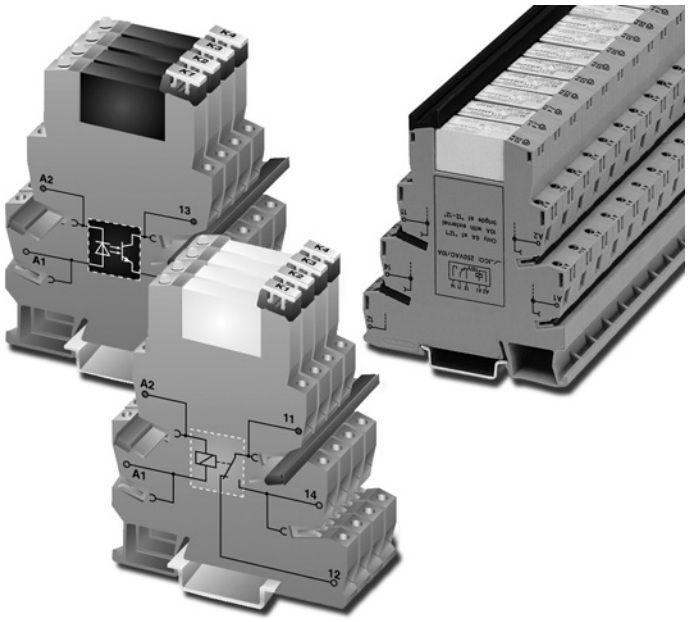
March 2006

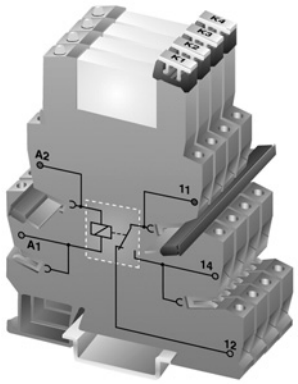
XR Series Terminal Block Relays

Contents

Note: Supplement to Publication No. CA08102001E, Tab 49.



XR Series Terminal Block Relays



Standard Terminal Block Relay

Product Description

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

Application Description

Used in automation systems, 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 12V DC to 120V AC
- Gold plated contacts available
- Equipped with a robust, miniature relay:
  - IP67 protection
  - Environmentally friendly, cadmium-free contact material
  - Easy, cost-effective installation and replacement using the engagement lever

Standards and Specifications

- $_{c}UL_{us}$ Listed
- CE

Product Selection

Table 1. Standard Terminal Block Relays Product Selection

Gold Plated Contacts	Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
1PDT Screw Connection					
No	6A	12V DC	10	**XRU1D12**	19.50
No	6A	120V AC/110V DC	10	**XRU1D120U**	26.00
Yes	6A	120V AC/110V DC	10	**XRU1D120UG**	30.50
No	6A	24V DC	10	**XRU1D24**	19.50
No	6A	24V AC/DC	10	**XRU1D24U**	22.50
Yes	6A	24V AC/DC	10	**XRU1D24UG**	26.50
1PDT Spring Cage Connection					
No	6A	12V DC	10	**XRP1D12**	24.50
No	6A	120V AC/110V DC	10	**XRP1D120U**	31.00
No	6A	24V DC	10	**XRP1D24**	24.50
No	6A	24V AC/DC	10	**XRP1D24U**	27.50
DPDT Screw Connection					
No	6A	12V DC	10	**XRU2D12**	32.00
No	6A	120V AC/110V DC	10	**XRU2D120U**	40.00
No	6A	24V DC	10	**XRU2D24**	32.00
No	6A	24V AC/DC	10	**XRU2D24U**	35.00

Table 2. Standard Replacement Relays

Gold Plated Contacts	Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
1PDT					
No	6A	12V DC	10	**XRR1D12**	9.00
No	6A	120V AC/110V DC	10	**XRR1D120U**	14.00
Yes	6A	120V AC/110V DC	10	**XRR1D120UG**	17.00
No	6A	24V DC	10	**XRR1D24**	9.00
Yes	6A	24V DC	10	**XRR1D24G**	12.00
DPDT					
No	6A	12V DC	10	**XRR2D12**	9.00
No	6A	120V AC/110V DC	10	**XRR2D120U**	14.00
No	6A	24V DC	10	**XRR2D24**	9.00

