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

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Innovative Designs. Powerful Solutions.

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

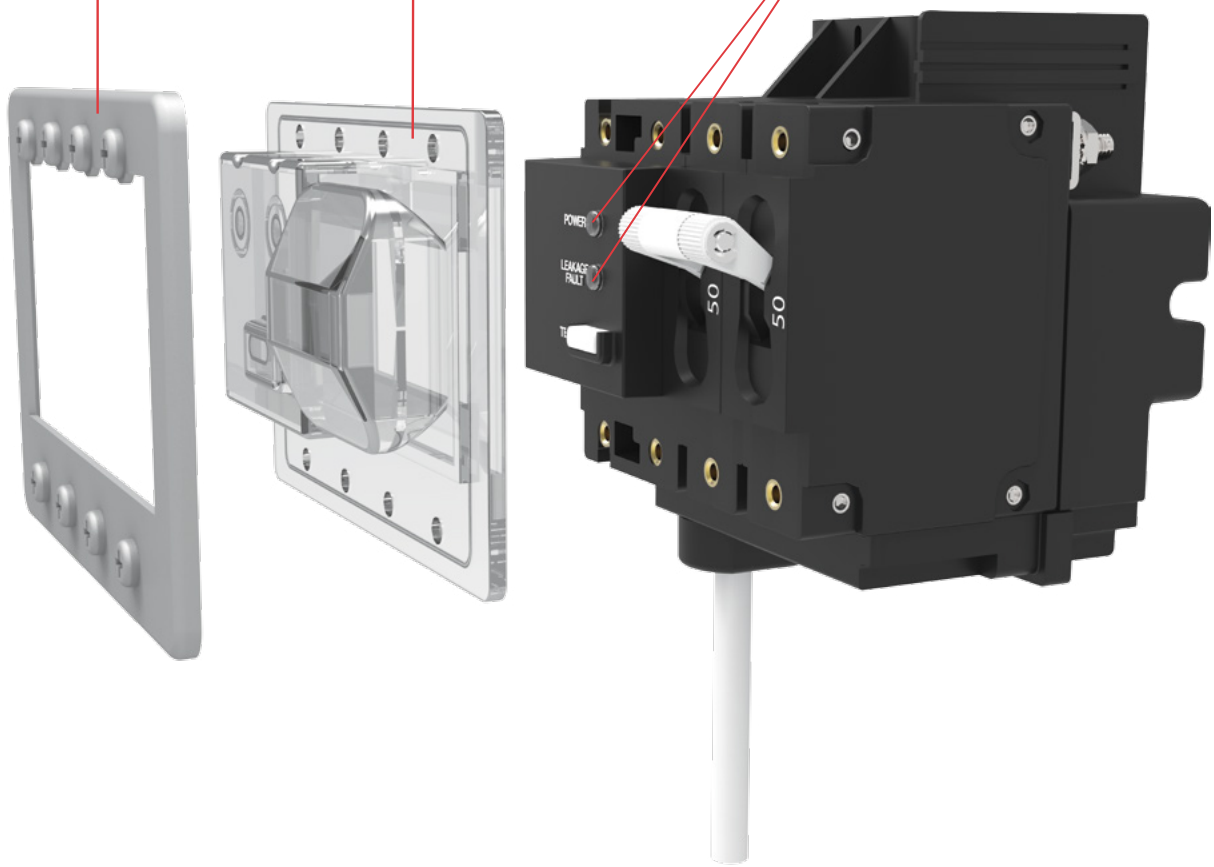
www.carlingtech.com

PC-Series Switch
DESIGN FEATURES

MOUNTING PLATE
Available in stainless steal 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

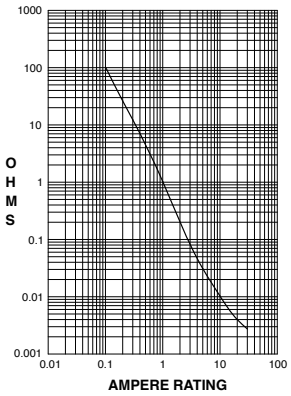
Agency Certifications

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	

RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Braker)



