

# CX-Series

## CIRCUIT BREAKER

The CX-Series circuit breaker features a unique and innovative arc-quenching configuration that allows the breaker to safely handle high amperage and high DC voltage applications in a compact package. By using a patent pending magnetic flux boosting terminal configuration, a strong magnetic field is created thus motivating the arc into an enhanced arc chamber improving the breaker's overall performance and reliability. The permanent magnets located at the entrance of the arc chamber combined with the upper and lower arc runner increase the magnetic blow out force and aid in motivating the arc off of the contacts and into the arc chamber. An enhanced arc chamber features arc splitter retainers with integrated pressurizing walls, which facilitates heat transfer from the arc thereby providing additional cooling and quick transition into the magnetically induced splitter plates. In turn, the twelve (12) splitter plates attract, segment and cool the arc for full extinction. Combined, these innovative features make the CX-Series breaker the best in class, providing stable performance even in the most demanding applications.



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### Product Highlights:

- ♦ UL 489 & UL 489B Listed
- ♦ TUV Certified IEC/EN 60947-2
- ♦ Temperature stable hydraulic-magnetic overcurrent sensing technology
- ♦ Optional relay trip circuit permitting remote operator system shut down
- ♦ Perfect fit for 380VDC Applications

### High DC Voltage Applications:

- ♦ Datacom, PDU and UPS Systems
- ♦ Power Supplies and Convertors
- ♦ Mission Critical Equipment
- ♦ Renewable Energy Systems
- ♦ Motor Controllers
- ♦ Charging Stations
- ♦ Smart Grids



