



**Carling Technologies®**

Innovative Designs. Powerful Solutions.

# GFCI / ELCI CIRCUIT PROTECTION



CATALOG

# FOUNDED IN 1920



Since its founding, Carling Technologies has continually forged a tradition of leadership in quality and product innovation.

There are few products that Carling Technologies hasn't turned "ON" and fewer industries that haven't turned to Carling for solutions. With ISO and TS registered manufacturing facilities and technical sales offices worldwide, Carling ranks among the world's largest manufacturers of circuit breakers, switches, power distribution units, digital switching systems and electronic controls.



## SWITCHES & CONTROLS

- Rocker
- Toggle
- Pushbutton
- Rotary

## CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

## CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

## MULTIPLEXED POWER SYSTEMS

- HMI Devices & I/O Modules
- Programmable Displays
- Data Communication Interfaces
- Electrical Systems Monitoring

## STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

## GLOBAL LOCATIONS:

Carling Technologies  
World Headquarters  
Plainville, CT, USA  
ISO9001:2015  
IATF16949:2016

Carling Technologies  
Brownsville, TX, USA  
ISO14001:2015  
ISO9001:2015  
IATF16949:2016

Carling Technologies  
Matehuala, Mexico  
ISO14001:2015  
ISO9001:2015  
IATF16949:2016

Carling Technologies,  
Maretron  
Jupiter, FL, USA

Carling Technologies  
European Headquarters  
Exeter, UK  
ISO9001:2015  
IATF16949:2016

Carling Technologies  
Kowloon, Hong Kong  
ISO9001:2015  
IATF16949:2016

Carling Technologies  
Zhongshan, China  
ISO14001:2015  
ISO9001:2015  
IATF16949:2016

## OTHER SERVED INDUSTRIES:



Medical



Industrial Control



Audio / Visual



Commercial Food



HVAC



Floor Care



Generators



Small Appliances



Security Systems



Test & Measurement

## WORLDWIDE NUMBERS:



**2400+**  
EMPLOYEES



**150+**  
ENGINEERS

## COMPETITIVE ADVANTAGES<sup>+</sup>



Innovative &  
Eco-Friendly Products



Excellent Quality &  
Customer Service



Reliable &  
On-Time Delivery



Vertical  
Integration



**70+**  
DISTRIBUTORS



**50+**  
REP FIRMS

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#### **HELPFUL TIP**

Click on a product to go directly to that page number!

## **GFCI/ELCI Circuit Protection**

This catalog features Carling Technologies' current line of GFCIs/ELCIs products, which offer maximum equipment protection against overload and short circuits.

Carling's Equipment leakage circuit breakers function as hydraulic-magnetic circuit breakers, offering customized overload and short circuit protection. In addition, they sense and guard against faults to ground using innovative electronics technologies. With the exception of small amounts of leakage, the current returning to the power supply will be equal to the current leaving the power supply. If the difference between the current leaving and returning through the earth leakage circuit breaker exceeds the leakage sensitivity setting, the breaker trips and its LED illuminates. The LED gives a clear indication that the trip occurred as a result of leakage to ground. This protection helps prevent serious equipment damage and fire.

**Available Online** are tools such as a [configurit](#), [product selector](#) and [stock check](#). Please visit [www.carlingtech.com](http://www.carlingtech.com) for the latest information on all our products.

**Application Solution Engineers** are readily available to assist you in selecting the appropriate product for your application. For further assistance, please email us at [team2@carlingtech.com](mailto:team2@carlingtech.com)

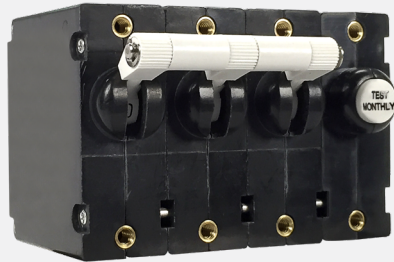
**Custom Design Solutions** can be tailor-made for most any application using our extensive engineering resources.

**Other Products** such as hydraulic-magnetic and thermal circuit breakers, switches and miniature switches are also available.

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# SELECTOR GUIDE



**PB-Series**



**PC-Series**

1-3 poles, 3rd pole switched neutral	1-poles (1 circuit breaker + 1 GFCI sensor module), 120V, 2-pole (2 circuit breakers + 1 GFCI sensor module), 120/240V, or 120V with neutral break 2-pole (2 circuit breakers + 1 GFCI sensor module), 240VAC, 3-pole 120/240V with neutral break (sensor module has 2 pole width)	<b>Poles</b>
handle, rocker, flat rocker	handle, rocker, flat rocker, push-to-reset	<b>Actuator Style</b>
30mA & 6mA	30mA & 6mA	<b>Leakage Current Trip Level</b>
For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds, complying with UL-1053 & ABYC E11. For 6mA leakage trip: ≤25ms	For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds, complying with UL-1053 & ABYC E11. For 6mA leakage trip: ≤25ms	<b>Leakage Current Trip Time</b>
0.10-30A@120/240VAC	0.10-50A@120/240VAC - 240VAC	<b>Max Current &amp; Voltage Ratings</b>
5,000A	5,000A	<b>Max Interrupting Capacity</b>
series trip	series trip	<b>Available Circuits</b>
.250" tabs, 8-32, 10-32, M4,M5 screw with upturned lugs, 8-32, 10-32, M4,M5 screw, bus type	10-32 threaded stud	<b>Termination</b>
front panel	front panel	<b>Mounting Method</b>
-35° C to +65° C	-35° C to +65° C	<b>Operating Temperature</b>
UL 489, UL 1077, UL 1500	UL 943 & CSA Approved, UL 1053, UL 1500	<b>Agency Approvals</b>

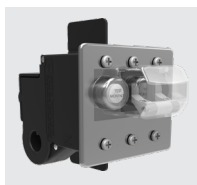
\*Options and approvals shown may apply to specific construction combinations only, consult factory for clarification.  
Manufacturer reserves the right to change product specifications without prior notice.



# PB-Series

## GFCI/ELCI & PANEL SEAL

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



### Resources:

[Configure a Complete Part](#)

[Download CAD & Sales Drawing](#)

### Product Highlights:

- Overload, short circuit and ground fault protection in a single package
- Handle or rocker style actuators
- 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

### Benefits:

- Increases safety around boats and marinas
- Protects against electrical shock hazards in areas near water
- Protects against defects in wires & conductors
- Reduces fire and shock hazards from defects in permanently installed appliances such as water heaters, battery chargers, lighting fixtures, etc.
- Detects lower level ground faults which do not trip ordinary circuit breakers, but can lead to fires, and shock hazards for boating occupants

### Typical Applications:

- Marine
- Generators
- Lighting

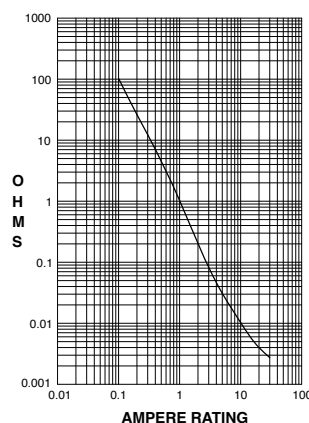
## Electrical Tables

**Table A:** UL Listed configurations and performance capabilities as Circuit Breakers.

PB-SERIES TABLE A					
Circuit Configuration	Voltage			Current Rating (Amps)	Interrupting Capacity (Amps)
	Max Rating	Frequency	Phase		
Series	120	60	1	.10 - 30	5000

## Electrical

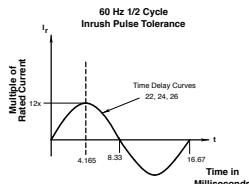
Maximum Voltage	120/240VAC 60 Hz
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0 & 30.0 amps. Other ratings available, see ordering scheme.
Insulation Resistance	Minimum of 100 Megohms at 500 VDC.
Dielectric Strength	UL, CUL - 1500 V 60 Hz for one minute between all electrically isolated terminals. PB-Series circuit breakers comply with the 8mm spacing and 3750V 60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between adjacent poles
Impedance	Values from Line to Load Terminal



Ampere Rating

CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15
5.10 - 20.0	± 25
20.10 - 30.0	± 35

Pulse Tolerance Curve



## Leakage To Ground

Standard Must Trip	120/240VAC 60 Hz
Leakage Current Ratings	5 & 30 milliamps. 5± 1mA For other ratings, consult factory.
Trip Time	300 ms Max. @ 100%, 40ms Max. @ 500% of must trip leakage current.
Test Button	On unit face along side of actuator.

## Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.
Trip Free	All PB-Series Circuit Breakers will trip on overload or ground fault, even when Handle is forcibly held in the ON position.
Trip Indication	The operating Handle moves positively to the OFF position when an overload or ground fault causes the breaker to trip.

## Physical

Number of Poles	1 - 3 poles, where the third pole is neutral
Internal Circuit Config.	Series Trip
Weight	Approximately 65 grams/pole. (2.32 ounces/pole.)
Standard Colors	Housing- Black; Actuator - See Ordering Scheme.

