Edison Idea Relays
Catalog Data
CA165002EN

Effective August 2019
Supersedes November 2014

COOPER POWER SERIES

iDP-210 feeder protection relay

Highlights

- Add functions and features using the IDEA Workbench™ feature
- Eaton's exclusive ICSF (Incipient Cable Splice Failure) Detection System for underground cables
- Virtual Test Set™ (VTS) event record simulator
- Relay-Replay™: The "what-if" analysis tool
- Interactive oscillography
- Instantaneous, Demand and Energy Metering
- Harmonics and THD metering
- Load Encroachment and Cold Load Pickup Logic
- Breaker Health Monitoring
- Sequence of Events Recording
- Distance-to-fault calculation
- 6 Voltage Input option
- Eight setting groups
- DNP 3.0 and Modbus protocols standard

Protective functions

- Fuse-fail detection (27FF)
- Reverse power (32)
- Phase instantaneous, definite time, and inverse time overcurrent (50/51)
- Ground instantaneous, definite time, and inverse time overcurrent (50N/51N)
- Negative-sequence instantaneous, definite time, and inverse time overcurrent (50Q/51Q)
- Multiple-shot programmable reclosing (79)
- Predictive Sync-check (25) with anti-motoring
- Breaker fail-to-trip and fail-to close detection (50BF)
- Directional phase, ground and negative sequence elements (67P, 67N, 67Q)
- Directional neutral (sensitive earth fault optional) protection (50G/50SEF)
- Multiple-step over/under frequency elements with voltage and current supervision (81)
- Over/under voltage elements (27/59)
- Sequence overvoltage (59P, 59Q, 59N)

Powering Business Worldwide

General

The iDP-210 feed protection relay is a member of Eaton's Cooper Power series Edison™ Idea™ line of protective relays. The iDP-210 is a full featured relay suitable for a variety of protection applications including feeder protection, reclosing, synch-check, frequency based load shedding, reverse power, overcurrent, over/under voltage and frequency. The iDP-210 relay also provides advanced power quality, metering, control, communication and PLC functions.

The iDP-210 relay uses Eaton's Cooper Power series ProView™ software package for PCs running the Microsoft® Windows® operating system. The IDEA Workbench feature of ProView software permits the user to add additional functionality to the iDP-210 relay by means of downloadable Custom Modules. These modules may be obtained from Eaton or created by the user. This ability provides a continuous upgrade path that not only protects the initial investment in the relay, but also provides a means to increase the relay's functionality in response to regulatory, power quality and reliability concerns.

Applications

The iDP-210 relay is an extremely versatile relay. Typical applications include distribution feeder protection, bus protection, transformer backup protection, line overcurrent protection, co-gen inter-tie applications, frequency based load shedding applications, over/under voltage protection, generator motoring protection, double wye capacitor bank protection and reclosing with or without synch-check.

To address the needs of automation, EMS and SCADA systems, the iDP-210 relay also provides advanced power quality, metering, control and communications capabilities.

Figure 1. IdeaPLUS relay hardware with integral breaker control panel.

Two hardware platforms

The iDP-210 relay is available both in the Idea and IdeaPLUS™ relay platforms. The IdeaPLUS platform is the same as the Edison Idea relay platform with the addition of a breaker control panel. See Figure 1. These features eliminate the need for separately mounted breaker controls. This control panel provides:

- Large green and red, self-illuminated breaker TRIP and CLOSE pushbuttons that operate even if the relay is not powered.
- Close Inhibit switch which, when enabled, blocks the ability of the relay to issue a close command to the circuit breaker.
- Close Circuit disable link. When removed, this link places a physical open in the breaker's close circuit making it impossible to close the breaker via the relay or its CLOSE button under any condition. This is provided in addition to the Hot Line Tag control for those situations when extra security is required.
- Nine additional feature pushbuttons with integral indicating LEDs. These provide instant access to ground trip block, reclose block and supervisory block. Six of the buttons are user configurable in the IDEA Workbench feature.

Customize the iDP-210 with the IDEA Workbench

The iDP-210 relay is a fully functional relay, ready to use right out of the box. However, there are applications where custom control logic, or custom functions need to be added to the relay. The IDEA Workbench feature is a revolutionary graphical software programming environment which permits the user to customize the iDP-210 relay.

- Add new features or protective functions by means of IDEA Workbench Custom Modules. These operate in the same fashion as the plug-ins for popular internet browsers. Your investment in the relay is protected as future needs and developments may be addressed through new Custom Modules.
- Create custom control and protection logic using over 400 programming signals and tools, all selectable from drag-off Toolboxes. Logic created using these tools can then be saved as Custom Modules to be reused or shared with associates.
- Monitor and control practically every aspect of the relay's operation.
- Create custom metering and measurement quantities.
- Create custom sequence of event records.
- Configure communication protocols to match existing SCADA system mappings.

The IDEA Workbench feature offers the user the ability to rapidly and accurately create customizations by working the way the engineer thinks, by using logic diagram and flowchart construction methods. No equation-based or command-based logic programming is required. See Figure 2.

The IDEA Workbench feature also addresses some of the more difficult questions associated with custom relay programming, namely:

Clarity: Compared to that offered by equation and command based programming techniques, graphical programming results in customizations whose operation is intuitive.

Testing: The ProView platform provides a Virtual Test Set (VTS) feature, which can be used to test the developed logic with realistic fault signals. During test, the logic diagrams become "live" showing the state of all variables, logic gates, contacts, counters, etc. To avoid any question of how the custom logic interacts with the relay itself, the VTS environment models the entire relay in addition to the custom programming. Unlike other programming environments, the IDEA Workbench feature does not require the user to have an actual relay or relay test set on hand to verify the proper operation of the programmed logic.

Documentation: Notes regarding how the custom logic operates may be embedded within the IDEA Workbench feature. This improves the ability of others to quickly understand how the logic is designed to work. Links to external files may also be embedded in the IDEA Workbench software, providing fast access to larger documents stored on company's network servers.

Portability: If the original data files are lost, the entire IDEA Workbench feature may be uploaded from the relay, complete with logic diagrams, embedded notes and external reference links.

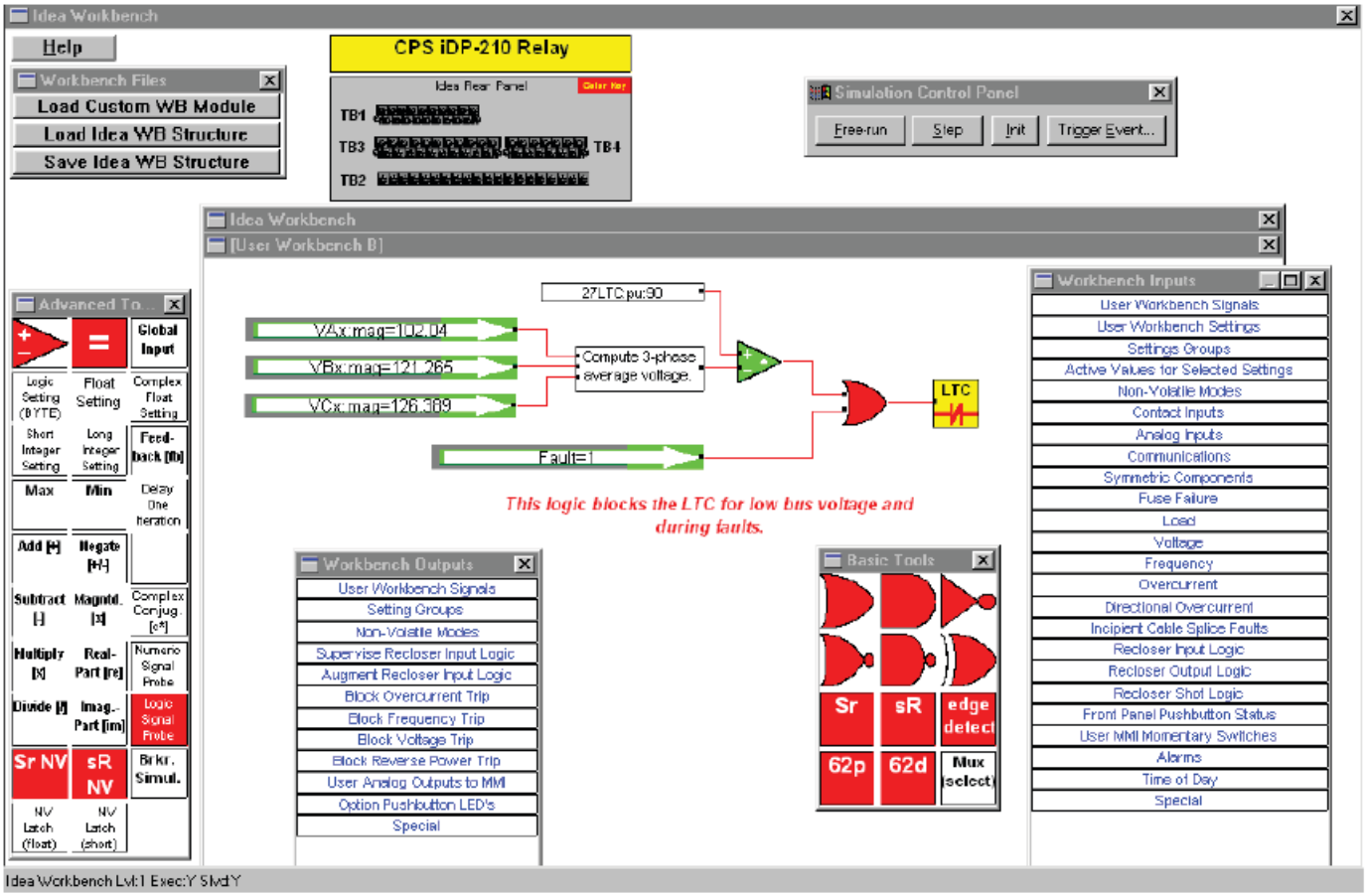

Figure 2. The IDEA Workbench graphical customization environment.

Incipient cable splice fault detector (ICSF)

One of the most common causes of buried cable failure is from moisture ingress to buried cable splices. When sufficient water accumulates in the splice, a line-to-ground fault briefly occurs. The fault is cleared as the water is suddenly converted in to steam. Over time, the insulation is damaged and the cable splice eventually fails. The iDP-210 relay contains an algorithm to recognize the unique waveform characteristics of these self-clearing faults. See Figure 4. By counting how often these events occur over a moving time window, the iDP-210 relay is able to give advance notice of pending cable splice failures. This permits cable maintenance to be scheduled rather than addressed on an emergency basis.

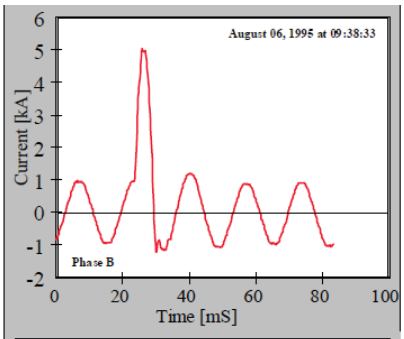

Figure 4: Typical Self-Clearing Fault Detected by the iDP-210's ICSF Algorithm

Figure 3. Typical self-cleaning fault detected by the IDP-210 relay's ICSF algorithm.