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## DESIGN FEATURES

**HYDRAULIC/MAGNETIC SENSING COIL**

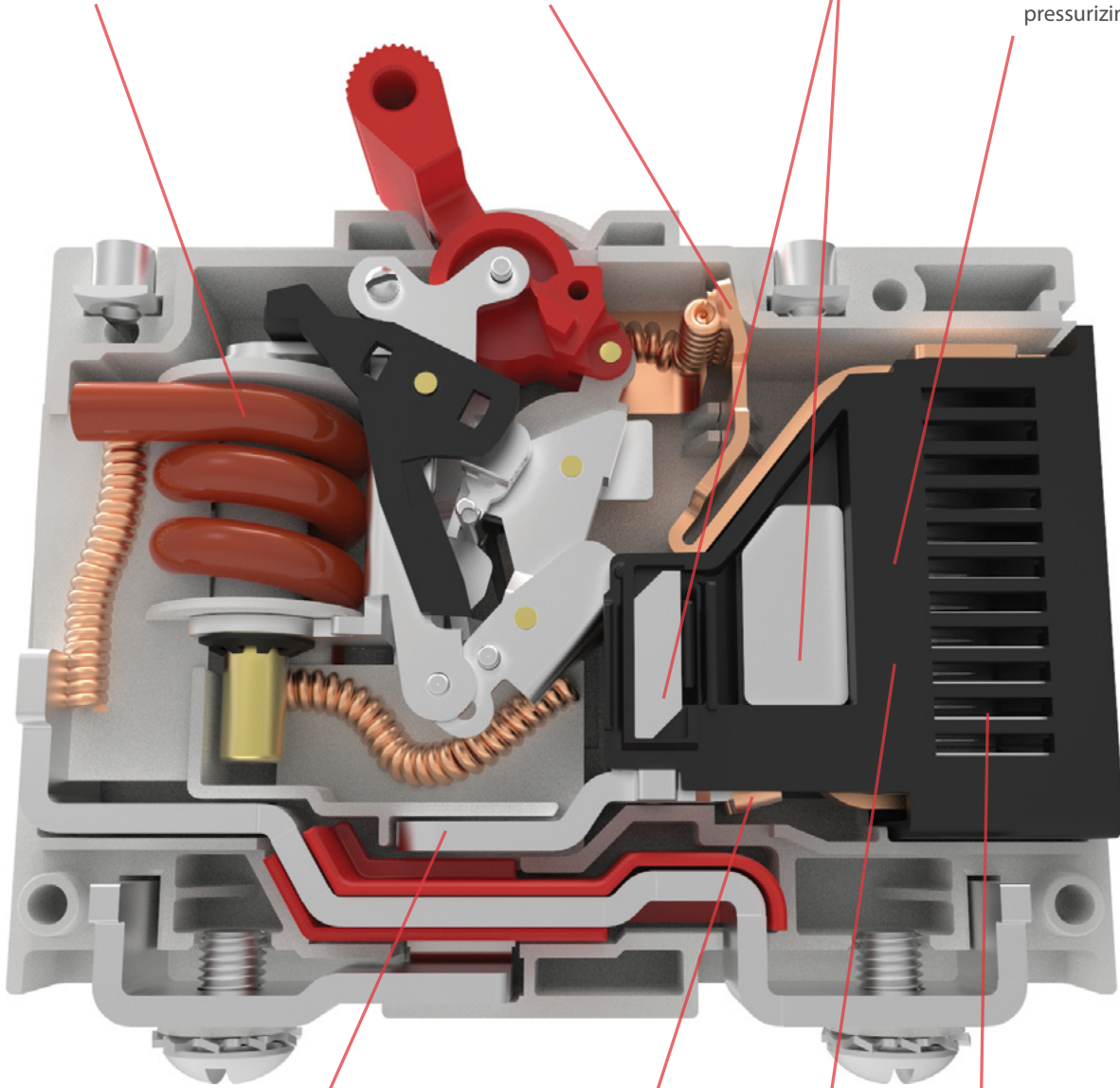
**UPPER ARC RUNNER**

Aids in motivating arc off of movable contact and into arc chamber

**MAGNETS**

**ARC SPLITTER RETAINER**

with integrated pressurizing walls



**PATENT PENDING MAGNETIC FLUX BOOSTING TERMINAL CONFIGURATION**

Design enhances motivation of arc into arc chamber

**LOWER ARC RUNNER**

Aids in motivating arc off of stationary contact and into arc chamber

**LARGE ARC GAP**

To generate high arc voltages

**(12) ARC DEIONIZING SPLITTER PLATES**

## Electrical Tables

**Table A:** Lists UL Listed (UL489) configuration and performance capabilities as a Molded Case Circuit Breaker

CX SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS					
CIRCUIT CONFIGURATION	VOLTAGE		MAX CURRENT RATING AMPS	INTERRUPTING CAPACITY (AMPS)	NUMBER OF POLES
	MAX. RATING	FREQUENCY			
SERIES	250	D.C.	15	5,000	1
	250 / 500	D.C.	15	10,000	2
	410 / 205	D.C.	50	10,000	2

**Table B:** Lists UL Recognized configurations and performance capabilities as a Component Supplementary Protector

CX SERIES TABLE B : UL1077 COMPONENT SUPPLEMENTARY PROTECTOR						
CIRCUIT CONFIGURATION	VOLTAGE		MAX CURRENT RATING AMPS	INTERRUPTING CAPACITY (AMPS)	NUMBER OF POLES	APPLICATION CODE
	MAX. RATING	FREQUENCY				
SERIES	300	D.C.	1 - 75	5,000	1	TC1, OL0, U3
	300	D.C.	76 - 125	3,000	1	TC1, OL0, U3
	440	D.C.	1 - 30	10,000	2	TC1, OL0, U3
	440	D.C.	31 - 63	5,000	2	TC1, OL0, U3
	600	D.C.	1 - 75	5,000	2	TC1, OL0, U3
	600	D.C.	76 - 115	3,000	2	TC1, OL0, U3
SWITCH ONLY <sup>1</sup>	600	D.C.	1 - 115	----	2 or 3	---

Notes:

1 Requires inclusion of a relay trip voltage coil

**Table C:** Lists UL Listed (UL489B) configuration and performance capabilities as a Molded Case Switch

CX SERIES TABLE C : UL489B LISTED PHOTOVATIC MOLDED CASE SWITCH						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING (AMPS)	INTERRUPTING RATING (AMPS)	CONSTRUCTION NOTES
	MAX RATING	FREQUENCY	POLES			
SERIES	600	DC	2 <sup>1</sup>	50 - 100	600	May have a third pole that is a voltage trip pole
	600	DC	4 <sup>2</sup>	110 - 175	600	May have a fifth pole that is a voltage trip pole

Notes:

1 Two poles in series.

2 Two poles in series in parallel with 2 poles in series.

**Table D:** TUV Certified Configuration to IEC / EN 60947-2. Low Voltage Switch gear and Control gear - Circuit Breakers

