



Carling Technologies®
Innovative Designs. Powerful Solutions.

HYDRAULIC-MAGNETIC

Circuit Protection



CATALOG

FOUNDED IN 1920



Since its founding, Carling Technologies has continually forged a tradition of leadership in quality and product innovation.

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- Toggle
- Pushbutton
- Rotary

CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

MULTIPLEXED POWER SYSTEMS

- HMI Devices & I/O Modules
- Programmable Displays
- Data Communication Interfaces
- Electrical Systems Monitoring

STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

GLOBAL LOCATIONS:

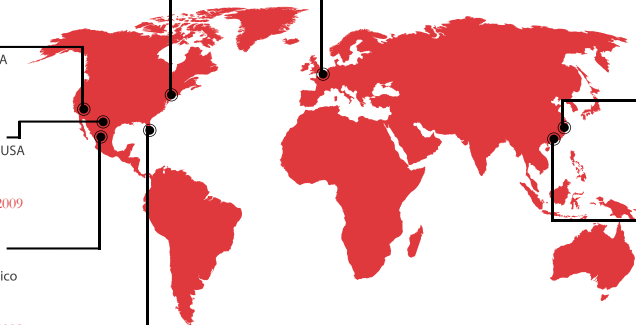
Carling Technologies
World Headquarters
Plainville, CT, USA
ISO9001:2008
ISO/TS16949:2009

Maretron
Phoenix, AZ, USA

Carling Technologies
Brownsville, TX, USA
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WORLDWIDE NUMBERS:

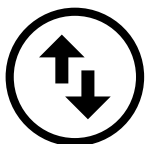


2000+
EMPLOYEES



150+
ENGINEERS

COMPETITIVE ADVANTAGES⁺



Vertical
Integration



Reliable &
On-Time Delivery



Excellent
Customer Service



Innovative &
Eco-Friendly Products



70+
DISTRIBUTORS



50+
REP FIRMS

Hydraulic-Magnetic Circuit Protection

Carling Technologies' hydraulic-magnetic circuit breakers are designed to provide maximum circuit protection to a wide variety of applications. Featuring cutting edge designs and advance features, our products are well known for their performance and reliability.



Within This Catalog, you will find comprehensive product information for each product series including applications, specifications and ordering schemes.

Available Online are tools such as part configurator, product selectors and stock checks. Please visit www.carlingtech.com for the latest information on all our products.

Application Solution Engineers are readily available to assist you in selecting the appropriate product for your application. For further assistance, please email us at custservice@carlingtech.com

Custom Design Solutions are available for OEMs that require specific product design and performance.

Other Circuit Protection Products such as thermal protection and ground fault circuit protection are also available. Please refer to www.carlingtech.com for a complete list of product offering.

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	 <i>M-Series</i>	 <i>MS-Series</i>	 <i>H-Series</i>	 <i>A-Series</i>
Number of Poles	1-2	1-3	1-3	1-6 (handle) 1-3 (rocker & metal toggle)
Actuator Style	solid color: angled rocker, paddle, baton, push-to-reset pushbutton, push-pull pushbutton two color: visi-rocker illuminated: angled rocker, flat rocker	sealed metal toggle	handle rocker curved & flat	sealed metal toggle handle rocker rocker paddle
Available Delays	AC/DC: instantaneous, short, medium, hi-inrush	DC: instantaneous, short & medium	AC, DC: instantaneous, ultra-short, short, medium & long	AC, DC, AC/DC: instantaneous, ultra-short, short, medium & long AC, DC: high inrush-short, medium & long
Max Current & Voltage Ratings	1 Pole: 0.02-15FLA@32VDC, 125VAC 15.1-25GPA@32VDC, 125VAC 0.02-12FLA@250VAC 0.02-7.5GPA@50VDC 0.02-30GPA@65VDC, 80VDC 2 Pole: 0.02-15FLA@65VDC, 250VAC 15.1-25GPA@65VDC, 250VAC Parallel Pole: 31-50GPA@80VDC	0.2-30A@65VDC 240VAC, 120/240VAC	1-35A@65VDC, 80VDC, 250VAC	0.02-30A@277VAC, 80VDC 31.0-50A@125/250VAC, 65VDC
Max Interrupting Capacity	1 Pole: 1,000A@32VDC 1,000A@125VAC 2 Pole: 1,000A@65VDC 1,000A@250VAC Parallel Pole: 600A@80VDC	3000A, U1@65VDC 2000A, U1@240VAC 2000A, U1@120/240VAC	3000A@65VDC 1000A@80VDC 1500A@250VAC	7500A@80VDC, UL only 3000A@120/250VAC, UL only 5000A@277VAC, with fuse backup
Auxiliary Switch Rating	7A@250VAC 0.1A@125VAC (gold contacts) 7A (res.)@28VDC 4A (ind.)@28VDC 0.25A@80VDC	5A@125VAC 3A@32VDC .1A@125VAC, 32VDC	1.0A@65VDC/0.5A@80VDC, 0.1A@125VAC (gold contacts)	10.1A@125VAC 0.1A@125VAC (gold contacts) 0.5A@65VDC 0.1A@80VDC
Available Circuits	series and switch only parallel pole	series and switch only	series, switch only, relay trip / v coil	series, shunt, relay, switch only, series with remote shutdown, relay & shunt trip dual coil
Terminal Options	.250" QC tabs 8-32 screw with upturned lugs 8-32, 10-32 screw (bus type) push in stud terminals	.250" QC tabs 8-32 screw & solder type	.250" QC tabs 8-32 & 10-32 screw (& metric), PCB	.250" QC tabs 8-32 & 10-32 screw (& metric), PCB
Mounting Method	snap-in front panel threaded bushing	front panel	threaded inserts	threaded inserts: front panel snap-in
Agency Approvals	UL recognized, CSA, VDE, TUV, UL489A listed	UL 1077, cUL	UL recognized, CSA accepted, TUV certified & CCC certified	UL, CSA, VDE, TUV (rocker), UL1500, UL489A

	 <i>B-Series</i>	 <i>TB-Series</i>	 <i>C-Series</i>	 <i>D-Series</i>	 <i>G-Series</i>
Number of Poles	1-6	2	1-6 (handle) 1-3 (rocker & metal toggle)	1-4 (handle) 1-3 (rocker)	1-3 (UL Listed) 1-4 (UL Recognized)
Actuator Style	handle rocker	handle	sealed metal toggle handle rocker	solid color curved rocker (1 per unit) two color visi-rocker (1 per unit) handle (1 per pole or unit)	handle
Available Delays	AC, DC, AC/DC: instantaneous, ultra-short, short, medium & long AC, DC: high inrush-short, medium & long	AC, ultrashort, shot, medium, long, high inrush	AC, DC, AC/DC: instant, ultrashort, short, medium & long AC, DC: high inrush-short, medium & long	AC, DC, AC/DC: instant, ultra-short, short, medium, long (motor loads) AC, DC, AC/DC: high inrush-short, medium, long	AC, DC: instantaneous, ultrashort, short, medium & long AC, DC: high inrush-short, medium & long
Max Current & Voltage Ratings	0.02-30A@ 277VAC, 80VDC 0.02-30A@ 125/250VAC, 65VDC	.1-20A@ 120/240VAC	UL Listed: 0.02-250A@80VDC 0.1-100A@125VDC 0.02-70A@120VAC 0.02-20A@240VAC UL Recognized: 0.02-30A@480WYE/277VAC 2 Pole, 1Ø 3 Pole, 3Ø 0.02-50A@277VAC 0.02-100A@250VAC, 80VDC 0.02-100A@120/240VAC, 65VDC	0.02-50A@ 277VAC, 65VDC 0.02-30A@ 480WYE /277VAC 2 Pole 1Ø 3 Pole 3Ø	UL Listed: 1-50A@80VDC 1-50A@125VDC 1-50A@120VAC 1-50A@120/240VAC 1-25A@240VAC UL Recognized: 0.1-63A@80VDC 0.1-63A@240VAC 0.1-63A@480YVAC
Max Interrupting Capacity	7500A@80 VDC, UL only 3000A@125/250VAC, UL only 5000A@277VAC, with fuse backup	5000A@ 120/240 VAC	UL Listed: 5000A@80VDC, 1 pole only 10000A@120VAC 5000A@125VDC/240VAC UL Recognized: 7500A@80VDC 3000A@125/250VAC, UL only 5000A@250VAC listed construction 5000A@480WYE/277VAC with fuse backup	1,500A@65VDC, 250VAC, VDE only 5,000A@65 VDC 5,000A@480WYE /277VAC with fuse back up 3,000A@125 /250VAC, UL only with fuse back up	UL Listed: 5000A@80VDC 5000A@125VDC 5000A@120VAC 5000A@120/240VAC 5000A@240VAC UL Recognized: 3000A@80VDC 3000A@240VAC 1500A@480VAC
Auxiliary Switch Rating	10.1A@125 VAC 0.1A@125 VAC (gold contacts), 0.5A@65 VDC 0.1A@80 VDC	10.1A@125 VAC 0.1A@125 VAC (gold contacts) 0.5A@65 VDC 0.1A@80 VDC	10.1A@250 VAC 0.1A@125 VAC (gold contacts), 0.5A@80 VDC	n/a	3A@125VAC 2A@30VDC
Available Circuits	series, shunt, relay, switch only, series with remote shutdown, relay & shunt trip dual coil, mid-trip with alarm switch	series trip	series, shunt, relay, switch only, series with remote shutdown, relay & shunt trip dual coil, mid-trip with alarm switch	series, switch only, series with remote shutdown	series, switch only
Terminal Options	.250" QC tabs, 8-32 & 10-32 screw (& metric), PCB	8/32, 10/32, M4, M5 back connector	10-32 stud, 1/4-20 stud, 10-32 screw with saddle clamp, 7/16 clip & push-In	recessed wire-ready, pressure plate type screw terminals	recessed wire-ready, pressure plate type screw terminals
Mounting Method	threaded inserts: front panel snap-in	threaded inserts	threaded inserts	rear mounted on DIN rail or front panel mounted	rear mounted on DIN rail
Agency Approvals	UL, CSA, VDE, TUV (rocker); UL1500, UL489, UL489A	UL489, TUV	UL, CSA, VDE, TUV, UL1500, UL489, UL489A	UL recognized, CSA, VDE	UL1077, cUL, TUV, UL489

