

# 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



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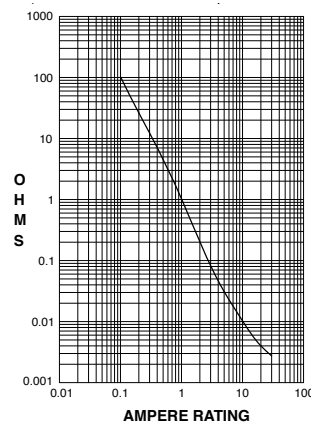
## Electrical Tables

**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

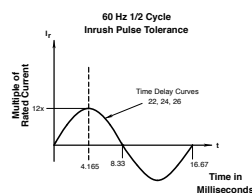
|                       |                                                                                                                                                                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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<br>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</b>     | <b>A</b>      | <b>-</b> | <b>24</b>                 | <b>-</b> | <b>620</b>          | <b>-</b> | <b>2</b>      | <b>B</b>               | <b>A</b>                   | <b>-</b> | <b>A</b>         | <b>G</b>                 |
| 1<br>Series | 2<br>System<br>Voltage/Poles |          | 3<br>Circuit | 4<br>Actuator |          | 5<br>Frequency<br>& Delay |          | 6<br>Current Rating |          | 7<br>Terminal | 8<br>Actuator<br>Color | 9<br>Mounting/<br>Barriers |          | 10<br>Trip Level | 11<br>Agency<br>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 |               |                |                |                |                |
|---------------------------|---------------|----------------|----------------|----------------|----------------|
| VERTICAL STYLE            | INDICATE "ON" |                | INDICATE "OFF" |                | SINGLE COLOR   |
|                           | CODE "10"     | CODE "11", "N" | CODE "12", "W" | CODE "13", "B" | CODE "14", "Y" |
|                           |               |                |                |                |                |
| HORIZONTAL STYLE          | INDICATE "ON" |                | INDICATE "OFF" |                | SINGLE COLOR   |
|                           | CODE "20"     | CODE "21", "O" | CODE "22", "U" | CODE "23", "S" | CODE "24", "R" |
|                           |               |                |                |                |                |

**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 |     |       |     |        |     |        |
|------|---------|-----|-------|-----|--------|-----|--------|
| 210  | 0.100   | 285 | 0.850 | 450 | 5.000  | 712 | 12.500 |
| 215  | 0.150   | 290 | 0.900 | 455 | 5.500  | 613 | 13.000 |
| 220  | 0.200   | 295 | 0.950 | 460 | 6.000  | 614 | 14.000 |
| 225  | 0.250   | 410 | 1.000 | 465 | 6.500  | 615 | 15.000 |
| 230  | 0.300   | 512 | 1.250 | 470 | 7.000  | 616 | 16.000 |
| 235  | 0.350   | 415 | 1.500 | 475 | 7.500  | 617 | 17.000 |
| 240  | 0.400   | 517 | 1.750 | 480 | 8.000  | 618 | 18.000 |
| 245  | 0.450   | 420 | 2.000 | 485 | 8.500  | 620 | 20.000 |
| 250  | 0.500   | 522 | 2.250 | 490 | 9.000  | 622 | 22.000 |
| 255  | 0.550   | 425 | 2.500 | 495 | 9.500  | 624 | 24.000 |
| 260  | 0.600   | 527 | 2.750 | 610 | 10.000 | 625 | 25.000 |
| 265  | 0.650   | 430 | 3.000 | 710 | 10.500 | 630 | 30.000 |
| 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 |     |        |

**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 Actuator Color | Single | 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>Threaded Insert, 2 per pole</b>                       |          |
| <b>A</b> 6-32 X 0.195 inches                             | yes      |
| <b>B</b> M3 x 5mm                                        | yes      |
| <b>Rockerguard Bezel, 2 per pole</b>                     |          |
| <b>C</b> 6-32 x 0.195"                                   | yes      |
| <b>D</b> M3 x 5 mm                                       | 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"                                   | yes      |
| <b>F</b> 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)