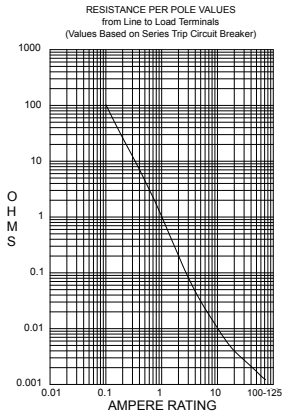
CX-SERIES TABLE D : TUV IEC/EN 60947-2 LOW VOLTAGE SWITCH GEAR & CONTROL GEAR / CIRCUIT BREAKER					
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING (AMPS)	INTERRUPTING CAPACITY
	MAX. RATING	FREQUENCY	POLES		ICS / ICU (AMPS)
SERIES	440	DC	2	1-63	4,000

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

## Electrical

Maximum Voltage  
Overload

600 VDC  
50 operations at 600% of rated current for UL489, and at 150% of rated current for UL1077.



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

## Physical

Number of Poles  
Termination  
Terminals  
Termination Barrier  
Mounting  
Actuator  
Internal Circuit Config.  
Materials

1- 2 poles, + Auxiliary Switch Pole.  
10-32 or M5 Screw Terminals  
1/4-20 or M6 Threaded Stud  
Standard with multi-pole constructions  
Threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)  
Handle, 1 per pole.  
Series Trip  
Housing - Glass filled Polyester  
Handle - Glass filled Polyester  
Line/Load Terminals - Copper Alloy.  
~150 Grams (~5.3 Ounces).  
~150 Grams (~5.3 Ounces).  
Housing - Gray.  
Handle - White, Black, Red, Green, Blue, Yellow, Gray,

Weight  
Standard Color

## Mechanical

Endurance  
Trip Free  
Trip Indication

Max 10,000 ON-OFF operations @ 6 per minute; 6000 with rated current & voltage, and 4,000 cycles mechanical.  
Trips on overload even when actuator is forcibly held in the “On” position.  
The operating handle moves positively to the “Off” position when an overload causes the breaker to trip.

## Environmental

Shock  
Vibration  
Moisture Resistance  
Salt Spray  
Thermal Shock  
Operating Temperature

Withstands 100 Gs, 6ms saw tooth while carrying rated current per MIL-PRF-55629 and MIL-STD-202G, Method 213G, Test Condition “I”. Instantaneous and ultra short curves tested at 90% of rated current  
Withstands 0.060” excursion from 10-55 Hz & 10 Gs 55-500 Hz, at rated current per MIL-PRF-55629 and MIL-STD-202G, Method 204D, Test Cond. A. Instantaneous & ultrashort curves tested at 90% of rated current.  
MIL-PRF-55629 and MIL-STD-202G, Method 106G, i.e., Ten 24-hour cycles at +25°C to +65°C, 80-98% RH.  
Method 101, Condition A (90-95% RH at 5% NaCl Solution, 96 hrs).  
MIL-PRF-55629 and MIL-STD-202G, Method 107G, Condition A (5-cycles at -55°C to +25°C to +85°C to +25°C).  
-40°C to +85°C.



**1 SERIES**  
C

**2 ACTUATOR**  
X Handle, one per pole

**3 POLES**  
1 One  
2 Two

**4 CIRCUIT**  
B Series Trip (current)

**5 AUXILIARY/ALARM SWITCH**  
0 Without Aux Switch

**6 FREQUENCY & DELAY**  
11 DC Ultra Short  
12 DC Short  
14 DC Medium  
16 DC Long

**7 CURRENT RATING (AMPERES)**

CODE	AMPERES	
220	0.20	
225	0.25	
230	0.30	
235	0.35	
240	0.40	
245	0.45	
250	0.50	
255	0.55	
260	0.60	
265	0.65	
270	0.70	
275	0.75	
280	0.80	
285	0.85	
290	0.90	
295	0.95	
410	1.00	
512	1.25	
415	1.50	
517	1.75	
420	2.00	
522	2.25	
425	2.50	
527	2.75	
430	3.00	
435	3.50	
440	4.00	
445	4.50	
450	5.00	
455	5.50	
460	6.00	
465	6.50	
470	7.00	
475	7.50	
480	8.00	
485	8.50	
490	9.00	
495	9.50	
610	10.00	
710	10.50	
611	11.00	
711	11.50	
612	12.00	
712	12.50	
613	13.00	
614	14.00	
615	15.00	
616	16.00	
617	17.00	
618	18.00	
620	20.00	
622	22.00	
624	24.00	
625	25.00	
630	30.00	
635	35.00	
640	40.00	
645	45.00	
650	50.00	

