PC-Series

Ground Fault Circuit Protection

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.

Features:

- Overload, short circuit and ground fault protection in a single package
- Handle style actuators and rocker style "acuquard"
- 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, 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
- Two integrated LED indicators distinguish 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.
- Optional Hot/Neutral reversal detection and protection



Benefits:

- Increases safety around boats and marinas
- Protects against electrical shock hazards in areas near water
- Protects against defects in the wires & conductors
- Reduces fire and shock hazards from defects in
- Detects low level ground faults, which do not trip ordinary circuit breakers, that can lead to fires and shock hazards for boating occupants



Electrical Tables

Table A: Lists UL Listed configurations as a Ground Fault Circuit Interruptor

PC SERIES TABLE A: LISTS UL LISTED CONFIGURATIONS AS A GROUND FAULT CIRCUIT INTERRUPTOR								
	VOLTAGE		CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL			
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES	
SERIES	120	50 / 60	1	1 - 50	5000	6	1 or 2 Poles. One pole of a two pole unit must be Neutral	
CEMES	120/240	50 / 60	1	1 - 50	5000	6	2 or 3 Poles. One pole of a three pole unit must be Neutral	

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

PC SERIES TABLE B: LISTS UL LISTED AND RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 120 and 120/240V								
	VOLTAGE		CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL			
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES	
SERIES	120	50 / 60	1	1 - 50	5000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral	
SEIVIES	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral	
SERIES	120	50 / 60	1	1 - 50	3000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral	
IGNITION PROTECTED	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral	

Table C: Lists UL Listed and Recognized as an Earth Leakage Circuit Interruptor - 240V

PC SERIES TABLE C: LISTS UL LISTED AND RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 240V							
	VOLTAGE		CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL		
CIRCUIT CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	NOTES
SERIES	240	50 / 60	1	1 - 30	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 11
SERIES IGNITION PROTECTED	240	50 / 60	1	1 - 50	3000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 12

Electrical

Current Ratings Voltage Rating Current Trip Level **Current Trip Time**

1 - 50 Amps maximum 120VAC, 120/240VAC, 240VAC

30mA & 6mA

For 30mA leakage trip: ≤ 22.2mA, shall not trip

30mA, shall trip within .10 seconds The above complies with UL-1053 & ABYC E11. For 6mA leakage

trip: ≤25ms

The above complies with UL-943. 50/60 Hz for 30mA leakage trip

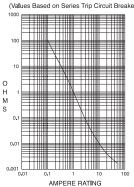
60 Hz for 6mA leakage trip

Interrupt Capacity 5,000 Amps

Impedence



Operating Frequency



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	15%
5.1 - 20.0	25%
20.1 - 50.0	35%

Innovative Features

Indicator

Neutral Protection

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 cicuit 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 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 and

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 1-pole (1 Circuit Breaker + 1 (Breakers only) GFCISensor 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,

Termination threaded stud.

GFCI Sensor Module Load Side: #10-32 threaded stud. Neutral pigtail. Front Panel, #6-32 and M3 threaded

Mounting inserts.

Handle, Flat Rocker, Curved Rocker

Actuator (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".

Withstands 0.06" excursion from 10-55 Vibration

> Hz, and 10 G 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current. 93% RH at 30°C for 168 Hours.

Moisture Resistance 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 CI2,

200±50 ppb NO2

Agency Certifications

UI Listed

UL Standard 489 Circuit Breakers, Molded Case,

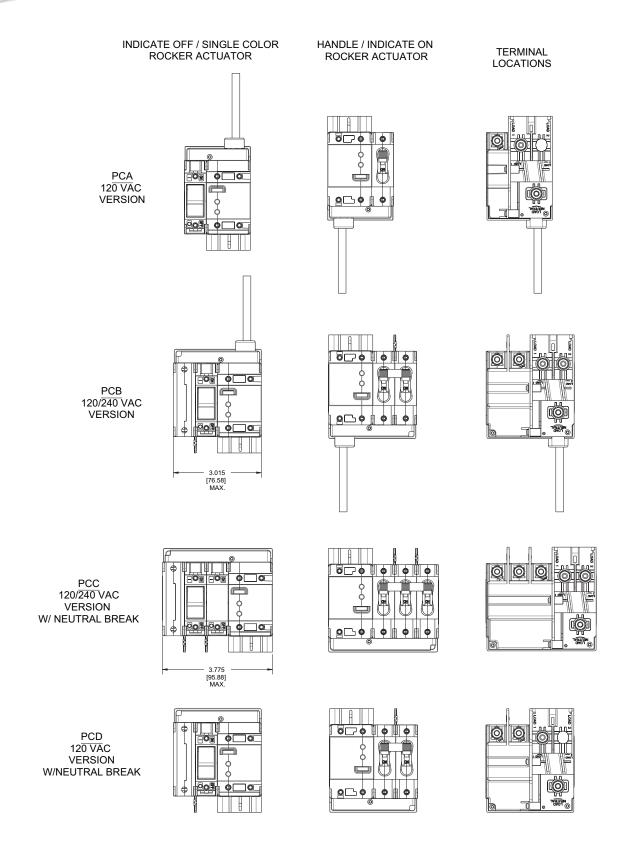
> (Guide DIVQ, File E129899) Supplementary Protectors

