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.

### Strategic Markets Served:

- On/Off Highway
- Marine
- Telecom/Datacom
- Military
- Renewable Energy

### Global Locations:

- **Carling Technologies**
  - World Headquarters
  - Plano, TX, USA
  - ISO 9001:2008
  - ISO/TS 16949:2009

- **Maretron**
  - Phoenix, AZ, USA

- **Carling Technologies**
  - Brownsville, TX, USA
  - ISO 9001:2008
  - ISO/TS 16949:2009

- **Carling Technologies**
  - Tijuana, Mexico
  - ISO 9001:2008
  - ISO/TS 16949:2009

- **Carling Technologies**
  - Jupiter, FL, USA

- **Carling Technologies**
  - European Headquarters
  - Exeter, UK
  - ISO 9001:2008
  - ISO/TS 16949:2009

- **Carling Technologies**
  - Hong Kong
  - ISO 9001:2008
  - ISO/TS 16949:2009

- **Carling Technologies**
  - Shanghai, China
  - ISO 9001:2008
  - ISO/TS 16949:2009

### Competitive Advantages:

- Innovative & Eco-Friendly Products
- Excellent Quality & Customer Service
- Reliable & On-Time Delivery
- Vertical Integration

### 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
- **70+** distributors
- **50+** rep firms

www.carlingtech.com
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.

Within This Catalog, you will find comprehensive product information for each product series including applications, specifications and ordering schemes.

Available Online are tools such as part configurator, product selectors and stock checks. Please visit 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 custservice@carlingtech.com

Custom Design Solutions are available for OEMs that require specific product design and performance.

Other Circuit Protection Products such as thermal protection and ground fault circuit protection are also available. Please refer to www.carlingtech.com for a complete list of product offering.

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Within This Catalog, you will find comprehensive product information for each product series including applications, specifications and ordering schemes.
<table>
<thead>
<tr>
<th><strong>PB-Series</strong></th>
<th><strong>PC-Series</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLES</strong></td>
<td>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)</td>
</tr>
<tr>
<td><strong>ACTUATOR STYLE</strong></td>
<td>handle, rocker, flat rocker, push-to-reset</td>
</tr>
<tr>
<td><strong>LEAKAGE CURRENT TRIP LEVEL</strong></td>
<td>30mA &amp; 6mA</td>
</tr>
<tr>
<td><strong>LEAKAGE CURRENT TRIP TIME</strong></td>
<td>For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds, complying with UL-1053 &amp; ABYC E11. For 6mA leakage trip: ≤ 25ms</td>
</tr>
<tr>
<td><strong>MAX CURRENT &amp; VOLTAGE RATINGS</strong></td>
<td>0.10-30A@120/240VAC</td>
</tr>
<tr>
<td><strong>MAX INTERRUPTING CAPACITY</strong></td>
<td>5,000A</td>
</tr>
<tr>
<td><strong>AVAILABLE CIRCUITS</strong></td>
<td>series trip</td>
</tr>
<tr>
<td><strong>TERMINATION</strong></td>
<td>.250&quot; tabs, 8-32, 10-32, M4,M5 screw with upturned lugs, 8-32, 10-32, M4,M5 screw, bus type</td>
</tr>
<tr>
<td><strong>MOUNTING METHOD</strong></td>
<td>front panel</td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE</strong></td>
<td>-35° C to +65° C</td>
</tr>
<tr>
<td><strong>APPROVALS</strong></td>
<td>UL 489, UL 1077, UL 1500</td>
</tr>
</tbody>
</table>

*Manufacturer reserves the right to change product information without prior notice
PB-Series
GFCI/ELCI & PANEL SEAL

The new 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:
Download 3D CAD Files
- IGS
- STP
## Electrical Tables

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

<table>
<thead>
<tr>
<th><strong>PB-SERIES TABLE A</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circuit Configuration</strong></td>
<td><strong>Max Rating</strong></td>
<td><strong>Voltage (VDC)</strong></td>
<td><strong>Frequency (Hz)</strong></td>
</tr>
<tr>
<td><strong>Current Configuration</strong></td>
<td><strong>Current (%)</strong></td>
<td><strong>Interrupting Capacity (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Series</td>
<td>120</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

