

PC-Series

Ground Fault Circuit Protection

The PC-Series, AC Residual Current Circuit Breaker with Overcurrent Protection (RCBO), combines the ground fault protection of a GFCI with the familiar overcurrent tripping characteristics of a normal circuit breaker.

The PC-series utilizes the hydraulic magnetic principle which provides precise operation and performance even when exposed to extremely hot and/or cold application environments.

Features:

- ♦ Overload, short circuit and ground fault protection in a single package
- ♦ Handle style actuators and rocker style “acuguard”
- ♦ 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 mounting
- ♦ Integral push-to-test button
- ♦ Two integrated LED indicators distinguish if a breaker is closed with Line Voltage present, or has opened due to leakage current, or has opened due to over current, or is closed with no Line Voltage present.
- ♦ Optional Hot/Neutral reversal detection and protection



Benefits:

- ♦ Increases safety around boats and marinas
- ♦ Protects against electrical shock hazards in areas near water
- ♦ Protects against defects in the wires & conductors
- ♦ Reduces fire and shock hazards from defects in
- ♦ Detects low level ground faults, which do not trip ordinary circuit breakers, that can lead to fires and shock hazards for boating occupants



Carling Technologies™

Innovative Designs. Powerful Solutions.

Innovative Designs. Powerful Solutions.

Carling Technologies, Inc.
60 Johnson Avenue • Plainville, CT 06062-1177
Phone: (860) 793-9281 • Fax: (860) 793-9231
Email: sales@carlingtech.com • www.carlingtech.com

Electrical Tables

Table A: Lists UL Listed configurations as a Ground Fault Circuit Interruptor

PC SERIES TABLE A : LISTS UL LISTED CONFIGURATIONS AS A GROUND FAULT CIRCUIT INTERRUPTOR							
	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES
SERIES	120	50 / 60	1	1 - 50	5000	6	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	6	2 or 3 Poles. One pole of a three pole unit must be Neutral

Table B: Lists UL Listed and Recognized as an Earth Leakage Circuit Interruptor - 120 and 120/240V

PC SERIES TABLE B : LISTS UL LISTED AND RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 120 and 120/240V							
	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES
SERIES	120	50 / 60	1	1 - 50	5000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral
SERIES IGNITION PROTECTED	120	50 / 60	1	1 - 50	3000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral

Table C: Lists UL Listed and Recognized as an Earth Leakage Circuit Interruptor - 240V

PC SERIES TABLE C : LISTS UL LISTED AND RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 240V							
	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES
SERIES	240	50 / 60	1	1 - 30	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 11
SERIES IGNITION PROTECTED	240	50 / 60	1	1 - 50	3000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 12

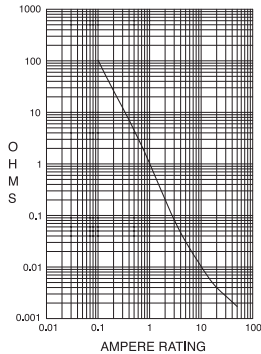
*Manufacturer reserves the right to change product specification without prior notice.

Electrical

Current Ratings	1 - 50 Amps maximum
Voltage Rating	120VAC, 120/240VAC, 240VAC
Current Trip Level	30mA & 6mA
Current Trip Time	For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds The above complies with UL-1053 & ABYC E11. For 6mA leakage trip: ≤25ms The above complies with UL-943.
Operating Frequency	50/60 Hz for 30mA leakage trip 60 Hz for 6mA leakage trip
Interrupt Capacity	5,000 Amps

Impedance

RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Breaker)



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	15%
5.1 - 20.0	25%
20.1 - 50.0	35%

Innovative Features

Indicator	Two integrated LEDs, Red & Green ♦ Green LED On, Red LED Off Line Voltage is present, the breaker is closed, and the device is protecting the circuits against over current and leakage current. ♦ Green LED Off, Red LED On The device has detected leakage current and has opened the circuit breaker. ♦ Green LED Flashing, Red LED Off The circuit breaker has opened due to over current or has been turned off manually ♦ Green LED Off, Red LED Off Line Voltage is not present ♦ Green LED Flashing, Red LED Off, Amber LED ON Indicates Hot & Neutral are reversed and the circuit breaker is open Neutral Protection When neutral is grounded on load side of circuit Test Button Located on Ground Fault Module
-----------	---

Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.
Trip Free	Trips on short circuit, overload or leakage to ground, even when actuator is forcibly held in the "On" position

Physical

Number of Poles (Breakers only)	1-pole (1 Circuit Breaker + 1 GFCI Sensor Module), 120V 2-pole (2 Circuit Breakers + 1 GFCI Sensor Module), 120/240V or 120V with Neutral Break. 240VAC two pole 3-pole 120/240V with Neutral Break (Sensor module has 2 pole width) Circuit Breaker Line Side: #10-32, threaded stud. GFCI Sensor Module Load Side: #10-32 threaded stud. Neutral pigtail. Front Panel, #6-32 and M3 threaded inserts.
Termination	Handle, Flat Rocker, Curved Rocker (with or without rocker guard), Push-to-Reset Rocker
Mounting	
Actuator	

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF- 55629 and MIL-STD-202G as follows:

Shock	Withstands 100 G, 6ms, sawtooth at rated current per Method 213, Test Condition "I".
Vibration	Withstands 0.06" excursion from 10-55 Hz, and 10 G 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current.
Moisture Resistance	93% RH at 30°C for 168 Hours.
Operating Temperature	-35°C to +66°C
Corrosion	UL-943-6.21, 3 weeks Humidity: 30±2°C, 70±2% relative humidity Mixed Flowing Gases: 100 ppb H ₂ S, 20 ppb Cl ₂ , 200±50 ppb NO ₂

Agency Certifications

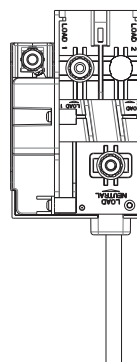
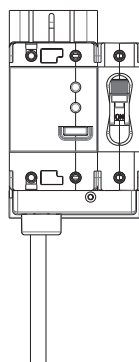
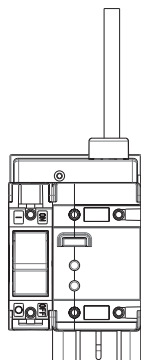
UL Listed	
UL Standard 489	Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)
UL Standard 1077	Supplementary Protectors
UL Standard 943	Class A Ground Fault Circuit Interruptors
UL Standard 1053	Ground Fault Sensing and Relaying Equipment
UL Standard 1500	Ignition Protection

INDICATE OFF / SINGLE COLOR
ROCKER ACTUATOR

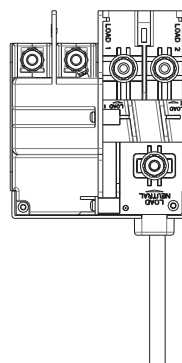
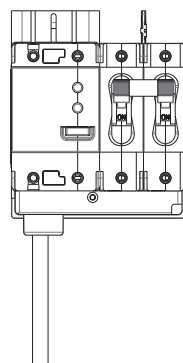
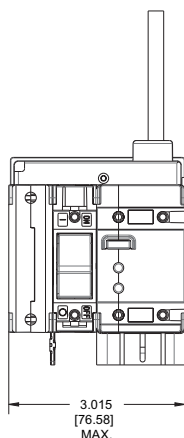
HANDLE / INDICATE ON
ROCKER ACTUATOR

TERMINAL
LOCATIONS

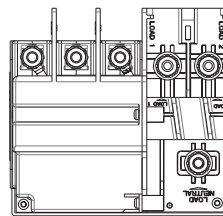
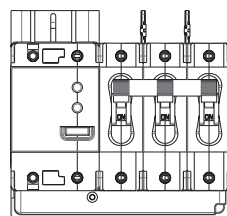
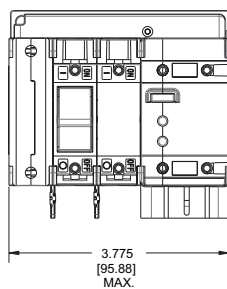
PCA
120 VAC
VERSION