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

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.
Termination	GFCI Sensor Module Load Side: #10-32 threaded stud. Neutral pigtail.
Mounting	Front Panel, #6-32 and M3 threaded inserts.
Actuator	Handle, Flat Rocker, Curved Rocker (with or without rocker guard), Push-to-Reset Rocker

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 CI2, 200±50 ppb NO2

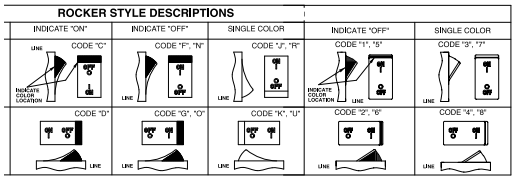
PC	B	-	B	A	-	24	-	620	-	1	B	A	-	A	10
1 Series	*2 System Voltage/Poles*		*3 Circuit*	*4 Actuator*		*5 Frequency & Delay*		*6 Current Rating*		*7 Terminal*	*8 Actuator Color*	*9 Mounting/ Barriers*		*10 Trip Level*	*11 Agency Approval*

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 Push-to-Reset
R Vertical legend
U Horizontal legend
Two Color Flat Visi-Rocker
1 Indicate OFF, vertical legend
2 Indicate OFF, horizontal legend
Single Color Flat Rocker
3 Vertical legend
4 Horizontal legend
Two Color Flat Visi-Rocker Push-to-Reset
5 Indicate OFF, vertical legend
6 Indicate OFF, horizontal legend
Single Color Flat Rocker Push-to-Reset
7 Vertical legend
8 Horizontal legend



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 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

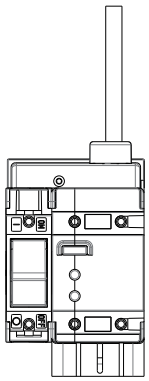
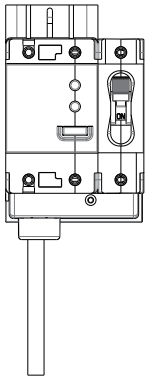
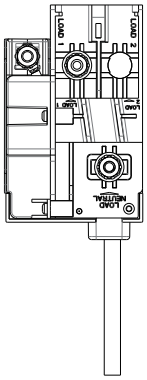
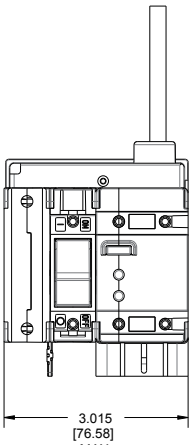
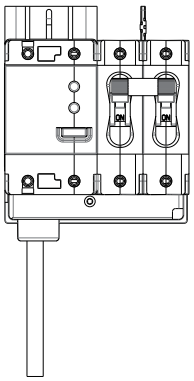
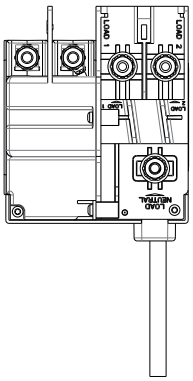
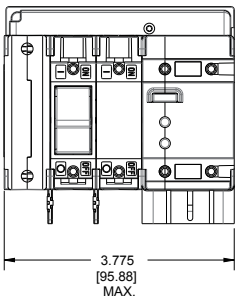
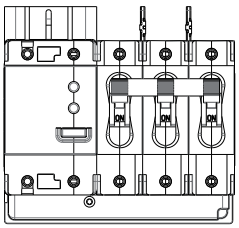
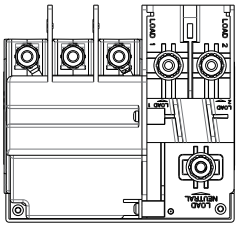
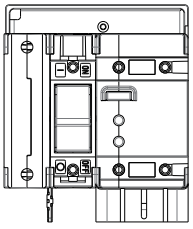
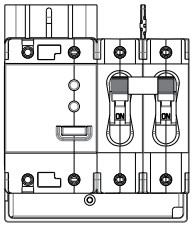
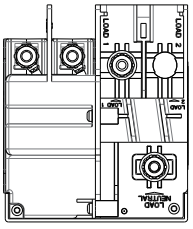
9 MOUNTING/BARRIERS