### Electrical

**Current Ratings**
- Maximum Voltage: 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.

**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**

<table>
<thead>
<tr>
<th>CURRENT (AMPS)</th>
<th>TOLERANCE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 - 5.0</td>
<td>± 15</td>
</tr>
<tr>
<td>5.10 - 20.0</td>
<td>± 25</td>
</tr>
<tr>
<td>20.10 - 30.0</td>
<td>± 35</td>
</tr>
</tbody>
</table>

### 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.

**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”. Ultrashort 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**
- Tested FMG Test. 3 weeks @ 30°C, 75% RH, 100ppb H2S, 20ppb Cl2, 200ppb NO2

### Agency Certifications

**UL Listed**
- UL Standard 489
- UL Standard 1077
- UL Standard 1053

**Circuit Breakers, Molded Case,**
- (Guide DIVQ, File E129899)

**Supplementary Protectors**
- Ground Fault Sensing and Relaying Equipment

*Manufacturer reserves the right to change product specification without prior notice.*
PB Series Circuit Breaker - Ordering Scheme

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

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 1
A one per pole
B one per multipole unit
C Indicate ON, vertical legend
D Indicate ON, horizontal legend
E Indicate OFF, vertical legend
F Indicate OFF, horizontal legend

5 Frequency & Delay
21 50 / 60Hz Ultra Short
22 50 / 60Hz Short
24 50 / 60Hz Medium
26 50 / 60Hz Long

6 Current Rating (Amperes)

<table>
<thead>
<tr>
<th>Code</th>
<th>210</th>
<th>215</th>
<th>220</th>
<th>225</th>
<th>230</th>
<th>235</th>
<th>240</th>
<th>245</th>
<th>250</th>
<th>255</th>
<th>260</th>
<th>265</th>
<th>270</th>
<th>275</th>
<th>280</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.100</td>
<td>0.150</td>
<td>0.200</td>
<td>0.250</td>
<td>0.300</td>
<td>0.350</td>
<td>0.400</td>
<td>0.450</td>
<td>0.500</td>
<td>0.550</td>
<td>0.600</td>
<td>0.650</td>
<td>0.700</td>
<td>0.750</td>
<td>0.800</td>
<td></td>
</tr>
<tr>
<td>285</td>
<td>290</td>
<td>295</td>
<td>310</td>
<td>312</td>
<td>315</td>
<td>317</td>
<td>320</td>
<td>320</td>
<td>325</td>
<td>327</td>
<td>330</td>
<td>340</td>
<td>400</td>
<td>445</td>
<td></td>
</tr>
<tr>
<td>0.850</td>
<td>0.900</td>
<td>0.950</td>
<td>1.000</td>
<td>1.250</td>
<td>1.500</td>
<td>1.750</td>
<td>2.000</td>
<td>2.250</td>
<td>2.500</td>
<td>2.750</td>
<td>3.000</td>
<td>3.500</td>
<td>4.000</td>
<td>4.500</td>
<td></td>
</tr>
<tr>
<td>450</td>
<td>455</td>
<td>460</td>
<td>465</td>
<td>470</td>
<td>475</td>
<td>480</td>
<td>485</td>
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<td>495</td>
<td>500</td>
<td>500</td>
<td>510</td>
<td>540</td>
<td>612</td>
<td></td>
</tr>
<tr>
<td>5.000</td>
<td>5.500</td>
<td>6.000</td>
<td>6.500</td>
<td>7.000</td>
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<td>8.000</td>
<td>8.500</td>
<td>9.000</td>
<td>9.500</td>
<td>10.000</td>
<td>10.500</td>
<td>11.000</td>
<td>11.500</td>
<td>12.000</td>
<td></td>
</tr>
<tr>
<td>712</td>
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<td>620</td>
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<td>624</td>
<td>625</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>12.500</td>
<td>13.000</td>
<td>14.000</td>
<td>15.000</td>
<td>16.000</td>
<td>17.000</td>
<td>18.000</td>
<td>20.000</td>
<td>22.000</td>
<td>24.000</td>
<td>25.000</td>
<td>30.000</td>
<td>30.000</td>
<td>30.000</td>
<td>30.000</td>
<td></td>
</tr>
</tbody>
</table>

