

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



### Resources:

[Download 3D CAD Files](#)

[IGS >](#)

[STP >](#)

### Product Highlights:

- ♦ Overload, short circuit and ground fault protection in a single package
- ♦ Handle style actuators and rocker style “acuguard”
- ♦ 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 poles ensures that an overload in one pole will trip all adjacent poles.
- ♦ Front panel mounting
- ♦ Integral push-to-test button
- ♦ Two integrated LED indicators show if a breaker is closed w/ Line Voltage present, or has opened due to leakage current, opened due to overcurrent, or closed w/ no Line Voltage present.
- ♦ Optional Hot/Neutral reversal detection and protection

### Benefits:

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

### Typical Applications:

- ♦ Marine
- ♦ Generators
- ♦ Lighting



**Carling Technologies™**

Innovative Designs. Powerful Solutions.

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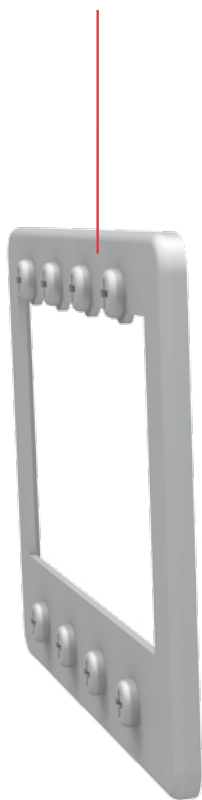
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# PC-Series Switch

## DESIGN FEATURES

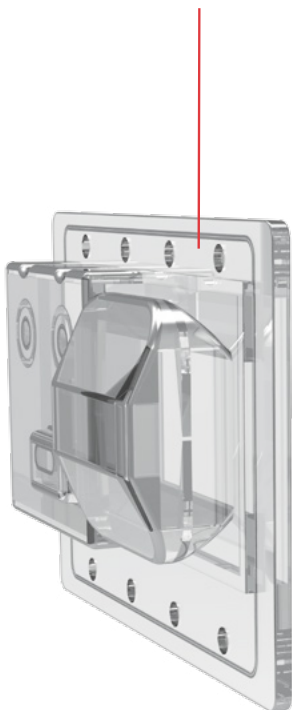
### MOUNTING PLATE

Available in stainless steel or zinc chromate plated carbon steel



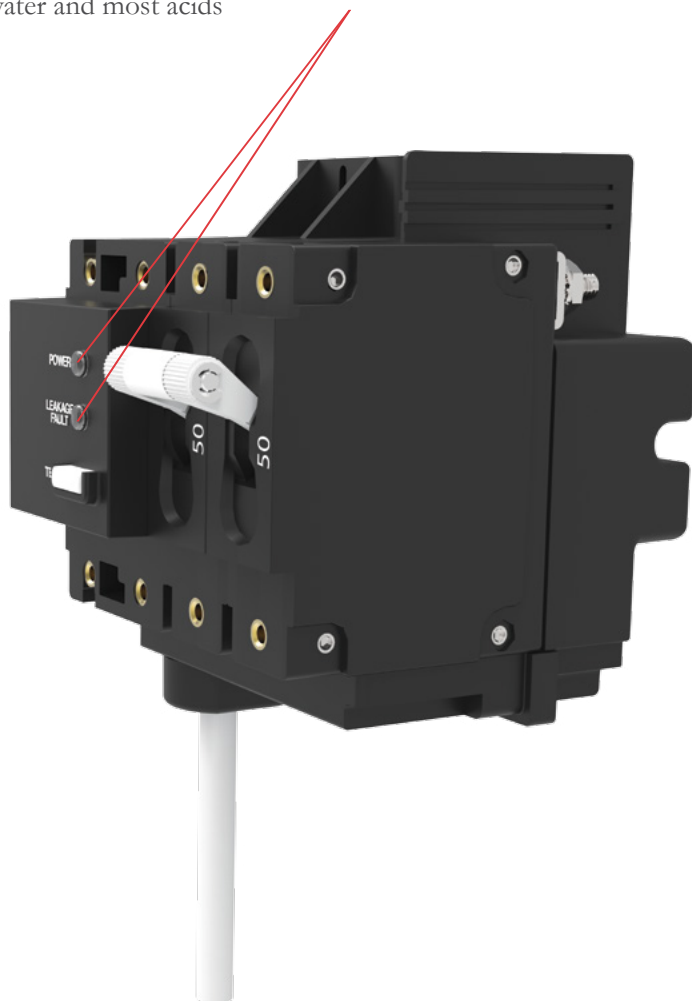
### OPTIONAL SEAL

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



### LEDs

Two separate lights that indicate power and ground fault leakage



\*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	Phase				
Series	120	50 / 60	1	1 - 50	5000	6	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120 / 240	50 / 60	1	1 - 50	5000	6	1 or 2 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	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	1 or 2 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	1 or 2 Poles. One pole of a three pole unit must be Neutral