Overcurrent protection

The iDP-210 relay offers inverse time, definite time (2 levels) and instantaneous elements for phase, residual and negative sequence overcurrent protection. An additional definite time ground overcurrent element is provided for a separate zero-sequence flux summing CT. This fourth current channel input may also be ordered in a sensitive earth fault version which may be set as low as 0.005 A secondary. Each overcurrent element may be independently selected to be non-directional, forward- or reverse-directional. Inverse time elements may be set for disk-like or instantaneous reset characteristics. Complete fuse-fail detection logic is also included to selectively non-directionalize or disable directional elements during loss of bus potential.

Reclosing and Synch-Check

A fully programmable, 4-shot reclose element, complete with sequence coordination and synch-check supervision is provided. Each protective element in the relay may be independently programmed as to how it interacts with the reclose logic for each shot in the reclose sequence. External relays may also be connected to the iDP-210 relay's reclosing logic with the same configuration capabilities as the relay's own internal protective elements. The iDP-210 relay may be used as a stand-alone reclosing and/or synch-check relay. The Synch-Check function provides the following features:

- Anticipatory Close accounts for the time it takes the circuit breaker mechanism to actually close once sent a CLOSE command.
- Anti-motoring control assures that synch-check will be declared only when the resulting power flow will be in the specified direction.

- Synch against voltages of different PT ratios and different nominal phase angle displacements (delta vs. wye).
- Anti-pump logic.
- Programmable Hot Bus, Cold Bus, Hot Line and Dead Line operation.

Frequency elements

Five levels of underfrequency plus an additional underfrequency alarm level combine with overfrequency elements to provide comprehensive stand-alone frequency protection. The iDP-210 relay also includes underfrequency load shedding and restoration logic. The load shedding is both voltage and current supervised. The current supervision is included to ensure that the feeder is carrying a minimum current level before load shedding is permitted. This ensures that a feeder will be disconnected only if sufficient load is present to be useful in saving the system, preventing the disconnection of a lightly loaded feeder which will only have the effect of disconnecting a larger number of customers and lowering a utility's reliability indices.

For restoration, a complete set of integrated timers is provided to allow for both scheduled restoration and the ability to ride through the momentary frequency excursions that occur during a system-wide restoration.

Reverse power

The iDP-210 relay provides a reverse power element that may be used for a variety of protective situations. These include generator and motor protection, loop protection and directional power supervision of other protective elements, including lockout of the reclose logic under reverse power conditions, or automatically changing to an alternate setting group when reverse power conditions are sensed. Fuse-fail detection logic is also included to selectively non-directionalize or disable this element during loss of bus potential.

Voltage elements

Numerous phase, zero sequence and negative sequence overvoltage elements are provided. Typical applications include overvoltage and open phasing protection. Phase undervoltage elements are also provided.

Cold load pickup and load encroachment logic

The iDP-210 relay provides both cold load pickup and load encroachment logic. Cold load pickup logic senses when a feeder is being connected after a period of being de-energized. The logic automatically increases the inverse time and low set definite time phase overcurrent element pickup levels to enable the relay to ride through the increased load current that flows as a result of the newly connected loads.

Load encroachment logic addresses the situation of a feeder operating in steady state conditions where the feeder load current begins to approach or slightly exceed the set overcurrent pickup levels. Examples include:

- Feeders where load growth has made previous settings inappropriate. The Load Encroachment Logic can be set for the feeder's expected maximum future load but set for the present load, reducing the likelihood of false tripping until such time that the feeder's overcurrent settings may be revisited.
- Feeders which may experience very heavy load increases due to contingency situations.

The iDP-210 relay will block the operation of balanced three-phase overcurrent elements as long as the load in the feeder is balanced and is within permissible feeder watt and VAR import/export limits. See Figure 4. This logic will not affect the operation of the relay for any unbalanced fault condition.

Six voltage input option

The iDP-210 relay is available with two sets of three-phase voltage inputs. This is useful for ring bus or other multi-source applications where the relay may be fed with external voltage inputs from more than one bus. This eliminates the need for external switching relays to route the appropriate voltage signals to the standard single three-phase input. Using the IDEA Workbench feature, the relay may be programmed to automatically switch between the x- and y- three phase sources under any arbitrary set of user-defined conditions including external breaker 52a contact inputs. Switching of the voltage banks switches the voltages used for metering as well as protection.

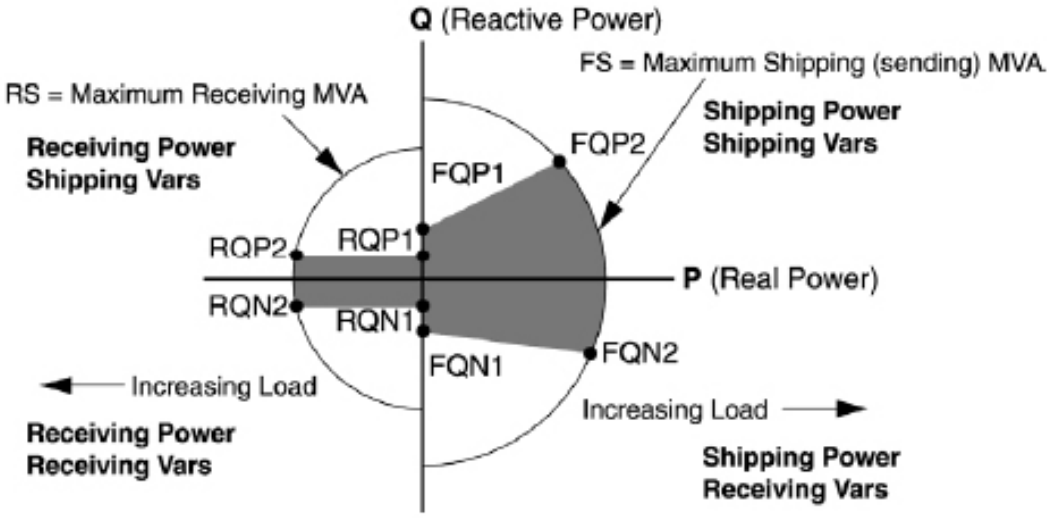

Figure 4. Load encroachment logic blocks three-phase overcurrent elements when load falls within the shaded area of the power plane.

Metering

The iDP-210 relay offers extensive metering capabilities, including:

- Instantaneous Volt, Amp, Watt, VARS, pf and frequency in both primary and secondary scaled values.
- Demand metering (current and four quadrant power) with alarm levels
- Energy metering
- Harmonics metering through the 15th harmonic including THD for all voltage and all current channels.

Event records and analysis tools

The iDP-210 relay shares the same event records and analysis tools as all Edison Idea relays. The Edison Idea relay allows for the display of event records in a variety of formats including waveforms (oscillography), magnitude plots, phasor diagrams, symmetrical component diagrams and more. ProView, the software for the Edison Idea relay, also provides a unique Application Diagram View that provides a one-screen view of everything that is going on in the relay. Many of these event views are also available in On-Line View mode, where it is possible to monitor the status of the relay in real-time, including phasor diagrams, which is ideal for verifying CT phasing during commissioning. The iDP 210 relay also includes distance to fault indication.

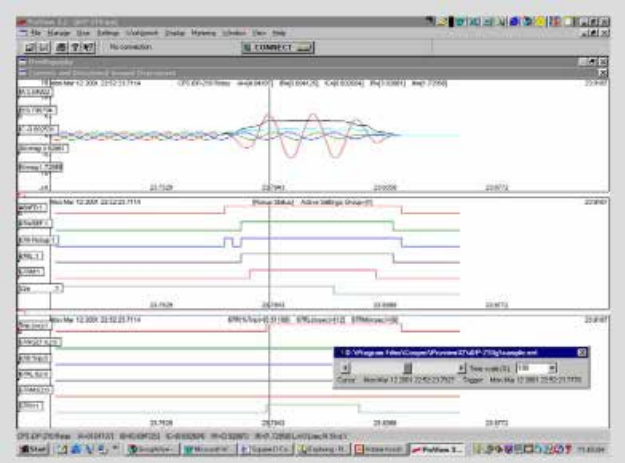

Figure 5. Typical oscillography view in the ProView application.

Relay-Replay

To evaluate the effect different settings would have on the relay, the Relay-Replay feature of the Edison Idea relay allows the user to make any number of setting changes and replay an existing event using these new settings without the need for an actual relay or expensive test equipment. The operation of every aspect of the relay's performance, from which elements pick-up, the response time of those elements that do and the operation of any custom programming made via the IDEA Workbench feature can be observed. This tool provides unprecedented "what-if" analysis capabilities.

Virtual Test Set (VTS)

To evaluate settings against any arbitrary fault, the Edison Idea relay permits the user to create a virtual event record through use of the software's VTS feature. The VTS allows complete control over:

- Pre-fault and post-fault voltage and current levels.
- Selection of phase-ground, phase-phase, phase-phase-ground and three phase fault types.
- Fault duration.
- Selection of system and fault impedances.
- Selection of DC time constant.
- Control over fault dynamics to verify reclosing sequences and sequence coordination.
- Control of frequency change, rate of change and acceleration during faults.
- Control over simulated breaker open and close times.
- Voltage and current parameters derived from a built-in power system model or entered manually.

Breaker health monitoring

To assist in preventative maintenance programs, the iDP-210 relay monitors a number of critical breaker statistics. These include the circuit breaker's average, maximum and most recent closing and opening times, the accumulated interrupted current and breaker fail-to-trip, slow-to-trip, fail-to-close and slow-to-close conditions.

Communications

Both Modbus RTU and DNP 3.0 communication protocols are included with the iDP-210 relay. A Communications Workbench provides the user the ability to customize communication maps, add or delete information, add control points, and even create new signals to be brought out through communications. The iDP-210 relay features two RS-232 auto-baud (57600 kbps max) communication ports and one port configurable for RS-485, serial fiber optic, and various Ethernet options (RJ-45, multi-mode fiber, single-mode fiber). Contact your Eaton representative for availability of other communication protocols.

Accessory contact I/O board

The iDP-210 relay comes standard with five (5) contact inputs and five (5) contact outputs. An optional contact I/O board is available which provides additional contact inputs and outputs. Three of the contact inputs may be specified as being normally closed. Note that if the six voltage input option is ordered, the number of contact inputs is reduced to 11. See Table 1.

Table 1. Contact Inputs and Outputs

Relay Platform	Optional I/O Board	Voltage Channels	Contact Inputs	Contact Outputs
Idea	No	4	5	5
	Yes	4	13	13
	Yes	6	11	13
IdeaPLUS	Yes	4	13	15
	Yes	6	11	15

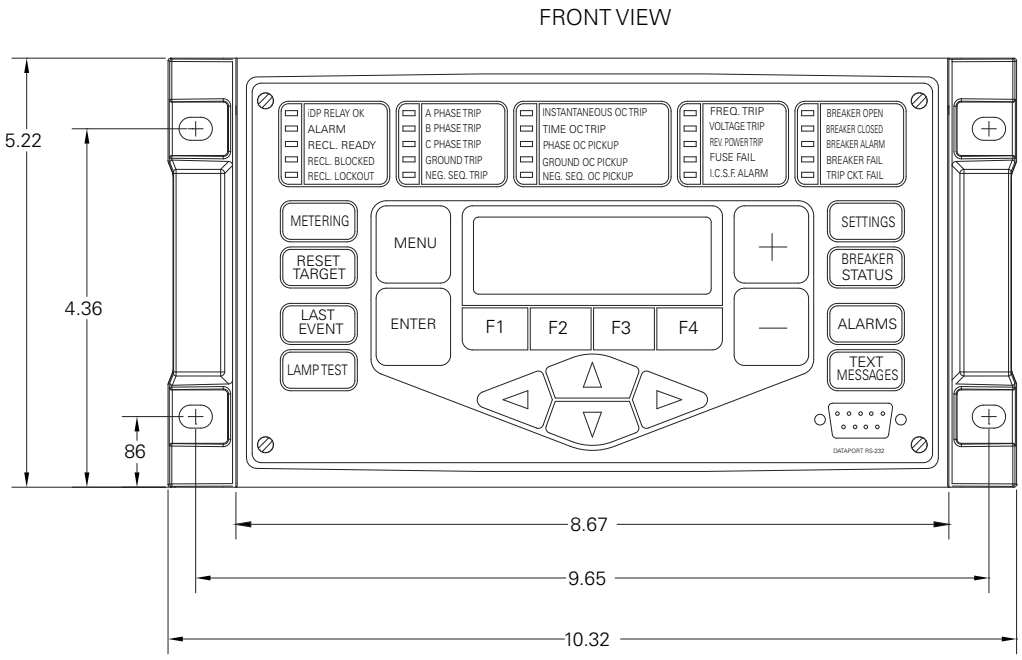

Figure 6. Idea relay, front view (inches).