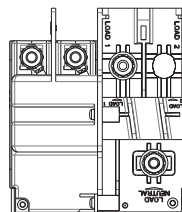
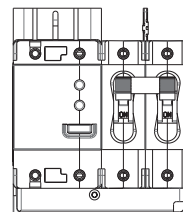
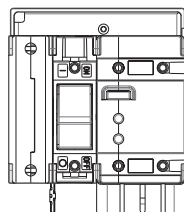
PCB
120/240 VAC
VERSION



PCC
120/240 VAC
VERSION
W/ NEUTRAL BREAK



PCD
120 VAC
VERSION
W/NEUTRAL BREAK

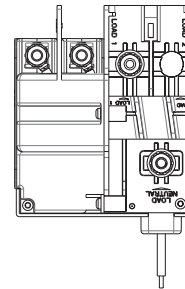
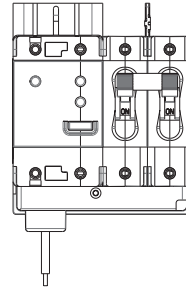
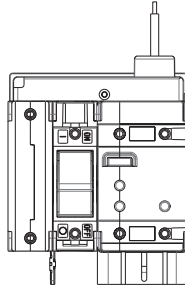


INDICATE OFF / SINGLE COLOR
ROCKER ACTUATOR

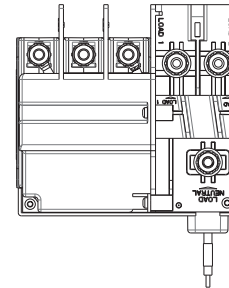
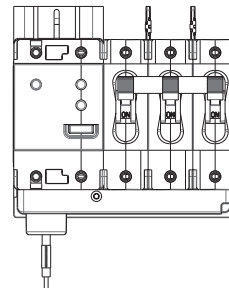
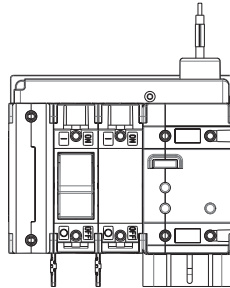
HANDLE / INDICATE ON
ROCKER ACTUATOR

TERMINAL
LOCATIONS

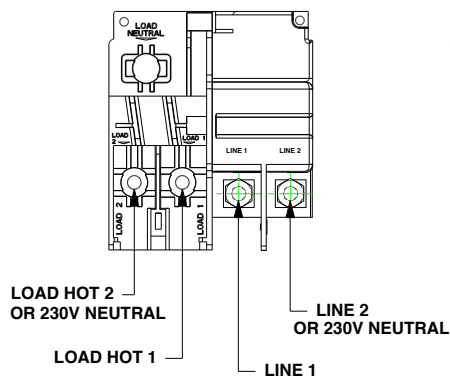
PCE
120 VAC VERSION
W/ REVERSE POLARITY
INDICATOR



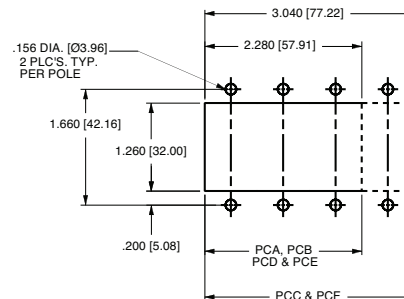
PCF
120/240 VAC VERSION
W/ REVERSE POLARITY
INDICATOR



