

# 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.



### 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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# CX-Series

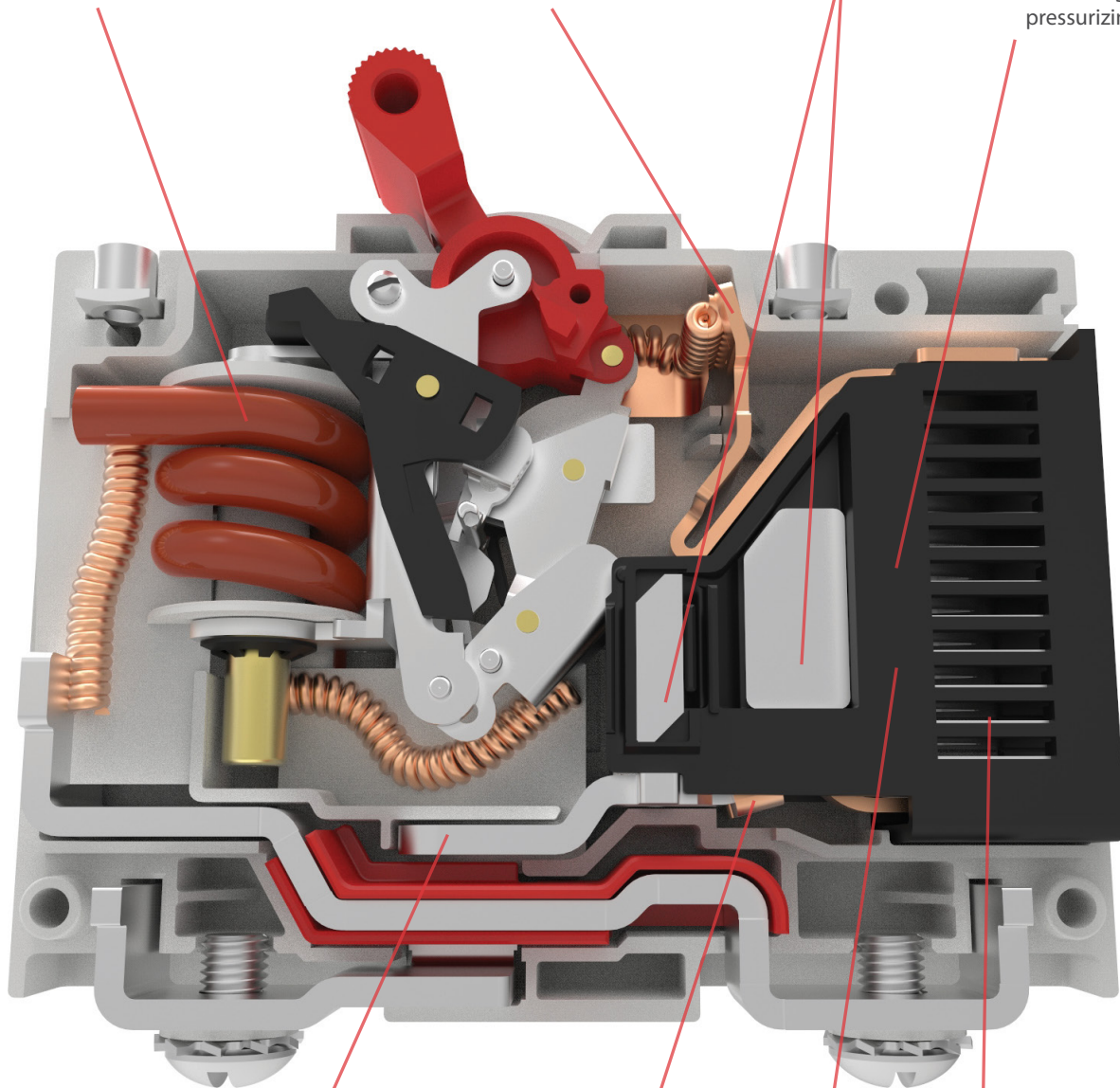
## DESIGN FEATURES

**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

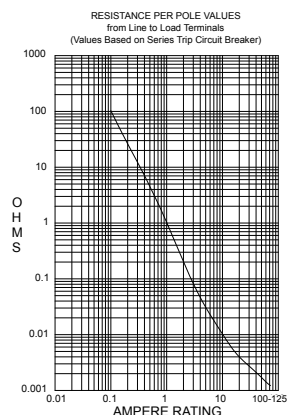
CX-SERIES TABLE D : TUV IEC/EN 60947-2 LOW VOLTAGE SWITCH GEAR & CONTROL GEAR / CIRCUIT BREAKER					
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING (AMPS)	INTERRUPTING CAPACITY
	MAX. RATING	FREQUENCY	POLES		ICS / ICU (AMPS)
SERIES	440	DC	2	1-63	4,000