**8 TERMINAL**  
2 Screw Terminal, 10-32  
3 Stud, 1/4-20  
5 Screw Terminal, M5  
6 Stud, M6

**9 ACTUATOR COLOR & LEGEND**

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

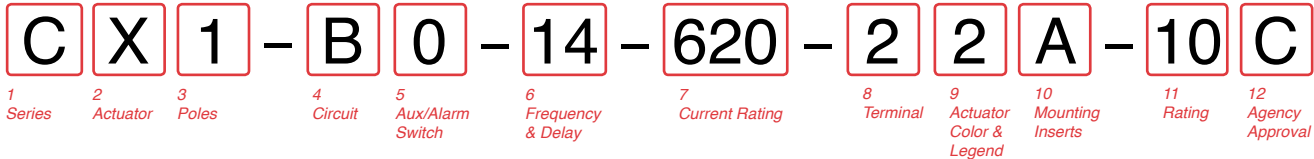
**10 MOUNTING INSERTS**  
A 6-32 Thread  
B M3 Thread

**11 MAX. APPLICATION RATING**  
12 250 VDC  
13 250/500 VDC <sup>1</sup>  
15 205/410 VDC

**12 AGENCY APPROVAL**  
A Without Approvals  
G UL 489 Listed  
S UL 489 Listed, TUV to IEC60947-2 <sup>1</sup>

Notes:  
<sup>1</sup> Only Available with 250/500 VDC up to 15 amps.





**1 SERIES**  
C

**2 ACTUATOR**  
X Handle, one per pole

**3 POLES <sup>7</sup>**  
1 One  
2 Two  
3 Three  
4 Four <sup>10</sup>

**4 CIRCUIT**  
A Switch Only (no coil) <sup>1, 9</sup>  
B Series Trip (current)  
G Relay Trip (voltage) <sup>1, 2, 3, 9</sup>

**5 AUXILIARY SWITCH**  
0 Without Aux Switch

**6 FREQUENCY & DELAY**  
03 DC 50/60Hz, Switch Only  
10 DC Instantaneous  
11 DC Ultra Short  
12 DC Short  
14 DC Medium  
16 DC Long