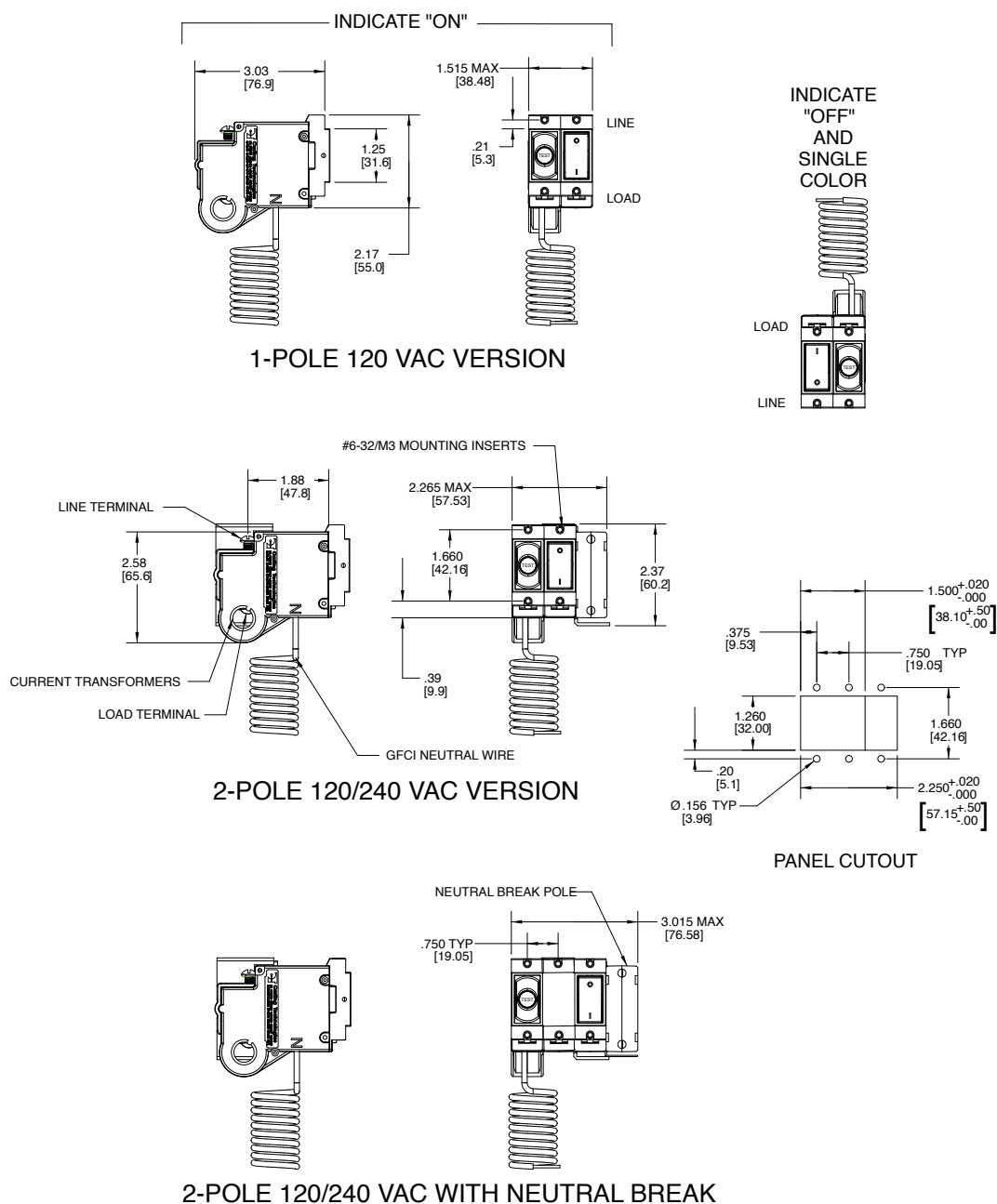
**11 AGENCY APPROVAL**

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

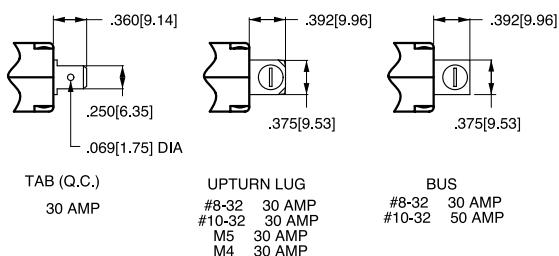
**Notes:**

- 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 & RATING



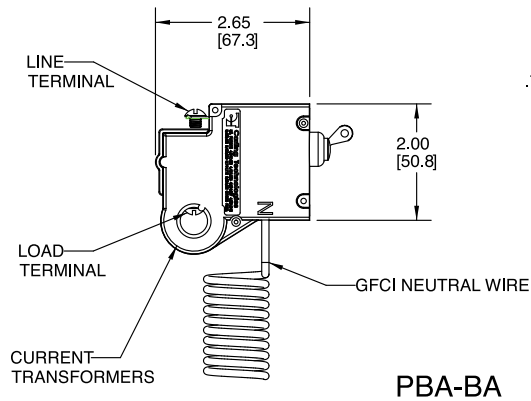
Notes:  
 1 All dimensions are in inches [millimeters].  
 2 Tolerance  $\pm 0.020$  [5.1] unless otherwise specified.

**TABLE A  
TIGHTENING TORQUE  
SPECIFICATIONS**

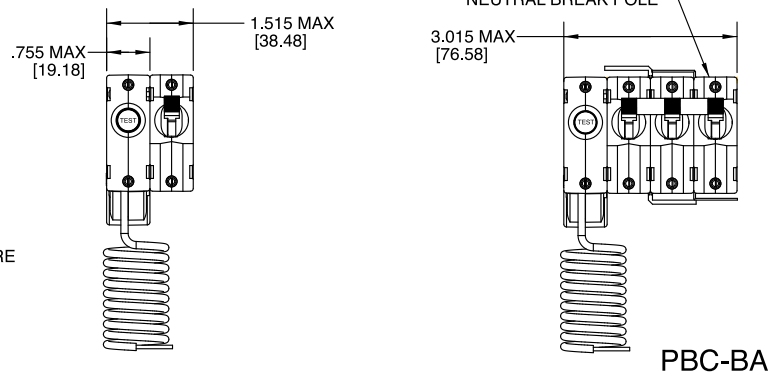