	 L-Series	 N-Series	 CX-Series	 E-Series	 F-Series
Number of Poles	1-3	1-2	1-5	1-6	1-3
Actuator Style	rocker, with or without guard	flush rocker, with or without push to reset guard	handle, 1 per pole	handle	handle
Available Delays	AC: ultrashort, short, medium, long, short-high inrush, medium-high inrush, long-high inrush	AC: ultrashort, short, medium, long, short-high inrush, medium-high inrush, long-high inrush	DC: instant, ultrashort, short, medium & long	AC, DC, AC/DC: instant, short, medium & long AC, DC, AC/DC: high inrush-short, medium & long	AC, DC: short, medium & long
Max Current & Voltage Ratings	.1-32A@120/240VAC .1-20A@415/240VAC, 3 pole	1-20A@240/277VAC 1-30A@120/240VAC	UL Recognized 0.2-115A@600VDC UL Listed 0.2-15A@250/500VDC 0.2-50A@205/410VDC	UL Listed 0.02-100A@240VAC, 80VDC, 125VDC UL Recognized 0.02-100A@277VAC, 160VDC, 1 pole 0.02-100A@600VAC, 2 Pole 1Ø, 3 pole 3Ø 0.02-120A@125VDC, 1 pole	UL489 Listed: 50-250A@125VDC 100-250A@120/240VAC 100-250A@277VAC 100-250A@208Y/120, 3ØVAC UL489A Listed 250-700A@125VDC
Max Interrupting Capacity	5000 amps	22,000 amps	UL Listed and UL Recognized up to 10,000 amps	UL Listed 50000A@80VDC 10000A@125VDC & 240VAC-5KA UL Recognized 5000A@125VDC 5000A@600VAC, without fuse backup 10000A@600VAC, with fuse backup	50000A@125VDC 10000A@120/240, 277, 208Y/120VAC
Auxiliary Switch Rating	n/a	n/a	20A@80VDC (GO circuit)	10.1A@250VAC 1.0A@65VDC 0.1A@80VDC	10.1A@250VAC 0.5A@65VDC 0.1A@80VDC
Available Circuits	series trip	series trip	series trip	series, shunt, relay, switch only, series with remote shutdown	series & switch only with or without metering shunt
Terminal Options	10-32, 8-32, M5 & M4 screw	screw terms	10-32 or M5 screw terminals 1/4-20 or M6 threaded stud	10-32 stud, 1/4-20 stud 0-32 screw, 1/4-20 screw, box wire connector	3/8-16 stud, 3/8-16 screw & box wire connector
Mounting Method	threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)	threaded insert: #6-32 x .195 inches ISO M3 x 5mm	threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)	rear or front panel	rear or front panel
Agency Approvals	UL 489, cUL, TUV (EN60934-2)	UL489, TUV (EN60947-2)	UL489, UL1077, TUV (EN60934-2)	UL, CSA, VDE, UL1500, UL489	cUL, TUV, UL489, UL489A

*Manufacturer reserves the right to change product information without prior notice

Circuit Protection Introduction

Any electrical or electronic equipment that is designed without including circuit protection is an accident waiting to happen. Under normal operating conditions, this may not appear to be a problem. However, normal operating conditions are not always guaranteed. Under strained or heavy use, a motor and/or another load-generating component within the equipment will draw additional current from the power source; when this happens, the equipment's wires and/or components will overheat and may ultimately burn up. Also, power surges and short circuits in unprotected equipment can cause extensive damage to the equipment and to the conductors leading to the equipment.

In addition to protecting the equipment, the entire electrical system including the control switches, wires, and power source must be protected from faults. A circuit protection device should be employed at any point where a conductor size changes. Many electronic circuits and components like transformers have a lower overload withstand threshold level than conductors such as wires and cables. These components require circuit protection devices featuring very fast overload sensing and opening capabilities.

Specifying a circuit protection device for an application is not a difficult task, but it will require some thought. If electrical and electronic equipment is designed with over-specified circuit protection devices they will be vulnerable to the damaging effects of power surges and the catastrophic results of a fire; while using under-specified circuit protection devices will result in nuisance tripping.

Before specifying a circuit protection device, equipment designers should evaluate the load characteristics during equipment startup and at normal operation. Many types of equipment will produce startup inrush current, or surges. In these cases, circuit breakers with the appropriate time delay should be selected. The time delay specified should slightly exceed the duration of the surge.

Before specifying a circuit protection device, an equipment designer should also consider the following:

- **Applied voltage rating (AC or DC)**
- **Single phase, multi-phase/number of poles**
- **Applicable national electric codes and safety regulatory agency standards**
- **Interrupting (short circuit) capacity**
- **Mounting requirements and position/ enclosure size constraints**

The short circuit capacity of a circuit protection device should be greater than the circuit's available short circuit fault current. Available short circuit current is the maximum RMS current that would be present if all the conductors were to be connected directly to the fault location. In reality, this is not the case. The actual short circuit current is much less than the available short circuit current. The actual short circuit current is reduced due to the combined impedance of the conductors, the size of the transformer and other current restricting components within the circuit.

The application's environmental conditions must be considered when selecting the proper circuit protection device. Excessive temperature, humidity, severe vibration and shock can cause adverse performance characteristics in many types of circuit protection devices. For instance, a fuse element is less reliable when it is hot than when it is cold.

The mounting position of a hydraulic-magnetic circuit breaker is critical to its performance. A standard hydraulic-magnetic circuit breaker should be mounted on a vertical panel as gravity will influence the "must hold" and "must trip" calibration. It is possible to specify the breaker for use in other mounting positions, however, special factory calibration will be required to prevent adverse performance characteristics.

Available Choices of Circuit Protection

Carling Technologies offers three types of circuit protection devices: thermal circuit protectors, hydraulic-magnetic circuit protectors/breakers and equipment leakage circuit breakers. This catalog features hydraulic-magnetic circuit protection products. For details related to our thermal and ground fault circuit protection product lines, please visit our website.

Thermal circuit protectors utilize a bimetallic strip electrically in series with the circuit. The heat generated by the current during an overload deforms the bimetallic strip and trips the breaker. Thermal protectors have a significant advantage over fuses in that they can be reset after tripping. They can also be used as the main ON/OFF switch for the equipment being protected. However, thermal breakers have some disadvantages. They are, in effect, “heat sensing” devices, and can be adversely affected by changes in ambient temperature. When operating in a cold environment, they will trip at a higher current level. When operating in a hot environment, they will “nuisance trip” at a lower current level resulting in unwanted equipment shut downs.