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

10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT
A 6 MA (CLASS A GFCI)
E 30 MA (ELCI) [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.

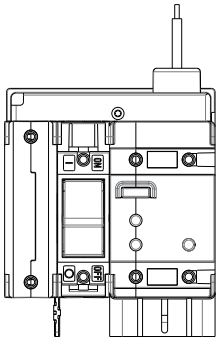
	INDICATE OFF / SINGLE COLOR ROCKER ACTUATOR	HANDLE / INDICATE ON ROCKER ACTUATOR	TERMINAL LOCATIONS
PCA 120 VAC VERSION			
PCB 120/240 VAC VERSION			
PCC 120/240 VAC VERSION W/ NEUTRAL BREAK			
PCD 120 VAC VERSION W/NEUTRAL BREAK			

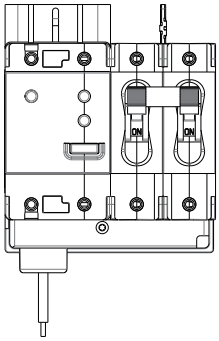
INDICATE OFF / SINGLE COLOR ROCKER ACTUATOR

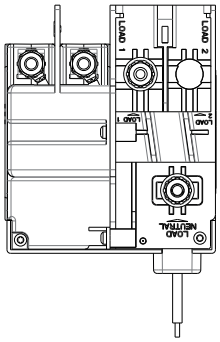
HANDLE / INDICATE ON ROCKER ACTUATOR

TERMINAL LOCATIONS

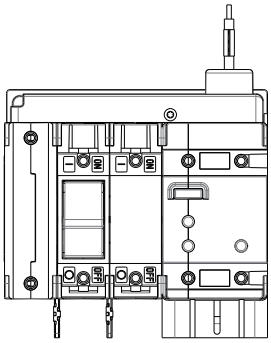
PCE
120 VAC VERSION
W/ REVERSE POLARITY
INDICATOR

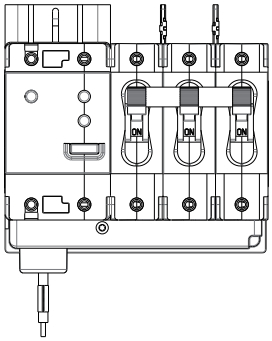


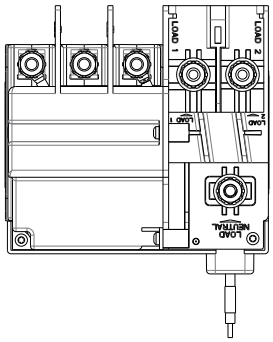




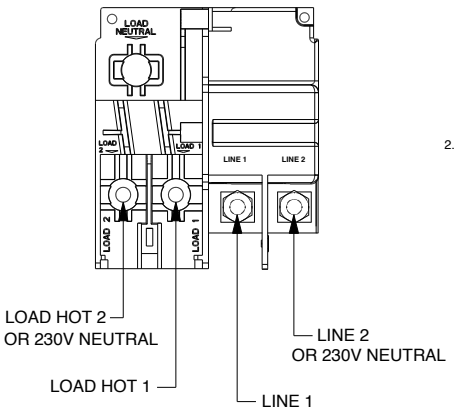
PCF
120/240 VAC VERSION
W/ REVERSE POLARITY
INDICATOR