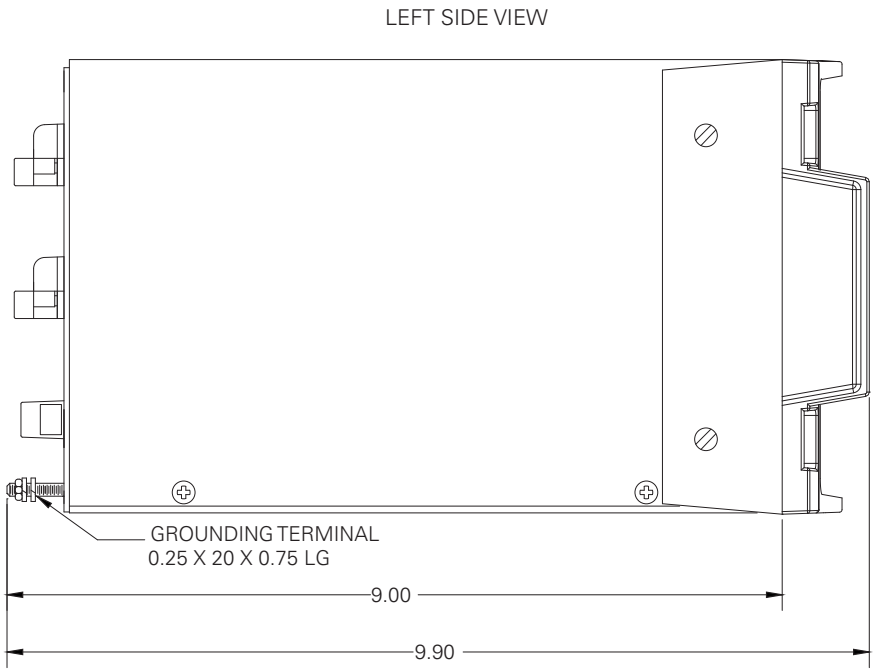

Figure 7. Idea relay, side view (inches).

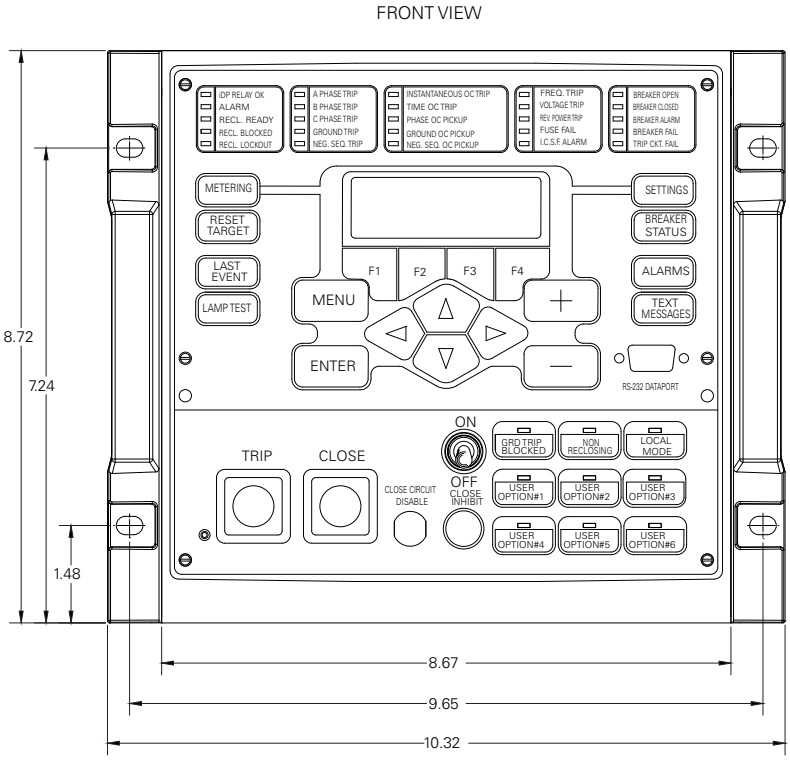

Figure 8. IdeaPLUS relay, front view (inches).

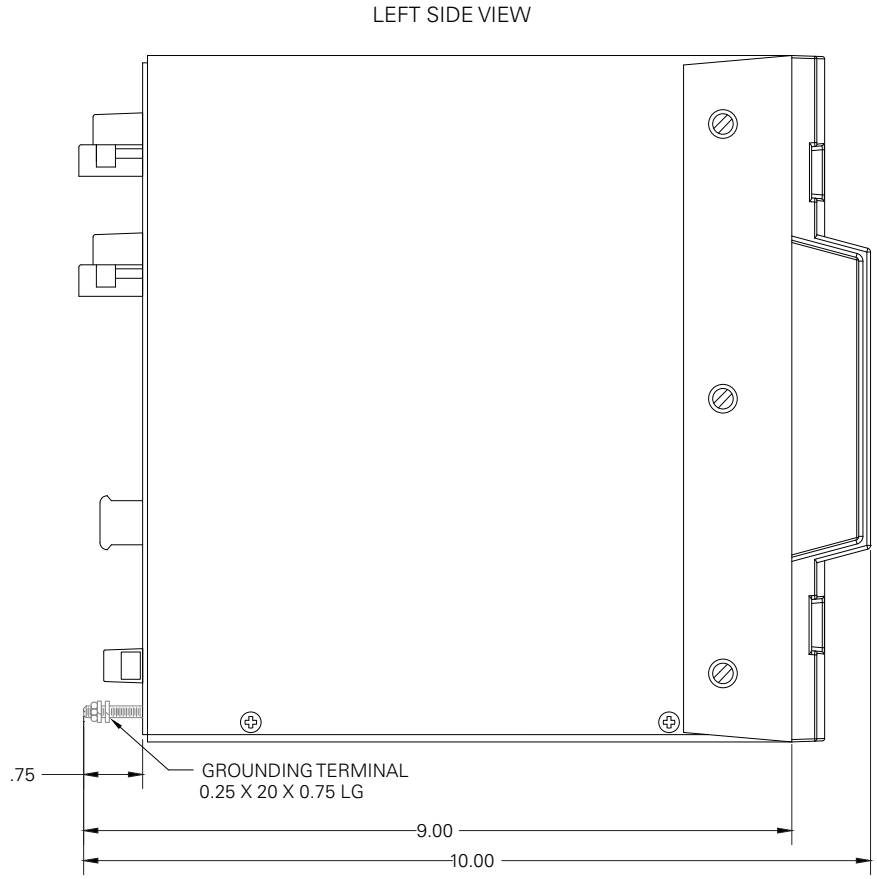

Figure 9. IdeaPLUS relay, side view (inches).

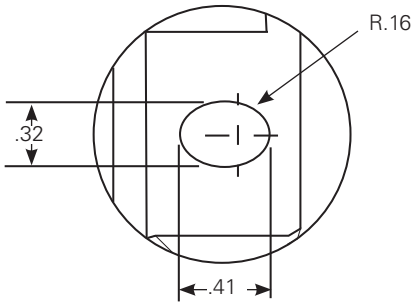

Figure 10. Idea relay, mounting hole detail (inches).

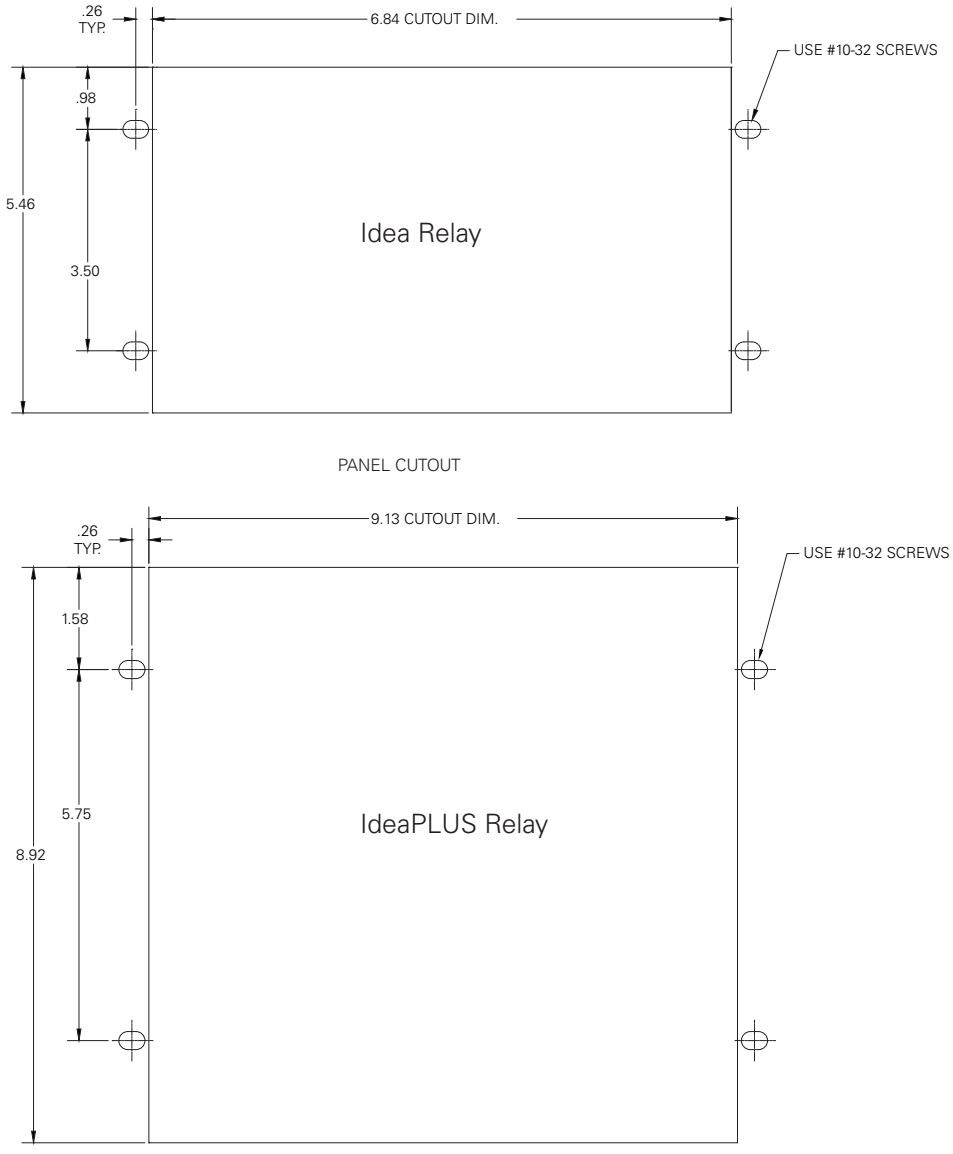

Figure 11. Panel cutout dimensions (inches).

