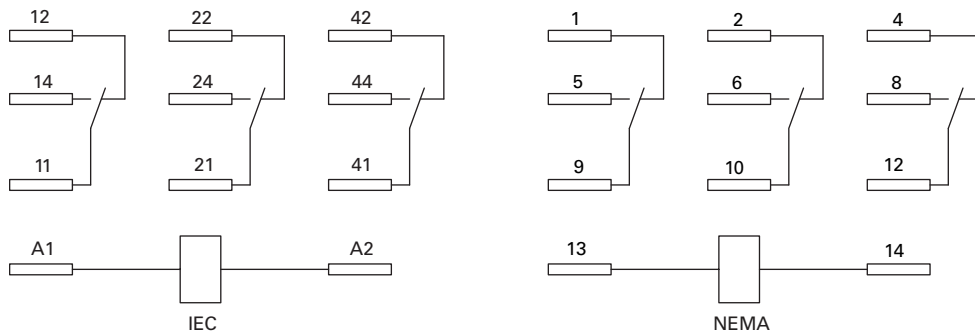
| Description | D7PF (DPDT) | D7PF (3PDT) | D7PF (4PDT) |
|--|---|---|---|
| Contact Characteristics | | | |
| Contact rating | 15 A | 15 A | 15 A |
| Terminal style | Plug-in | Plug-in | Plug-in |
| Contact materials | Silver alloy | Silver alloy | Silver alloy |
| Maximum switching voltage | 300 V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

Wiring Diagrams

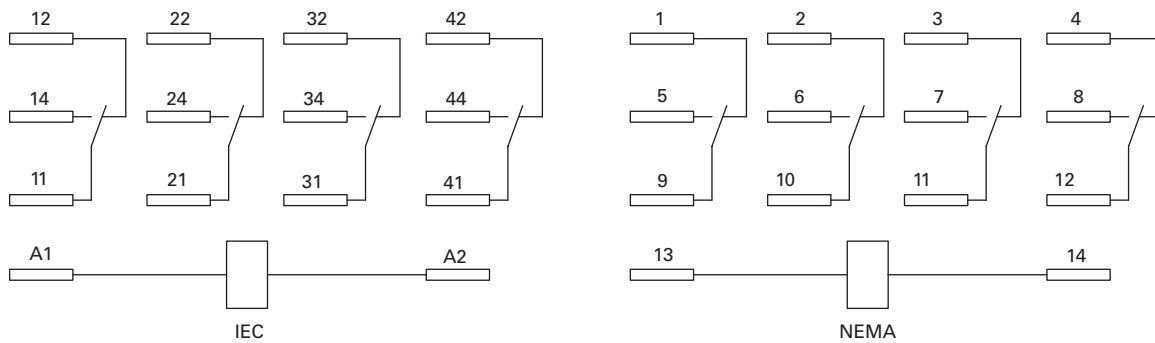
D7PR2/D7PF2



D7PR3/D7PF3



D7PR4/D7PF4



3.4

Control Relays and Timers

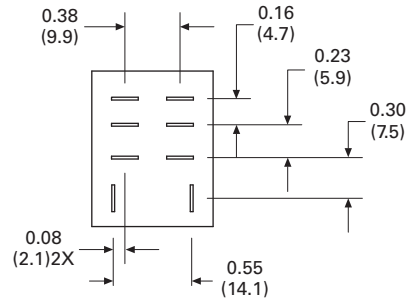
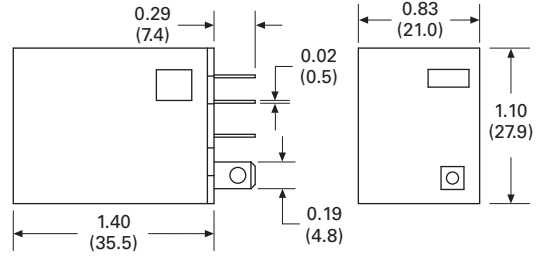
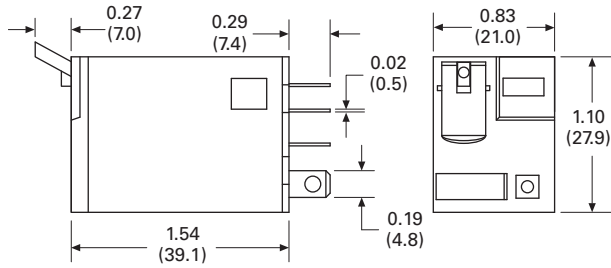
General Purpose Plug-In Relays

Dimensions

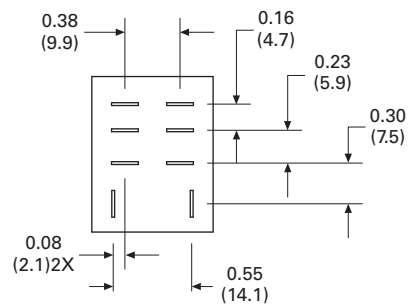
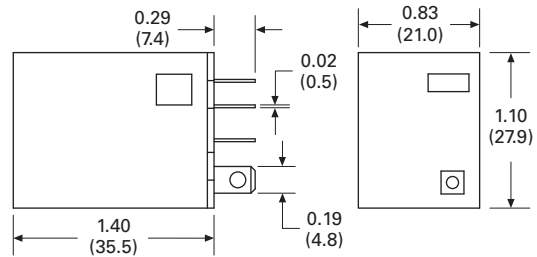
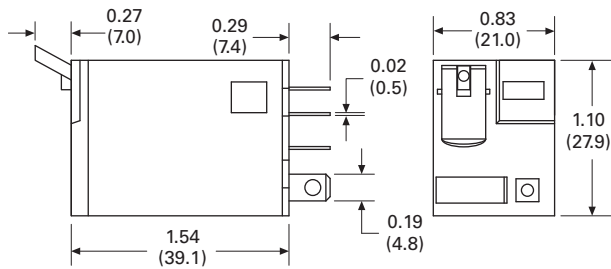
Approximate Dimensions in Inches (mm)

D7PR1/D7PF1

3

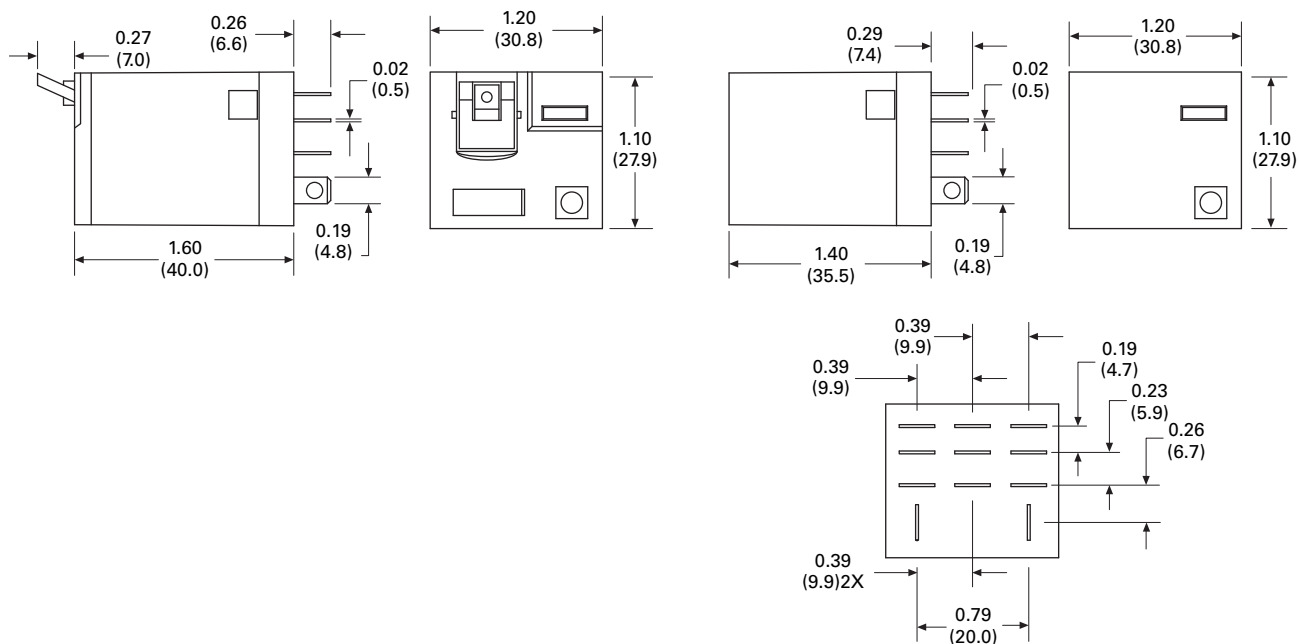


D7PR2/D7PF2

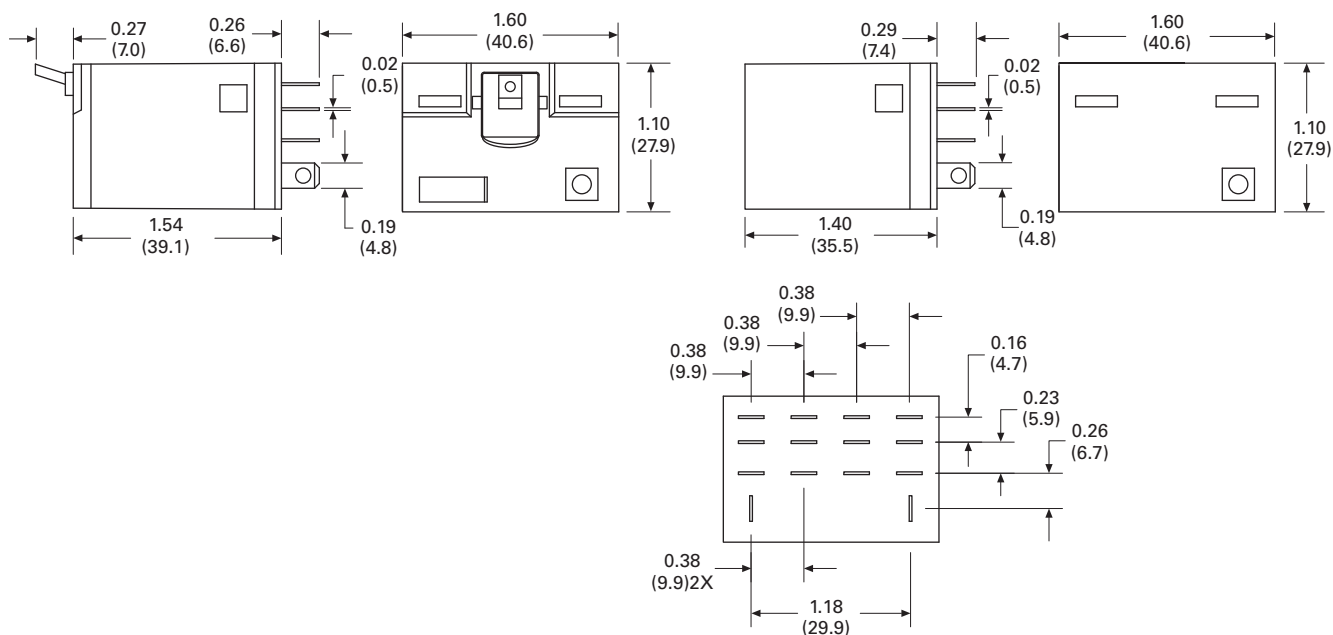


Approximate Dimensions in Inches (mm)

D7PR3/D7PF3



D7PR4/D7PF4



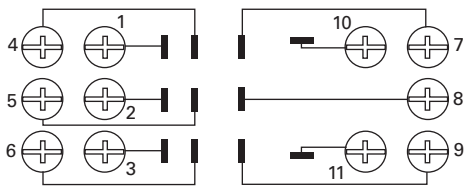
3.4

Control Relays and Timers

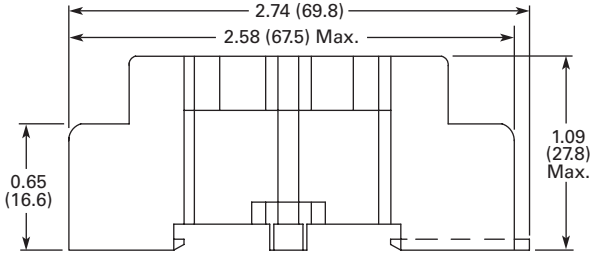
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

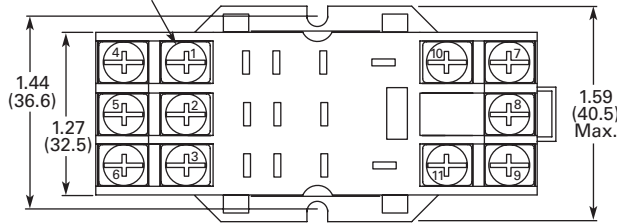
D7PA3



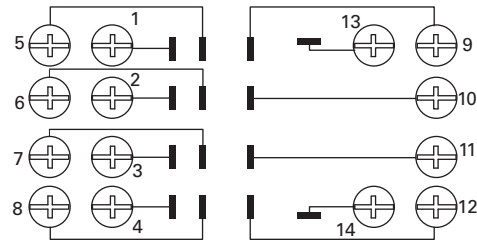
Wiring Diagram (Top View)



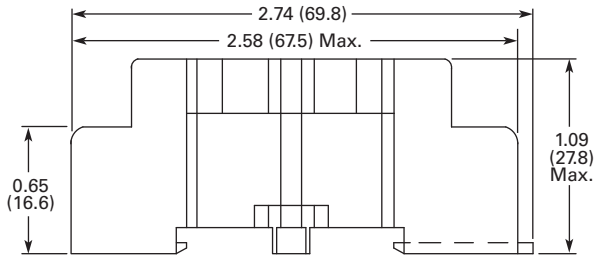
Combination Slotted/Phillips
Head Screws 6-32 x 5/16"



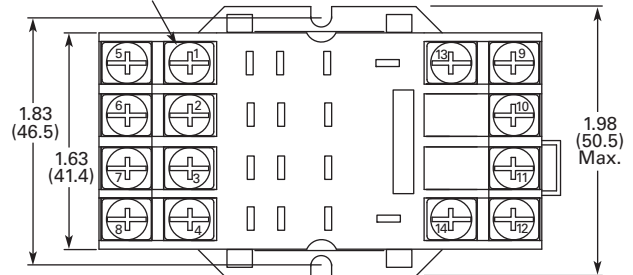
D7PA4



Wiring Diagram (Top View)

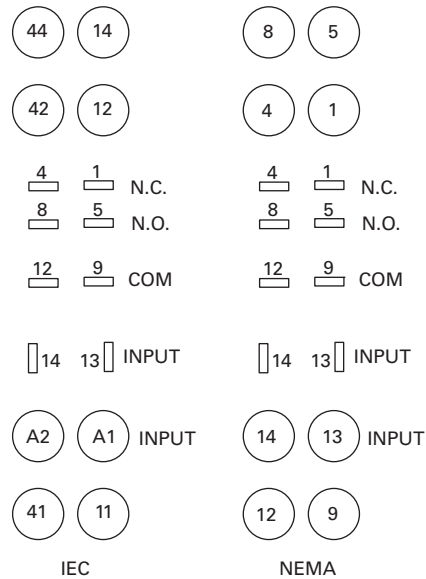
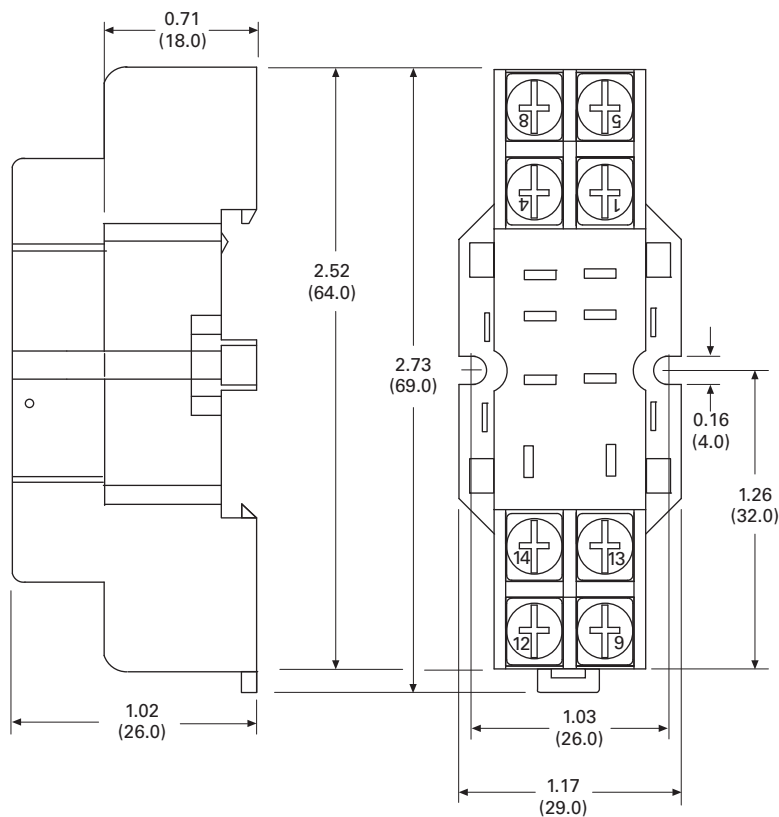


Combination Slotted/Phillips
Head Screws 6-32 x 5/16"



Approximate Dimensions in Inches (mm)

D7PA9 Standard Mount



3.4

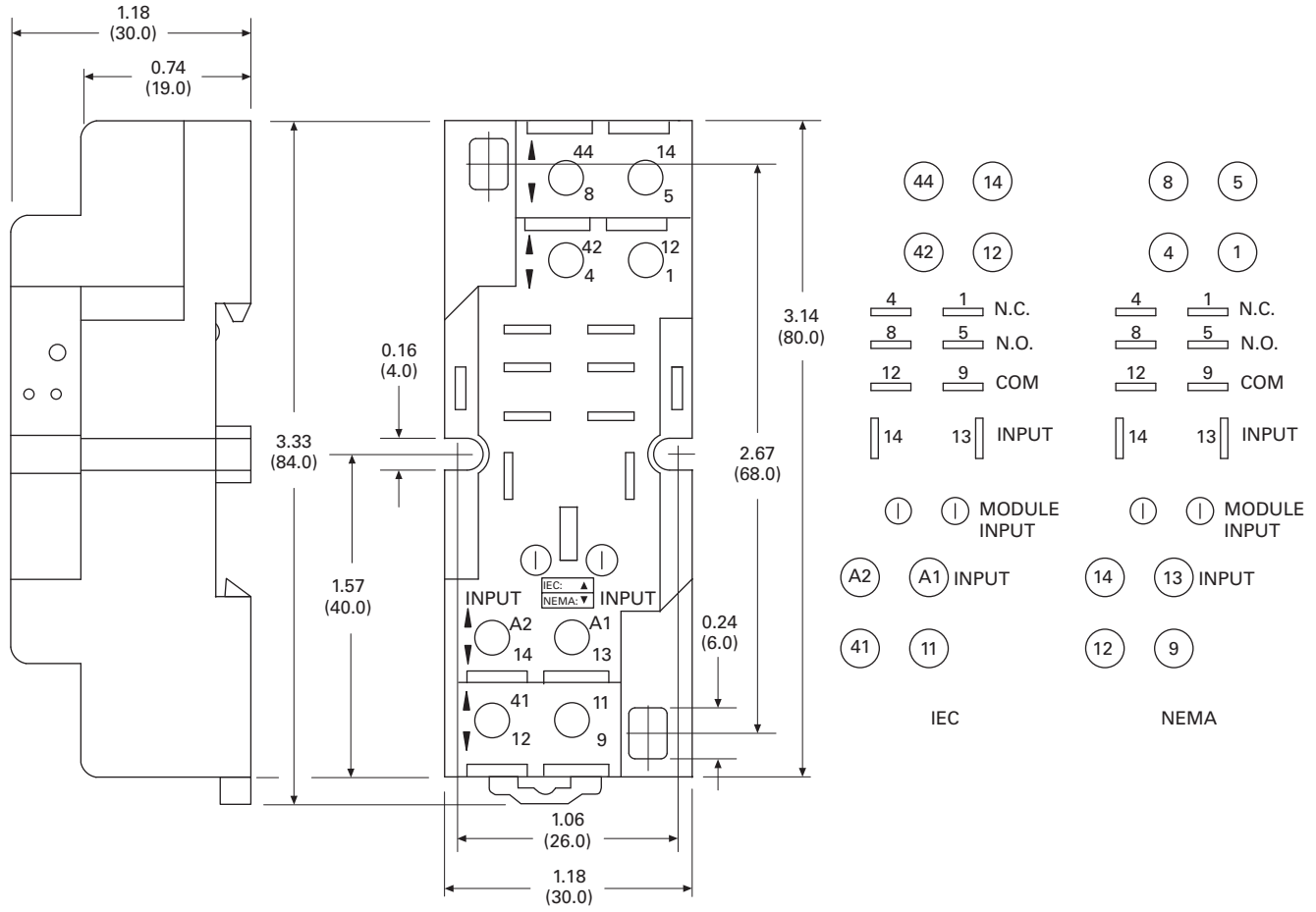
Control Relays and Timers

General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

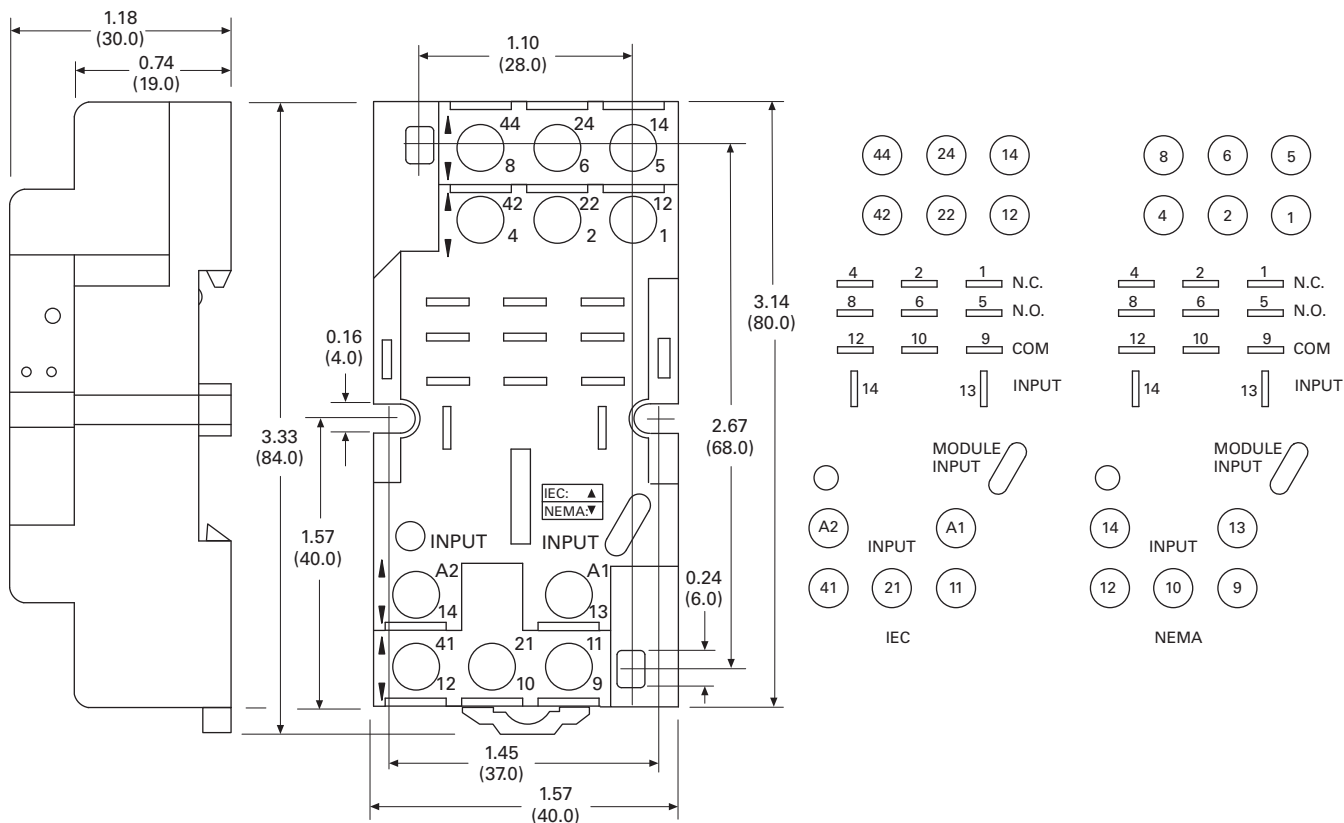
D7PAA

3



Approximate Dimensions in Inches (mm)

D7PAB



3.4

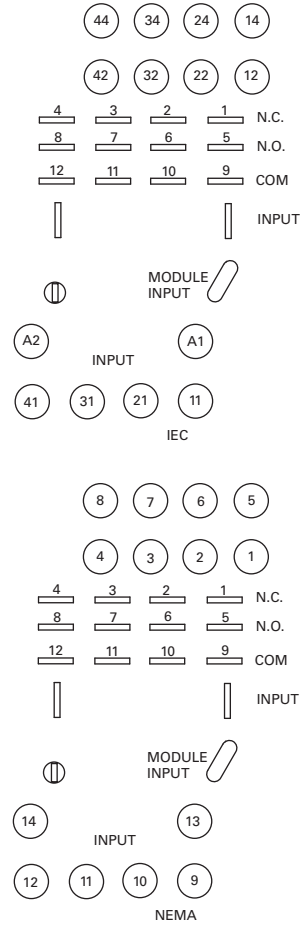
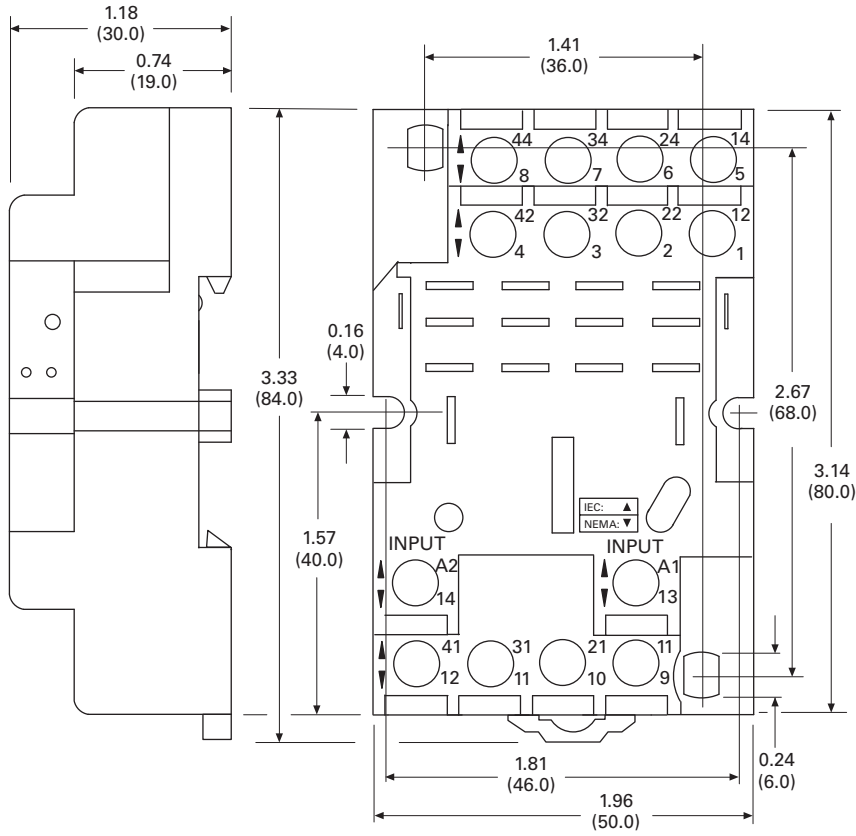
Control Relays and Timers

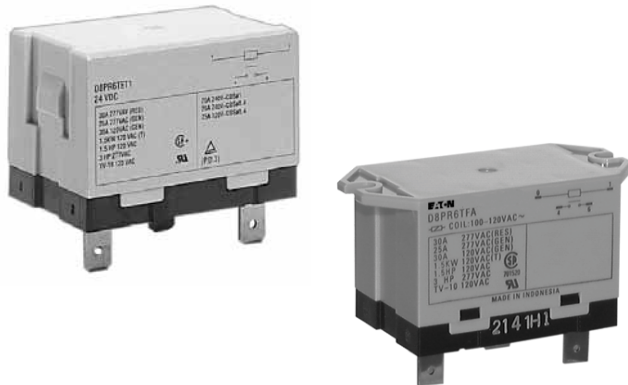
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

D7PAD

3



D8 Series Relay**D8 Series****Product Description**

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




Features

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

Contents**Description**

| Description | Page |
|---|-------------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | |
| Catalog Number Selection | V7-T3-104 |
| Product Selection | V7-T3-104 |
| Technical Data and Specifications | V7-T3-105 |
| Dimensions | V7-T3-105 |
| D9 Series | V7-T3-108 |
| Accessories | V7-T3-112 |

Standards and Certifications

-  File # E1491
-  File # LR701520
- 

3.4

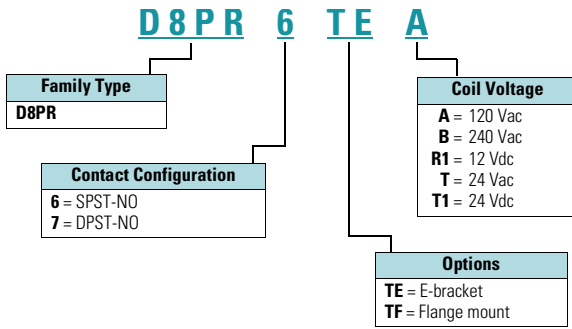
Control Relays and Timers

General Purpose Plug-In Relays

3

Catalog Number Selection

D8 Series ①



Product Selection

D8 Relay/Socket Quick Reference

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

D8 Series Relay



D8 Series ②

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

Notes

- ① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
- ② Additional coil voltages available—consult Sales Office or Customer Support Center.