Hydraulic-magnetic circuit protectors/breakers provide highly precise, reliable and cost effective solutions to most design problems. They have the advantages of thermal breakers but none of their disadvantages. The hydraulic-magnetic circuit breaker is considered to be temperature stable and thus is not appreciably affected by changes in ambient temperature. Its over-current sensing mechanism reacts only to changes of current in the circuit being protected. It has no “warm-up” period

to slow down its response to overload. It has no “cool-down” period after overload before it can be reset. The characteristics of a hydraulic-magnetic circuit breaker can be tailored in four separate areas: the desired circuit; the trip point (in amperes); the time delay (in seconds); and the inrush handling capacity of the breaker. These factors can be varied with relatively little impact on the short circuit capability of the breaker. Typically, hydraulic-magnetic circuit breakers are available with a choice of three different trip time delay curves: slow, medium and long. These choices provide the designer with a high level of design flexibility when matching the breakers trip time delay curves to other circuit protection devices in a cascade, or discriminating circuit. In addition, special hi-inrush constructions are available for equipment with severe inrush characteristics.

Equipment leakage circuit breakers function as hydraulic-magnetic circuit breakers, offering customized overload and short circuit protection. In addition, they sense and guard against faults to ground using innovative electronics technologies. With the exception of small amounts of leakage, the current returning to the power supply will be equal to the current leaving the power supply. If the difference between the current leaving and returning through the earth leakage circuit breaker exceeds the leakage sensitivity setting, the breaker trips and its LED illuminates. The LED gives a clear indication that the trip occurred as a result of leakage to ground. This protection helps prevent serious equipment damage and fire.

Carling Technologies' Hydraulic-Magnetic Circuit Breakers

Carling Technologies' hydraulic/magnetic circuit breakers are current sensing devices employing a time proven hydraulic magnetic design. Their precision mechanisms are temperature stable and are not adversely affected by temperature changes in their operating environment. As such, derating considerations due to temperature variations are not normally required, and heat-induced nuisance tripping is avoided.

Features

- ♦ A trip-free mechanism, a safety feature, makes it impossible to manually hold the contacts closed during overcurrent or fault conditions.
- ♦ Worldwide safety agency approvals are available.
- ♦ Current ratings to 700 Amps and rated voltages to 600 VAC are available.
- ♦ A common trip linkage between all poles, another safety feature, ensures that an overload in one pole will trip all adjacent poles.
- ♦ Industry standard dimensions, mounting and current ratings provide maximum application versatility.
- ♦ Series trip, mid-trip and switch only (with or without auxiliary switch), remote shutdown, shunt trip, relay trip and dual coil circuit options are offered.
- ♦ Handle actuators, solid color rocker actuators, illuminated rocker actuators and the exclusive Visi-Rocker® two-color rocker actuators, allow design flexibility and contemporary panel styling.
- ♦ 35mm DIN Rail back panel mounting available for world market applications.

Typical Applications

Magnetic circuit breakers protect wiring, motors, generators, transformers, solid state systems, computers, telecommunications systems, micro-processors, peripheral and printing devices, office machines, machine tools, medical and dental equipment, instrumentation, vending machines, industrial automation and packaging systems, process control

systems, lamps, ballasts, storage batteries, linear and switching power supplies, as well as marine control panels and numerous other applications.

Generally, wherever precise and reliable circuit protection is required, a magnetic circuit breaker is specified.

What Makes a Magnetic Breaker Trip

The most common magnetic circuit breaker configuration is called "Series Trip". It consists of a current sensing coil connected in series with a set of contacts. (Fig. 1)

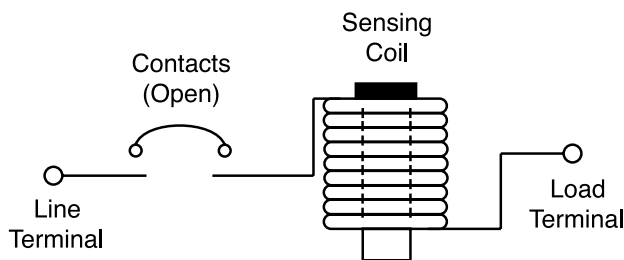


Figure 1

Inside the coil is a non-magnetic delay tube, housing a spring-biased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is developed by the coil. When the contacts are closed, current flow begins. (Fig. 2)

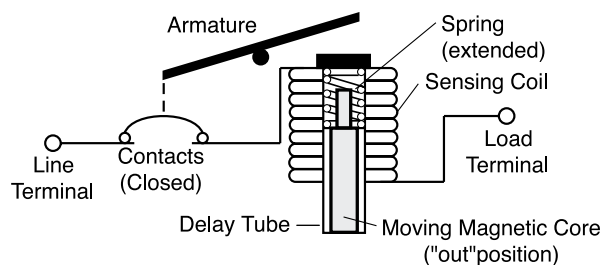


Figure 2 - Rated Current or Less

As the normal operating or "rated" current flows through the sensing coil, a magnetic field is created around that coil. When the current flow increases, the strength of the magnetic field increases, drawing the spring-biased, movable, magnetic core toward the pole piece. As the core moves inward, the efficiency of the magnetic circuit is increased, creating an even greater electro-magnetic force. When the core is fully "in", maximum electro-magnetic force is attained, the armature is attracted to the pole piece, unlatching a trip mechanism, thereby opening the contacts. (Fig. 3)

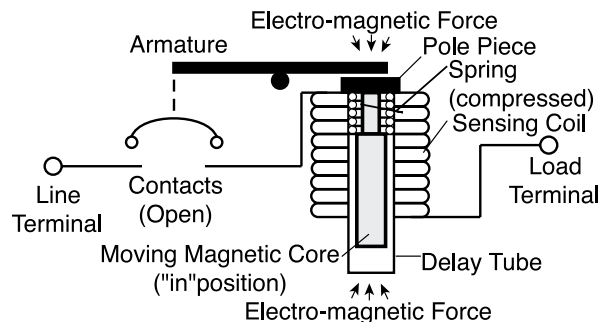


Figure 3 - Moderate Overload with Induced Delay

Under short circuit conditions, the resultant increase in electromagnetic energy is so rapid, that the armature is attracted without core movement, allowing the breaker to trip without an induced delay. This is called "instantaneous trip". It is a safety feature which results in a very fast trip response when most needed. (Fig. 4)

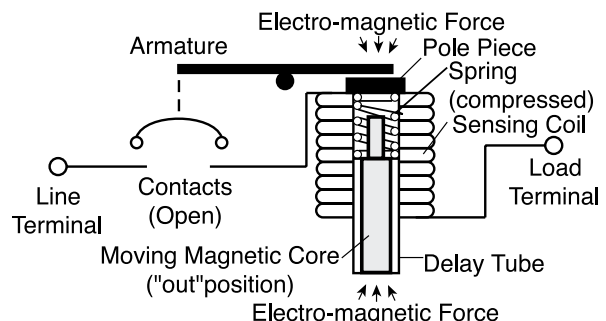


Figure 4 - Short Circuit Condition - No Induced Delay

How Various Time Delays are Obtained

Generally speaking, the trip time of a time delay magnetic circuit breaker is directly related to the length of time it takes for the moving metal core to move to the fully “in” position. If the delay tube is filled with air, the core will move rather quickly, and the breaker will trip quickly. This is characteristic of the Ultrashort Delay Curves #11 and #21. Solid state devices, which cannot tolerate even short periods of current overload, should use Instantaneous Curves #10, #20 and #30. These curves have no intentional time delay.

When the delay tube is filled with a light viscosity (temperature stable) fluid, the core’s travel to the full “in” position will be intentionally delayed. This results in the slightly longer Medium Delays #14, 24, 34 and 44, which are used for general purpose applications.

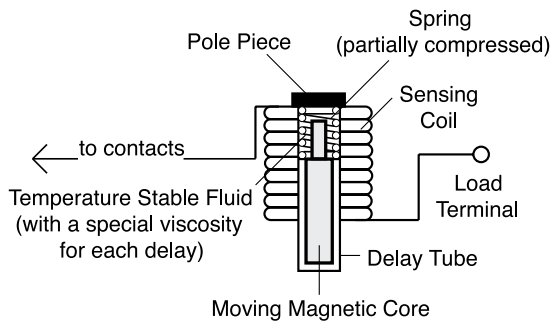


Figure 5 - Rated Current or Less

When a heavy viscosity fluid is used, the result will be a very long delay, such as Delay Curve #16, #26, #36 or #46. These curves are commonly used in motor applications to minimize the potential for nuisance tripping during lengthy motor start-ups.

