

# 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 which 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 permanently installed appliances such as water heaters, battery chargers, lighting fixtures, etc.
- Detects low level ground faults, which do not trip ordinary circuit breakers, that can lead to fires and shock hazards for boating occupants

## 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							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
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							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
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

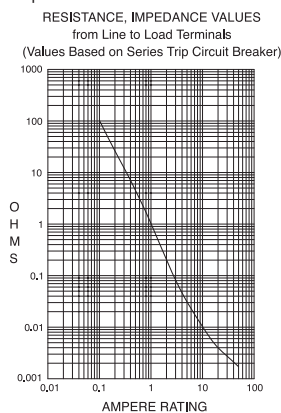
**Table C:** Lists UL Listed and Recognized as an Earth Leakage Circuit Interruptor - 240V

PC SERIES TABLE C : LISTS UL LISTED AND RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 240V							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
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

## 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



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 ♦ <b>Green LED On, Red LED Off</b> Line Voltage is present, the breaker is closed, and the device is protecting the circuits against over current and leakage current. ♦ <b>Green LED Off, Red LED On</b> The device has detected leakage current and has opened the circuit breaker. ♦ <b>Green LED Flashing, Red LED Off</b> The circuit breaker has opened due to over current or has been turned off manually ♦ <b>Green LED Off, Red LED Off</b> Line Voltage is not present ♦ <b>Green LED Flashing, Red LED Off, Amber LED ON</b> 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 <b>Humidity:</b> 30±2°C, 70±2% relative humidity <b>Mixed Flowing Gases:</b> 100 ppb H2S, 20 ppb Cl2, 200±50 ppb NO2

## Agency Certifications

<b>UL Listed</b>	
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

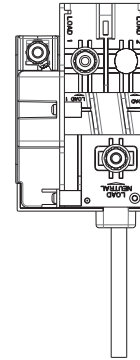
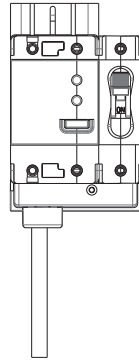
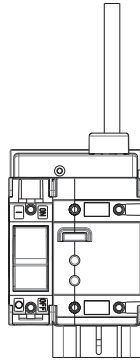
\*Manufacturer reserves the right to change product specification without prior notice.

INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

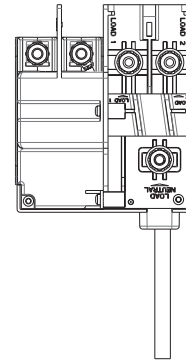
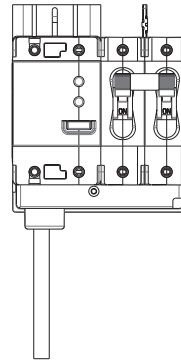
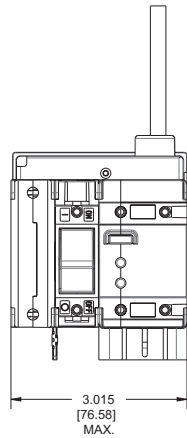
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

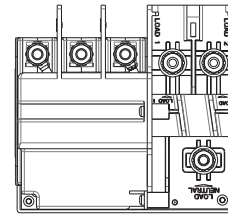
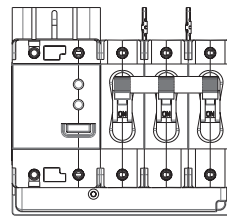
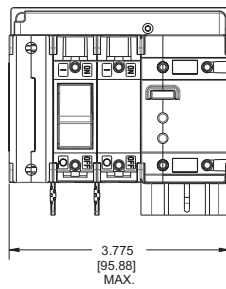
PCA  
120 VAC  
VERSION