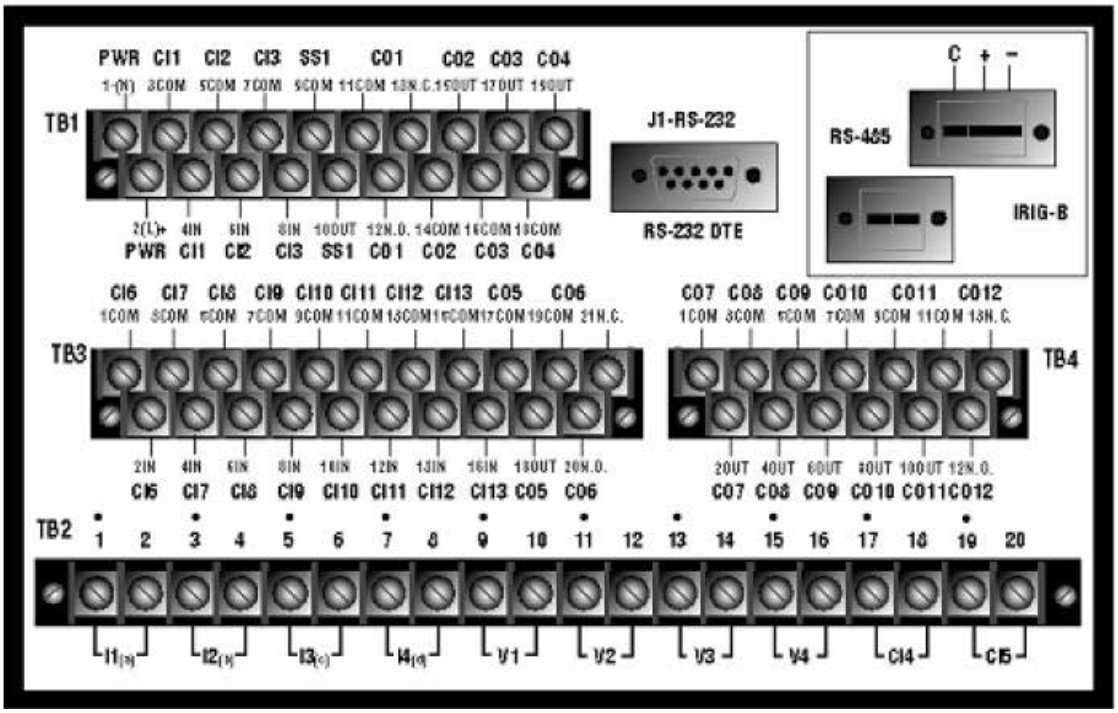

Figure 12. Idea relay, rear panel details; 4 voltage inputs, PR6D2D10xxxxxx ordering option.

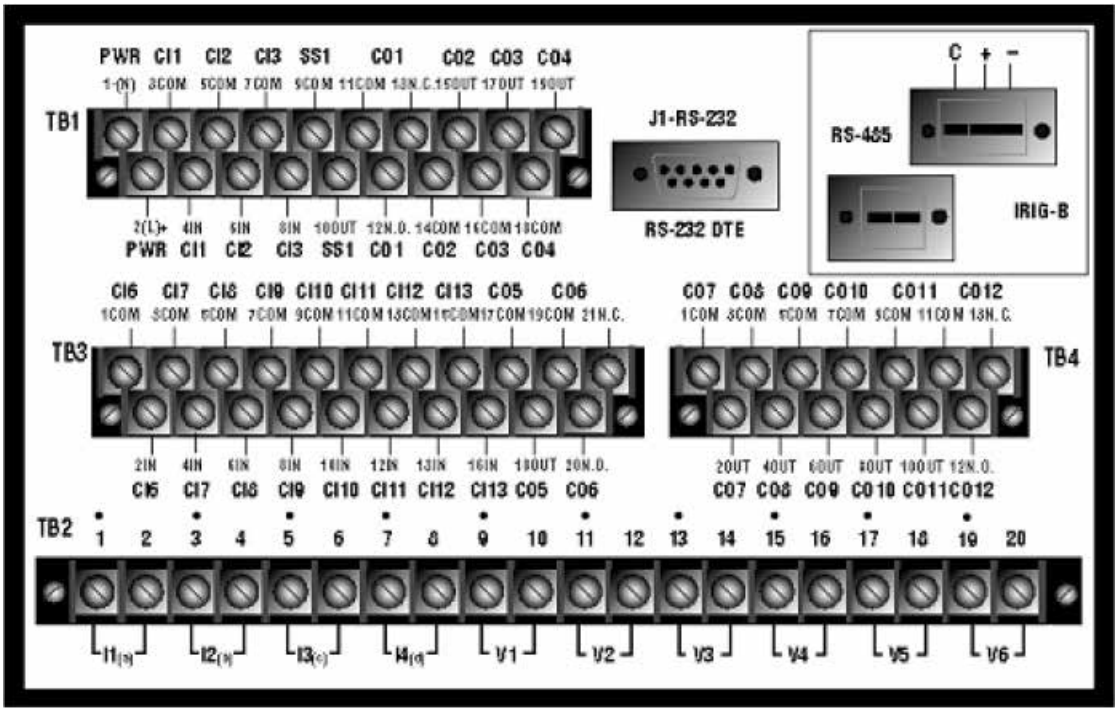

Figure 13. Idea relay, rear panel details; 6 voltage inputs, PR6D2D16xxxxxx ordering option.

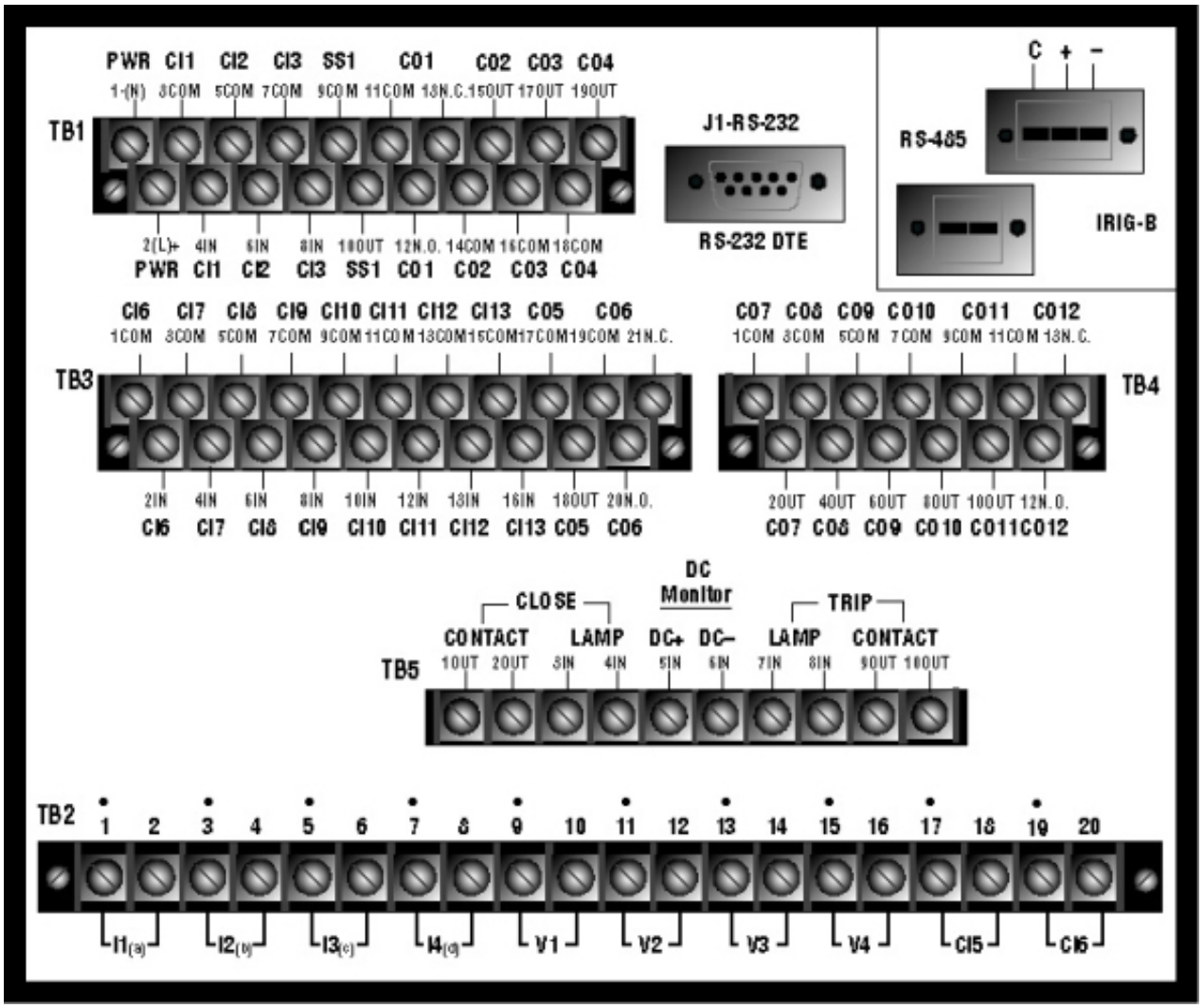

Figure 14. IdeaPLUS relay, rear panel details; 4 voltage inputs, PR6P2D10xxxxxx ordering option.