Technical Data and Specifications

Coil Resistance

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

D8 Relays

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

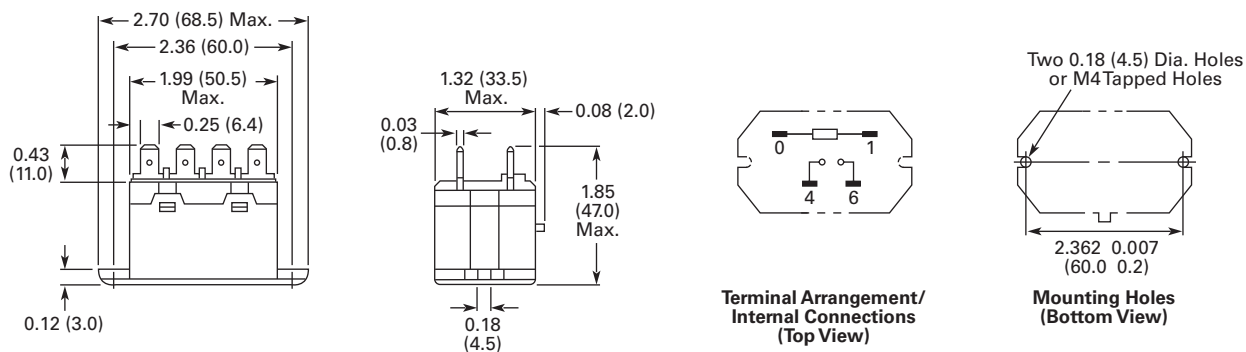
Coil Data

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

Dimensions

Approximate Dimensions in Inches (mm)

D8PR6TF



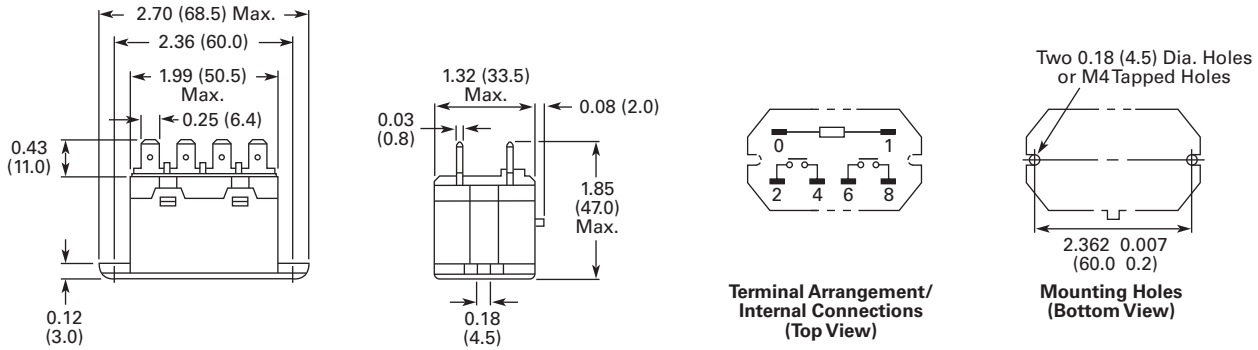
3.4

Control Relays and Timers

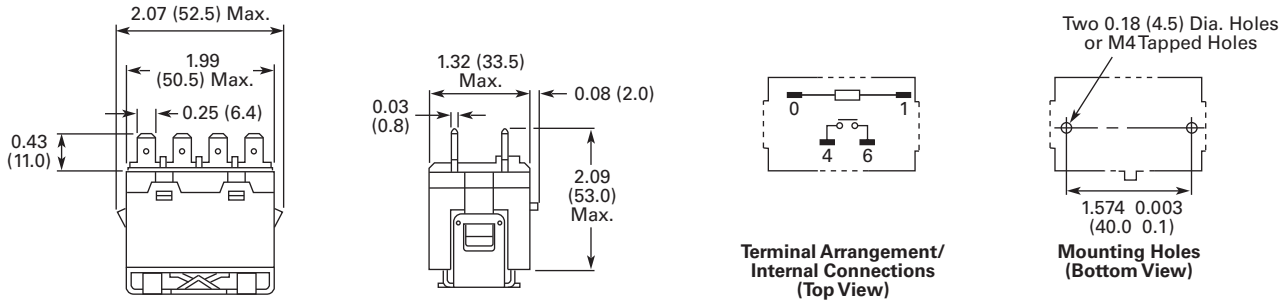
General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

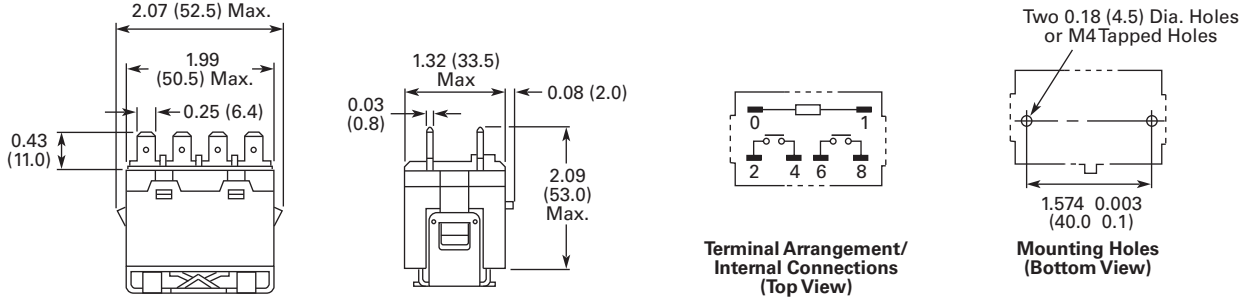
D8PR7TF



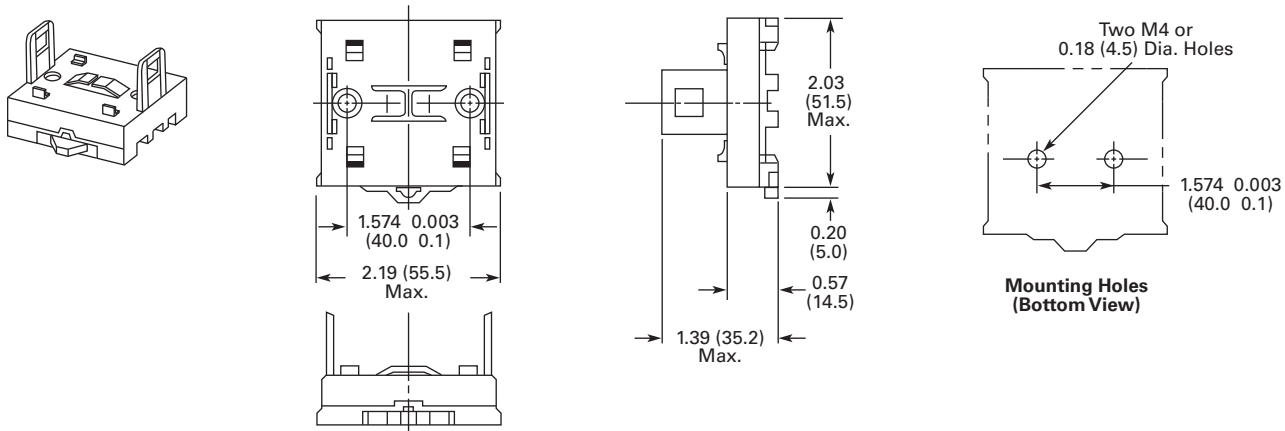
D8PR6TE with D8PA5 Bracket Attached



D8PR7TE with D8PA5 Bracket Attached



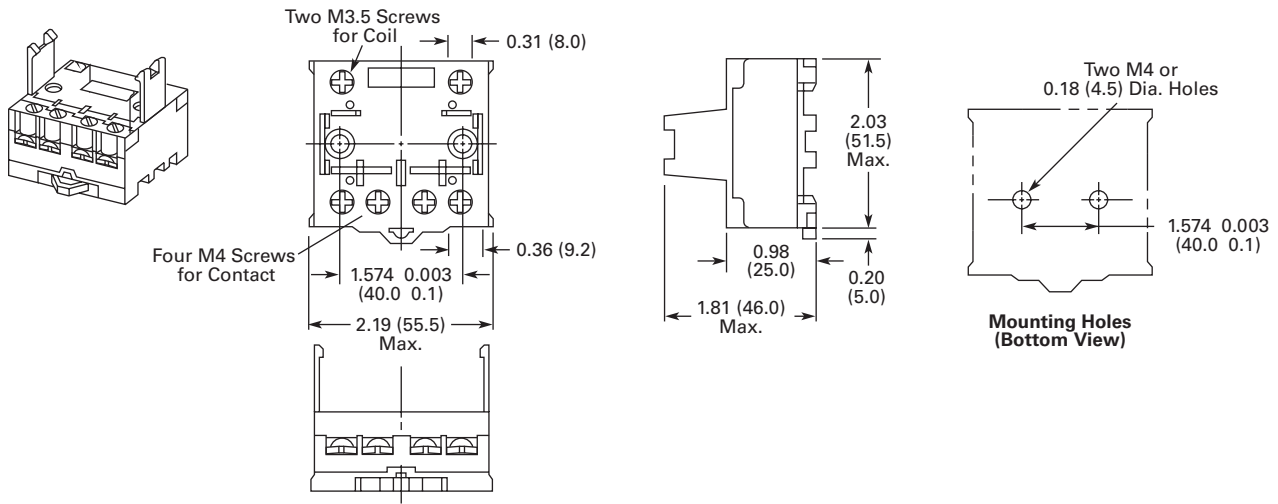
D8PA1



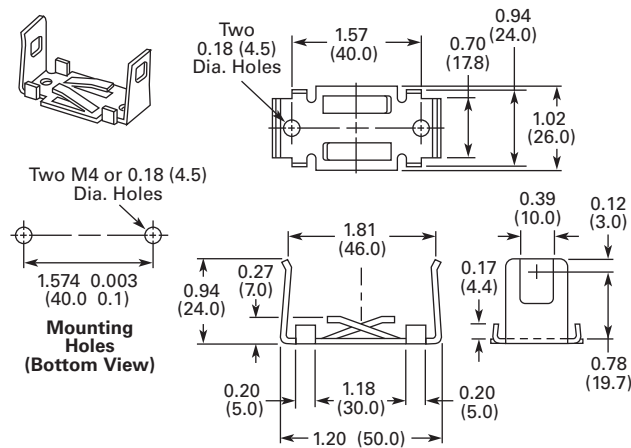
Note: Minimum spacing around relay = 0.20 inches (5 mm).

Approximate Dimensions in Inches (mm)

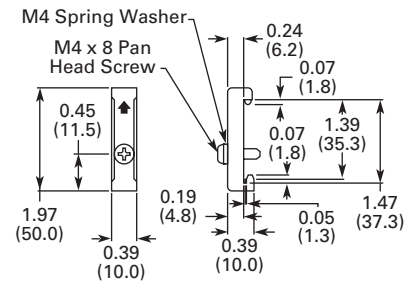
D8PA2



D8PA5



PFP-M DIN Rail End Stop



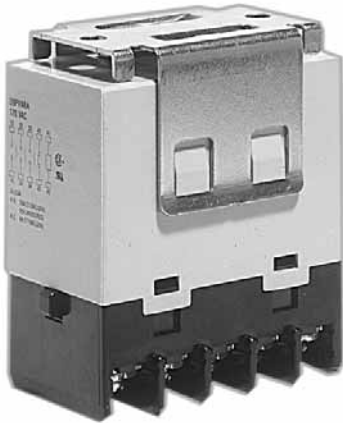
3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

D9 Series Relay



Contents

| Description | Page |
|--|-----------|
| D1RR/D1RF Series..... | V7-T3-53 |
| D2RR/D2RF Series..... | V7-T3-57 |
| D3RR/D3RF Series..... | V7-T3-67 |
| D4 Series..... | V7-T3-76 |
| D5RR/D5RF Series..... | V7-T3-80 |
| D7PR/D7PF Series..... | V7-T3-89 |
| D8 Series..... | V7-T3-103 |
| D9 Series | |
| Product Selection..... | V7-T3-109 |
| Technical Data and Specifications..... | V7-T3-109 |
| Dimensions..... | V7-T3-110 |
| Accessories..... | V7-T3-112 |

D9 Series

Product Description

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

Features

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

Standards and Certifications

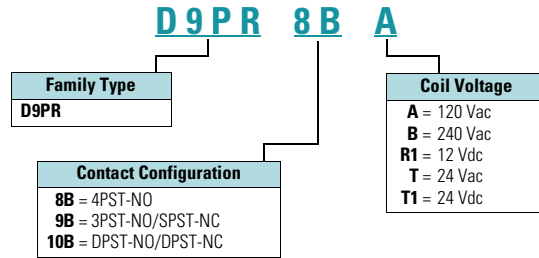


File # E1491



File # LR701520

Catalog Number Selection



Product Selection

D9 Series

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

Technical Data and Specifications

Coil Resistance

| Coil Voltage | Ohms | mA | Coil Voltage | Ohms | mA |
|--------------|------|------|--------------|------|-----|
| 24 Vac | — | 75 | 12 Vdc | 72 | 167 |
| 120 Vac | — | 21.6 | 24 Vdc | 288 | 83 |
| 240 Vac | — | 10.8 | 110 Vdc | 6050 | 18 |

D9PR Specifications

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

3.4

Control Relays and Timers

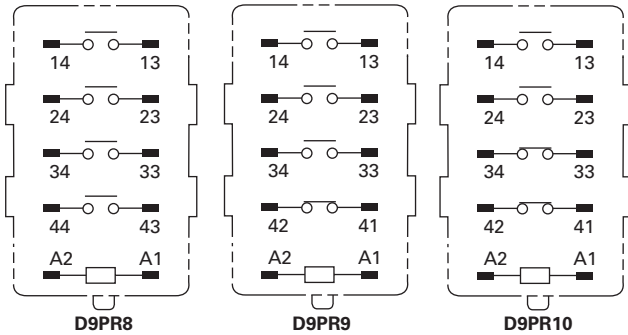
General Purpose Plug-In Relays

3

Coil Data

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

Terminal Arrangements

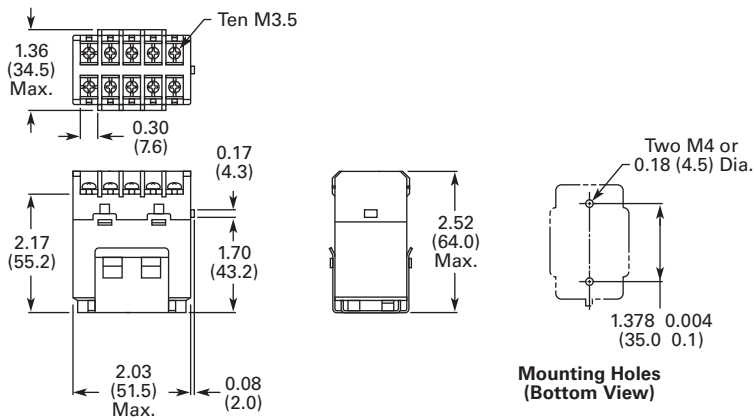


Dimensions

Approximate Dimensions in Inches (mm)

D9PR

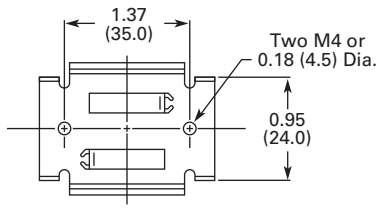
Screw Terminal Brackets



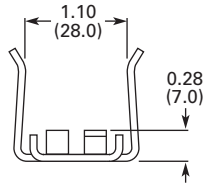
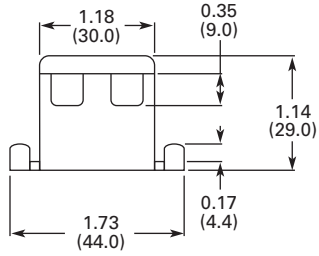
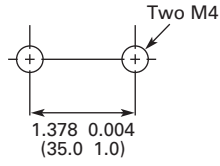
Mounting Holes
(Bottom View)

Approximate Dimensions in Inches (mm)

Mounting Bracket



Mounting Holes



3.4

Control Relays and Timers

General Purpose Plug-In Relays

Accessories



3

Contents

| Description | Page |
|---------------------------------|-----------|
| D1RR/D1RF Series | V7-T3-53 |
| D2RR/D2RF Series | V7-T3-57 |
| D3RR/D3RF Series | V7-T3-67 |
| D4 Series | V7-T3-76 |
| D5RR/D5RF Series | V7-T3-80 |
| D7PR/D7PF Series | V7-T3-89 |
| D8 Series | V7-T3-103 |
| D9 Series | V7-T3-108 |
| Accessories | |
| MOD Modules | V7-T3-113 |
| Relay Clips | V7-T3-114 |
| Coil Bus Jumpers | V7-T3-116 |
| Write-On Plastic Labels/ID Tags | V7-T3-116 |
| Flange Mount Adapters | V7-T3-117 |

Accessories

Accessories Selection Guide

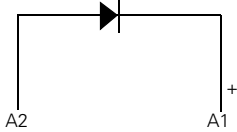
Eaton offers a variety of simple-to-install relay accessories that allow you to customize the features of a relay system to meet your exact needs.

The MOD Module System

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

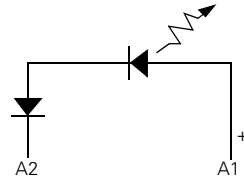
Circuit Diagrams

Diode Circuit



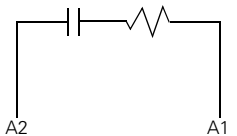
The diode module protects external drive circuitry from inductive voltages generated when removing coil voltages.

LED Circuit



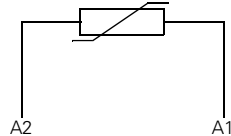
The LED status lamp verifies that power is being supplied to the coil. Ideal for both AC and DC applications. Polarity sensitive for DC applications.

RC Circuit



Snubs back EMF of relay coil.

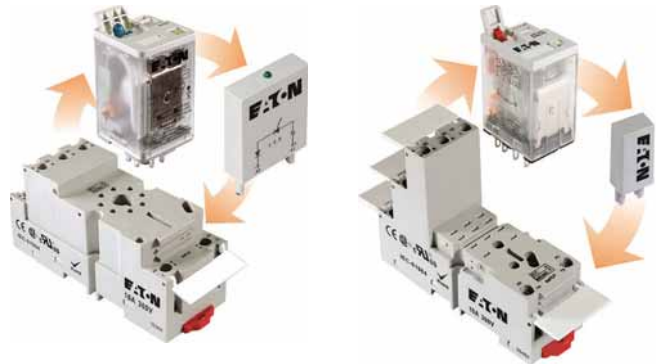
Metal Oxide Varistor (MOV) Circuit



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

System Diagrams



The MOD Module System



MOD Modules

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

MOD Modules

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

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3




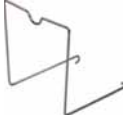




Relay Clips

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

Metal Hold-Down Clips

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

Metal Hold-Down Clips

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

**Plastic Ejector/
Hold-Down Clips**

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

PWC-D24**Plastic Ejector/Hold-Down Clips**

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

Plastic ID Clips

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

PQC-1349**Plastic ID Clips**

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

PMC-1783

| | | |
|-----------------|-------|--------------|
| PMC-1783 | D7PAB | D7PF1, D7PF2 |
|-----------------|-------|--------------|

PMC-1784

| | | |
|-----------------|-------|-------|
| PMC-1784 | D7PAD | D7PF4 |
|-----------------|-------|-------|

3.4

Control Relays and Timers

General Purpose Plug-In Relays

3

Coil Bus Jumpers

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



System Diagrams

Coil Bus Jumpers ①



Write-On Plastic Labels/ID Tags

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

Coil Bus Jumpers

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

Write-On Plastic Labels/ID Tags

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

Note

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

Flange Mount Adapters

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

Unit with Flange Mount Adapter



Flange Mount Adapters

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

9575H Series 3000 Relay



9575H Series 3000—Type AA, AC and DC

Product Description

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

Application Description

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

Contents

Description

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

Page

Standards and Certifications

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



Product Selection

When Ordering, Specify

Catalog number and magnet coil code letter. Example: for DPDT relay with auxiliary

switch and a 120 V 50/60 Hz coil, order Catalog Number 9575H3A010.

9575H Series 3000 Relay



Type AA Relays ^①

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

Coil Voltage Selection

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

Accessories

Enclosure ^③

| Description | Catalog Number |
|------------------|----------------|
| NEMA 1 Enclosure | 9575H2449 |

Notes

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

Technical Data and Specifications

Relay Specifications

3

Coil

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

Contacts

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

Dielectric Withstanding Voltage

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

Miscellaneous

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

Auxiliary Switch Specifications

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

Average Operating Times (Milliseconds)

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

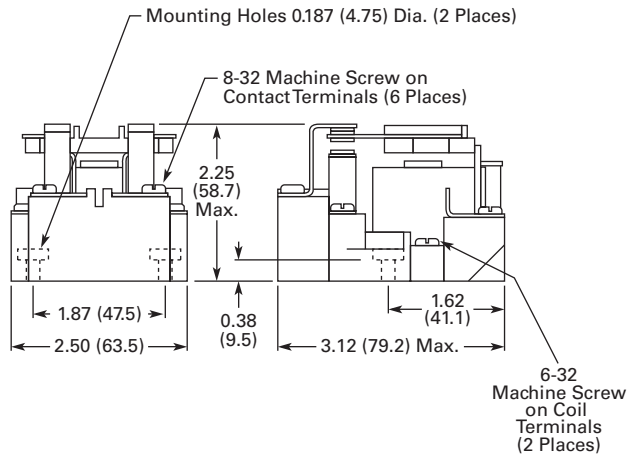
Temperature Ranges

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

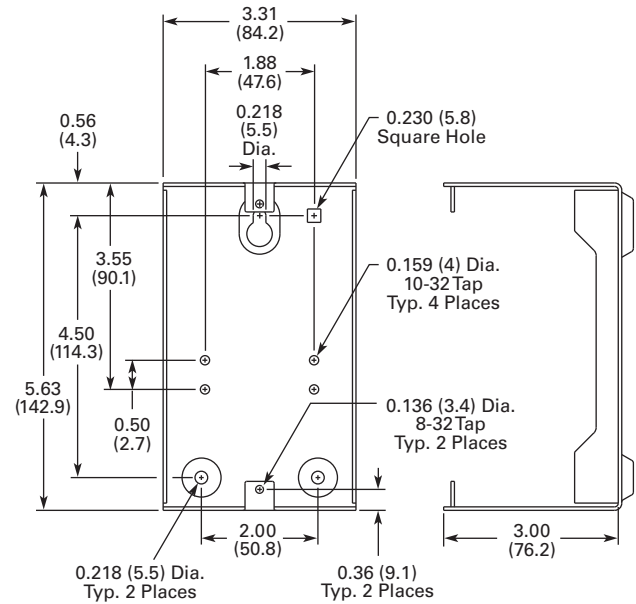
Dimensions

Approximate Dimensions in Inches (mm)

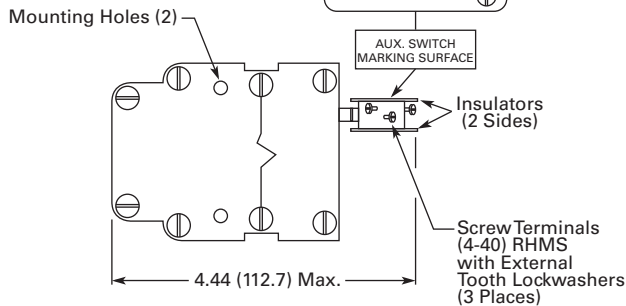
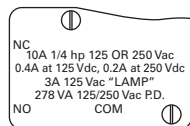
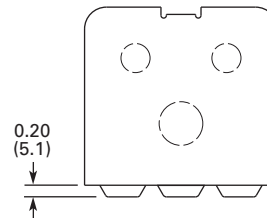
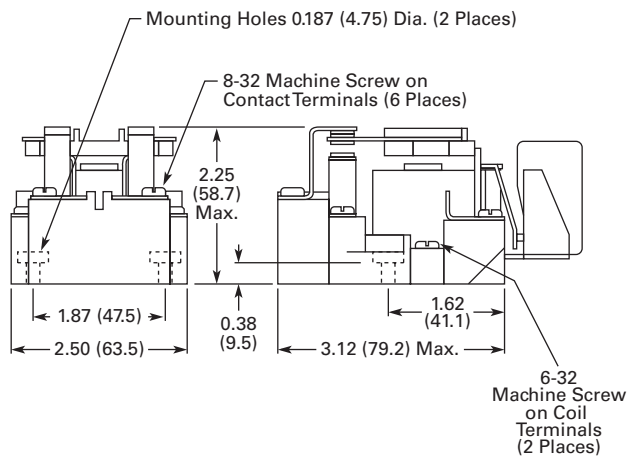
9575H3 DPDT Relay



9575H2449



9575H3 DPDT Relay with Auxiliary SPDT Switch



RELAY TOP VIEW

3.6

Control Relays and Timers

Solid-State Relays

3

Solid-State Relays



Contents

Description

Solid-State Relays

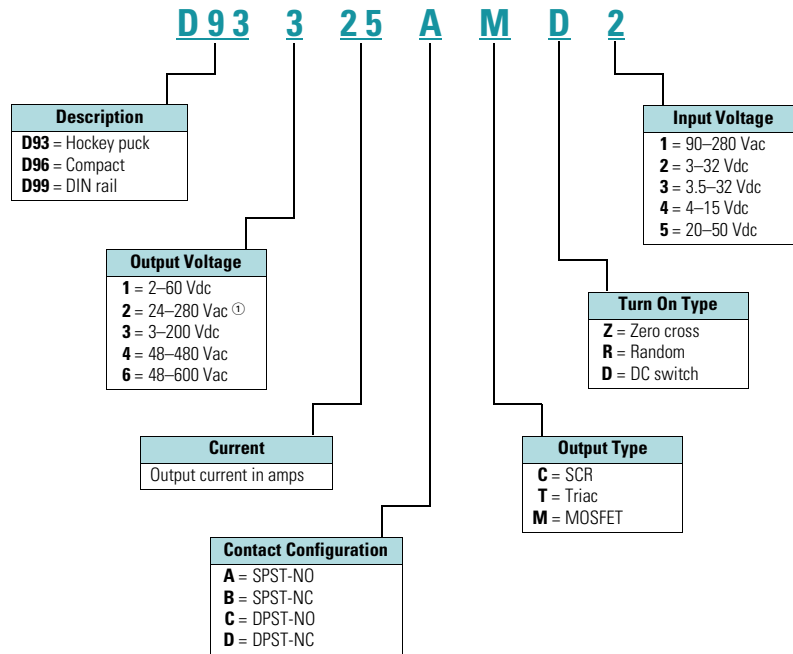
| | |
|------------------|-----------|
| D93 Series | V7-T3-123 |
| D96 Series | V7-T3-130 |
| D99 Series | V7-T3-135 |

Page

Product Overview

Catalog Number Selection

Solid-State Relays—D93, D96 and D99 Series



Note

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

D93 Series—Solid-State Relays



D93 Series

Product Description

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

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

Application Description

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

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

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

Contents

Description

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

Features and Benefits

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

Standards and Certifications

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



3.6

Control Relays and Timers

Solid-State Relays

Product Selection

D93210ACZ1

D93 Series

3



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

Accessories

D93HS1



D93 Series—Heat Sink

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

Heat Sink Accessory

| Description | Catalog Number |
|-------------|----------------|
| Heat sink | D93HS1 |

