

# PC-Series

## 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



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# PC-Series Switch

## DESIGN FEATURES

### MOUNTING PLATE

Available in stainless steel or zinc chromate plated carbon steel



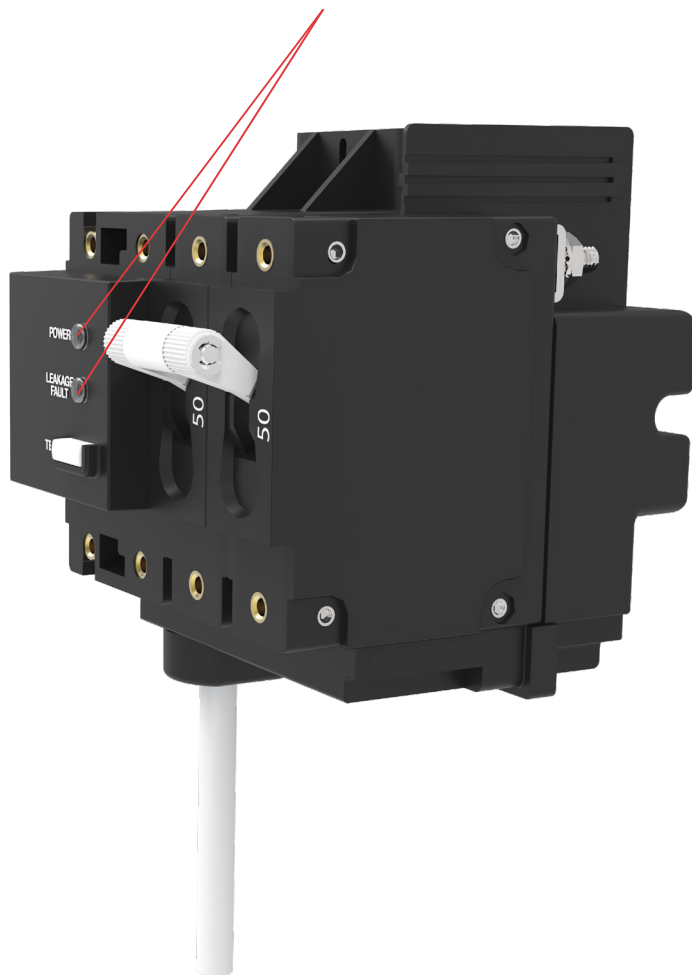
### OPTIONAL SEAL

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

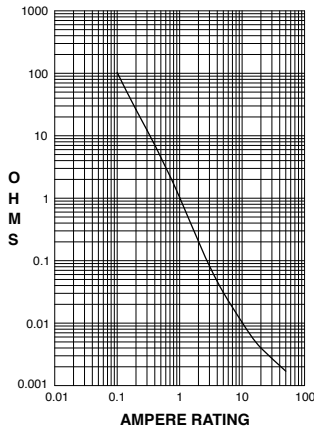
| PC-SERIES TABLE B: UL Recognized Configurations as an Earth Leakage Circuit Interruptor |            |                   |       |                       |                               |                                     |   |
|---|------------|-------------------|-------|-----------------------|-------------------------------|-------------------------------------|---|
| 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 Braker)



| 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)<br>2-pole: approximately 375 grams (13.2 ounces)<br>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<br>Humidity: 30±2°C, 70±2% relative humidity<br>Mixed Flowing Gases:<br>100 ppb H <sub>2</sub> S,<br>20 ppb Cl <sub>2</sub> ,<br>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

**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 4**

- 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   | LINE<br>CODE "C", "N"   | LINE<br>CODE "F", "N" | LINE<br>CODE "J", "R" | LINE<br>CODE "1", "5"   | LINE<br>CODE "3", "7" |
|                  | INDICATE COLOR LOCATION | LINE                  | LINE                  | INDICATE COLOR LOCATION | LINE                  |
| HORIZONTAL STYLE | LINE<br>CODE "D", "O"   | LINE<br>CODE "G", "O" | LINE<br>CODE "K", "U" | LINE<br>CODE "2", "6"   | LINE<br>CODE "4", "8" |
|                  | LINE                    | LINE                  | LINE                  | LINE                    | LINE                  |