## Environmental

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

Shock	Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I". Ultra-short curves tested @ 90% of rated current.
Vibration	Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current.
Moisture Resistance	Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.
Salt Spray	Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).
Thermal Shock	Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).
Operating Temperature	-35° C to +65° C
Corrosion	Tested FMG Test. 3 weeks @ 30°C 75% RH, 100ppb H2S, 20ppb Cl2, 200ppb NO2

## Agency Certifications

UL Listed	
UL Standard 489	Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)
UL Standard 1077	Supplementary Protectors
UL Standard 1053	Ground Fault Sensing and Relaying Equipment

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

<b>PB</b>	<b>B</b>	-	<b>B</b>	<b>A</b>	-	<b>24</b>	-	<b>620</b>	-	<b>2</b>	<b>B</b>	<b>A</b>	-	<b>A</b>	<b>G</b>
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 PB

### 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 two pole with switched neutral

### 3 CIRCUIT

- B** Series Trip (Current)

### 4 ACTUATOR <sup>1</sup>

#### 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 Flat Visi-Rocker

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

#### Single Color Flat Rocker

- 3** Vertical legend  
**4** Horizontal legend

ROCKER STYLE DESCRIPTIONS				
	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR	INDICATE "OFF"
VERTICAL STYLE	CODE "C", "D" 	CODE "F", "G" 	CODE "J", "K" 	CODE "1", "2" 
	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION
HORIZONTAL STYLE	CODE "D" 	CODE "G", "H" 	CODE "K", "L" 	CODE "3", "4" 
	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION	INDICATE COLOR LOCATION

### 5 FREQUENCY & DELAY

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

### 6 CURRENT RATING (AMPERES)

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

### 7 TERMINAL <sup>2</sup>

- 1** <sup>3</sup> Push-On 0.250 Tab (Q.C.)  
**2** Screw 8-32 w/upturned lugs  
**3** Screw 8-32 (Bus Type)  
**4** Screw 10-32 w/upturned lugs  
**5** Screw 10-32 (Bus Type)  
**B** Screw M5 w/upturned lugs  
**C** Screw M4 w/upturned lugs  
**E** Screw M4 (Bus Type)  
**H** Screw M5 (Bus Type)

### 8 ACTUATOR COLOR & LEGEND

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

### 9 MOUNTING / BARRIERS

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

### 10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT

- A** <sup>3,4</sup> 5 MA (CLASS A GFCI)  
**E** 30 MA (ELCI)

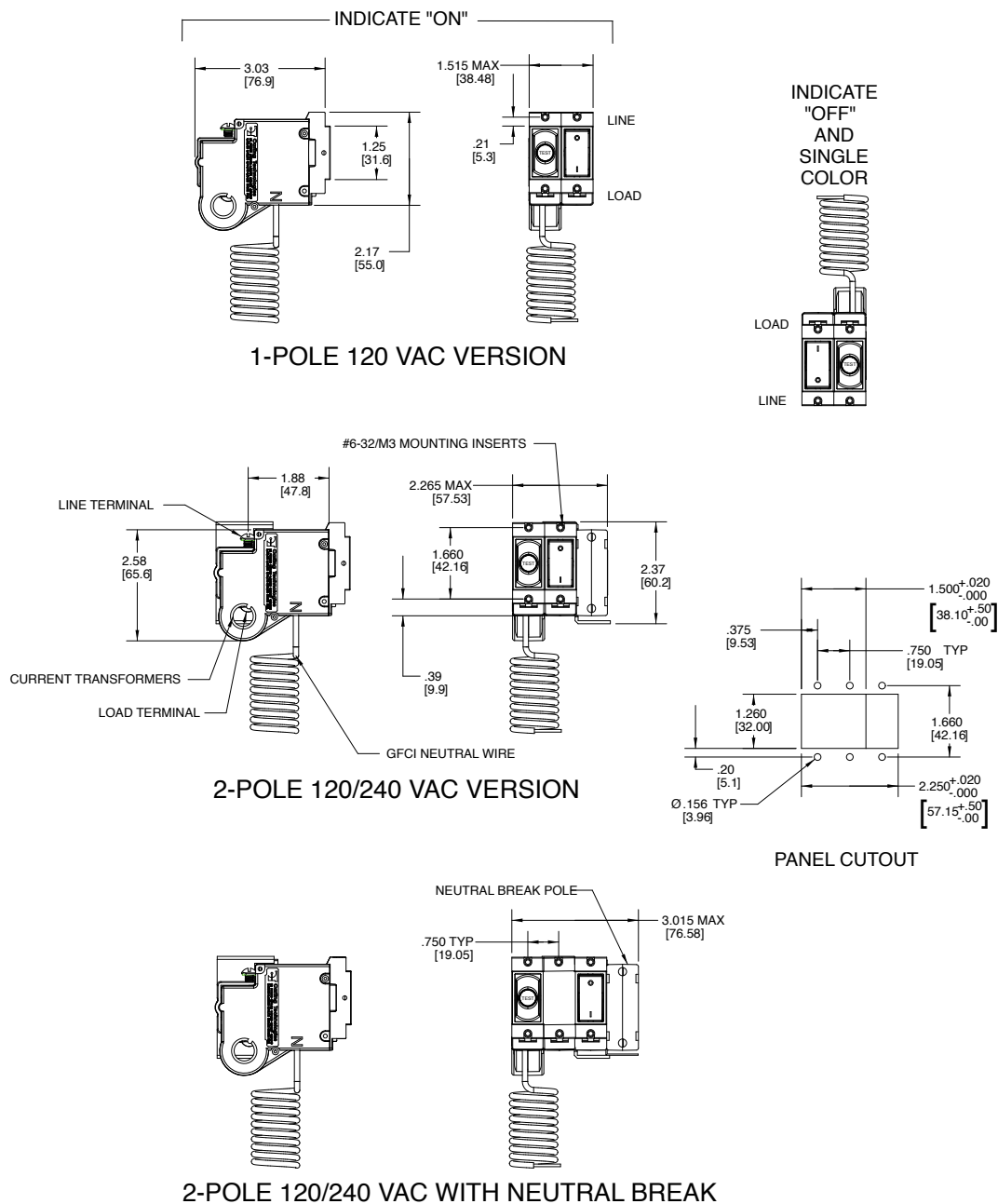
### 11 AGENCY APPROVAL

- A** without Approvals  
**G** UL489 Listed, CSA Certified  
**C** UL1077  
**I** <sup>5</sup> UL1077 / UL1500 Ignition Protected

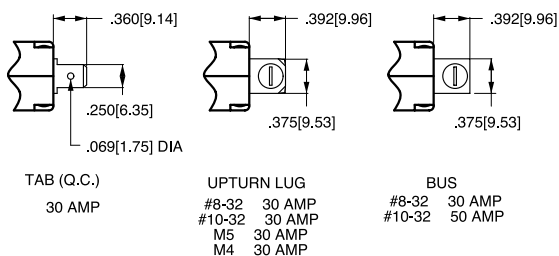
#### Notes:

- Actuator Code:  
A: Handle tie pin spacer(s) and retainers provided unassembled with multi-pole units.  
B: Handle location as viewed from front of breaker:  
2 pole - left pole 3 pole - center pole
- Screw Terminals are recommended on ratings greater than 20 amps.
- Available with leakage current trip level - Max trip current code E, and agency approval C.
- 30mA per UL1053, available with agency approval codes C & G.
- UL1500 only available with 30MA trip level.

## Dimensional Specifications: in. [mm]



## TERMINAL DIMENSIONAL DETAIL &amp; RATING



## Notes:

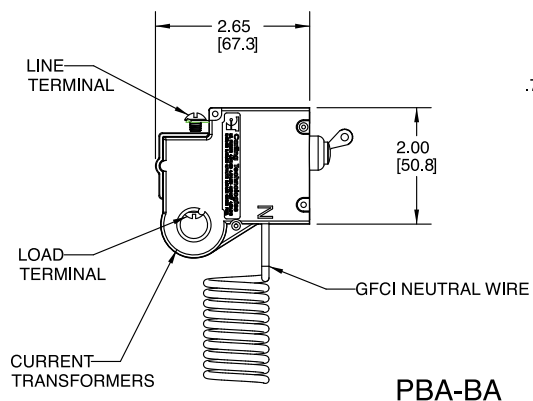
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance  $\pm 0.020$  [.51] unless otherwise specified.

TABLE A  
TIGHTENING TORQUE  
SPECIFICATIONS

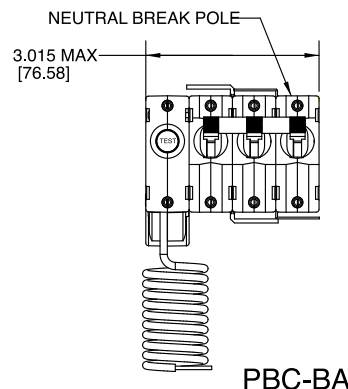
THREAD SIZE	TORQUE
#6-32 & M3 MOUNTING HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#8-32 & M4 THREAD TERMINAL SCREW	12-15 IN-LBS [1.4-1.7 NM]
#10-32 & M5 THREAD TERMINAL SCREW	15-20 IN-LBS [1.7-2.3 NM]

## Dimensional Specifications: in. [mm]

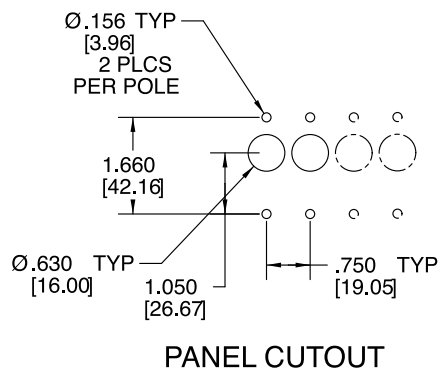
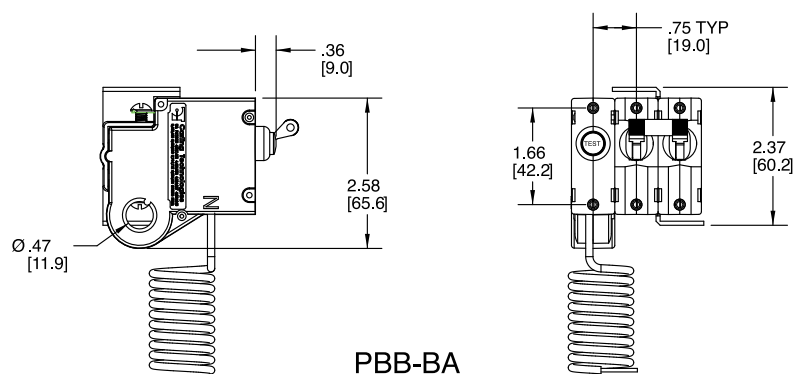
### TYPICAL 1-POLE 120 VAC VERSION