7 Terminal
1 3 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)
6 Screw M5 w/upturned lugs
7 Screw M4 w/upturned lugs
8 Screw M4 (Bus Type)
9 Screw M5 (Bus Type)

8 Actuator Color & Legend
Handle Rocker Actuator Color
Actuator Color I-O ON-OFF Dual 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
Threaded Insert, 2 per pole BARRIERS
A 6-32 X 0.195 inches yes
B M3 x 5mm yes
C Rockerguard Bezel, 2 per pole
D 6-32 x 0.195” yes
E M3 x 5 mm yes
F Standard Bezel with Recessed Off-Side Flat Rocker
G Threaded Insert, 2 per pole
H M3 x 5 mm yes

10 Leakage Current Trip Level - Max. Trip Current
A 3.4 5 MA (CLASS A GFCI)
B 30 MA (ELCI)

11 Agency Approval
A without Approvals
G UL489 Listed, CSA Certified
C UL1077
E UL1077 / UL1500 Ignition Protected

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 code C.
4 30mA per UL1053, available with agency approval codes C & G.
5 UL1500 only available with 30MA tripping level.
Dimensional Specifications: in. [mm]

1-POLE 120 VAC VERSION

2-POLE 120/240 VAC VERSION

2-POLE 120/240 VAC WITH NEUTRAL BREAK

TABLE A
TIGHTENING TORQUE SPECIFICATIONS

<table>
<thead>
<tr>
<th>THREAD SIZE</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6-32 &amp; M3 MOUNTING HARDWARE</td>
<td>7.9 IN-LBS (0.8-1.0 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].
Dimensional Specifications: in. [mm]

TYPICAL 1-POLE 120 VAC VERSION

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

Notes:
1. All dimensions are in inches [millimeters].
2. Tolerance ±0.020 [0.51] unless otherwise specified.
120 VAC with Switched Neutral

120 VAC without Switched Neutral

120/240 VAC with Switched Neutral

120/240 VAC without Switched Neutral
## PB-Series Circuit Breaker - Panel Seal Ordering Scheme

### 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. 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

2 POLE CUTOUT

1.93 [49]

2.33 TYP [59.1]

8PB-12

HANDLE, 1 PER MULTIPOLE UNIT

3 POLE CUTOUT

2.68 [68.1]

8PB-13

8PB-23

4 POLE CUTOUT

3.43 [107.1]

8PB-14

8PB-24

---

**Rocker Actuator**

2 POLE CUTOUT

2.17 [55.2]

2.22 TYP [56.4]

8PB-A2

3 POLE CUTOUT

2.95 [75]

8PB-A3
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.

**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

**Resources:**
Download 3D CAD Files
- IGS
- STP
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
**Electrical Tables**

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

<table>
<thead>
<tr>
<th>Circuit Configuration</th>
<th>Voltage</th>
<th>Current Rating (Amps)</th>
<th>Short Circuit Capacity (Amps)</th>
<th>Ground Fault Trip Level (Milliamps)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>120</td>
<td>1 - 50</td>
<td>5000</td>
<td>6</td>
<td>1 or 2 Poles. One pole of a two pole unit must be Neutral</td>
</tr>
<tr>
<td></td>
<td>120 / 240</td>
<td>1 - 50</td>
<td>5000</td>
<td>6</td>
<td>2 or 3 Poles. One pole of a three pole unit must be Neutral</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Circuit Configuration</th>
<th>Voltage</th>
<th>Current Rating (Amps)</th>
<th>Short Circuit Capacity (Amps)</th>
<th>Ground Fault Trip Level (Milliamps)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>120</td>
<td>1 - 50</td>
<td>5000</td>
<td>30</td>
<td>1 or 2 Poles. One pole of a two pole unit must be Neutral</td>
</tr>
<tr>
<td></td>
<td>120 / 240</td>
<td>1 - 50</td>
<td>3000</td>
<td>30</td>
<td>2 or 3 Poles. One pole of a three pole unit must be Neutral</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Circuit Configuration</th>
<th>Voltage</th>
<th>Current Rating (Amps)</th>
<th>Short Circuit Capacity (Amps)</th>
<th>Ground Fault Trip Level (Milliamps)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>240</td>
<td>1 - 30</td>
<td>5000</td>
<td>30</td>
<td>2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 11</td>
</tr>
<tr>
<td>Series Ignition Protection</td>
<td>240</td>
<td>1 - 50</td>
<td>5000</td>
<td>30</td>
<td>2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 12</td>
</tr>
</tbody>
</table>