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

**7 TERMINAL**

- 1** Stud, 10-32 threaded

**8 ACTUATOR COLOR & LEGEND**

**Handle**

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

**9 MOUNTING / BARRIERS**

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

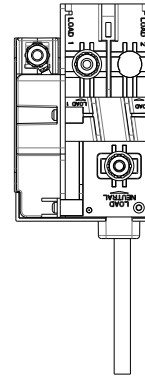
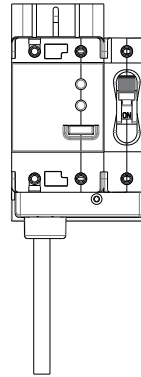
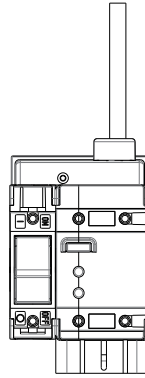
## Dimensional Specifications: in. [mm]

INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

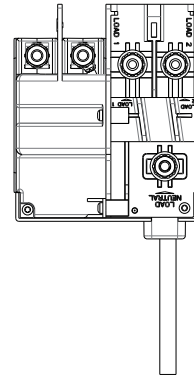
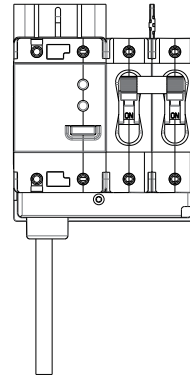
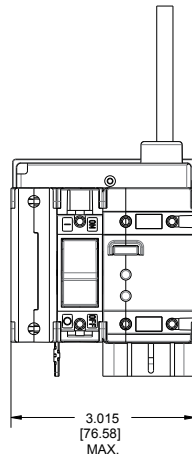
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

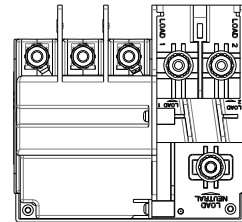
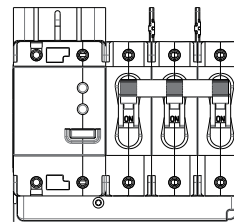
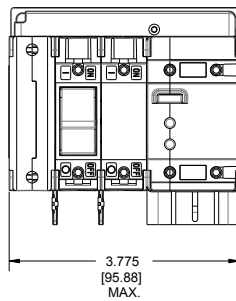
PCA  
120 VAC  
VERSION



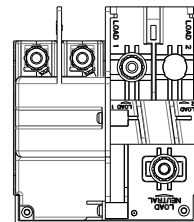
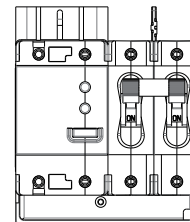
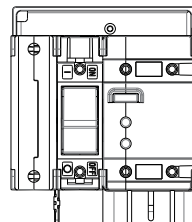
PCB  
120/240 VAC  
VERSION