\*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

1- 2 poles, + Auxiliary Switch Pole.  
10-32 or M5 Screw Terminals  
1/4-20 or M6 Threaded Stud

Terminals  
Termination Barrier  
Mounting

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,

Actuator  
Internal Circuit Config.  
Materials

Weight  
Standard Color

## Mechanical

Endurance

Max 10,000 ON-OFF operations @  
6 per minute; 6000 with rated  
current & voltage, and 4,000 cycles  
mechanical.

Trip Free

Trips on overload even when  
actuator is forcibly held in the "On"  
position.

Trip Indication

The operating handle moves  
positively to the "Off" position when  
an overload causes the breaker  
to trip.

## Environmental

Shock

Withstands 100 Gs, 6ms saw tooth  
while carrying rated current per  
MILPRF-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 MILSTD-202G, Method 204D,  
Test Cond. A. Instantaneous &  
ultrashort curves tested at 90% of  
rated current.

Vibration

Moisture Resistance

MIL-PRF-55629 and MIL-STD-  
202G, Method 106G, i.e., Ten 24-  
hour cycles at +25°C to +65°C, 80-  
98% RH.

Salt Spray

Method 101, Condition A (90-95%  
RH at 5% NaCl Solution, 96 hrs).

Thermal Shock

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).

Operating Temperature

-40°C to +85°C.

<b>C</b>	<b>X</b>	<b>1</b>	<b>-</b>	<b>B</b>	<b>0</b>	<b>-</b>	<b>14</b>	<b>-</b>	<b>615</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>A</b>	<b>-</b>	<b>12</b>	<b>G</b>
1 Series	2 Actuator	3 Poles		4 Circuit	5 Aux/Alarm Switch		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color & Legend	10 Mounting Inserts		11 Rating	12 Agency Approval

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

**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	<b>A</b>	<b>B</b>	<b>1</b>	Black
Black	<b>C</b>	<b>D</b>	<b>2</b>	White
Red	<b>F</b>	<b>G</b>	<b>3</b>	White
Green	<b>H</b>	<b>J</b>	<b>4</b>	White
Blue	<b>K</b>	<b>L</b>	<b>5</b>	White
Yellow	<b>M</b>	<b>N</b>	<b>6</b>	Black
Gray	<b>P</b>	<b>Q</b>	<b>7</b>	Black
Orange	<b>R</b>	<b>S</b>	<b>8</b>	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.

<b>C</b>	<b>X</b>	<b>2</b>	<b>-</b>	<b>S</b>	<b>0</b>	<b>-</b>	<b>03</b>	<b>-</b>	<b>810</b>	<b>-</b>	<b>3</b>	<b>2</b>	<b>A</b>	<b>-</b>	<b>06</b>	<b>14</b>
1 Series	2 Actuator	3 Poles		4 Circuit	5 Relay Trip		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color & Legend	10 Mounting Inserts		11 Rating	12 Agency Approval

**1 SERIES****C****2 ACTUATOR****X** Handle, one per pole**3 POLES** <sup>1,2</sup>

**2** Two  
**3** Three  
**4** Four  
**5** Five

**4 CIRCUIT****S** Switch Only**5 RELAY TRIP VOLTAGE COIL RATING** <sup>1,2</sup>

**0** Without Relay Trip Voltage Coil  
**A** 12 VDC  
**B** 24 VDC  
**C** 32 VDC  
**D** 48 VDC

**6 FREQUENCY & DELAY****03** DC Switch Only**7 CURRENT RATING (AMPERES)** <sup>1,3</sup>*2-Pole Section***810** 50A - 100A*4-Pole Section***917** 110A - 175A**8 TERMINAL** <sup>4,5</sup>