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

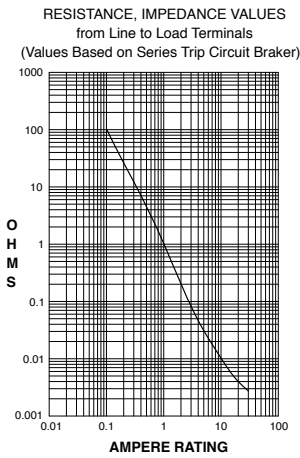
PC-SERIES TABLE C: UL Recognized Configurations as an Earth Leakage Circuit Interruptor - 240V							
Circuit Configuration	Voltage			Current Rating (Amps)	Short Circuit Capacity (Amps)	Ground Fault Trip Level (Milliamps)	Notes
	Max Rating	Frequency	Phase				
Series	240	50 / 60	1	1 - 30	5000	30	2 or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

## Agency Certifications

UL Standard 489	Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)
UL Standard 1077	Supplementary Protectors
CSA 22.2 No. 144.1	Class A Ground Fault Circuit Interrupters
UL Standard 1053	Ground Fault Sensing and Relaying Equipment
UL Standard 1500	Ignition Protection

### Electrical

Current Ratings 1 - 50 Amps maximum  
 Voltage Rating 120VAC, 120/240VAC, 240VAC  
 Current Trip Level 30mA & 6mA  
 Current Trip Time For 30mA leakage trip:  
 ≤ 22.2mA, shall not trip  
 30mA, shall trip within .10 seconds  
 The above complies with & ABYC E11. For 6mA leakage trip: ≤25ms  
 Operating Frequency 50/60 Hz for 30mA leakage trip  
 60 Hz for 6mA leakage trip  
 Interrupt Capacity 5,000 Amps  
 Impedance



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

### Innovative Features

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

### Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.  
 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 (Breakers only) 1-pole (1 Circuit Breaker + 1 GFCI Sensor Module), 120V  
 2-pole (2 Circuit Breakers + 1 GFCI Sensor Module), 120/240V or 120V with Neutral Break. 240VAC two pole. 3-pole 120/240V with Neutral Break (Sensor module has 2 pole width) Circuit Breaker Line Side: #10-32, Threaded stud. GFCI Sensor Module Load Side: #10-32 threaded stud. Neutral pigtail. Front Panel, #6-32 and M3 threaded inserts.  
 Termination Handle, Flat Rocker, Curved Rocker (with or without rocker guard), Push-to-Reset Rocker  
 Mounting  
 Actuator

### 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".  
 Vibration Withstands 0.06" excursion from 10-55 Hz, and 10 G 55-500 Hz, a 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 **Humidity:** 30±2°C, 70±2% relative humidity  
**Mixed Flowing Gases:** 100 ppb H2S, 20 ppb Cl2, 200±50 ppb NO2

**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**

- 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
- E** 120 VAC single phase with reversed polarity indicator, 2 pole
- F** 120/240 VAC single phase with reversed polarity indicator, 3 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**

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

**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	Rocker Single	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**

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

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

- A** 6 MA (CLASS A GFCI)
- E** 30 MA (ELC) 1,2

**11 AGENCY APPROVAL**

- AA** without Approvals
- 10** CSA certified
- 11** UL 1053 1,2
- 12** UL 1053 & UL 1500 1,2

Notes:

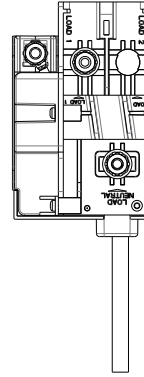
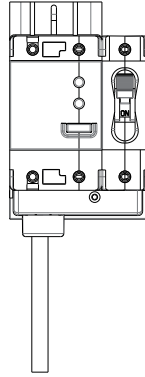
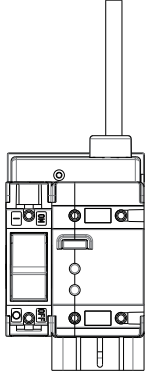
- 1 This device meets the requirements of ABCY E11.
- 2 30mA per UL1053, available with agency approval codes 11 & 12.

INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

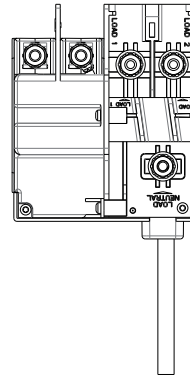
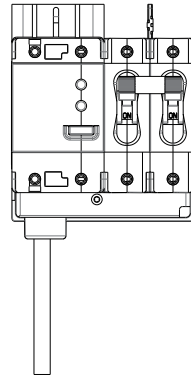
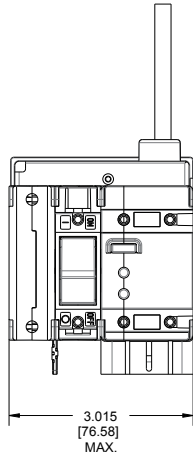
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

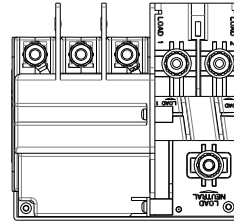
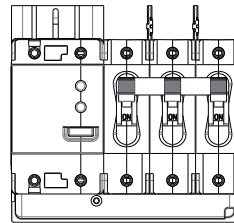
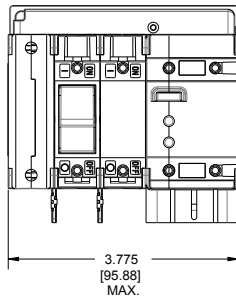
PCA  
120 VAC  
VERSION



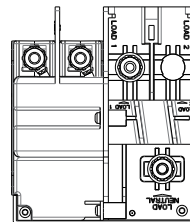
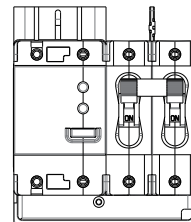
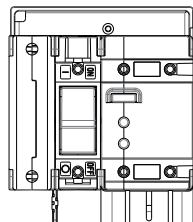
PCB  
120/240 VAC  
VERSION



PCC  
120/240 VAC  
VERSION  
W/ NEUTRAL BREAK



PCD  
120 VAC  
VERSION  
W/NEUTRAL BREAK

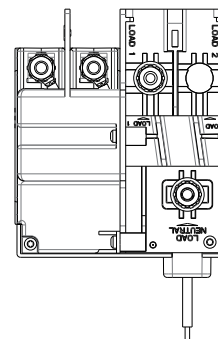
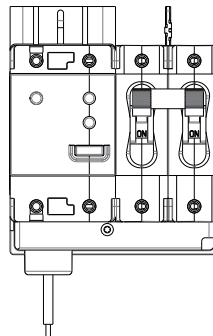
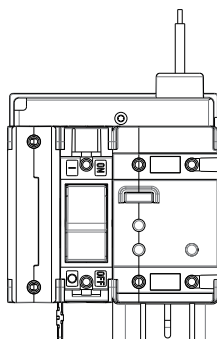


INDICATE OFF / SINGLE COLOR  
ROCKER ACTUATOR

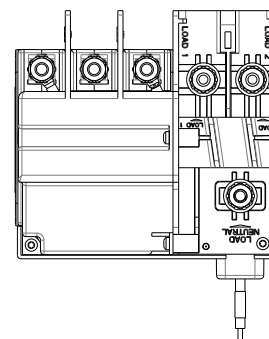
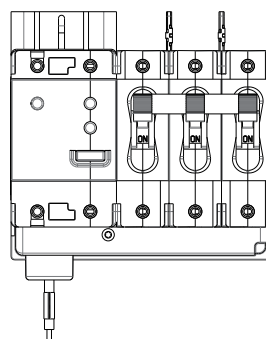
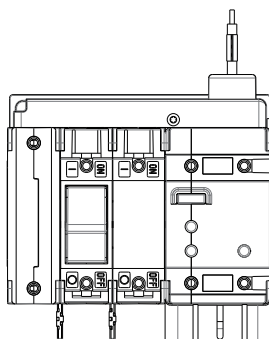
HANDLE / INDICATE ON  
ROCKER ACTUATOR