Discount Symbol **1CD1**

Technical Data and Specifications

Table 3. Standard 1PDT Screw Connection Terminal Block Relays Technical Data

Catalog Number	**XRU1D12**	**XRU1D24**	**XRU1D24U**	**XRU1D120U**
Replacement Relay	**XRR1D12**	**XRR1D24**	**XRR1D24**	**XRR1D120U**
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Connection Data				
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Input Data for 1PDT Screw Connection Versions				
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Permissible Range See **Page 6**	See **Figure 5**	See **Figure 7**	See **Figure 8**	See **Figure 6**
Typical Input Current	15.3 mA	9 mA	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
Typical Response Time	5 mS	5 mS	6 mS	6 mS
Typical Release Time	8 mS	8 mS	15 mS	15 mS
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	
Output Data				
Contact Type	1PDT			
Contact Material	AgSnO			
Max. Switching Voltage	250V AC/DC ①			
Min. Switching Voltage	12V AC/DC			
Limiting Continuous Current	6A			
Min. Switching Current	10 mA			
Min. Switching Power	120 mW			
Miscellaneous Data				
Test Voltage I/O	4 kV, 50 Hz, 1 min		4 kV	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)			
Rated Operating Mode	100% Operating Factor			
Inflammability Class	V0, in Accordance with UL 94			
Mechanical Service Life	2 x 10^7 Cycles			

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

Table 4. Standard 1PDT Screw Connection Terminal Block Relays with Gold Contacts Technical Data

Catalog Number	**XRU1D24UG**	**XRU1D120UG**
Replacement Relay	**XRR1D24G**	**XRR1D120UG**
Input Voltage	24V AC/DC	120V AC/110V DC
Connection Data		
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)	
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)	
Input Data for 1PDT Screw Connection Versions with Gold Contacts		
Input Voltage	24V AC/DC	120V AC/110V DC
Permissible Range See **Page 6**	See **Figure 8**	See **Figure 6**
Typical Input Current	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
Typical Response Time	6 mS	6 mS
Typical Release Time	15 mS	15 mS
Input Protection	Bridge Rectifier	
Output Data		
Contact Type	1PDT	
Contact Material	AgSnO, Gold Plated ②	
Max. Switching Voltage	30V AC/36V DC (250V AC/DC) ③	
Min. Switching Voltage	100 mV (12V AC/DC) ③	
Limiting Continuous Current	50 mA (6A) ③	
Min. Switching Current	1 mA (10 mA) ③	
Min. Switching Power	100 (120 mW) ③	
Miscellaneous Data		
Test Voltage I/O	4 kV, 50 Hz, 1 min	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)	-40° to 131°F (-20° to 55°C)
Rated Operating Mode	100% Operating Factor	
Inflammability Class	V0, in Accordance with UL 94	
Mechanical Service Life	2 x 10^7 Cycles	

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

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

Table 5. Standard 1PDT Spring Cage Terminal Block Relays Technical Data

Catalog Number	**XRP1D12**	**XRP1D24**	**XRP1D24U**	**XRP1D120U**
Replacement Relay	**XRR1D12**	**XRR1D24**	**XRR1D24**	**XRR1D120U**
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Connection Data				
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Input Data for 1PDT Spring Cage Versions				
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Permissible Range See **Page 6**	See **Figure 5**	See **Figure 7**	See **Figure 8**	See **Figure 6**
Typical Input Current	15.3 mA	9 mA	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
Typical Response Time	5 mS	5 mS	6 mS	6 mS
Typical Release Time	8 mS	8 mS	15 mS	15 mS
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	
Output Data				
Contact Type	1PDT			
Contact Material	AgSnO			
Max. Switching Voltage	250V AC/DC ①			
Min. Switching Voltage	12V AC/DC			
Limiting Continuous Current	6A			
Min. Switching Current	10 mA			
Min. Switching Power	120 mW			
Miscellaneous Data				
Test Voltage I/O	4 kV, 50 Hz, 1 min		4 kV	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)			-4° to 131°F (-20° to 55°C)
Rated Operating Mode	100% Operating Factor			
Inflammability Class	V0, in Accordance with UL 94			
Mechanical Service Life	2 x 10^7 Cycles			