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

D93TP1



D93 Series—Thermal Transfer Pad

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

Technical Data and Specifications

D93 Series

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

3.6

Control Relays and Timers

Solid-State Relays

3

D93 Series, continued

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

D93 Series, continued

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

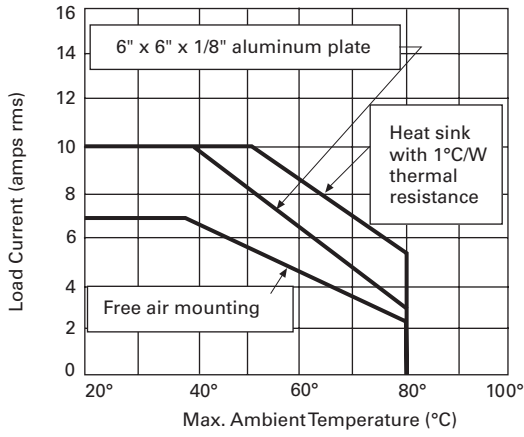
3.6

Control Relays and Timers

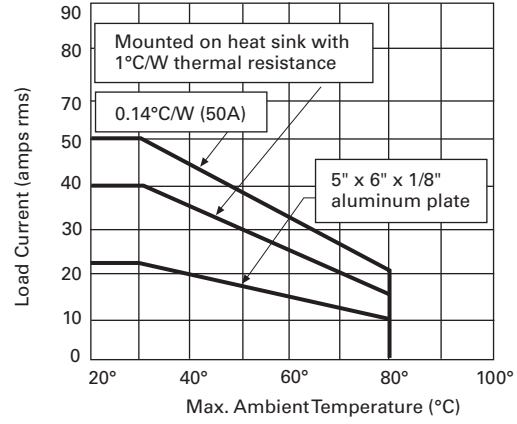
Solid-State Relays

Temperature Derating Curves

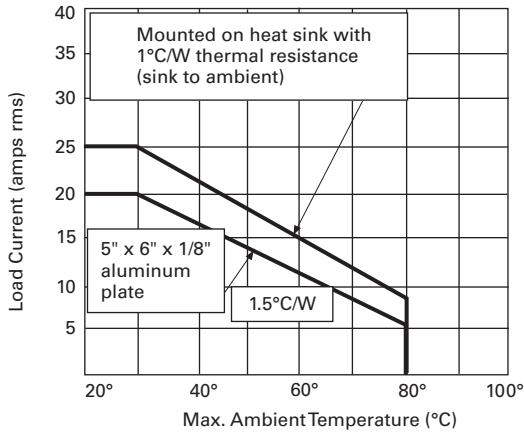
10 Amp Styles



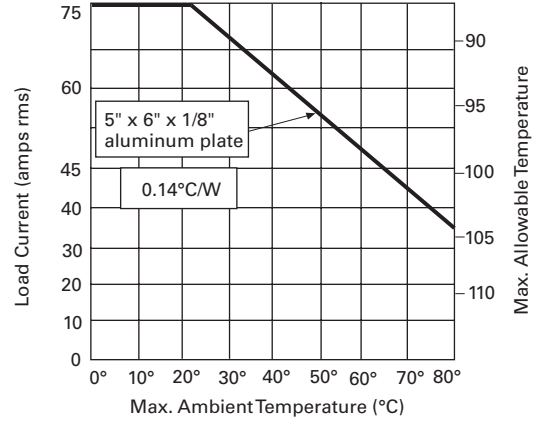
40 and 50 Amp Styles



25 Amp Styles



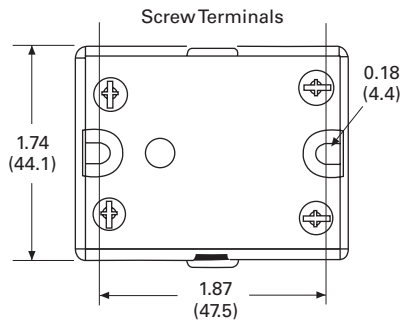
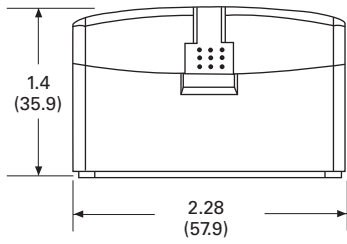
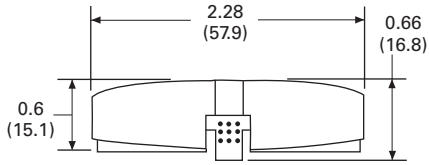
75 Amp Styles



Dimensions

Approximate Dimensions in Inches (mm)

D93 Series



D96 Series—Solid-State Relays



Contents

| Description | Page |
|---|------------------|
| D93 Series | V7-T3-123 |
| D96 Series | |
| Product Selection | V7-T3-131 |
| Technical Data and Specifications | V7-T3-132 |
| Dimensions | V7-T3-134 |
| D99 Series | V7-T3-135 |

D96 Series

Product Description

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

Application Description

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

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

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

Features and Benefits

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

Standards and Certifications

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



Product Selection

D96115ACZ3

D96 Series



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

Technical Data and Specifications

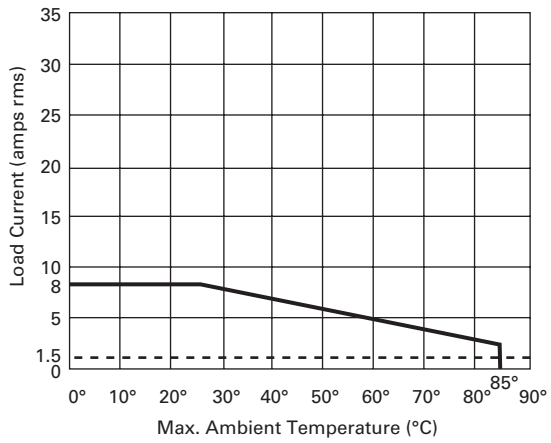
D96 Series

3

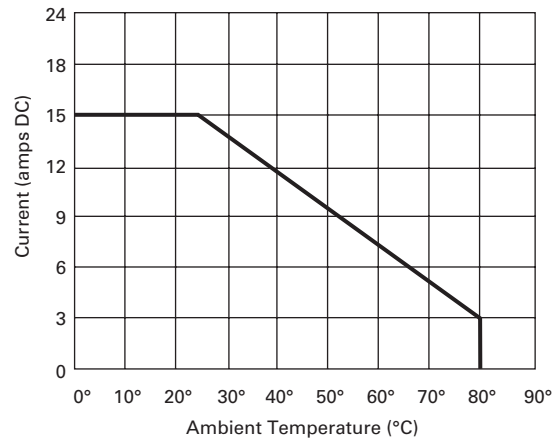
| Description | Units | D96210ACZ1 | D96210ACZ2 | D96210ACR1 | D96210ACR2 | D96115ACZ3 | D96208ACZ3 | D96210BCR2 |
|--|------------------------|-------------|-------------------|----------------|----------------|-------------------|-------------------|----------------|
| Output Characteristics | | |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

Temperature Derating Curves

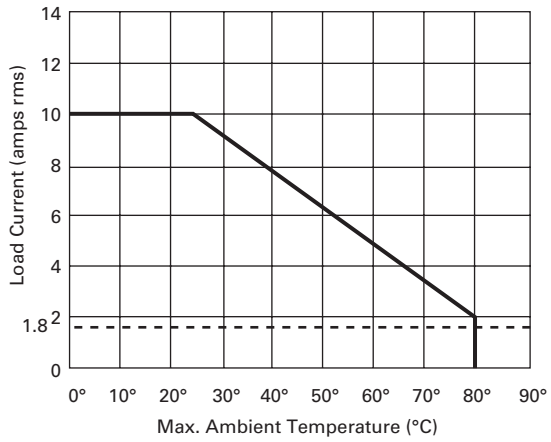
8 Amp Style



15 Amp Style



10 Amp Style



3.6

Control Relays and Timers

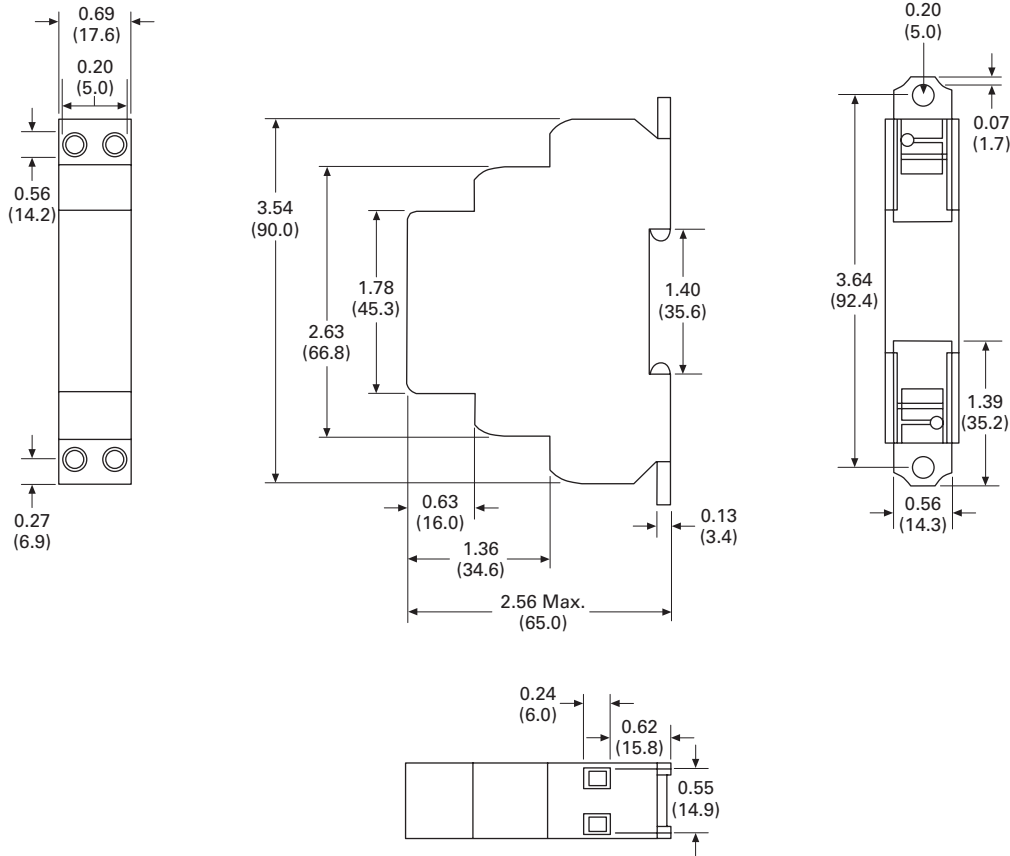
Solid-State Relays

Dimensions

Approximate Dimensions in Inches (mm)

D96 Series

3



D99 Series—Solid-State Relays



D99 Series

Product Description

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

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

Application Description

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

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

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

Contents

| Description | Page |
|---|-----------|
| D93 Series | V7-T3-123 |
| D96 Series | V7-T3-130 |
| D99 Series | |
| Product Selection | V7-T3-136 |
| Technical Data and Specifications | V7-T3-137 |
| Dimensions | V7-T3-140 |

Features and Benefits

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

Standards and Certifications

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



3.6

Control Relays and Timers

Solid-State Relays

Product Selection

D99210ACZ1

D99 Series

3



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

Technical Data and Specifications

D99 Series

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

3.6

Control Relays and Timers

Solid-State Relays

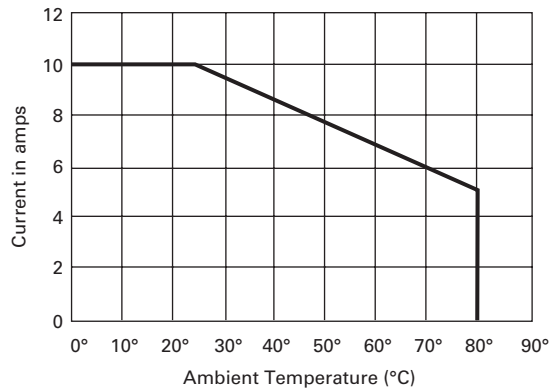
3

D99 Series, continued

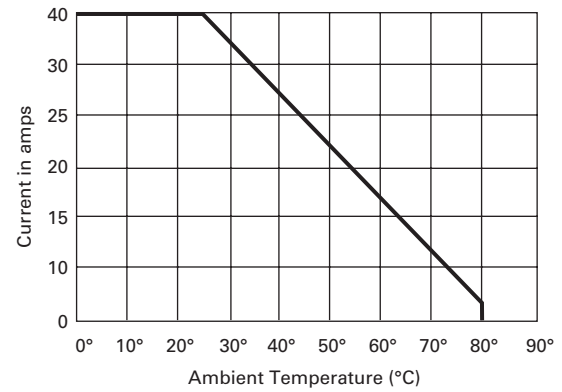
| Description | Units | D99610ACZ1 | D99610ACZ2 | D99625ACZ1 | D99625ACZ2 | D99640ACZ1 | D99640ACZ2 |
|--|------------------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|
| Output Characteristics | | | | | | | |
| Contact configuration |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

Temperature Derating Curves

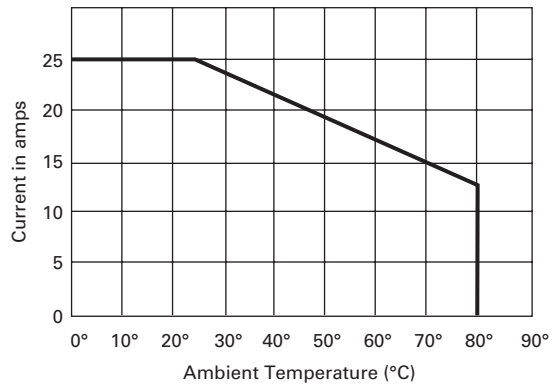
10 Amp Styles



40 Amp Styles



25 Amp Styles



3.6

Control Relays and Timers

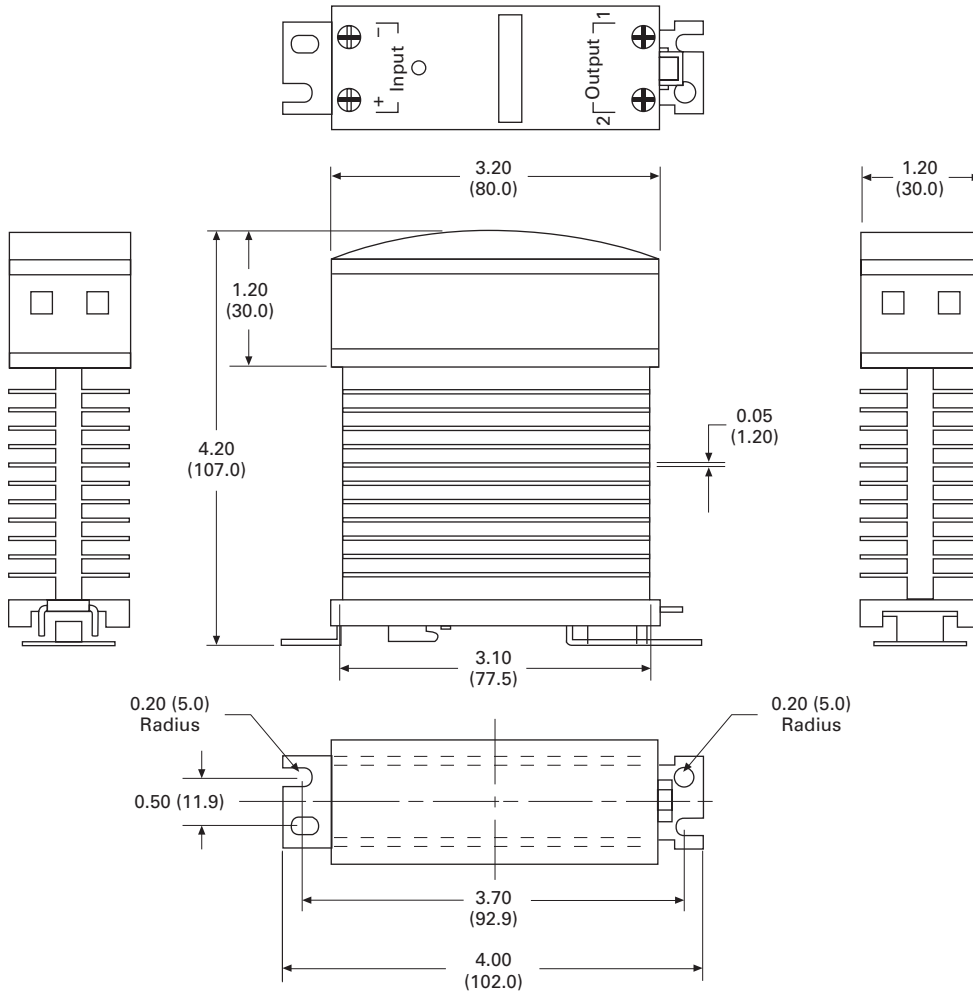
Solid-State Relays

Dimensions

Approximate Dimensions in Inches (mm)

D99 Series

3



Machine Tool Relays



Product Overview

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

Contents

| Description | Page |
|---|------------------|
| Machine Tool Relays | |
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

D15 Series—Freedom 600 V Multipole



D15 Series—Freedom 600 V Multipole

Product Description

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

Application Description

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

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

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

Contents

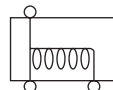
| <i>Description</i> | <i>Page</i> |
|---|-------------|
| D15 Series—Freedom 600 V Multipole | |
| Product Selection | V7-T3-143 |
| Accessories | V7-T3-144 |
| Technical Data and Specifications | V7-T3-145 |
| Dimensions | V7-T3-146 |
| BF/BFD Series—Fixed Contact | |
| Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact | |
| Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole | |
| with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole | |
| with Convertible Contacts | V7-T3-163 |

Features and Benefits

- 600 V, 10 A continuous thermal current
- State indicator visually shows relay ON or OFF status
- Relay base has mounting holes on 35 x 60 mm centers, permitting direct replacement of competitive relays
- Relay also mounts on 35 mm DIN rail as standard
- Magnet coil has three terminals, permitting either top or diagonal wiring—easy to replace European or U.S. relays without changing wiring layout
- Contact pole terminals have captive, backed-out, self-lifting pressure plates with ± screws—reduced wiring time
- All terminals are shrouded or “finger-proofed” to reduce possibility of electrical shock

Standards and Certifications


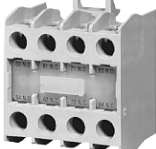

- UL
- CSA certified



Product Selection**When Ordering, Specify**

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

Factory-Assembled Multipole Relays

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

Additional Contact Poles

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

Notes

- ① Underscore indicates missing code suffix for magnet coil—see Magnet Coil Selection table above.
 ② Not all suffix codes available: consult Customer Support Center.

Magnet Coil Selection

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

Accessories

C320 Pneumatic Timer Attachment



Pneumatic Timer Attachment

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

| Description | Maximum Ampere Ratings | | | |
|-------------|------------------------|-----|------|-----|
| | Volts AC | | | |
| | 120 | 240 | 480 | 600 |
| Make | 30 | 15 | 7.5 | 6 |
| Break | 3 | 1.5 | 0.75 | 0.6 |

Attachment mounts on top of any Freedom Series relay (top-mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has DPST

timed contacts—circuits in each pole must be the same polarity. Units are convertible from OFF to ON delay or vice-versa.

Finger Protection Shields

| Application | Catalog Number |
|-------------|----------------|
| D15 | C320LS1 |

Snap-on shields for both contactors and starters provide IEC Type IP20

Finger Protection. Prevents accidental contact with line/load terminals.

Adhesive Dust Cover

| Description | Catalog Number |
|-----------------|-------------------|
| 25 to a package | C320DSTCVR |

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom D15. Adhesive covers are easily

applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

Solid-State Timer



Solid-State ON DELAY Timer ^①

| Timing Range | Catalog Number ^{②③④} |
|--------------------|-------------------------------|
| 0.1 to 1.0 seconds | C320TDN1_ |
| 1 to 30 seconds | C320TDN30_ |
| 30 to 300 seconds | C320TDN300_ |
| 5 to 30 minutes | C320TDN3000_ |

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

C321MP1



Metal Mounting Plate

| Description | Catalog Number |
|----------------------|----------------|
| Metal mounting plate | C321MP1 |

Fits all D15 multipole relays.

DIN Rail



Mounting Channel (DIN Rail)

| Description | Catalog Number |
|----------------|-------------------|
| 1 meter length | XBANS3575P |

Designed for DIN rail mounting of Freedom Series relays.

C320TS2



Transient Suppressor Kits

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

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24–120 V, 208–240 V or 27–480 V coils respectively.

These devices mount directly to the coil terminals.

Notes

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

C320DC



AC/DC Interface Module— Controller Coil Voltage Ranges

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

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

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

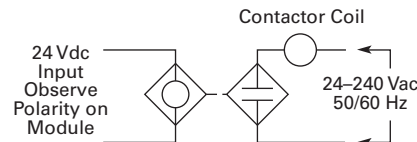
provisions for DIN rail mounting.

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

Design Characteristics

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

Typical Application—Solid-State Switch



Technical Data and Specifications

Contact Ratings—NEMA A600

Continuous Thermal Rating: 10 A

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

Contact Ratings—NEMA P300

Continuous Thermal Rating: 5 A

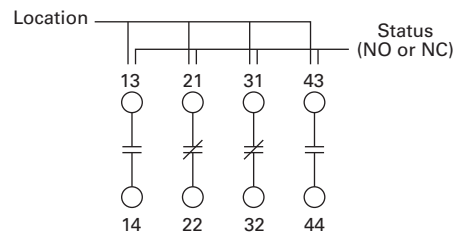
| DC Volts | Make/Break Amperes |
|----------|--------------------|
| 125 | 1.1 |
| 250 | 0.55 |

Magnet Coil Data

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

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

Example of Terminal Marking with 2NO and 2NC Contacts



Relay terminals are identified by a two-digit number in accordance with International Standards approved by CENELEC (European Committee for Electrotechnical Standardization). The number is marked on the relay and is used to identify location and status of the contacts.

The first digit indicates the location of the contact on the relay. The numbering begins with 1 and continues without a break from left to right.

The second digit indicates the status of the contacts (NO or NC). Terminal marking 1 and 2 mean NC and 3 and 4 mean NO.

3.7

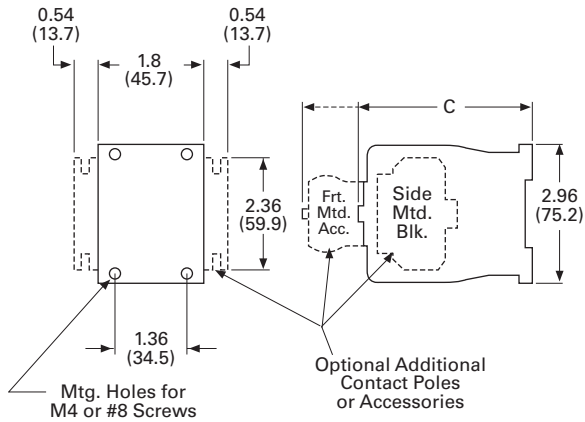
Control Relays and Timers

Machine Tool Relays

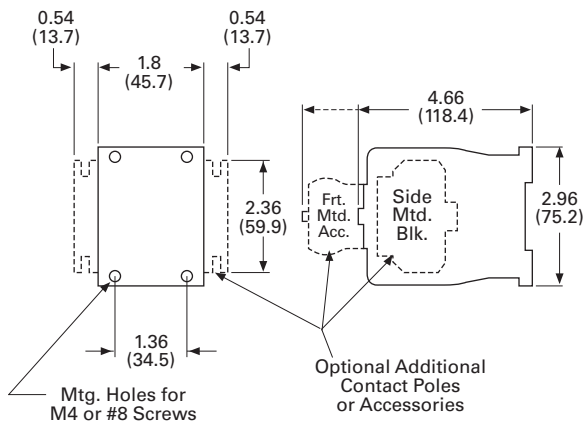
Dimensions

Approximate Dimensions in Inches (mm)

D15 Four-Pole Relay



D15 Six- and Eight-Pole Relays



Dimensions and Shipping Weights

| Description | Dimension C | Shipping Weights Lbs (kg) |
|------------------------------------|--------------|------------------------------|
| Relay only | 3.30 (83.8) | 1.3 (0.6) |
| Relay with timer attachment | 5.55 (141.0) | 1.5 (0.7) |
| Relay with front contact pole deck | 4.66 (118.4) | 1.7 (0.8) |

BF/BFD Series—Fixed Contact Industrial Control**BF/BFD Series—Fixed Contact Industrial Control****Product Description**

Type BF is AC operated, 300 V maximum, and the BFD is DC operated, 250 V. Fixed contact relays are available in any combination of NO and NC from two to 12 poles. BF and BFD relays have captive clamp terminals fully accessible from the front, a molded coil with low operating temperature and silver alloy contacts suitable for low voltage circuits.

Features and Benefits**Wiring to Relay**

- In parallel with coil—one timed and up to 12 instantaneous contacts, or
- In series with coil—up to 12 timed contacts in one relay

Permanent Magnet Latch

- Field mountable on Catalog Number BF; factory installed on BFD
- Latch coil continuously rated
- Latch plunger adjustable for optimum performance

Contents

| Description | Page |
|--|------------------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | |
| Product Selection | V7-T3-148 |
| Options | V7-T3-150 |
| Technical Data and Specifications | V7-T3-151 |
| Dimensions | V7-T3-152 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

Standards and Certifications

- UL recognized, UL File No. E19223 (AC relays only)
- CSA certified, File No. LR39402-6, LR28548-10, 11 (AC and DC relays)



Product Selection

When Ordering, Specify

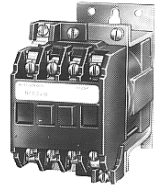
- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

3

Type BF



Type BFD



Complete Relay—Type BF and BFD, Two-, Three-, Four- and Six-Pole ^①

| Number of Poles | Type of Contact | | BF 300 Vac Basic Relays 120/60, 110/50 AC Coil | BFD 250 Vdc Basic Relays 120 DC Coil |
|-----------------|-----------------|-------------|---|--|
| | NO (Form A) | NC (Form B) | Catalog Number | Catalog Number |
| 2 | 2 | 0 | BF20F | BFD20S |
| | 1 | 1 | BF11F | BFD11S |
| | 0 | 2 | BF02F | BFD02S |
| 3 | 3 | 0 | BF30F | BFD30S |
| | 2 | 1 | BF21F | BFD21S ^② |
| | 1 | 2 | BF12F | BFD12S |
| | 0 | 3 | BF03F | BFD03S |
| 4 | 4 | 0 | BF40F | BFD40S |
| | 3 | 1 | BF31F | BFD31S |
| | 2 | 2 | BF22F | BFD22S |
| | 1 | 3 | BF13F | BFD13S |
| | 0 | 4 | BF04F | BFD04S |
| 6 | 6 | 0 | BF60F | BFD60S |
| | 5 | 1 | BF51F | BFD51S |
| | 4 | 2 | BF42F | BFD42S |
| | 3 | 3 | BF33F | BFD33S |
| | 2 | 4 | BF24F | BFD24S |
| | 0 | 6 | BF06F | BFD06S |

Coil Voltage

| BF Coils | | |
|----------|-------|-------------|
| Volts AC | Hz | Suffix Code |
| 12 | 60 | H |
| 24 | 60 | I |
| 48 | 60 | J |
| 110 | 60 | V |
| 110/120 | 50/60 | F |
| 208 | 60 | K |
| 220/240 | 50/60 | G |
| 440 | 60 | C |

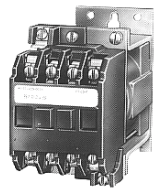
| BFD Coils | |
|-----------|-------------|
| Volts DC | Suffix Code |
| 6 | C |
| 12 | D |
| 24 | L |
| 38 | N |
| 48 | M |
| 72 | E |
| 95 | B |
| 120 | S |
| 130 | U |
| 240 | T |

Notes

- ^① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.
- ^② Consult Customer Support Center for availability.

When Ordering, Specify

- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

Type BF**Type BFD****Complete Relay—Type BF and BFD, Eight-, 10- and 12-Pole** ^①

| Number of Poles | Type of Contact | | BF 300 Vac Basic Relays 120/60, 110/50 AC Coil | BFD 250 Vdc Basic Relays 120 DC Coil |
|-----------------|-----------------|-------------|---|--|
| | NO (Form A) | NC (Form B) | Catalog Number | Catalog Number |
| 8 | 8 | 0 | BF80F | BFD80S |
| | 7 | 1 | BF71F | BFD71S |
| | 6 | 2 | BF62F | BFD62S |
| | 5 | 3 | BF53F | BFD53S |
| | 4 | 4 | BF44F | BFD44S |
| | 0 | 8 | BF08F | BFD08S |
| 10 | 10 | 0 | BF100F | BFD100S |
| | 8 | 2 | BF82F | BFD82S ^② |
| | 7 | 3 | BF73F ^② | BFD73S |
| | 6 | 4 | BF64F | BFD64S |
| | 5 | 5 | BF55F | BFD55S ^② |
| | 4 | 6 | BF46F | BFD46S |
| | 2 | 8 | BF28F | BFD28S |
| 12 | 12 | 0 | BF120F | BFD120S |
| | 8 | 4 | BF84F | BFD84S |
| | 7 | 5 | BF75F | BFD75S |
| | 6 | 6 | BF66F | BFD66S |
| | 5 | 7 | BF57F | BFD57S |
| | 4 | 8 | BF48F | BFD48S |

Coil Voltage

| BF Coils | | |
|----------|-------|-------------|
| Volts AC | Hz | Suffix Code |
| 12 | 60 | H |
| 24 | 60 | I |
| 48 | 60 | J |
| 110 | 60 | V |
| 110/120 | 50/60 | F |
| 208 | 60 | K |
| 220/240 | 50/60 | G |
| 440 | 60 | C |

| BFD Coils | |
|-----------|-------------|
| Volts DC | Suffix Code |
| 6 | C |
| 12 | D |
| 24 | L |
| 38 | N |
| 48 | M |
| 72 | E |
| 95 | B |
| 120 | S |
| 130 | U |
| 240 | T |

Notes

- ^① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.
- ^② Consult Customer Support Center for availability.

3.7

Control Relays and Timers

Machine Tool Relays

3

Permanent Magnet Latch, Relay Mounted



Permanent Magnet Latch

| Coil Volts | Coil Hz | Catalog Number |
|------------------|---------|----------------|
| AC Relays | | |
| 24 | 60 | BFMLI ② |
| 48 | 60 | BFMLJ ② |
| 110/120 | 50/60 | BFMLF |
| 220/240 | 50/60 | BFMLG |
| DC Relays | | |
| 24 | — | BFMLL |
| 48 | — | BFMLM |
| 120 | — | BFMLS |
| 240 | — | BFMLT |

Options

FASTON Push-On Terminals

| Description | Code Letter | Catalog Number |
|---|-------------|----------------|
| Insert letter F after relay type designation in listed catalog number. Example: BFF20F or BFD F 20S | F | — |

Overlapping Contacts

| Description | Code Letter | Catalog Number |
|--|-------------|----------------|
| NO contact closes before corresponding NC contact opens—supplied as NO/NC set(s). Insert letter A after relay type designation in listed catalog number. Example: BFA22F or BFD A F22S | A | — |

NEMA 1 Enclosure for Relay Types

| Description | Code Letter | Catalog Number |
|------------------|-------------|-------------------|
| BF, AR—all poles | — | 4977D40G04 |
| BFD—4–8 poles | — | 4977D40G04 |
| ARD—4–8 poles | — | 4977D40G04 |

Notes

- ① For panel mount, add Suffix **F**.
- ② Consult Customer Support Center for availability.