### TYPICAL 2-POLE 120/240 VAC WITH NEUTRAL BREAK VERSION



### TYPICAL 2-POLE 120/240 VAC VERSION

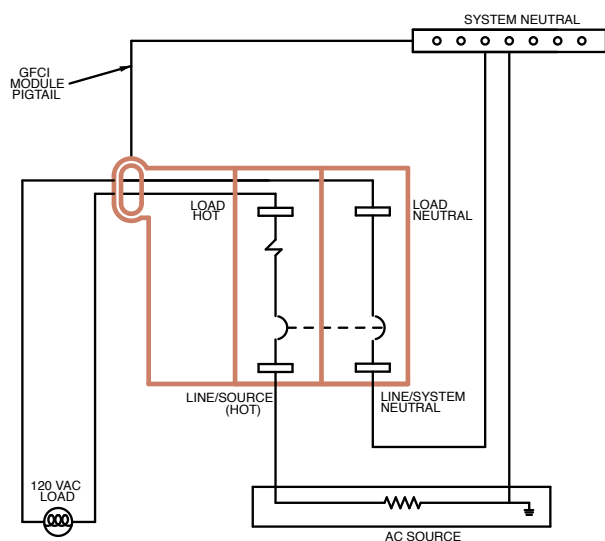


Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance  $\pm 0.020$  [.51] unless otherwise specified.

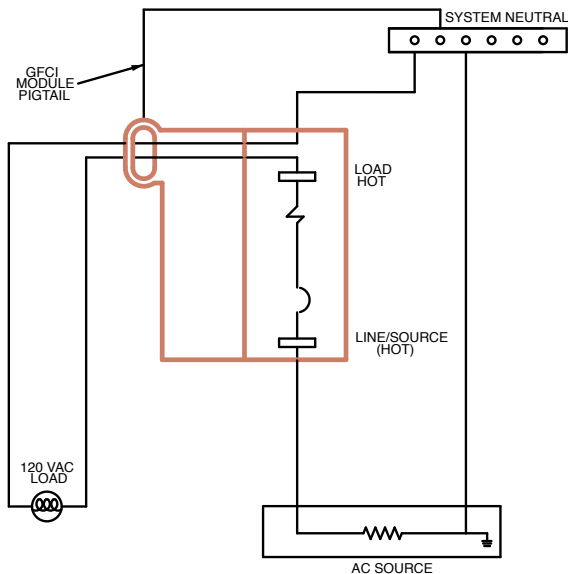


### 120 VAC with Switched Neutral



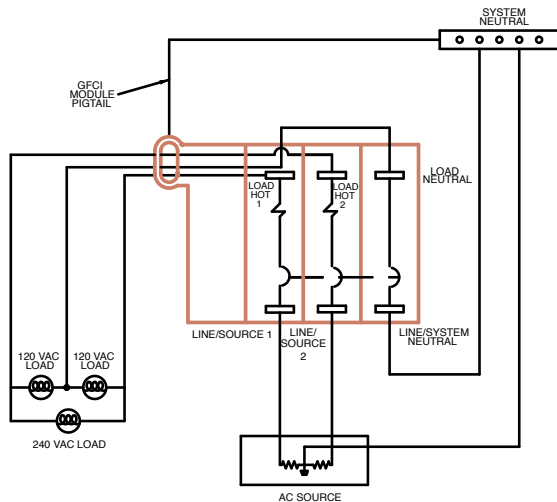
120 VAC WITH SWITCHED NEUTRAL

### 120 VAC without Switched Neutral



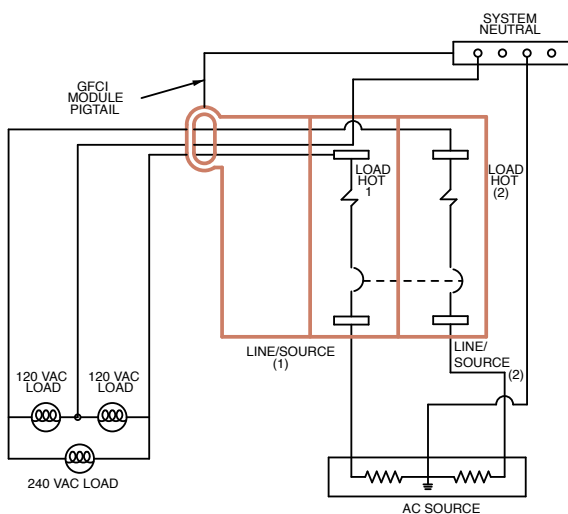
120 VAC WITHOUT SWITCHED NEUTRAL

### 120/240 VAC with Switched Neutral



120 VAC WITH SWITCHED NEUTRAL

### 120/240 VAC without Switched Neutral



120 VAC WITHOUT SWITCHED NEUTRAL

8
PB
-
1
4
1

1  
Type  
Number
2  
Series
3  
Actuator
4  
Poles
5  
Mounting

#### 1 TYPE NUMBER

8 Circuit Breaker Assembly

#### 2 SERIES

PB

#### 3 ACTUATOR TYPE

- 1 Handle, one per pole
- 2 Handle, one per multipole unit
- A Rocker <sup>2</sup>

#### 4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE

- 2 Two
- 3 Three
- 4 Four

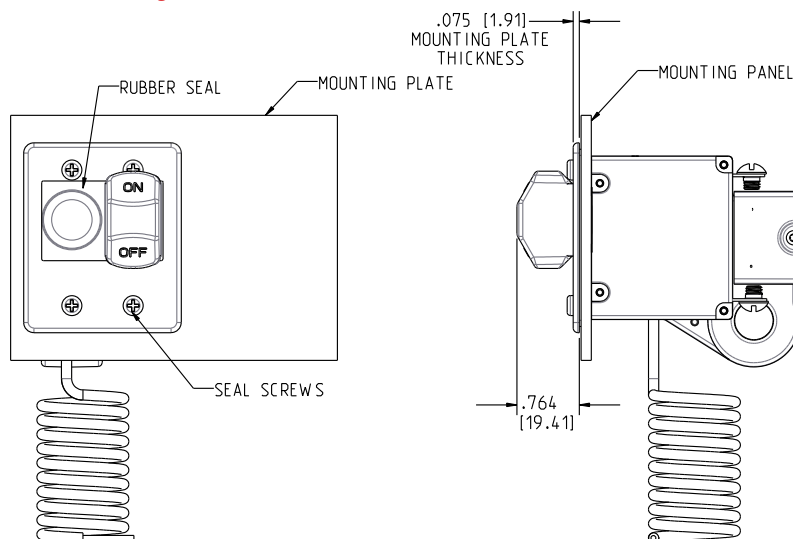
#### 5 MOUNTING SCREWS / PLATE MATERIAL <sup>1</sup>

- 1 6-32 Thread Phillips Head
- 2 M-3 Thread Phillips Head
- 3 6-32 Thread Slotted Head
- 4 M-3 Thread Slotted Head
- 5 6-32 Thread Phillips Head with Stainless Steel Plate
- 6 M-3 Thread Phillips Head with Stainless Steel Plate
- 7 6-32 Thread Slotted Head with Stainless Steel Plate
- 8 M-3 Thread Slotted Head with Stainless Steel Plate

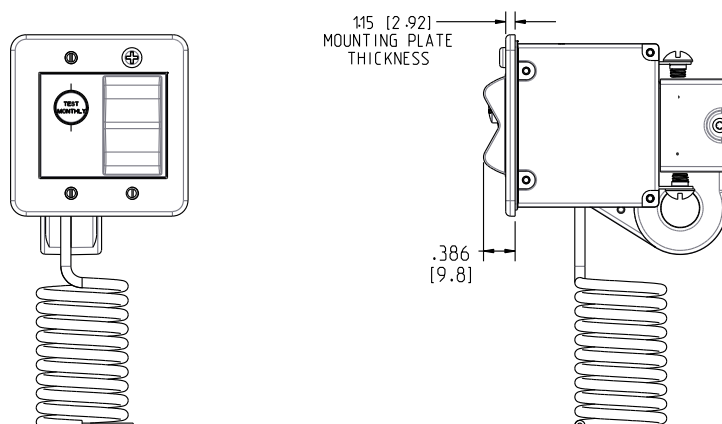
#### Notes:

- 1 Screws supplied to accommodate mounting panel thickness of 1/8" ± 1/32". Consult Factory for additional options
- 2 Available for Flat and Curved Rocker options - No Rockerguard Bracket