**7 CURRENT RATING (AMPERES) <sup>6</sup>**

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

**8 TERMINAL <sup>8</sup>**  
2 Screw, 10-32  
3 Stud, 1/4-20  
5 Screw, M5  
6 Stud, M6

**9 ACTUATOR COLOR & LEGEND**

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

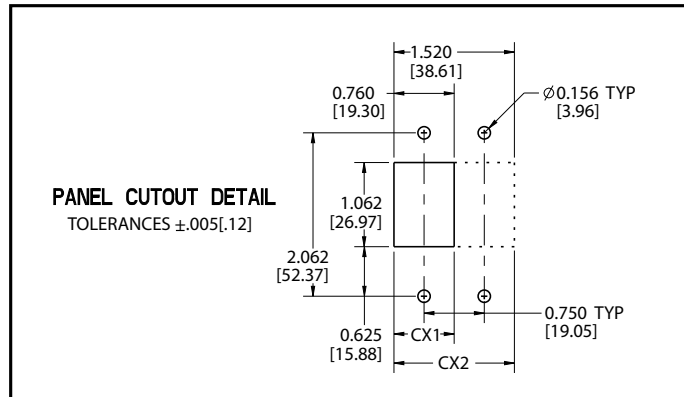
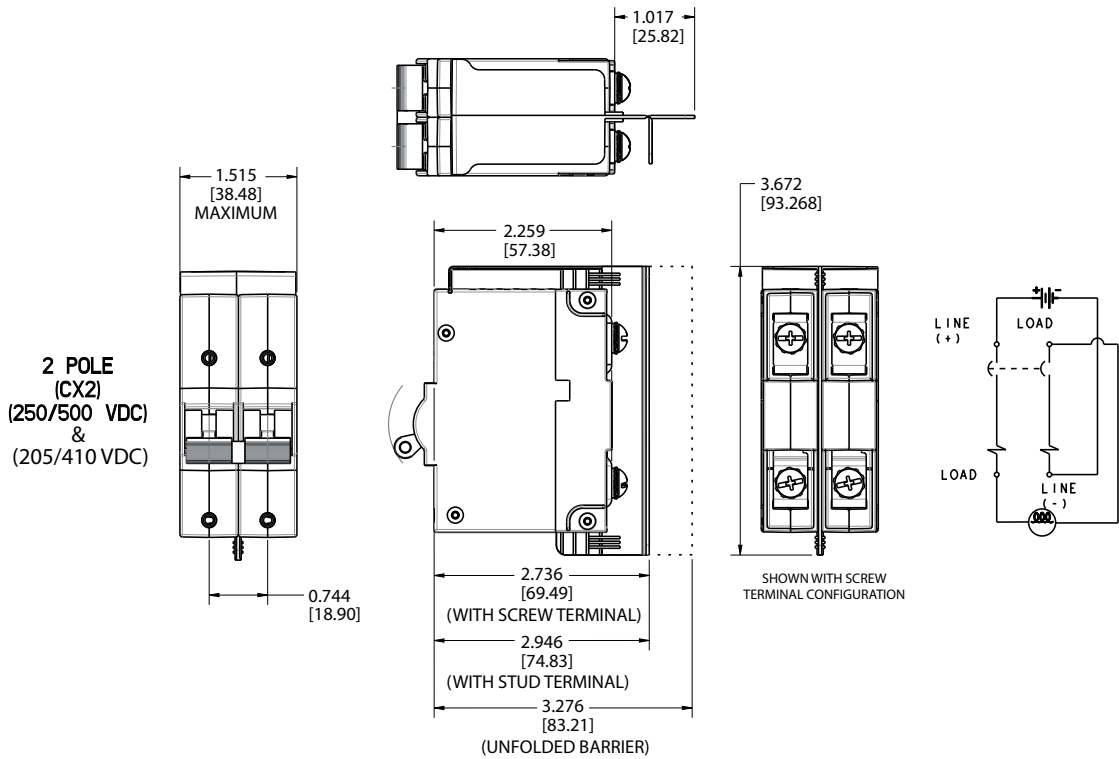
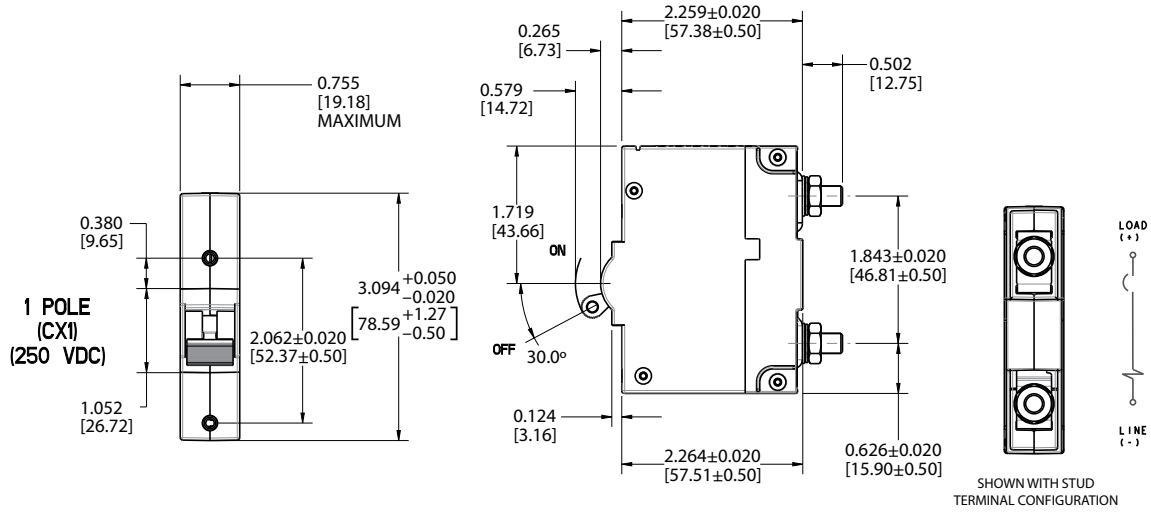
**10 MOUNTING INSERTS**  
A 6-32 Thread  
B M3 Thread

