

Introducing SmartGuard™

Overload, short circuit and equipment ground fault protection in a single package!

Today's high tech equipment demands high tech protection. Our SmartGuard Equipment Leakage Circuit Breaker (ELCB) provides that protection, in one attractive, space-saving package.

SmartGuard is an equipment ground fault protection device that functions as a standard high-quality Carlingswitch hydraulic/magnetic circuit breaker, offering customized overload and short circuit protection. In addition, this breaker senses and guards against faults to ground using a state of the art integrated circuit developed by Carlingswitch. This new technology detects faults and when a fault occurs, the breaker trips and an LED illuminates. The LED gives a clear indication that the trip occurred as a result of leakage. This protection helps prevent serious equipment damage and fire.

SmartGuard is the most significant addition to the Carlingswitch product family, since the start of our circuit protection line close to two decades ago.

Protection for Many Applications

SmartGuard is specifically designed for those applications that could benefit from having overload, short circuit and ground fault protection in a single package.

SmartGuard can be used to protect several different types of equipment. Applications include:

- resistance and impedance heating systems
- telecommunications
- stage /theatre lighting
- marine control panels
- office machines
- medical equipment
- industrial automation
- industrial control
- UPS Systems



Innovative Features

Carlingswitch SmartGuard ELCB's are ground fault sensing and interruption devices employing innovative electronics technologies. Their precision mechanisms are temperature stable and are not adversely affected by temperature changes in their operating environment. As such, derating considerations due to temperature variations are not normally required, and heat-induced nuisance tripping is avoided.

- Overload, short circuit and ground fault protection in a single package
- Handle style actuators with optional "handleguard"
- Short circuit interrupt capacity, up to 5,000 amps
- Current ratings up to 50 amps
- Voltage ratings up to 480VAC
- Wiping Contacts - Mechanical linkage with two-step actuation – cleans contacts, provides high, positive contact pressure & longer contact life
- A trip-free mechanism, a safety feature, makes it impossible to manually hold the contacts closed during overload or fault conditions.
- A common trip linkage between all poles, another safety feature, ensures that an overload in one pole will trip all adjacent poles.
- Front panel or DIN Rail mounting options
- "Electromagnetic compatibility"
- "State of the art" integrated circuit developed by Carlingswitch
- Equipment leakage sensitivity from 10 to 100 milliamps
- Integral push-to-test button and LED "tripped" indicator
- Immediate reset after fault has been cleared

Founded in 1920, Carlingswitch has evolved to become a leader in today's switch and circuit protection technologies. Our in-house tooling and parts fabrication capabilities ensure consistently high quality products, short lead times and competitive pricing.

General Specifications

ELECTRICAL

UL Recognized and CSA Certified configurations and performance capabilities:

CIRCUIT CONFIGURATION	SYSTEM VOLTAGE			CURRENT RATING		INTERRUPTING CAPACITY, AMPS Without BACKUP FUSE UL/CSA	LEAKAGE CURRENT MUST TRIP RATINGS (MILLIAMPS)
	MAX RATING	FREQUENCY	PHASE	FULL LOAD AMPS ¹	GENERAL PURPOSE AMPS ²		
SERIES	120/208	50/60 Hz	1 Ø	1.00 - 50.0	-	5000	10 - 100
	120/240	50/60 Hz	3 Ø	1.00 - 50.0	-	2000	10 - 100
	208-240 480Y	50/60 Hz	3 Ø	1.00 - 30.0	30.1 - 50	2000	10 - 100

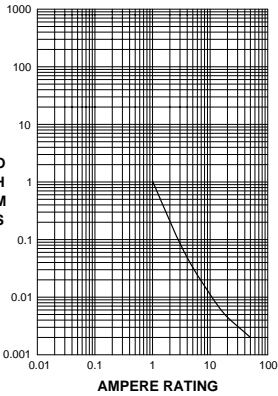
1. For motor load Applications
2. For Non-Motor Load Applications

Maximum Voltage: AC, 480 WYE/277 VAC, 50/60 Hz
Standard Current Ratings: 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 & 50.0 amps.
 For other ratings, consult factory.