| THREAD SIZE                       | TORQUE                       |
|-----------------------------------|------------------------------|
| #6-32 & M3 MOUNTING HARDWARE      | 7-9 IN-LBS<br>[0.8-1.0 NM]   |
| #8-32 & M4 THREAD TERMINAL SCREW  | 12-15 IN-LBS<br>[1.4-1.7 NM] |
| #10-32 & M5 THREAD TERMINAL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

## Dimensional Specifications: in. [mm]

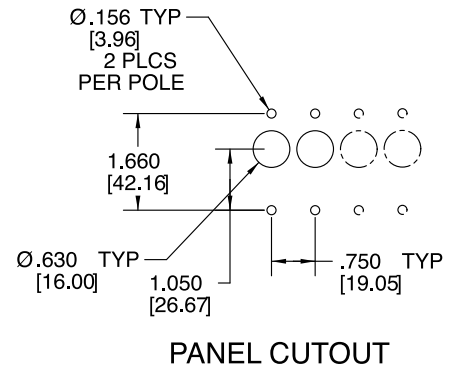
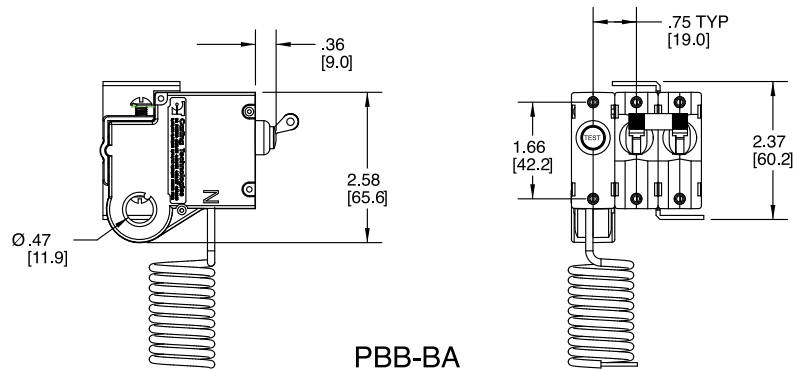
### TYPICAL 1-POLE 120 VAC VERSION