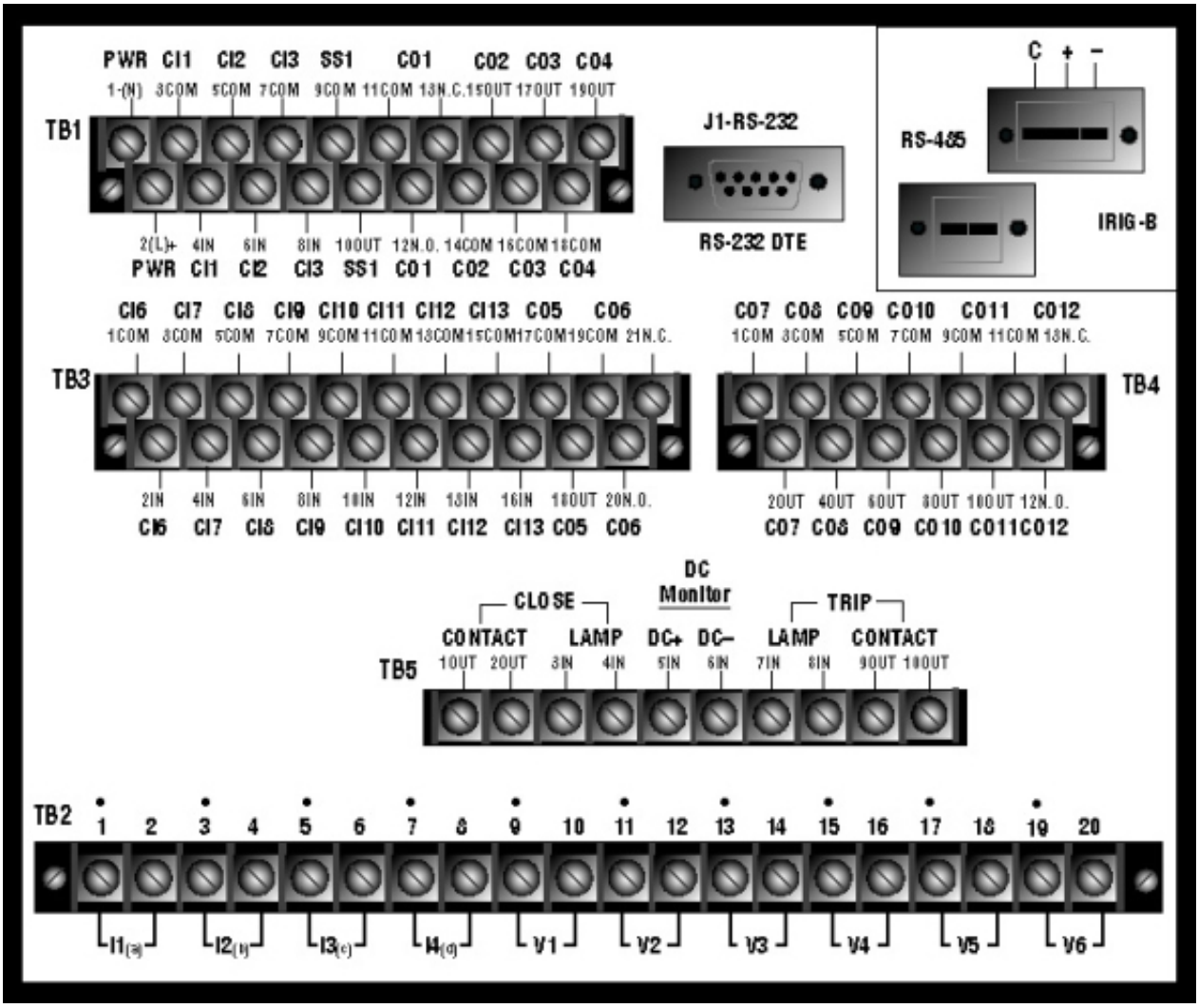

Figure 15. IdeaPLUS relay, rear panel details; 6 voltage inputs, PR6P2D16xxxxxx ordering option.

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) elements only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

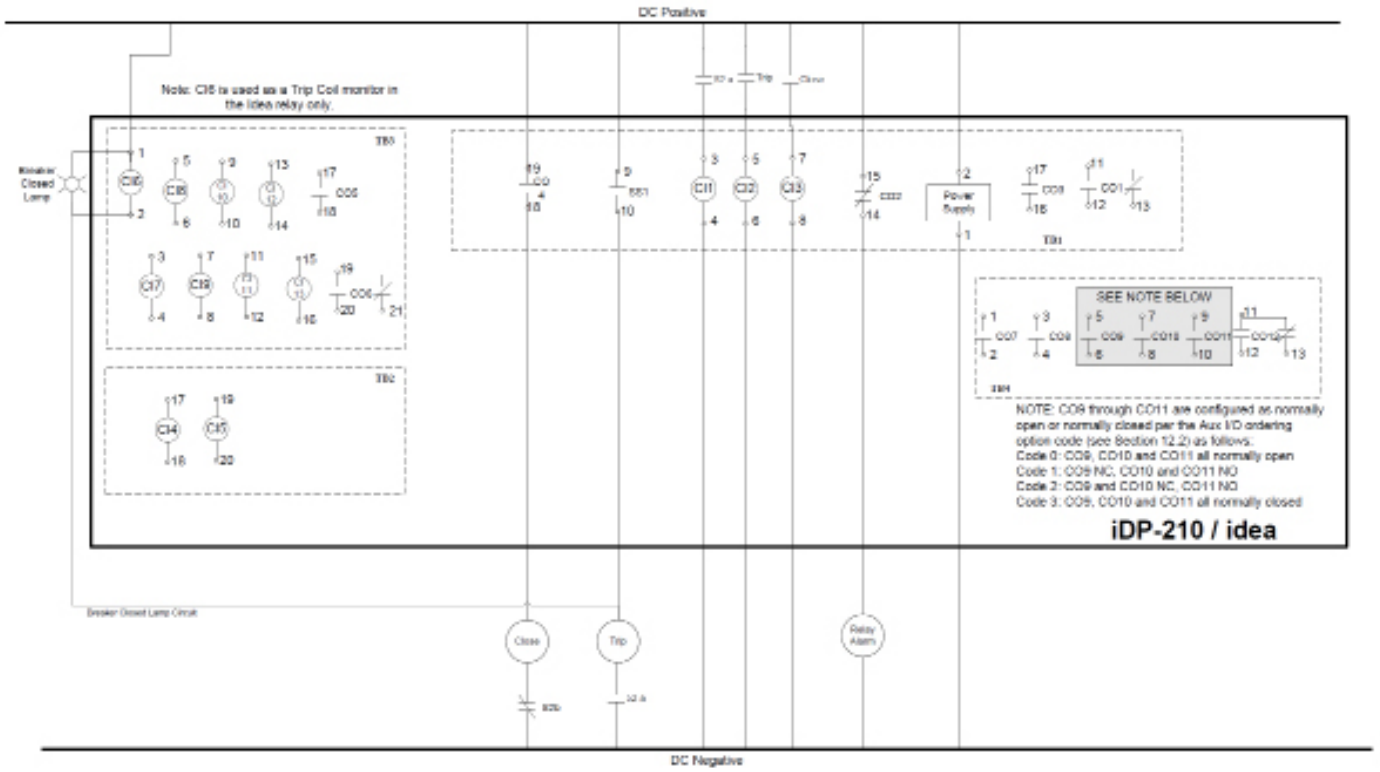

Figure 16. Edison Idea relay DC connection diagram where optional contact I/O board is present.

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) elements only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

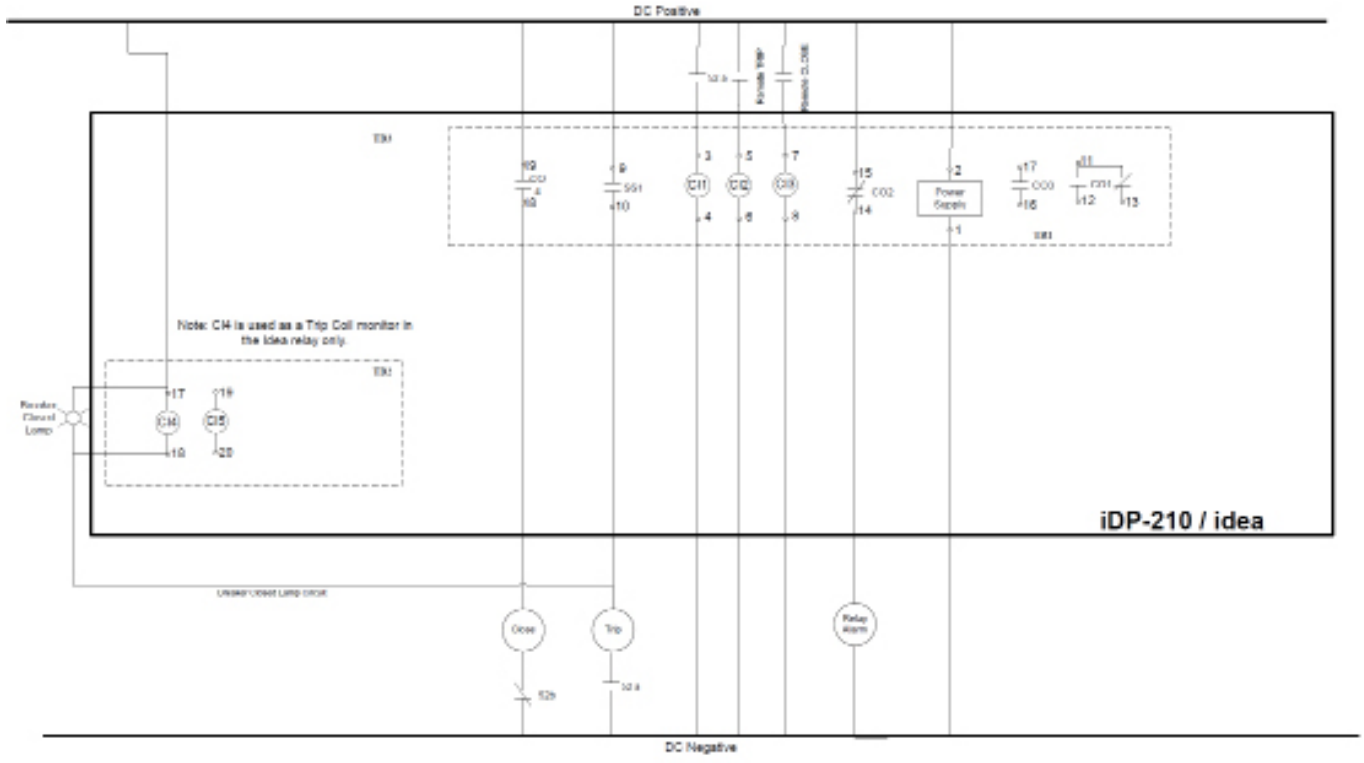

Figure 17. Edison Idea relay DC connection diagram where optional contact I/O board is NOT present.

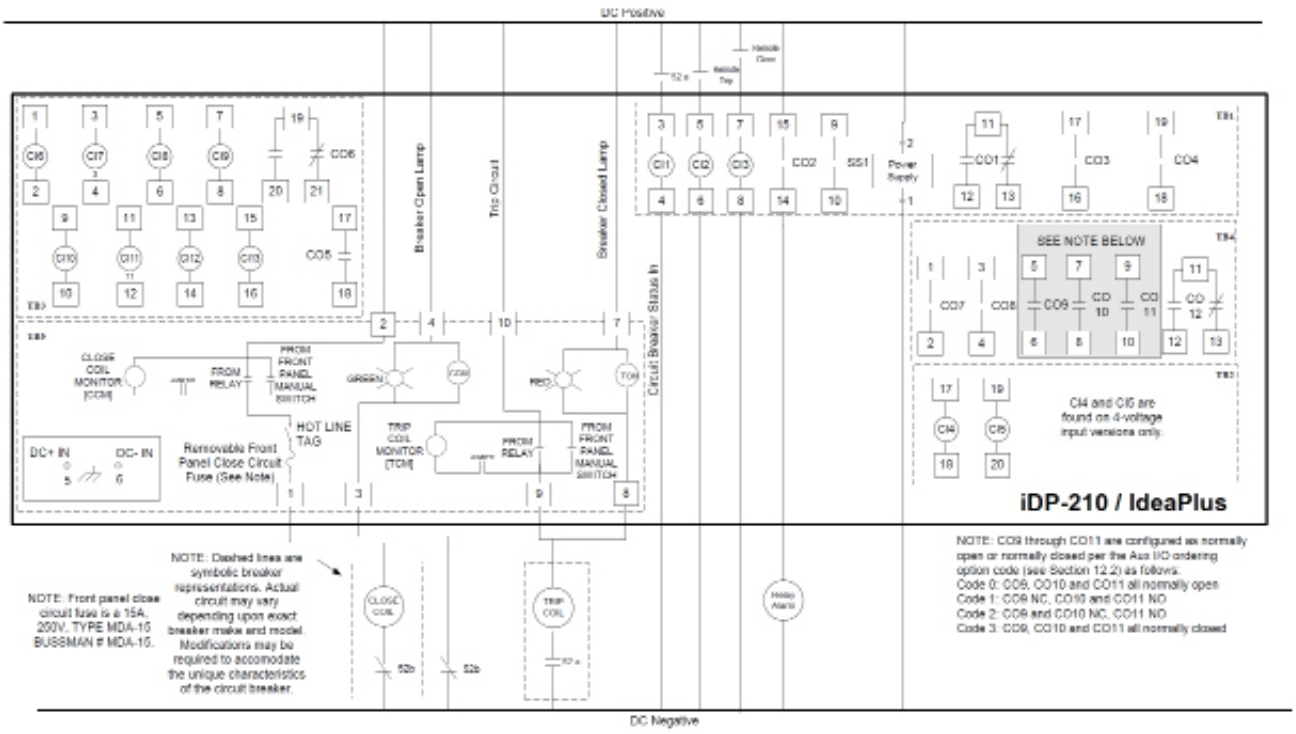

Figure 18. IdeaPLUS relay DC connection diagram.