Insulation Resistance: Minimum of 100 Megohms at 500 VDC.

Dielectric Strength: 1960 VAC, 60 Hz for one minute between all electrically isolated terminals.

Resistance, Impedance:
FROM LINE TO LOAD TERMINAL
 (Values Based on Series Trip Circuit Breaker)



CURRENT (AMPS)	TOLERANCE (%)
1.00 - 5.0	± 15%
5.1 - 20.0	± 25%
20.1 - 50.0	± 35%

MECHANICAL

Endurance: 10,000 ON-OFF operations @ 6 per minute; with rated current and voltage.

Trip Free: All SmartGuard equipment leakage circuit breakers will trip on overload or leakage to ground, even when actuator is forcibly held in the ON position.

Trip Indication: The actuator moves to the OFF position when an overload or earth leakage ground fault causes the breaker to trip. The LED is illuminated when leakage to ground causes the circuit breaker to trip.

ENVIRONMENTAL

Operating Temperature: +10°C to +50°C

PHYSICAL

Number of Poles: 2, 3 & 4

Length (included switched or unswitched neutral):
 4.2 inches (106.7 mm)

Width: 2-pole: 3.0 inches (76.2 mm)
 3-pole: 3.75 inches (95.3 mm)
 4-pole: 4.5 inches (114.3 mm)

Depth: 2.5 inches (63.5mm).

Weight: 2-pole: 16.0 oz. (453.6 gm)
 3-pole: 21.4 oz. (606.7 gm)
 4-pole: 26.9 oz. (762.6 gm)

Standard Colors: Housing - gray; Actuator - black, red, or white

Mounting: Front Panel or Standard 35mm Symmetrical DIN Rail (35 x 7.5 or 35 x 15mm per DIN EN5002).

Termination: Box Lug

LEAKAGE TO GROUND

Standard Must Trip Leakage Current Ratings: 10, 15, 30, 50 and 100 milliamps. For other ratings, consult factory.

Trip Time: 300 ms Max. @ 100%, 40ms Max. @ 500% of must trip leakage current.

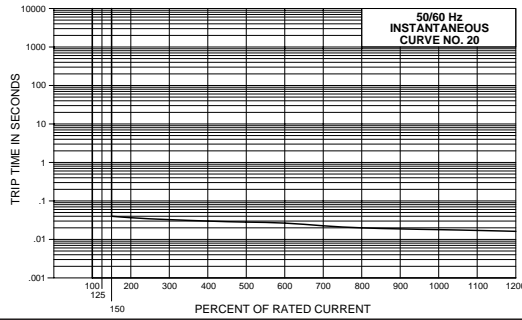
Test Button: On breaker face above actuator.

Leakage Trip Indicator: Red LED on breaker face above actuator.