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



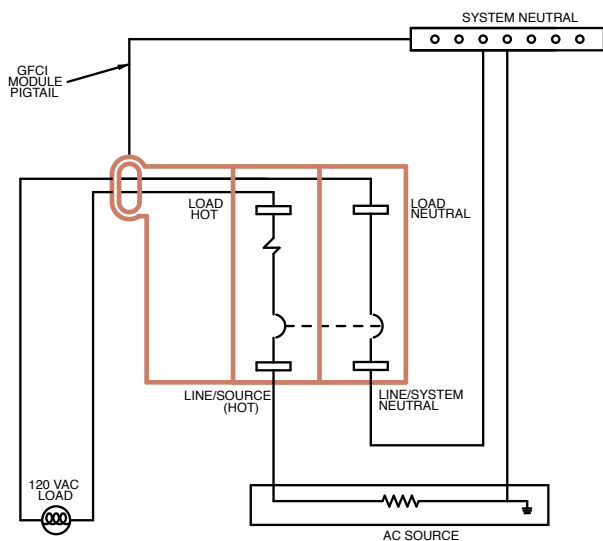
### TYPICAL 2-POLE 120/240 VAC VERSION



Notes:

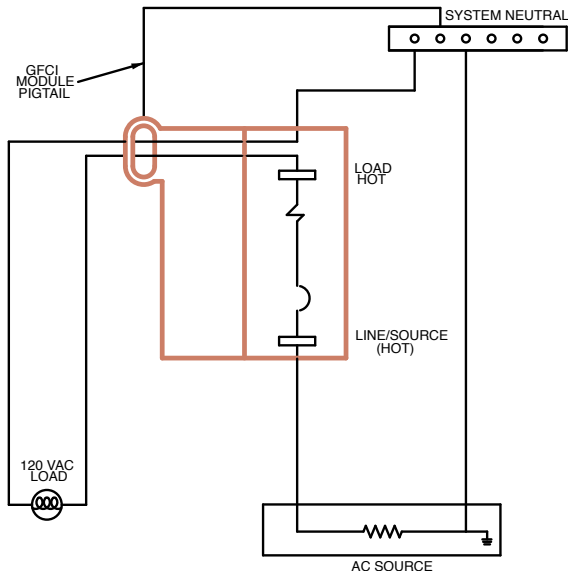
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance  $\pm 0.020$  [51] unless otherwise specified.

