Edison Idea Relays
Catalog Data
CA165005EN

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Supersedes 165-265 February 2013

COOPER POWER SERIES

iTAP-265 dual overcurrent relay

Highlights

- Add functions and features using the IDEA Workbench™ feature
- Eaton's Cooper Power™ series 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
- Cold Load Pickup Logic
- Sequence of Events Recording
- Eight setting groups
- DNP 3.0 and Modbus protocols standard
- Viewable "Live" logic diagrams to aid in event analysis

Protective functions

- Independent phase instantaneous/definite time and inverse time overcurrent (50/51) for each tap
- Independent residual instantaneous/definite time, and inverse time overcurrent (50R/51R) for each tap
- Independent Close Inhibit/Hot Line Tag for each tap

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General

The iTAP-265 dual overcurrent relay is a member of Eaton's Cooper Power series Edison™ Idea™ line of protective relays. The iTAP-265 is a full featured relay suitable for overcurrent protection for two three-phase feeders in typical underground distribution switchgear applications. The iTAP-265 relay includes logic for manual or automatic control of two three-phase motor-operated feeders. The iTAP-265 relay also provides advanced power quality, metering, control, communication, and PLC functions.

The iTAP-265 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 relay by direct programming or by importing Custom Modules. These modules may be obtained from Eaton or created by the user.

Applications

The iTAP-265 relay contains independent inverse-time and definite-time overcurrent elements to protect two three-phase feeders (taps) in underground distribution switchgear.

To address the needs of automation, EMS, and SCADA systems, the iTAP-265 relay also provides advanced power quality, metering, control, and communications capabilities.

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

Hardware platform

The iTAP-265 relay is available in the IdeaPLUS™ relay platform. The IdeaPLUS platform contains a breaker control panel. See Figure 1. This feature eliminate the need for separately mounted breaker controls. This control panel provides:

- Large green and red, self-illuminated breaker TRIP and CLOSE pushbuttons.[1]
- Close Inhibit switch which, when enabled, blocks the ability of the relay to issue a close command to the circuit breaker.[2]
- 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 tap selection, ground trip block, and local/remote selection. Four of the buttons are user configurable in the IDEA Workbench feature.

1 Ability to close when unpowered determined by ordering option.

2 The Close Inhibit switch may be cleared remotely by communications unless Supervisor control is disabled from the relay's front panel.

Customize the iTAP-265 with the IDEA Workbench

The iTAP-265 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 iTAP-265 relay.

- Create custom control and protection logic using over 150 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.

