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.

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

Resources:
Configure a Complete Part
Download CAD & Sales Drawing

Carling Technologies, Inc.
60 Johnson Avenue, Plainville, CT 06062
Email: sales@carlingtech.com
Application Support: team2@carlingtech.com
Phone: 860.793.9281 Fax: 860.793.9231
www.carlingtech.com
Electrical Tables

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

<table>
<thead>
<tr>
<th>PB-SERIES TABLE A</th>
<th>Circuit Configuration</th>
<th>Voltage</th>
<th>Max Rating</th>
<th>Frequency</th>
<th>Phase</th>
<th>Current Rating (Amps)</th>
<th>Interrupting Capacity (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>120</td>
<td>60</td>
<td>1</td>
<td></td>
<td></td>
<td>0.10 - 30</td>
<td>5000</td>
</tr>
</tbody>
</table>

Electrical

Maximum Voltage
Current Ratings
120/240VAC 60 Hz
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

Mechanical

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

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 CI2, 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
### PB-Series - GFCI/ELCI Circuit Breaker - Ordering Scheme

#### 1 Series

<table>
<thead>
<tr>
<th>PB</th>
<th>B - B</th>
<th>A - 24</th>
<th>620</th>
<th>2 B A - A G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

#### 2 System Voltage/Poles

<table>
<thead>
<tr>
<th>Series</th>
<th>Voltage/Poles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120 VAC single phase, one pole</td>
</tr>
<tr>
<td>B</td>
<td>120/240 VAC single phase, two pole</td>
</tr>
<tr>
<td>C</td>
<td>120/240 VAC single phase with switched neutral, three pole</td>
</tr>
<tr>
<td>D</td>
<td>120 VAC two pole with switched neutral</td>
</tr>
</tbody>
</table>

#### 3 Circuit

<table>
<thead>
<tr>
<th>Code</th>
<th>B</th>
<th>Series Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

#### 4 Actuator (Current)

<table>
<thead>
<tr>
<th>Code</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### 5 Frequency & Delay

<table>
<thead>
<tr>
<th>Code</th>
<th>21</th>
<th>22</th>
<th>24</th>
<th>26</th>
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<tbody>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

#### 6 Current Rating (Amperes)

<table>
<thead>
<tr>
<th>Code</th>
<th>210</th>
<th>215</th>
<th>220</th>
<th>225</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0.100</td>
<td>0.150</td>
<td>0.200</td>
<td>0.250</td>
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</tbody>
</table>

#### 7 Terminal

<table>
<thead>
<tr>
<th>Code</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 8 Actuator Color & Legend

<table>
<thead>
<tr>
<th>Handle</th>
<th>Actuator Color</th>
<th>I-O</th>
<th>ON-OFF</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

#### 9 Mounting / Barriers

<table>
<thead>
<tr>
<th>Code</th>
<th>21</th>
<th>22</th>
<th>24</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

#### 10 Leakage Current Trip Level - Max. Trip Current

<table>
<thead>
<tr>
<th>Code</th>
<th>21</th>
<th>22</th>
<th>24</th>
<th>26</th>
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<tbody>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

#### 11 Agency Approval

<table>
<thead>
<tr>
<th>Code</th>
<th>21</th>
<th>22</th>
<th>24</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

**Notes:**

1. 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
   - 2 Screw Terminals are recommended on ratings greater than 20 amps.
   - 3 Available with leakage current trip level - Max trip current code E, and agency approval C.
   - 4 30mA per UL1053, available with agency approval codes C & G.
   - 5 UL1500 only available with 30MA trip level.
Dimensional Specifications: in. [mm]

<table>
<thead>
<tr>
<th>1-POLE 120 VAC VERSION</th>
<th>2-POLE 120/240 VAC VERSION</th>
<th>2-POLE 120/240 VAC WITH NEUTRAL BREAK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDICATE &quot;ON&quot;</strong></td>
<td><strong>#8-32/M3 MOUNTING INSERTS</strong></td>
<td><strong>NEUTRAL BREAK</strong></td>
</tr>
<tr>
<td>3.03 [76.9]</td>
<td>1.88 [47.4]</td>
<td>.750 TYP [19.05]</td>
</tr>
<tr>
<td>2.17 [55.0]</td>
<td>2.296 MAX [57.53]</td>
<td>3.015 MAX [76.58]</td>
</tr>
<tr>
<td>.21 [5.3]</td>
<td>1.660 [42.18]</td>
<td>1.660 [42.18]</td>
</tr>
<tr>
<td><strong>INDICATE &quot;OFF&quot;</strong> AND SINGLE COLOR</td>
<td><strong>PANEL CUTOUT</strong></td>
<td></td>
</tr>
<tr>
<td>1.25 [31.8]</td>
<td>2.37 [60.3]</td>
<td></td>
</tr>
<tr>
<td><strong>CURRENT TRANSFORMERS</strong></td>
<td><strong>LOAD TERMINAL</strong></td>
<td></td>
</tr>
<tr>
<td>1.58 [40.0]</td>
<td>.750 TYP [19.05]</td>
<td></td>
</tr>
<tr>
<td><strong>LOAD TERMINAL</strong></td>
<td><strong>NEUTRAL BREAK POLE</strong></td>
<td></td>
</tr>
<tr>
<td>.39 [9.9]</td>
<td>.750 TYP [19.05]</td>
<td></td>
</tr>
<tr>
<td><strong>GFCI NEUTRAL WIRE</strong></td>
<td><strong>SCALE 0.500</strong></td>
<td></td>
</tr>
<tr>
<td>.156 TYP [3.96]</td>
<td>.750 TYP [19.05]</td>
<td></td>
</tr>
</tbody>
</table>