TERMINAL  
LOCATIONS

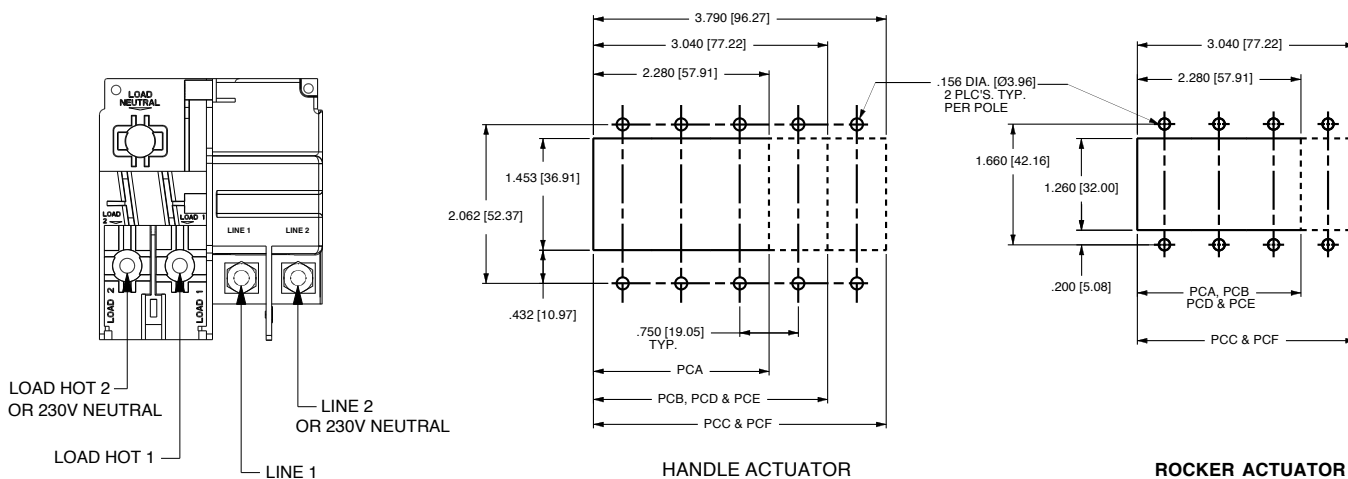
PCE  
120 VAC VERSION  
W/ REVERSE POLARITY  
INDICATOR