**Impedance (Across Circuit breaker only)**

![Impedance Chart]

**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
PC-Series Circuit Breaker - General Specifications

**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
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. 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).

**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.
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 H₂S, 20 ppb Cl₂, 200±50 ppb NO₂

**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

GFCI Auto-Monitoring Successful Self Tests are followed by a flash of light per Next Page
GFCI Heartbeat Indicator 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.
GFCI End of Life

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

www.carlingtech.com
GFCI LED Indication

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

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-Series Circuit Breaker - Ordering Scheme

**1 Series**
- **PC**

**2 System Voltage / Poles**
- **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

**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)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Ampères</th>
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<tbody>
<tr>
<td>410</td>
<td>1.000</td>
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<tr>
<td>454</td>
<td>4.500</td>
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<tr>
<td>610</td>
<td>10.000</td>
</tr>
<tr>
<td>618</td>
<td>18.000</td>
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<tr>
<td>512</td>
<td>1.250</td>
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<tr>
<td>450</td>
<td>5.000</td>
</tr>
<tr>
<td>710</td>
<td>10.500</td>
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<td>620</td>
<td>20.000</td>
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<tr>
<td>415</td>
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<td>455</td>
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<td>611</td>
<td>11.000</td>
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<tr>
<td>622</td>
<td>22.000</td>
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<td>517</td>
<td>1.750</td>
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<tr>
<td>460</td>
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<tr>
<td>711</td>
<td>11.500</td>
</tr>
<tr>
<td>624</td>
<td>24.000</td>
</tr>
<tr>
<td>520</td>
<td>2.000</td>
</tr>
<tr>
<td>465</td>
<td>6.500</td>
</tr>
<tr>
<td>612</td>
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<td>635</td>
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<tr>
<td>527</td>
<td>2.750</td>
</tr>
<tr>
<td>480</td>
<td>8.000</td>
</tr>
<tr>
<td>614</td>
<td>14.000</td>
</tr>
<tr>
<td>640</td>
<td>40.000</td>
</tr>
<tr>
<td>430</td>
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<tr>
<td>485</td>
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<td>615</td>
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<td>435</td>
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<tr>
<td>490</td>
<td>9.000</td>
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<tr>
<td>616</td>
<td>16.000</td>
</tr>
<tr>
<td>660</td>
<td>60.000</td>
</tr>
<tr>
<td>440</td>
<td>4.000</td>
</tr>
<tr>
<td>495</td>
<td>9.500</td>
</tr>
<tr>
<td>617</td>
<td>17.000</td>
</tr>
</tbody>
</table>

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

**8 Actuator Color & Legend**

<table>
<thead>
<tr>
<th>Handle</th>
<th>Rocker Actuator Color</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I-O</td>
</tr>
<tr>
<td></td>
<td>ON-OFF</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>White</strong></td>
<td>A</td>
</tr>
<tr>
<td><strong>Black</strong></td>
<td>B</td>
</tr>
<tr>
<td><strong>Red</strong></td>
<td>C</td>
</tr>
<tr>
<td><strong>Green</strong></td>
<td>D</td>
</tr>
<tr>
<td><strong>Blue</strong></td>
<td>E</td>
</tr>
<tr>
<td><strong>Yellow</strong></td>
<td>F</td>
</tr>
<tr>
<td><strong>Gray</strong></td>
<td>G</td>
</tr>
<tr>
<td><strong>Orange</strong></td>
<td>H</td>
</tr>
<tr>
<td><strong>Yellow</strong></td>
<td>I</td>
</tr>
<tr>
<td><strong>Gray</strong></td>
<td>J</td>
</tr>
<tr>
<td><strong>Orange</strong></td>
<td>K</td>
</tr>
</tbody>
</table>