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

Table 6. Standard DPDT Screw Connection Terminal Block Relays Technical Data

Catalog Number	**XRU2D12**	**XRU2D24**	**XRU2D24U**	**XRU2D120U**
Replacement Relay	**XRR2D12**	**XRR2D24**	**XRR2D24**	**XRR2D120U**
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Connection Data				
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Input Data				
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC / 110V DC
Permissible Range See **Page 6**	See **Figure 9**	See **Figure 11**	See **Figure 12**	See **Figure 10**
Typical Input Current	33 mA	18 mA	17.5 mA	4.5 mA (120V AC) 4.2 mA (110V DC)
Typical Response Time	8 mS	8 mS	8 mS	7 mS
Typical Release Time	10 mS			
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	
Output Data:				
Contact Type	2PDT	Single Contact, 2PDT		
Contact Material	AgNi			
Max. Switching Voltage	250V AC/DC			
Min. Switching Voltage	5V			
Limiting Continuous Current	6A			
Max. Inrush Current	15A (300 mS)			
Min. Switching Current	10 mA			
Min. Switching Power	50 mW			
General Data				
Test Voltage I/O	4 kV, 50 Hz, 1 min /2.5 kV, 50 Hz, 1 Min. (Between the PDTs)			
Ambient Temp Range	-4° to 140°F (-20° to 60°C)			
Rated Operating Mode	100% Operating Factor			
Inflammability Class	V0, in Accordance with UL 94			
Mechanical Service Life	3 x 10^7 cycles			

Dimensions

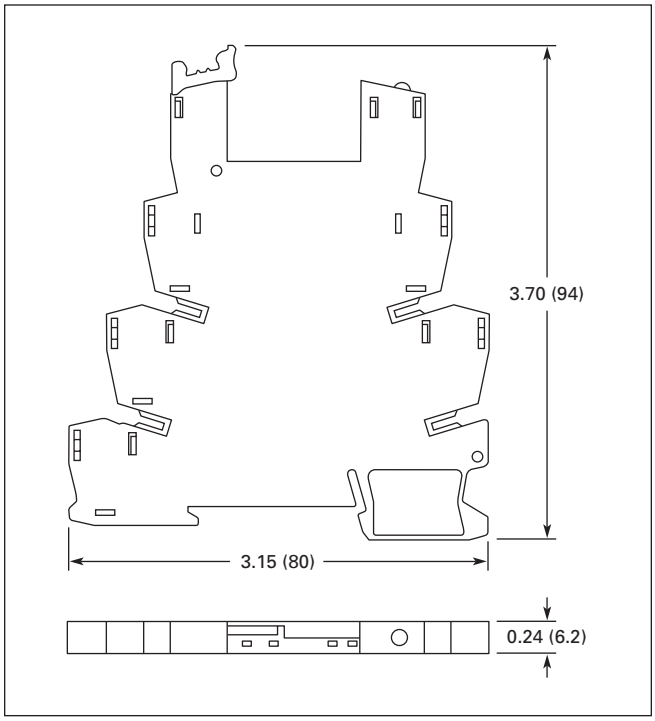


Figure 1. Standard 1PDT Terminal Block Relays — Approximate Dimensions in Inches (mm)

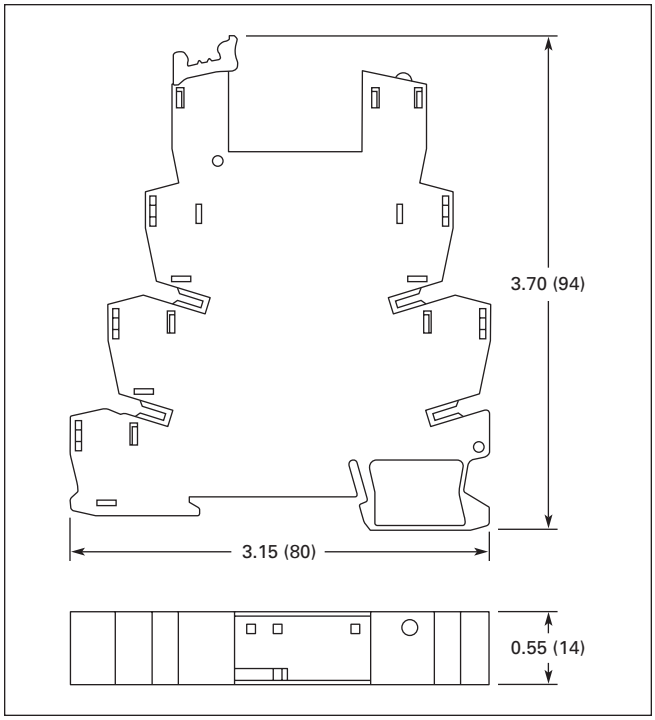


Figure 2. Standard DPDT Terminal Block Relays — Approximate Dimensions in Inches (mm)