Technical Data and Specifications

General Specifications

BF Relay Electrical Ratings—NEMA A300

| Volts | Maximum Current | | | Maximum VA | |
|-------|-----------------|------|-------|------------|-------|
| | Cont. | Make | Break | Make | Break |
| 120 | 10 | 60 | 6 | 7200 | 720 |
| 240 | 10 | 30 | 3 | 7200 | 720 |

Horsepower Ratings (UL Recognized)

| Phase | AC Volts | | Volts | DC Rating—NEMA P300 | | | Max. Make or Break (VA) |
|-------|----------|-----|-------|---------------------|-------|-------------------------|-------------------------|
| | 115 | 230 | | Maximum Current | Break | Max. Make or Break (VA) | |
| 1 | 1/6 | 1/2 | 125 | 5.0 | 1.1 | 1.1 | 138 |
| 3 | — | 1 | 250 | 5.0 | 0.55 | 0.55 | 138 |

Resistive Rating

| | |
|---------|-------|
| 125 Vdc | 3 A |
| 250 Vdc | 1.5 A |

Coil Power Requirements

| | |
|----|--------------------------------|
| AC | 72 VA open, 22 VA closed |
| DC | 12 watts (nominal), 250 V max. |

Permanent Magnet Latch Specifications

| Item | Specification |
|-------------------------------|--|
| Unlatching power requirements | Open gap: 24 VA AC Closed gap: 7 VA Burden: 4 watts (AC) |

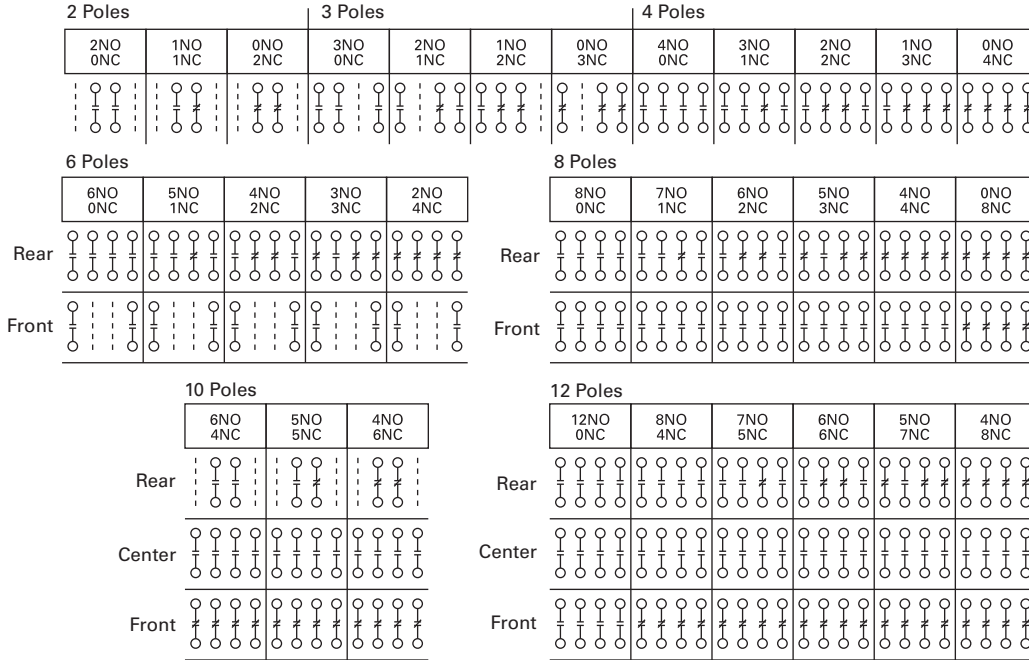
3.7

Control Relays and Timers

Machine Tool Relays

3

Contact Arrangements—BF and BFD Relays

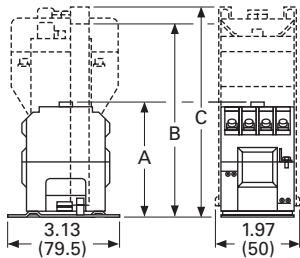


Note: NO = Normally Open NC = Normally Closed

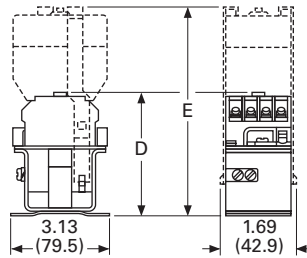
Dimensions

Approximate Dimensions in Inches (mm)

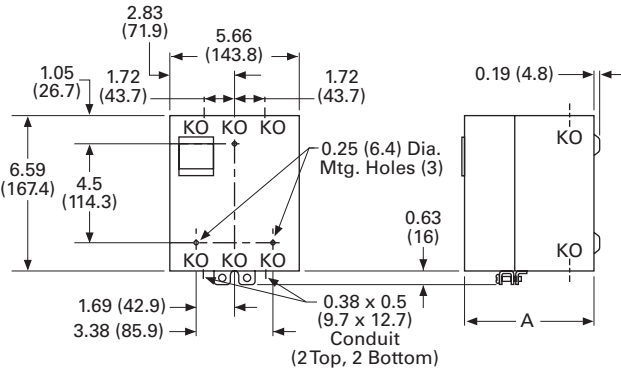
BF Relay with Permanent Magnet Latch and Solid-State Timer



BFD Relay with Solid-State Timer



Enclosures—NEMA 1 for BF, BFD, AR and ARD



BF and BFD Relay Dimensions

| Number of Poles | A BF Only | B BF w/Latch | C BF w/Timer | D BFD Only | E BFD w/Timer |
|-----------------|--------------|-----------------|-----------------|---------------|------------------|
| 4 | 3.22 (81.8) | 6.22 (158.0) | 5.88 (149.4) | 4.03 (102.4) | 7.06 (179.3) |
| 8 | 4.19 (106.4) | 7.19 (182.6) | 6.88 (174.8) | 4.97 (126.2) | 8.00 (203.2) |
| 12 | 4.81 (122.2) | 7.81 (198.4) | 7.50 (190.5) | 5.63 (143.0) | 8.66 (220.0) |

NEMA 1 for BF, BFD, AR and ARD Dimensions

| Poles | Catalog Number | A NEMA 1 |
|-----------------------------------|--------------------|--------------|
| Relays without Attachments | | |
| All | BF, AR, ARD | 5.34 (135.6) |
| 4 – 8 | BFD | 5.34 (135.6) |
| 10, 12 | BFD | 7.97 (202.4) |
| Relays with Attachments | | |
| All | BF, AR, ARD | 7.97 (202.4) |

AR/ARD Series—Convertible Contact Industrial Control



AR/ARD Series—Convertible Contact Industrial Control

Product Description

The AR/ARD relays are electromechanical convertible contact relays. AR relays are AC devices and the ARD is for DC applications.

Application Description

Type AR and ARD relays are designed for use on machine tools, process lines, conveyors and similar automatic and semi-automatic equipment.

Features and Benefits

Permanent Magnet Latch

By energizing the relay coil, the latch attachment “sets” (when the base relay’s armature/crossbar assembly has closed) holding the relay ON, even after the relay coil has been de-energized. The clearing coil on the latch is energized to release the armature/crossbar assembly.

- Field mountable to four- and six-pole
- Latch plunger is adjustable
- Latch coil continuously rated
- Unlatching power requirements
 - Open gap: 24 VA
 - Closed gap: 7 VA
 - Burden: 4 watts AC, 6 watts DC

Contents

| <i>Description</i> | <i>Page</i> |
|--|------------------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | |
| Product Selection | V7-T3-154 |
| Accessories | V7-T3-155 |
| Options | V7-T3-155 |
| Technical Data and Specifications | V7-T3-156 |
| Dimensions | V7-T3-157 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

Operation

AR relays are available in either four- or six-pole configurations. AR relays are easily converted to eight- or 10-poles simply by adding a four-pole deck. In addition, mechanical latch attachments are available with four- and six-pole relays.

Contacts are convertible from NO to NC, to provide any combination desired up to a maximum of 10. For the ARD, the number of poles cannot exceed **four** NC in any pole configuration. Wide spacing of contacts simplifies installation, contact testing and maintenance. Contacts are electrically and mechanically isolated from each other. Overlap contacts are also available in one or two sets. These contacts should be mounted in the center pole positions. AC and DC contact cartridges should not be used in the same relay.

Standards and Certifications

- UL File No. E19223
- CSA File No. LR39402-6, LR54517 and LR54520



Reference Information

- ART, ARTD: IL 14510, IL 14485

Product Selection

When Ordering, Specify

- Catalog number of basic relay with 120/60, 110/50 AC coil from AR/ARD Relays table.
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table below and substitute it for the last letter in the catalog number. Example: AR64**V** for a 110/60 AC coil.

3

AR/ARD Relays



AR/ARD Relays

| Number of Poles | Contact | | | AR 600 Vac Relays 120/60, 110/50 AC Coil | ARD 600 Vdc Relays 120 DC Coil |
|-----------------|---------|----|----------------|---|-----------------------------------|
| | NO | NC | Blank Cavities | Catalog Number | Catalog Number |
| 4 | 0 | 0 | 4 | AR4A | ARD4S |
| | 2 | 0 | 2 | AR420A | ARD420S |
| | 4 | 0 | 0 | AR440A | ARD440S |
| 6 | 0 | 0 | 6 | AR6A | ARD6S |
| | 4 | 0 | 2 | AR640A | — |
| | 6 | 0 | 0 | AR660A | ARD660S |
| 8 ^① | 6 | 0 | 2 | AR860A | ARD860S ^② |
| | 8 | 0 | 0 | AR880A | ARD880S |
| 10 ^① | 10 | 0 | 0 | AR10100A | ARD10100S |

Coil Voltage

| AR Coils | | | ARD Coils | |
|----------|-------|-------------|-----------|-------------|
| Volts AC | Hz | Suffix Code | Volts DC | Suffix Code |
| 12 | 60 | F | 12 | D |
| 24 | 60 | I | 24 | L |
| 48 | 60 | G | 48 | M |
| 110 | 60 | V | 95 | B |
| 110/120 | 50/60 | A | 120 | S |
| 208 | 60 | B | 130 | U |
| 220/240 | 50/60 | W | 240 | T |
| 277 | 60 | C | | |
| 380/440 | 50/60 | H | | |
| 440/480 | 50/60 | X | | |
| 550 | 60 | D | | |
| 550/600 | 50/60 | E | | |

Contact Cartridges—600 V

| Terminal Type | Standard Contact Cartridge Catalog Number ^③ | Overlap Contact Cartridge Catalog Number ^④ |
|----------------------|---|--|
| AC Cartridges | | |
| With clamp terminals | ARC | AROC |
| With screw terminals | ARCR | AROCR |
| DC Cartridges | | |
| With clamp terminals | ARDC | ARDOC |
| With screw terminals | ARDCR | ARDOCR |

Notes

- ① Will not accept top-mounted latch or timers.
- ② Contact Customer Support Center for availability.
- ③ Standard cartridges are sold in cartons of four cartridges. Catalog number is for single cartridge.
- ④ Overlap contact cartridges are sold in sets of two cartridges. Catalog number is for sets of two.

ARML Permanent Magnet Latch for AR/ARD Relays



Permanent Magnet Latch

| Operating Volts | Coil Hz | Catalog Number |
|--------------------------------|---------|----------------|
| For AC Control Circuits | | |
| 24 | 60 | ARMLI |
| 48 | 60 | ARMLG |
| 120 | 60/50 | ARMLA |
| 240 | 60/50 | ARMLW |
| For DC Control Circuits | | |
| 24 | — | ARMLL |
| 48 | — | ARMLM |
| 120 | — | ARMLS |
| 240 | — | ARMLT |

Accessories

Four-Pole Top Deck Adder

- Increases contact capacity from four/six-poles to eight/10-poles
- Mounts on top of basic relay using three screws
- Will not interfere with wiring, testing or convertible cartridges
- Screw terminals for ring connectors available; to order, add Suffix **R** to catalog number listed below

Four-Pole Top Deck Adder



Four-Pole Top Deck Adder

| No. of Poles | Contacts | | | Catalog Number |
|--------------------------------|----------|----|----------------|----------------|
| | NO | NC | Blank Cavities | |
| With 600 Vac Cartridges | | | | |
| 4 | 2 | 0 | 2 | ARA20 |
| | 4 | 0 | 0 | ARA40 |
| With 600 Vdc Cartridges | | | | |
| 4 | 2 | 0 | 2 | ARDA20 |
| | 4 | 0 | 0 | ARDA40 |

Options

Convertible Contacts

| Description | Code Letter | Catalog Number |
|--|-------------|----------------|
| AR and ARD relays listed are supplied with NO contacts that are easily converted to NC. If both NO and NC poles are required, order by catalog number. Example: four-pole relay with 1NO and 3NC contacts, order AR413A. | ① | — |

Screw Terminals

| Description | Code Letter | Catalog Number |
|---|-------------|----------------|
| For ring-type connectors, add suffix R to the catalog number. Example: AR420 AR . | R | — |

Surge Suppressor

ARSS Surge Suppressor for AR Relays



| | Catalog Number |
|------------------|----------------|
| Surge Suppressor | ARSS |

Overlapping Contacts

| Description | Code Letter | Catalog Number |
|--|-------------------------|----------------|
| NO contact closes before corresponding NC contact opens — supplied as NO/NC sets of two cartridges. Insert letter S after relay type designation in listed catalog number. Example: AR402 AS . Specify the number of sets required: S for one set and S2 for two sets. | S or S2 ① | — |

Note

① Consult Customer Support Center for availability.

Technical Data and Specifications

General

Contact Ratings—600 Vac Cartridge NEMA A600

| Volts | Maximum Current | | | Maximum VA | |
|-------|-----------------|------|-------|------------|-------|
| | Cont. | Make | Break | Make | Break |
| 120 | 10 | 60 | 6 | 7200 | 720 |
| 240 | 10 | 30 | 3 | 7200 | 720 |
| 480 | 10 | 15 | 1.5 | 7200 | 720 |
| 600 | 10 | 12 | 1.2 | 7200 | 720 |

DC Cartridges—NEMA P600

| Volts | Maximum Current | | Maximum VA |
|-------|-----------------|---------------|---------------|
| | Continuous | Make or Break | Make or Break |
| 125 | 5 | 1.10 | 138 |
| 250 | 5 | 0.55 | 138 |
| 600 | 5 | 0.20 | 138 |

Resistive Rating

| | |
|---------|-------|
| 125 Vdc | 3 A |
| 250 Vdc | 1.5 A |

Coil Power Requirements

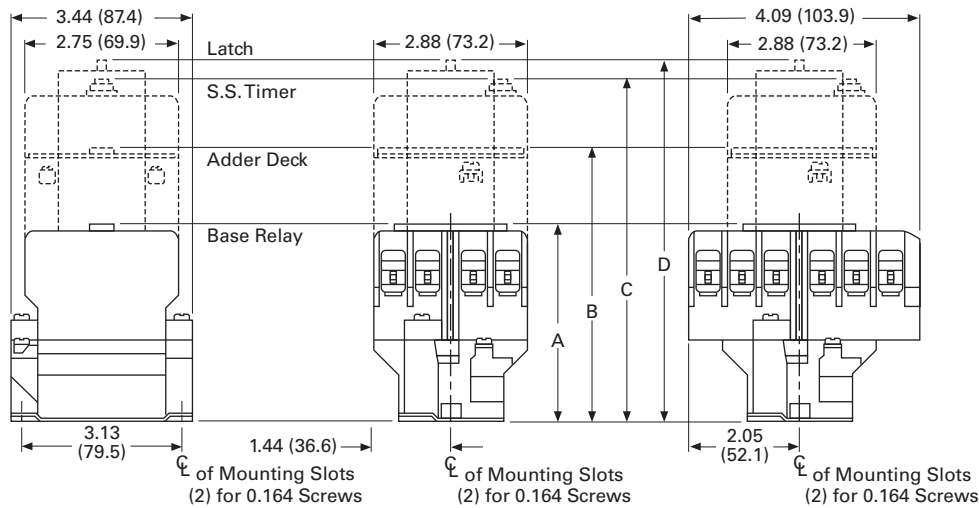
| | |
|----|---------------------------|
| AC | 96 VA open, 14 VA closed |
| DC | 14 watts open, 250 V max. |

| Voltage | AR Relays | ARD Relays |
|------------------------|-----------|------------|
| Pickup voltage (max.) | 85% | 65% |
| Dropout voltage (min.) | 60% | 15% |
| Voltage (max.) | 110% | 110% |

Dimensions

Approximate Dimensions in Inches (mm)

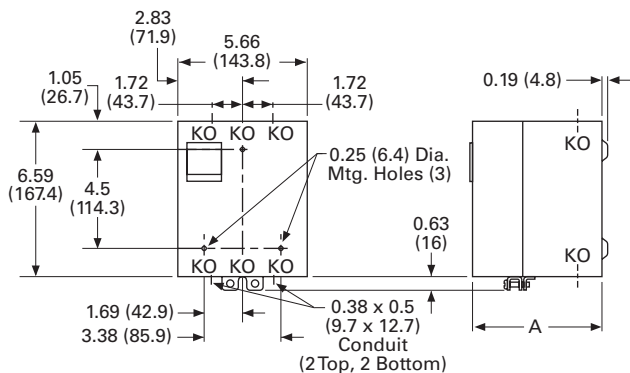
Four- and Six-Pole with Four-Pole Adder, Solid-State Timer and Mechanical Latch



Four- and Six-Pole with Four-Pole Adder, Solid-State Timer and Mechanical Latch

| Relay Catalog Number | A Four-, Six-Pole Relays | B Relay Adder | C Relay with Timer | D Relay with Latch |
|----------------------|--------------------------|---------------|--------------------|--------------------|
| AR | 3.56 (90.4) | 4.94 (125.5) | 6.00 (152.4) | 6.39 (162.3) |
| ARD | 4.63 (117.6) | 6.00 (152.4) | 7.06 (179.3) | 7.45 (189.2) |

Enclosures—NEMA 1 for BF, BFD, AR and ARD



Enclosures—NEMA 1 for BF, BFD, AR and ARD

| Poles | Catalog Number | Dimension A NEMA 1 |
|-----------------------------------|----------------|--------------------|
| Relays without Attachments | | |
| All | BF, AR, ARD | 5.34 (135.6) |
| 4-8 | BFD | 5.34 (135.6) |
| 10, 12 | BFD | 7.97 (202.4) |
| Relays with Attachments | | |
| All | BF, AR, ARD | 7.97 (202.4) |

D26 Series—Type M, 600 Vac Multipole with Convertible Contacts



Contents

| <i>Description</i> | <i>Page</i> |
|---|------------------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | |
| Product Selection | V7-T3-159 |
| Technical Data and Specifications | V7-T3-161 |
| Dimensions | V7-T3-162 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | V7-T3-163 |

D26 Series—Type M, 600 Vac Multipole with Convertible Contacts

Product Description

Relays can be ordered as complete devices in any pole combination up to a maximum of 12NO or 8NC and 4NO poles, or can be assembled from components shown on **Page V7-T3-160**.

Relay base assembly (**D26MB**) will accept from 1 to 4 rear poles (**D26MPR**, **D26MPS** and/or **D26MPL**).

Features

Contact poles D26MPR and D26MPF in 2- through 8-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180° (in either direction).

Options

Adding a front deck, the total number of poles can be increased to 8, all convertible NO to NC.

Adding a **D26MF**, 4-pole fixed NO attachment, builds a 12-pole relay with 8 convertible poles and 4 fixed NO poles.

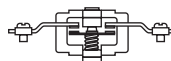
Relays with mechanical latch are available in any convertible pole combination up to eight poles maximum.

Standards and Certifications

- UL listed—Class No. NKCR2, File E1230(N)
- CSA certified—File LR353



Normally Closed Contact



Normally Open Contact

To obtain overlapping contacts, use **D26MPS** (NO early closing) and **D26MPL** (NC late opening) rear poles, in related circuits.

Product Selection

Complete AC Relays

When Ordering, Specify

- Catalog number and magnet coil suffix letter.
- Example: For a 4-pole relay having 4NO contacts, order Catalog Number **D26MR40**, with a 120 V, 60 Hz coil, order **D26MR40A**.
- For fast delivery and minimum inventory, it is recommended that component parts or complete relays with NO poles be ordered.

4-Pole Complete AC Relays—Open Type

| Number of Contacts | Type of Contact | | Relay Only Catalog Number | Relay with Mechanical Latch Catalog Number |
|--------------------|-----------------|-------------|---------------------------|--|
| | NO (Form A) | NC (Form B) | | |
| 2 | 2 | 0 | D26MR20 | D26MR202 |
| | 1 | 1 | D26MR11 | D26MR112 |
| | 0 | 2 | D26MR02 | D26MR022 |
| 3 | 3 | 0 | D26MR30 | D26MR302 |
| | 2 | 1 | D26MR21 | D26MR212 |
| | 1 | 2 | D26MR12 | D26MR122 |
| | 0 | 3 | D26MR03 | D26MR032 |
| 4 | 4 | 0 | D26MR40 | D26MR402 |
| | 3 | 1 | D26MR31 | D26MR312 |
| | 2 | 2 | D26MR22 | D26MR222 |
| | 1 | 3 | D26MR13 | D26MR132 |
| | 0 | 4 | D26MR04 | D26MR042 |
| 6 ^① | 6 | 0 | D26MR60 | D26MR602 |
| | 5 | 1 | D26MR51 | D26MR512 |
| | 4 | 2 | D26MR42 | D26MR422 |
| | 3 | 3 | D26MR33 | D26MR332 |
| | 2 | 4 | D26MR24 | D26MR242 |
| | 1 | 5 | D26MR15 | D26MR152 |
| | 0 | 6 | D26MR06 | D26MR062 |
| | 8 ^① | 8 | 0 | D26MR80 |
| 7 | | 1 | D26MR71 | D26MR712 |
| 6 | | 2 | D26MR62 | D26MR622 |
| 5 | | 3 | D26MR53 | D26MR532 |
| 4 | | 4 | D26MR44 | D26MR442 |
| 3 | | 5 | D26MR35 | D26MR352 |
| 2 | | 6 | D26MR26 | D26MR262 |
| 1 | | 7 | D26MR17 | D26MR172 |
| 0 | | 8 | D26MR08 | D26MR082 |



4-Pole with Latch



4-Pole with Pneumatic Timer Attachment



Magnet Coil Selection

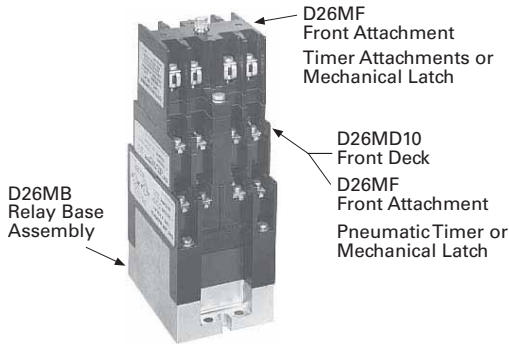
| Volts/Hertz | Suffix Code | Volts/Hertz | Suffix Code |
|---------------------|-------------|-------------------------------|-------------|
| 120/60–110/50 | A | 32/60 ^② | V |
| 240/60–220/50 | B | 12/60 ^② | R |
| 208/60 ^② | E | 6/60 | P |
| 24/60 | T | 380/50 ^② | L |
| 277/60 | H | 480/60 or 440/50 | C |
| | | 600/60 or 550/50 ^② | D |

Notes

^① **10- and 12-Poles:** The 6 and 8 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For a 12 contact relay, order **D26MR804A**.

^② Consult Customer Support Center for availability.

Relay Component Parts Location



Relay with Pneumatic Timer Attachment Factory Installed (without Relay Contacts)

| Contact Positions ^① | Timer Operation | Catalog Number ^② |
|--------------------------------|-----------------|-----------------------------|
| 4 | ON delay | D26MR005 |
| 4 | OFF delay | D26MR006 |

The relays listed above will accept up to four catalog number D26MPR contacts (convertible—NO or NC) for instantaneous operation. Order contacts separately.

For additional information on timer attachment, see **Page V7-T3-161**.

For assembly of relays from component parts and relay accessories, see components tables below.

Rear Pole



Front Pole



Separate Contacts

| Description | Catalog Number |
|---|-----------------|
| Convertible Contacts | |
| Rear pole—NO | D26MPR |
| Rear pole—NC | D26MPR02 |
| Front pole—NO | D26MPF |
| Front pole—NC | D26MPF02 |
| Gold plated (for low power circuits) | |
| Rear pole—NO | D26MPR03 |
| Front pole—NO | D26MPF03 |
| Non-Convertible Contacts | |
| Rear pole NO early closing ^③ | D26MPS |
| Rear pole NC late opening ^③ | D26MPL |

Relay Base Assembly



Relay Base Assembly (without Poles)

| Description | Catalog Number |
|---------------------|---------------------------|
| Relay base assembly | D26MB ^④ |

Basic four-pole D26 relay without contacts. Provision for adding one to four poles

as needed, **D26MPR**, **D26MPL** and/or **D26MPS** rear pole type.

Rear Pole



Front Deck (Convertible Contact Poles)

| Description | Catalog Number |
|----------------------------|----------------|
| Front Deck with ... | |
| 1NO contact pole | D26MD10 |
| 2NO contact poles | D26MD20 |
| 4NO contact poles | D26MD40 |

Provides up to four additional front pole type D26MPF contacts. Convertible, NO to NC.

Four-Pole Front Attachment



Four-Pole Front Attachment (4NO Fixed Circuit)

| Description | Catalog Number |
|------------------|----------------|
| Front attachment | D26MF |

Can be added to any two- to eight-pole Type M, D26 relay to provide up to a 12-pole

relay. Four NO, non-convertible contacts are included in this assembly.

Notes

- ① Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).
- ② Consult Customer Support Center for availability.
- ③ To obtain overlapping contacts, these two special poles must be used in related circuits.
- ④ Add magnet coil suffix letter, see **Page V7-T3-159**. Example: D26MBA.

Relay State Indicating Light



Relay State Indicating Light

| Description | Catalog Number |
|-------------------|----------------|
| 120 Vac, 50/60 Hz | D26MAP120 |
| 240 Vac, 50/60 Hz | D26MAP240 |

Light provided with leads and bracket for mounting on two-to 12-pole relays. May be

used to monitor state of magnet coil or relay contact operation.

Pneumatic Timer Attachment



Pneumatic Timer Attachment

| Description | Catalog Number |
|-------------|----------------|
| ON delay | D26MTE |
| OFF delay | D26MTD |

Attachment mounts on any 0-to four-pole D26 relay without latch. Timer unit has DPDT timed contacts (circuits in each pole must be the same polarity). Adjustable timing

range—0.1 to 180 seconds, repeat accuracy $\pm 10\%$. Units are convertible from OFF delay to ON delay or vice versa.

Mounting Channel



Mounting Channel

| Description | Catalog Number |
|----------------------------|----------------|
| 10 in length for 4 relays | D26MC4 |
| 20 in length for 8 relays | D26MC8 |
| 30 in length for 12 relays | D26MC12 |
| 40 in length for 16 relays | D26MC16 |

Pre-spaced mounting for adjacent relay installation. Indexed for cutting to desired

length. Captive mounting screws provided in channel for easier installation.

Manual Test Accessory



Manual Test Accessory

| Description | Catalog Number |
|-----------------------|----------------|
| Manual test accessory | D26MTA |

Tool to manually hold relays in the energized position for circuitry testing on completed

panel. (10 per box, order in multiples of 10.)

Transient Suppressor



Transient Suppressor

| Description | Catalog Number |
|----------------------------------|----------------|
| Magnet coil transient suppressor | D26MAS1 |
| Latch coil transient suppressor | D26MAS2 |

May be mounted on any 120 Vac relay magnet coil or latch coil or 120 Vdc latch coil—connects directly across coil terminals. All DC magnet coils have a built-in varistor for transient suppression.

Limits high voltage transients produced in the circuit when power is removed from the coil.

Technical Data and Specifications

General

Contact Ratings (Amperes) A600

| AC Volts ^① | Make and Emergency Interrupting Capacity | Break | Continuous Thermal Rating |
|-----------------------|--|-------|---------------------------|
| 120 | 60 | 6 | 10 |
| 240 | 30 | 3 | 10 |
| 480 | 15 | 1.5 | 10 |
| 600 | 12 | 1.2 | 10 |

Coil Power

| Relay | Watts | | VA | | Operating Time |
|-----------------|--------|--------|--------|--------|-----------------------|
| | Inrush | Sealed | Inrush | Sealed | Range in Milliseconds |
| Two- to 12-pole | 95.0 | 9 | 155 | 22 | Pickup: 6–13 |
| Latch coil | 18.5 | 11 | 41 | 17 | Dropout: 8–26 |

Note

^① For DC contact ratings, see **Page V7-T3-165**.