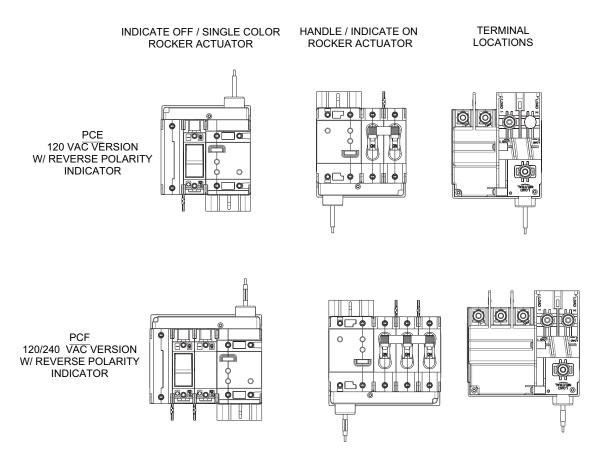
UL Standard 1077 UL Standard 943 Class A Ground Fault Circuit Interruptors

UL Standard 1053 Ground Fault Sensing and Relaying

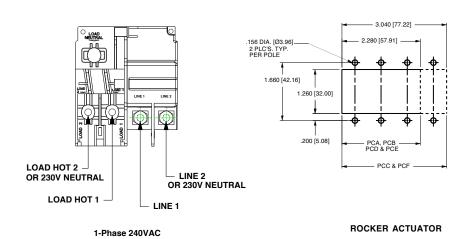
Equipment

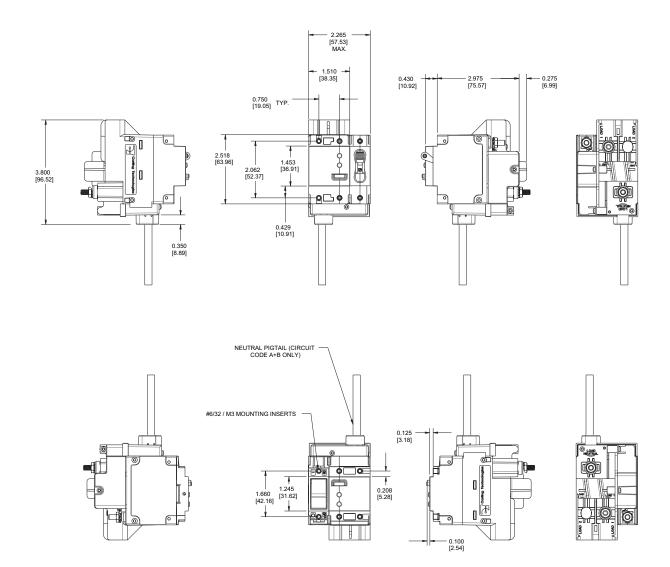
UL Standard 1500 Ignition Protection





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

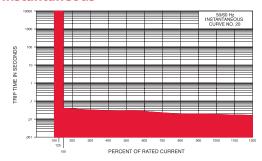




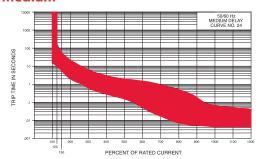
For additional circuit breaker dimensions, reference the C-Series Breakers in the Carling Circuit Protection catalog

Time Delay Curves

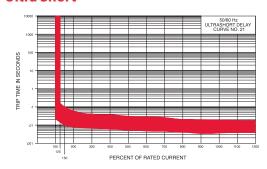
Instantaneous



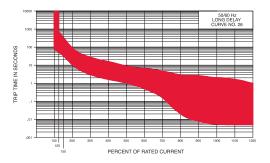
Medium



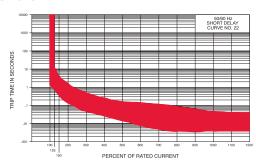
Ultra Short



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	.014150	.011095	.008055	.006035	.005027	.005021	.004018	.004017
22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027220	.008130	.004090	.004045	.004040
24	No Trip	10.0 - 160	6.00 - 60.0	2.20 - 20.0	.300 - 3.00	.050 - 1.30	.007500	.005060	.005040
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.