**TERMINAL DIMENSIONAL DETAIL & RATING**

- **TAB (O.C.)**
  - 30 AMP [0.75] DIA: .375[9.53]
  - 30 AMP [1.0] DIA: .392[9.96]

- **UPPER LUG**
  - #8-32: .360[9.14], .250[6.35]
  - #10-32: .375[9.53]

- **BUS**
  - #8-32: .392[9.96]
  - #10-32: .375[9.53]
  - #10-32: .392[9.96]

**TABLE A**

<table>
<thead>
<tr>
<th>THREAD SIZE</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8-32 &amp; M3 MOUNTING HARDWARE</td>
<td>7.9 IN-LBS [0.881.0 NM]</td>
</tr>
<tr>
<td>#8-32 &amp; M4 THREAD TERMINAL SCREW</td>
<td>12-15 IN-LBS [1.4-1.7 NM]</td>
</tr>
<tr>
<td>#10-32 &amp; M5 THREAD TERMINAL SCREW</td>
<td>15-20 IN-LBS [1.7-2.3 NM]</td>
</tr>
</tbody>
</table>

Notes:
1. All dimensions are in inches [millimeters].
2. Tolerance ±0.020 [0.51] unless otherwise specified.
Dimensional Specifications: in. [mm]

**TYPICAL 1-POLE 120 VAC VERSION**

- Line Terminal: 2.65 [67.9]
- Load Terminal: 2.00 [50.8]

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

- Neutral Break Pole: 1.515 [38.48]
- Panel Cutout: 3.015 [76.68]

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

- Ø .630 [16.00] TYP
- Ø .156 TYP [3.96] 2 PLCs Per Pole
- Ø .47 [11.9]

**Notes:**
1. All dimensions are in inches [millimeters].
120 VAC with Switched Neutral

120 VAC without Switched Neutral

120/240 VAC with Switched Neutral

120/240 VAC without Switched Neutral

---

Email: sales@carlingtech.com  Application Support: team2@carlingtech.com
Phone: (860) 793–9281  Fax: (860) 793–9231  www.carlingtech.com
## PB-Series - GFCI/ELCI Circuit Breaker - Panel Seal Ordering Scheme

**8 PB - 1 4 1**

<table>
<thead>
<tr>
<th>1 TYPE NUMBER</th>
<th>2 Series</th>
<th>3 Actuator</th>
<th>4 Poles</th>
<th>5 Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 PB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

**4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE**
- 2: Two
- 3: Three
- 4: Four

**5 MOUNTING SCREWS / PLATE MATERIAL**
- 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".
2. Available for Flat and Curved Rocker options - No Rocker guard Bracket

---

### Handle Style Panel Seal

![Handle Style Panel Seal Diagram](image)

### Rocker Style Panel Seal

![Rocker Style Panel Seal Diagram](image)
Handle Actuator

8PB-12

2 POLE CUTOUT

1.93 [49]

2.33 TYP [59.1]

8PB-13

3 POLE CUTOUT

2.68 [68.1]

8PB-14

4 POLE CUTOUT

3.43 [87.1]

Rocker Actuator

8PB-A2

2 POLE CUTOUT

2.17 [55.2]

2.22 TYP [56.4]

8PB-A3

3 POLE CUTOUT

2.95 [75.1]
Time Delay Curves

**Ultra Short**

**Medium**

**Short**

**Long**

![Diagram of Time Delay Curves](image-url)
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About Carling

Founded in 1920, Carling Technologies is a leading manufacturer of electrical and electronic switches and assemblies, circuit breakers, electronic controls, power distribution units, and multiplexed power distribution systems. With four ISO9001 and IATF16949 registered manufacturing facilities and technical sales offices worldwide, Carling Technologies Sales, Service and Engineering teams do much more than manufacture electrical components, they engineer powerful solutions! To learn more about Carling please visit www.carlingtech.com/company-profile.

To view all of Carling’s environmental, quality, health & safety certifications please visit www.carlingtech.com/environmental-certifications
Worldwide Headquarters
Carling Technologies, Inc.
60 Johnson Avenue, Plainville, CT 06062
Phone: 860.793.9281  Fax: 860.793.9231
Email: sales@carlingtech.com

Northern Region Sales Office: nrsm@carlingtech.com
Southeast Region Sales Office: sersm@carlingtech.com
Midwest Region Sales Office: mrsm@carlingtech.com
West Region Sales Office: wrsm@carlingtech.com
Latin America Sales Office: larsm@carlingtech.com

Asia-Pacific Headquarters
Carling Technologies, Asia-Pacific Ltd.,
Suite 1607, 16/F Tower 2, The Gateway,
Harbour City, 25 Canton Road,
Tsimshatsui, Kowloon, Hong Kong
Phone: Int + 852-2737-2277  Fax: Int + 852-2736-9332
Email: sales@carlingtech.com.hk

Shenzhen, China: shenzhen@carlingtech.com
Shanghai, China: shanghai@carlingtech.com
Pune, India: india@carlingtech.com
Kaohsiung, Taiwan: taiwan@carlingtech.com
Yokohama, Japan: japan@carlingtech.com

Europe | Middle East | Africa Headquarters
Carling Technologies LTD
4 Airport Business Park, Exeter Airport,
Clyst Honiton, Exeter, Devon, EX5 2UL, UK
Phone: Int + 44 1392.364422  Fax: Int + 44 1392.364477
Email: ltd.sales@carlingtech.com

Germany: gmbh@carlingtech.com
France: sas@carlingtech.com