3.7

Control Relays and Timers

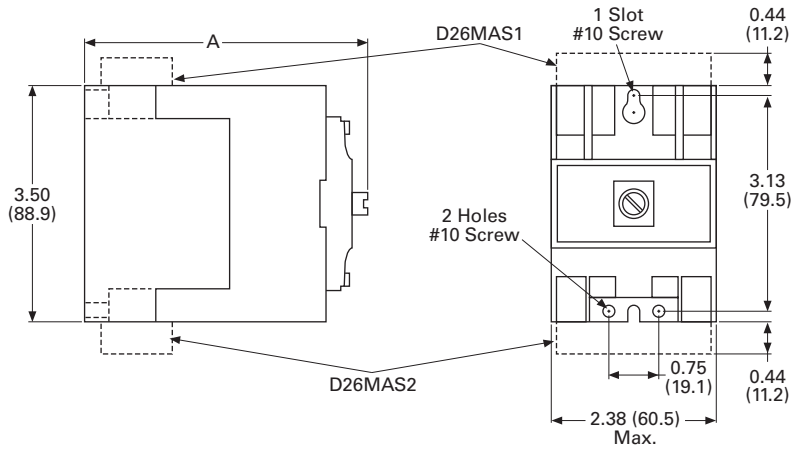
Machine Tool Relays

Dimensions

Approximate Dimensions in Inches (mm)

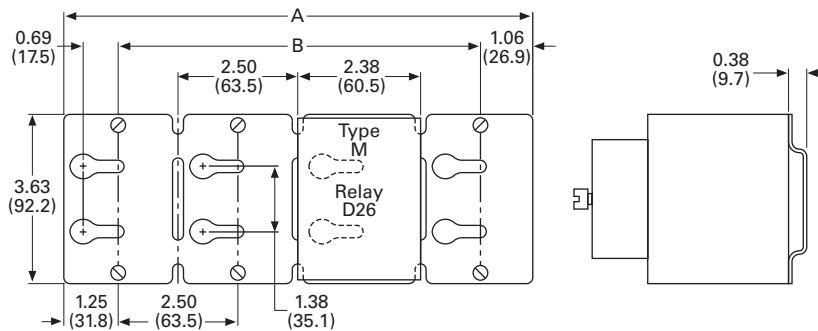
AC and DC D26 Relays

3



| AC Relay D26 | DC Relay D26 | Dimension A | Ship. Wt. Lbs (kg) |
|---------------------------------|---------------------------------|--------------|-----------------------|
| 1-4 poles | 1-3 poles | 4.00 (101.6) | 2.5 (1.1) |
| 1-4 poles with timer D26 or D87 | 1-3 poles with timer D26 or D87 | 6.00 (152.4) | 3.3 (1.5) |
| 1-4 poles with latch | 1-2 poles with latch | 6.13 (155.7) | 3.5 (1.6) |
| 1-4 poles with D26MF | 1-3 poles with D26MF | 5.81 (147.6) | 2.8 (1.3) |
| 5-8 poles | 4-7 poles | 5.25 (133.4) | 2.8 (1.3) |
| 5-8 poles with timer D87 | 4-7 poles with timer D87 | 7.25 (184.2) | 3.5 (1.6) |
| 5-8 poles with latch | 3-6 poles with latch | 7.31 (185.7) | 3.8 (1.7) |
| 9-12 poles | 8-11 poles | 7.00 (177.8) | 3.0 (1.4) |

Mounting Channel



| Catalog Number | Dimension A | Dimension B |
|----------------|-------------|--------------|
| D26MC16 | 40 (1016) | 37.5 (952.5) |
| D26MC12 | 30 (762) | 27.5 (698.5) |
| D26MC8 | 20 (508) | 17.5 (444.5) |
| D26MC4 | 10 (254) | 7.5 (190.5) |

Note: Channel mounts through keyholes with #10 screws (two each end and one every fourth relay). Relays mount with screws captive in channel. All screws must be tightened firmly.

D26 Series—Type M, DC Multipole with Convertible Contacts



Contents

| Description | Page |
|--|-----------|
| D15 Series—Freedom 600 V Multipole | V7-T3-142 |
| BF/BFD Series—Fixed Contact Industrial Control | V7-T3-147 |
| AR/ARD Series—Convertible Contact Industrial Control | V7-T3-153 |
| D26 Series—Type M, 600 Vac Multipole with Convertible Contacts | V7-T3-158 |
| D26 Series—Type M, DC Multipole with Convertible Contacts | |
| Product Selection | V7-T3-164 |
| Technical Data and Specifications | V7-T3-165 |
| Dimensions | V7-T3-166 |

D26 Series—Type M, DC Multipole with Convertible Contacts

Product Description

Type M, DC multipole relays are physically and mechanically similar to the (D26) Type M AC relays described on **Page V7-T3-159**. They differ only in the electrical ratings and available pole combinations due to the use of a normally closed late opening, coil clearing contact, factory wired to the pickup winding of the magnet coil. (Contact is shown as L in figure to the right.) Magnet coil has built-in varistor for transient suppression.

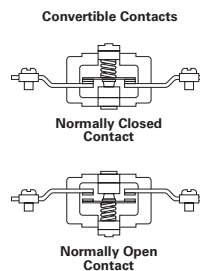
The mechanically latched relay has one extra contact, normally open early closing, factory wired in series with the winding of the intermittent rated latch coil. (Contact is shown as S in figure to the right.)

Component parts for these relays are the same as those listed for the (D26) Type M AC relays on **Page V7-T3-159**, except for the Indicating Light, which is not applicable to a DC relay.

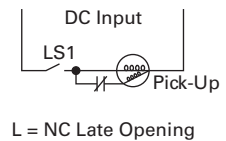
Contact poles D26MPR and D26MPF in 2- to 7-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180° (in either direction).

Latch Operation

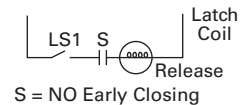
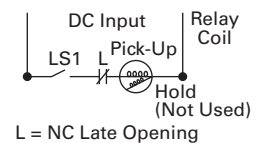
With the latch coil de-energized, energizing the relay coil will pick up the relay and mechanically latch it in the pickup position. With the relay coil de-energized, energizing the latch coil will allow the relay to drop out.



DC Type M Relay



DC Type M Relay with Latch



Product Selection

Complete DC Relays

When Ordering, Specify

- Catalog number and magnet coil suffix letter.
- Example: For a 4-pole relay having 4NO contacts, order Catalog Number **D26MRD40**, with a 120 Vdc coil, order **D26MRD40A1**.

3

3-Pole



3-Pole with Latch



Complete DC Relays—Open Type

| Number of Contacts | Type of Contact ^① | | Relay Only Catalog Number | Relay with Mechanical Latch Catalog Number |
|--------------------|------------------------------|-------------|---------------------------|--|
| | NO (Form A) | NC (Form B) | | |
| 2 | 2 | 0 | D26MRD20 | D26MRD202 |
| | 1 | 1 | D26MRD11 | D26MRD112 |
| | 0 | 2 | D26MRD02 | D26MRD022 |
| 3 | 3 | 0 | D26MRD30 | D26MRD302 |
| | 2 | 1 | D26MRD21 | D26MRD212 |
| | 1 | 2 | D26MRD12 | D26MRD122 |
| 4 | 0 | 3 | D26MRD03 | D26MRD032 |
| | 4 | 0 | D26MRD40 | D26MRD402 |
| | 3 | 1 | D26MRD31 | D26MRD312 |
| 6 ^② | 2 | 2 | D26MRD22 | D26MRD222 |
| | 1 | 3 | D26MRD13 | D26MRD132 |
| | 0 | 4 | D26MRD04 | D26MRD042 |
| | 6 | 0 | D26MRD60 | D26MRD602 |
| 7 ^② | 5 | 1 | D26MRD51 | D26MRD512 |
| | 4 | 2 | D26MRD42 | D26MRD422 |
| | 3 | 3 | D26MRD33 | D26MRD332 |
| | 2 | 4 | D26MRD24 | D26MRD242 |
| | 1 | 5 | D26MRD15 | D26MRD152 |
| | 0 | 6 | D26MRD06 | D26MRD062 |
| | 7 | 0 | D26MRD70 | — |
| 6 | 1 | D26MRD61 | — | |
| 5 | 2 | D26MRD52 | — | |
| 4 | 3 | D26MRD43 | — | |
| 3 | 4 | D26MRD34 | — | |
| 2 | 5 | D26MRD25 | — | |
| 1 | 6 | D26MRD16 | — | |
| 0 | 7 | D26MRD07 | — | |

Magnet Coil Selection

| Volts/Hertz | Suffix Code | Volts/Hertz | Suffix Code |
|-------------|-------------|-------------|-------------|
| 12 | R1 | 120 | A1 |
| 24 | T1 | 240 | B1 |
| 48 | W1 | | |

Notes

- ^① Relay has additional factory wired normally closed coil clearing contact (see diagram).
- ^② **10- and 11-Poles:** The 6 and 7 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For an 11 contact relay, order D26MRD70**4A1**.

3-Pole with Timer Attachment**Relay with Pneumatic Timer Attachment (without Relay Contacts)**

| Contact Positions ^① | Timer Operation | Catalog Number |
|--------------------------------|-----------------|----------------|
| 3 | ON delay | D26MRD005 |
| 3 | OFF delay | D26MRD006 |

The relays listed above will accept up to three catalog number D26MPR contacts (convertible—NO or NC) for instantaneous operation.

Order contacts separately. For additional information on timer attachment, see **Page V7-T3-161**.

Technical Data and Specifications**General****Contact Ratings (Amperes) ^②**

| DC Volts | Inductive Make/Break | Resistive Make/Break |
|----------|----------------------|----------------------|
| 28 | 7.0 | 10.0 |
| 48 | 2.5 | 10.0 |
| 120 | 1.1 | 2.0 |
| 240 | 0.2 | 0.4 |

| Relay | Coil Power | | Operating Time |
|-----------------|-------------------|-------------------|----------------------|
| | Watts Inrush | Sealed | Average Milliseconds |
| Two- to 11-pole | 168 | 13.2 | Pickup: 10 |
| Latch coil | 21.6 intermittent | 21.6 intermittent | Dropout: 16 |

Notes

- ^① Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).
- ^② Contact ratings do not apply to contacts D26MPL and D26MPS. For AC contact ratings, see **Page V7-T3-161**.

3.7

Control Relays and Timers

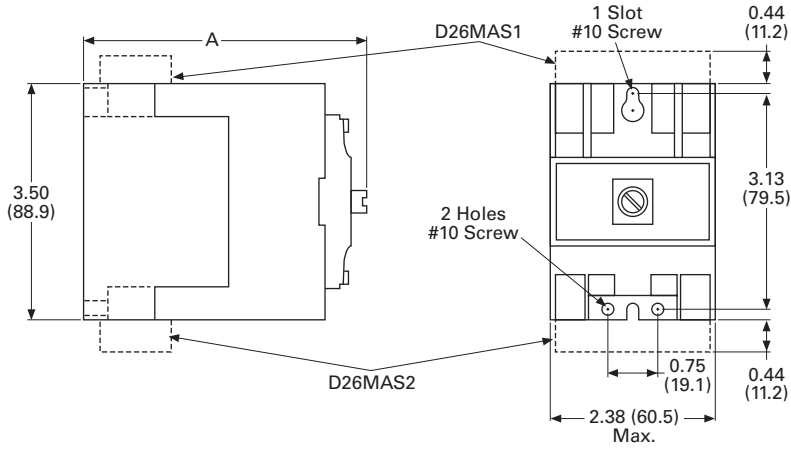
Machine Tool Relays

Dimensions

Approximate Dimensions in Inches (mm)

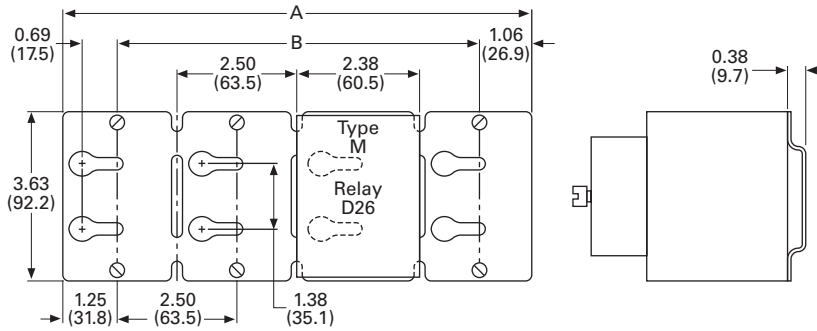
AC and DC D26 Relays

3



| AC Relay D26 | DC Relay D26 | Dimension A | Ship. Wt. Lbs (kg) |
|---------------------------------|---------------------------------|--------------|-----------------------|
| 1-4 poles | 1-3 poles | 4.00 (101.6) | 2.5 (1.1) |
| 1-4 poles with timer D26 or D87 | 1-3 poles with timer D26 or D87 | 6.00 (152.4) | 3.3 (1.5) |
| 1-4 poles with latch | 1-2 poles with latch | 6.13 (155.7) | 3.5 (1.6) |
| 1-4 poles with D26MF | 1-3 poles with D26MF | 5.81 (147.6) | 2.8 (1.3) |
| 5-8 poles | 4-7 poles | 5.25 (133.4) | 2.8 (1.3) |
| 5-8 poles with timer D87 | 4-7 poles with timer D87 | 7.25 (184.2) | 3.5 (1.6) |
| 5-8 poles with latch | 3-6 poles with latch | 7.31 (185.7) | 3.8 (1.7) |
| 9-12 poles | 8-11 poles | 7.00 (177.8) | 3.0 (1.4) |

Mounting Channel



| Catalog Number | Dimension A | Dimension B |
|-------------------|-------------|--------------|
| D26MC16 | 40 (1016) | 37.5 (952.5) |
| D26MC12 | 30 (762) | 27.5 (698.5) |
| D26MC8 | 20 (508) | 17.5 (444.5) |
| D26MC4 | 10 (254) | 7.5 (190.5) |

Note: Channel mounts through keyholes with #10 screws (two each end and one every fourth relay). Relays mount with screws captive in channel. All screws must be tightened firmly.

Timing Relays



Contents

| Description | Page |
|---------------------|-----------|
| Timing Relays | |
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Product Selection Guide

Function Code Cross-Reference Guide

| Function | Description | Timer Series | | | | | E5-248 ^③ |
|----------|--|--------------|----------------|------|------|------|---------------------|
| | | Universal TR | TR | TMR5 | TMR6 | TMRP | |
| 1 | Asymmetrical flasher, pause first | lp | — | R/P | — | — | RC DLY |
| 2 | Asymmetrical flasher, pulse first | li | — | Y | — | — | RC |
| 3 | ON delay and OFF delay with control contact | ER | — | — | — | — | — |
| 4 | ON delay and single shot leading edge voltage controlled | EWu | — | — | — | — | — |
| 5 | ON delay and single shot leading edge control contact | EWs | — | — | — | — | — |
| 6 | Single shot leading and single shot trailing edge with control contact | WsWa | — | — | — | — | — |
| 7 | Pulse sequence monitoring | Wt | — | — | — | — | — |
| 8 | ON delay, power triggered | E | A ^① | N | — | A | — |
| 9 | Single shot leading edge voltage controlled | Wu | B ^① | T | — | C | — |
| 10 | OFF delay/signal OFF delay | R | E ^② | F | — | D | OFF DLY |
| 11 | Single shot leading edge with control input | Ws | F ^② | C/G | — | H | SS |
| 12 | Single shot trailing edge with control input | Wa | — | — | — | — | — |
| 13 | ON delay control signal start, trailing edge OFF | Es | — | — | — | — | — |
| 14 | Flasher, pause first | Bp | C ^① | L | — | B | — |
| 15 | Retriggerable single shot | — | — | W/D | — | E | SS |
| 16 | Flasher, ON first | — | D ^① | — | — | F | — |
| 17 | ON delay control signal start, leading edge OFF | — | A ^② | — | — | — | ON DLY |
| 18 | Flasher—control signal start, pause first | — | B ^② | — | — | — | RC DLY |
| 19 | Flasher—control signal start, ON first | — | C ^② | — | — | — | RC |
| 20 | Signal ON/OFF delay | — | D ^② | — | — | — | — |
| 21 | ON/OFF delay | — | — | — | — | I | — |
| 22 | Single pulse generator | — | — | — | — | G | OS |
| 23 | Memory latch | — | — | — | — | J | — |
| 24 | True OFF delay | — | — | — | X | — | — |

Notes

^① Applies to TRN model only.

^② Applies to TRF model only.

^③ The E5-248 is battery powered and has three programmable trigger functions. This product may perform somewhat differently from the standard timing relays. Refer to the operator instructions for details.

Product Overview

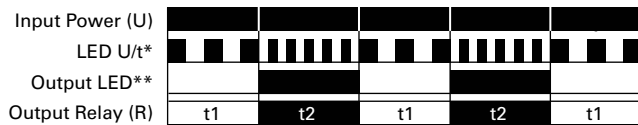
Timer Function Descriptions

Function #1—Universal TR, TMR5, E5-248

Asymmetrical Flasher, Pause First Repeat Cycle, OFF/ON Delay

When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins.

After the interval t2 has expired, the output relay switches into OFF position. The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.

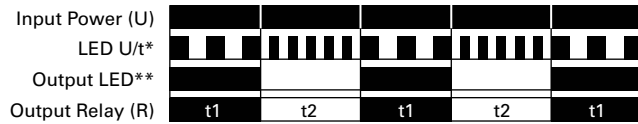


Function #2—Universal TR, TMR5, E5-248

Asymmetrical Flasher, Pulse First Repeat Cycle, ON/OFF Delay

When the supply voltage U is applied, the output relay R switches into the ON position and the set interval t1 begins. After the interval t1 has expired, the output relay R switches into OFF position

and the set interval t2 begins. After the interval t2 has expired, the output relay switches into ON position. The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.

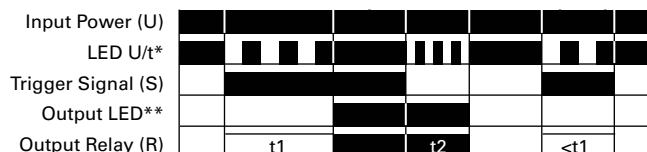


Function #3—Universal TR

ON Delay and OFF Delay with Control Contact

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position. If the control contact is opened, the set

interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. If the control contact is opened before the interval t1 has expired, the interval already expired is erased and is restarted with the next cycle.



Function #4—Universal TR

ON Delay and Single Shot Leading Edge Voltage Controlled

When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position. After the interval t2 has expired, the output relay

switches into OFF position. If the supply voltage is interrupted before the interval t1 + t2 has expired, the interval already expired is erased and is restarted when the supply voltage is next applied.

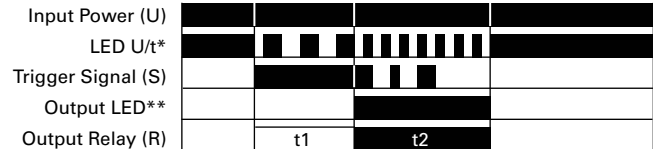


Function #5—Universal TR

ON Delay and Single Shot Leading Edge Control Contact

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set

interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. A new cycle can only be initiated when the control has been completed.

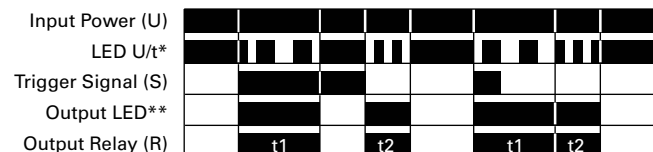


Function #6—Universal TR

Single Shot Leading and Single Shot Trailing Edge with Control Contact Asymmetrical Signal ON/OFF Delay

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position and the set interval t1 begins. After the interval t1 has expired, the output relay R switches into OFF position. If the control contact S is opened, the

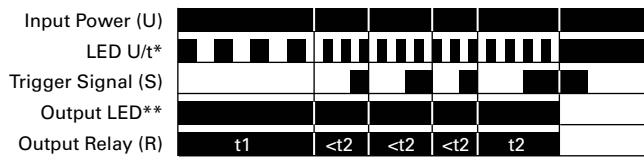
output relay again switches to the ON position and the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. During the interval, the control contact can be operated any number of times.



Function #7—Universal TR Pulse Sequence Monitoring

When the supply voltage U is applied, the set interval t1 begins and the output relay R switches to the ON position. After the interval t1 has expired, the interval t2 begins. As long as the control switch S is closed and opened within the

interval t2, the relay will remain in the ON position. If the control switch is not closed and opened within the interval t2, the relay will change to the OFF position until supply voltage U is interrupted and reapplied.



Function #8—Universal TR, TRN, TMR5, TMRP ON Delay, Power Triggered Delay ON Make

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay

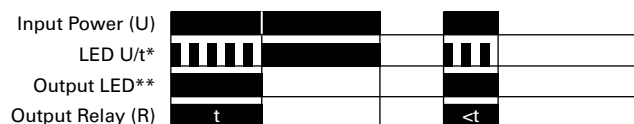
R switches to the ON position. The relay will remain in that position until supply voltage U is interrupted.



Function #9—Universal TR, TRN, TMR5, TMRP Single Shot Leading Edge Voltage Controlled Interval ON/Interval (Power Start)

When the supply voltage U is applied, the output relay R switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position.

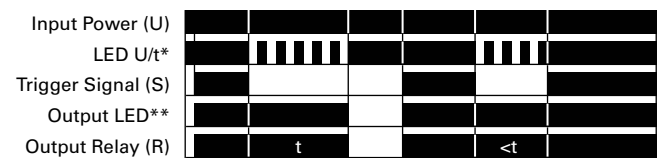
The relay will remain in that position until supply voltage U is interrupted. If the supply voltage is interrupted prior to interval t timing out, the relay will immediately switch to the OFF position.



Function #10—Universal TR, TRF, TMR5, TMRP, E5-248 OFF Delay/Signal OFF Delay Delay ON Release

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position. When the control contact is opened, interval t begins. After the interval t has expired, the

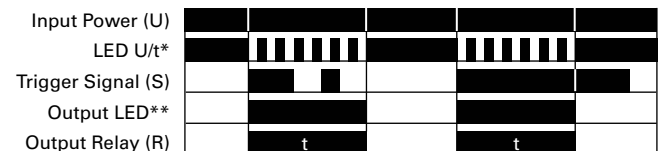
output relay R switches to the OFF position. If the control contact S is closed before interval t expires, the output relay will remain in the ON position until the control switch opens, at which time the interval t will begin again.



Function #11—Universal TR, TRF, TMR5, TMRP, E5-248 Single Shot Leading Edge with Control Input Single Shot/One Shot (Signal Start)/Momentary Interval

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position and the set interval t begins. After the

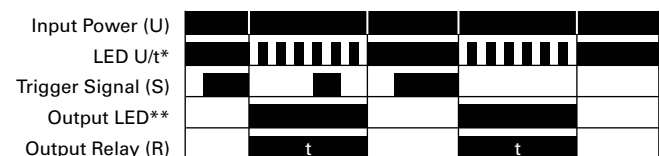
interval t has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle cannot be started until the set interval t has timed out.



Function #12—Universal TR Single Shot Trailing Edge with Control Input

The supply voltage U must be constantly applied to the device. When the control contact S is closed and reopened, the output relay R switches to the ON position and the set interval t begins. After the interval t

has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle must be started after the set interval t has timed out.



3.8

Control Relays and Timers

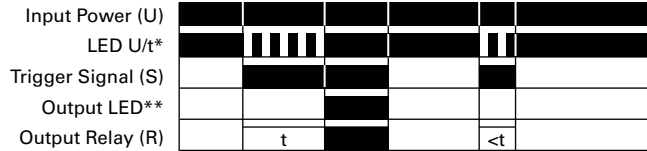
Timing Relays

3

Function #13—Universal TR ON Delay Control Signal Start, Trailing Edge OFF

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay

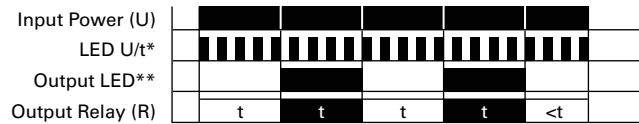
will remain in that position until the control switch opens. If the control switch is opened prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



Function #14—Universal TR, TRN, TMR5, TMRP Flasher, Pause First Cycle 1 (Power Start, OFF First)

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again. After interval t

has expired, the relay will switch to the OFF position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.



Function #15—TMR5, TMRP, E5-248 Watchdog Retriggerable Single Shot

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the relay switches to the ON position and the set interval t begins. After the interval t has expired, the output relay R

switches to the OFF position. Closing the control switch during interval t will reset the time. Continuous cycling of the trigger signal at a rate faster than the preset time will cause the relay to remain in the ON position.



Function #16—TRN, TMRP Flasher, ON First Cycle 3 (Power Start, ON First)

When the supply voltage U is applied, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin again.

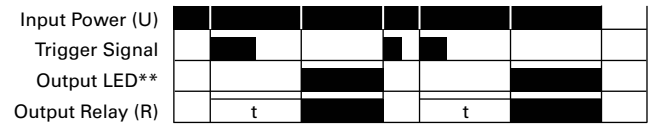
After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.



Function #17—TRF, E5-248 ON Delay Control Signal Start, Leading Edge OFF

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay will remain in that position

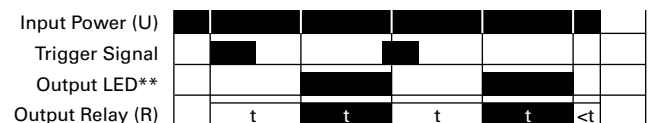
until the control switch has opened and closed. If the control switch is opened and closed prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



Function #18—TRF, E5-248 Flasher—Control Signal Start, Pause First

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again.

After interval t has expired, the relay will switch to the OFF position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted. The control switch is ignored during the cycle.

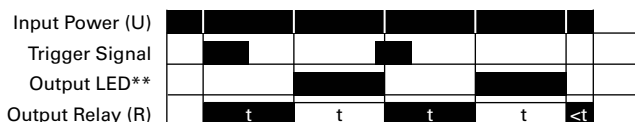


Function #19—TRF, E5-248

Flasher—Control Signal Start, ON First

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin

again. After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted. The control switch is ignored during the cycle.

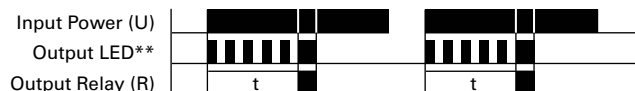


Function #22—TMRP, E5-248

Single Pulse Generator, Voltage Controlled

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the relay will switch to the ON position for

0.5 seconds before returning to the OFF position. Supply voltage U must be removed and reapplied to repeat the pulse.

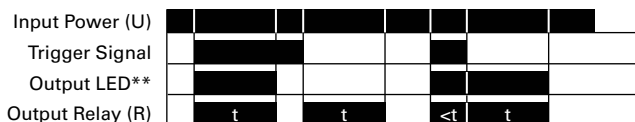


Function #20—TRF

Signal ON/OFF Delay

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired with the control switch still closed, the output relay R switches to the OFF

position. When the control switch is opened, the relay will switch to the ON position again and the interval t will begin. If the control switch is closed and opened within the interval t, the relay will remain in the ON position until interval t has timed out after the control switch is opened.



Function #23—N/A

Memory Latch Control Switch Make

The supply voltage U must be constantly applied to the device. Output changes state

with every closure of the control switch S (leading edge).

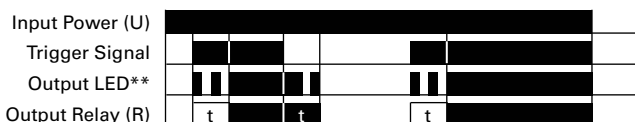


Function #21—TMRP

ON/OFF Delay Make/Break with Control Switch Trigger

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. When the

control switch is opened, interval t will begin again. After interval t has timed out, the relay will switch to the OFF position. If supply voltage U is removed at any time, the relay will return to the OFF position.



Function #24—TMR6

True OFF Delay

When the supply voltage U is applied, the relay switches to the ON position. When supply power is removed, set time interval t begins. After

interval t has expired, the relay switches to the OFF position and will remain there until supply power U is applied again.



Universal TR Series



3

Universal TR Series

Product Description

Eaton's Universal TR Series timers are our most flexible and cost-effective timing relays available. Products are available with up to seven user-selectable functions and seven user-selectable time ranges. Each unit is DIN rail mountable with a direct connection, eliminating the need for additional sockets. The Universal TR Series timers are available in SPDT and DPDT contact configurations, and have a compact IEC-style footprint and a universal input voltage range for AC and DC applications.

Application Description

A timing relay is a simple form of time-based control, allowing the user to open or close the contacts based on a specified timing function. The Universal TR Series timers are equipped with a set of selector switches, which can easily be set to a specific function and time, thereby reducing the number of product variations required. The universal input voltage (either 12–240 Vac/Vdc or 24–240 Vac/Vdc, depending on the model) further reduces the number of product variations.

The Universal TR Series timers are ideal for high-variability operations, such as systems integrators, distributors, and small equipment manufacturers. The compact design saves panel space, and the low cost and high flexibility of the units reduce inventory requirements.