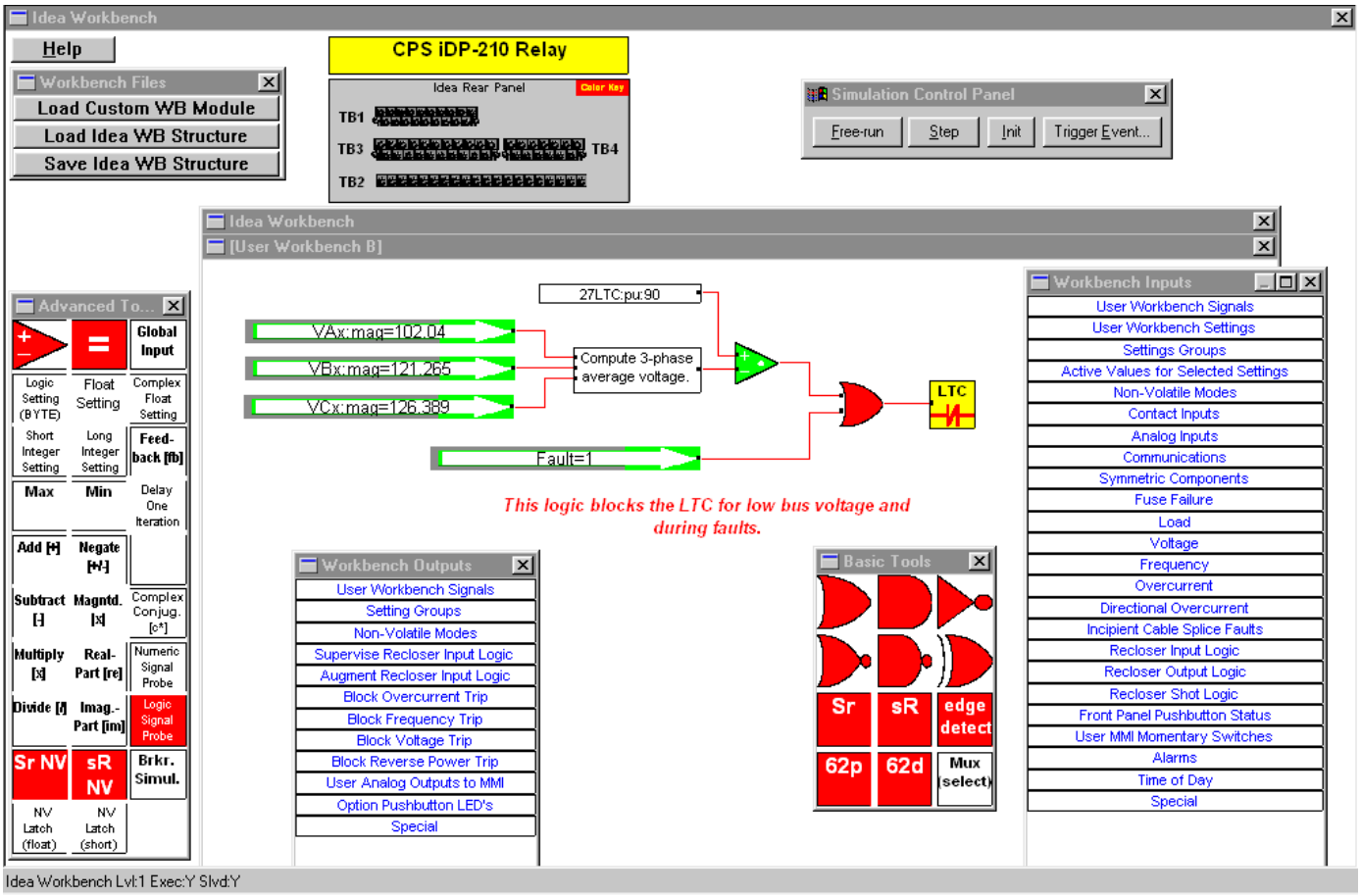


Figure 2. The IDEA Workbench graphical customization environment.

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 into steam. Over time, the insulation is damaged and the cable splice eventually fails. The iTAP-265 relay contains an algorithm to recognize the unique waveform characteristics of these self-clearing faults. See Figure 3. By counting how often these events occur over a moving time window, the iTAP-265 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.

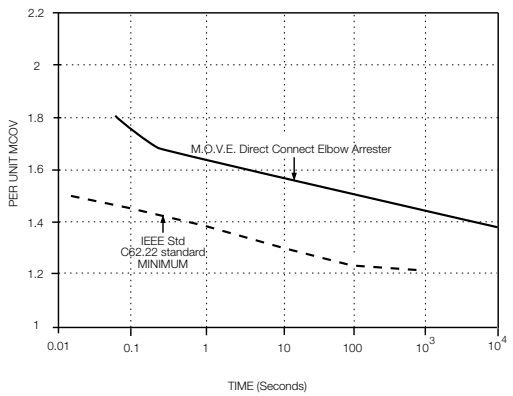


Figure 3. Typical self-cleaning fault detected by the IDP-210 relay's ICSF algorithm.

Overcurrent protection

The iTAP-265 relay offers inverse time and definite time elements for phase and residual overcurrent protection. Inverse time elements may be set for disk-like or instantaneous reset characteristics.

Cold load pickup logic

The iTAP-265 relay provides cold load pickup logic for each tap. 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.

Metering

The iTAP-265 relay offers extensive metering capabilities, including:

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

Event records and analysis tools

The iTAP-265 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.

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
- Fault duration
- Selection of system and fault impedances
- Selection of DC time constant
- Voltage and current parameters derived from a built-in power system model or entered manually

Communications

Both Modbus RTU and DNP 3.0 communication protocols are included with the iTAP-265 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 iTAP-265 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).[3] Contact your Eaton representative for availability of other communication protocols.

[3] Option selected when ordering.