Schematics

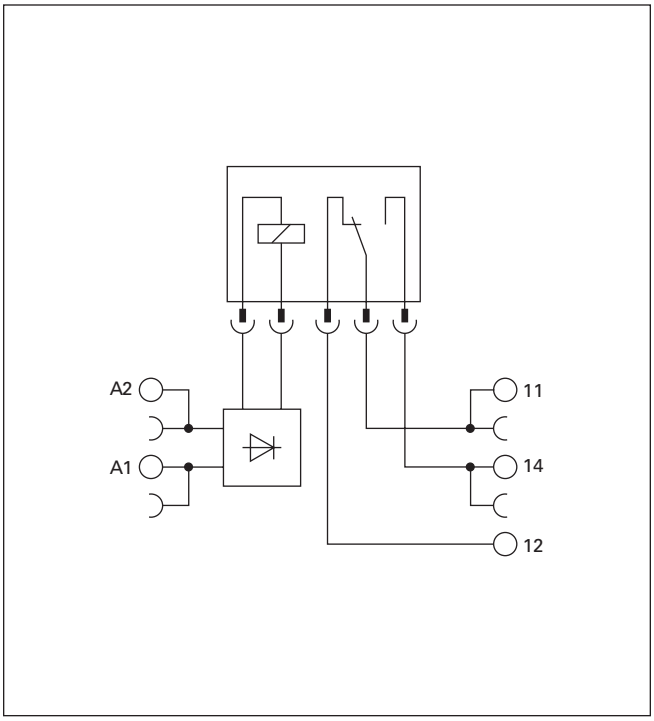


Figure 3. Schematics for 1PDT Terminal Block Relays

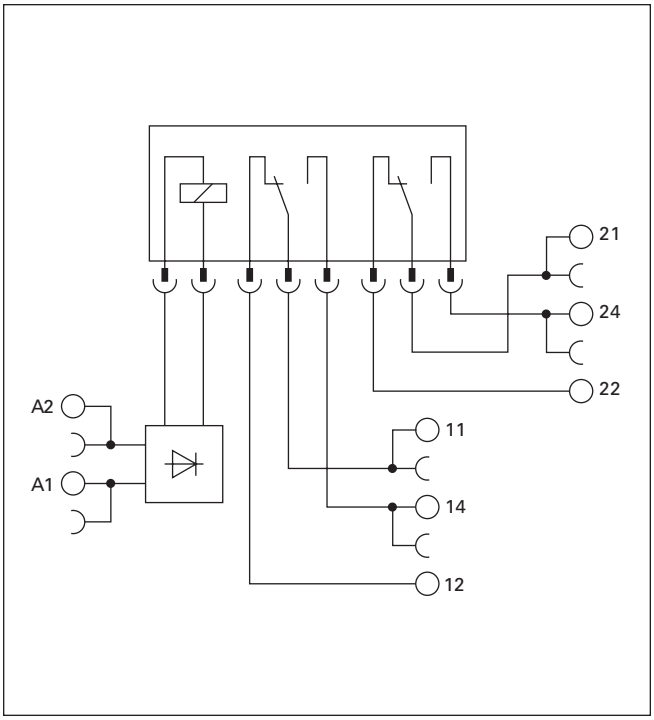


Figure 4. Schematic for DPDT Terminal Block Relays

Permissible Range Diagrams

1PDT

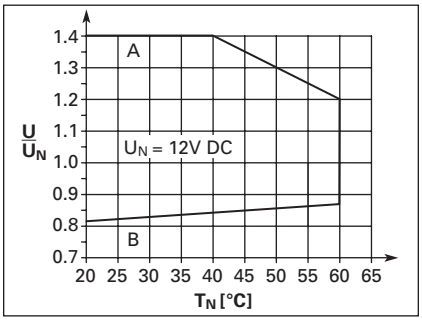


Figure 5. Operating Range Voltage for 12V DC 1PDT Relay Module

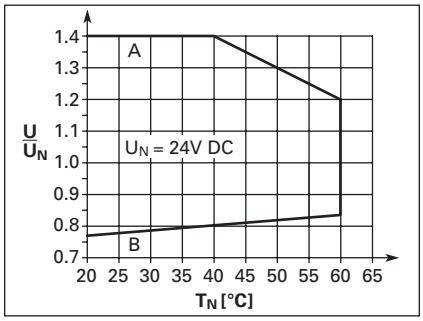


Figure 7. Operating Range Voltage for 24V DC 1PDT Relay Module

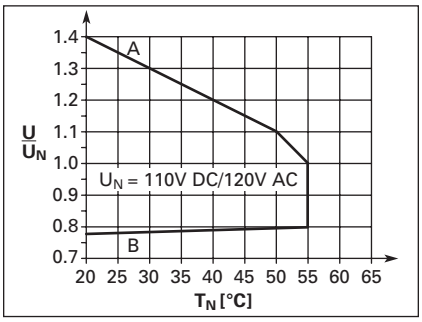


Figure 6. Operating Range Voltage for 120V AC/110V DC 1PDT Relay Module

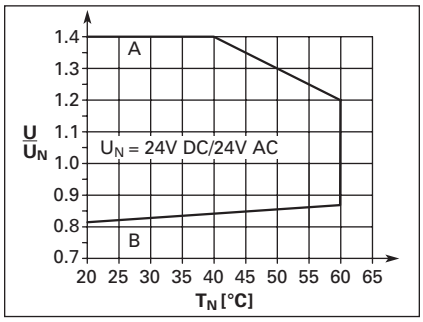


Figure 8. Operating Range Voltage for 24V AC/DC 1PDT Relay Module

DPDT

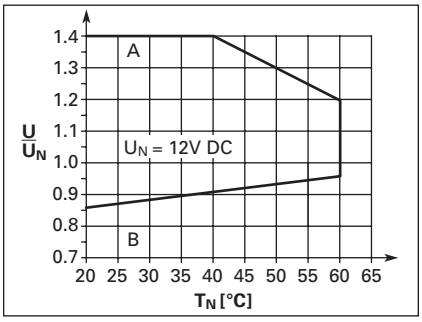


Figure 9. Operating Range Voltage for 12V DC DPDT Relay Module

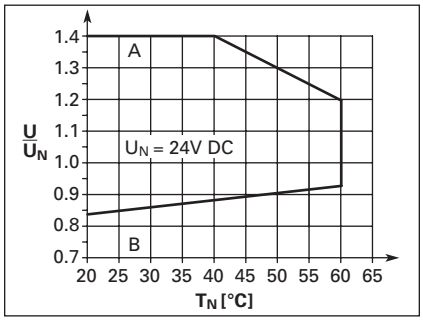


Figure 11. Operating Range Voltage for 24V DC DPDT Relay Module

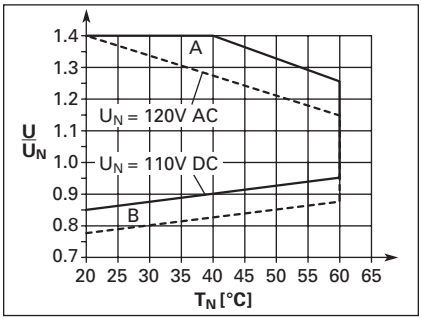