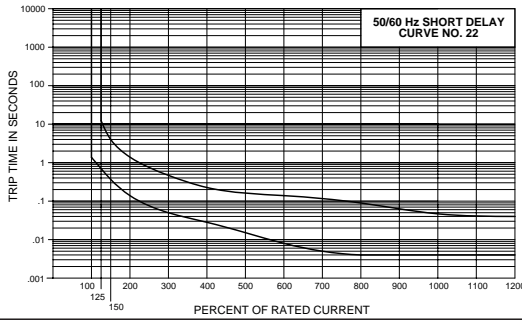
Time Delay Values

AC

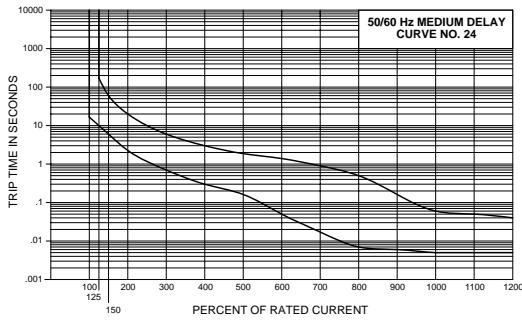
Instantaneous



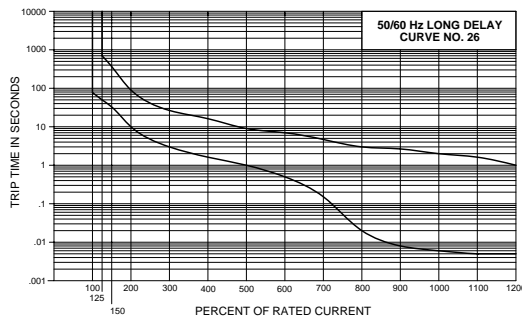
Short



Medium



Long



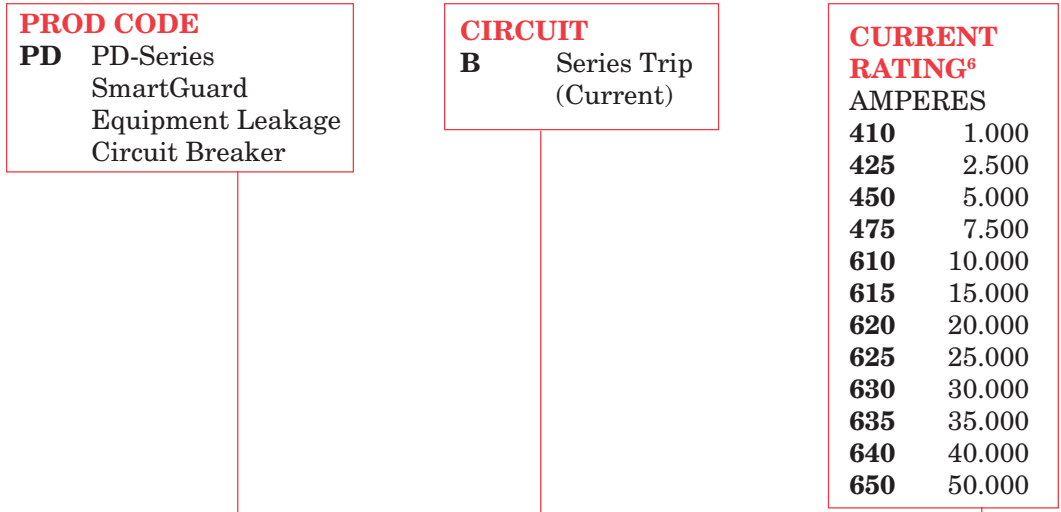
NOTES

Delay Curves 22,24,26: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.

Delay Curve 20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limits shown in this curve.

All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.

Ordering Scheme



PD R - B - 24 - 650

SYSTEM VOLTAGE/POLES		
	SYSTEM VOLTAGE	POLES
A	120VAC 1Ø	One plus unswitched neutral ³
B	120/240 VAC 1Ø	Two
C	120/208 VAC 1Ø, 120/240 VAC 1Ø	Two plus unswitched neutral ³
D	120/208 VAC 1Ø, 120/240 VAC 1Ø	Two plus switched neutral ^{3,4}
E	208/240 VAC 3Ø	Three
F	208/240 VAC 3Ø	Three plus unswitched neutral ³
G	208/240 VAC 3Ø	Three plus switched neutral ^{3,4}
P	480Y VAC 3Ø	Three
Q	480Y VAC 3Ø	Three plus unswitched neutral ³
R	480Y VAC 3Ø	Three plus switched neutral ^{3,4}

FREQUENCY AND DELAY	
20	50/60Hz Instantaneous
22	50/60Hz Short
24	50/60Hz Medium
26	50/60Hz Long

- NOTES
- The leakage currents shown will cause the breaker to trip (must-trip current). The must-hold current is 75% of the must-trip current. For other leakage current values, please consult factory.
 - All breakers are front panel mountable using screw size shown. Breakers may also be mounted on either 35mm x 7.5mm or 35mm x 15mm symmetrical DIN rail.
 - Units with a switched or unswitched neutral connection are the same size as a unit with an additional breaker pole (e.g. a 2-pole unit with a switched or unswitched neutral is the same physical size as a 3-pole unit.)
 - Switched neutral poles contain the same overcurrent protection as the other poles.
 - Please consult factory for other constructions.
 - Please consult factory for other current ratings.
 - Please consult factory for VDE & TUV certification status.