PCC  
120/240 VAC  
VERSION  
W/ NEUTRAL BREAK



PCD  
120 VAC  
VERSION  
W/NEUTRAL BREAK

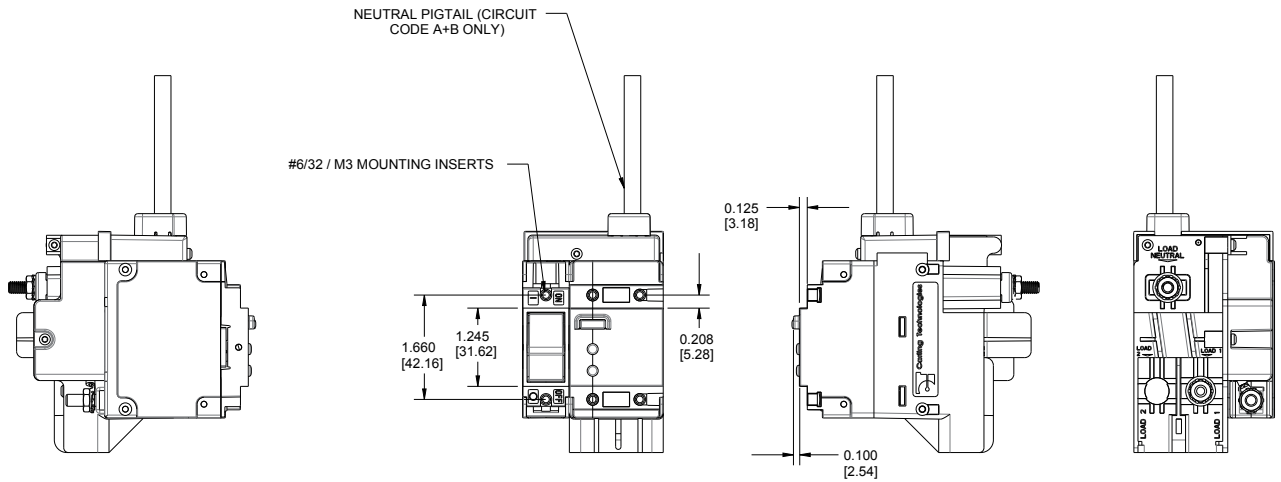
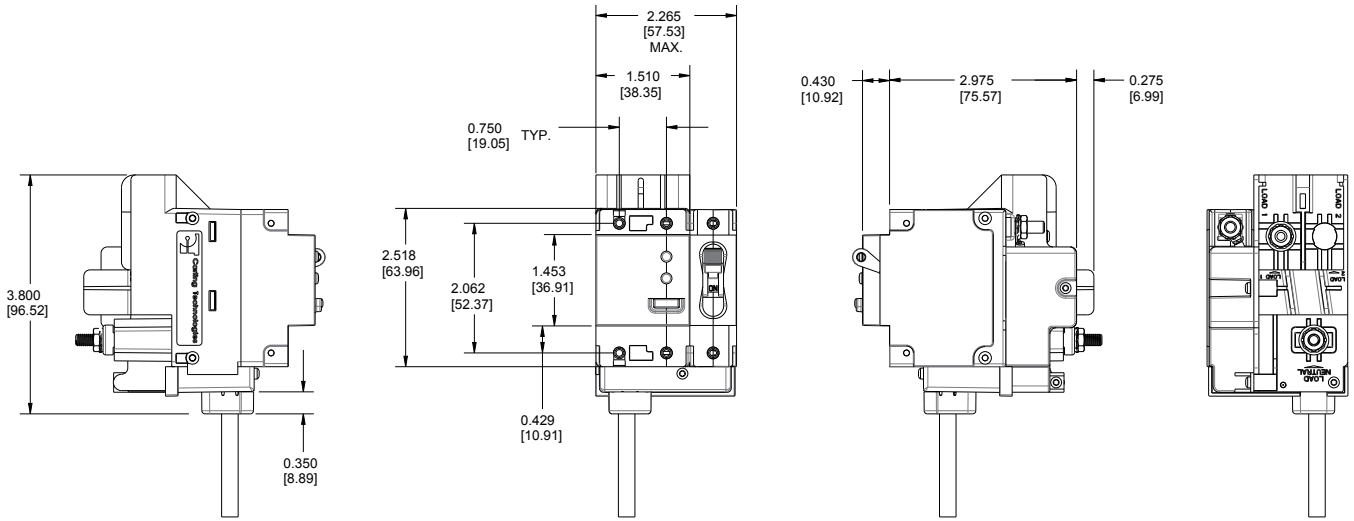


## Dimensional Specifications: in. [mm]

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



PANEL CUTOUT DETAIL  
TOLERANCES ±.005 [12]



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



**8** **PC** - **1** **4** **1**

<sup>1</sup> Type Number    <sup>2</sup> Series    <sup>3</sup> Actuator    <sup>4</sup> Poles    <sup>5</sup> 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

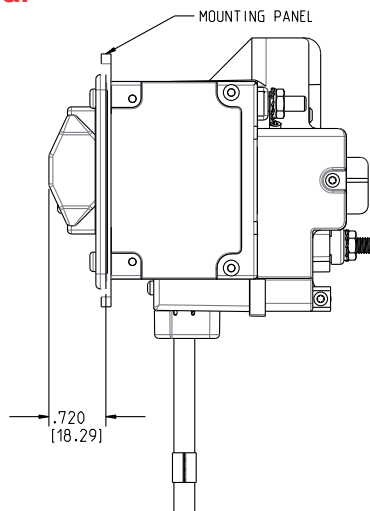
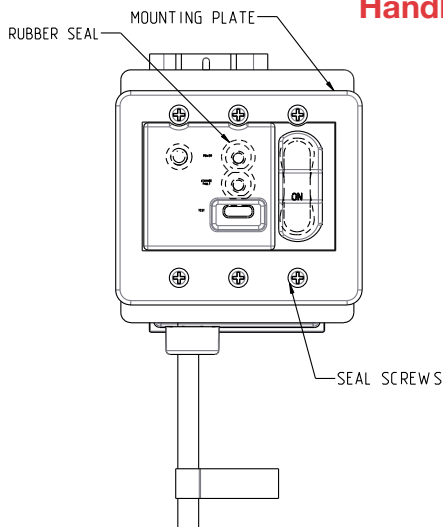
**5 MOUNTING SCREWS / PLATE MATERIAL <sup>1</sup>**