**3** Stud, 1/4-20  
**6** Stud, M6  
**A** Stud, 1/4-20, with 10-32 Screw Terminals on Voltage Pole  
**B** Stud, M6, with M5 Screw Terminals on Voltage Pole

**9 HANDLE COLOR & LEGEND**

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

**10 MOUNTING INSERTS****A** 6-32 Thread **B** M3 Thread**11 MAX. APPLICATION RATING****06** 600VDC**12 AGENCY APPROVAL**

**A** Without Approvals  
**14** UL489B Listed

## Notes:

- 2 Pole Unit is required for ratings between 50A - 100A.  
4 Pole Unit is required for ratings between 110A - 175A.
- A Relay Trip Voltage Coil Pole may be added to either the 2 or 4 Pole construction. The addition of this extra pole dictates a change in the designation for the number of poles in selection 3.
- For Current Ratings between 50A - 100A select current code 810 (100A).  
For Current Ratings between 101A - 175A select current code 917 (175A).
- Voltage Pole must have screw terminals.  
Switch Pole must have stud terminals.
- On 3 Pole Unit, Voltage Pole to be located at P1 as standard.  
On 5 Pole Unit, Voltage Pole to be located at P3 as standard.

<b>C</b>	<b>X</b>	<b>1</b>	<b>-</b>	<b>B</b>	<b>0</b>	<b>-</b>	<b>14</b>	<b>-</b>	<b>620</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>A</b>	<b>-</b>	<b>10</b>	<b>C</b>
1 Series	2 Actuator	3 Poles		4 Circuit	5 Aux/Alarm Switch		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color & Legend	10 Mounting Inserts		11 Rating	12 Agency Approval

**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						
<b>220</b>	0.200	<b>415</b>	1.500	<b>490</b>	9.000	<b>630</b>	30.000
<b>225</b>	0.250	<b>517</b>	1.750	<b>495</b>	9.500	<b>635</b>	35.000
<b>230</b>	0.300	<b>420</b>	2.000	<b>610</b>	10.000	<b>640</b>	40.000
<b>235</b>	0.350	<b>522</b>	2.250	<b>710</b>	10.500	<b>650</b>	50.000
<b>240</b>	0.400	<b>425</b>	2.500	<b>611</b>	11.000	<b>660</b>	60.000
<b>245</b>	0.450	<b>527</b>	2.750	<b>711</b>	11.500	<b>665</b>	65.000
<b>250</b>	0.500	<b>430</b>	3.000	<b>612</b>	12.000	<b>670</b>	70.000
<b>255</b>	0.550	<b>435</b>	3.500	<b>712</b>	12.500	<b>675</b>	75.000
<b>260</b>	0.600	<b>440</b>	4.000	<b>613</b>	13.000	<b>680</b>	80.000
<b>265</b>	0.650	<b>445</b>	4.500	<b>614</b>	14.000	<b>685</b>	85.000
<b>270</b>	0.700	<b>450</b>	5.000	<b>615</b>	15.000	<b>690</b>	90.000
<b>275</b>	0.750	<b>455</b>	5.500	<b>616</b>	16.000	<b>695</b>	95.000
<b>280</b>	0.800	<b>460</b>	6.000	<b>617</b>	17.000	<b>810</b>	100.000
<b>285</b>	0.850	<b>465</b>	6.500	<b>618</b>	18.000	<b>911</b>	115.000
<b>290</b>	0.900	<b>470</b>	7.000	<b>620</b>	20.000	<b>912</b>	125.000
<b>295</b>	0.950	<b>475</b>	7.500	<b>622</b>	22.000		
<b>410</b>	1.000	<b>480</b>	8.000	<b>624</b>	24.000		
<b>512</b>	1.250	<b>485</b>	8.500	<b>625</b>	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	<b>A</b>	<b>B</b>	<b>1</b>	Black
Black	<b>C</b>	<b>D</b>	<b>2</b>	White
Red	<b>F</b>	<b>G</b>	<b>3</b>	White
Green	<b>H</b>	<b>J</b>	<b>4</b>	White
Blue	<b>K</b>	<b>L</b>	<b>5</b>	White
Yellow	<b>M</b>	<b>N</b>	<b>6</b>	Black
Gray	<b>P</b>	<b>Q</b>	<b>7</b>	Black
Orange	<b>R</b>	<b>S</b>	<b>8</b>	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>  
**18** 220/440VDC <sup>11</sup>