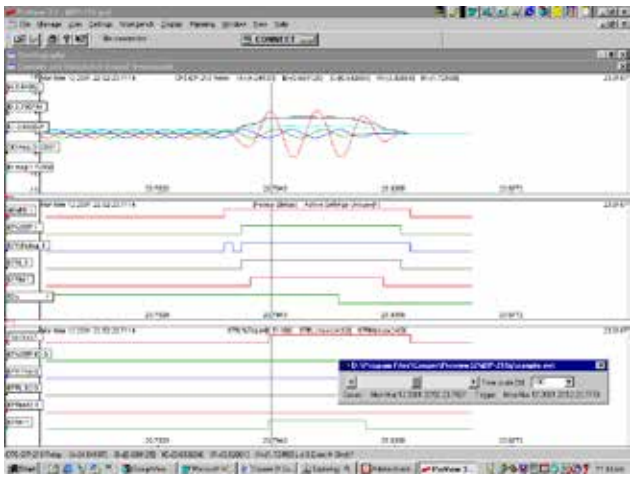


Figure 4. Typical oscillography view in the ProView application.

FRONT VIEW

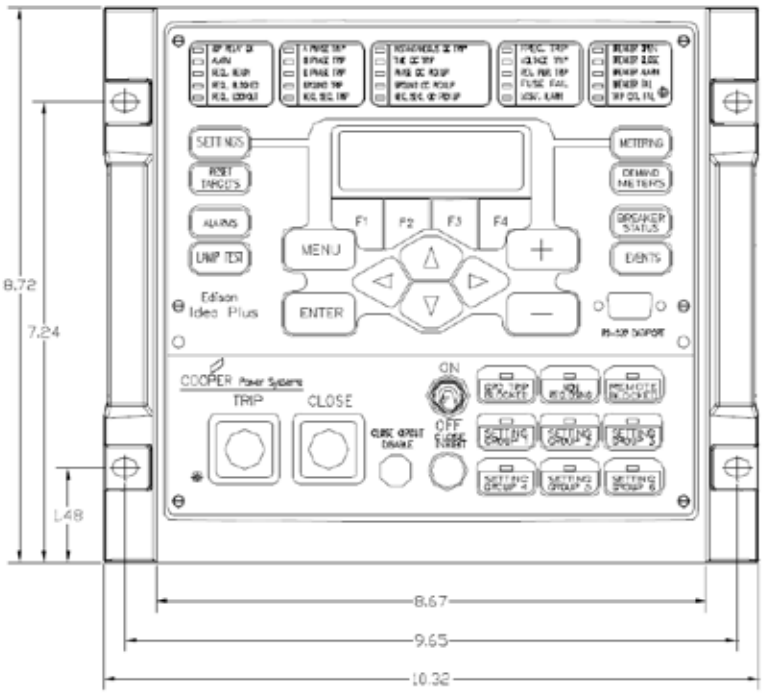


Figure 5. IdeaPLUS relay, front view (inches).