**11 MAX. APPLICATION RATING**  
10 300VDC  
11 440 VDC without factory installed terminal bus <sup>4</sup>  
14 440VDC with factory installed terminal bus <sup>4</sup>  
06 600VDC <sup>5</sup>

**12 AGENCY APPROVAL**  
A Without Approvals  
C UL 1077 Recognized  
W UL 1077 Recognized & TUV Certified IEC/ EN 60947-2 <sup>9</sup>

- Notes:
- 1 Only available when tied to a protected pole  
Requires special P/N consult factory for details
  - 2 Voltage trip circuit coil not rated for continuous duty - use instantaneous delay code 10
  - 3 Contacts Rated for 20A @ 80 VDC
  - 4 440VDC Rating available in two different wiring configurations.  
(see next page for more details)
  - 5 600 VDC only available with factory installed terminal bus (see next page for more details)
  - 6 Single pole units available up to 125A, multi pole units limited to 115A Max.  
(see next page for more details)
  - 7 3 Pole units must include one Auxiliary switch pole (circuit code A or G) - Requires Special Part Number. (see next page for more details)
  - 8 Screw Terminals are limited to 50A max.
  - 9 Agency approval code W only available with 440 VDC rating & circuit code B.
  - 10 4 Pole 600 VDC units only available up to 75A Max. (see next page for more details)

## Dimensional Specifications: in. [mm]

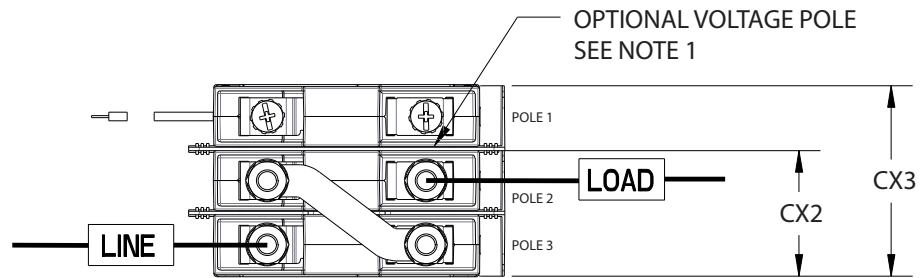
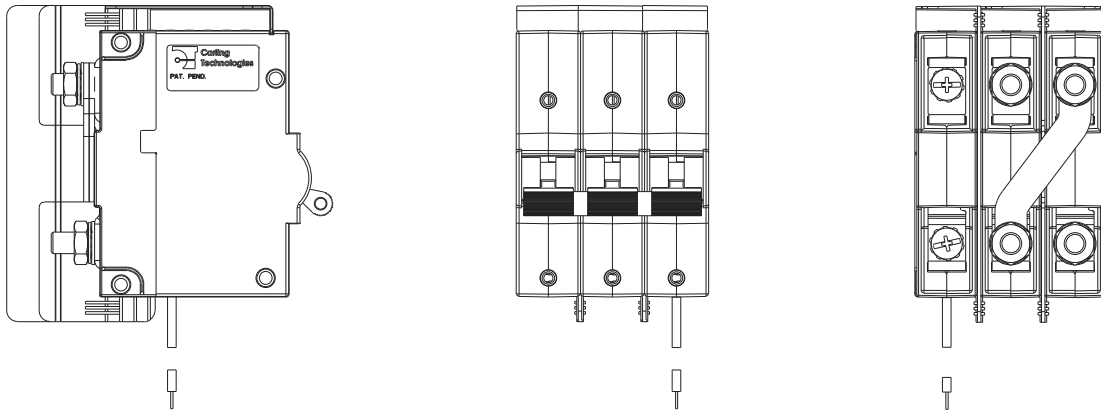


**Notes:**

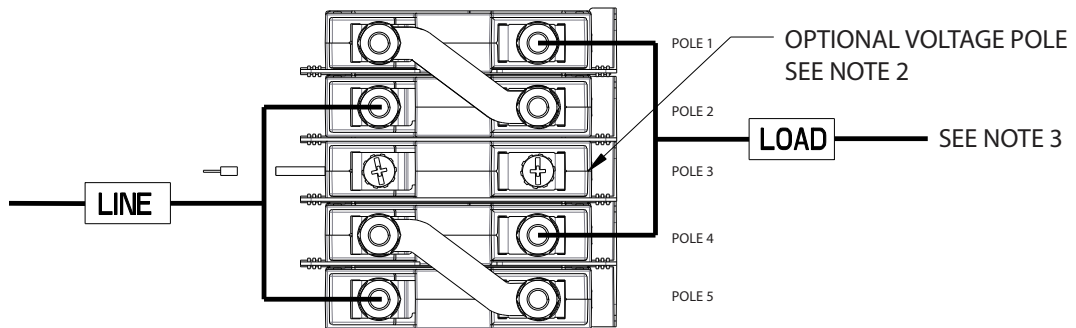
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance  $\pm 0.020$  [51] unless otherwise specified.