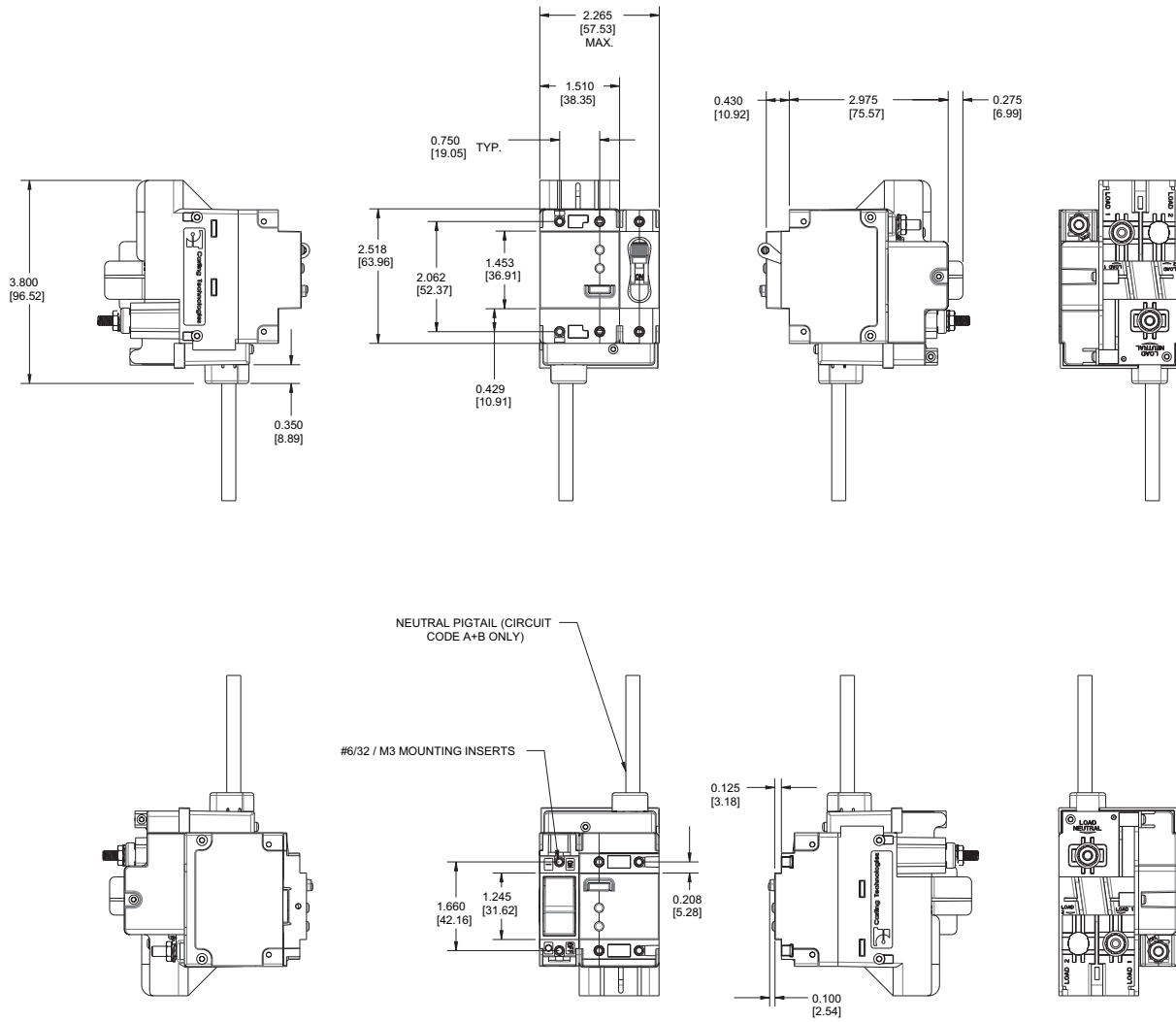
NOTE: NEUTRAL & GROUND PIGTAIL WIRES - SUPPLIED 12" LONG MIN. (CIRCUIT CODES A,B,E & F)