**12 AGENCY APPROVAL**

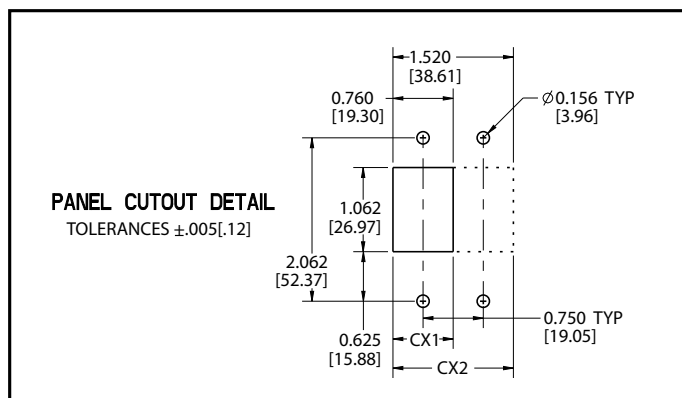
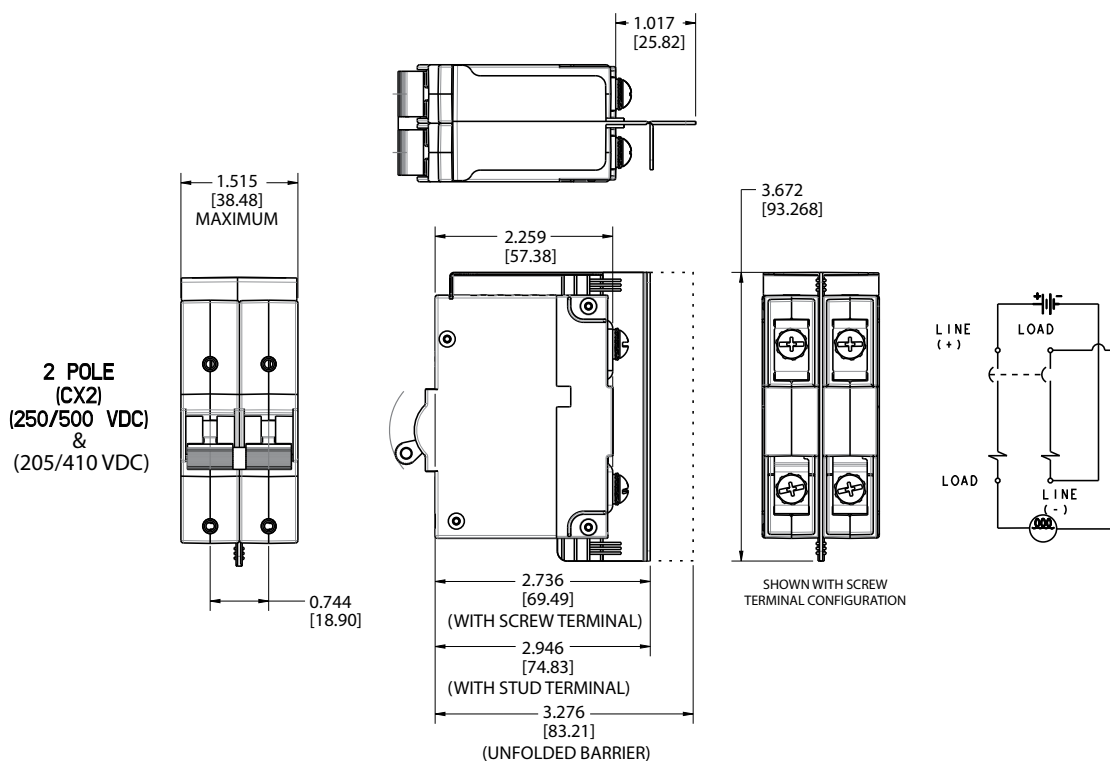
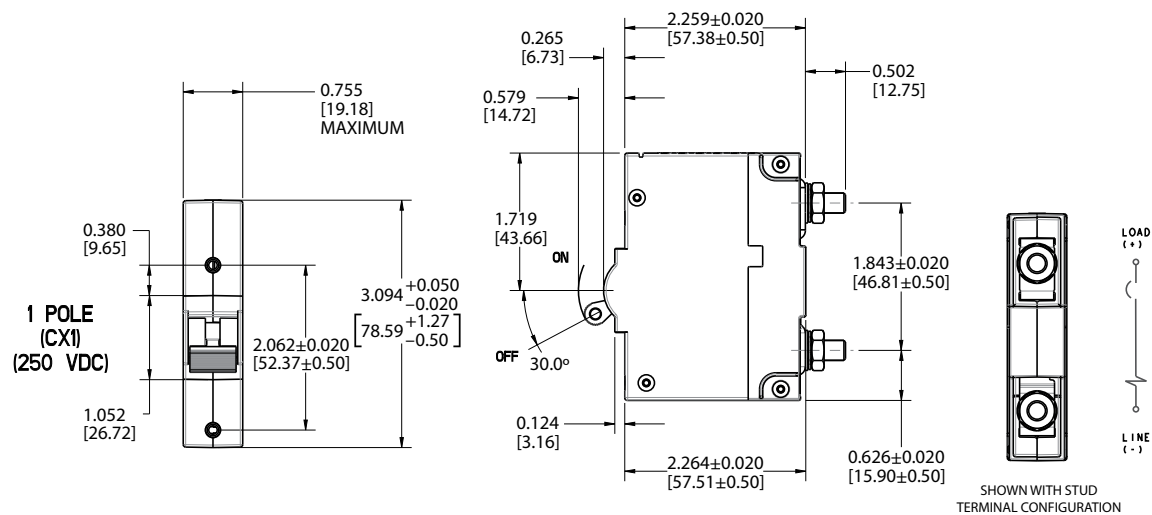
- A** Without Approvals  
**C** UL 1077 Recognized  
**W** UL 1077 Recognized & TUV Certified IEC/ EN 60947-2 <sup>9</sup>