TERMINAL

1 Front Connected Box Lug with Pressure Plate

ACTUATOR COLOR & LEGEND ON LABEL

	HANDLE COLOR	LEGEND ON LABEL
A	White	I-O
B	White	ON-OFF
1	White	Dual
C	Black	I-O
D	Black	ON-OFF
2	Black	Dual
E	Red	I-O
F	Red	ON-OFF
3	Red	Dual

AGENCY APPROVAL

A W/O Approval
B ULRecognized
C ULRecognized
 CSA Certified
D⁷ ULRecognized
 CSA Certified
 VDE Certified
E⁷ ULRecognized
 CSA Certified
 TUV Certified

- **C** - **1 A 1** - **1** - **C**

EQUIPMENT LEAKAGE - TRIP CURRENT¹

C 10 milliamps
D 15 milliamps
E 30 milliamps
F 50 milliamps
G 100 milliamps

ACTUATOR STYLE

HANDLE
A without Handleguard
B with Handleguard

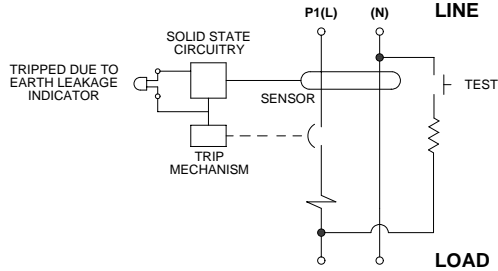
MOUNTING