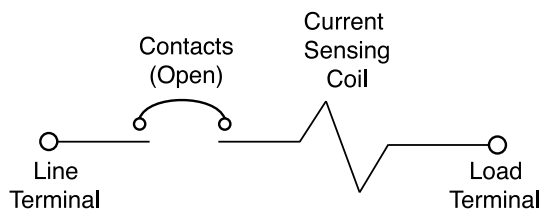
By use of magnetic “shunt” plates within the magnetic circuit, it is possible to divert magnetic flux resulting in higher “inrush withstanding capability” (or high inrush delays). These delays disregard short duration, high pulse surges (typically 8ms or less and up to 25x rated current), characteristic of transformers, switching power supplies and capacitive loads. Delay Curves #42, #44, and #46, are available for these applications.

Hydraulic delay protectors have the added advantage of tripping slightly sooner when operating in higher temperature conditions and slightly longer when cold. This characteristic mirrors the protection needs in most applications. Note that the current required to trip the breaker does not change, just the time delay for tripping.

Available Circuit Options

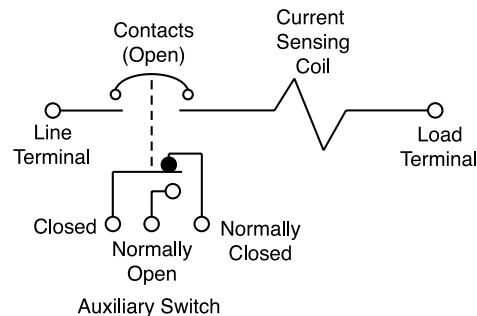
Series Trip

Inside the coil is a non-magnetic delay tube, housing a springbiased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is developed by the coil. When the contacts are closed, current flow begins. (Fig. 2)



Series Trip with Auxiliary Switch

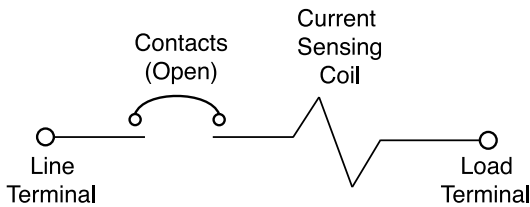
Inside the coil is a non-magnetic delay tube, housing a springbiased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is developed by the coil. When the contacts are closed, current flow begins. (Fig. 2)



Series Mid-Trip with Auxiliary / Alarm Switch

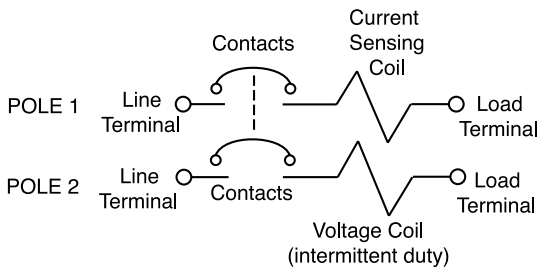
Similar to “Series Trip with Auxiliary Switch” except the S.P.D.T. auxiliary switch is actuated only upon electrical trip of the breaker. Upon electrical trip, the “N.O.” contact closes and the “N.C.” contact opens. This can be used to remotely signal the “TRIPPED” status of the breaker. Also, upon electrical trip, the handle moves to the “MID” position as opposed to the “full OFF” position typical of other breakers. This gives a specific visual panel indication of a “TRIPPED” breaker as compared to one which is merely turned OFF.

Series Mid-Trip is also available without Auxiliary/ Alarm Switch.



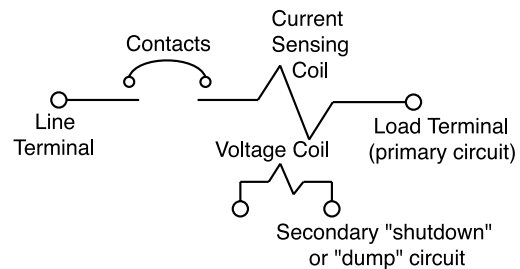
Series Trip with Remote Shutdown

(For “dump” circuit or “panic” circuit applications). Same as a Series Trip but with an additional (self-interrupting) “voltage coil” pole (usually of opposite polarity) for remote shutdown. In the example, a momentary voltage pulse to Pole 2 will shut down both Pole 1 and Pole 2. Because the voltage coil in Pole 2 is self-interrupting, no additional components, such as auxiliary switches, etc., are required in that circuit. Approximately 4 watts minimum is required to activate the voltage coil pole. This extra pole configuration is usually required by World Approval Agencies. Consult factory for this circuit.

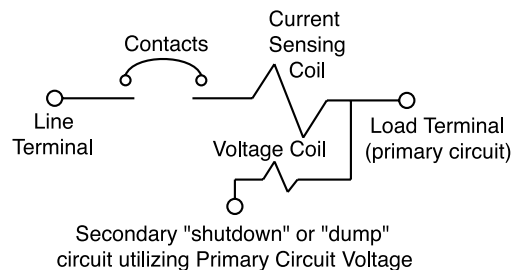


Dual Coil with Remote Shutdown

Similar to “Series Trip with Remote Shutdown” except an extra pole is NOT required. A Dual Coil breaker has two coils in the space normally occupied by a single coil. A current coil is used for overload protection and the instant trip voltage coil can be used for remote shutdown. Approximately 30 watts minimum is required to activate this type of voltage coil. Two Dual Coil options are available. The most common is the “Relay Trip Dual Coil”, a four terminal device in which the voltage coil circuit is electrically isolated from the current coil circuit. This allows the triggering of the voltage coil from an independent voltage source separate from line voltage. As such, a DC pulse to the voltage coil can be used to shutdown a primary high energy AC circuit. However, because voltage coils are rated for intermittent duty, provisions must be made to disconnect the power source from the voltage coil after tripping.



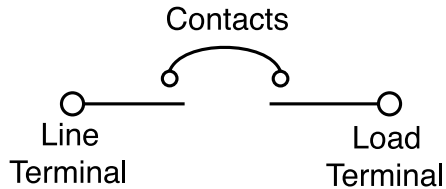
The other circuit option is the “Shunt Trip Dual Coil”, a three terminal device with one side of the voltage coil internally connected to the primary circuit. The other side of the voltage coil is connected to an external third terminal on the bottom of the breaker. This circuit option uses line voltage for dual coil activation, saving wiring costs and resulting in a self-protecting voltage coil.



Care must be taken to avoid mis-wiring of the primary and secondary (voltage coil) circuits. Mis-wiring could lead to damage to the voltage coil and/ or its power source.

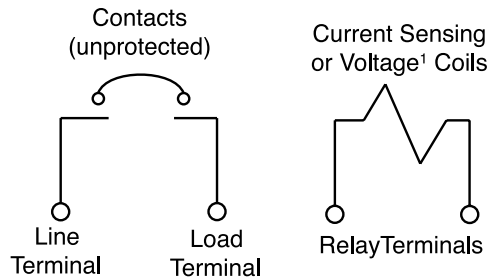
Switch Only

Same as a Series Trip, but without a sensing coil. Provides low cost, heavy-duty switch capability when overload protection is not needed. "Switch Only" is available with and without an auxiliary switch.



Relay Trip

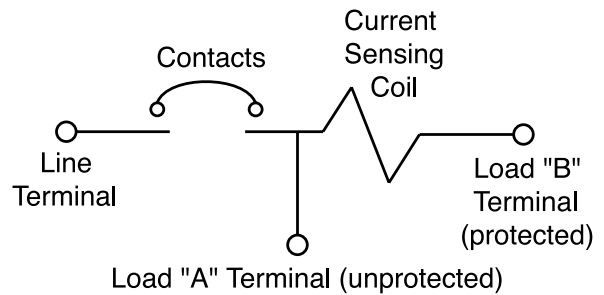
A four terminal device in which the contact and coil circuits are electrically isolated but mechanically linked. An overload in the coil circuit will cause the contact circuit to open. These circuits may be of opposite polarity. Commonly used in dump circuit, panic circuit, and remote shutdown applications. (Note: World Approval Agencies may require a more electrically isolated voltage coil pole for this function - Ref. "Series Trip with Remote Shutdown" circuit option.)