**9 Mounting / Barriers**

<table>
<thead>
<tr>
<th>Mounting Style</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threaded Insert, 2 per pole</td>
<td>6-32 X 0.195 inches, yes</td>
</tr>
<tr>
<td>Rockerguard Bezel</td>
<td>ISO M3 x 5mm, yes</td>
</tr>
<tr>
<td>Threaded Insert, 2 per pole</td>
<td>6-32 X 0.195 inches, yes</td>
</tr>
<tr>
<td>Standard Bezel with Recessed Off-Side Flat Rocker</td>
<td>ISO M3 x 5mm, yes</td>
</tr>
<tr>
<td>Push-to-Reset Bezel</td>
<td>ISO M3 x 5mm, yes</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Agency Approval</th>
<th>Current Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>6 MA (CLASS A GFCI)</td>
</tr>
<tr>
<td>UL 943 and CSA certified</td>
<td>30 MA (ELCI)</td>
</tr>
</tbody>
</table>

**11 Agency Approval**

<table>
<thead>
<tr>
<th>Agency Approval</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>without Approvals</td>
</tr>
<tr>
<td>UL 1053</td>
<td>1.3</td>
</tr>
<tr>
<td>UL 1053 &amp; UL 1500</td>
<td>1.3</td>
</tr>
</tbody>
</table>

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

3.015
[76.68]
MAX.

PCB
120/240 VAC
VERSION

PCC
120/240 VAC
VERSION
W/ NEUTRAL BREAK

PCC & PCF
ROCKER ACTUATOR

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

PCD
120 VAC
VERSION
W/NEUTRAL BREAK

PCB, PCD & PCE
PCA, PCB

3.040
[77.22]

2.280
[57.91]

.750
[19.05]

.432
[10.97]

.200
[5.08]

1.660
[42.16]

2 PLC’S
PER POLE

.156
[Ø 3.96]

1.260
[32.00]

TYP.

120 VAC
INDICATE OFF / SINGLE COLOR
ROCKER ACTUATOR

HANDLE / INDICATE ON
ROCKER ACTUATOR

TERMINAL
LOCATIONS

PCC & PCF
ROCKER ACTUATOR

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

PCD & PCE
PCA, PCB

3.040
[77.22]

2.280
[57.91]

.750
[19.05]

.432
[10.97]

.200
[5.08]

1.660
[42.16]

2 PLC’S
PER POLE

.156
[Ø 3.96]

1.260
[32.00]

TYP.
Dimensional Specifications: in. [mm]

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

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

www.carlingtech.com
PC-Series Circuit Breaker - Panel Seal Ordering Scheme, Dimensional Specifications

8 PC - 1 4 1

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
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
**PC-Series Circuit Breaker - Panel Seal Configuration - Dimensional Specifications**

**Handle Actuator**

- **3 Pole Cutout**
  - Handle, 1 per pole
  - Handle, 1 per multipole unit
  - 8PC-13
  - 3.12 [79.2]
  - 2.71 TYP [68.8]

- **4 Pole Cutout**
  - 8PC-14
  - 3.87 [98.2]

- **5 Pole Cutout**
  - 8PC-15
  - 4.62 [117.3]

**Rocker Actuator**

- **3 Pole Cutout**
  - 8PC-A3
  - 2.95 [75]
  - 2.22 TYP [56.4]

- **4 Pole Cutout**
  - 8PC-A4
  - 3.70 [94]
Time Delay Curves

**Instantaneous**

- No Trip
- May Trip .040 MAX .035 MAX .030 MAX .025 MAX .020 MAX .017 MAX .016 MAX .015 MAX

**Medium**

- No Trip
- .014 - .150 .011 - .095 .008 - .055 .006 - .035 .005 - .027 .005 - .021 .004 - .018 .004 - .017

**Ultra Short**

- No Trip
- .700 - 12.0 .350 - 4.00 .130 - 1.30 .027 - .220 .008 - .130 .004 - .090 .004 - .045 .004 - .040