1 Threaded insert 6-32 x 0.195 inches deep
2 Threaded insert ISO M3 x 5mm deep

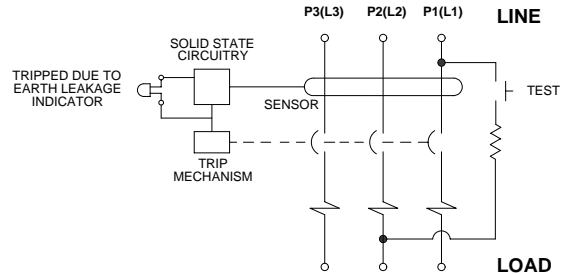
Circuit Diagrams

CIRCUIT SCHEMATICS

1-POLE CIRCUIT PDA

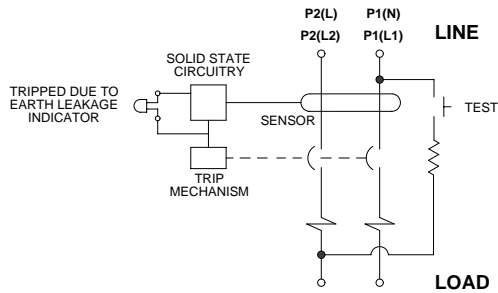


3-POLE CIRCUITS PDE & PDP

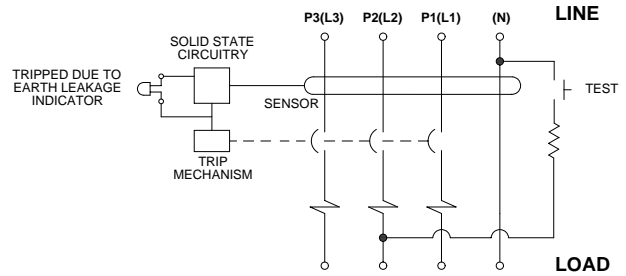


2-POLE CIRCUITS

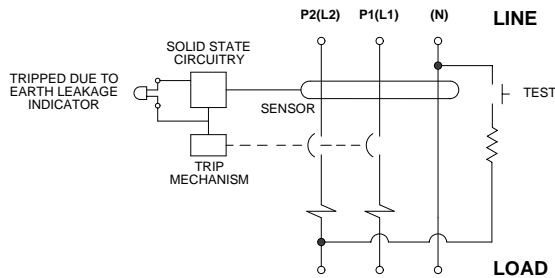
PDB



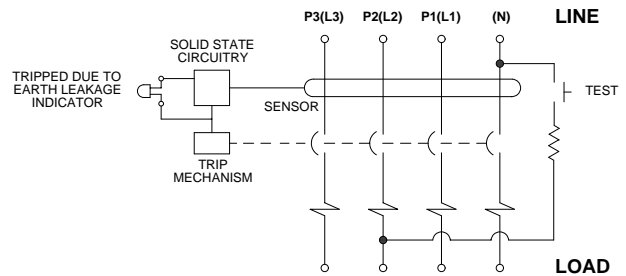
PDF & PDQ (WITH UNSWITCHED NEUTRAL)



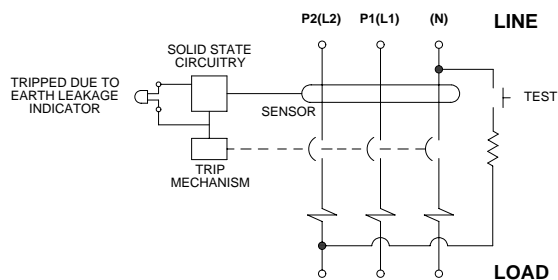
PDC (WITH UNSWITCHED NEUTRAL)



PDG & PDR (WITH SWITCHED NEUTRAL)



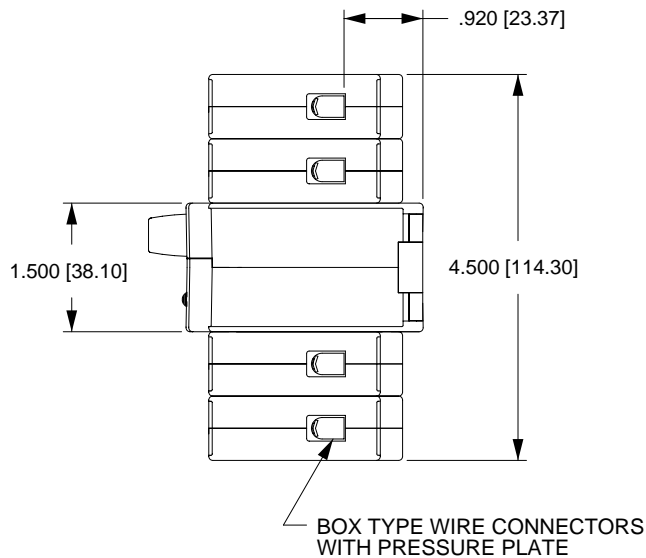
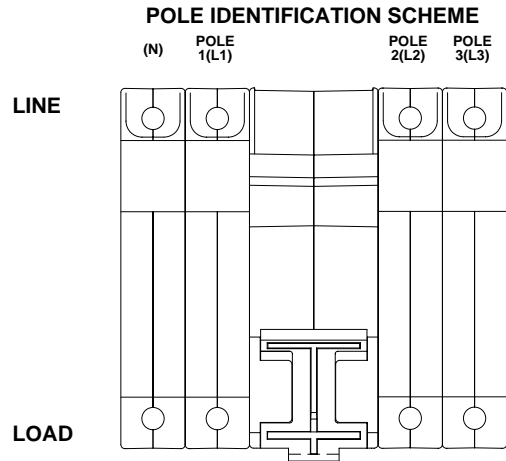
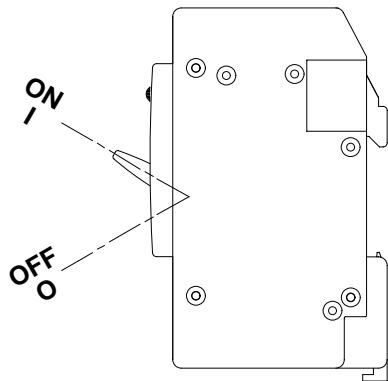
PDD (WITH SWITCHED NEUTRAL)