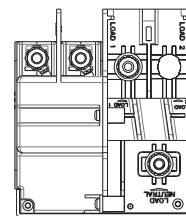
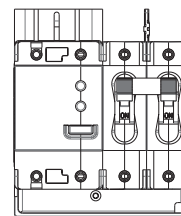
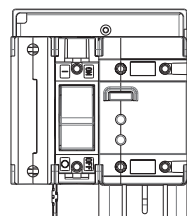
PCB  
120/240 VAC  
VERSION



PCC  
120/240 VAC  
VERSION  
W/ NEUTRAL BREAK



PCD  
120 VAC  
VERSION  
W/NEUTRAL BREAK

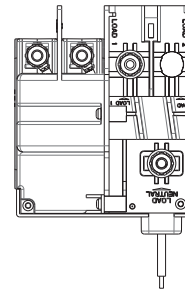
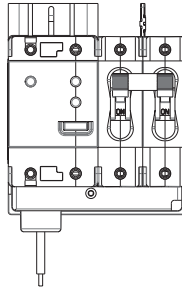
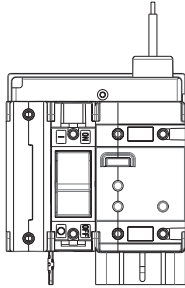


INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

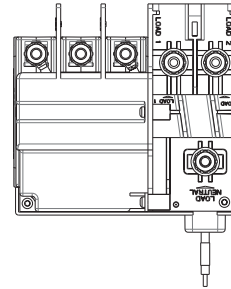
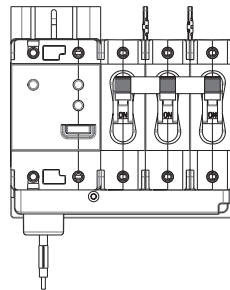
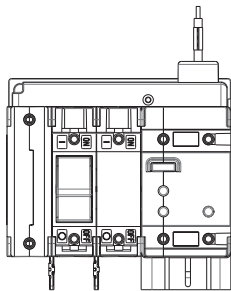
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