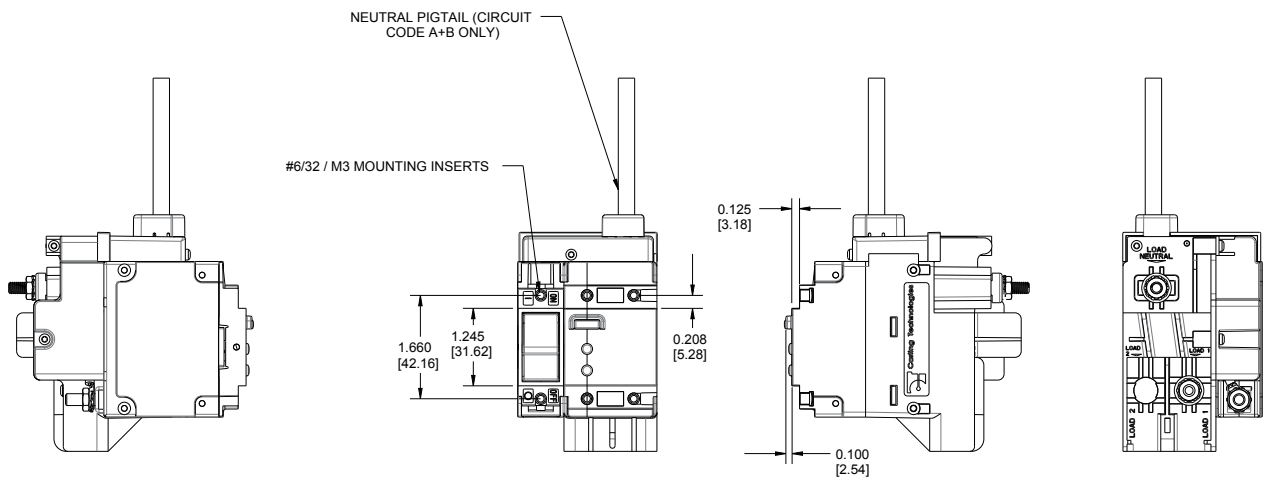
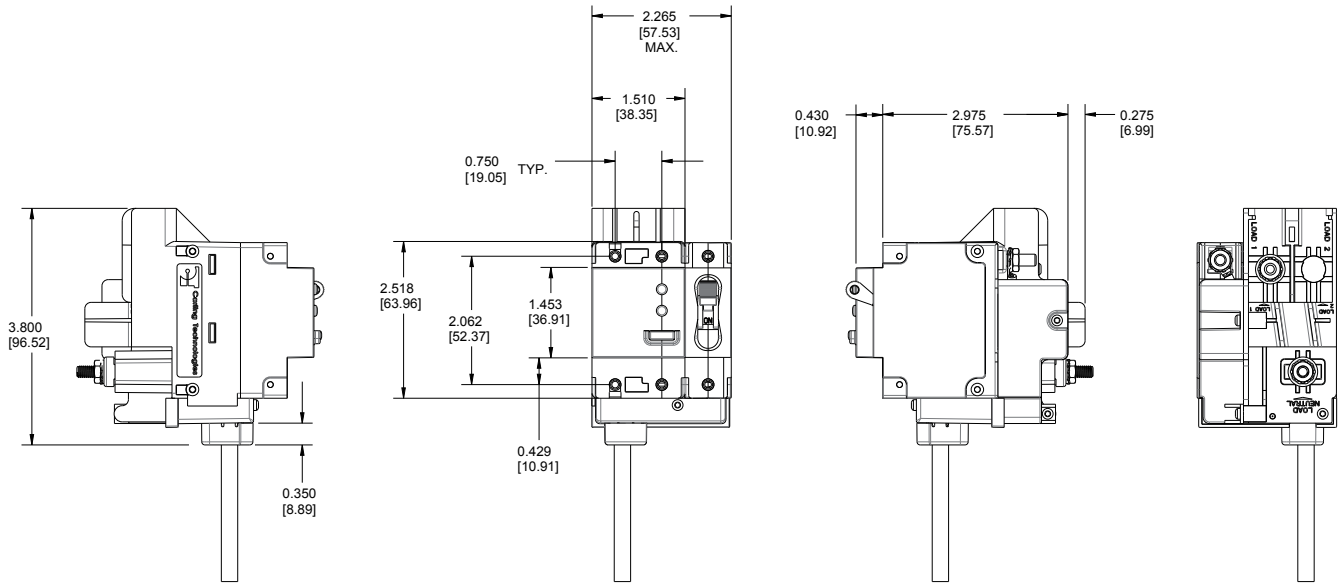
PCF  
120/240 VAC VERSION  
W/ REVERSE POLARITY  
INDICATOR



NOTE: NEUTRAL & GROUND PIGTAIL WIRES - 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**

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

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

**3** Three  
**4** Four  
**5** Five

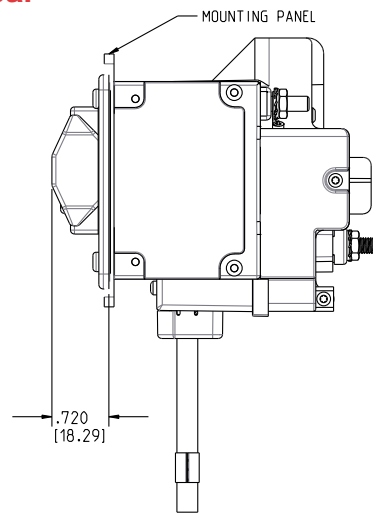
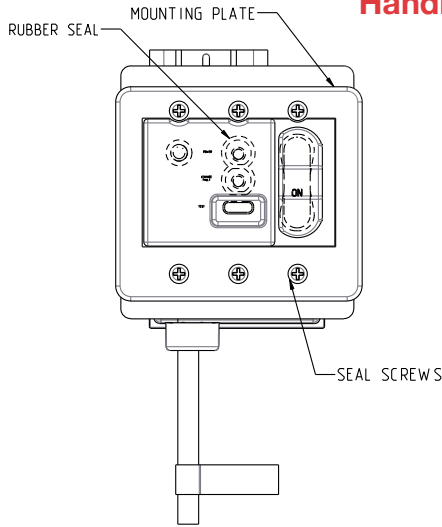
**5 MOUNTING SCREWS / PLATE MATERIAL <sup>1</sup>**