### 120 VAC with Switched Neutral



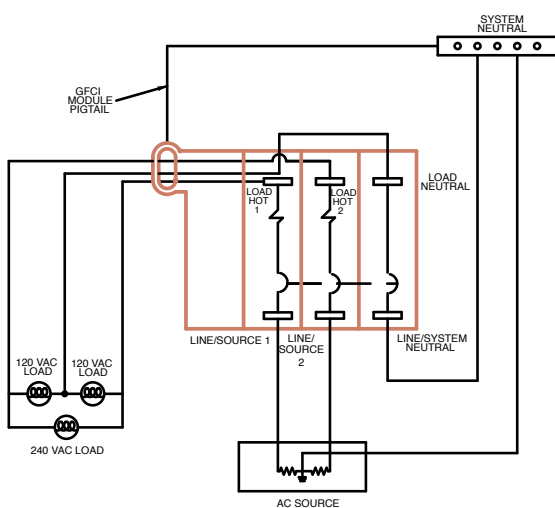
120 VAC WITH SWITCHED NEUTRAL

### 120 VAC without Switched Neutral



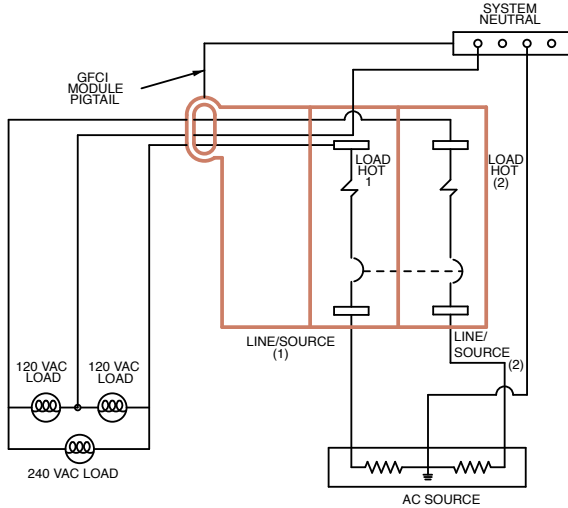
120 VAC WITHOUT SWITCHED NEUTRAL

### 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<br>Type<br>Number | 2<br>Series |   | 3<br>Actuator | 4<br>Poles | 5<br>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

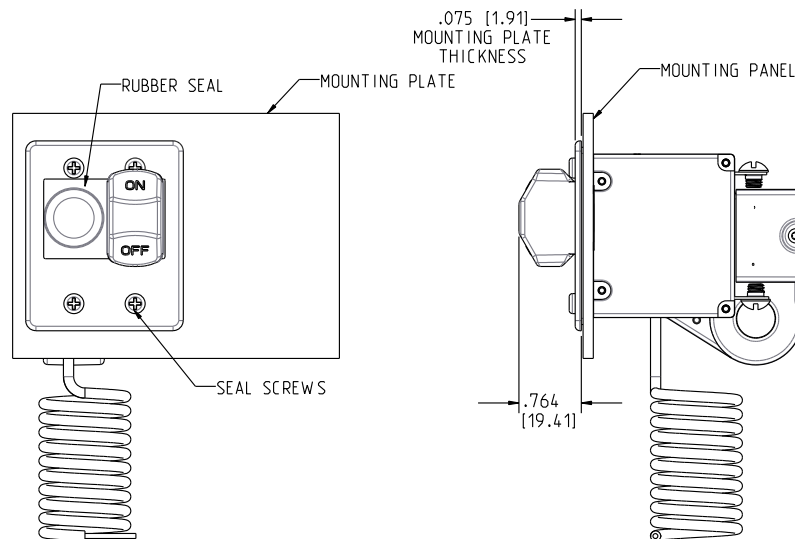
#### 5 MOUNTING SCREWS / PLATE MATERIAL <sup>1</sup>

- 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

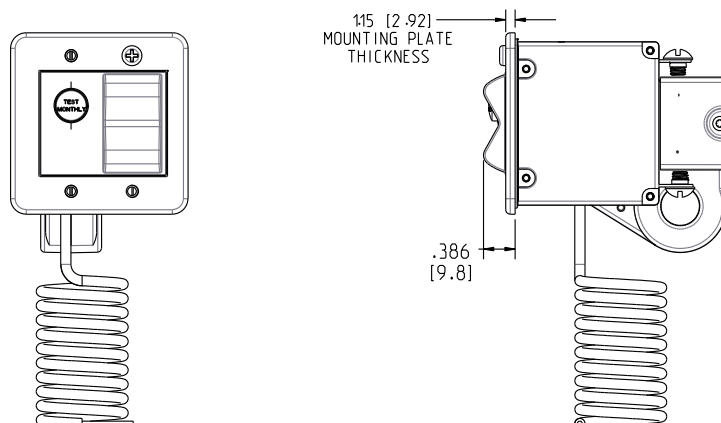
#### Notes:

- 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

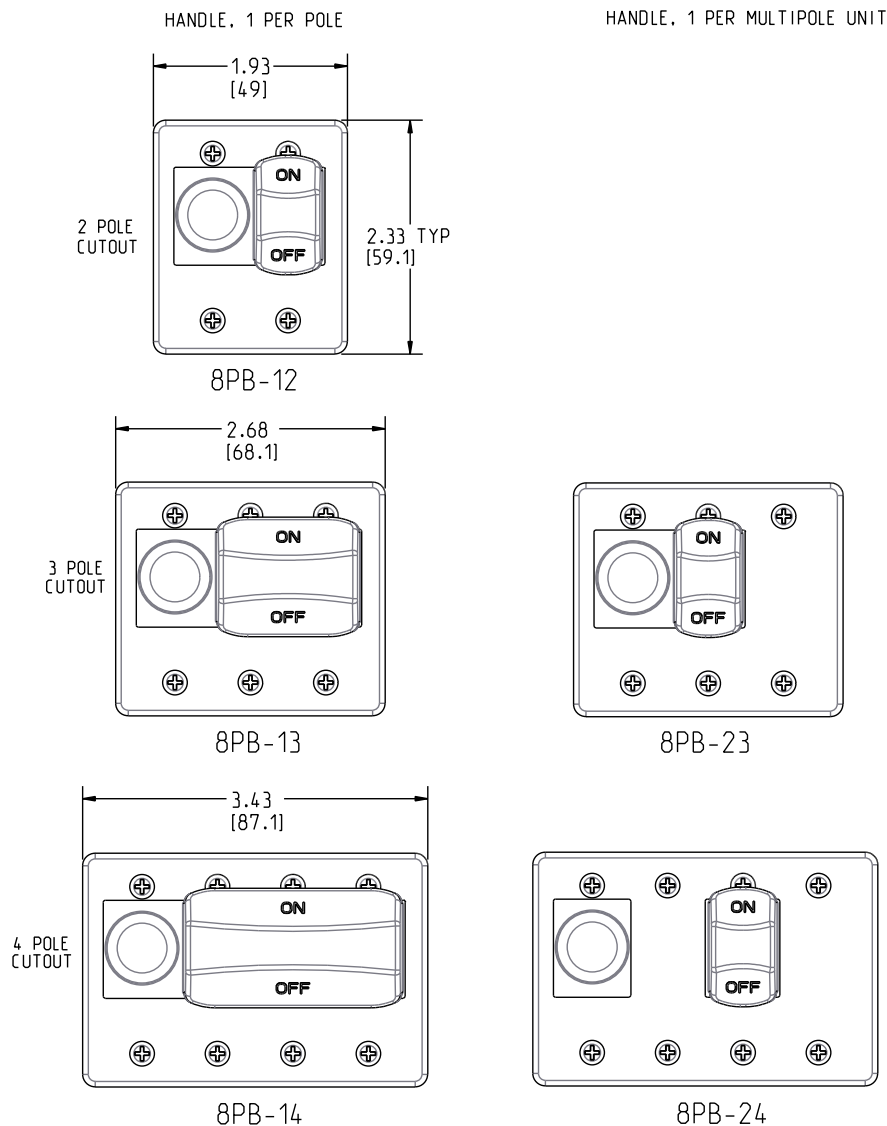
### Handle Style Panel Seal



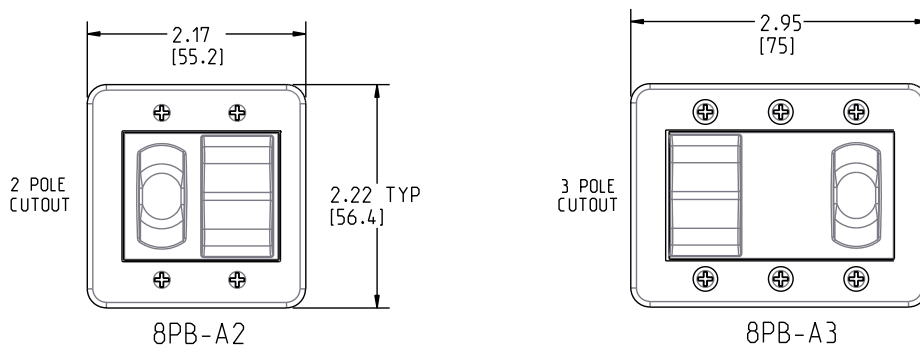
### Rocker Style Panel Seal



## Handle Actuator



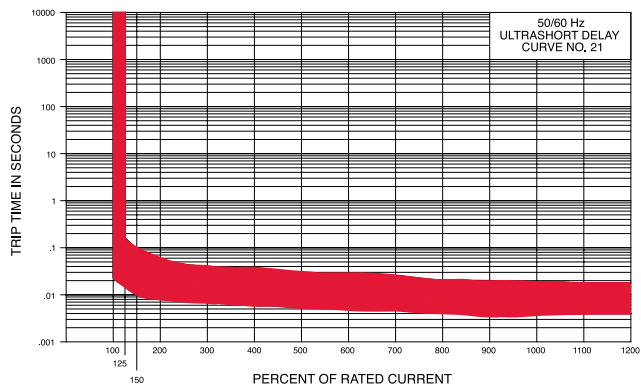