## Notes:

- <sup>1</sup> Only available when tied to a protected pole.  
 Requires special part number consult factory for details  
<sup>2</sup> Voltage trip circuit coil not rated for continuous duty - use instantaneous delay code 10  
<sup>3</sup> Contacts Rated for 20A @ 80 VDC  
<sup>4</sup> 440 VDC Rating available in two different wiring configurations.  
<sup>5</sup> 600 VDC only available with factory installed terminal bus.  
<sup>6</sup> Single pole units available up to 125A, multi pole units limited to 115A Max.  
<sup>7</sup> 3 Pole units must include one Auxiliary switch pole (circuit code A or G) - Requires Special Part Number. Unless breaker is rated 220/440 VDC (Voltage Code 18) in which case Circuit Code B is required.  
<sup>8</sup> Screw Terminals are limited to 50A max.  
<sup>9</sup> Agency approval code W only available with 440 VDC or 220/440 VDC rating and circuit code B.  
<sup>10</sup> 4 Pole 600 VDC units only available up to 75A Max.  
<sup>11</sup> 3 Pole 220/440 VDC units only available in one specific wiring configuration.  
 See dimensional specifications pages for more details



### Dimensional Specifications: in. [mm]



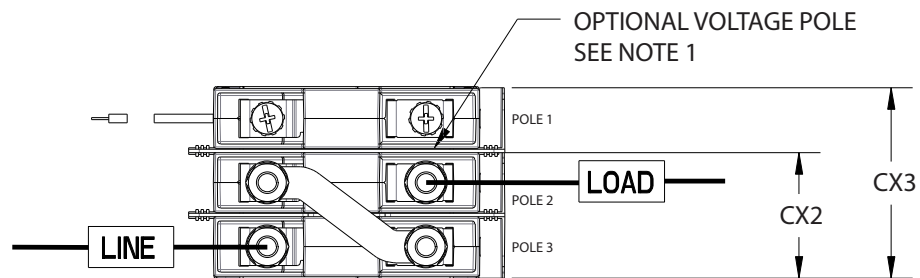
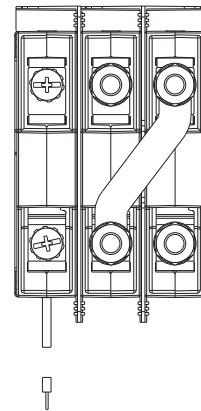
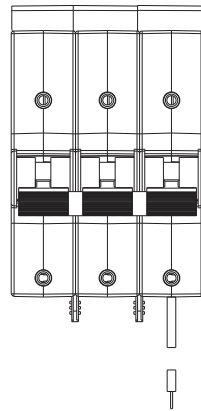
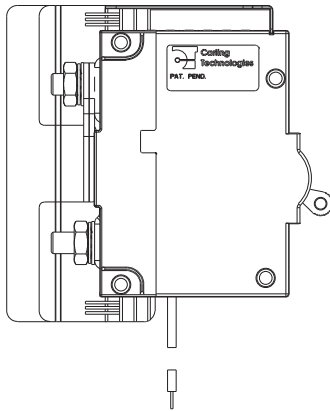
Notes:

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

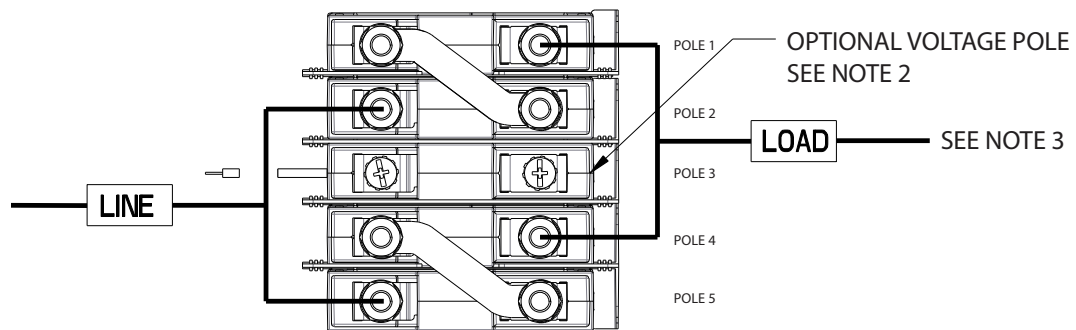
CLA-8119 Rev: C



## Dimensional Specifications: in. [mm]



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



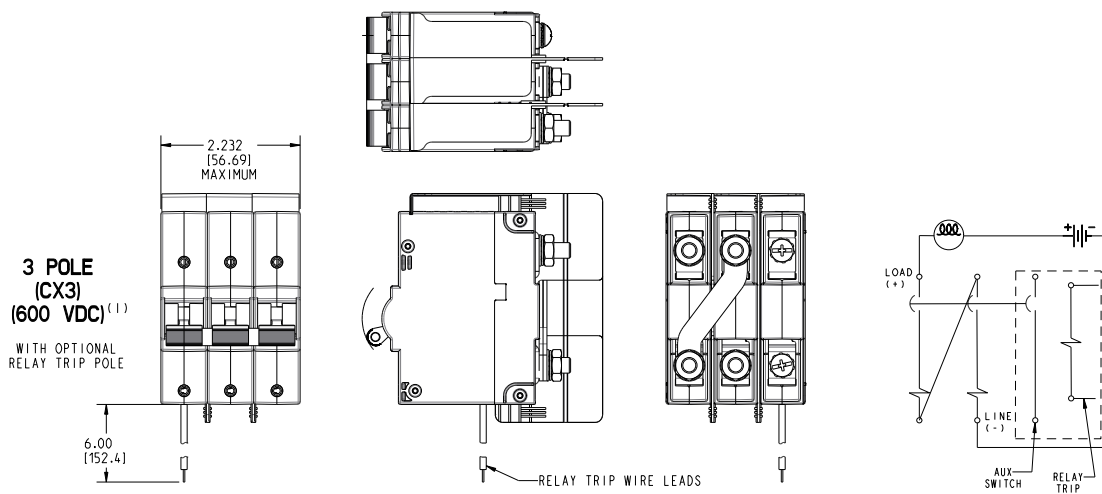
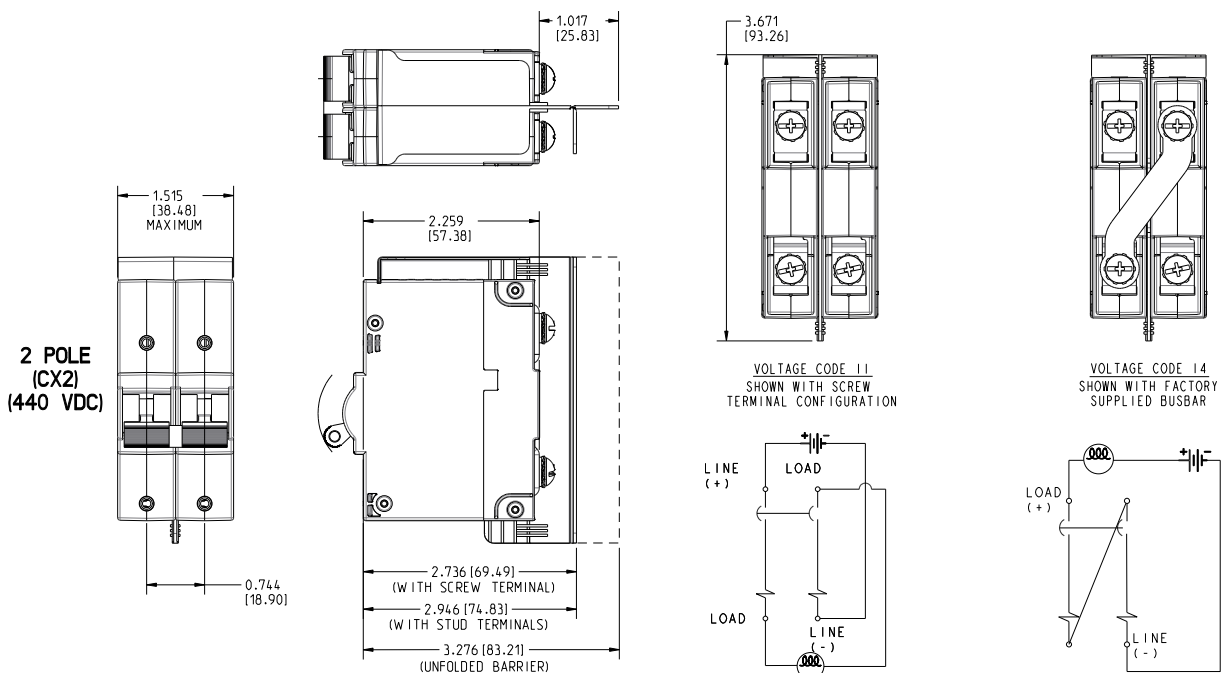
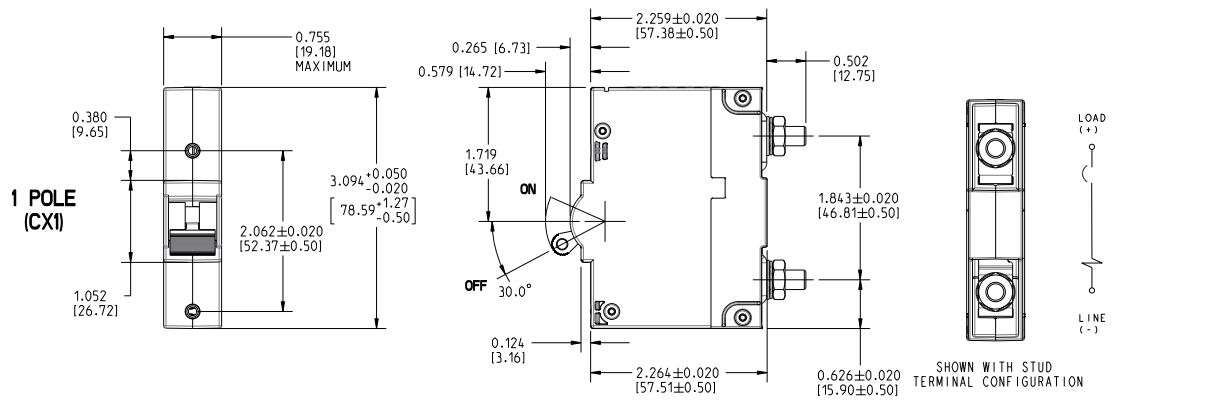
CX5 - 4 POLE SWITCH (CX4) SHOWN  
WITH OPTIONAL VOLTAGE POLE  
101A-175A DEVICE, 600VDC