### Handle Style Panel Seal

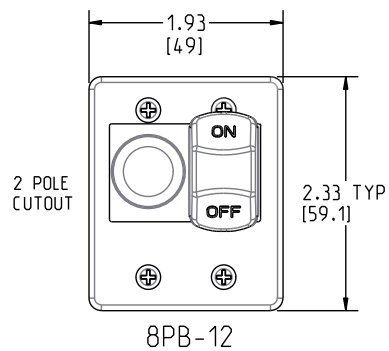


### Rocker Style Panel Seal

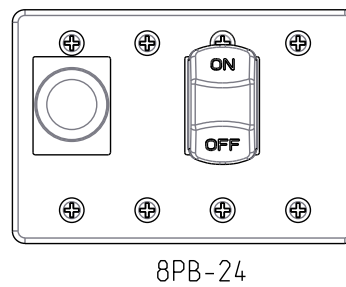
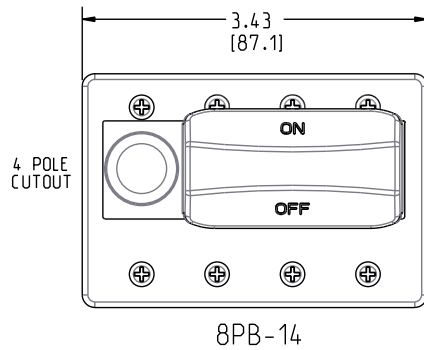
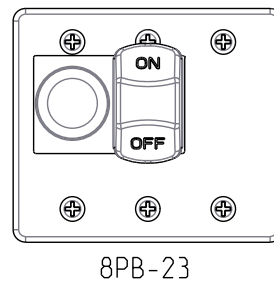
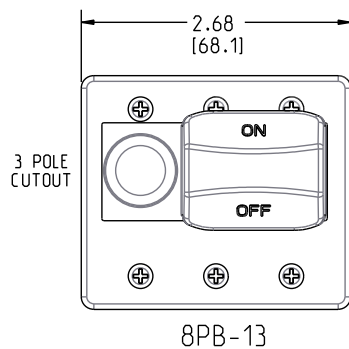


## Handle Actuator

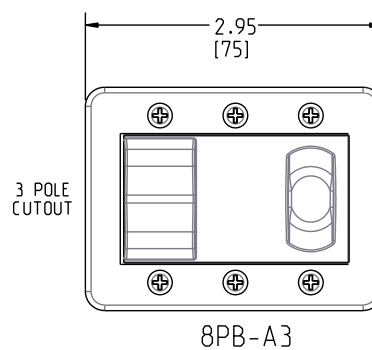
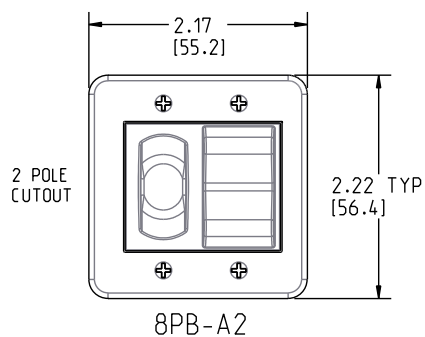
HANDLE, 1 PER POLE



HANDLE, 1 PER MULTIPOLE UNIT

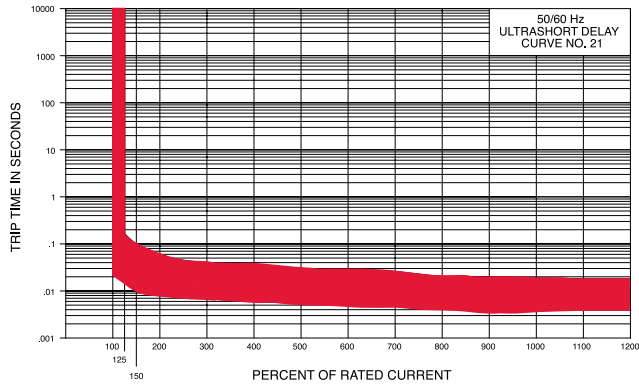


## Rocker Actuator

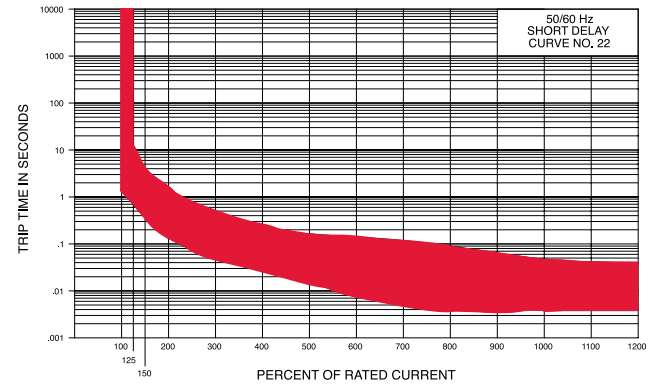


## Time Delay Curves

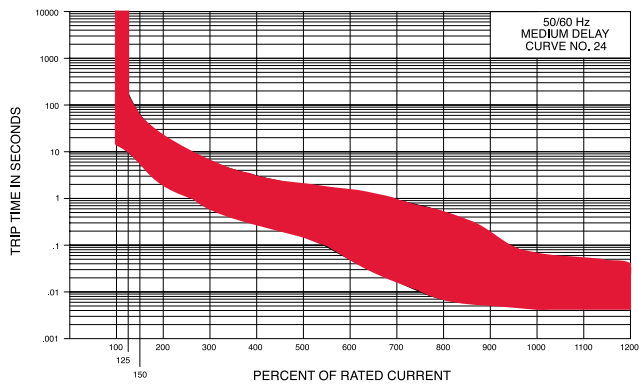
### Ultra Short



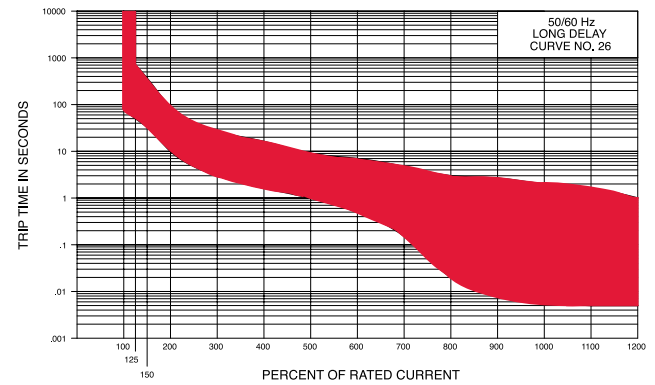
### Medium



### Short



### Long



# PC-Series

## GFCI/ELCI & PANEL SEAL

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. It detects lower level ground faults that do not trip ordinary circuit breakers, but could lead to shock hazards and fires in installations near water. Innovative features include status LED indicators distinguishing 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.



### Resources:

[Configure a Complete Part](#)

[Download CAD & Sales Drawing >](#)

### Product Highlights:

- Meets latest UL 943 standards
- GFCI self-test auto-monitoring & end-of-life indication
- Integrated push-to-reset button
- Overload, short circuit and ground fault protection in a single package
- Status LED indicators
- Single circuit solution for AC branch ground fault protection
- Optional panel seal

### Typical Applications:

- Generators
- Water Heaters
- Battery Chargers
- Marine
- AC main ground fault protection for a boat's entire AC electrical system

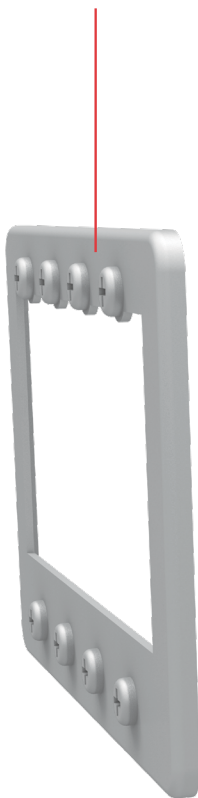


# PC-Series Switch

## DESIGN FEATURES

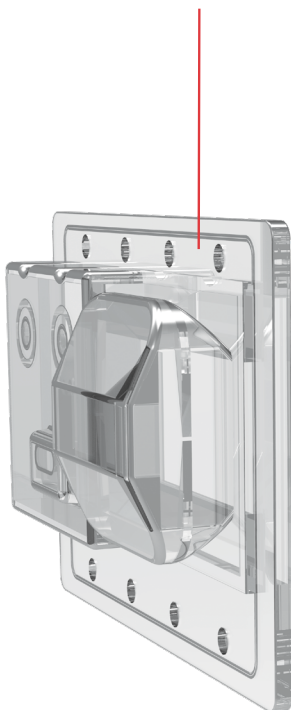
### MOUNTING PLATE

Available in stainless steel or zinc chromate plated carbon steel



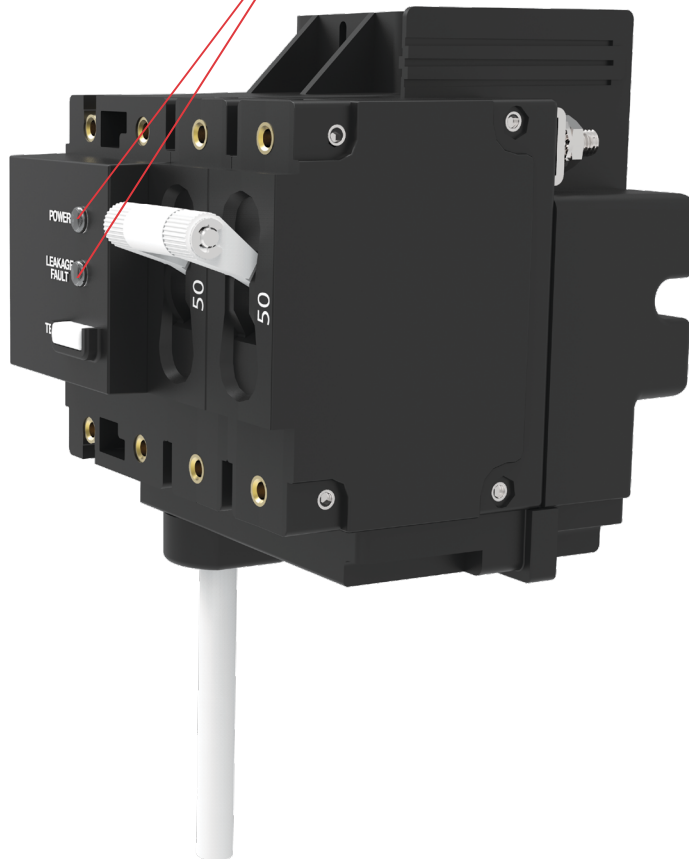
### OPTIONAL SEAL

IP66/67 panel seals provide ideal protection against salt spray, ozone, dust, water and most acids