## Rocker Actuator



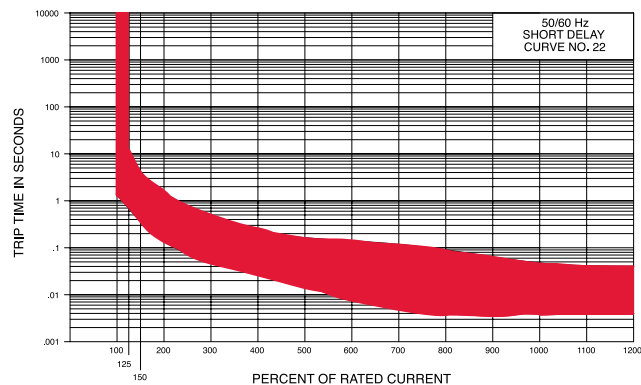


## Time Delay Curves

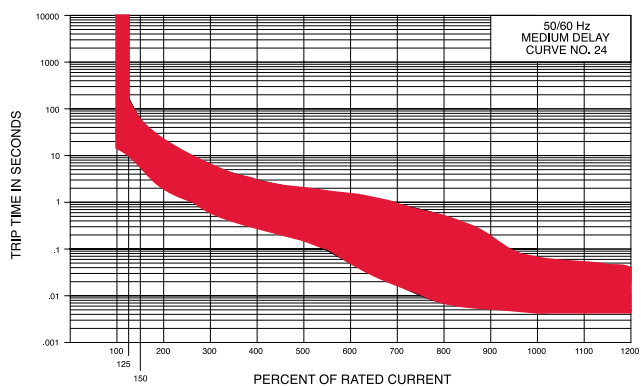
### Ultra Short



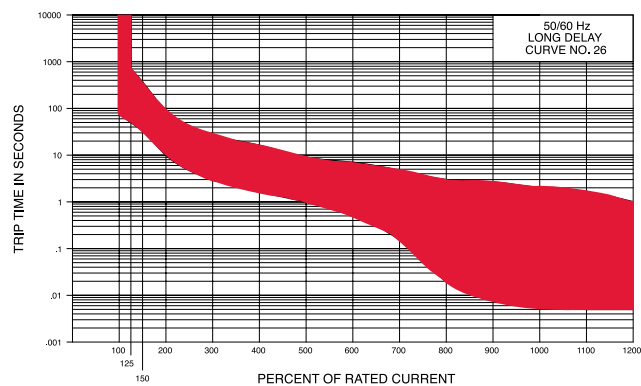
### Medium



### Short



### Long



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