Contents

Description

| | <i>Page</i> |
|---|------------------|
| Universal TR Series | |
| Product Selection | V7-T3-173 |
| Technical Data and Specifications | V7-T3-173 |
| Wiring Diagrams | V7-T3-174 |
| Dimensions | V7-T3-175 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Features

- Multiple user-selectable timing functions and timing ranges in a single unit reduce product variations and stock keeping units (SKUs)
- Universal input voltages from 12 or 24 to 240 Vac or Vdc eliminate the need to order and stock separate coil voltages
- Compact, DIN rail mountable case reduces panel size
- Advanced LED indication makes troubleshooting easy
- Staggered terminal locations allow access to lower-level terminals after wiring
- SPDT or DPDT contacts with 8 A ratings

Standards and Certifications

- cULus listed
- CE marked
- RoHS compliant
- IEC/EN 61812



Product Selection

Single-Pole Model

Universal TR Timing Relays



| Supply Voltage | Description | Catalog Number |
|-------------------|------------------------------------|----------------|
| 4-Function | | |
| 24–240 Vac/Vdc | Compact DIN rail mount, SPDT | TRL04 |
| 7-Function | | |
| 24–240 Vac/Vdc | Compact DIN rail mount, SPDT | TRL07 |
| 12–240 Vac/Vdc | Compact DIN rail mount, DPDT | TRL27 |
| | Asymmetrical pulse generator, DPDT | TRW27 |

Technical Data and Specifications

Universal TR Timing Relays

| Description | TRL04 | TRL07 | TRL27 | TRW27 |
|------------------------------|--|--|--|--|
| Functions ^① | E, R, Wu, Bp | E, R, Wu, Bp, Ws, Wa, Es | E, R, Wu, Bp, Ws, Wa, Es | li, lp, ER, Ewu, Ews, WsWa, Wt |
| Time range | 0.05 sec to 100 hours | 0.05 sec to 100 hours | 0.05 sec to 100 hours | 0.05 sec to 100 hours |
| Input | | | | |
| Supply voltage | 24–240 Vac/Vdc | 24–240 Vac/Vdc | 12–240 Vac/Vdc | 12–240 Vac/Vdc |
| Rated supply frequency | +10% /–15% | +10% /–15% | ±10% | ±10% |
| Rated consumption | 4 VA (1.5 W) | 4 VA (1.5 W) | 6 VA (2 W) | 6 VA (2 W) |
| Duty cycle | 100% | 100% | 100% | 100% |
| Reset time | 100 ms | 100 ms | 100 ms | 100 ms |
| Residual ripple for DC | 10% | 10% | 10% | 10% |
| dropout voltage | >30% of rated supply voltage | >30% of rated supply voltage | >30% of rated supply voltage | >30% of rated supply voltage |
| Overvoltage category | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) |
| Rated surge voltage | 4 kV | 4 kV | 4 kV | 4 kV |
| Output | | | | |
| Contact configuration | SPDT (one changeover contact) | SPDT (one changeover contact) | DPDT (two changeover contacts) | DPDT (two changeover contacts) |
| Rated voltage | 250 Vac | 250 Vac | 250 Vac | 250 Vac |
| Switching capacity | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) | 2000 VA (8 A/250 V) |
| Fusing | 8 A fast acting | 8 A fast acting | 8 A fast acting | 8 A fast acting |
| Mechanical life | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations | 20 x 10 ⁶ operations |
| Electrical life | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive | 2 x 10 ⁵ operations at 1000 VA load, resistive |
| Switching frequency | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) | Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1) |
| Overvoltage category | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) | III (in accordance with IEC 60664-1) |
| Rated surge voltage | 4 kV | 4 kV | 4 kV | 4 kV |
| Control Signal | | | | |
| Loadable | Yes | Yes | Yes | Yes |
| Maximum cable length | 10m | 10m | 10m | 10m |
| Trigger level (sensitivity) | Automatic adaption to supply voltage | Automatic adaption to supply voltage | Automatic adaption to supply voltage | Automatic adaption to supply voltage |
| Minimum control pulse length | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms | DC 50 ms/AC 100 ms |

Note

^① Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

Universal TR Timing Relays, continued

| Description | TRL04 | TRL07 | TRL27 | TRW27 |
|-----------------------|---|---|---|---|
| Accuracy | | | | |
| Base accuracy | ±1% of maximum scale value | ±1% of maximum scale value | ±1% of maximum scale value | ±1% of maximum scale value |
| Adjustment accuracy | <5% of maximum scale value | <5% of maximum scale value | <5% of maximum scale value | <5% of maximum scale value |
| Repetition accuracy | <0.5% or ±5 ms | <0.5% or ±5 ms | <0.5% or ±5 ms | <0.5% or ±5 ms |
| Temperature influence | ≤0.01% / °C | ≤0.01% / °C | ≤0.01% / °C | ≤0.01% / °C |
| Physical | | | | |
| Ambient temperature | -25 to 55 °C | -25 to 55 °C | -25 to 55 °C | -25 to 55 °C |
| Storage temperature | -25 to 70 °C | -25 to 70 °C | -25 to 70 °C | -25 to 70 °C |
| Relative humidity | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) | 15% to 85% (in accordance with IEC 60721-3-3 Class 3K3) |
| Pollution degree | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) | 2, if built in 3 (in accordance with IEC 60664-1) |
| Housing material | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating | Self-extinguishing plastic housing, IP40 rating |
| Mounting | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position | Mounted on DIN rail TS 35 according to EN 60715, any position |
| Terminal rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating | Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating |
| Tightening torque | Max. 1 Nm | Max. 1 Nm | Max. 1 Nm | Max. 1 Nm |

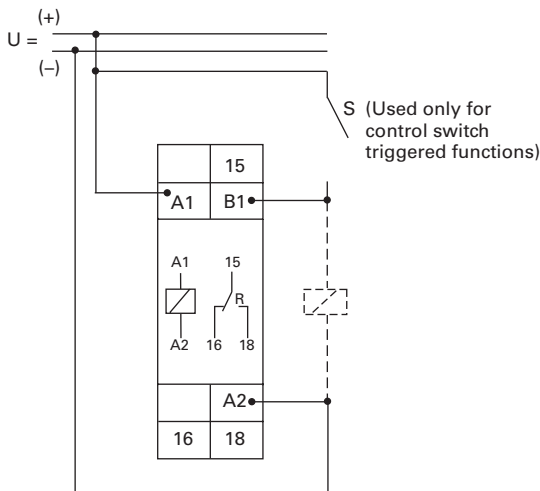
Terminal Capacity

Description

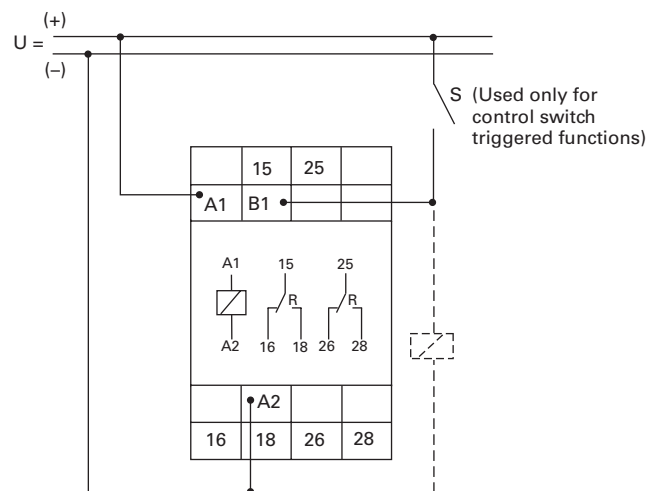
- 1 x 0.5 to 2.5 mm² with/without multicore cable end
- 1 x 4 mm² without multicore cable end
- 2 x 0.5 to 1.5 mm² with/without multicore cable end
- 2 x 2.5 mm² flexible without multicore cable end

Wiring Diagrams

Single-Pole, Double-Throw Units (SPDT)—TRL04 and TRL07



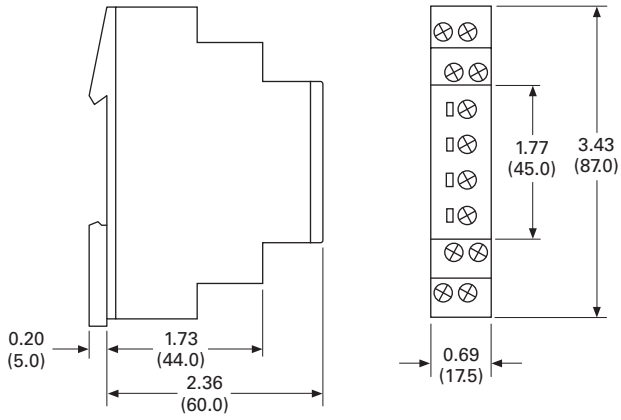
Double-Pole, Double-Throw Units (DPDT)—TRL27 and TRW27



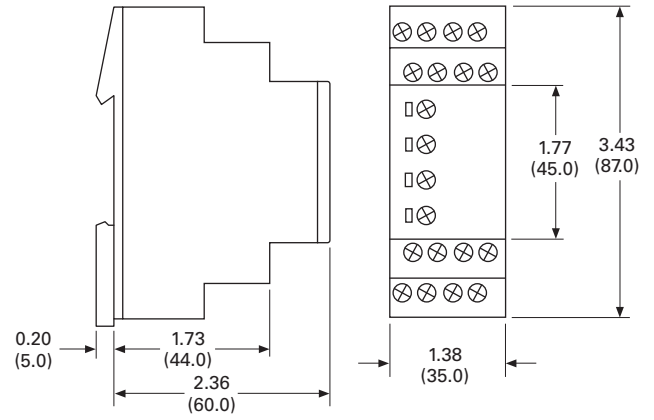
Dimensions

Approximate Dimensions in Inches (mm)

17.5 mm (TRL04 and TRL07)



35 mm (TRL27 and TRW27)



TR Series



TR Series

Product Description

The upgraded TR Series Timing Relays are designed to meet most timing requirements by offering more flexibility in range of input voltage, timing range and functionality. Use a rotary switch to choose from 20 selectable time ranges from 0.1 second to 600 hours. We offer both a power triggered and signal triggered model—each with expanded operation modes. There is a green LED to indicate when power is ON and an orange LED when output is ON.

Features

- 20 time ranges and 10 timing functions
- Time delays from 0.1 sec to 600 hrs
- Space-saving, compact package
- High repeat accuracy of $\pm 0.2\%$
- LED indication
- Standard 8- or 11-pin and 11-blade termination
- 2 Form C DPDT delayed output contacts
- 10 A contact rating

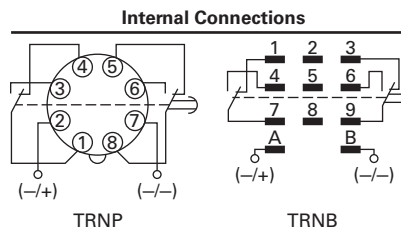
Contents

Description

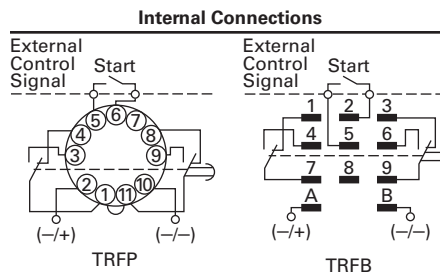
| | <i>Page</i> |
|---|------------------|
| Universal TR Series | V7-T3-172 |
| TR Series | |
| Catalog Number Selection | V7-T3-177 |
| Product Selection | V7-T3-177 |
| Accessories | V7-T3-177 |
| Technical Data and Specifications | V7-T3-178 |
| Dimensions | V7-T3-178 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Operation

TRNP and TRNB



TRFP and TRFB

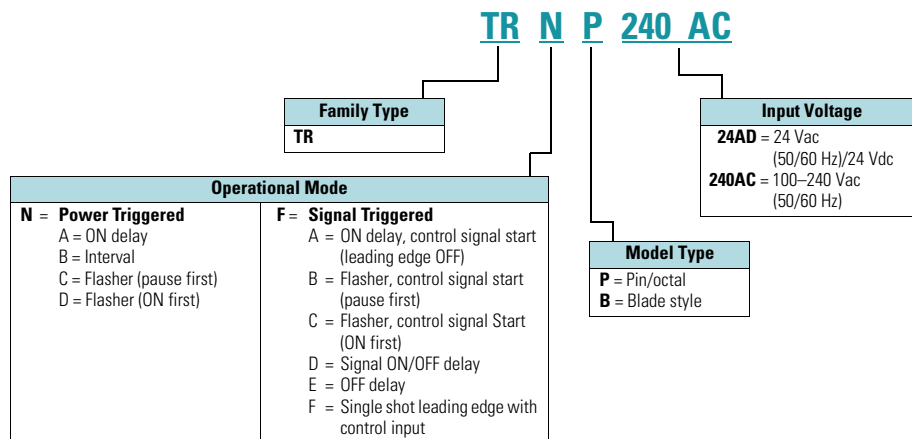


Standards and Certifications

- cULus listed
- CSA
- CE marked
- TUV



Catalog Number Selection



Product Selection

TR Plug-In Timing Relays—Power Triggered

| Coil Voltage | Octal Catalog Number | Blade Catalog Number |
|--------------|----------------------|----------------------|
| 24 Vac/Vdc | TRNP24AD | TRNB24AD |
| 100–240 Vac | TRNP240AC | TRNB240AC |

TR Plug-In Timing Relays—Signal Triggered

| Coil Voltage | Octal Catalog Number | Blade Catalog Number |
|--------------|----------------------|----------------------|
| 24 Vac/Vdc | TRFP24AD | TRFB24AD |
| 100–240 Vac | TRFP240AC | TRFB240AC |

Accessories

Sockets for Use with TR Timers—Standard Pack of 10

| Timing Relay | Terminal Style | Catalog Number |
|--------------|--|----------------|
| TRNP | 8-pin octal | D3PA2 |
| TRFP | 11-pin octal | D3PA3 |
| TRNB, TRFB | 0.187 in solder/QC terminals (blade style) | D5PA2 |

Technical Data and Specifications

General

| Description | Specification |
|-------------------------------------|---|
| Operation system | Solid-state CMOS circuit |
| Time range | 0.1 sec to 600 hours |
| Pollution degree | 2 (IE60664-1) |
| Overvoltage category | III (IE60664-1) |
| Rated operational voltage | |
| 240 AC | 100–240 Vac (50/60 Hz) |
| 24 AC | 24 Vac (50/60 Hz)/24 Vdc |
| 12 DC | 12 Vdc |
| Voltage tolerance | |
| 240 AC | 85–264 Vac (50/60 Hz) |
| 24 AC | 20.4–26.4 Vac (50/60 Hz)/21.6–26.4 Vdc |
| 12 DC | 10.8–13.2 Vdc |
| Input OFF voltage | Rated voltage x 10% minimum |
| Ambient operating temperature | –4 to 149 °F (–20 to 65 °C) |
| Reset time | 100 ms maximum |
| Repeat error | ± 0.2%, ± 20 ms ^① |
| Voltage error | ± 0.2%, ± 20 ms ^① |
| Temperature error | ± 0.5%, ± 20 ms ^① |
| Setting error | ± 10% maximum |
| Insulation resistance | 100M ohm minimum (500 Vdc) |
| Dielectric strength | |
| Between power and output terminals | 2000 Vac, 1 minute |
| Between contacts of different poles | 2000 Vac, 1 minute |
| Between contacts of same pole | 1000 Vac, 1 minute |
| Vibration resistance | 10–55 Hz amplitude 0.5 mm; 2 hrs in each of 3 axes |
| Shock resistance | |
| Operating extremes | 10G |
| Damage limits — | |
| TRNP, TRFP | 40G (3x in each of 3 axes) |
| TRNB, TRFB | 10G (3x in each of 3 axes) |
| Power consumption (approx.) | |
| 240 AC | 6.5 VA TRNP, TRNB/6.6 VA TRFP, TRFB |
| 240 Vac/60 Hz | 11.6 VA TRNP, TRNB/12.1 VA TRFP, TRFB |
| 24 AC (AC/DC) | 3.4 VA–1.7 W TRNP, TRNB/3.5 VA–1.7 W TRFP, TRFB |
| 12 DC | 1.6 W |

TR Series Contact Ratings

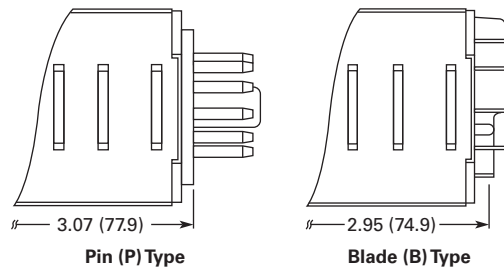
| Description | Specification |
|--------------------------------------|--|
| Contact configuration | 2 Form C, DPDT (delayed output) |
| Allowable voltage/current | 240 Vac, 30 Vdc/10 A |
| Max. permissible operating frequency | 1800 cycles per hour |
| Rated load | |
| Resistive | 10 A, 240 Vac/30 Vdc |
| Inductive | 7 A, 240 Vac/30 Vdc |
| Horsepower rating | 1/6 hp 120 Vac, 1/3 hp 240 Vac |
| Life | |
| Electrical | 500,000 operations minimum (resistive) |
| Mechanical | 50,000,000 operations minimum |

Dimensions

Approximate Dimensions in Inches (mm)

TR Series Dimensions and Weights

| Description | Specification |
|-------------------|--|
| Dimensions | |
| TRNP, TRFP | 1.58H x 1.42W x 3.07D in. (40H x 36W x 77.9D mm) |
| TRNB, TRFB | 1.58H x 1.42W x 2.95D in. (40H x 36W x 74.9D mm) |
| Weights | |
| TRNP | 87g |
| TRFP | 89g |
| TRNB, TRFB | 85g |



Note

^① For the value of the error against a preset time, whichever value is larger should apply.

TMR5 Series



TMR5 Series

Product Description

The TMR5 Series Time Delay Relays are designed for a broad range of OEM applications. The TMR5 Series offers non-programmable plug-in style timers with a variety of functions available. Each unit offers a single function and single input voltage, and operates over a defined time delay range. Units with fixed time delays are also available. Eaton also offers customization capabilities for these timers—remote adjustments, special pin configurations, and more. Contact us to discuss your specific application and design of a custom timer.

Features

- Single timing range for each unit
- Ranges available from 0.02 sec to 24 hours
- Wide variety of functions available
- Plugs into standard 8- or 11-pin socket
- 10 A DPDT output contacts
- Can be easily customized to meet your needs

Contents

Description

| Description | Page |
|-----------------------------------|-----------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | |
| Catalog Number Selection | V7-T3-180 |
| Product Selection | V7-T3-180 |
| Accessories | V7-T3-180 |
| Technical Data and Specifications | V7-T3-181 |
| Wiring Diagrams | V7-T3-181 |
| Dimensions | V7-T3-182 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | V7-T3-185 |

Standards and Certifications

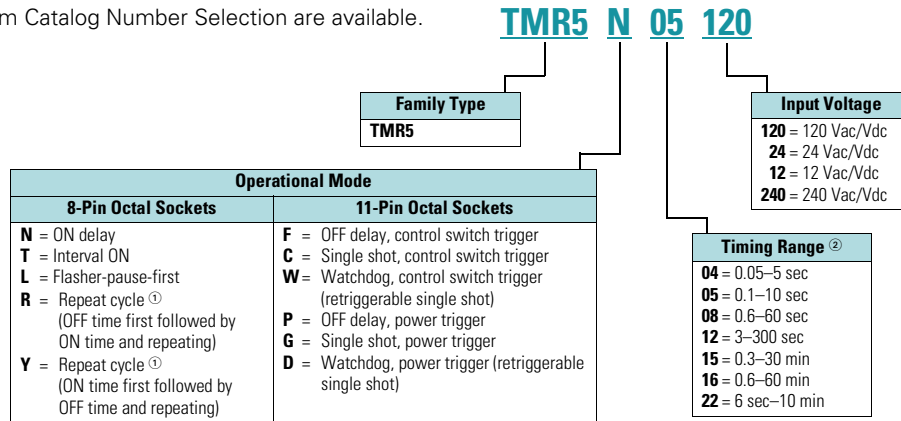
- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked

cRUUS

ROHS
COMPLIANT

Catalog Number Selection

All configurations from Catalog Number Selection are available.



Product Selection

TMR5 Time Delay Relays

| Input Voltage | Socket | Timing Range | Catalog Number |
|--|--------|--------------|-------------------|
| ON Delay | | | |
| 120 Vac/Vdc | 8-pin | 0.1–10 sec | TMR5N05120 |
| | | 0.6–60 sec | TMR5N08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5N0524 |
| | | 0.6–60 sec | TMR5N0824 |
| OFF Delay, Control Switch Trigger | | | |
| 120 Vac/Vdc | 11-pin | 0.1–10 sec | TMR5F05120 |
| | | 0.6–60 sec | TMR5F08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5F0524 |
| | | 0.6–60 sec | TMR5F0824 |
| Interval ON | | | |
| 120 Vac/Vdc | 8-pin | 0.1–10 sec | TMR5T05120 |
| | | 0.6–60 sec | TMR5T08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5T0524 |
| | | 0.6–60 sec | TMR5T0824 |
| Single Shot, Control Switch Trigger | | | |
| 120 Vac/Vdc | 11-pin | 0.1–10 sec | TMR5C05120 |
| | | 0.6–60 sec | TMR5C08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5C0524 |
| | | 0.6–60 sec | TMR5C0824 |
| Repeat Cycle (OFF Time First Followed by ON Time and Repeating) | | | |
| 120 Vac/Vdc | 8-pin | 0.1–10 sec | TMR5R05120 |
| | | 0.6–60 sec | TMR5R08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5R0524 |
| | | 0.6–60 sec | TMR5R0824 |
| Repeat Cycle (ON Time First Followed by OFF Time and Repeating) | | | |
| 120 Vac/Vdc | 8-pin | 0.1–10 sec | TMR5Y05120 |
| | | 0.6–60 sec | TMR5Y08120 |
| 24 Vac/Vdc | | 0.1–10 sec | TMR5Y0524 |
| | | 0.6–60 sec | TMR5Y0824 |

Accessories

Accessories for Use with TMR5 Time Delay Relays

| Description | Standard Pack | Catalog Number |
|------------------|---------------|-----------------|
| 8-pin socket | 10 | D3PA2 |
| 11-pin socket | 10 | D3PA3-A2 |
| Hold-down spring | 10 | D65CHDS |

Notes

- Indicates DUAL knob unit. All dual knob units can have independently selectable and adjustable ON and OFF times. If different ON and OFF times are desired, add two codes for time ranges in the part number. The first code listed indicates the first timing range of the unit (OFF time for R, ON time for Y) and the second code indicates the second timing range (ON time for R, OFF Time for Y).
- Fixed time delay settings are available for orders of 50 pieces or more. Contact EatonCare for additional information at 877-ETN-CARE (386-2273).

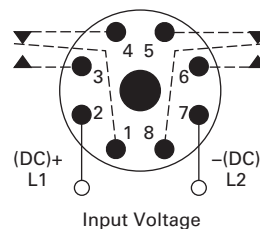
Technical Data and Specifications

TMR5 Time Delay Relays

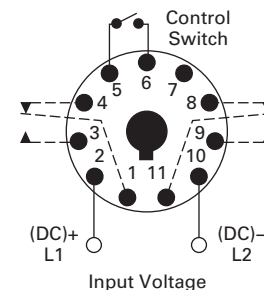
| Description | Specification |
|---|---|
| Voltage tolerance | |
| AC operation | +10/–15% of nominal at 50/60 Hz |
| DC operation | +10/–15% of nominal |
| Load burden | 2 VA |
| Setting accuracy | |
| Maximum setting (adjustable) | +5%, –0% |
| Minimum setting (adjustable) | +0%, –50% |
| Fixed time delay | |
| < 2 seconds | +1% |
| 0.1–2 seconds | ±5% |
| Repeat accuracy (constant voltage and temperature) | |
| > 2 seconds delay | ±0.1% |
| 0.1–2 seconds delay | ±2% |
| Reset time | |
| ON Delay/interval/repeat cycle | 0.1 second |
| OFF Delay/single shot/watchdog | 0.04 second |
| Startup time (time from when power is applied until unit is timing) | |
| 120 and 240 V units | 0.05 second |
| 12, 24 and 48 V units | 0.08 second |
| Maintain function time (time unit continues to time after power is removed) | 0.01 second |
| Temperature | |
| 12–120 V input voltage | –18 to 150 °F (–28 to 65 °C) |
| 240 V input voltage | –18 to 122 °F (–28 to 50 °C) |
| Insulation voltage | 2000 V |
| Output contacts | DPDT 10 A @ 240 Vac/30 Vdc, 1/2 hp @ 120/240 Vac (NO contacts) 1/3 hp @ 120/240 Vac (NC contacts) B300 and R300; AC-15 and DC-13 |
| Life | |
| Mechanical | 10,000,000 operations |
| Full load | 100,000 operations |

Wiring Diagrams

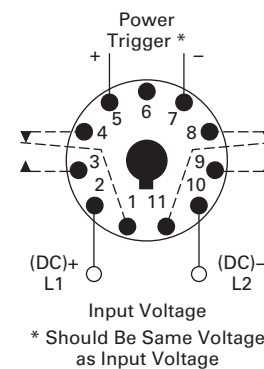
Wiring for 8-Pin Units



Wiring for 11-Pin Control Switch Trigger Units



Wiring for 11-Pin Power Trigger Units



3.8

Control Relays and Timers

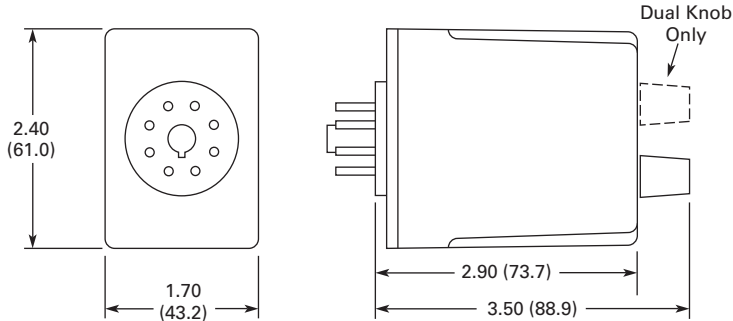
Timing Relays

Dimensions

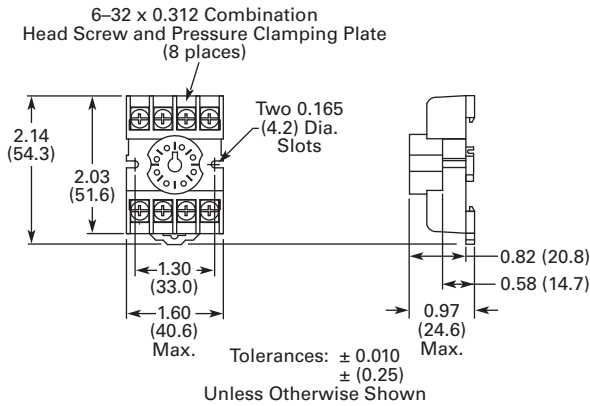
Approximate Dimensions in Inches (mm)

TMR5

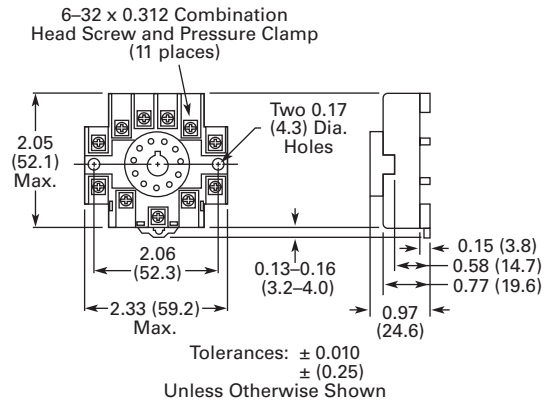
3



D3PA2 Socket



D3PA3 Socket



TMR6 Series



TMR6 Series

Product Description

Most electronic time delay relays with an OFF delay function require input voltage to be applied continuously in order to operate correctly. However, there are many applications where this is not possible—keeping a relay energized for some amount of time after input voltage has been removed. Eaton’s TMR6 true OFF delay product provides this function even when input voltage is removed. It duplicates the operation of the older OFF delay pneumatic time delay relays.

Features

- Provides OFF delay function without requiring input voltage during OFF time delay
- Duplicates operation of pneumatic OFF delay timers
- Each unit has eight timing ranges built in, covering 0.05 seconds to 30 minutes
- Selecting a range is easy using a rotary switch (no math is required or DIP switches to set)
- Uses industry-standard 8-pin octal socket
- 10 A DPDT output contacts

Timing Ranges

Select one of the eight timing ranges using the selector knob, and then adjust the time within that range for an accurate delay setting.

Timing Ranges

| Dial Setting | Timing Range |
|--------------|--------------|
| A | 0.05–5 sec. |
| B | 0.1–10 sec. |
| C | 0.3–30 sec. |
| D | 0.6–60 sec. |
| E | 1.8–180 sec. |
| F | 3–300 sec. |
| G | 0.1–10 min. |
| H | 0.3–30 min. |

Contents

Description

| | Page |
|-----------------------------------|-----------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | |
| Catalog Number Selection | V7-T3-184 |
| Product Selection | V7-T3-184 |
| Accessories | V7-T3-184 |
| Technical Data and Specifications | V7-T3-184 |
| Wiring Diagram | V7-T3-184 |
| Dimensions | V7-T3-184 |
| TMRP Series | V7-T3-185 |

Operation

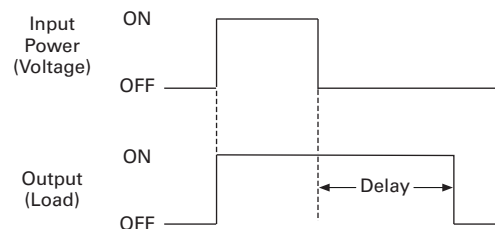
True OFF Delay

Upon application of input voltage, the relay is energized. When the input voltage is removed, the preset time begins. At the end of the preset time, the relay is de-energized.

Voltage must be applied for a minimum of 0.1 second to assure proper operation.

Any application of the input voltage during the preset time will keep the relay energized and reset the time delay. No external trigger switch is required.

True OFF Delay



Standards and Certifications

- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked



3.8

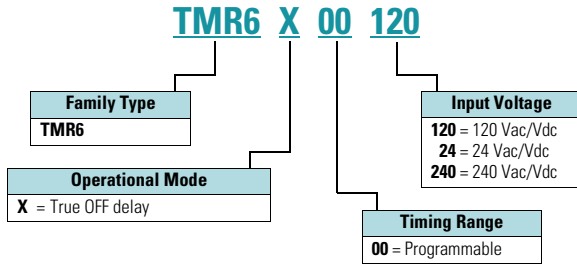
Control Relays and Timers

Timing Relays

3

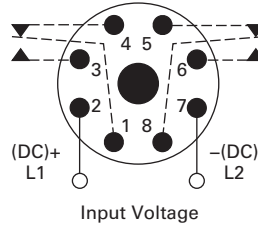
Catalog Number Selection

All configurations from Catalog Number Selection are available.