### LEDs

Two separate lights that indicate power, ground fault leakage and end-of-life



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

## Electrical Tables

**Table A:** UL Listed & CSA Certified configurations as a Ground Fault Circuit Interruptor

PC-SERIES TABLE A: UL Listed / CSA 22.2 No. 144.1 Configurations as a Ground Fault Circuit Interruptor							
Circuit Configuration	Voltage			Current Rating (Amps)	Short Circuit Capacity (Amps)	Ground Fault Trip Level (Milliamps)	Notes
	Max Rating	Frequency (Hertz)	Phase				
Series	120	60	1	1 - 50	5000	6	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120 / 240	60	1	1 - 50	5000	6	2 or 3 Poles. One pole of a three pole unit must be Neutral

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

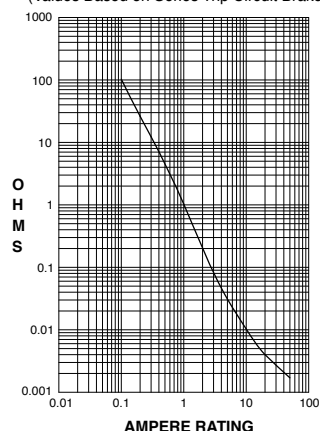
PC-SERIES TABLE B: UL Recognized Configurations as an Earth Leakage Circuit Interruptor							
Circuit Configuration	Voltage			Current Rating (Amps)	Short Circuit Capacity (Amps)	Ground Fault Trip Level (Milliamps)	Notes
	Max Rating	Frequency (Hertz)	Phase				
Series	120	50 / 60	1	1 - 50	5000	30	1 or 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 Protection	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:** UL Recognized as an Earth Leakage Circuit Interruptor - 240V

PC-SERIES TABLE C: UL Recognized Configurations as an Earth Leakage Circuit Interruptor - 240V							
Circuit Configuration	Voltage			Current Rating (Amps)	Short Circuit Capacity (Amps)	Ground Fault Trip Level (Milliamps)	Notes
	Max Rating	Frequency (Hertz)	Phase				
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 Protection	240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 12

Impedance (Across Circuit breaker only)

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



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15
5.10 - 20.0	± 25
20.10 - 50.0	± 35

## Agency Certifications

UL Standard 489

UL Standard 1077

UL Standard 943 & CSA 22.2 No. 144.1

UL Standard 1053

UL Standard 1500

Circuit Breakers, Molded Case,  
(Guide DIVQ, File E129899)  
Supplementary Protectors  
Class A Ground Fault Circuit Interrupters  
Ground Fault Sensing and Relaying Equipment  
Ignition Protection

## Electrical

Current Ratings	50 Amps maximum
Voltage Rating	120 VAC, 120/240 VAC
Dielectric Strength	1480 VAC, 60Hz for 1 minute between all electrically isolated terminals
Insulation Resistance	Minimum of 100 Megohms at 500VDC
Leakage Current Trip Level	5±1 mA
Leakage Current Trip Time	≤ 25 ms complies with UL 943
EMI	UL 943 / IEC 61000-4-6, 0.5V 150KHz ~ 230 MHz
Operating Frequency	50/60 Hz
Reverse Polarity	A reversed Line / Load connection to the circuit breaker shall not cause damage to the device
Grounded Neutral	When neutral is grounded on load side of circuit
Overload	50 operations @ 600% of rated current on Breakers
Switched Neutral	2nd Pole on 120V and 3rd Pole on 120/240V, Optional
Manual Test	To be performed at least every month by pressing the test button on the GFCI to verify the device's ability to respond and trip when subjected to simulated leakage. Current imbalance is sufficient to cause tripping at 85% of rated voltage. Line Power at L1 is required.
GFCI Auto-Monitoring	Performed automatically without opening circuit breaker contacts or compromising ability to respond to ground or neutral faults. Automatic Self-Test performed automatically every time power is supplied within 5 seconds. Automatic Self-Test Frequency: 3 seconds. Line Power at L1 is required. Feedback when auto-monitoring Self-Test fails: Circuit breaker trips and cannot be reset and a visual indication is displayed (See Next Page).
GFCI Heartbeat Indicator	Successful Self Tests are followed by a flash of light per Next Page
GFCI End of Life	Circuit breaker trips and cannot be reset. A visual indication is displayed via the LED's located on the front of the device (See Next Page). Line Power at L1 is required.

## Mechanical

Endurance	10,000 "On-Off" Operations at 6 per minute; 6000 with Rated Current & Voltage (3000 test button and 3000 manual operations) and 4000 on/off operations with no load.
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	1-pole (1 Circuit Breaker + 1 GFCI Sensor Module), 120V. 2-pole (2 Circuit Breakers + 1 GFCI Sensor Module), 120/240V or 120V with Switched Neutral. 3-pole (3 Circuit Breakers + 1 GFCI Sensor Module), 120/240V with Switched Neutral.
Termination	Circuit Breaker Line Side: #10-32 GFCI Sensor Module Load Side: #10-32. Neutral pigtail provided with non-switched neutral units.
Mounting	Front Panel, #6-32 or M3 threaded inserts.
Actuator	Handle, Flat Rocker, Curved Rocker (with or without rocker guard), Push-to-Reset Rocker
Internal Configuration	Circuit Breaker, Series Trip Switch only (without over-current protection)
Weight	1-pole: approximately 300 grams (10.6 ounces) 2-pole: approximately 375 grams (13.2 ounces) 3-pole: approximately 500 grams (17.6 ounces)
Standard Colors	Housing – Black, Test Button – White, Text – White

## 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".
Thermal Shock	Method 107D, Condition A (5-cycle at -55°C to +25°C to +85°C to +25°C)
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 & 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 <sub>2</sub> S, 20 ppb Cl <sub>2</sub> , 200±50 ppb NO <sub>2</sub>

## GFCI LED Indication

Condition	Breaker	LED Output
Power with Open Circuit	Open	None
Circuit Manually Opened	Open	None
Power with Closed Circuit	Closed	Green (solid)
Ground Fault Leakage	Trips Open	Red (solid)
Grounded Neutral	Trips Open	Red (solid)
Passed Automatic, Self-Test	Closed	Red (flash lasting 2 ms, every 3 seconds)
Failed Automatic, Self-Test	Trips Open	Red (continuous flashing, every 0.10 seconds)
Manual GFCI Monthly Test	Trips Open	Red (solid)
Over Current	Trips Open	None
End of Life	Trips Open	Red (continuous flashing, every 0.10 seconds)

Loss of line power results in no LED output and no continuous trip

## GFCI Test Instructions

1. Turn "OFF" the GFCI Breaker actuator. Turn on the power to the panel. The green and red LED's should be off.
2. Turn "ON" the GFCI Breaker actuator. The green "POWER" LED should show steady illumination and the red "LEAKAGE FAULT" LED should flash every 3 seconds to indicate a successful self-test.
3. Depress the "TEST" button. This will cause the actuator to move to the "OFF" position and the red LED to turn on and show steady illumination, indicating that the GFCI is functioning properly. The green LED will also go from steady to off. If the actuator fails to move to the "OFF" position or the red LED fails to illuminate, the unit MUST be replaced.
4. Turn the GFCI Breaker actuator to the "ON" position. The red LED should flash every 3 seconds and the green LED should show steady illumination.
5. This test is to be performed on a monthly basis and recorded on the "Monthly Test Reminder" label.

## ELCI LED Indication

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

<b>PC</b>	<b>B</b>	<b>-</b>	<b>B</b>	<b>A</b>	<b>-</b>	<b>24</b>	<b>-</b>	<b>620</b>	<b>-</b>	<b>1</b>	<b>B</b>	<b>A</b>	<b>-</b>	<b>A</b>	<b>10</b>
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 <sup>4</sup>**

- A** 120 VAC single phase, 1 pole  
**B** 120/240 VAC single phase, 2 pole  
**C** 120/240 VAC single phase with switched neutral, 3 pole  
**D** 120 VAC single phase with switched neutral, 2 pole  
**G** 240 VAC single phase, 2 pole

**3 CIRCUIT****B** Series Trip (Current)**4 ACTUATOR****Handle****A** 1 per breaker pole**B** 1 per 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** Indicate OFF,

Vertical legend

**O** Indicate OFF,

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


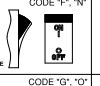

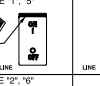
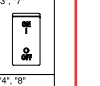





**Single Color Flat Rocker****3** Vertical legend**4** Horizontal legend**Two Color Flat Visi-Rocker****Push-to-Reset****5** Indicate OFF,

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	 CODE "C", "D", "F", "G"	 CODE "N", "O", "R", "U"	 CODE "J", "K"	 CODE "1", "2", "3", "4"	 CODE "5", "6", "7", "8"
HORIZONTAL STYLE	 CODE "C", "D", "F", "G"	 CODE "N", "O", "R", "U"	 CODE "J", "K"	 CODE "1", "2", "3", "4"	 CODE "5", "6", "7", "8"