LEFT SIDE VIEW

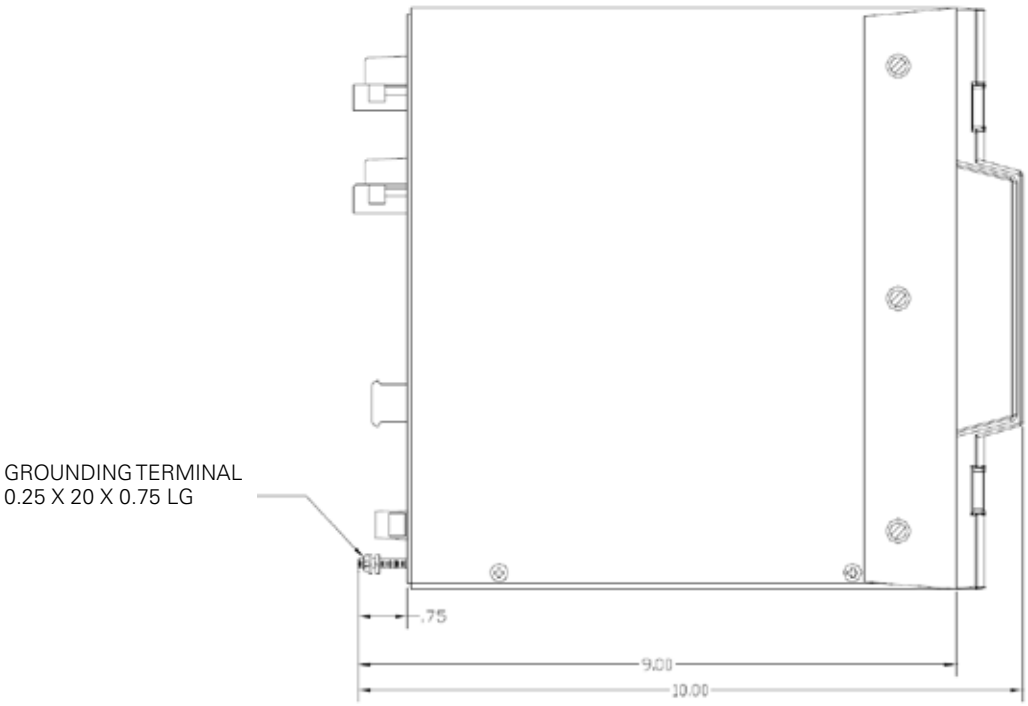


Figure 6. IdeaPLUS relay, side view (inches).

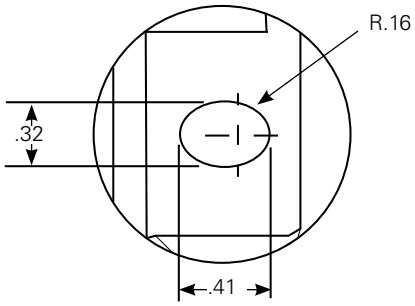


Figure 7. Idea relay, mounting hole detail (inches).

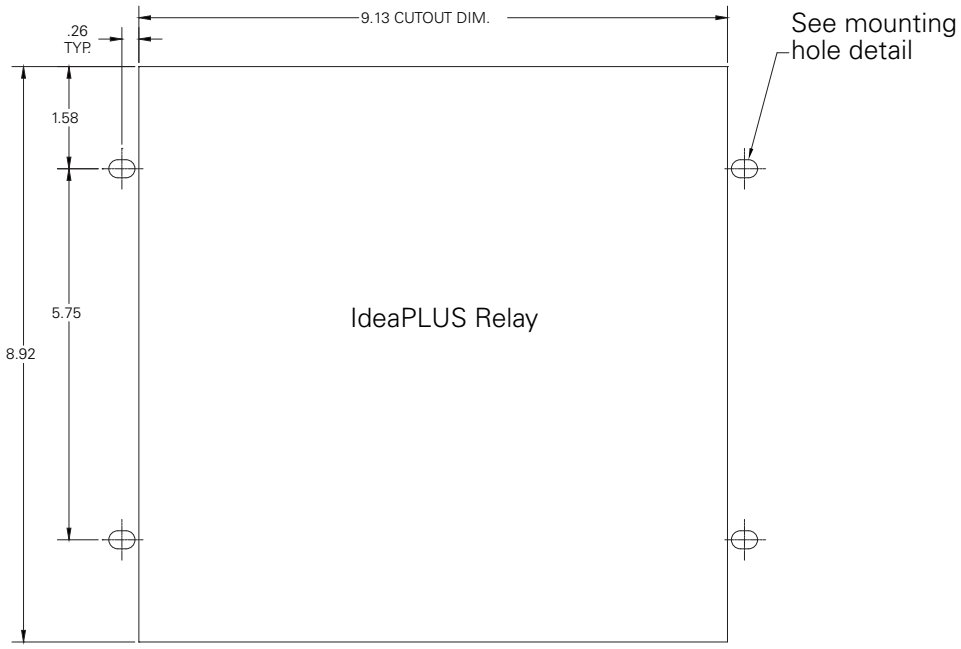


Figure 8. Panel cutout dimensions (inches).