**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

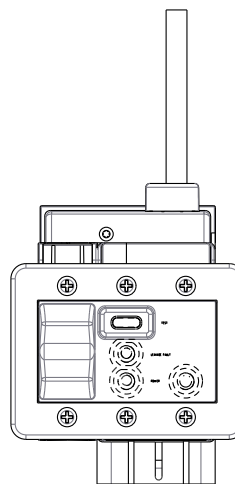
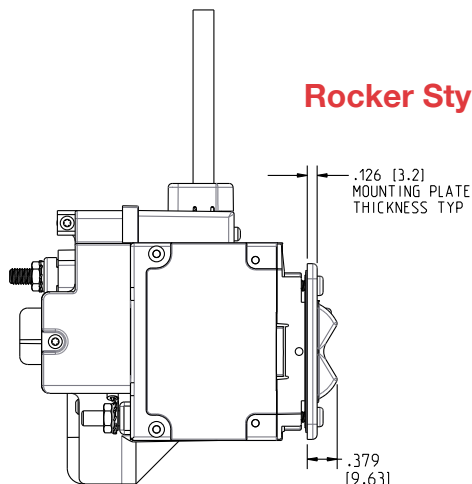
**Notes:**

- 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 Style Panel Seal**



**Rocker Style Panel Seal**



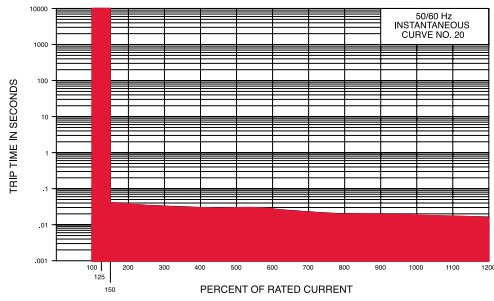
### Handle Actuator



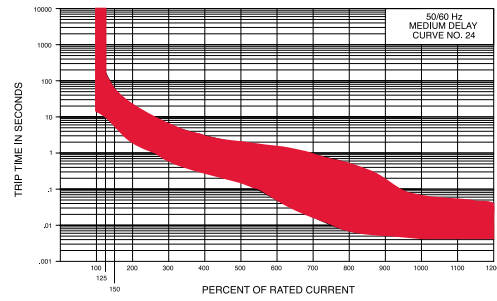
### Rocker Actuator



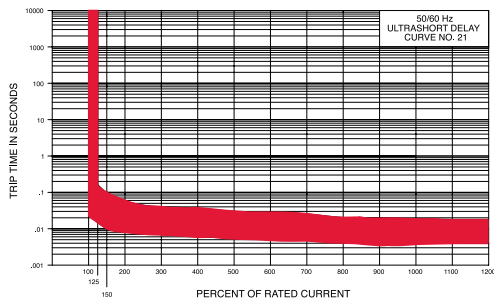
### Time Delay Curves Instantaneous



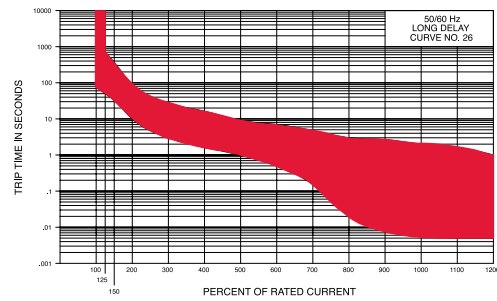
### Medium



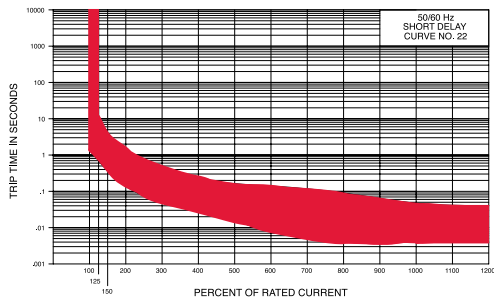
### Ultra Short



### 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.

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