**Long**

- No Trip
- 10.0 - 160 6.00 - 60.0 2.20 - 20.0 .300 - 3.00 .050 - 1.30 .007 - .500 .005 - .060 .004 - .040

**Short**

- 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

### Time Delay Values

<table>
<thead>
<tr>
<th>Delay</th>
<th>100%</th>
<th>125%</th>
<th>150%</th>
<th>200%</th>
<th>400%</th>
<th>600%</th>
<th>800%</th>
<th>1000%</th>
<th>1200%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>No Trip</td>
<td>May Trip</td>
<td>.040 MAX</td>
<td>.035 MAX</td>
<td>.030 MAX</td>
<td>.025 MAX</td>
<td>.020 MAX</td>
<td>.017 MAX</td>
<td>.015 MAX</td>
</tr>
<tr>
<td>21</td>
<td>No Trip</td>
<td>.014 - .150</td>
<td>.011 - .095</td>
<td>.008 - .055</td>
<td>.006 - .035</td>
<td>.005 - .027</td>
<td>.005 - .021</td>
<td>.004 - .018</td>
<td>.004 - .017</td>
</tr>
<tr>
<td>22</td>
<td>No Trip</td>
<td>.700 - 12.0</td>
<td>.350 - 4.00</td>
<td>1.30 - 1.30</td>
<td>.027 - .220</td>
<td>.008 - .130</td>
<td>.004 - .090</td>
<td>.004 - .045</td>
<td>.004 - .040</td>
</tr>
<tr>
<td>24</td>
<td>No Trip</td>
<td>10.0 - 160</td>
<td>6.00 - 60.0</td>
<td>2.20 - 20.0</td>
<td>.300 - 3.00</td>
<td>.050 - 1.30</td>
<td>.007 - .500</td>
<td>.005 - .060</td>
<td>.005 - .040</td>
</tr>
<tr>
<td>26</td>
<td>No Trip</td>
<td>50.0 - 700</td>
<td>32.0 - 350</td>
<td>10.0 - 90.0</td>
<td>1.50 - 15.0</td>
<td>.500 - 7.00</td>
<td>.020 - 3.00</td>
<td>.006 - 2.00</td>
<td>.005 - 1.00</td>
</tr>
</tbody>
</table>

Notes:
- Other time delay values available, consult factory.
- Delay Curves 21, 22, 24, 26: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
- Delay Curve 20: Breakers to hold 100% and must trip at 125% 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 for complete details.

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

**SWITCHES AND CONTROLS**
Rocker, toggle, pushbutton, rotary, battery disconnects and controls.

**MINI & SUB-MINI SWITCHES**
Sealed and non-sealed rocker, toggle, pushbutton and slide options.

**HYDRAULIC-MAGNETIC CIRCUIT PROTECTION**
1-6 poles from .02 to 700A with CSA, VDE, TUV, UL489, UL489A, UL1500 approvals.

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

**GFCI/ELCI CIRCUIT PROTECTION**
1-3 poles from 0.10 to 50A with CSA, UL489, UL1077, UL1053, UL1500 approvals.
Below is a list of useful market specific catalogs and brochures. Please scan the QR codes below or visit [carlingtech.com/onthego](http://carlingtech.com/onthego) for complete details.

<table>
<thead>
<tr>
<th>ON-OFF HIGHWAY</th>
<th>MARINE</th>
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<tbody>
<tr>
<td>Switches, Controls and Custom Solutions</td>
<td>Circuit Protection and Switches</td>
</tr>
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<table>
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<tr>
<th>RENEWABLE ENERGY</th>
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<td>COTS Switches and Circuits Breakers</td>
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<th>INDUSTRIAL AUTOMATION</th>
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<td>Hydraulic-Magnetic Circuit Breakers</td>
<td>Switches and Circuit Breakers</td>
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<td><img src="catalog" alt="QR Code" /> <img src="brochure" alt="QR Code" /></td>
<td><img src="brochure" alt="QR Code" /></td>
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</tbody>
</table>
Authorized Sales Representatives and Distributors

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About Carling

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