**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

<b>410</b> 1.000	<b>445</b> 4.500	<b>610</b> 10.000	<b>618</b> 18.000
<b>512</b> 1.250	<b>450</b> 5.000	<b>710</b> 10.500	<b>620</b> 20.000
<b>415</b> 1.500	<b>455</b> 5.500	<b>611</b> 11.000	<b>622</b> 22.000
<b>517</b> 1.750	<b>460</b> 6.000	<b>711</b> 11.500	<b>624</b> 24.000
<b>420</b> 2.000	<b>465</b> 6.500	<b>612</b> 12.000	<b>625</b> 25.000
<b>522</b> 2.250	<b>470</b> 7.000	<b>712</b> 12.500	<b>630</b> 30.000
<b>425</b> 2.500	<b>475</b> 7.500	<b>613</b> 13.000	<b>635</b> 35.000
<b>527</b> 2.750	<b>480</b> 8.000	<b>614</b> 14.000	<b>640</b> 40.000
<b>430</b> 3.000	<b>485</b> 8.500	<b>615</b> 15.000	<b>650</b> 50.000
<b>435</b> 3.500	<b>490</b> 9.000	<b>616</b> 16.000	
<b>440</b> 4.000	<b>495</b> 9.500	<b>617</b> 17.000	

**7 TERMINAL****1** Stud, 10-32 threaded**8 ACTUATOR COLOR & LEGEND****Handle**

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

**9 MOUNTING / BARRIERS**

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

**10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT**

- A** 6 MA (CLASS A GFCI) <sup>2</sup>  
**E** 30 MA (ELCI) <sup>1,3</sup>

**11 AGENCY APPROVAL**

- AA** without Approvals  
**10** UL 943 and CSA certified <sup>2</sup>  
**11** UL 1053 <sup>1,3</sup>  
**12** UL 1053 & UL 1500 <sup>1,3</sup>

**Notes:**

- 1 This device meets the requirements of ABCY E11.  
2 6mA per UL943, available with agency code 10.  
3 30mA per UL1053, available with agency approval codes 11 & 12.  
4 Agency approval code 10 only available with system voltages A, B, C and D.



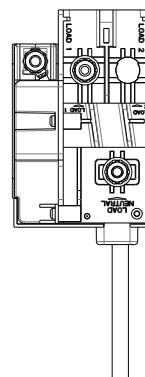
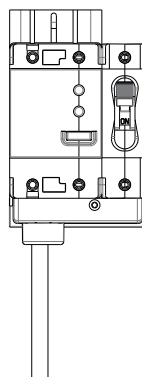
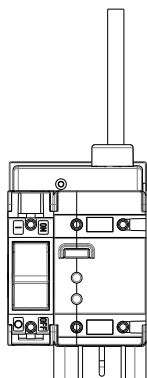
## Dimensional Specifications: in. [mm]

INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

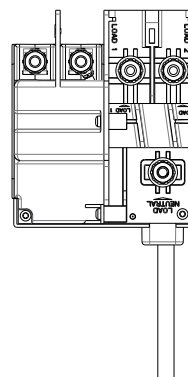
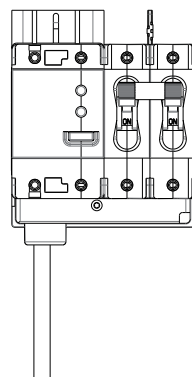
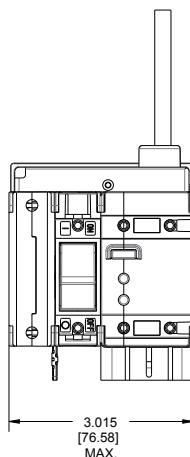
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

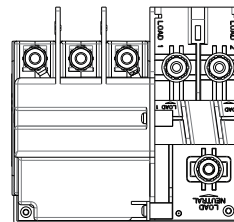
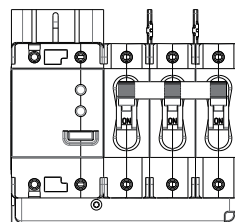
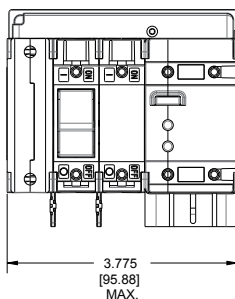
PCA  
120 VAC  
VERSION



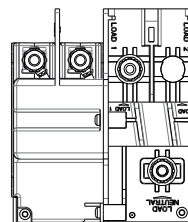
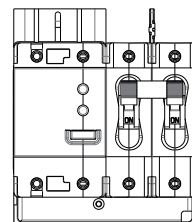
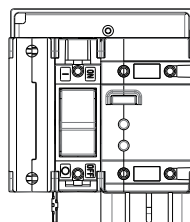
PCB  
120/240 VAC  
VERSION



PCC  
120/240 VAC  
VERSION  
W/ NEUTRAL BREAK

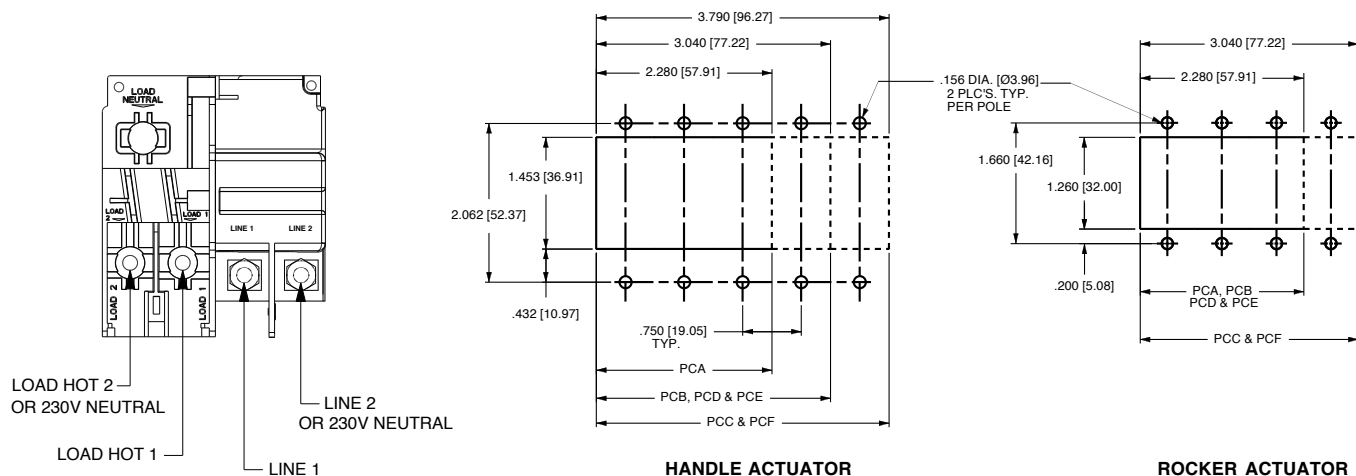


PCD  
120 VAC  
VERSION  
W/NEUTRAL BREAK



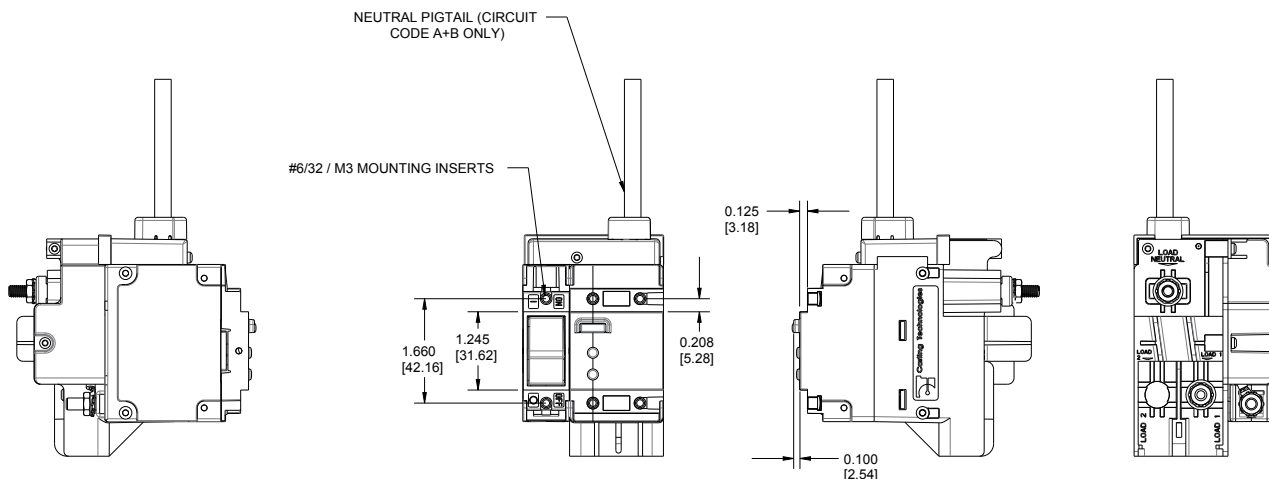
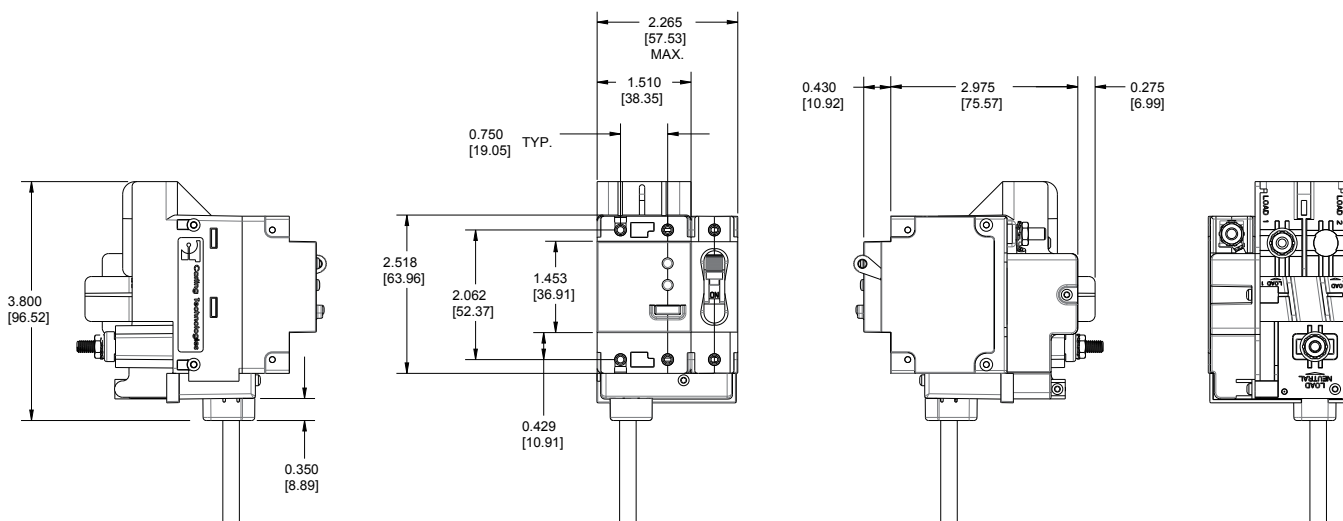
## Dimensional Specifications: in. [mm]