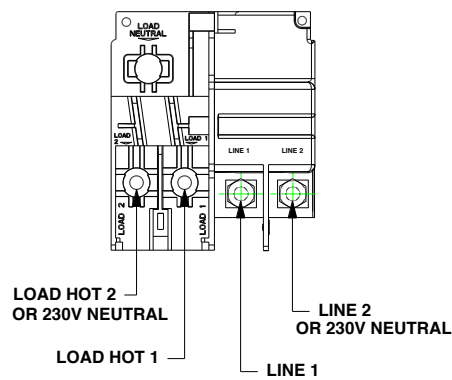
PCE  
120 VAC VERSION  
W/ REVERSE POLARITY  
INDICATOR



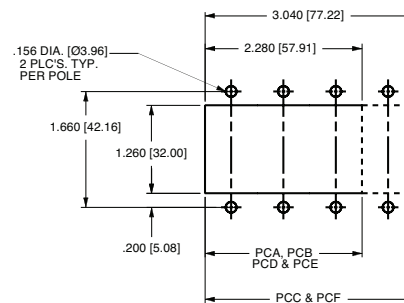
PCF  
120/240 VAC VERSION  
W/ REVERSE POLARITY  
INDICATOR



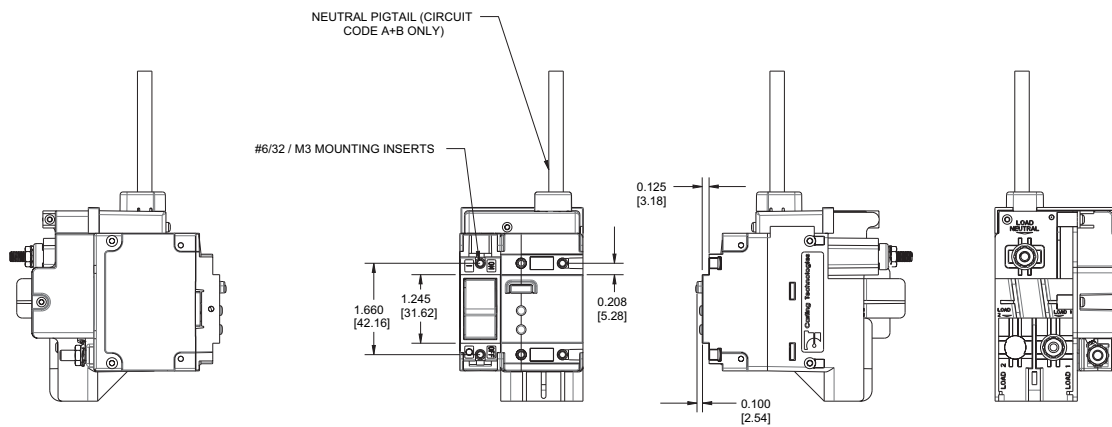
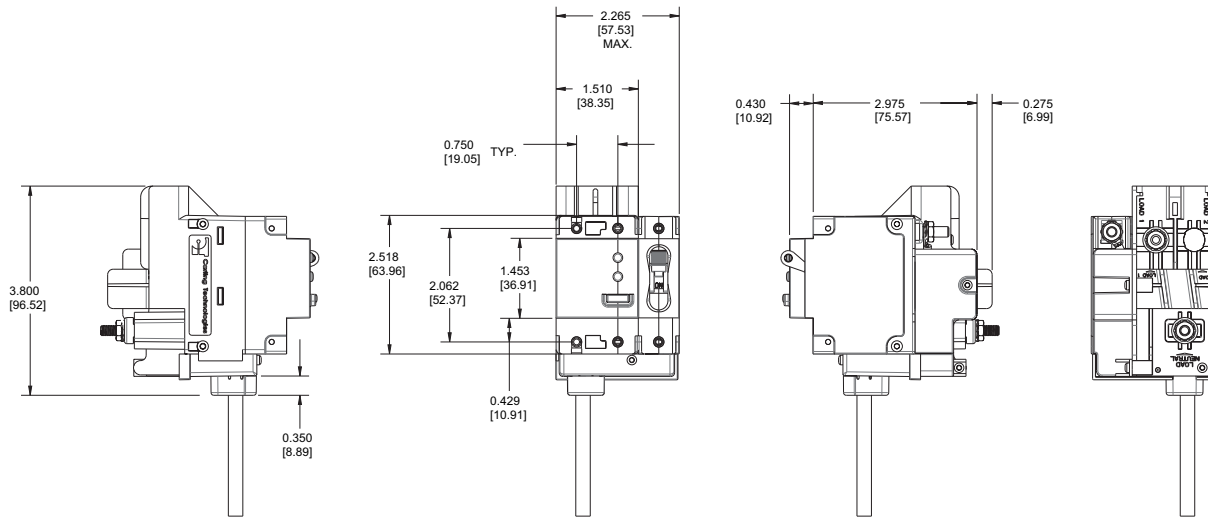
NOTE: NEUTRAL & GROUND PIGTAIL WIRES - SUPPLIED 12" LONG MIN. (CIRCUIT CODES A,B,E & F)



1-Phase 240VAC



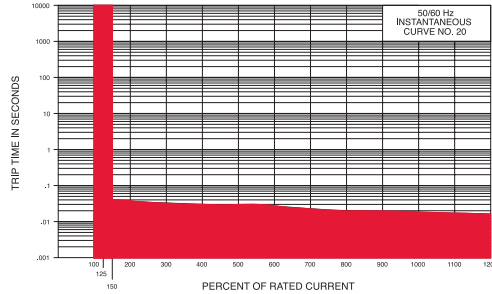
ROCKER ACTUATOR



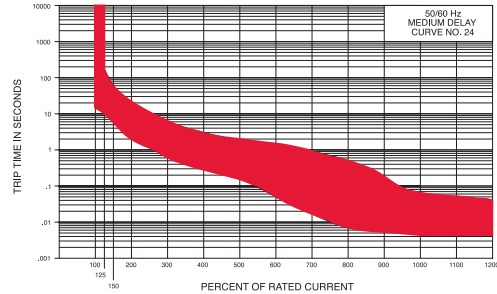
Notes:  
For additional circuit breaker dimensions, reference the C-Series Breakers in the Carling Circuit Protection catalog