Figure 10. Operating Range Voltage for 120V AC/110V DC DPDT Relay Module

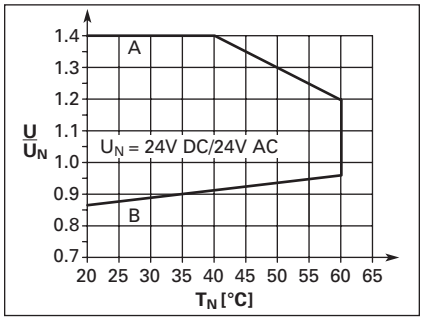


Figure 12. Operating Range Voltage for 24V AC/DC DPDT Relay Module

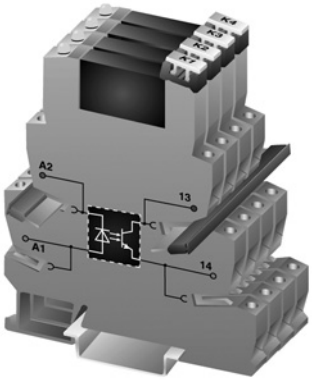
Notes:

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

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

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

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



OptoCoupler Terminal Block Relay

Product Description

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

Application Description

The ***XR*** Series OptoCoupler relays can be used as an input or output interface. They provide the typical reliability of 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 24V DC/3A
- IP67-protected optical electronics
- Wear-resistant and bounce-free switching
- Insensitive to shock and vibration
- Integrated protection circuit
- Zero voltage switch at AC output