**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 w/ Stainless Steel Plate  
**6** M-3 Thread Phillips Head w/ Stainless Steel Plate  
**7** 6-32 Thread Slotted Head w/ Stainless Steel Plate  
**8** M-3 Thread Slotted Head w/ Stainless Steel Plate

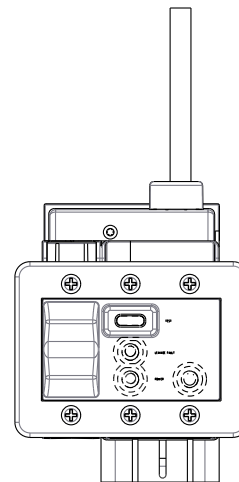
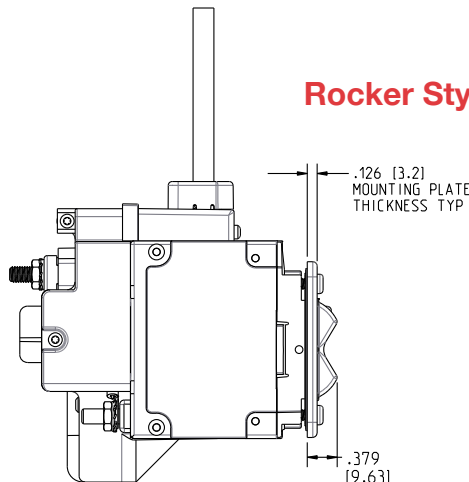
Notes:

**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

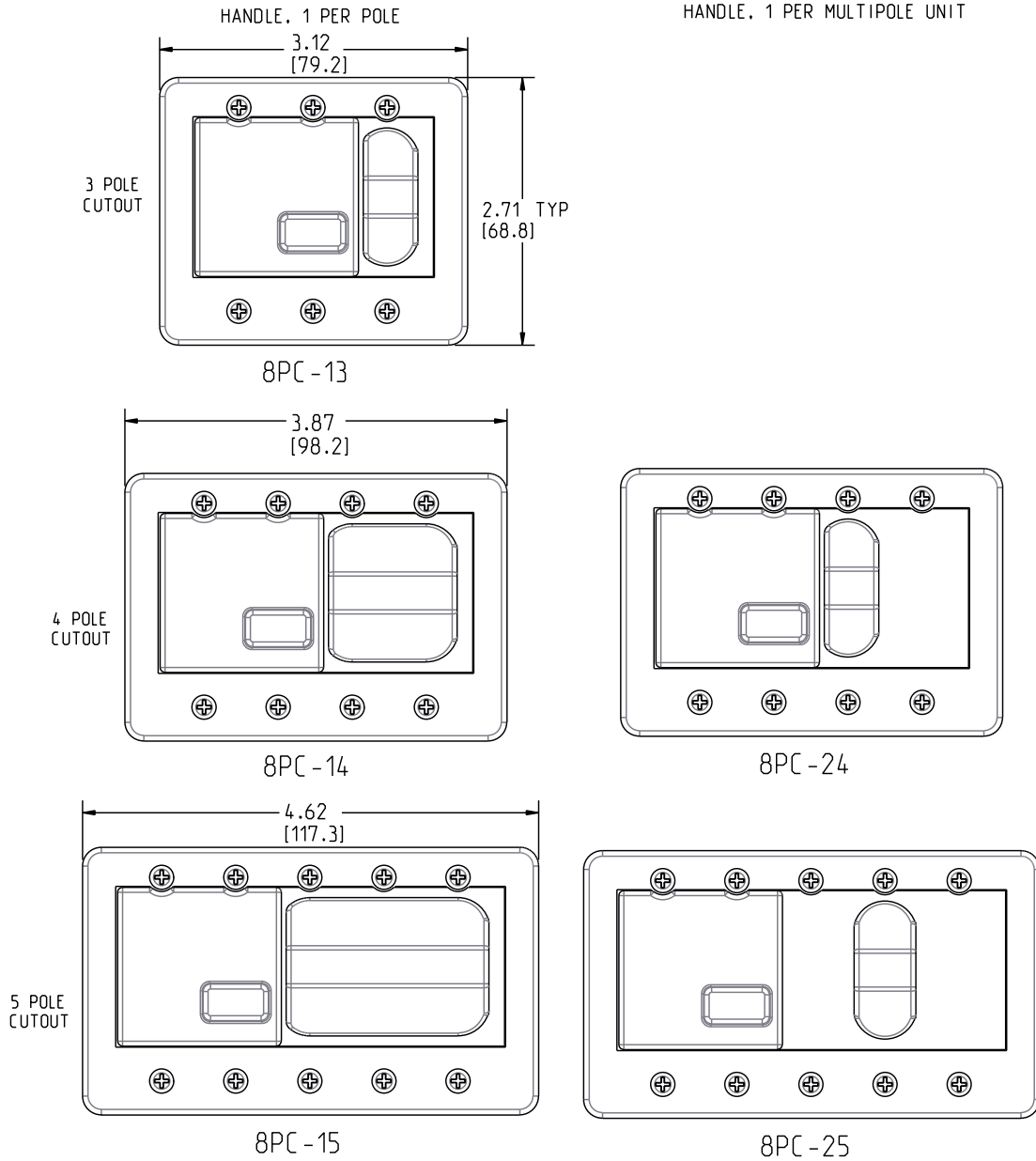
**Handle Style Panel Seal**



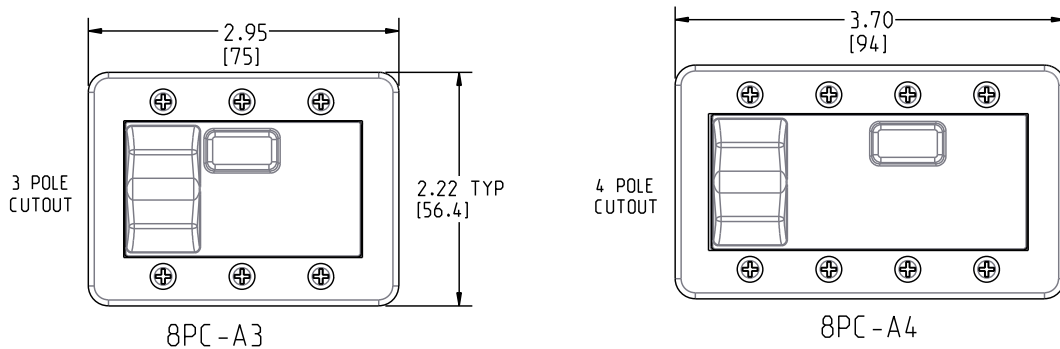
**Rocker Style Panel Seal**



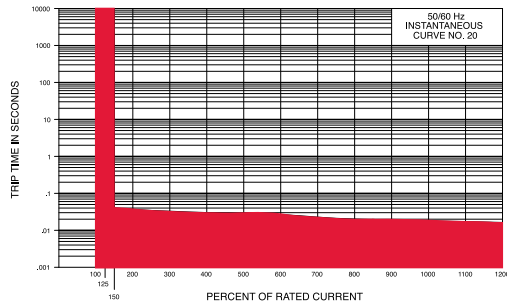
### Handle Actuator



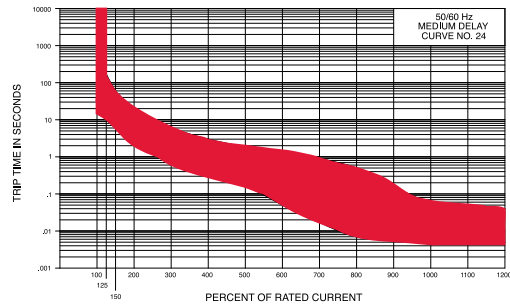
### Rocker Actuator



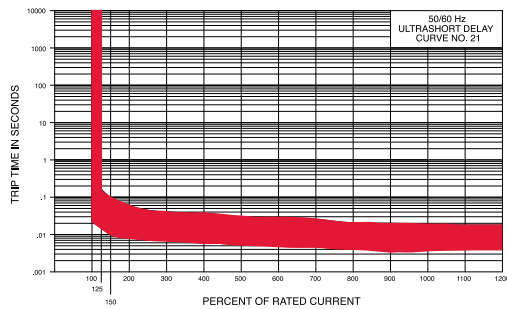
## Time Delay Curves Instantaneous



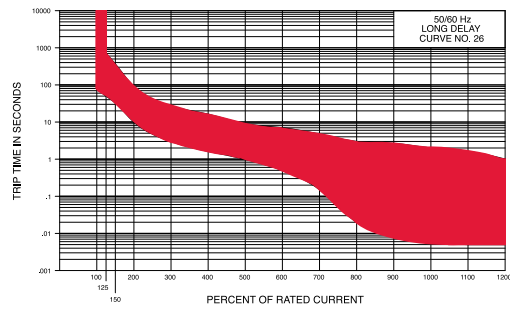
## Medium



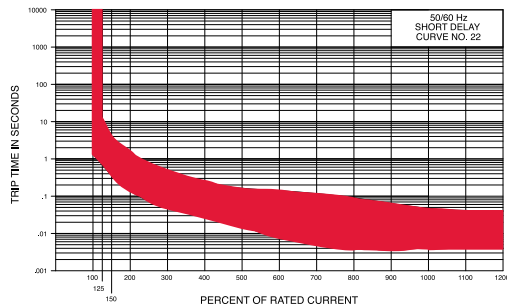