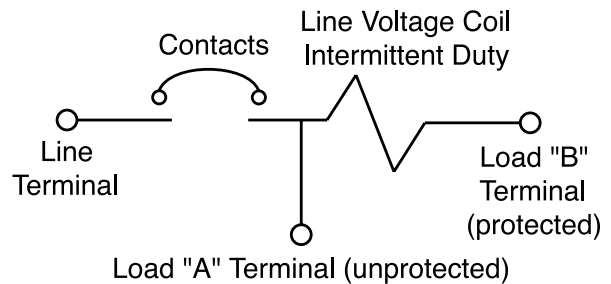
1. Voltage coils rated for intermittent duty only, and must be disconnected after being pulsed.

Shunt Trip

A three terminal device similar to "Series Trip", but with the addition of a third terminal between the contacts and the coil. This circuit is usually used to control two separate loads (A&B) from the same power source, while sensing overload current in only one load (B). It should be noted that overload protection is not provided in the load (A) circuit, and if needed, must be provided by other means. Also, the sum of the current in circuit A & B must not exceed the contact rating of the device.



Another application possibility occurs when a voltage coil (rated for line voltage) is used. Here the load (B) terminal is connected in series with a N.O. push-button switch or similar control device. With this, a line voltage pulse through the coil can be used as a means of remotely opening the load (A) circuit. The voltage coil is self-interrupting, no additional components, such as auxiliary switches, etc., are needed in the load (B) circuit.



Most countries have regulatory agencies that determine the safety and performance standards required for products used in that country. Carling Technologies' circuit breakers are tested and have been certified by the most widely recognized of these agencies including Underwriters Laboratories (UL) in the United States; Canadian Standards Association (CSA) in Canada; TUV Rheinland/Berlin-Brandenburg (TUV) and Verband Deutscher Elektrotechniker (VDE) in Germany.

UL Recognized / UL1077 Recognized

UL Recognition covers components, which are incomplete or restricted in performance capabilities. These components will later be used in complete end products or systems Listed by UL. These Recognized components are not intended for separate installation in the field, they are intended for use as components of complete equipment submitted for investigation to UL.

Carling Technologies offers circuit breakers which are classified as supplementary circuit protectors and are Recognized under the UL Components Recognition Program as Protectors, Supplementary, UL Standard 1077. A UL 1077 Recognized supplementary circuit protector must have a Listed overcurrent device as a "back up". Carling's M, Q, A, B, C, D and E circuit breakers offer UL 1077 Recognition.

UL Listed / UL 489 Listed

UL Listing indicates that samples of the circuit breaker as a complete product have been tested by UL to nationally recognized safety standards and have been found to be free from reasonably foreseeable risks of fire, electric shock and related hazards, and that the product was manufactured under UL's Follow-Up Services program.

Carling Technologies offers branch circuit breakers that are UL 489 Listed. Branch circuit breakers are classified as a final overcurrent device dedicated to protecting the branch circuit and outlet(s). They do not require an additional "back up" overcurrent device wired in series to protect a circuit. Carling's C, E and F-Series circuit breakers offer UL489 Listing. In addition, they are UL489A Listed for the Telecom industry.

UL1500 (MARINE)

UL1500 refers to products and components classified as ignitionprotected, and are intended to be installed and used in accordance with applicable requirements to the U.S. Coast Guard, the Fire Protection Standard for Pleasure and Commercial Motor Craft, ANSI/NFPA No. 302, and the American Boat and Yacht Council, Incorporated. Specially constructed versions of Carling Technologies' A, B and C-Series circuit breakers meet this standard.

CSA

The CSA (Canadian Standards Association) is the closest in concept and nature to UL of any group outside of the United States. Their standards and requirements are often almost identical to corresponding UL standards. CSA publishes their standards for most circuit protection devices as separate sections of CSA Standard C22.2 that in turn, forms a part of the Canadian Electrical Code. All of Carling Technologies' circuit protection products meet the applicable requirements of CSA Standard C22.2.

CUL

A CUL mark on a product means that samples of the product have been evaluated to the applicable Canadian standards and codes by Underwriters Laboratories, Inc.

VDE and TUV

There are two German government approved independent agencies, VDE (Verband Deutscher Elektrotechniker), and TUV (Technischer Überwachungs-Verein). In the circuit protection field, outside of the U.S.A. and Canada, VDE is the best known certification mark. VDE testing facilities are located in Germany.

TUV also performs testing and grants certification in accordance to the IEC/EN specifications. TUV's organization is made up of at least eleven geographically dispersed companies. At least two are located in the United States. This aids some U.S. manufacturers in getting "fast track" approval to IEC/EN specifications. Carling's M, H, A, B, C, D, L, E, and F-Series breakers have been certified to meet EN60934 by VDE and TUV labs.

CE MARKING

The European Union's (EU) approach to create single market access is based on four principles: harmonized directives, harmonized standards, harmonized conformity assessment procedures and CE marking. The CE marking is affixed to products indicating that the product conforms to relevant directives and standards. Various directives and standards contain the requirements for CE marking. The CE marking is primarily for market control by custom inspectors.

Before a manufacturer can affix the CE marking to their product they must complete the following steps:

1. Identify the applicable EU directive/standard
2. Perform the conformity assessment according to the applicable EU directive/standard
3. Establish a Technical File containing test reports, documentation, certificates, etc.
4. Prepare and sign a EU Declaration of Conformity

Many of Carling Technologies' circuit protection products are available with CE marking indicating conformance to Low Voltage Directive 73/23/EEC.

Warranty Policy

Carling Technologies, Inc. (Seller) warrants that goods sold hereunder shall be free of defects in material and workmanship for two years from date of shipment. In the event of such defects, the Seller's only obligation shall be the replacement or the cost of the defective goods, themselves, excluding, without limitation, labor costs, which are or may be required in connection with the replacement or reinstallation of the goods. This warranty is the Seller's sole obligation and excludes all other remedies or warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, whether or not purposes or specifications are described herein. This Warranty expressly excludes any and all incidental, special and/or consequential damages of any nature. Seller further disclaims any responsibility for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident; or misapplied, or modified or repaired by a person or persons not authorized by the Seller or which have been improperly installed.

M-Series

CIRCUIT BREAKER

The M-Series is a low cost, miniature, hydraulic-magnetic circuit breaker which features a compact, space saving design, front panel snap-in mounting and a vertically mounted parallel pole configuration. It features various styling options to maximize your design flexibility. Choices include rocker, illuminated rocker, paddle and baton style handle actuators, push-to-reset and push-pull pushbutton actuators, as well as Visi-Rocker two color actuators. Our exclusive Rockerguard bezel helps prevent inadvertent actuation and a wiping contact mechanism assures long-term reliability.

The M-Series circuit breakers are available with 1, 2 or parallel poles, 0.02 to 50 amp ratings, and 125 and 250VAC or 80VDC versions. With over 16 different time delays, 5 terminal styles, a variety of panel hardware, various colors, and legend imprinting, it assures suitability for most any application design.



Resources:

[Download 3D CAD Files](#)

[IGS >](#)

[STP >](#)

Product Highlights:

- Parallel pole configuration fits in one rack unit
- MIL-PRF-55629
- MIL STD 202 compliant
- MIL-PRF-39019F ingress protection
- Sealed toggle actuator
- Compact design

Typical Applications:

- Telecom/Datacom
- Transportation
- Marine
- Generators
- Power Supplies
- Medical Equipment

Electrical

Maximum Voltage 125/250 VAC 50/60 Hz, 80 VDC (See Rating Tables.)

Current Ratings Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00 thru 15.0 in 1 amp increments, 18.0, 20.0, 25.0, 30.0. Other ratings available - see Ordering Scheme.

Auxiliary Switch Rating SPDT; 7A 250VAC, 7A (Res) 28VDC, 4A (Ind.) 28VDC, 0.25A 80VDC (Res) (silver contacts), 0.1A 125VAC (gold contacts).

Insulation Resistance Minimum of 100 Megohms at 500 VDC.

Dielectric Strength UL, CSA 1500V, 50/60 Hz for one minute between all electrically isolated terminals. M-Series Circuit Breakers comply with the 8mm spacing and 3750 V 50/60Hz dielectric requirements from hazardous voltage to operator accessible surfaces, per Publications IEC 380, 435, 950, EN 60950 and VDE 0805.

Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute with rated Current and Voltage.

Trip Free All M-Series Circuit Breakers will trip on overload, even when actuator is forcibly held in the ON position.

Trip Indication The actuator moves positively to the OFF position when an overload causes the circuit breaker to trip.