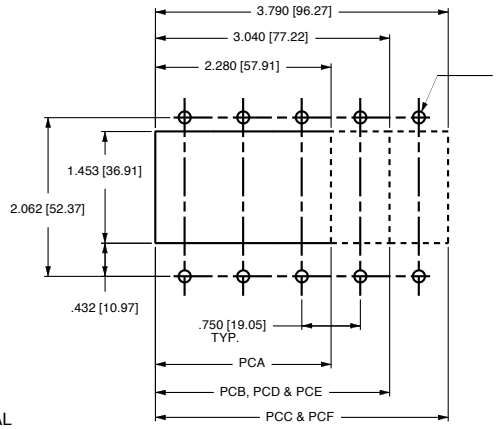




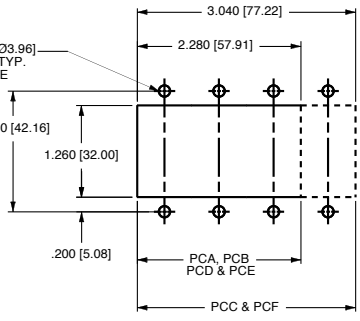


NOTE: NEUTRAL & GROUND PIGTAIL WIRES - SUPPLIED 12" LONG MIN. (CIRCUIT CODES A,B,E & F)