1-Phase 240VAC



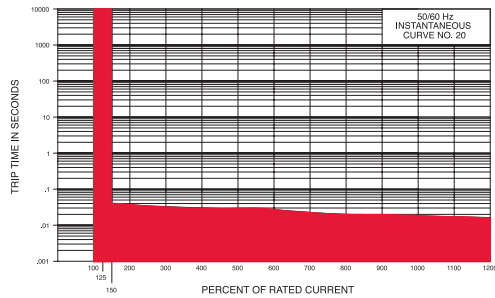
ROCKER ACTUATOR



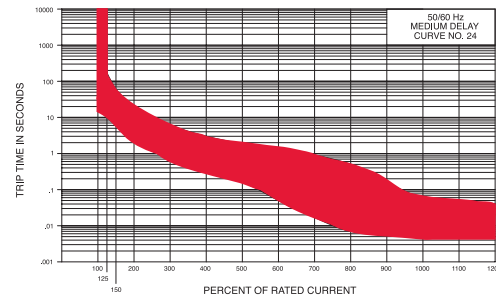
Notes:
For additional circuit breaker dimensions, reference the C-Series Breakers in the Carling Circuit Protection catalog

Time Delay Curves

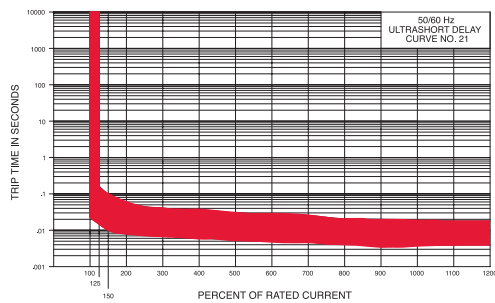
Instantaneous



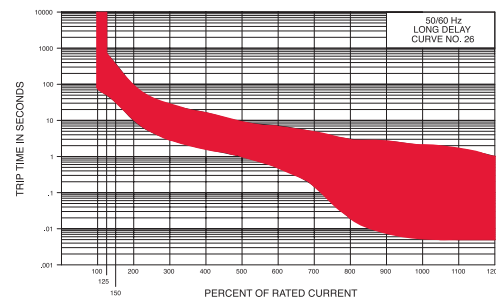
Medium



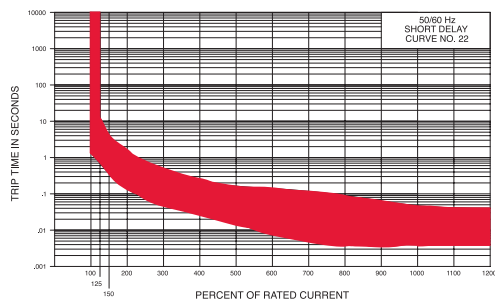
Ultra Short



Long



Short



TIME DELAY VALUES									
PERCENT OF RATED CURRENT									
DELAY	100%	125%	150%	200%	400%	600%	800%	1000%	1200%
20	No Trip	May Trip	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
21	No Trip	.014 - .150	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
24	No Trip	10.0 - 160	6.00 - 60.0	2.20 - 20.0	.300 - 3.00	.050 - 1.30	.007 - .500	.005 - .060	.005 - .040
26	No Trip	50.0 - 700	32.0 - 350	10.0 - 90.0	1.50 - 15.0	.500 - 7.00	.020 - 3.00	.006 - 2.00	.005 - 1.00

Notes:

Other time delay values available, consult factory.

Delay Curves 21,22,24,26: 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 limit 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.

The minimum inrush pulse tolerance handling capability is 12 times the rated current. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse.

PC	B	—	B	A	—	24	—	620	—	1	B	A	—	A	10
1 Series	2 System Voltage/Poles		3 Circuit	4 Actuator		5 Frequency & Delay		6 Current Rating		7 Terminal	8 Actuator Color	9 Mounting/ Barriers		10 Trip Level	11 Agency Approval

1 SERIES PC

2 SYSTEM VOLTAGE / POLES

- A** 120 VAC single phase, one pole
B 120/240 VAC single phase, two pole
C 120/240 VAC single phase with switched neutral, three pole
D 120 VAC single phase with switched neutral, two pole
E 120 VAC single phase with reversed polarity indicator, two pole
F 120/240 VAC single phase with reversed polarity indicator, three pole
G 240 VAC single phase, two pole

3 CIRCUIT

- B** Series Trip (Current)