Wiring Diagram

Wiring for 8-Pin Units



Product Selection

TMR6 True OFF Delay Relays

| Input Voltage | Timing Range | Catalog Number |
|-----------------------|--|-------------------|
| True OFF Delay | | |
| 120 Vac/Vdc | 0.05 sec–30 min (user selectable, 8 ranges) | TMR6X00120 |
| 24 Vac/Vdc | | TMR6X0024 |
| 240 Vac/Vdc | | TMR6X00240 |

Accessories

Accessories for Use with TMR6 Time Delay Relays

| Description | Standard Pack | Catalog Number |
|------------------|---------------|----------------|
| 8-pin socket | 10 | D3PA2 |
| Hold-down spring | 10 | D65CHDS |

Technical Data and Specifications

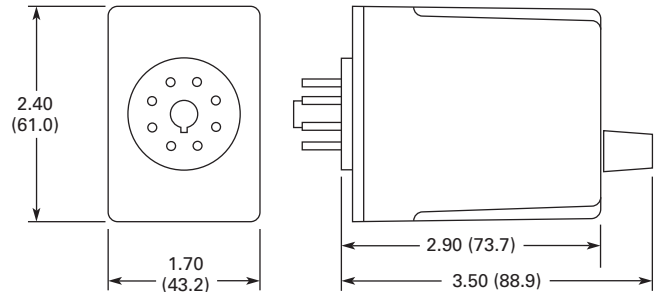
TMR6 Time Delay Relays

| Description | Specification |
|--|---|
| Voltage tolerance | |
| AC operation | +10/–15% of nominal at 50/60 Hz |
| DC operation | +10/–15% of nominal |
| Load burden | 2 VA |
| Setting accuracy | |
| Maximum setting (adjustable) | +5%, –0% |
| Minimum setting (adjustable) | +0%, –50% |
| Repeat accuracy (constant voltage and temperature) | ±0.1% or 50 ms, whichever is greater |
| Temperature | –18 to 150 °F (–28 to 65 °C) |
| Insulation voltage | 2,000 V |
| Output contacts | DPDT 10 A @ 240 Vac/30 Vdc, 1/2 hp @ 120/240 Vac (NO contacts) 1/3 hp @ 120/240 Vac (NC contacts) B300 and R300; AC-15 and DC-13 |
| Life | |
| Mechanical | 2,000,000 operations |
| Full load | 100,000 operations |

Dimensions

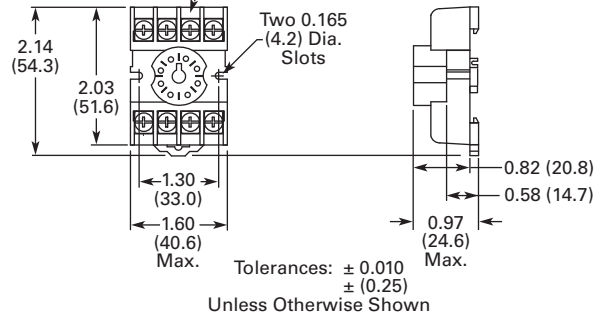
Approximate Dimensions in Inches (mm)

TMR6



D3PA2 Socket

6–32 x 0.312 Combination Head Screw and Pressure Clamping Plate (8 places)



TMRP Series



TMRP Series

Product Description

Eaton's TMRP Series timers combine flexibility with ease of use and installation to make the most versatile timer in our offering. The thumb-wheel setting design allows for quick selection and review of up to 10 timing functions and seven timing ranges. The TMRP units can be mounted in a 1/16 DIN cutout or on a DIN rail with our D3 series sockets. Input voltage is 12–240 Vac/Vdc to work with all popular control voltages.

Application Description

A timing relay is a simple form of time-based control, allowing the user to open or close the contacts based on a specified timing function. The TMRP series is equipped with a set of thumb-wheel style selector switches, which can easily be set to a specific function and time, thereby reducing the number of product variations required. The universal input voltage of 12–240 Vac/Vdc further reduces the number of product variations.

The TMRP timers are ideal for high-variability operations, such as systems integrators, distributors, and small equipment manufacturers. The flexible enclosure design allows for back-panel mounting, through-panel mounting, or DIN rail mounting.

Contents

| Description | Page |
|---|-------------|
| Universal TR Series | V7-T3-172 |
| TR Series | V7-T3-176 |
| TMR5 Series | V7-T3-179 |
| TMR6 Series | V7-T3-183 |
| TMRP Series | |
| Product Selection | V7-T3-186 |
| Technical Data and Specifications | V7-T3-186 |
| Wiring Diagrams | V7-T3-187 |
| Dimensions | V7-T3-187 |

Features

- Multiple user-selectable timing functions and timing ranges in a single unit reduce product variations and stock keeping units (SKUs)
- Universal input voltages from 12–240 Vac/Vdc eliminate the need to order and stock separate coil voltages
- Timing ranges up to 9990 hours
- Dual LED indication makes troubleshooting easy
- Flexible design for back-panel, through-panel (45 mm x 45 mm cutout), or DIN rail mounting
- SPDT or DPDT contacts with 12 A ratings
- Plastic dust cover keeps out contaminants and eliminates accidental set point changes
- Use with standard Eaton D3 sockets—see Technical Data and Specifications

LED Indicator

| LED Description | Function |
|-------------------------------|---|
| Solid green "Input" | Supply voltage present |
| Solid red "Output" | Relay energized |
| Slowly flashing red "Output" | Timing cycle activated, relay not energized |
| Rapidly flashing red "Output" | Timing cycle activated, relay energized |

Standards and Certifications

- UL recognized
- CE marked
- RoHS compliant



Product Selection

TMRP5100

TMRP Timing Relays



| Supply Voltage | Description | Catalog Number |
|--------------------|------------------------------|-----------------|
| 10-Function | | |
| 12–240 Vac/Vdc | Control switch trigger, DPDT | TMRP5100 |
| | Control switch trigger, SPDT | TMRP5101 |
| | Power trigger, DPDT | TMRP5102 |

Technical Data and Specifications

TMRP Timing Relays

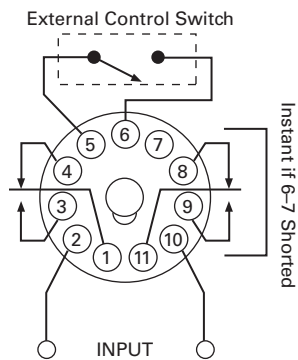
| Description | TMRP5100 | TMRP5101 | TMRP5102 |
|------------------------------|---|---|---|
| Functions ^① | A, B, C, D, E, F, G, H, I, J | A, B, C, D, E, F, G, H, I, J | A, B, C |
| Time range | 0.1 sec to 9,990 hours | 0.1 sec to 9,990 hours | 0.1 sec to 9,990 hours |
| Input | | | |
| Supply voltage | 12–240 Vac/Vdc | 12–240 Vac/Vdc | 12–240 Vac/Vdc |
| Supply voltage tolerance | ±15% | ±15% | ±15% |
| Rated consumption | 2.5 VA (2 W) maximum | 2.5 VA (2 W) maximum | 2.5 VA (2 W) maximum |
| Reset time | 150 ms | 150 ms | 150 ms |
| Reverse polarity protection | Yes | Yes | Yes |
| Operate time | 25 ms maximum | 25 ms maximum | 25 ms maximum |
| Release time | 25 ms maximum | 25 ms maximum | 25 ms maximum |
| Rated surge voltage | 4 kV | 4 kV | 4 kV |
| Output | | | |
| Contact configuration | DPDT | SPDT | DPDT |
| Contact rating (AC) | 12 A resistive at 120, 240 UL 508 | 12 A resistive at 120, 240 UL 508 | 12 A resistive at 120, 240 UL 508 |
| Contact rating (DC) | 12 A resistive at 30 UL 508 | 12 A resistive at 30 UL 508 | 12 A resistive at 30 UL 508 |
| Contact rating horsepower | 1/2 at 120 Vac, 1 at 240 Vac | 1/2 at 120 Vac, 1 at 240 Vac | 1/2 at 120 Vac, 1 at 240 Vac |
| Contact rating pilot duty | A300, 720 VA at 240 Vac | A300, 720 VA at 240 Vac | A300, 720 VA at 240 Vac |
| Minimum load | 12 V/100 mA | 12 V/100 mA | 12 V/100 mA |
| Contact material | Silver-nickel 90/10 | Silver-nickel 90/10 | Silver-nickel 90/10 |
| Contact resistance | 100 milliohms max. at 1 A 12 Vdc | 100 milliohms max. at 1 A 12 Vdc | 100 milliohms max. at 1 A 12 Vdc |
| Mechanical life—full load | 10 million operations | 10 million operations | 10 million operations |
| Electrical life—full load | 100,000 operations | 100,000 operations | 100,000 operations |
| Control Signal | | | |
| Minimum control pulse length | 50 ms minimum | 50 ms minimum | 50 ms minimum |
| Accuracy | | | |
| Repetition accuracy | 0.10% at constant voltage and temperature | 0.10% at constant voltage and temperature | 0.10% at constant voltage and temperature |
| Physical | | | |
| Ambient temperature | –10 to 55 °C | –10 to 55 °C | –10 to 55 °C |
| Storage temperature | –40 to 85 °C | –40 to 85 °C | –40 to 85 °C |
| Mounting | Use with D3PA3 socket | Use with D3PA2 socket | Use with D3PA2 socket |

Note

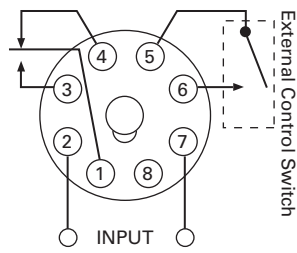
^① Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

Wiring Diagrams

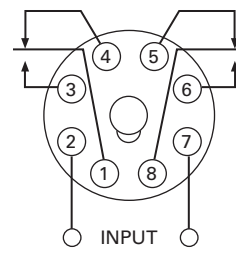
TMRP5100



TMRP5101



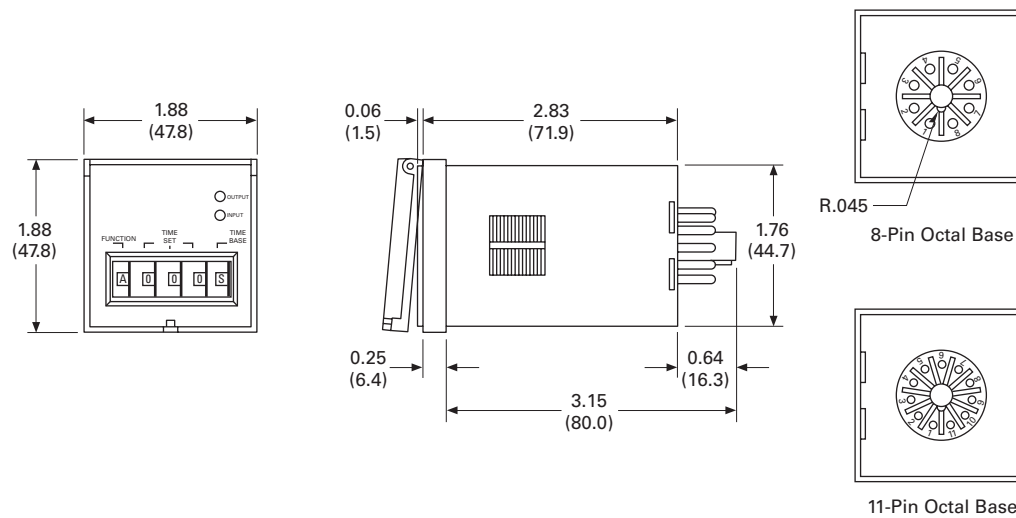
TMRP5102



Dimensions

Approximate Dimensions in Inches (mm)

TMRP Series



D85 Series—Alternating Relays



3

Product Description

Alternating relays are used in applications where the optimization of load usage is required by equalizing the run time of two loads. They are also used where additional capacity is required in case of excess load requirements. This alternating action is initiated by a control switch—such as a float switch, manual switch, timing relay, pressure switch or other isolated contact. Each time the initiating switch is opened, the output relay contacts will change state, thus alternating the two loads. Two LED indicators show the status of the output relay.

The D851 and D852 Series Relays are used with one control switch and are available in either SPDT or DPDT output configurations with or without a selector switch to lock in one sequence. The D852X Series Relays are available in DPDT cross-wired output configurations for use with one or two control switches (LEAD and LAG).

The D853 Series is designed for use with three-switch applications (LEAD, LAG and STOP). The D853 Series combines a standard DPDT Cross-Wired alternating relay, contactor auxiliary contacts, and a control relay into one compact and economical product. This saves space and labor, while reducing the number of components needed. The D853 Series uses Sequence On—Simultaneous Off (S.O.S.O.) operation, where the two loads are energized sequentially, but remain on together until the STOP switch is opened. This device also protects against failure of the STOP and LEAD switches. If both switches fail, the two pump motors will be energized simultaneously when the LAG switch is closed.

Contents

Description

| | <i>Page</i> |
|---|------------------|
| D85 Series—Alternating Relays | |
| Product Selection | V7-T3-189 |
| Accessories | V7-T3-189 |
| Technical Data and Specifications | V7-T3-190 |
| Wiring Diagrams | V7-T3-190 |
| Dimensions | V7-T3-192 |

Features

- For duplex loads
- Works with one-, two-, or three-switch applications
- Compact plug-in design using industry standard sockets
- 10 A SPDT or DPDT output configurations
- Optional low profile selector switch to lock in one sequence
- Two LEDs indicate relay status
- D853 Series replaces separate components in duplex panel—saving space and reducing labor

Standards and Certifications

- CE
- cRUus
- UL listed ①
- RoHS compliant



Note

① When used with appropriate Eaton socket.

Product Selection

D85 Series—Alternating Relays ^①

| Output Contacts | Control Voltage | Socket | Catalog Number |
|------------------------------------|-----------------|--------|----------------|
| SPDT | 12 Vac | 8-pin | D851NR |
| SPDT | 24 Vac | 8-pin | D851NT |
| SPDT | 120 Vac | 8-pin | D851NA |
| SPDT | 240 Vac | 8-pin | D851NB |
| SPDT w/selector switch | 12 Vac | 8-pin | D851LR |
| SPDT w/selector switch | 24 Vac | 8-pin | D851LT |
| SPDT w/selector switch | 120 Vac | 8-pin | D851LA |
| SPDT w/selector switch | 240 Vac | 8-pin | D851LB |
| DPDT | 12 Vac | 11-pin | D852NR |
| DPDT | 24 Vac | 11-pin | D852NT |
| DPDT | 120 Vac | 11-pin | D852NA |
| DPDT | 240 Vac | 11-pin | D852NB |
| DPDT w/selector switch | 12 Vac | 11-pin | D852LR |
| DPDT w/selector switch | 24 Vac | 11-pin | D852LT |
| DPDT w/selector switch | 120 Vac | 11-pin | D852LA |
| DPDT w/selector switch | 240 Vac | 11-pin | D852LB |
| DPDT cross-wired | 12 Vac | 8-pin | D852XNR |
| DPDT cross-wired | 24 Vac | 8-pin | D852XNT |
| DPDT cross-wired | 120 Vac | 8-pin | D852XNA |
| DPDT cross-wired | 240 Vac | 8-pin | D852XNB |
| DPDT cross-wired w/selector switch | 12 Vac | 8-pin | D852XLR |
| DPDT cross-wired w/selector switch | 24 Vac | 8-pin | D852XLT |
| DPDT cross-wired w/selector switch | 120 Vac | 8-pin | D852XLA |
| DPDT cross-wired w/selector switch | 240 Vac | 8-pin | D852XLB |

Accessories

D85 Series—Alternating Relays

| Description | Standard Pack | Catalog Number |
|------------------|---------------|-----------------|
| 8-pin socket | 10 | D3PA2 |
| 11-pin socket | 10 | D3PA3-A2 |
| Hold-down spring | 10 | D65CHDS |

Note

^① Contact Eaton for relays for 3-switch applications (Lead-Lag-Stop).

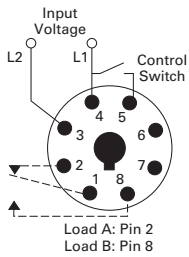
Technical Data and Specifications

D85 Series—Alternating Relays

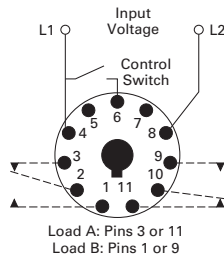
| Description | Specification |
|-----------------------------------|--|
| Voltage tolerance | +10%/-15% of control voltage at 50/60 Hz |
| Load (burden) | Less than 3 VA |
| Output contacts | 10 A resistive at 240 Vac / 30 Vdc, 1/2 hp at 120/240 Vac (NO), 1/3 hp at 120/240 Vac (NC) |
| Mechanical life | 10,000,000 operations |
| Electrical life | 100,000 operations |
| Temperature | -20 °F to +150 °F (-28 ° to 65 °C) |
| Transient protection | 10,000 volts for 20 microseconds |
| Indicator LEDs | 2 LEDs marked LOAD A and LOAD B |
| Optional selector switch settings | ALTERNATE, LOCK LOAD A, LOCK LOAD B |

Wiring Diagrams

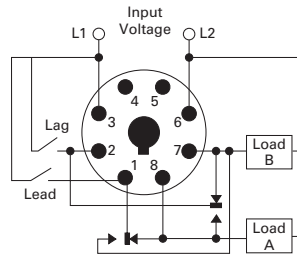
D851 Series Relays, SPDT



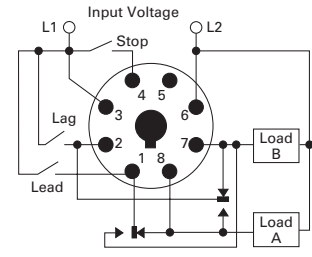
D852 Series Relays, DPDT



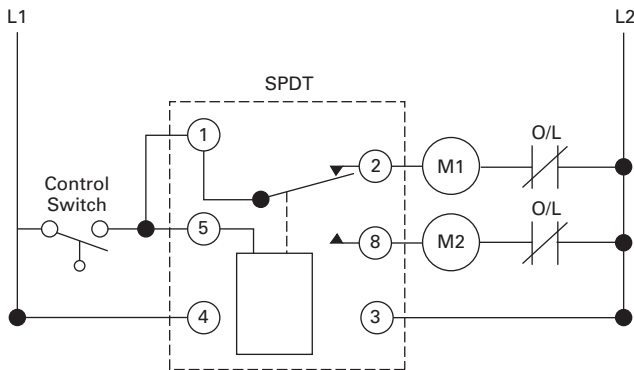
D852X Series Relays, DPDT Cross-Wired



D853 Series Relays, Three-Switch Applications



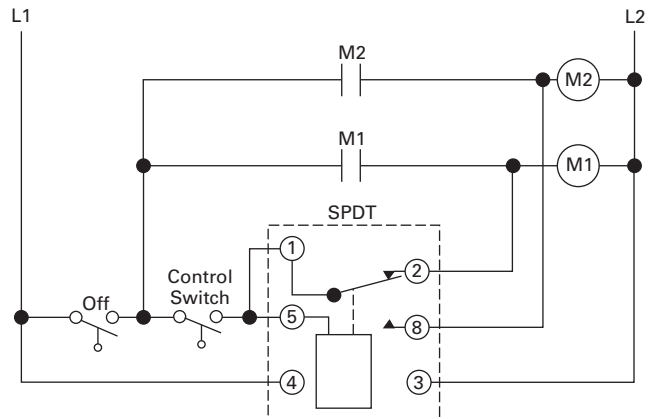
Typical Installations for SPDT and DPDT Alternating Relays, Standard Installation



In the OFF state (standard installation), the control switch is open, the alternating relay is in the LOAD A position, and both loads (M1 and M2) are off. When the control switch closes, it energizes the first load (M1). The red LED marked "LOAD A" glows. As long as the control switch remains closed, M1 remains energized.

When the control switch opens, the first load (M1) is turned off and the alternating relay toggles to the LOAD B position. When the control switch closes again, it energizes the second load (M2). The red LED marked "LOAD B" glows.

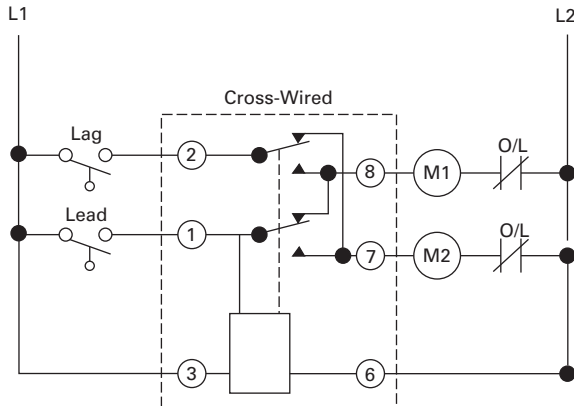
Typical Installations for SPDT and DPDT Alternating Relays, Anti-Bounce Installation



When the control switch opens, the second load (M2) is turned off, the alternating relay toggles back to the LOAD A position, and the process can be repeated again. On relays with DPDT contacts, two pilot lights can be used for remote indication of LOAD A or LOAD B status.

To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

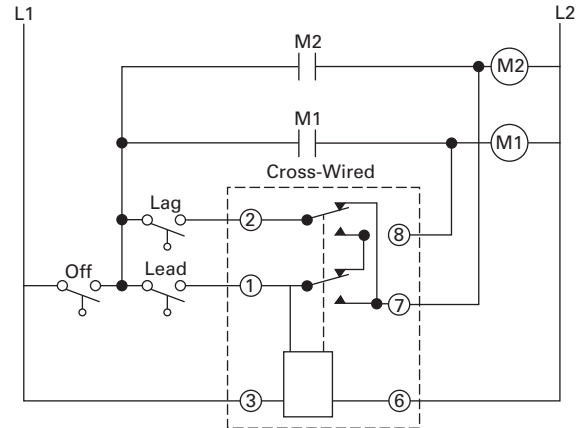
Typical Installations for DPDT Cross-Wired Alternating Relays, Standard Installation



In the OFF state, both the LEAD control switch and the LAG control switch are open, the alternating relay is in the LOAD A position, and both loads are off. When the LEAD control switch closes, it energizes the first load (M1). The red LED marked "LOAD A" glows. As long as the LEAD control switch remains closed, M1 remains energized. If the LAG control switch closes, it energizes the second load (M2).

When the LAG control switch opens, the second load (M2) is turned off. When the LEAD control switch opens, the first load (M1) is turned off and the alternating relay toggles to the LOAD B position.

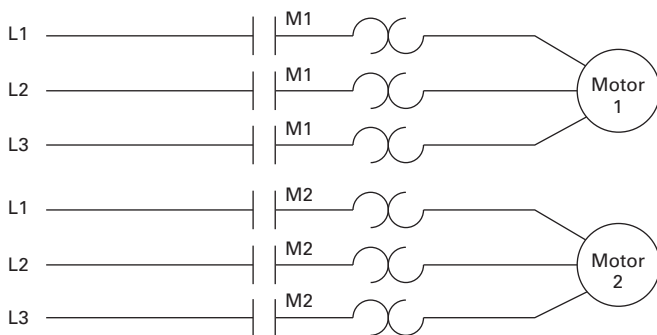
Typical Installations for DPDT Cross-Wired Alternating Relays, Anti-Bounce Installation



When the LEAD control switch closes, it turns on the second load (M2). The red LED marked "LOAD B" glows. If the LAG control switch closes, it will energize the first load (M1). When the LAG control switch opens, the first load (M1) is turned off. When the LEAD control switch opens, the second load (M2) is turned off, the alternating relay toggles back to the LOAD A position, and the process can be repeated again.

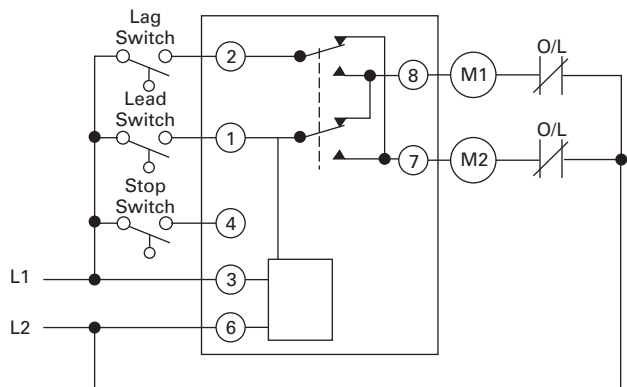
To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

Typical Installations for DPDT Cross-Wired Relays for Three-Switch Applications



In the OFF state, all three switches are open, the alternating relay is in the LOAD A position, and both loads are off. No action happens with the alternating relay or either load when the STOP switch closes. When the LEAD switch closes, Load #1 (M1) turns on. When the LAG switch closes, Load #2 (M2) turns on. Both loads remain on as long as all three switches are closed.

When the LAG switch opens, Load #2 (M2) remains on because the STOP switch is still closed. When the LEAD switch opens, Load #1 (M1) remains on because the STOP switch is still closed. When the STOP switch opens, both Load #1 (M1) and Load #2 (M2) are turned off simultaneously.



The alternating relay toggles to the LOAD B position. The entire cycle is then repeated, but with Load #2 (M2) energized first followed by Load #1 (M1). This type of operation is known as "Sequence On-Simultaneously Off (S.O.S.O.)"—the two loads are energized sequentially, but remain on together until the STOP switch is opened.

If both the STOP switch and LEAD switch fail to close and turn on the first load, both loads will be turned on simultaneously when the LAG switch is closed.

3.9

Control Relays and Timers

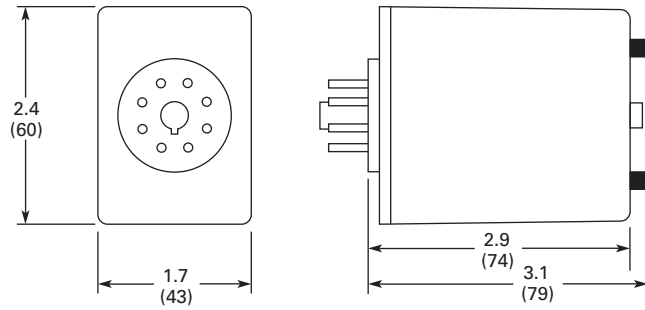
Alternating Relays

Dimensions

Approximate Dimensions in Inches (mm)

D85 Series—Alternating Relays

3



Safety Relays



Product Description

Safety relays are intended to reliably monitor the signals from safety devices at all times and switch off quickly and reliably in an emergency. Single-channel and dual channel versions are available for the construction of safety applications. The internal logic of the safety relays monitors the safety circuits (emergency stop, guard door, and so on) and activates the enable paths in a fault-free condition. Upon actuation of the safety device or in the event of a fault, the enable paths are switched off. Any faults that occur in the control circuit, such as ground fault, cross connection fault or wire breakage are also detected.

Application Description

Eaton's ESR5 safety relays provide optimal safety and a high degree of reliability on plant machinery. Applications that meet the highest safety requirements in accordance with EN 954-1, EN ISO 13849-1 up to PL e and accordance with IEC 62061 up to SILCL 3 can be realized with the ESR5 safety relay.