Standards and Certifications

- $_{c}UL_{us}$ Listed
- CE

Product Selection

Table 7. OptoCoupler Terminal Block Relays Product Selection

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
2A	120V AC/110V DC	10	**XRU1S120U**	58.00
2A	24V DC	10	**XRU1S24**	55.00

Table 8. OptoCoupler Replacement Relays

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
2A	24V DC	18	**XRR1S24**	45.00
2A	120V AC/110V DC	10	**XRR1S120U**	48.00

Discount Symbol **1CD1**

Technical Data and Specifications

Table 9. Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays Technical Data

Catalog Number	**XRU1S24**	**XRU1S120U**
Replacement Relay	**XRR1S24**	**XRR1S120U**
Input Voltage	24V DC	120V AC/110V DC
Connection Data		
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)	
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)	
Input Data		
Input Voltage	24V DC	120V AC/110V DC
Permissible Range	0.8 – 1.2	0.8 – 1.1
Typical input current	9 mA	4 mA
Switching Level 1 signal (“H”)	≥ 0.8	≥ 0.8
Switching Level 0 signal (“L”)	≤ 0.4	≤ 0.25
Typical Switch-On Time	20 µS	6 mS
Typical Turn-Off Time	500 µS	10 mS
Input Protection	Polarity Protection Diode, Free-Wheeling Diode	Bridge Rectifier
Output Data		
Max. Switching Voltage	33V DC	33V DC
Min. Switching Voltage	3V DC	3V DC
Limiting Continuous Current	3A (See **Figure 13**)	
Max. Inrush Current	15A (10 mS)	
Output Circuit	2-Conductor Floating	
Output Protection	Polarity Protection, Surge Protection	
Voltage Drop at Max. Limiting Continuous Current	≤ 200 mV	
General Data		
Test Voltage I/O	2.5 kV, 50 Hz, 1 min	
Ambient Temp Range	-4° to 140°F (-20° to 60°C)	
Rated Operating Mode	100% Operating Factor	
Inflammability Class	V0, in Accordance with UL 94	
Mechanical Service Life	2 x 10^7 cycles	

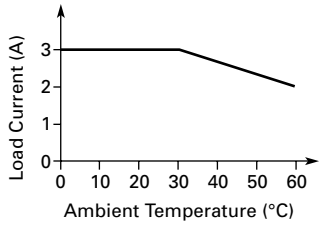


Figure 13. Derating Curve

Dimensions

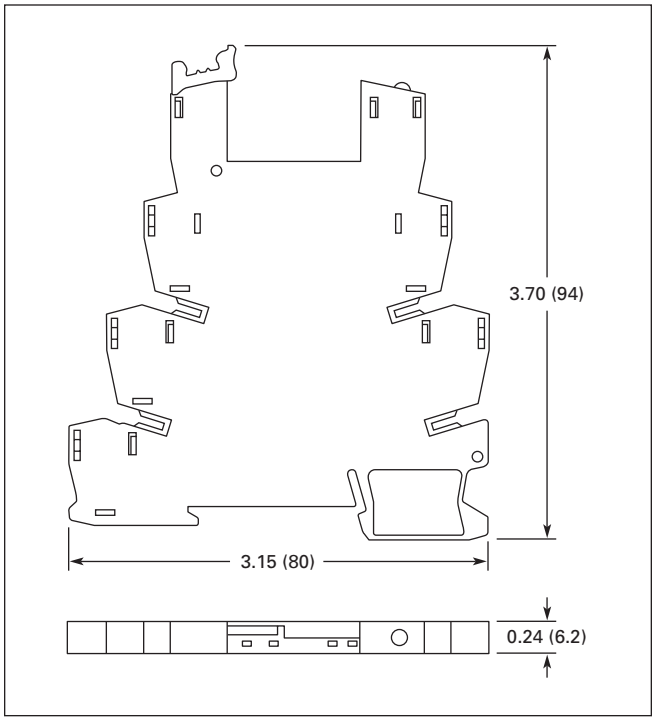


Figure 14. Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays — Approximate Dimensions in Inches (mm)