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



### PANEL CUTOUT DETAIL

TOLERANCES  $\pm .005$  [.12]



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

8

PC

-

1

4

1

1

2

3

4

5

Type  
Number

Series

Actuator

Poles

Mounting

**1 TYPE NUMBER**  
8 Circuit Breaker Assembly

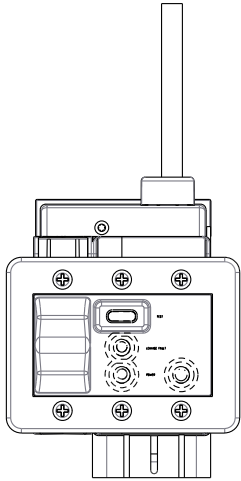
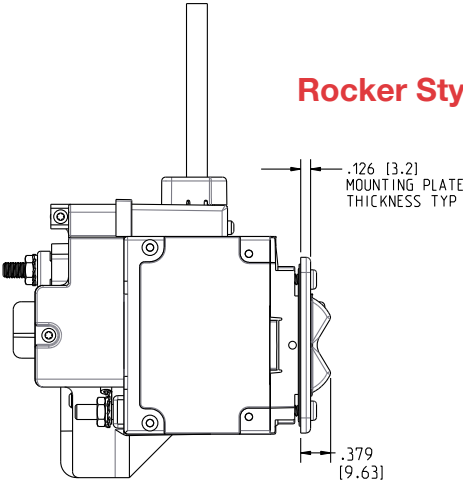
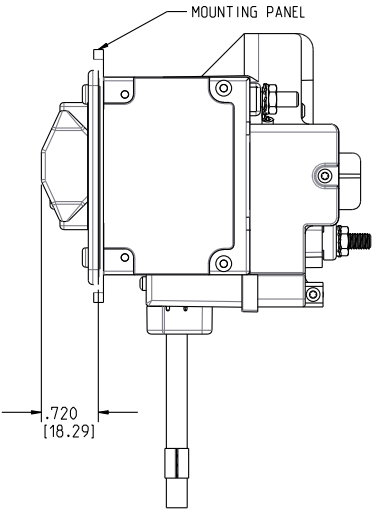
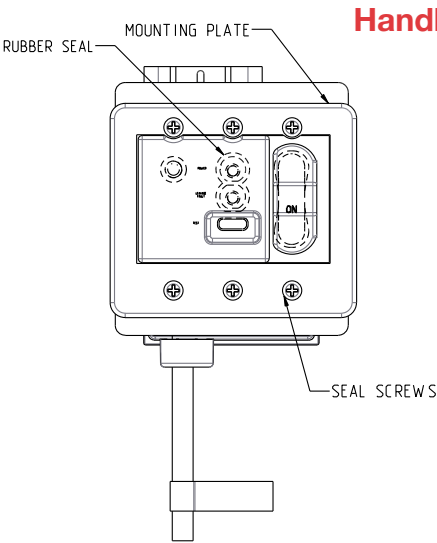
**2 SERIES**  
PC

**3 ACTUATOR TYPE**  
1 Handle, one per pole  
2 Handle, one per multipole unit  
A Rocker

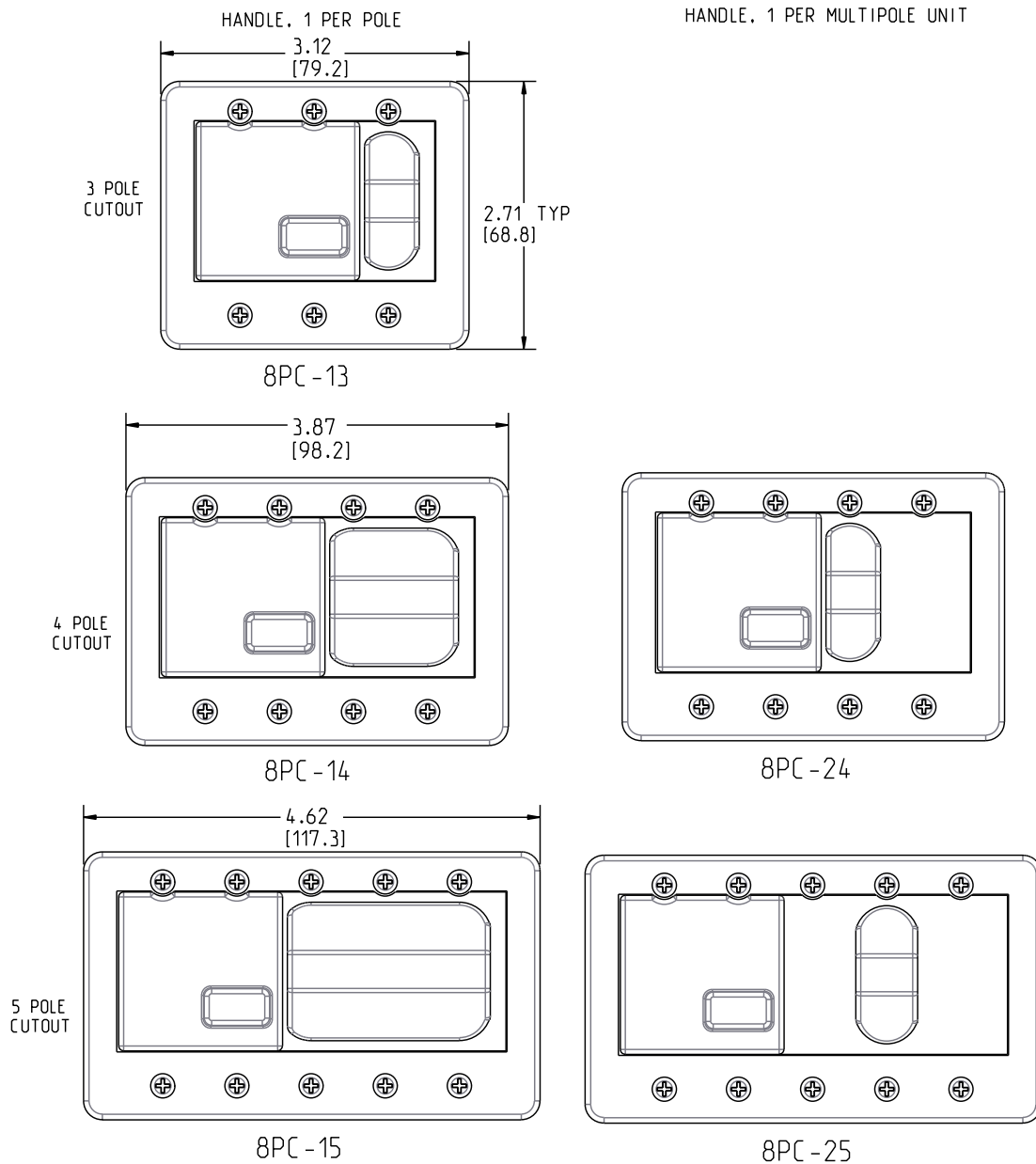
**4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE**  
3 Three  
4 Four  
5 Five

**5 MOUNTING SCREWS / PLATE MATERIAL <sup>1</sup>**  
1 6-32 Thread Phillips Head  
2 M-3 Thread Phillips Head  
3 6-32 Thread Slotted Head  
4 M-3 Thread Slotted Head  
5 6-32 Thread Phillips Head with Stainless Steel Plate  
6 M-3 Thread Phillips Head with Stainless Steel Plate  
7 6-32 Thread Slotted Head with Stainless Steel Plate  
8 M-3 Thread Slotted Head with Stainless Steel Plate

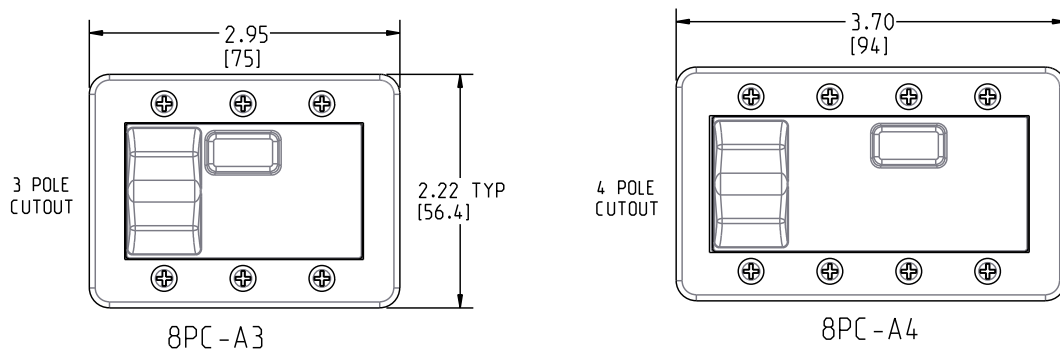
Notes:  
1 Screws supplied to accommodate mounting panel thickness of 1/8" ± 1/32".  
Consult Factory for additional options  
2 Available for Flat and Curved Rocker options - No Rockerguard Bracket