## Dimensional Specifications: in. [mm]



CX3 - 2 POLE SWITCH (CX2) SHOWN  
WITH OPTIONAL VOLTAGE POLE  
50A-100A DEVICE, 600VDC

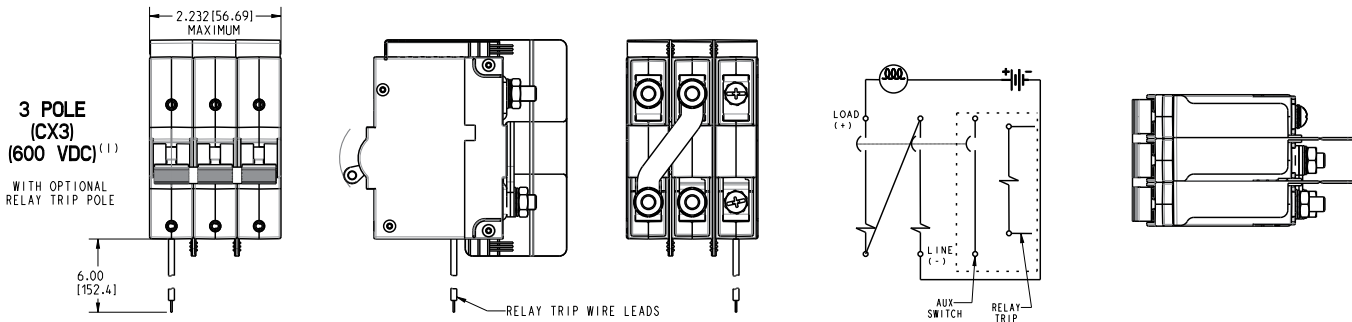
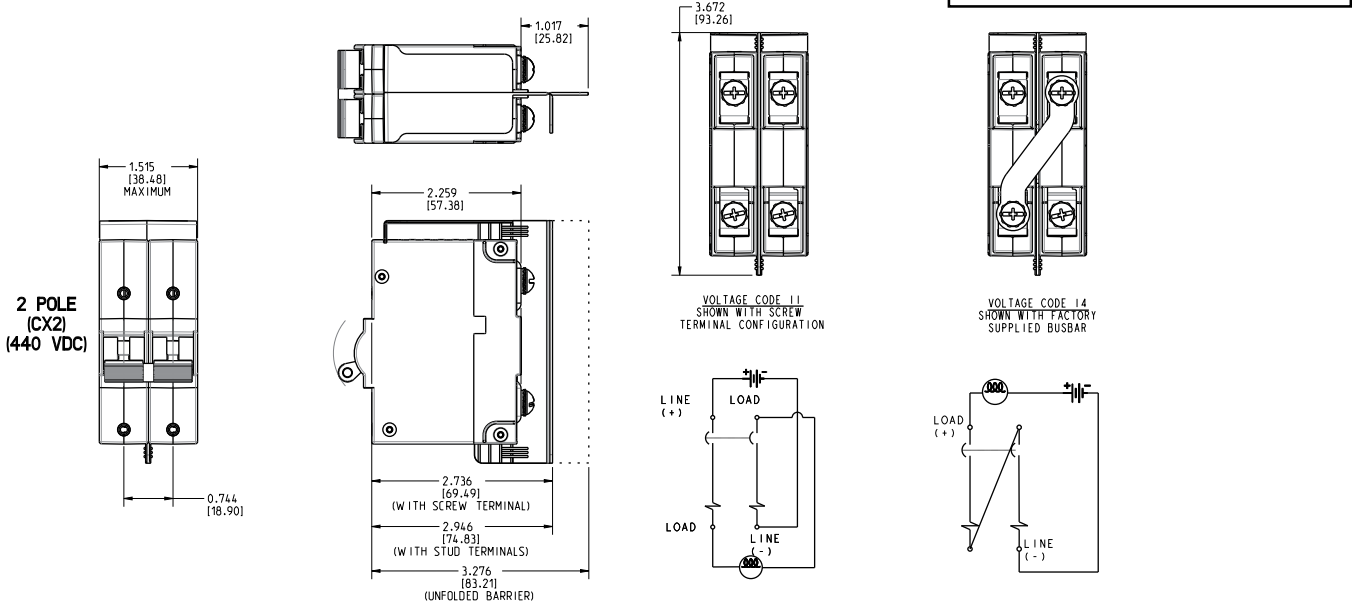
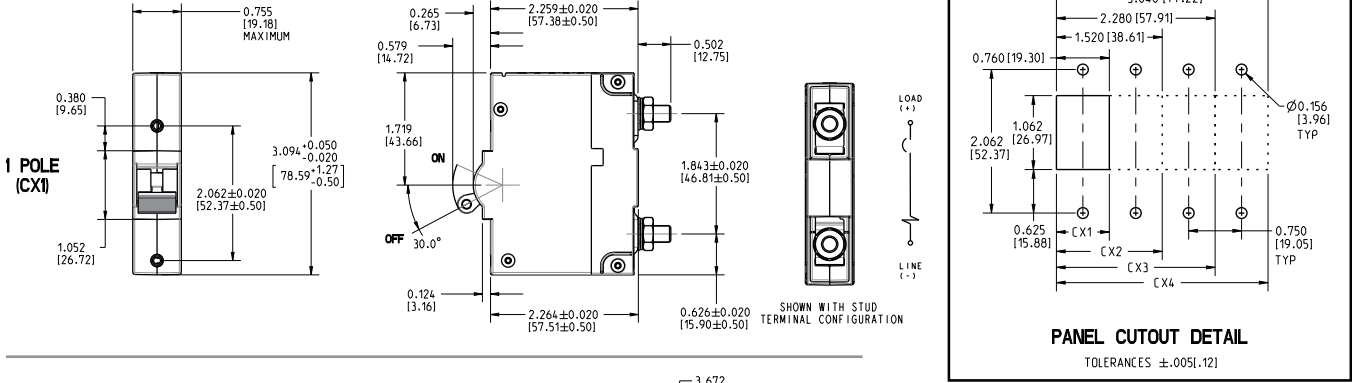