## Ultra Short



## 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.

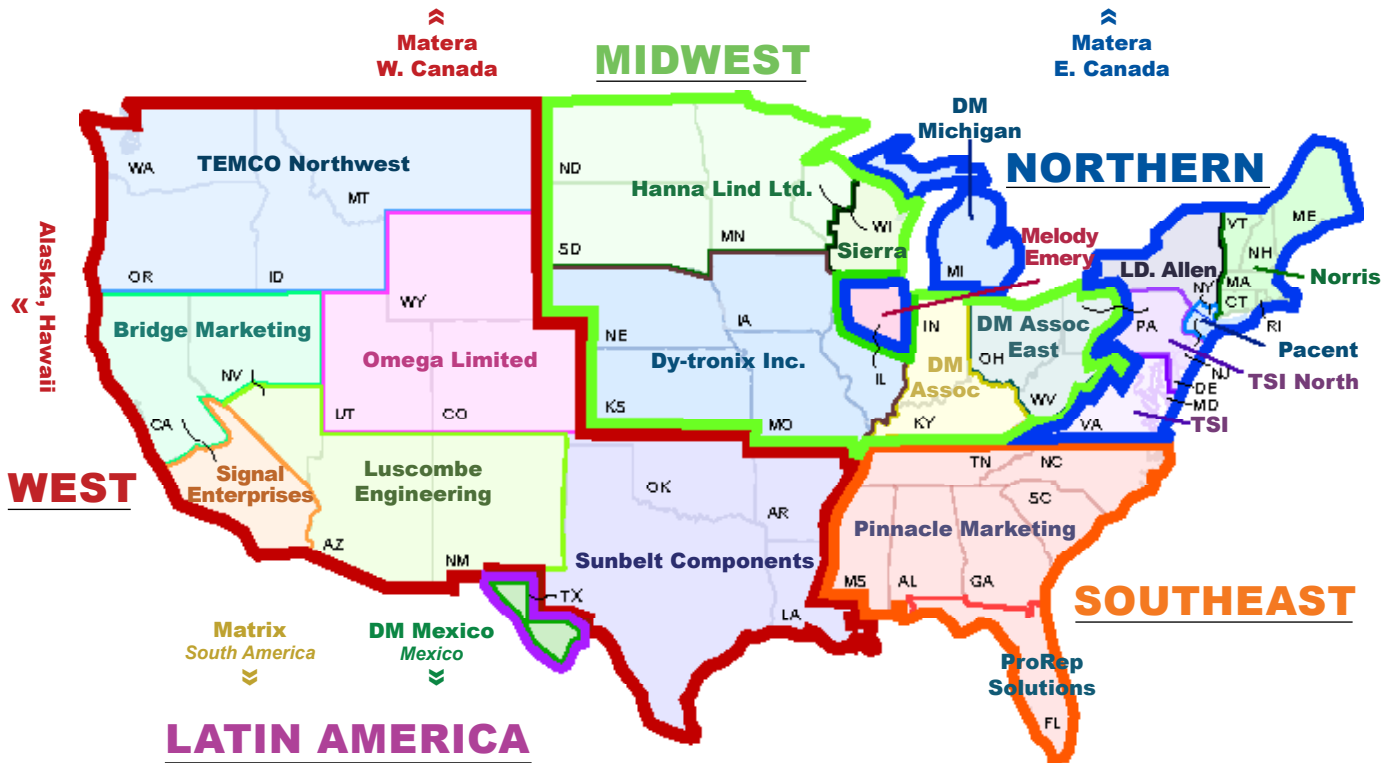
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.

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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## 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 ISO 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](http://www.carlingtech.com/company-profile).

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