## Handle Actuator

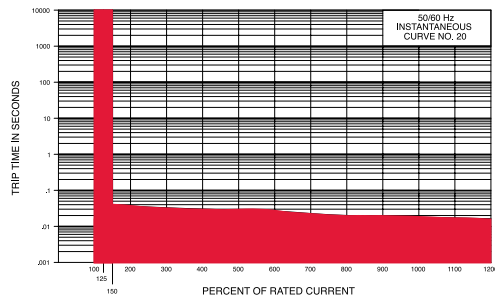


## Rocker Actuator

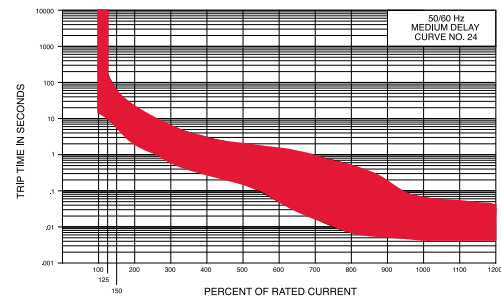


## Time Delay Curves

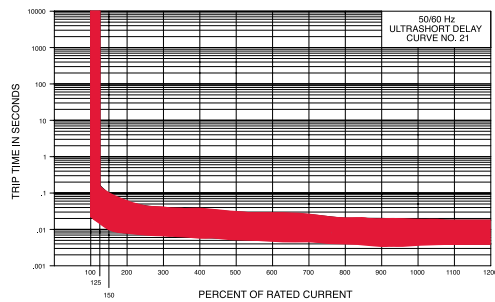
### Instantaneous



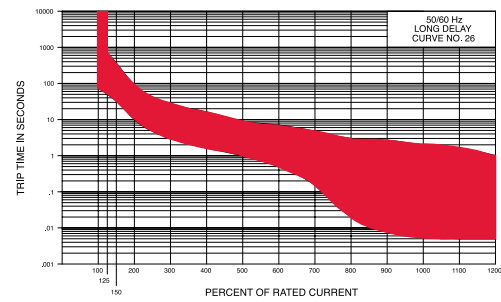
### Medium



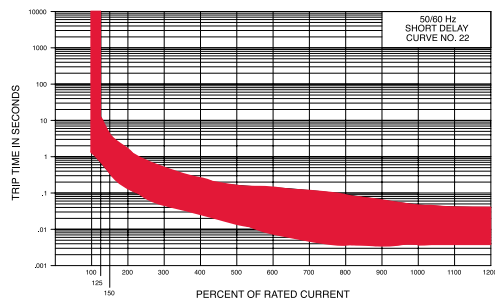
### Ultra Short



### 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.



Below is a list of useful product catalogs.

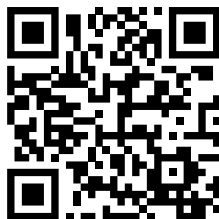
Please scan the QR codes below or visit **[carlingtech.com/onthego](http://carlingtech.com/onthego)** for complete details.

## WEBSITE

Product Selector, Resources, Configurit,  
Find Rep, Product Materials and Videos.



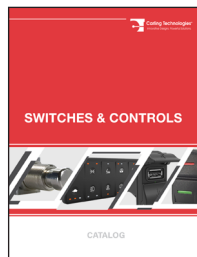
*carlingtech.com*



*/onthego*

## SWITCHES AND CONTROLS

Rocker, toggle, pushbutton, rotary, battery  
disconnects and controls.



*catalog*

## MINI & SUB-MINI SWITCHES

Sealed and non-sealed rocker, toggle,  
pushbutton and slide options.



*catalog*

## HYDRAULIC-MAGNETIC CIRCUIT PROTECTION

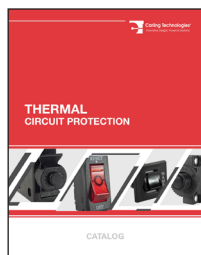
1-6 poles from .02 to 700A with CSA, VDE, TUV,  
UL489, UL489A, UL1500 approvals.



*catalog*

## THERMAL CIRCUIT PROTECTION

1 pole from 3 to 60A with UL, cUL, CE,  
UL1500/ISO 8846 approvals.



*catalog*

## GFCI/ELCI CIRCUIT PROTECTION

1-3 poles from 0.10 to 50A with CSA, UL489,  
UL1077, UL1053, UL1500 approvals.



*catalog*

Below is a list of useful market specific catalogs and brochures.  
Please scan the QR codes below or visit [carlingtech.com/onthego](https://carlingtech.com/onthego) for complete details.

### ON-OFF HIGHWAY

Switches, Controls and Custom Solutions



*brochure*

### MARINE

Circuit Protection and Switches



*brochure*

### RENEWABLE ENERGY

Circuit Breakers and Disconnect products



*brochure*

### MILITARY

COTS Switches and Circuits Breakers



*brochure*

### TELECOM/DATACOM

Hydraulic-Magnetic Circuit Breakers



*brochure*

### INDUSTRIAL AUTOMATION

Switches and Circuit Breakers



*brochure*

## Authorized Sales Representatives and Distributors

Click on a region of the map below to find your local representatives and distributors or visit [www.carlingtech.com/findarep](http://www.carlingtech.com/findarep).



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To view all of Carling's environmental, quality, health & safety certifications please visit [www.carlingtech.com/environmental-certifications](http://www.carlingtech.com/environmental-certifications)

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Phone: Int + 852-2737-2277

Email: [sales@carlingtech.com.hk](mailto:sales@carlingtech.com.hk)

#### Sales Offices:

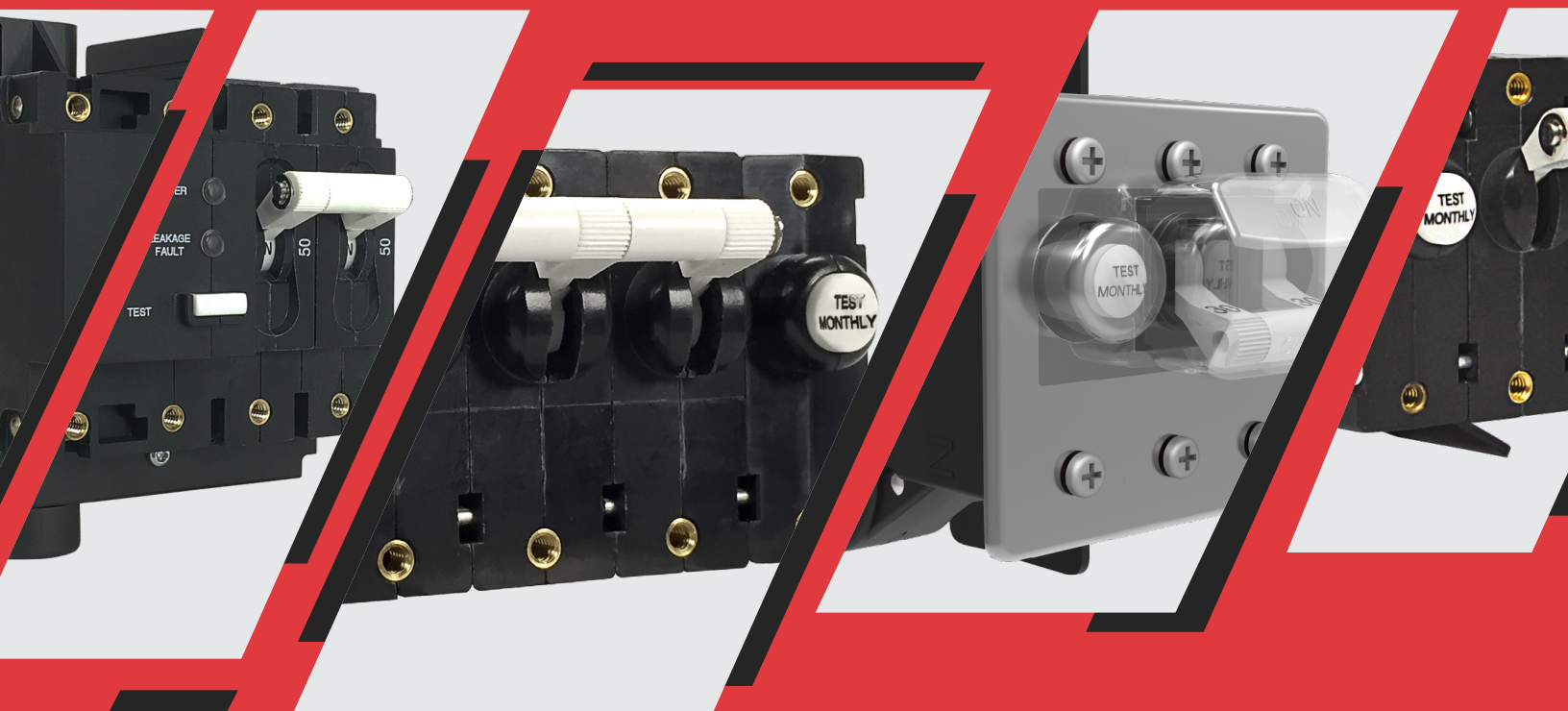
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