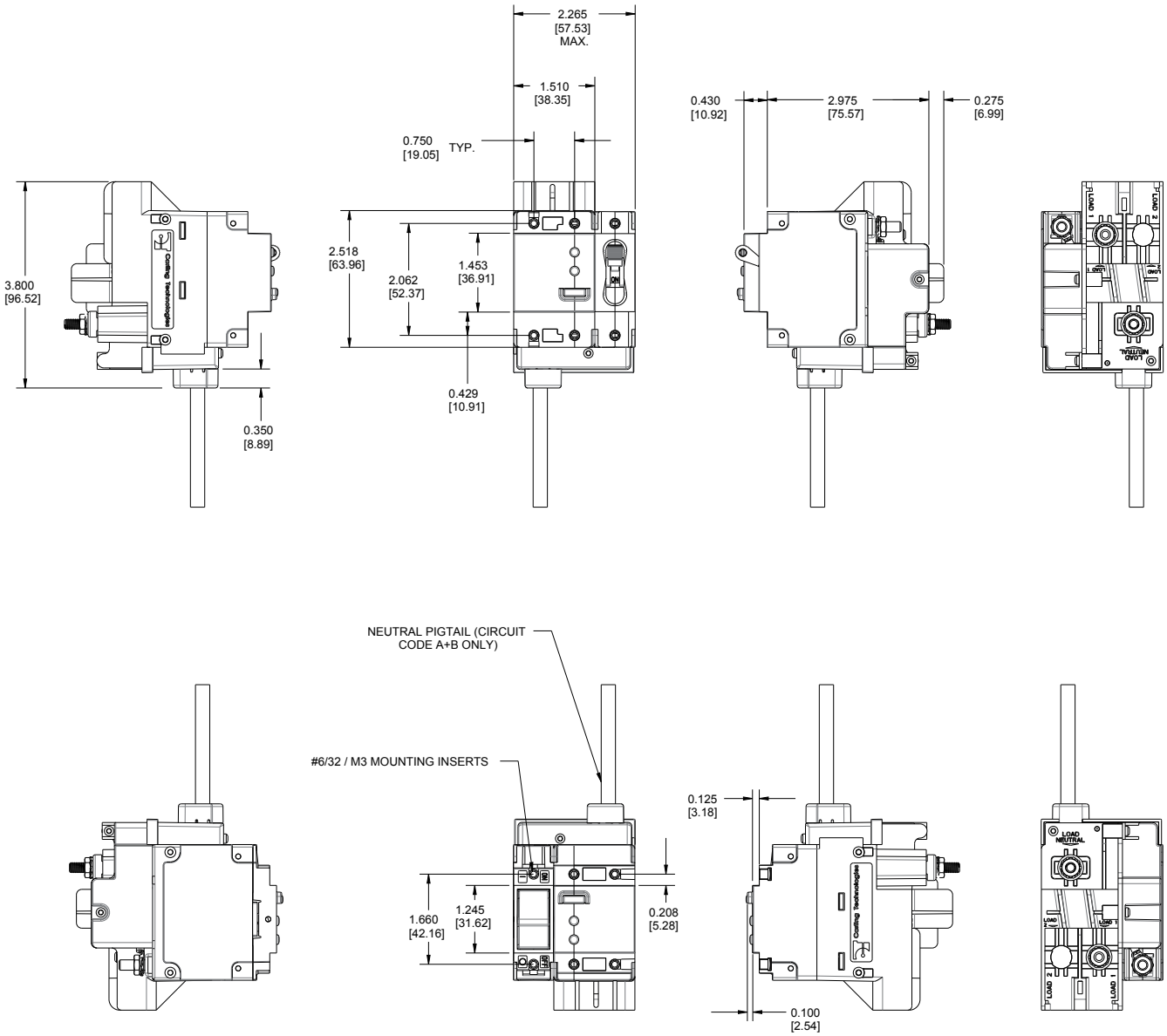
HANDLE ACTUATOR



ROCKER ACTUATOR

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

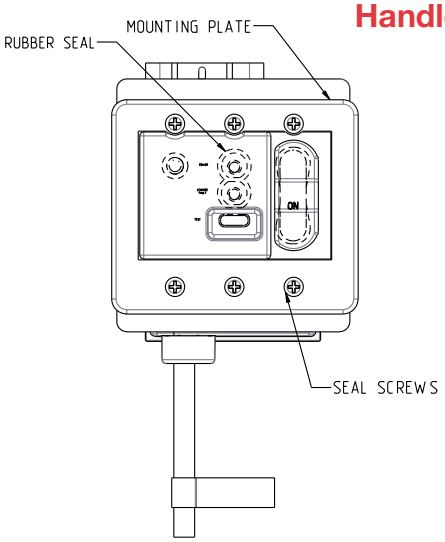
3 ACTUATOR TYPE
1 Handle, one per pole
2 Handle, one per multipole unit
A Rocker [2]

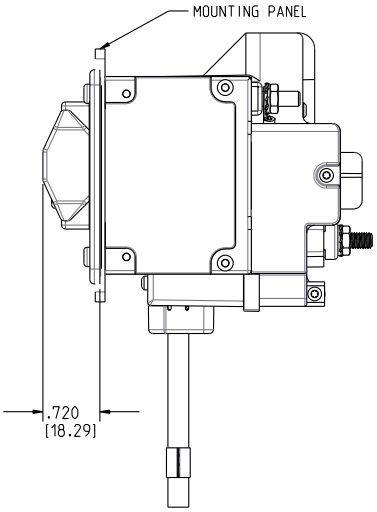
4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE
3 Three
4 Four
5 Five

5 MOUNTING SCREWS / PLATE MATERIAL [1]
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

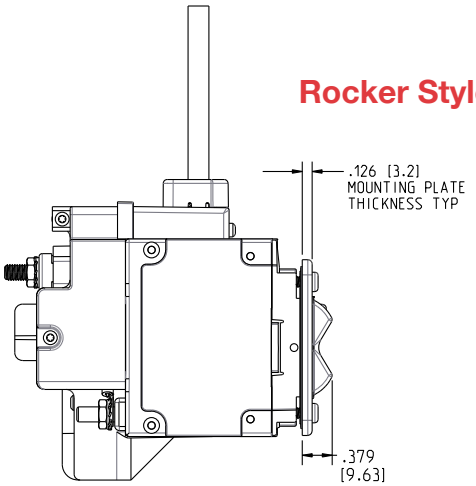
Notes:
1 Screws supplied to accommodate mounting panel thickness of 1/8" ± 1/32". Consult Factory for additional options
2 Available for Flat and Curved Rocker options - No Rockerguard Bracket