Physical

Number of Poles 1 or 2

Internal Circuit Configs. Series with or without Auxiliary Switch. Switch Only with or without Auxiliary Switch.

Weight Approximately 30 grams/pole (Approximately 1.07 ounces/pole)

Standard Colors See Ordering Scheme

Environmental

Designed in accordance with requirements of specification MIL PRF-55629 & MIL-STD-202G as follows:

Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Cond. I. Instantaneous curves tested at 80% of rated current.

Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous curves tested at 80% of rated current.

Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.

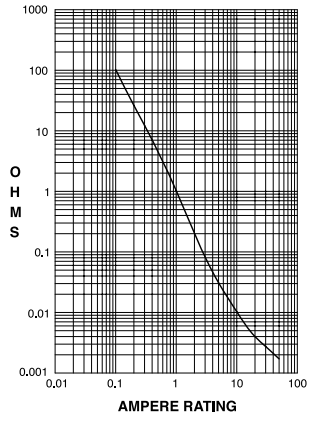
Salt Spray Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).

Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).

Operating Temperature -40° C to +85° C

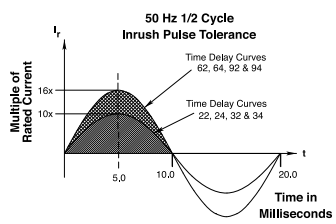
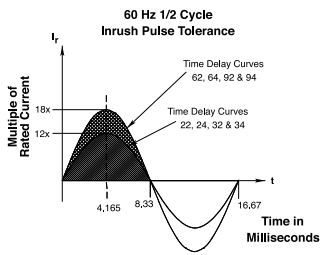
Chemical Resistance Only the outside surfaces of the case and the handles may be cleaned with detergents or alcohol. Organic (hydrocarbon based) solvents are not recommended because they attack plastics. Caution should be taken when solvents are used to clean and remove flux from terminals. Lubricants should not be introduced into the handle/bushing openings

RESISTANCE PER POLE VALUES from Line to Load Terminals (Values Based on Series Trip Circuit Breaker)



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 20.0	± 25
20.1 - 50.0	± 35

Pulse Tolerance Curves



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

Electrical Tables

Table A: Lists UL Recognized and CSA Accepted configurations & performance capabilities as a Component Supplementary Protector.

M-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
Circuit Configuration	Voltage			Current Rating		Poles Breaking	Short Circuit Capacity (Amps)		Application Codes	
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps		UL / CSA		UL	CSA
							With Backup Fuse	Without Backup Fuse		
Series	32	DC	---	0.02 - 15	---	1	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 25	1	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
	50 ²	DC	---	0.02 - 7.5	---	1	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	2	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	65	DC	---	---	15.1 - 25	2	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	1	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	65 ^{1,2}	DC	---	---	15.1 - 30	1	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	2	5000 ³	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1
	65	DC	---	---	15.1 - 25	2	5000 ³	---	TC1, 2, OL0, C1	TC1, 2, OL0, C1
				0.02 - 15	---	1	---	600	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	80 ¹	DC	---	---	15.1 - 30	1	---	600	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	1	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	125	50 / 60	1	0.02 - 15	---	1	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 30	1	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				1 - 30	---	1	---	360	TC1, OL1, U2	TC3, OL1, U3
250 ²	50 / 60	1	0.02 - 12	---	1	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
250	50 / 60	1	---	12.1 - 18	1	1000 ⁴	---	TC1, 2, OL0, C1	TC1, 2, OL0, C1	
250	50 / 60	1	0.02 - 15	---	2	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
			---	15.1 - 30	2	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1	
			1 - 30	---	2	---	360	TC1, OL1, U2	TC3, OL1, U3	

- Notes:
 1 Polarity Sensitive
 2 Available only with Special Catalog Number. Consult Factory.
 3 Requires Branch Circuit Backup with a UL Listed type K-5 or RK-5 fuse rated 30 Amps maximum
 4 Requires Branch Circuit Backup with a UL Listed type K-5 or RK-5 fuse rated 60 Amps maximum

Table B: Lists UL Recognized, CSA Accepted and TUV and VDE Certified configurations and performance capabilities as a Component Supplementary Protector.

M-SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS												
Circuit Configuration	Voltage			Current Rating		Poles Breaking	Short Circuit Capacity (Amps)				Application Codes	
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps		UL / CSA		VDE / TUV		UL	CSA
							With Backup Fuse	Without Backup Fuse	With Backup Fuse	Without Backup Fuse		
Series	32	DC	---	0.02 - 15	---	1	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 25	1	---	1000	3000	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
	50 ²	DC	---	0.02 - 7.5	---	1	---	1000	3000	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	2	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	65	DC	---	---	15.1 - 25	2	---	1000	3000	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	2	5000	---	3000	500	TC1, 2, OL1, C1	TC1, 2, OL1, C1
	65 ³	DC	---	---	15.1 - 30	2	5000	---	3000	500	TC1, 2, OL0, C1	TC1, 2, OL0, C1
				0.02 - 15	---	1	---	600 ⁴	---	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	80 ¹	DC	---	---	15.1 - 30	1	---	600 ⁴	---	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				0.02 - 15	---	1	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	125	50 / 60	1	0.02 - 15	---	1	---	360	3000	500	TC1, OL1, U2	TC3, OL1, U3
				1 - 15	---	1	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
	250	50 / 60	1	0.02 - 12	---	1	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				0.02 - 20	---	2	---	1000	3000	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
				1 - 12	---	1	---	360	3000	500	TC1, OL1, U2	TC3, OL1, U3

- Notes:
 1 Polarity Sensitive
 2 Available only with Special Catalog Number. Consult Factory.
 3 Requires Branch Circuit Backup with a UL Listed type K-5 or RK-5 fuse rated 30 Amps maximum
 4 TUV only, not VDE
 5 Requires backup protection with a thermal magnetic circuit breaker rated 32 amps and having a Type C trip characteristic per EN60898/DIN VDE 0641 (C32A) for ratings greater than 15amps, and a thermal magnetic circuit breaker rated 16 amps and having a Type C trip characteristic per EN60898/DIN VDE 0641 (C16A) for ratings 15 amps and less

Electrical Tables

Table C: Lists UL489A Listed and TUV Certified configurations and performance capabilities for use in Communications Equipment.

M-SERIES TABLE C: UL489A Listed (Communications Equipment - Polarity Sensitive)						
Circuit Configuration	Voltage		Current Rating General Purpose Amps	Poles Breaking	Interrupting Capacity (Amps)	
	Max Rating	Frequency			Without Backup Fuse	
					UL489A	TUV
Series	80	DC	0.02 - 30	1	600	---
	65 ¹	DC	0.02 - 30	1	1000	---
	80	DC	0.10 - 30	1	600	600

Notes:
1. Available only with Special Catalog Number

Table D: Lists UL489A Listed configurations and performance capabilities for use in Communications Equipment.

M-SERIES TABLE D: Parallel Pole Construction UL489A Listed (Communications Equipment - Polarity Sensitive)						
Circuit Configuration	Voltage		Current Rating General Purpose Amps	Poles Breaking	Interrupting Capacity (Amps)	
	Max Rating	Frequency			Without Backup Fuse	
					UL489A	
Series	80	DC	31 - 50	2	600	
	65 ¹	DC	31 - 50	2	1000	

Notes:
1. Available only with Special Catalog Number

Agency Certifications

UL Recognized

UL Standard 1077



Component Recognition Program as Protectors, Supplementary (Guide CCN/QVNU2, File E75596)

CSA Accepted



Component Supplementary Protector (Class 3215 30, File 047848 0 000) CSA Standard C22.2 No. 235

UL Listed

UL Standard 489A



Communications Equipment (Guide CCN/DITT, File E189195)

VDE Certified



EN60934, VDE 0642 under File 10537

TUV Certified



EN60934, under License No. R9671109



1 SERIES
M

2 ACTUATOR

Single Color	Two Color Visi	Single Color Translucent
A Angled	D Indicate ON	F Angled
B Flat	E Indicate OFF	G Flat

STYLE	INDICATE - "ON" (CODE-D)	INDICATE - "OFF" (CODE-E)	FLAT (CODES-B & G)	ANGLED (CODES-A & F)
VERTICAL				
HORIZONTAL				

3 POLES
2 Two

4 CIRCUIT/AUXILIARY SWITCH ²

P Series Trip Current (Parallel Pole)
with Auxiliary Switch, Silver Contacts

Q Series Trip Current (Parallel Pole) .110 x 0.20 Q.C
with Auxiliary Switch, Gold Contacts