1 SERIES PC

2 SYSTEM VOLTAGE / POLES

120 VAC single phase, one pole

120/240 VAC single phase, two pole 120/240 VAC single phase with switched neutral, three pole 120 VAC single phase with switched neutral, two pole

120 VAC single phase with reversed polarity indicator, two pole 120/240 VAC single phase with reversed polarity indicator, three pole

240 VAC single phaze, two pole

3 CIRCUIT

Series Trip (Current)

4 ACTUATOR

Handle

A B one per multipole unit Two Color Curved Visi-Rocker

Indicate ON, vertical legend

Indicate ON,

horizontal legend Indicate OFF, vertical legend G

Indicate OFF, horizontal legend

Single Color Curved Rocker Vertical legend Horizontal legend

Two Color Curved Visi-Rocker

Push-to-Reset Vertical legend Horizontal legend Single Color Curved Rocker Push-to-Reset

Vertical legend Horizontal legend

Two Color Flat Visi-Rocker Indicate OFF, vertical legend

Indicate OFF,

horizontal legend Single Color Flat Rocker Vertical legend

4 Horizontal legend Two Color Flat Visi-Rocker

Push-to-Reset Indicate OFF.

vertical legend Indicate OFF,

horizontal legend Single Color Flat Rocker

Push-to-Reset Vertical legend

Horizontal legend

	ROCKER	STYLE DESCRIPT	IONS		
	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR	INDICATE "OFF"	SINGLE COLOR
VERTICAL	NO CODE CO	CODE "F", "N"	CODE 'J', 'R'	CODE "I", "5"	CODE '3', '7'
HORIZONTAL	T T	CODE.G.'.JO.	CODE TK', TU'	CODE '2', '6'	CODE "4", "8"

5 AUXILIARY/ALARM SWITCH

50/60Hz Instantaneous 21 50/60Hz Ultra Short 50/60Hz Short 22 50/60Hz Medium 26

50/60Hz Long

Notes:

- This device meets the requirements of ABCY E11.
- 6mA per UL.943, available with agency approval code 10. 30mA per UL.1053, available with agency approval codes 11 & 12. AIC Rating at 120 VAC 3kA, at 120/240 VAC 5kA

6 CU	IRRENT	RATING	(AMPERES)
CODE	AMPERES		

CODE	AMPERES						
210	0.100	285	0.850	450	5.000	712	12.500
215	0.150	290	0.900	455	5.500	613	13.000
220	0.200	295	0.950	460	6.000	614	14.000
225	0.250	410	1.000	465	6.500	615	15.000
230	0.300	512	1.250	470	7.000	616	16.000
235	0.350	415	1.500	475	7.500	617	17.000
240	0.400	517	1.750	480	8.000	618	18.000
245	0.450	420	2.000	485	8.500	620	20.000
250	0.500	522	2.250	490	9.000	622	22.000
255	0.550	425	2.500	495	9.500	624	24.000
260	0.600	527	2.750	610	10.000	625	25.000
265	0.650	430	3.000	710	10.500	630	30.000
270	0.700	435	3.500	611	11.000	635	35.000
275	0.750	440	4.000	711	11.500	640	40.000
280	0.800	445	4.500	612	12.000	650	50.000

7 TERMINAL

Stud, 10-32 threaded

8 ACTUATOR COLOR & LEGEND

Acuator Color White Black Red Green Blue Yellow Gray Orange	I-O A C F H K M P R	ON-OFF B D G J L N Q	Dual 1 2 3 4 5 6 7 8	Legend Color Black White White White Whack Black Black Black
Orange	н	S	8	Black

9 MOUNTING/BARRIERS

9 10	IOUNTING/BARRIERS	
	MOUNTING STYLE	BARRIERS
	Threaded Insert, 2 per pole	
Α	6-32 X 0.195 inches	yes
В	ISO M3 x 5mm	yes
	Rockerguard Bezel	
	Threaded Insert, 2 per pole	
С	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	
Е	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
Н	ISO M3 x 5mm	yes

10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT

5 MA (CLASS A GFCI)2

30 MA (ELCB)1,3

11 AGENCY APPROVAL

W/O Approvals UL 943²

UL 1053^{1,3}

UL 1053 & UL 1500^{1,3,4}

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