Schematic

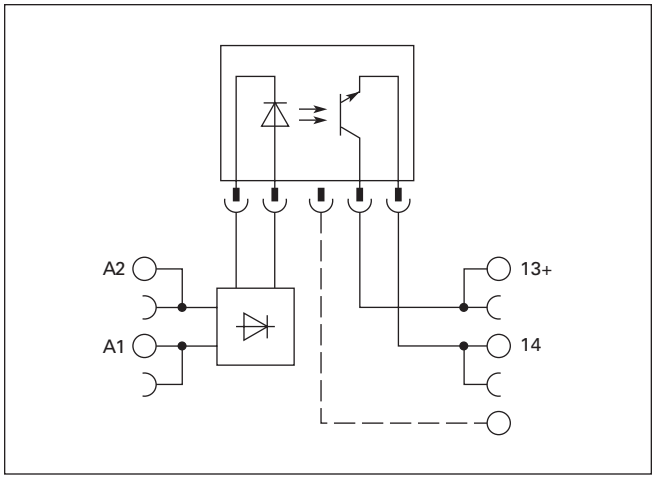
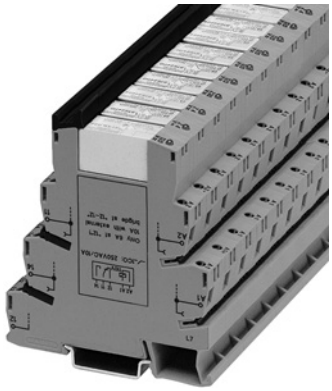


Figure 15. Schematic for Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



High Current Terminal Block Relay

Product Description

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

Application Description

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

Features

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

Standards and Certifications

- $_{c}UL_{us}$ Listed
- CE

Product Selection

Table 10. High Current Terminal Block Relays Product Selection

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
10A	12V DC	10	**XRU1H12**	28.50
10A	120V AC/110V DC	10	**XRU1H120U**	35.00
10A	24V DC	10	**XRU1H24**	28.50
10A	24V AC/DC	10	**XRU1H24U**	30.00

Table 11. High Current Replacement Relays

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. $
10A	24V DC	10	**XRR1H24**	13.00
10A	24V AC/DC	10	**XRR1H24U**	13.50
10A	12V DC	10	**XRR1H12**	13.00
10A	120V AC/110V DC	10	**XRR1H120U**	16.00

Discount Symbol **1CD1**

Technical Data and Specifications

Table 12. Information for High Current Terminal Block Relays (1PDT)

Catalog Number — Assembled Unit	**XRU1H12**	**XRU1H24**	**XRU1H24U**	**XRU1H120U**
Replacement Relay	**XRR1H12**	**XRR1H24**	**XRR1H24U**	**XRR1H120U**
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Connection Data				
Rigid Solid AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm^2)	26 – 14 (0.14 – 2.5)			
Input Data (Permissible Range — See Page 6)				
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Permissible Range See **Page 6**	See **Figure 9**	See **Figure 11**	See **Figure 12**	See **Figure 10**
Typical Input Current	33 mA	18 mA	17.5 mA	4.5 mA (120V AC)/ 4.2 mA (110V DC)
Typical Response Time	8 mS	8 mS	8 mS	7 mS
Typical Release Time	10 mS			
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	
Output Data				
Contact Type	Single Contact, 1PDT			
Contact Material	AgNi			
Max. Switching Voltage	250V AC/DC ①			
Min. Switching Voltage	12V AC/DC			
Limiting Continuous Current	10A (6)A ②			
Max. Inrush Current	30A (300 mS)			
Min. Switching Current	100 mA			
Min. Switching Power	1.2W			
Miscellaneous Data				
Test Voltage I/O	4 kV, 50 Hz, 1 min			
Ambient Temp Range	-4° to 140°F (-20° to 60°C)			
Rated Operating Mode	100% Operating Factor			
Inflammability Class	V0, in Accordance with UL 94			
Mechanical Service Life	3 x 10^7 cycles			