Compatible with a wide variety of safety devices:

- Emergency stops
- Rope pulls
- Two-hand control stations
- Light curtain (OSSD)
- Gate enable device
- Safety switches

Contents

Description

Safety Relays

| | <i>Page</i> |
|---|-------------|
| Product Selection | V7-T3-194 |
| Technical Data and Specifications | V7-T3-195 |
| Dimensions | V7-T3-198 |

Features

- Use for the highest safety requirements in accordance with EN 954-1, EN ISO 13849-1, IEC 62061 and EC 61508
- Suitable for the world market with UL, cUL certifications and TÜV Rhineland functional safety certifications
- Applicable for EN 60204 stop categories 0 or 1
- Plug-in screw terminals for fast and fault-free replacement
- Multi-voltage versions (24–230 Vac/Vdc) for a flexible range of application
- Delayed and non-delayed contact expansions accommodate a wide variety of applications

Standards and Certifications

- UL 508; CSA C22.2 No 14-95; CE Marked
- UL/cUL file number: E29184
- Degree of protection: IP20
- TÜV Rhineland certified
- UL/cULus listed



Product Selection

Safety Relays

Technical Overview

3



| Single Channel | Dual Channel | Safety Output (NO) | Safety Output (NO) (Delayed) | Output Delay | Signal Output (NC) | Feedback Output | Control Voltage | Removable Terminal Blocks | Type of Unit | Catalog Number |
|----------------|--------------|--------------------|------------------------------|--------------|--------------------|-----------------|-----------------|---------------------------|--------------|---------------------|
| ■ | — | 4 | — | — | 1 | — | 24 Vac/Vdc | ■ | Main | ESR5-NO-41-24VAC-DC |
| ■ | ■ | 2 | — | — | 1 | — | 24 Vac/Vdc | ■ | Main | ESR5-NO-21-24VAC-DC |
| ■ | ■ | 3 | — | — | 1 | — | 24 Vac/Vdc | ■ | Main | ESR5-NO-31-24VAC-DC |
| ■ | ■ | 3 | — | — | 1 | — | 230 Vac | ■ | Main | ESR5-NO-31-230VAC |
| ■ | ■ | 3 | — | — | 1 | — | 24–230 Vac/Vdc | ■ | Main | ESR5-NO-31-AC-DC |
| ■ | ■ | 2 | 2 | 0.1–30s | — | — | 24 Vdc | ■ | Main | ESR5-NV3-30 |
| — | ■ | 2 | — | — | 1 | — | 24 Vac/Vdc | ■ | Main | ESR5-NZ-21-24VAC-DC |
| ■ | — | 5 | — | — | 1 | 1 | 24 Vac/Vdc | ■ | Expansion | ESR5-NE-51-24VAC-DC |
| ■ | — | — | 4 | 0.3–3s | 1 | 1 | 24 Vdc | ■ | Expansion | ESR5-VE3-42 |

Application Overview

| Emergency Stop | Safety Switches | Light Curtain/OSSD ① | Two-Hand Control (EN 574 Type III C) | Contact Expansion | Off-Delayed | Cross Circuit Recognition | Monitored Manual Reset ② | Catalog Number |
|----------------|-----------------|----------------------|--------------------------------------|-------------------|-------------|---------------------------|--------------------------|---------------------|
| ■ | ■ | — | — | — | — | — | — | ESR5-NO-41-24VAC-DC |
| ■ | ■ | — | — | — | — | ■ | — | ESR5-NO-21-24VAC-DC |
| ■ | ■ | — | — | — | — | ■ | — | ESR5-NO-31-24VAC-DC |
| ■ | ■ | — | — | — | — | ■ | ■ | ESR5-NO-31-230VAC |
| ■ | ■ | — | — | — | — | ■ | ■ | ESR5-NO-31-AC-DC |
| ■ | ■ | ■ | — | — | ■ | ■ | ■ | ESR5-NV3-30 |
| — | ■ | — | ■ | — | — | ■ | — | ESR5-NZ-21-24VAC-DC |
| — | — | — | — | ■ | — | — | — | ESR5-NE-51-24VAC-DC |
| — | — | — | — | ■ | ■ | — | — | ESR5-VE3-42 |

Application Overview, continued

| Single Channel | Dual Channel | Stop Category EN 60204 | Control Category to EN 954-1 | Achievable PL per ISO 13849-1 | Achievable SIL per EN IEC 62061 | Catalog Number |
|----------------|--------------|------------------------|------------------------------|-------------------------------|---------------------------------|---------------------|
| ■ | — | 0 | 2 | PL d | SIL 3 | ESR5-NO-41-24VAC-DC |
| ■ | ■ | 0 | 4 | PL e | SIL 3 | ESR5-NO-21-24VAC-DC |
| ■ | ■ | 0 | 4 | PL e | SIL 3 | ESR5-NO-31-24VAC-DC |
| ■ | ■ | 0 | 4 | PL e | SIL 3 | ESR5-NO-31-230VAC |
| ■ | ■ | 0 | 4 | PL e | SIL 3 | ESR5-NO-31-AC-DC |
| ■ | ■ | 0/1 | 4 | PL e | SIL 3 | ESR5-NV3-30 |
| — | ■ | 0 | 4 | PL e | SIL 3 | ESR5-NZ-21-24VAC-DC |
| ■ | — | 0 | 4 | PL e | SIL 3 | ESR5-NE-51-24VAC-DC |
| ■ | — | 1 | 3 | PL d | SIL 2 | ESR5-VE3-42 |

Notes

- ① Laser scanners or light curtains with OSSD outputs.
- ② All main units can also be reset automatically or manually.

Technical Data and Specifications

Safety Relay

| Description | Unit | ESR5-NO-21_ | ESR5-NO-41_ | ESR5-NO-31-24VAC-DC | ESR5-NZ-21_ |
|--|-------------------|--|--|--|--|
| General | | | | | |
| Standards | | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed |
| Type-dependent standards | | — | — | — | EN 574 Part no. IIIC |
| Lifespan, mechanical—c (contacts) | x 10 ⁶ | 10 | 10 | 10 | 10 |
| Maximum operating frequency | Ops/h | 3600 | 3600 | 3600 | 3600 |
| Climatic proofing | | Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 |
| Ambient temperature | °F (°C) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) |
| Ambient temperature storage | °F (°C) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) |
| Mounting position | | Any | Any | Any | Any |
| Vibration resistance (IEC/EN 60068-2-6) | | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm |
| Shock resistance (IEC 60068-2-27) | | — | — | — | — |
| Protection type | | | | | |
| Housing | | IP20 | IP20 | IP20 | IP20 |
| Terminals | | IP20 | IP20 | IP20 | IP20 |
| Protection against direct contact when actuated from front (IEC 0106 Part 100) | | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof |
| Weight | kg | 0.17 | 0.22 | 0.17 | 0.22 |
| Terminal capacity | | | | | |
| Solid or flexible | mm ² | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) |
| Flexible with ferrule | mm ² | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) |
| Solid or stranded | AWG | 24–12 | 24–12 | 24–12 | 24–12 |
| Terminal screw | | | | | |
| Pozidriv screwdriver | Size | 2 | 2 | 2 | 2 |
| Flat-blade screwdriver | mm | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 |
| Max. tightening torque | Nm | 0.6 | 0.6 | 0.6 | 0.6 |
| Main Contacts | | | | | |
| Rated impulse withstand voltage—U _{imp} | Vac | 6000 | 4000 | 4000 | 6000 |
| Overvoltage category/pollution degree | | | | | |
| Outside | | III/2 | III/2 | III/2 | III/2 |
| Inside | | — | — | — | — |
| Rated insulation voltage—U _i | Vac | 250 | 250 | 250 | 250 |
| Rated operating voltage—U _e | Vac | 230 | 230 | 230 | 230 |
| Rated operation current | | | | | |
| AC-15 | | | | | |
| 230 V (360 ops./h)—I _e | A | 5 | 4 | 5 | 4 |
| 230 V (3600 ops./h)—I _e | A | 3 | 3 | 3 | 3 |
| DC-13 | | | | | |
| 24 V (360 ops./h)—I _e | A | 6 | 4 | 6 | 4 |
| 24 V (3600 ops./h)—I _e | A | 3 | 2.5 | 3 | 2.5 |
| Max. summation current of all poles | | | | | |
| 24 Vac/Vdc devices | A | 72 | 72 | 72 | 72 |
| 230 Vac devices | A | — | — | — | — |
| Square of the total current (and total current) of all current paths | | 72 A ² (6 + 6) | 72 A ² (4.2 + 4.2 + 4.2 + 4.2) | 72 A ² (4.9 + 4.9 + 4.9) | 72 A ² (6 + 6) |
| Short-circuit protection | | | | | |
| Max. fuse | A gG/gL | 10 | 6 | 10 | 6 |

3.10

Control Relays and Timers

Safety Relays

Safety Relay, continued

| Description | Unit | ESR5-N0-21_ | ESR5-N0-41_ | ESR5-N0-31-24VAC-DC | ESR5-NZ-21_ |
|--|-------|--|---------------------------|--|---------------------------|
| Power Supply Circuit | | | | | |
| Actuating voltage 50/60 Hz | Vac | 24 | 24 | 24 | 24 |
| Actuating voltage— U_s | Vdc | 24 | 24 | 24 | 24 |
| Voltage tolerance pick-up voltage | x_e | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 |
| Power consumption | | | | | |
| AC operated 50/60 Hz | VA | — | — | — | — |
| AC operated 50/60 Hz | W | 3.4 | 3.4 | 3.4 | 3 |
| DC operated | W | 1.6 | 1.6 | 1.6 | 1.5 |
| Fuse for control circuit supply | | | | | |
| 24 V | | Short-circuit proof | Short-circuit proof | Short-circuit proof | Short-circuit proof |
| 115/230 V | | — | — | — | — |
| Control Circuit | | | | | |
| Rated output voltage | Vdc | 24 | 24 | 24 | 24 |
| Rated operational current | mA | S12, S22: 30, S34: 45 | S12: 65, S34: 40 | S12, S22: 30, S34: 45 | S11, S21: 60, Y2: 45 |
| Resistance—R | | 50 | 22 | 50 | 22 |
| Short-circuit current | A | 2.3 | 2.3 | 2.3 | 2.3 |
| Response time | ms | 100 | 65 | 100 | 50 |
| Recovery time | ms | — | — | — | — |
| Response time with reset monitoring— t_{A1} | ms | — | — | — | — |
| Response time without reset monitoring— t_{A2} | ms | 100 | 65 | 100 | 50 |
| Reset time— t_R/t_{R1} | ms | Single-channel 45; dual-channel 10 | 45 | Single-channel 45; dual-channel 10 | 20 |
| Minimum on duration— t_M | ms | — | — | — | — |
| Recovery time— t_W | ms | Approx. 1000 | Approx. 1000 | Approx. 1000 | Approx. 1000 |
| Synchronous monitoring time— t_S | ms | — | — | — | 500 |
| Electromagnetic Compatibility (EMC) | | | | | |
| Emitted interference | | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 |
| Interference immunity | | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 |

Safety Relay, continued

| Description | Unit | ESR5-NO-31-230VAC | ESR5-NO-31-24V-230VAC-DC | ESR5-NV3_ | ESR5-VE3_ | ESR5-NE-51_ |
|--|-------------------|--|--|--|--|--|
| General | | | | | | |
| Standards | | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed |
| Type-dependent standards | | EN 60204 (if applicable) | EN 60204 (if applicable) | EN 60204 (if applicable) | — | — |
| Lifespan, mechanical—c (contacts) | x 10 ⁶ | 10 | 10 | 10 | 10 | 10 |
| Maximum operating frequency | Ops/h | 3600 | 3600 | 3600 | 900 | 3600 |
| Climatic proofing | | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Cold in accordance with: EN 60068-2-1, dry heat in accordance with EN 60068-2-2, humidity storage test in accordance with 60068-2-78 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 |
| Ambient temperature | °F (°C) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) | −4 ° to 131 ° (−20 ° to 55 °) |
| Ambient temperature storage | °F (°C) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) | −13 ° to 167 ° (−25 ° to 75 °) |
| Mounting position | | Any | Any | Any | Any | Any |
| Vibration resistance (IEC/EN 60068-2-6) | | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm |
| Shock resistance (IEC 60068-2-27) | | — | — | — | — | — |
| Protection type | | | | | | |
| Housing | | IP40 | IP40 | IP20 | IP20 | IP20 |
| Terminals | | IP20 | IP20 | IP20 | IP20 | IP20 |
| Protection against direct contact when actuated from front (IEC 0106 Part 100) | | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof |
| Weight | kg | 0.3 | 0.3 | 0.17 | 0.17 | 0.22 |
| Terminal capacity | | | | | | |
| Solid or flexible | mm ² | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) | 1 x (0.2–2.5) 2 x (0.2–1) |
| Flexible with ferrule | mm ² | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) | 1 x (0.25–2.5) 2 x (0.25–1) |
| Solid or stranded | AWG | 24–12 | 24–12 | 24–12 | 24–12 | 24–12 |
| Terminal screw | | | | | | |
| Pozidriv screwdriver | Size | 2 | 2 | 2 | 2 | 2 |
| Flat-blade screwdriver | mm | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 |
| Max. tightening torque | Nm | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Main Contacts | | | | | | |
| Rated impulse withstand voltage—U _{imp} | Vac | 6000 | 6000 | 4000 | 4000 | 4000 |
| Overvoltage category/pollution degree | | | | | | |
| Outside | | III/2 | III/2 | III/2 | III/2 | III/2 |
| Inside | | — | — | — | — | — |
| Rated insulation voltage—U _i | Vac | 250 | 250 | 250 | 250 | 250 |
| Rated operating voltage—U _e | Vac | 230 | 230 | 230 | 230 | 230 |
| Rated operation current | | | | | | |
| AC-15 | | | | | | |
| 230 V (360 ops./h)—I _e | A | 4 | 4 | — | 5 | 4 |
| 230 V (3600 ops./h)—I _e | A | 3 | 3 | 3 | 3 | 3 |
| DC-13 | | | | | | |
| 24 V (360 ops./h)—I _e | A | 4 | 4 | — | 6 | 4 |
| 24 V (3600 ops./h)—I _e | A | 2.5 | 2.5 | 3 | 3 | 2.5 |
| Max. summation current of all poles | | | | | | |
| 24 Vac/Vdc devices | A | 50 | 50 | 49 | 50 | 50 |
| 230 Vac devices | A | 50 | 50 | — | — | — |
| Square of the total current (and total current) of all current paths | | 50 A ² (4 + 4 + 4) | 50 A ² (4 + 4 + 4) | 50 A ² (4 + 4 + 4) | 49 A ² (3.5 + 3.5 + 3.5 + 3.5) | 50 A ² (3.7 + 3.7 + 3.7 + 3.7) |
| Short-circuit protection | | | | | | |
| Max. fuse | A gG/gL | 6 | 6 | 10 | 10 | 6 |

3.10

Control Relays and Timers

Safety Relays

3

Safety Relay, continued

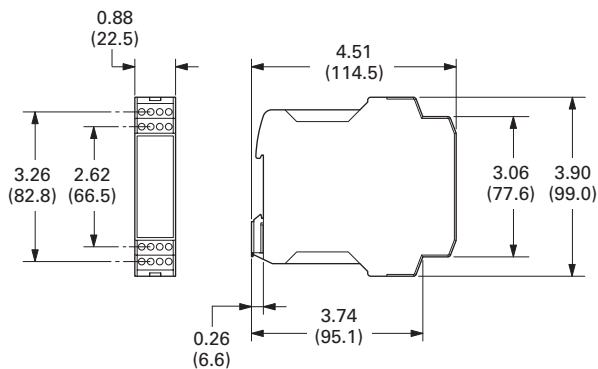
| Description | Unit | ESR5-NO-31-230VAC | ESR5-NO-31-24V-230 VAC-DC | ESR5-NV3_ | ESR5-VE3_ | ESR5-NE-51_ |
|--|-------|---------------------------------|---------------------------------|--|---------------------------|---------------------------|
| Power Supply Circuit | | | | | | |
| Actuating voltage 50/60 Hz | Vac | 230 | 24–230 | — | — | 24 |
| Actuating voltage— U_s | Vdc | — | 230 | 24 | 24 | 24 |
| Voltage tolerance pick-up voltage | x_e | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.8–1.1 |
| Power consumption | | | | | | |
| AC operated 50/60 Hz | VA | — | — | — | — | — |
| AC operated 50/60 Hz | W | 5.8 | 5.8 | — | — | 2.2 |
| DC operated | W | 2.9 | 2.9 | 1.8 | 2 | 2.2 |
| Fuse for control circuit supply | | | | | | |
| 24 V | | — | Short-circuit proof | — | — | — |
| 115/230 V | | Short-circuit proof | Short-circuit proof | — | — | — |
| Control Circuit | | | | | | |
| Rated output voltage | Vdc | 24 | 24 | 24 | 24 | 24 |
| Rated operational current | mA | S10, S12, S22: 35, S34, S35: 45 | S10, S12, S22: 35, S34, S35: 45 | S12, S22: 3.5, S34, S35: 7 | A1, A2: 84, K1/K2: 5 | A1, A2: 92 |
| Resistance—R | | 11 | 11 | 500 | — | — |
| Short-circuit current | A | 0.7 | 0.7 | 0.1 | — | — |
| Response time | ms | 250 | 250 | 150 | 20 | 20 |
| Recovery time | ms | — | — | — | — | — |
| Response time with reset monitoring— t_{A1} | ms | 60 | 60 | 150 | 20 | 20 |
| Response time without reset monitoring— t_{A2} | ms | 250 | 250 | 150 | 20 | 20 |
| Reset time— t_R/t_{R1} | ms | 20 | 20 | 20 (non-delayed enable paths); 100 (min. delayed enable paths) | 0.3–3 s (+50%) adjustable | 20 |
| Minimum on duration— t_M | ms | — | — | — | — | — |
| Recovery time— t_W | ms | Approx. 1000 | Approx. 1000 | Approx. 330 | Approx. 1000 | — |
| Synchronous monitoring time— t_S | ms | — | — | — | — | — |
| Electromagnetic Compatibility (EMC) | | | | | | |
| Emitted interference | | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 |
| Interference immunity | | According to EN 61000-6-2 | According to EN 61000-6-2 | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 | According to EN 61000-6-2 |

Dimensions

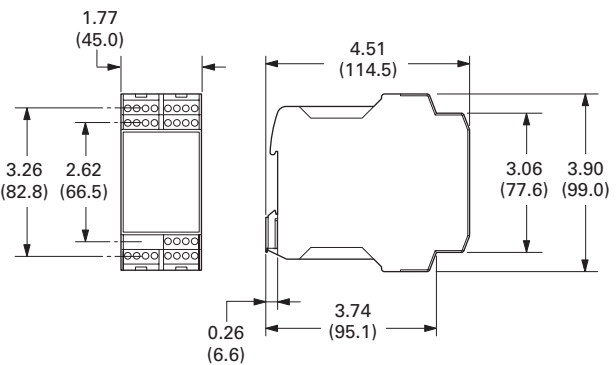
Approximate Dimensions in Inches (mm)

Safety Relays, Contact Expansion Modules

ESR5_ 24 Vac/Vdc



ESR5_ 230 Vac



easySafety



Product Description

The easySafety control relay for safety-related applications monitors all commonly used safety devices and also takes over the required control tasks for the machine. Packed with a host of conventional safety relays in the form of safety function blocks, easySafety not only features integrated safety functions but also standard functions in a single device—all in one.

In addition to the safety circuit diagram containing the safety configuration, the safety control relay also contains a standard circuit diagram. This circuit diagram can be used for standard tasks, such as the processing of diagnostics signals or general control tasks of a machine.

Application Description

Because of the large number of safety function blocks, the user can tackle a large number of application options with only one device. The user can also respond directly to future and changing application requirements. This saves financial resources and offers future investment security. Last but not least, it reduces the stock-keeping required for special safety relays. The easySafety meets the requirements of Category 4 to EN 954-1, PL e to EN ISO 13849-1, SILCL 3 to EN IEC 62061 and SIL 3 to EN IEC 61508. With easySafety, it is possible to implement applications meeting the most stringent safety requirements.

Contents

| Description | Page |
|-----------------------------------|-----------|
| easySafety | |
| Product Selection | V7-T3-200 |
| Accessories | V7-T3-200 |
| Technical Data and Specifications | V7-T3-201 |
| Dimensions | V7-T3-204 |

Features

Safety function blocks:

- Emergency stop
- Guard door monitoring with and without interlock/guard locking
- Two-hand control (EN 574)
- Electro-sensitive protective devices (light curtains)
- Light curtain muting
- Enable switch
- Start device
- Operating mode selector
- Safety timing relay
- Overspeed monitoring
- Feedback loop monitoring (EDM)
- Zero speed monitoring

- All-in-one: Safety and control functions combined in one device
- Simple configuration through prefabricated and tested safety components
- Direct state display and increased machine availability due to fast error diagnosis through integrated display
- Multistep password concept prevents unwanted manipulation

Standards and Certifications

- Product standards: CE marked; UL 508; CSA C22.20.4-04; CSA 22.2 No. 142-M11987
- UL CCN: NRAQ
- CSA File No. 012528
- CSA Class No. 2252-81 and 2252-01
- TÜV Rhineland certified
- Degree of Protection IEC: IP20



Product Selection

easySafety

easySafety Relays ①



| Inputs (Safety) Digital | Outputs (Safety) 6 A Relay | Outputs (Safety) Transistor | Outputs (Safety) Test Signal | Display + Keypad | Catalog Number |
|----------------------------|-------------------------------|--------------------------------|---------------------------------|---------------------|-----------------------|
| 14 | 1 (redundant) | 4 | 4 | — | ES4P-221-DMXX1 |
| 14 | 1 (redundant) | 4 | 4 | Yes | ES4P-221-DMXD1 |
| 14 | 4 | — | 4 | — | ES4P-221-DRXX1 |
| 14 | 4 | — | 4 | Yes | ES4P-221-DRXD1 |

Accessories

easySoft



Programming Software

| Description | Catalog Number |
|--|-----------------|
| easySoft-Safety (including easySoftPro) ② | ESP-SOFT |

Memory Card



Memory Card

| Description | Catalog Number |
|---------------|-----------------------|
| 256 kB module | ES4A-MEM-CARD1 |

Programming Cables

| Description | Catalog Number |
|------------------------------|-----------------------|
| SUB-D, nine-pole, serial, 2m | EASY800-PC-CAB |

SUB-D Cable

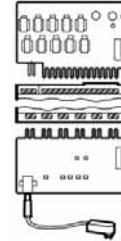


| Description | Catalog Number |
|-------------|------------------------|
| USB, 2m | EASY800-USB-CAB |

USB Cable



Input/Output Simulator



Input/Output Simulator

| Description | Catalog Number |
|--|-------------------------|
| With plug-in power supply unit 100–240 Vac/24 Vdc | ES4A-221-DMX-SIM |

Notes

- ① EN 954-1: 1996, Category 4.
EN ISO 13849-1: 2006, PL e (Performance Level).
IEC 61508: 1998, SIL 3 (Safety Integrity Level).
IEC 62061: 2005, SILCL 3 (Safety Integrity Level Claim Limit).
Expandable: standard inputs/outputs and standard bus systems.
24 Vdc supply voltage.
- ② Operating systems:
Windows® 2000 SP4, Windows XP SP1, Windows Vista (32 bit).

Technical Data and Specifications

easySafety Relay

| Description | Unit | ES4P_ |
|---|-----------------|---|
| General | | |
| Standards | | EN 55011, EN 55022, IEC/EN 61000-4, IEC 60068-2-6, IEC 60068-2-27, EN 954-1: Category 4, EN ISO 13849-1: PL e, EN IEC 62061: SILCL 3, EN IEC 61508: SIL 3 |
| Dimensions (W x H x D) | mm | 107.5 (6 space units) x 90 x 72 |
| Mounting | | Top-hat rail IEC/EN 60715, 35 mm or screw fixing using fixing brackets ZB4-101-GF1 (accessories) |
| Times | | |
| Inputs | | |
| Maximum duration of external test pulse | ms | 1 |
| Semi-conductor output | | |
| Off test pulse | ms | <1 |
| Switch-off delay | ms | <0.15 |
| Terminal Capacity | | |
| Solid | mm ² | 0.2–4 (AWG 22–12) |
| Flexible with ferrule | mm ² | 0.2–2.5 (AWG 22–12) |
| Standard screwdriver | mm | 3.5 x 0.8 |
| Maximum tightening torque | Nm | 0.6 |
| Ambient Climatic Conditions | | |
| Operating ambient temperature | °C | –25 to +55, low temperatures to IEC 60068-2-1, high temperatures to IEC 60068-2-2 |
| Condensation | | Prevent condensation by means of suitable measures |
| LCD display (clearly legible) | °C | 0 to +55 |
| Storage | °C | –40 to +70 |
| Relative humidity, noncondensing (IEC/EN 60068-2-30) | % | 5 to 95 |
| Air pressure (in operation) | hPa | 795 to 1080 |
| Ambient Mechanical Conditions | | |
| Protection type, IEC/EN 60529 | | IP20 |
| Vibrations (IEC/EN 60068-2-6) | | |
| Constant amplitude 0.15 mm | Hz | 10 to 57 |
| Constant acceleration, 2g | Hz | 57 to 150 |
| Mechanical shock resistance (IEC/EN 60068-2-27) semi-sinusoidal 15g/11 ms | Shocks | 18 |
| Drop to IEC/EN 60068-2-31 | Drop | mm |
| Mounting position | | Horizontal/vertical |
| Electromagnetic Compatibility (EMC) According to IEC/EN 61000-6-2 | | |
| Electrostatic discharge (IEC/EN 61000-4-2, Level 3, ESD) | | |
| Air discharge | kV | 8 |
| Contact discharge | kV | 6 |
| Radio interference suppression (EN 55011) | | EN 55011 Class B, EN 55022 Class B |
| Power pulses (surge) (IEC/EN 61000-4-5, Level 2) | kV | 1 (supply cables, symmetrical) |
| Insulation Resistance | | |
| Overvoltage category/pollution degree | | III/2 |
| Clearance in air and creepage distances | | EN 50178, UL 508, CSA C22.2, No. 142, EN 60664-1:2003 |
| Insulation resistance | | EN 50178 |
| Backup/Accuracy of the Real-Time Clock | | |
| Accuracy of the real-time clock | s/day | Normally ±5 (±0.5 h/year) |
| Repetition Accuracy of Timing Relays in Standard Circuit | | |
| Accuracy of timing relay (of value) | % | ±0.02 |
| Resolution | | |
| Range "S" | ms | 5 |
| Range "M:S" | s | 1 |
| Retentive Memory | | |
| Write cycles of the retentive memory (minimum) | | 10,000,000,000 (1010) (read/write cycles) |

easySafety Relay, continued

| Description | Unit | ES4P_ | |
|---|--------|-------|---|
| Power Supply | | | |
| Rated operational voltage | U_e | V | 24 Vdc (-15/+20%) |
| Permissible range | | Vdc | 20.4 to 28.8 |
| Ripple | | % | ≤ 5 |
| Interfaces | | | |
| EASyNet (CAN-based) | | | |
| Bus termination (first and last station) | | | Yes |
| Control operating mode EASyNet | | | |
| Number of users | | | Maximum 8 |
| NET Network | | | |
| Stations | Number | | Maximum 8 |
| Data transfer rate/distance | | | 1000 Kbit/s, 6m 500 Kbit/s, 25m 250 Kbit/s, 60m 125 Kbit/s, 125m 50 Kbit/s, 300m 20 Kbit/s, 700m 10 Kbit/s, 1000m Bus lengths greater than 40m can only be achieved with enhanced cross-section conductors and terminal adapters |
| Potential isolation | | | |
| From power supply | | | Yes |
| From the inputs | | | Yes |
| From the outputs | | | Yes |
| From the PC interface, memory card, NET network, EASYLink | | | Yes |
| Bus termination (first and last station) | | | Yes |
| Terminal type | | | RJ45 |
| Digital Inputs 24 Vdc | | | |
| Number | | | 14 |
| Inputs can be used as analog inputs | | | — |
| Status display | | | LCD display (if provided) |
| Potential isolation | | | |
| From power supply | | | No |
| Between digital inputs | | | No |
| From the outputs | | | Yes |
| From PC interface, memory card, EASYLink | | | No |
| From network EASyNet | | | Yes |
| Rated operational voltage | U_e | Vdc | 24 |
| At signal "0" | U_e | Vdc | <5 |
| At signal "1" | U_e | Vdc | >15 |
| Clock Outputs | | | |
| Number | | | 4 |
| Voltage | | Vdc | 24 |
| Electrical isolation | | | No |

easySafety Relay, continued

| Description | Unit | ES4P_ |
|---|---------------|--|
| Relay Outputs | | |
| Number | | 4 for ES4P-...-DR_, 1 redundant for ES4P-...-DM_ |
| Outputs in groups of | | 1 |
| Parallel switching of outputs to increase power | | Not permissible |
| Protection of an output relay | | Fuse: 6 A gG, circuit breaker with characteristic C: 24 Vdc 4 A, Short-circuit current <250 A |
| Potential isolation | | |
| From power supply | | Yes |
| From the inputs | | Yes |
| From PC interface, memory card, EASYNet, EASYLink | | Yes |
| Safe isolation according to EN 50178 | Vac | 300 |
| Basic insulation | Vac | 600 |
| Lifespan, mechanical | Operations | $\times 10^6$ 10 |
| Contacts | | |
| Conventional thermal current | A | 6 |
| Rated impulse withstand voltage U_{imp} contact coil | kV | 6 |
| Rated operational voltage | U_e | Vac 250 |
| Rated insulation voltage | U_i | Vac 250 |
| Safe isolation to EN 50178 between coil and contact | Vac | 300 |
| Making capacity | | |
| AC-15, 230 Vac, 3 A | Operations | 80,000 |
| DC-13, 24 Vdc, 5 A, 0.1 Hz | Operations | 40,000 |
| Switching frequency | | |
| Mechanical operations | $\times 10^6$ | 10 |
| Switching frequency | Hz | 10 |
| UL/CSA | | |
| UL 508 | | B300/R300 |
| Transistor Outputs | | |
| Number | | 4 |
| Rated operational voltage | U_e | Vdc 24 |
| Permissible range | U_e | Vdc 20.4–28.8 |
| Ripple | % | ≤ 5 |
| Protection against polarity reversal | | Yes (Caution: A short-circuit will result if 0 V or GND is applied to the outputs in the event that the supply voltage is connected to the wrong poles.) |
| Potential isolation | | |
| From power supply | | Yes |
| From the inputs | | Yes |
| From PC interface, memory card, network, EASYNet, EASYLink | | Yes |
| Rated operational current at signal "1" DC | I_e | A Maximum 0.5 |
| At signal "1" with $I_e = 0.5$ A | | V $U = U_e - 1$ V |
| Short-circuit protection | | Yes, thermal |
| Short-circuit tripping current for $R_A \leq 10$ m ohms | A | $0.7 \leq I_e \leq 2$ per output |
| Total short-circuit current | A | 8 |
| Peak short-circuit current | A | 16 |
| Thermal cutout | | Yes |
| Maximum operating frequency at constant resistive load $R_L < 100$ k Ω (dependant on program and load) | Ops/h | 40,000 |
| Parallel connection of outputs | | No |
| Status indication of the outputs | | LCD display (if provided) |
| Inductive load | | |
| Without external suppressor circuit | | |
| Duty factor | | $T_{0.95} = 3 \times T_{0.65} = 3 \times L/R$ $T_{0.95}$ = Time in ms, until 95% of the steady-state current has been reached |
| With external suppressor circuit | | |
| Utilization factor | g | 1 |
| Duty factor | % DF | 100 |
| Maximum switching frequency, maximum duty factor | Operations | Depending on the suppressor circuit |

3.11

Control Relays and Timers

easySafety

Dimensions

Approximate Dimensions in Inches (mm)

ESR5_

3