CX5 - 4 POLE SWITCH (CX4) SHOWN  
WITH OPTIONAL VOLTAGE POLE  
101A-175A DEVICE, 600VDC

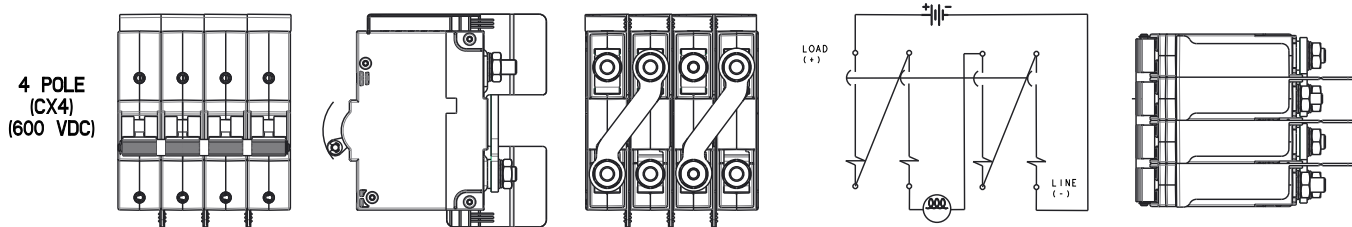
**Notes:**

- 1 All dimensions are in inches [millimeters].
- 2 3 pole configuration supplied with voltage coil on pole 1. Optional location pole 3. Consult factory.
- 3 5 pole configuration supplied with voltage coil in center pole. (Pole 3)
- 4 Line & Load connections requires bus connection as shown.  
Minimum cross section .127 in<sup>2</sup> (81.94 mm<sup>2</sup>)

## Dimensional Specifications: in. [mm]



(1) 600V RATING REQUIRES MINIMUM OF 2 PROTECTED POLES



(2) FOUR POLE UNIT AVAILABLE UP TO 75A MAXIMUM

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 600V Rating requires minimum of 2 protected poles

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