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

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

Dimensions

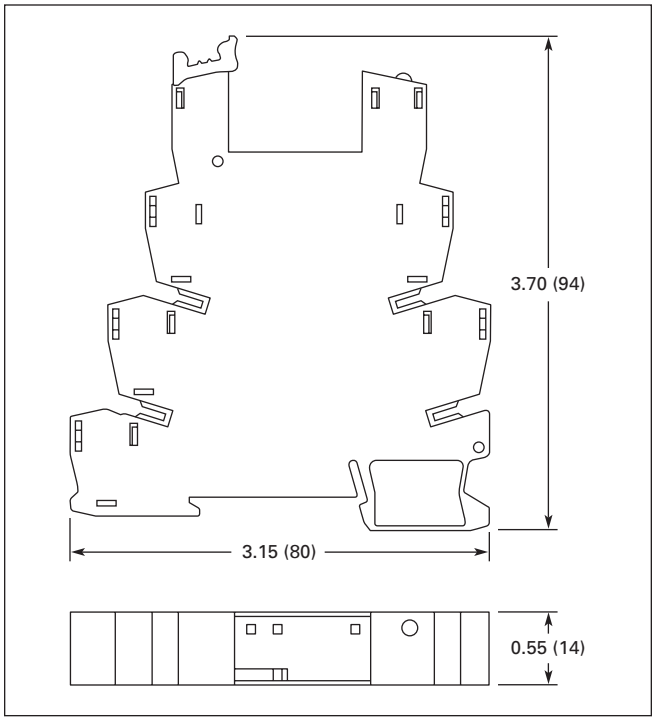


Figure 16. High Current Terminal Block Relays — Approximate Dimensions in Inches (mm)

Schematic

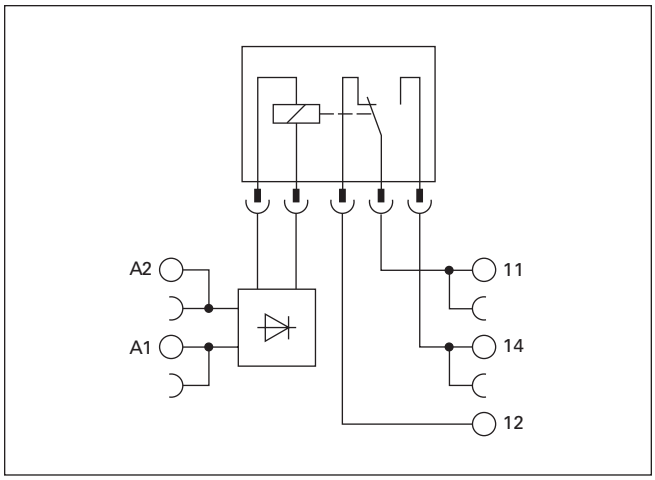
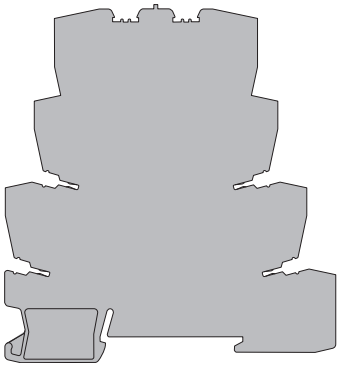


Figure 17. Schematic for High Current Terminal Block Relays

Product Description

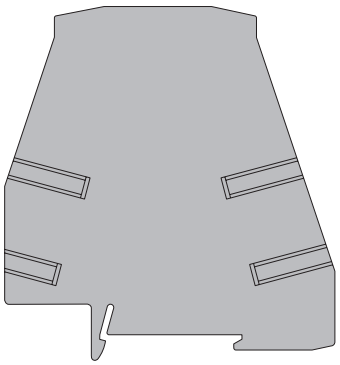
Power Terminal Block

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



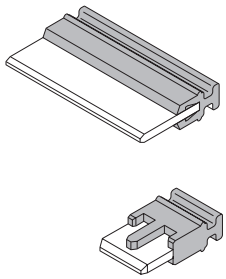
End Cover

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



Bridges

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



Product Selection

Table 13. Product Selection Table for *XR* Series Accessories

Description	Color	Standard Pack	Catalog Number	Price U.S. $
2-Position Snap-In Jumper	Red	10	**XRAFBST2RD**	1.40
2-Position Snap-In Jumper	Blue	10	**XRAFBST2BU**	1.40
2-Position Snap-In Jumper	Gray	10	**XRAFBST2GY**	1.40
80-Position Snap-In Jumper	Red	5	**XRAFBST500RD**	22.00
80-Position Snap-In Jumper	Blue	5	**XRAFBST500BU**	22.00
80-Position Snap-In Jumper	Gray	5	**XRAFBST500GY**	22.00
Power Terminal Block	Gray	5	**XRAPLCESK**	27.00
End Cover	Black	5	**XRAATPBK**	5.75

Table 14. Power Terminal Block Technical Specifications

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	32A
Max. Voltage	250V AC ①
Approvals	c UL us

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

Discount Symbol **1CD1**

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