### 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]



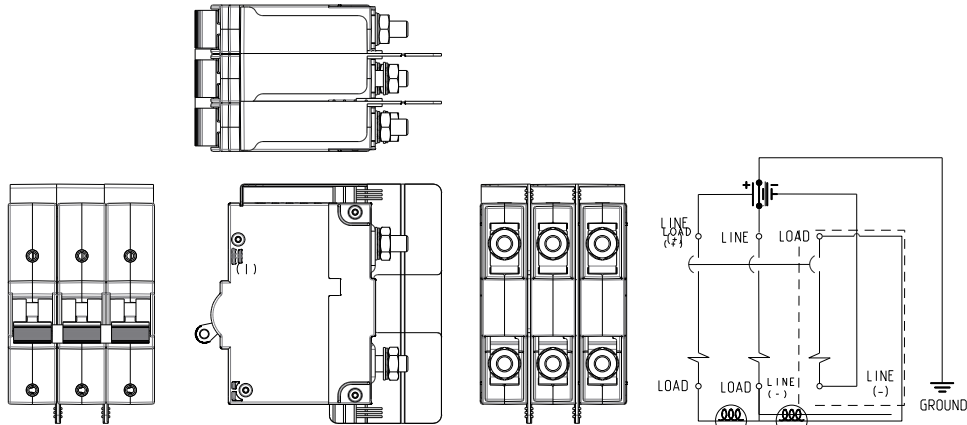
(1) 600V RATING REQUIRES MINIMUM OF 2 PROTECTED POLES

### Notes:

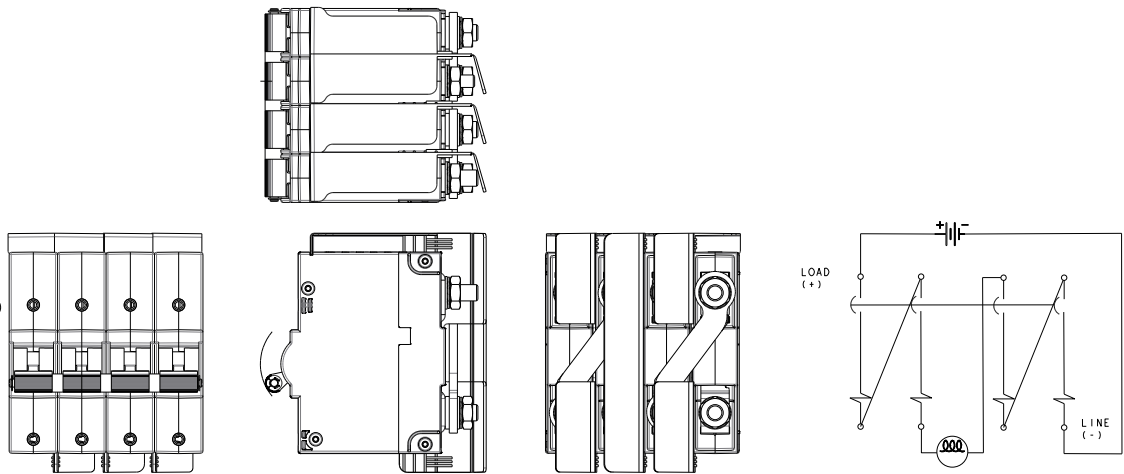
- 1 All dimensions are in inches [millimeters].
- 2 600V Rating requires minimum of 2 protected poles

## Dimensional Specifications: in. [mm]

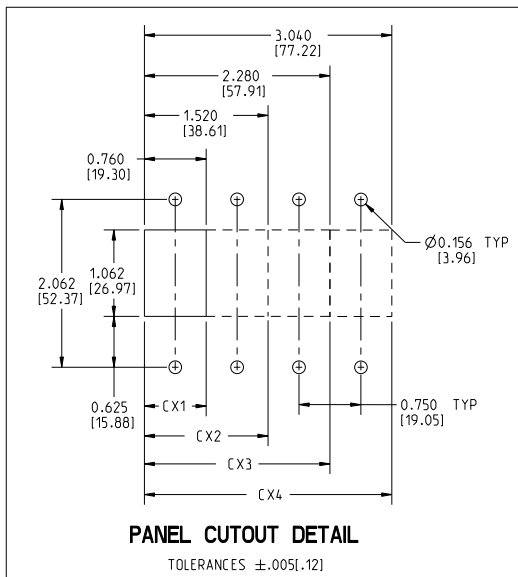
**3 POLE  
(CX3)  
(220/440 VDC)**



**4 POLE<sup>(1,2)</sup>  
(CX4)  
(600 VDC)**



(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