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) elements only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

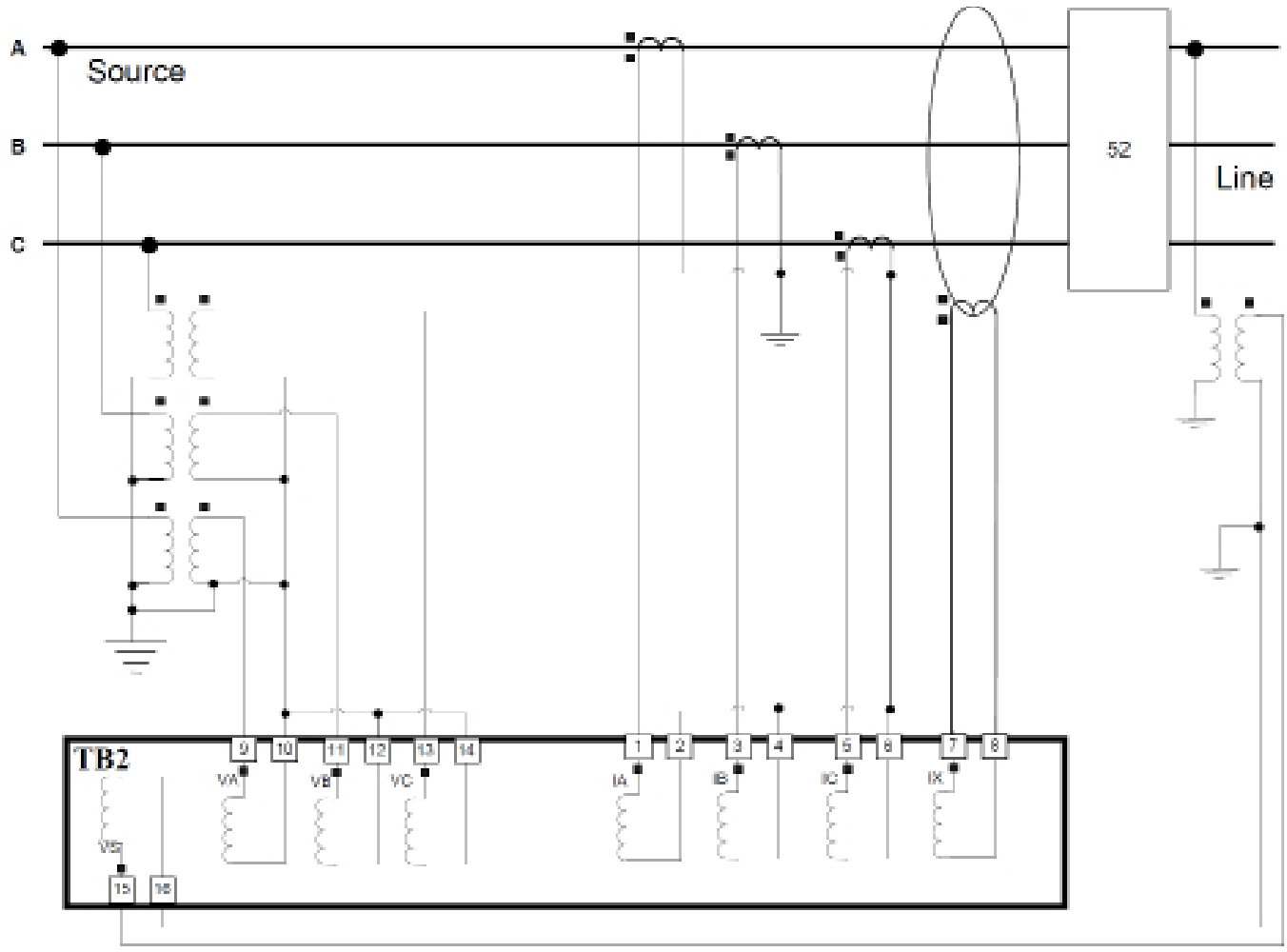

Figure 19. Idea relay AC connection diagram - 4 voltage inputs, normal ABC phase rotation.

Idea	**PR6D2D10xxxxxx and PR6D2D20xxxxxx Ordering Options**
IdeaPLUS	**PR6P2D10xxxxxx and PR6P2D20xxxxxx Ordering Options**

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) element only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

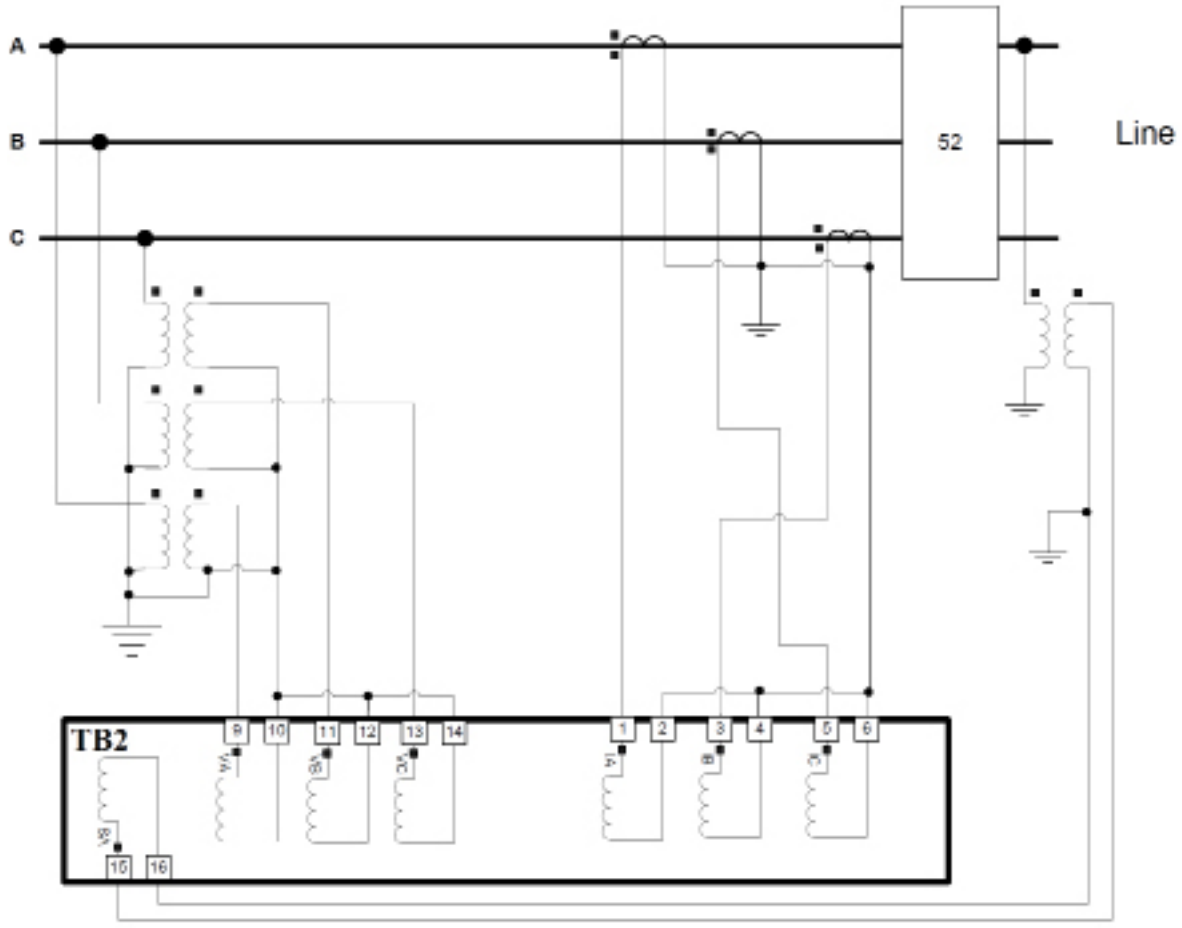

Figure 20. Idea relay AC connection diagram - 4 voltage inputs, ACB phase rotation.

Idea **PR6D2D10xxxxxx and PR6DD20xxxxxx Ordering Options**

IdeaPLUS **PR6P2D10xxxxxx and PR6P2D20xxxxxx Ordering Options**

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) element only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