R Series Trip Current (Parallel Pole) .110 x 0.20 Q.C

5 FREQUENCY & TIME DELAY

D2 DC Short

D4 DC Medium

6 CURRENT RATING (AMPERES)

CODE	AMPERES
631	31.000
635	35.000
640	40.000
645	45.000
650	50.000

7 TERMINAL

A Push in Stud

5 10-32 Screw (Bus Type)

8 ILLUMINATION

Non-Illuminated

A Non-Illuminated

9 ACTUATOR COLOR & LEGEND

	Actuator Visi ¹	Legend
1	White	Black
2	Black	White
3	Red	White
4	Green	White
5	Blue	White
6	Yellow	Black
7	Gray	Black
8	Orange	Black

10 LEGEND

2 ON - OFF Vertical

3 ON - OFF Horizontal

6 Dual Vertical

7 Dual Horizontal

11 BEZEL COLOR

A White without Rockerguard

B Black without Rockerguard

G Gray without Rockerguard

1 White with Rockerguard

2 Black with Rockerguard

7 Gray with Rockerguard

12 AGENCY APPROVAL

T UL 489A Listed

Notes:
1 Reminder of Rocker same color as Visi
2 Aux Switch only available with screw terminals



1 SERIES
M

2 ACTUATOR
M Paddle
T Push-Pull

3 POLES
2 Two

4 CIRCUIT/AUXILIARY SWITCH 1
P Series Trip Current (Parallel Pole)
with Auxiliary Switch, Silver Contacts
Q Series Trip Current (Parallel Pole) .110 x 0.20 Q.C.
with Auxiliary Switch, Gold Contacts
R Series Trip Current (Parallel Pole) .110 x 0.20 Q.C.

5 FREQUENCY & TIME DELAY
D2 DC Short
D4 DC Medium

6 CURRENT RATING (AMPERES)

CODE	AMPERES
631	31.000
635	35.000
640	40.000
645	45.000
650	50.000

7 TERMINAL
A Push in Stud
5 10-32 Screw (Bus Type)

8 ACTUATOR COLOR & LEGEND

Handle		Push Button	
1	White	A	White
2	Black	B	Black
3	Red	C	Red
4	Green	D	Green
5	Blue	E	Blue
6	Yellow	F	Yellow
7	Gray	G	Gray
8	Orange	H	Orange

9 FRONT PANEL HARDWARE
Handle
A No outer Panel Hardware
B Knurled Nut, Bright Nickel
C Knurled Nut, Bright Nickel with Locking Ring
D Knurled Nut, Black
E Knurled Nut, Black with Locking Ring
F Panel Dress, Bright Nickel
G Panel Dress, Bright Nickel with Locking Ring
H Panel Dress, Black
J Panel Dress, Black with Locking Ring
Push Button
1 No outer Panel Hardware
2 Knurled Nut, Bright Nickel

10 LEGEND PLATE / BUTTON MARKING
Handle Actuator Legend Plate
B ON - OFF Vertical
C ON - OFF Horizontal
Push-Pull Actuator Legend Plate
2 Rated Amps Horizontal
3 Rated Amps Line Side Down
4 Rated Amps Line Side Up

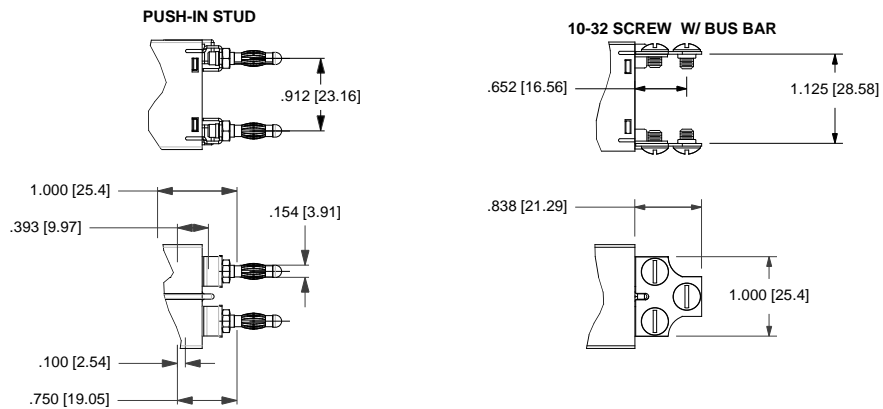
11 BUSHING COLOR
B Black

12 AGENCY APPROVAL
T UL 489A Listed

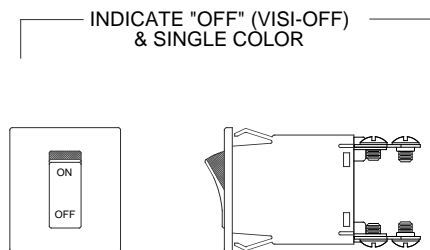
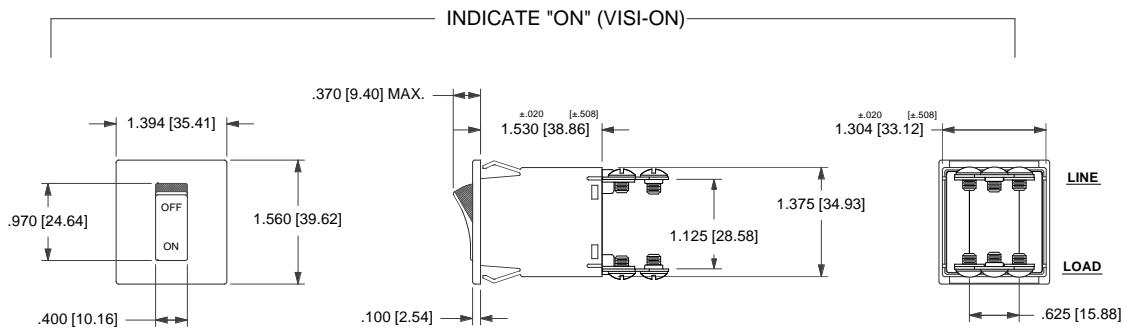
Notes:
1 Aux Switch only available with screw terminals

Dimensional Specifications: in. [mm]

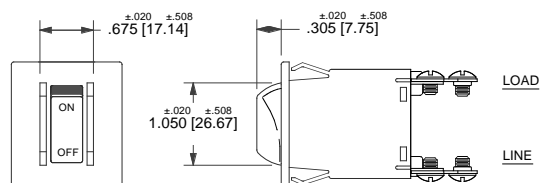
PARALLEL POLE TERMINAL OPTIONS



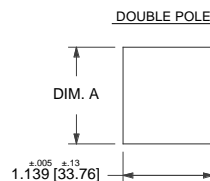
ROCKER ACTUATOR DETAIL



ROCKERGUARD CONFIGURATION



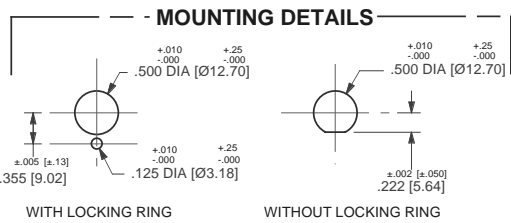
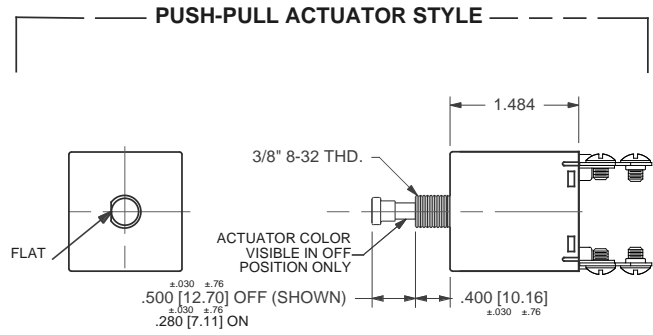
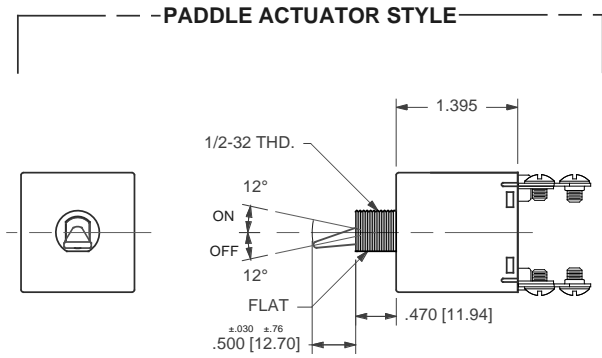
PANEL CUT - OUT DETAIL (ROCKER)



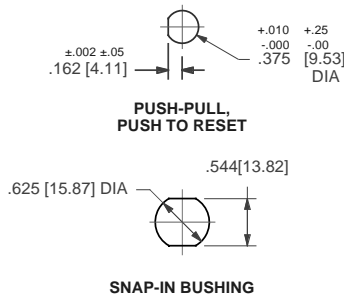
PANEL THICKNESS	DIM. A
.062 [1.57]	1.385 [35.18]
.093 [2.36]	1.420 [36.07]
.125 [3.18]	1.460 [37.08]

- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance ± 0.10 [2.5] unless otherwise specified.
 - Dimensions apply to both rocker styles.
 - I-o, on-off or dual legends available for vertical or horizontal mounting.
 - Notice that circuit breaker line and load terminal orientation on indicate "off" is opposite that of indicate "on".