4 ACTUATOR

Handle

- A** one per pole
B one per multipole unit

Two Color Curved Visi-Rocker

- C** Indicate ON, vertical legend
D Indicate ON, horizontal legend
F Indicate OFF, vertical legend
G Indicate OFF, horizontal legend

Single Color Curved Rocker

- J** Vertical legend
K Horizontal legend

Two Color Curved Visi-Rocker

Push-to-Reset

- N** Vertical legend
O Horizontal legend

Single Color Curved Rocker

Push-to-Reset

- R** Vertical legend
U Horizontal legend

Two Color Flat Visi-Rocker

- 1** Indicate OFF, vertical legend
2 Indicate OFF, horizontal legend

Single Color Flat Rocker

- 3** Vertical legend
4 Horizontal legend

Two Color Flat Visi-Rocker

Push-to-Reset

- 5** Indicate OFF, vertical legend
6 Indicate OFF, horizontal legend

Single Color Flat Rocker

Push-to-Reset

- 7** Vertical legend
8 Horizontal legend

ROCKER STYLE DESCRIPTIONS					
VERTICAL STYLE	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR		INDICATE "OFF"
	CODE "1"	CODE "1", "N"	CODE "2", "R"	CODE "1", "R"	CODE "3", "R"
HORIZONTAL STYLE	CODE "1"	CODE "1", "O"	CODE "1", "U"	CODE "2", "U"	CODE "4", "U"
	CODE "1"	CODE "1", "O"	CODE "2", "U"	CODE "2", "U"	CODE "4", "U"

5 AUXILIARY/ALARM SWITCH

- 20** 50/60Hz Instantaneous
21 50/60Hz Ultra Short
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long

6 CURRENT RATING (AMPERES)

CODE	AMPERES				
210	0.100	285	0.850	450	5.000
215	0.150	290	0.900	455	5.500
220	0.200	295	0.950	460	6.000
225	0.250	410	1.000	465	6.500
230	0.300	512	1.250	470	7.000
235	0.350	415	1.500	475	7.500
240	0.400	517	1.750	480	8.000
245	0.450	420	2.000	485	8.500
250	0.500	522	2.250	490	9.000
255	0.550	425	2.500	495	9.500
260	0.600	527	2.750	610	10.000
265	0.650	430	3.000	710	10.500
270	0.700	435	3.500	611	11.000
275	0.750	440	4.000	711	11.500
280	0.800	445	4.500	612	12.000
				650	50.000

7 TERMINAL

- 1** Stud, 10-32 threaded

8 ACTUATOR COLOR & LEGEND

Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	A	B	1	Black
Black	C	D	2	White
Red	F	G	3	White
Green	H	J	4	White
Blue	K	L	5	White
Yellow	M	N	6	Black
Gray	P	Q	7	Black
Orange	R	S	8	Black

9 MOUNTING/BARRIERS

	MOUNTING STYLE	BARRIERS
A	Threaded Insert, 2 per pole	
	6-32 X 0.195 inches	yes
B	Rockerguard Bezel	
	ISO M3 x 5mm	yes
C	Threaded Insert, 2 per pole	
	6-32 X 0.195 inches	yes
D	Standard Bezel with Recessed Off-Side Flat Rocker	
	ISO M3 x 5mm	yes
E	Threaded Insert, 2 per pole	
	6-32 X 0.195 inches	yes
F	Push-to-Reset Bezel	
	ISO M3 x 5mm	yes
G	Threaded Insert, 2 per pole	
	6-32 X 0.195 inches	yes
H	Rockerguard Bezel	
	ISO M3 x 5mm	yes

10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT

- A** 5 MA (CLASS A GFCI)²
E 30 MA (ELCB)^{1,3}

11 AGENCY APPROVAL

- AA** W/O Approvals
10 UL 943²
11 UL 1053^{1,3}
12 UL 1053 & UL 1500^{1,3,4}

Notes:

- 1 This device meets the requirements of ABCY E11.
2 6mA per UL943, available with agency approval code 10.
3 30mA per UL1053, available with agency approval codes 11 & 12.
4 AIC Rating at 120 VAC 3kA, at 120/240 VAC 5kA