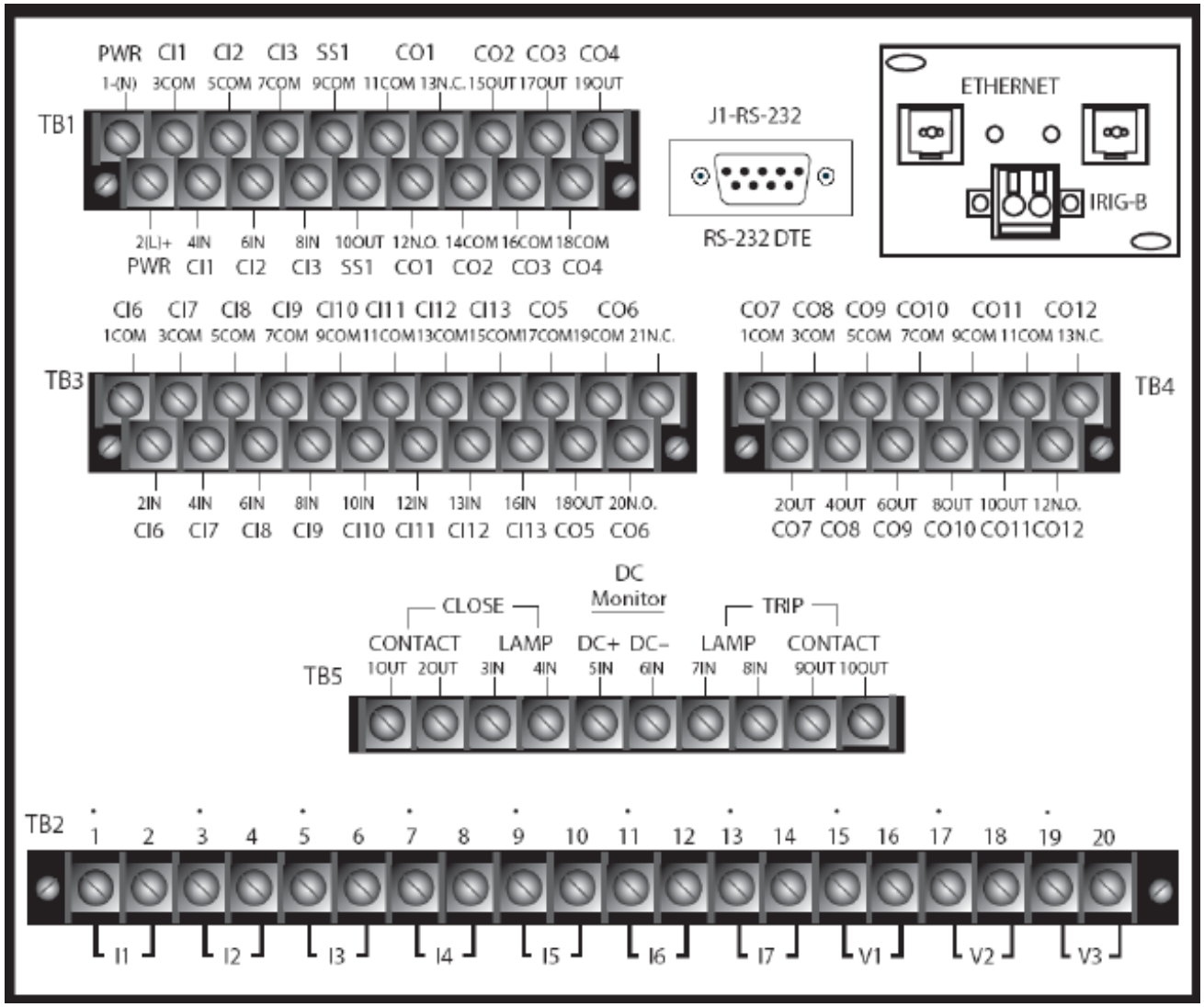
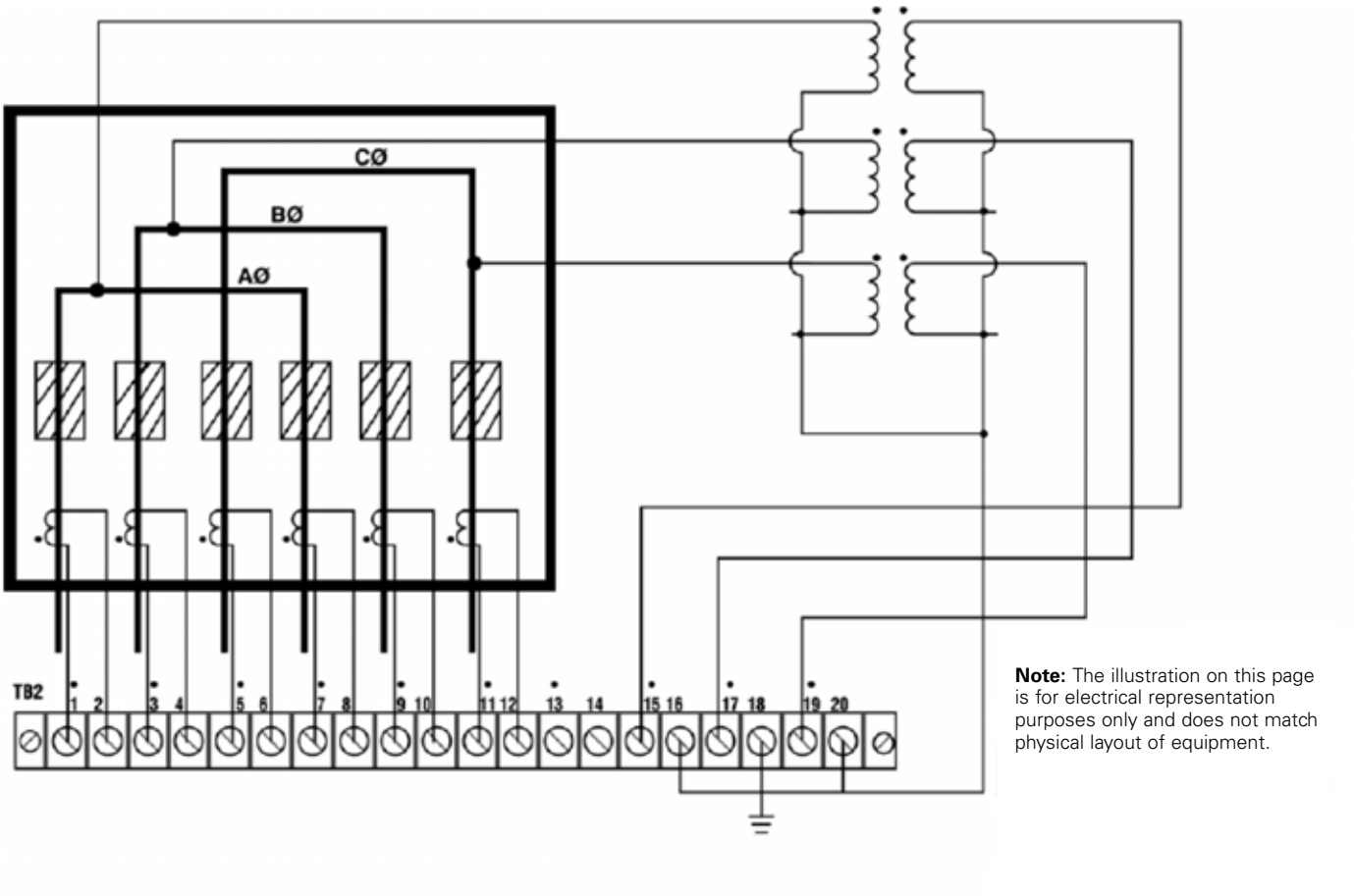