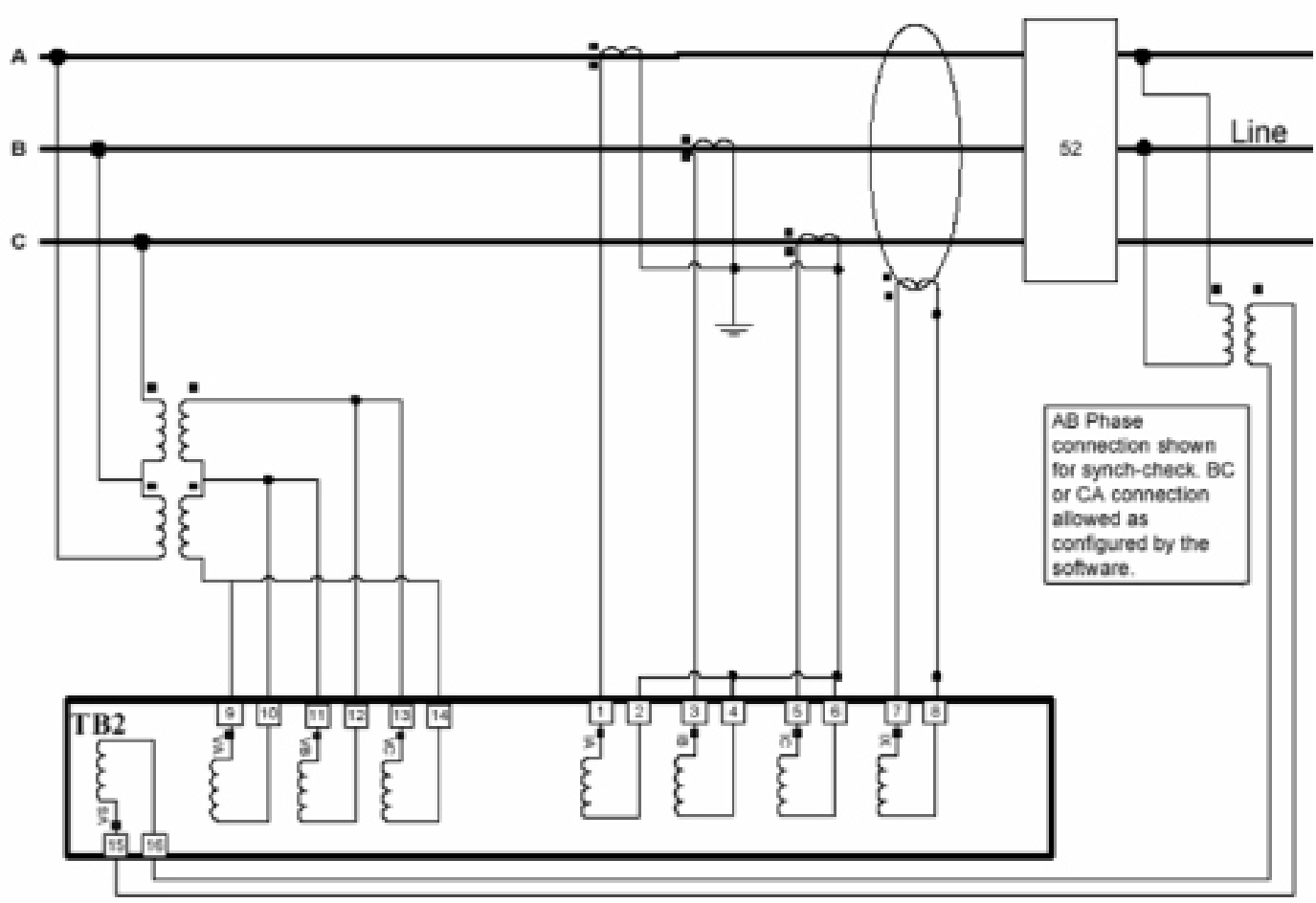

Figure 21. Idea relay AC connection diagram - 4 voltage inputs, delta PT connection.

Idea **PR6D2D10xxxxxx and PR6D2D20xxxxxx Ordering Options**

IdeaPLUS **PR6P2D10xxxxxx and PR6P2D20xxxxxx Ordering Options**

Note: Terminals 7 and 8 are used for the In or Sensitive Ground Fault (SGF) element only. The residual overcurrent elements (Ir) derive their signals internally from the A, B and C phase current input signals.

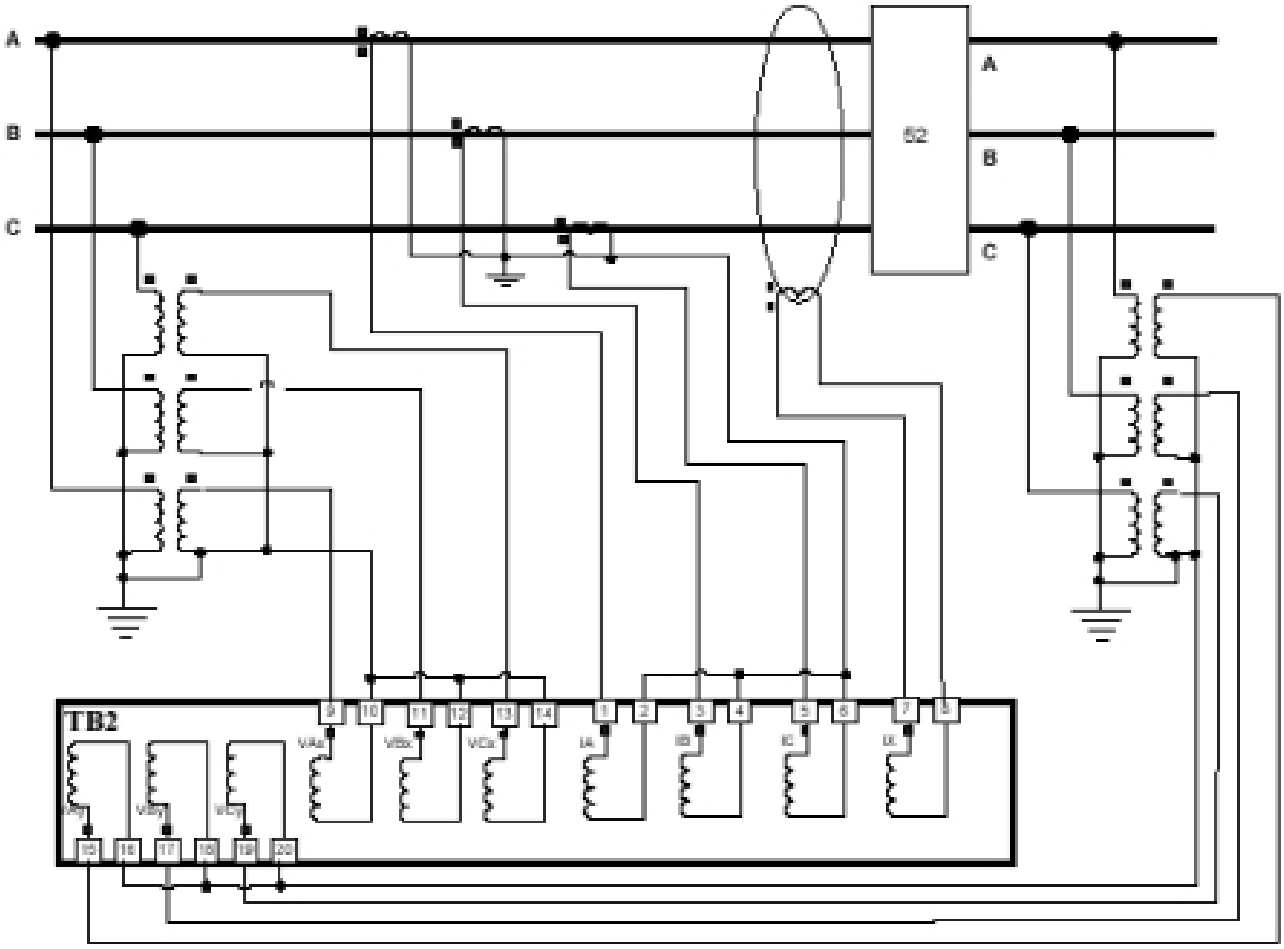

Figure 22. Idea relay AC connection diagram - 6 voltage inputs, normal ABC phase rotation.

Idea	**PR6D2D16xxxxxx and PR6D2D26xxxxxx Ordering Options**
IdeaPLUS	**PR6P2D16xxxxxx and PR6P2D26xxxxxx Ordering Options**

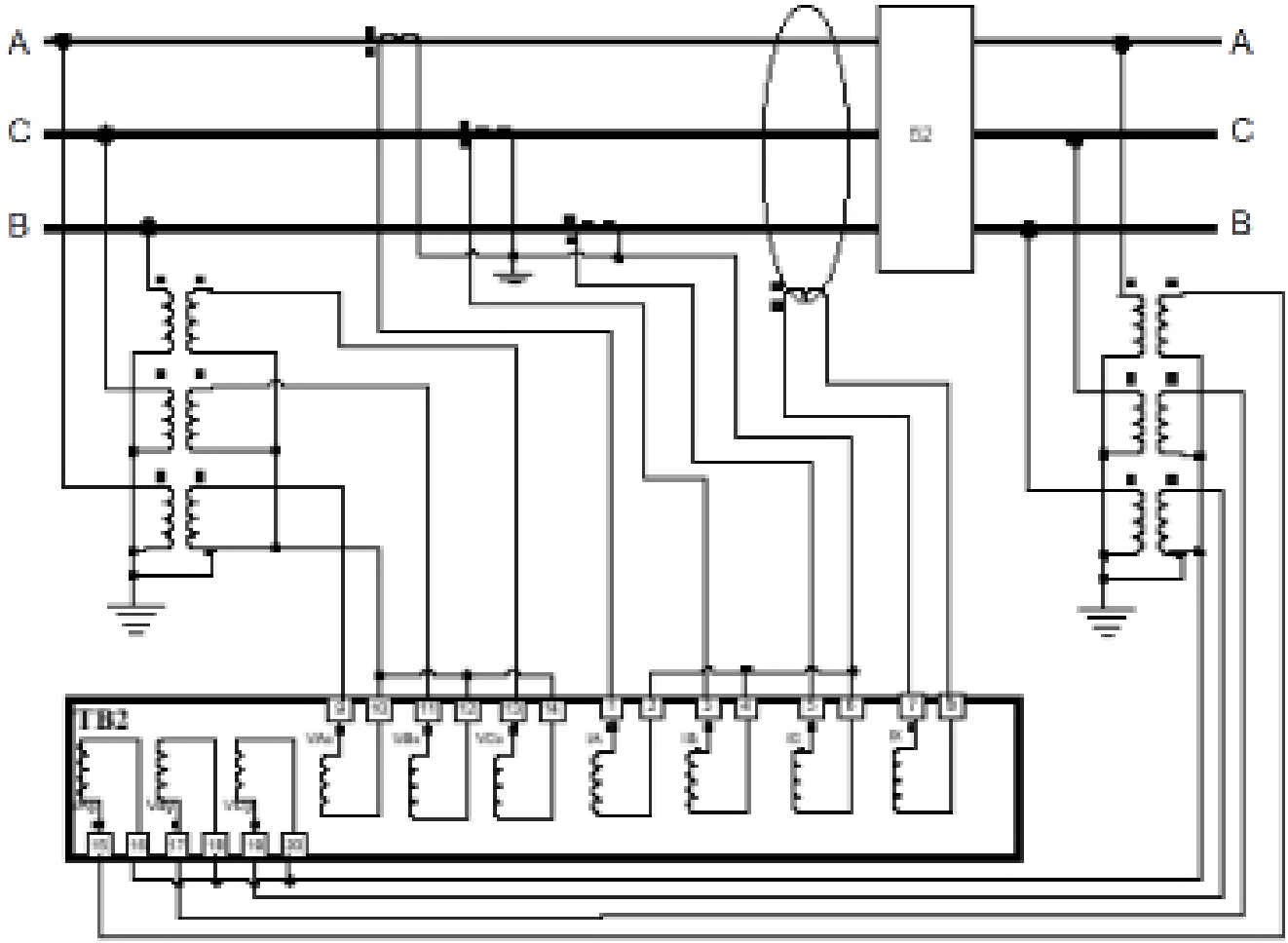

Figure 23. Idea relay AC connection diagram - 6 voltage inputs, ACB phase rotation

Idea	**PR6D2D16xxxxxx and PR6D2D26xxxxxx Ordering Options**
IdeaPLUS	**PR6P2D16xxxxxx and PR6P2D26xxxxxx Ordering Options**