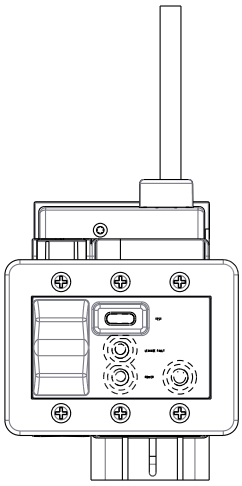
Handle Style Panel Seal





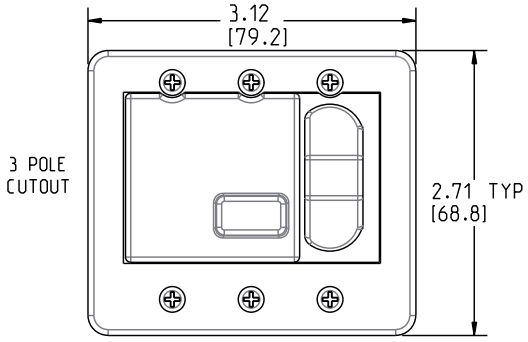
Rocker Style Panel Seal





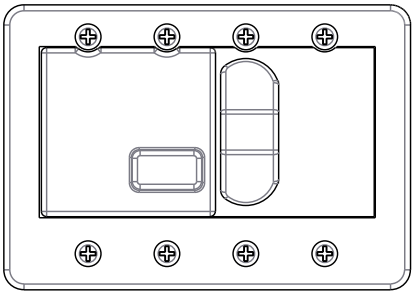
Handle Actuator

HANDLE, 1 PER POLE

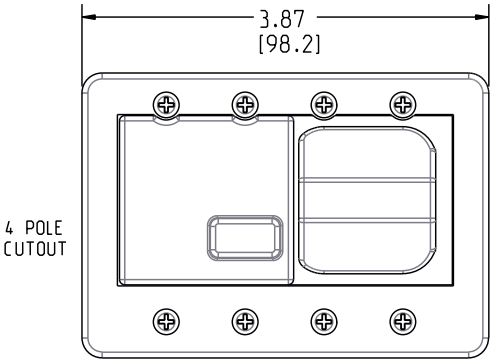


8PC-13

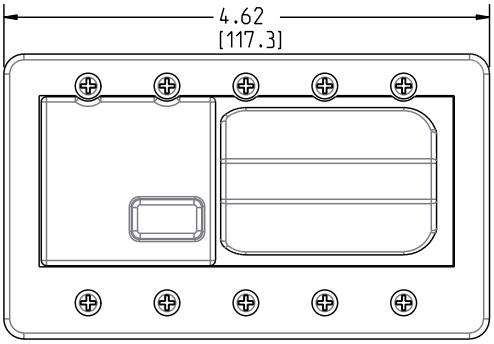
HANDLE, 1 PER MULTIPOLE UNIT



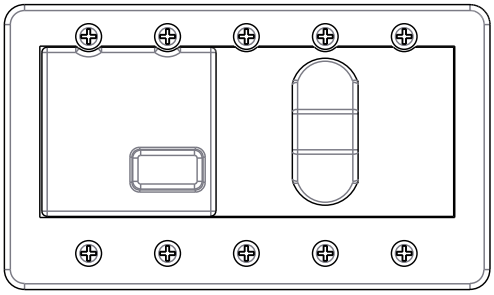
8PC-24



8PC-14

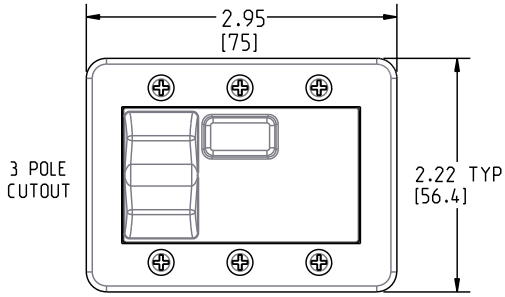


8PC-15

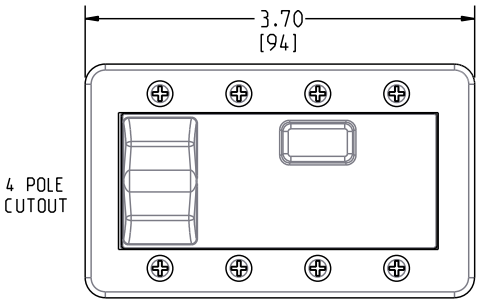


8PC-25

Rocker Actuator



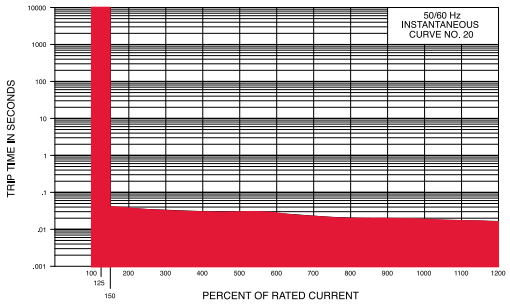
8PC-A3



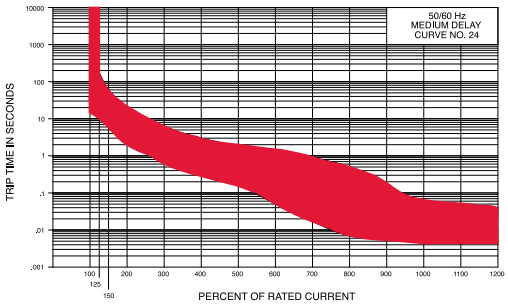
8PC-A4

Time Delay Curves

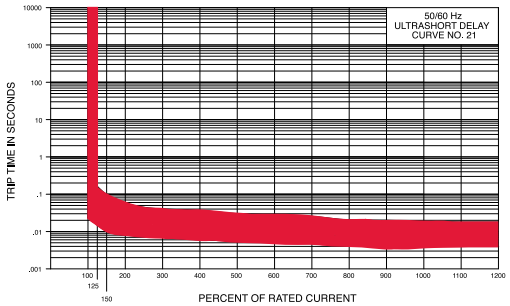
Instantaneous



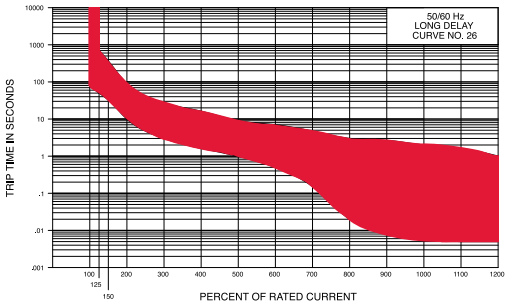
Medium



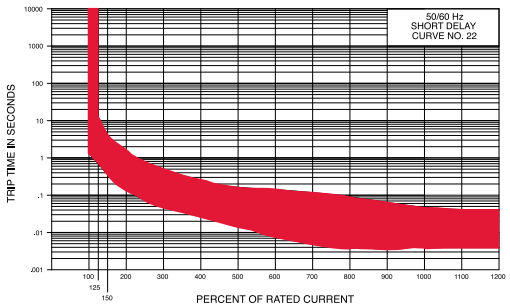
Ultra Short



Long



Short



Time Delay Values									
	Percent of Rated Current								
Delay	100%	125%	150%	200%	400%	600%	800%	1000%	1200%
20	No Trip	May Trip	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
21	No Trip	.014 - .150	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
24	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
26	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.

Email: sales@carlingtech.com Application Support: team2@carlingtech.com
Phone: (860) 793–9281 Fax: (860) 793–9231 **www.carlingtech.com**

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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

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