Figure 9. IdeaPLUS relay, rear panel details.



Note: The illustration on this page is for electrical representation purposes only and does not match physical layout of equipment.

Figure 10. iTAP-265 IdeaPLUS relay AC connection diagram.

Table 1. 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**	**T65**	**E**	**1**	**5**	**7**	**0**	**S**	**T**	**3**
TYPE	Edison Idea/IdeaPlus Relay	PR6										
	Edison IdeaPlus Chassis		P2									
Scheme/ Model	iTAP-265 Dual Overcurrent Relay			T65								
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	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

Table 2. Specifications

Frequency	50/60 Hz
Voltage Inputs	Three 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	Seven 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 Comm. 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 (1993) 16 hours at –40 °C
Electrostatic Discharge	EN 61000-4-2 (2008) 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)
	20 MHz – 1 Ghz, Idea 35 V/m.
	IEEE Std C37.90.2™-1995 standard
	35 V/m from 20 MHz to 1 GHz
	Conducted:
	IEC 61000-4-6 (2001)
	150 kHz – 80 MHz, 10 Vrms
	IEC 61000-4-16 (2001)
	15 Hz – 150 kHz, 10 Vrms
Surge Withstand	IEEE Std C37.90.1™-2002 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
Object Penetration	IEC 60529 (2001-02) IP3X rating

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