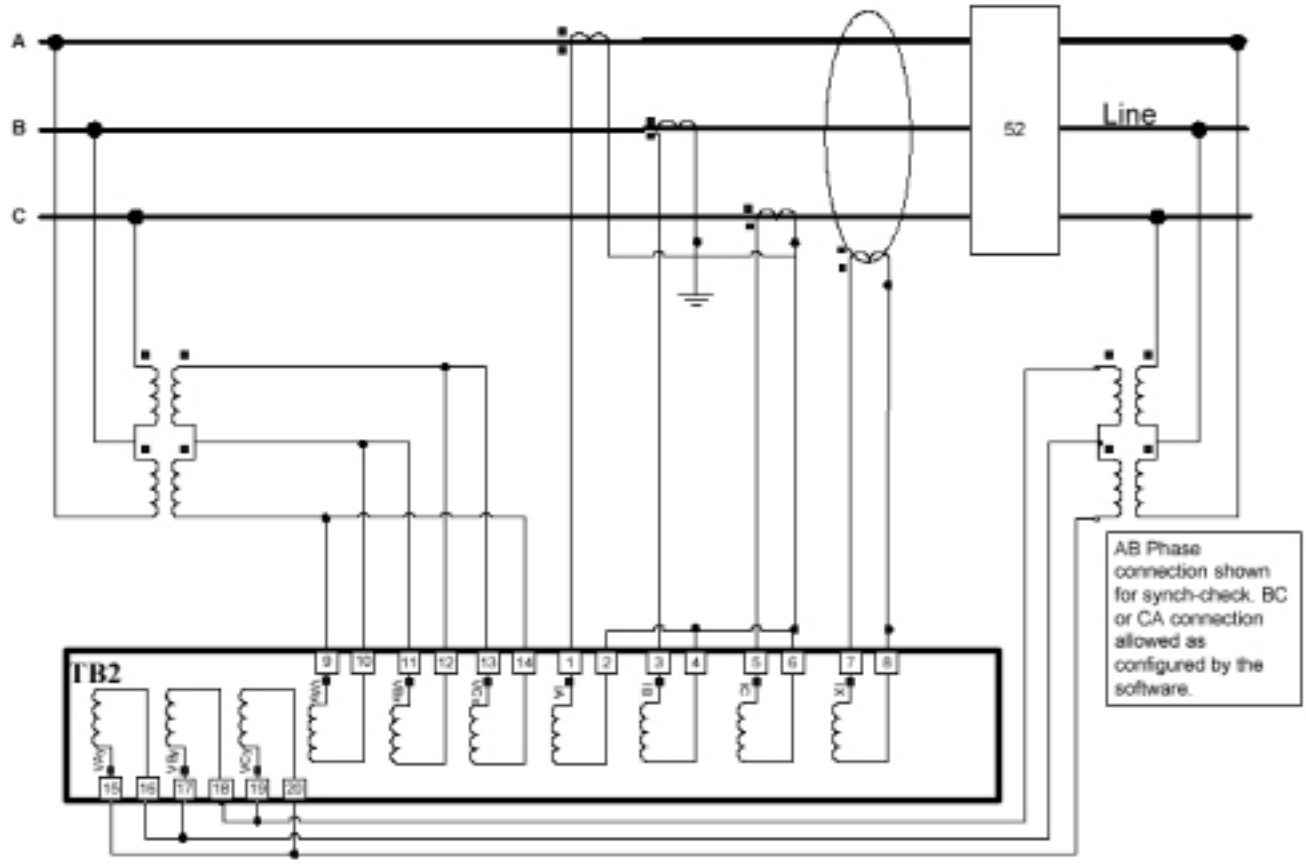

Figure 24. Idea relay AC connection diagram - 6 voltage inputs, delta PT connection.

Idea	**PR6D2D10xxxxxx and PR6D2D26xxxxxx Ordering Options**
IdeaPLUS	**PR6D2D16xxxxxx and PR6P2D26xxxxxx Ordering Options**

Table 2. Ordering Options

Construct Catalog Number from this table.

Note: Tagging and lamp style options (columns J and K) apply only to IdeaPLUS relay part numbers.

		A	B	C	D	E	F	G	H	I	J	K
		Idea and IdeaPlus									IdeaPlus	
		Product	Enclosure	Scheme	Language	Power	Input Range	Protocol	Aux I/O	Term Block	Tagging	Lamp Style
		PR6										
Sample Catalog Number:		**PR6**	**P2**	**D10**	**E**	**1**	**5**	**7**	**N**	**S**	**T**	**3**
TYPE	Edison Idea/IdeaPlus Relay	PR6										
	Edison Idea Chassis		D2									
	Edison IdeaPlus Chassis		P2									
Scheme/ Model	iDP-210 Feeder Relay			D10								
	iDP-210 Feeder Relay w/2 sets of 3-phase voltage inputs			D16								
	iDP-210 Feeder Relay with SEF			D20								
	iDP-210 Feeder Relay with SEF and 2, 3-phase VT inputs			D26								
Inserts Language	English				E							
	French				F							
	Portuguese				P							
	Spanish				S							
	Other				O							
Power	48 Vdc Power Supply					4						
	125 Vdc/120 Vac Power Supply					1						
	250 Vdc/240 Vac Power Supply					2						
	Other					X						
Input Ranges	5 Amp CT Inputs, 67/120 V PT Inputs						5					
	1 Amp CT Inputs, 67/120 V PT Inputs						1					
Comm. Protocol	RS 485							1				
	Fiber Serial							3				
	Ethernet: Multimode Fiber MTRJ/MTRJ							4				
	Ethernet: Multimode Fiber MTRJ/ Wire RJ 45							5				
	Ethernet: Wire RJ45/RJ45							6				
	Standard: None							7				
	Ethernet: Single Mode Fiber LC/LC							8				
Aux I/O	No additional Contact I/O								N			
	Add 8 Contact Inputs and 8 contact outputs, all N.O								0			
	Add 8 Contact Inputs and 8 contact outputs, 1 NC, 7NO								1			
	Add 8 Contact Inputs and 8 contact outputs, 2 NC, 6NO								2			
	Add 8 Contact Inputs and 8 contact outputs, 3 NC, 5NO								3			
Term.	All Barrier									S		
	All Compression									C		
Tag Type	Mechanical Hot-Line Tag, CLOSE inhibited on relay fail										T	
	Mechanical Hot-Line Tag, CLOSE enabled on relay fail										A	
	Software based Close-inhibit, CLOSE inhibited on relay fail										C	
	Software based Close-inhibit, CLOSE enabled on relay fail										R	
Trip/Close Lamp Type	125 Vdc/120 Vac LED Lamps for Trip and Close Status											3
	48 Vdc LED Lamps for Trip and Close Status											2
	24 Vdc LED Lamps for Trip and Close Status											1
	48 Vdc Incandescent Lamps for Trip and Close Status											7
	24 Vdc Incandescent Lamps for Trip and Close Status											6
	Other											X
	No Bulbs											0

Idea Relay Requires Aux I/O Board

Table 3. Accessories

Description	Catalog Number
19" rack mount filler panel for Idea relay	PR6ADRP
19" rack mount filler panel for IdeaPLUS relay	PR6APRP
19" rack-mount two-relay side-by-side joiner kit for Idea relay	PR6ADJK
19" rack-mount two-relay side-by-side joiner kit for IdeaPLUS relay	PR6APJK
6 foot (2m) front panel RS232 cable	KME5-66S

Table 4. Specifications

Frequency	50/60 Hz
Voltage Inputs	Six voltage input channels
	50 – 250 Vac continuous (phase-to-neutral)
	Burden < 0.1 VA at 120 V
	Primary DC Resistance 1,454Ω
	Error % < 0.3% over operating temperature
Current Inputs	Four current input channels
	$I_{Nominal}$ = 5 A, $I_{continuous}$ = 15 A, $I_{3\ sec}$ = 150 A, $I_{1\ sec}$ = 300 A
	Range of overcurrents settings 0.1 A to 90 A
	Burden < 0.2 VA at 5 A
	Primary DC Resistance 3.4 mΩ
	Error % < 0.3% over operating temperature
	$I_{Nominal}$ = 1A, $I_{continuous}$ = 3.2A, I_{3sec} = 30 A, I_{1sec} = 100 A
	Range of overcurrents settings 0.02 A to 18 A
	Burden < 0.2 VA at 1 A
	Primary DC Resistance 52.1 mΩ
	Error % < 0.3% over operating temperature
Digital Inputs (Optically Isolated)	9 – 150 Vdc [24 Vdc power supply]
	36 – 150 Vdc [48 Vdc power supply]
	90 – 300 Vdc [120 Vac / 125 Vdc power supply]
	165 – 300 Vdc [240 Vac / 250 Vdc power supply]
	Nominal current draw of 2.5 mA, minimum operating time of 15 msec
Relay Outputs	240 Vac / 250 Vdc. Make: 30 A for 0.2 seconds; Carry: 6 A continuous. Break: 0.2 A (L/R = 40 ms)
	Pickup time: <8 ms; Dropout time: <5 ms
Solid-State Outputs	240 Vac / 250 Vdc; Make: 30 A for 0.2 seconds; Carry: 8 A continuous. Break: 10 A (L/R = 40 ms)
	Pickup time: <1 ms; Dropout time: <15 ms
Power Supply	24 Vdc ± 20%
	48 Vdc ± 20%
	120 Vac / 125 Vdc ± 30%
	240 Vac / 250 Vdc ± 20%
	Burden: 14 W
Local/Remote Communications	EIA-RS-232C: 1 ea. located on front and rear panel
	Baud Rates: Auto baud rate up to 115,200 bps
	IRIG-B: 1 located on rear panel
	Optional Communications Daughterboards:
	RS-485 (DC isolated) Modbus 57,600 bps; DNP 38,400 bps
	Serial Fiber Optic (ST)
	Ethernet, Multi-Mode, Fiber Optic (MTRJ/MTRJ)
	Ethernet, Multi-Mode, Fiber Optic / Wire (MTRJ/RJ45)
	Ethernet, Multi-Mode, Wire (RJ45/RJ45)
	Ethernet, Single-Mode, Fiber Optic (LC/LC)

Table 4. Specifications (continued)

Front Panel Targets	23 Programmable LEDs
Front Panel Display	20 x 4 character LCD
Front Panel Keypad	8 fixed-function keys, 4 multi-function "soft" keys
	8 programmable "Hot-Keys"
Dimensions	Idea relay: 3 U high by 8.5" wide; 19" rack mount adapter plates and side by side mounting kits available
Relay Weight	10 lbs
Mounting	Horizontal
Operating Temperature	-40 °F to 158 °F (-40°C to 70 °C) continuous
Bump & Shock Test	IEC 60255-21-2 (1988) Class 1
Cold Temperature Test	IEC 60068-2-1 (2005) 16 hours at –40 °C
Electrostatic Discharge	EN 61000-4-2 (2008 Ed. 2.0) Levels 1, 2, 3, and 4
High Temperature Test	IEC 60068-2-2 (2005) 16 hours at 70 °C
Humidity Test	IEC 60068-2-30 (1999) 25 °C to 55 °C, 95% Humidity, 2 cycles
Impulse/Dielectric Withstand	IEC 60255-5 (2000)
	Impulse Test: 5 kV, 1.2 µs rise time, half wave 50 µs. Applied 3 impulses at each polarity
	Dielectric: 3150 Vdc for 1 minute.
	Insulation Resistance: Greater than 10 Gigaohms.
Radio Frequency Interference	Radiated:
	EN 61000-4-3 (2006)
	80 MHz – 2.7 Ghz, Idea 35 V/m.
	IEEE Std C37.90.2™-1995 standard
	Conducted:
	IEC 61000-4-6 (2003 with A1: 2004, A2 2006))
	150 kHz – 80 MHz, 10 Vrms
Surge Withstand	IEEE Std C37.90.1™-2012 standard 2.5 kV oscillatory, ‡ 4 kV fast transient
Vibration Test	IEC 60255-21-1 (1988) Class 1
Contact Rating	IEEE Std C37.90™-1989 standard, Section 6.7, 30 A for 0.2 seconds, 2000 operations, at 125 Vdc, 250 Vdc, and 240 Vac

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Printed in USA
Publication No. CA165002EN
August 2019

For Eaton's Cooper Power series product information call 1-877-277-4636 or visit: www.eaton.com/cooperpowerseries.