## Time Delay Curves

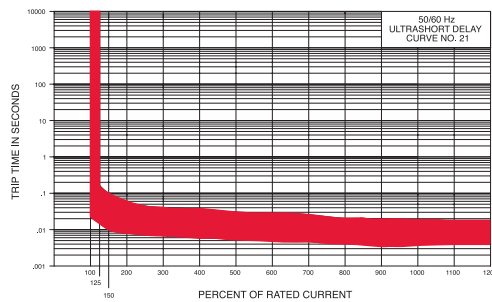
### Instantaneous



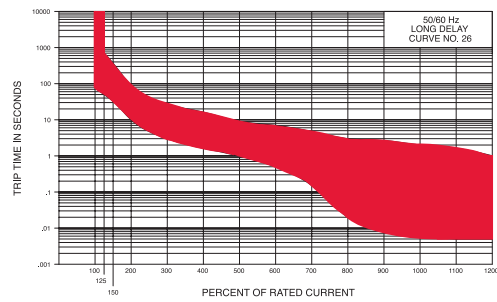
### Medium



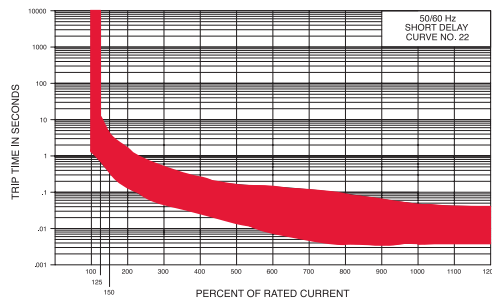
### Ultra Short



### Long



### Short

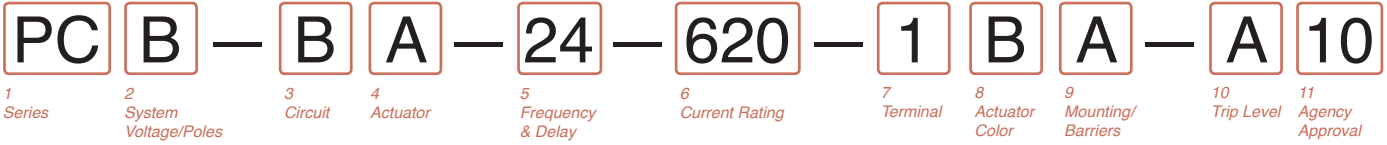


TIME DELAY VALUES									
PERCENT OF RATED CURRENT									
DELAY	100%	125%	150%	200%	400%	600%	800%	1000%	1200%
<b>20</b>	No Trip	May Trip	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
<b>21</b>	No Trip	.014 - .150	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
<b>22</b>	No Trip	.700 - 12.0	350 - 4.00	130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
<b>24</b>	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
<b>26</b>	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.





**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					
	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR	INDICATE "OFF"	SINGLE COLOR
VERTICAL STYLE					
HORIZONTAL STYLE					

**5 FREQUENCY & DELAY**  
**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
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635	35.000
				640	40.000
				650	50.000

**7 TERMINAL**  
**1** Stud, 10-32 threaded

**8 ACTUATOR COLOR & LEGEND**

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

**9 MOUNTING/BARRIERS**

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

**10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT**  
**A** 5 MA (CLASS A GFCI)<sup>2</sup>  
**E** 30 MA (ELCB)<sup>1,3</sup>

**11 AGENCY APPROVAL**  
**AA** W/O Approvals  
**10** UL 943<sup>2</sup>  
**11** UL 1053<sup>1,3</sup>  
**12** UL 1053 & UL 1500<sup>1,3,4</sup>

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