NOTES

1. All dimensions are in inches [mm].
2. Tolerance $\pm .020$ [.51] unless otherwise specified.

Terminal Diagrams

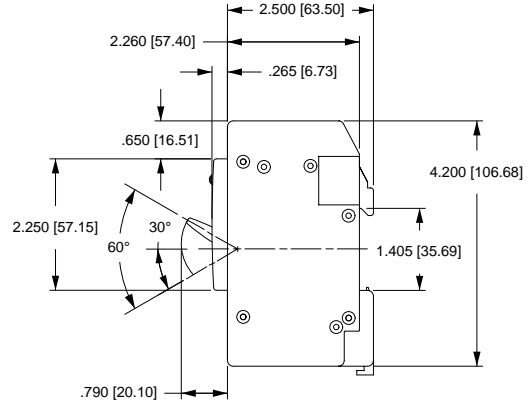
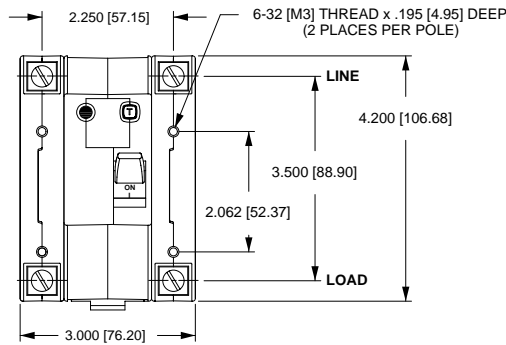


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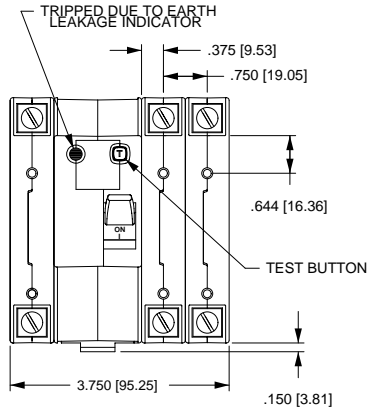
1. All dimensions are in inches [mm].
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Form & Fit Diagrams

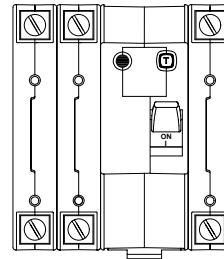
PDA & PDB



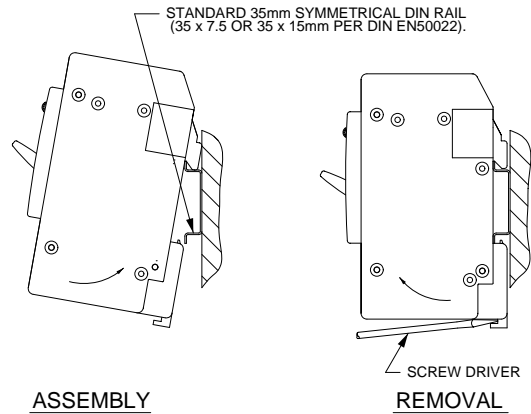
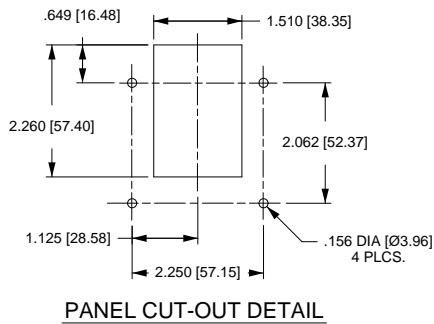
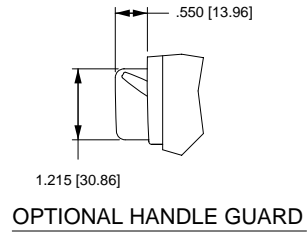
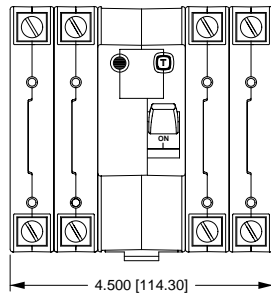
PDC & PDD



PDE & PDP



**PDF, PDG
PDQ & PDR**



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