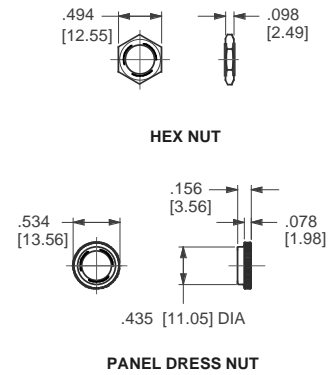
Dimensional Specifications: in. [mm]



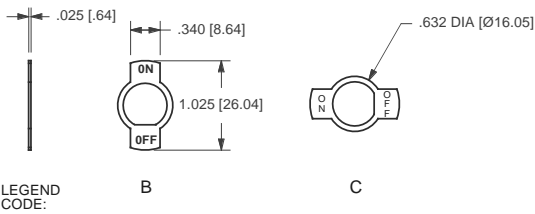
MOUNTING DETAILS



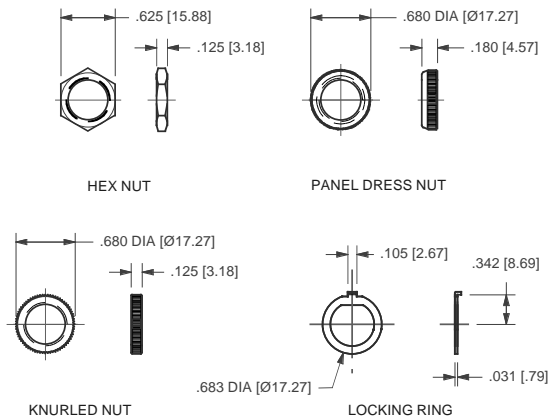
PANEL HARDWARE



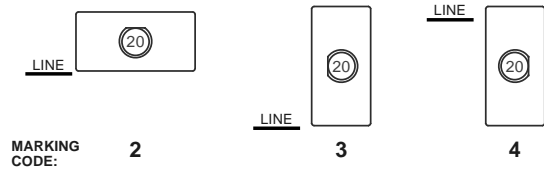
LEGEND PLATES



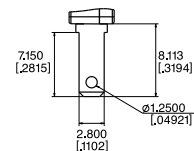
PANEL HARDWARE



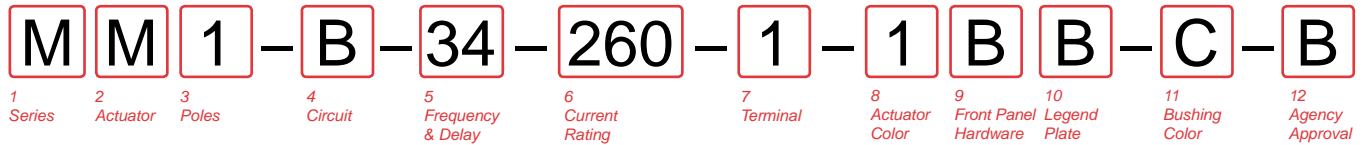
BUTTON MARKING ORIENTATION



.110QC AUXILIARY SWITCH TERMINALS



- Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±0.10 [2.5] unless otherwise specified.
3 Dimensions apply to both rocker styles.
4 I-o, on-off or dual legends available for vertical or horizontal mounting.
5 Notice that circuit breaker line and load terminal orientation on indicate "off" is opposite that of indicate "on".



1 SERIES
M

2 ACTUATOR 1

Handle
M Paddle

Push Button
T Push-Pull

Push Button with Snap-In Mounting
V Push-Pull

N Baton

U Push To Reset

W Push To Reset

3 POLES
1 One 2 Two

4 CIRCUIT 2
without Auxiliary Switch
A Switch Only (no coil), Maintained Contacts
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts
M Series Trip (Current) Aux Switch .110 QC x .020 QC
P 3,4 Switch Only, Maintained Contacts .060 Dia, Round Solder Turret
Q 3,4 Switch Only, Maintained Contacts .058 Dia, Round Q.C.
R 3,13 Switch Only, Maintained Contacts .080 Dia x .020 Flat Q.C.
S 3 Series Trip (Current) .060 Dia, Round Solder Turret
T 3,4 Series Trip (Current) .058 Dia, Round Q.C.
U 3,13 Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.

with Auxiliary Switch, Gold Contacts
2 3,4 Switch Only, Maintained Contacts .058 Dia, Round Q.C.
3 3,13 Switch Only, Maintained Contacts .080 Dia x .020 Flat Q.C.
4 3,4 Series Trip (Current) .058 Dia, Round Q.C.
5 3,13 Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.
9 Series Trip (Current) Aux Switch .110 QC x .020 QC

Terminal Type:
.110 QC x .020 QC
.060 Dia, Round Solder Turret
.058 Dia, Round Q.C.
.080 Dia x .020 Flat Q.C.

5 FREQUENCY & DELAY

03	DC 50/60Hz, Switch Only	32	DC, 50/60Hz Short
10	DC Instantaneous	34	DC, 50/60Hz Medium
12	DC Short	62	50/60Hz Short, Hi-Inrush
14	DC Medium	64	50/60Hz Medium, Hi-Inrush
20	50/60Hz Instantaneous	72	DC, Short, Hi-Inrush
22	50/60Hz Short	74	DC, Medium, Hi-Inrush
24	50/60Hz Medium	92	DC, 50/60Hz Short, Hi-Inrush
30	DC, 50/60Hz Instantaneous	94	DC, 50/60Hz Medium, Hi-Inrush

Voltage			Full Load Amp Rating		General Purpose Amps		Tungsten Lamp Rating		Poles Breaking
Max Rating	Frequency	Phase	Max Amps	Choose Current Coil Rating Code	Max Amps	Choose Current Coil Rating Code	Max Amps	Choose Current Coil Rating Code	
32	DC	-	15	615	25	625	-	-	1
50	DC	-	-	-	7.5	Consult Factory	-	-	1
65	DC	1	15	615	25	625	-	-	2
125	50/60Hz	1	15	615	25	625	15	615	1
250	50/60Hz	1	12	612	-	-	-	-	1
250	50/60Hz	1	15	615	25	625	-	-	2

- Notes:
- One actuator is located in the center of each multi-pole breaker. Actuator codes V & W limited to single pole breakers only.
 - Switch Only circuits are not available with Push-To-Reset actuators. For Switch Only circuits, select Current Coil Rating from the above chart.
 - One Auxiliary Switch is supplied per breaker. On two-pole breakers, standard Auxiliary Switch mounting is in pole one. Auxiliary Switch option limited to Series Trip and Switch Only circuits. Not available with back connect screw or push-in stud terminals.
 - Mates with AMP .058" diameter pin receptacles including 60983-1 (gold plated) and 60983-2 (tin plated).
 - Actuator color is only visible in the OFF position on Push-Pull actuators.
 - All units except snap-in mounting have one hex nut installed on bushing for use behind the panel.
 - Other colors available. Consult factory.
 - TUV and VDE Certification above 15 amps is for 2-pole only and is limited to a max. of 20 amps. Screw Terminal or Push-In Stud recommended above 20 amps.
 - 30 amp rating not available with delay's 30, 32, 34, 92 or 94.
 - Screw Terminals are VDE certified only with use of ring terminal attached to wire.
 - Terminal code A available with circuit codes A & B only.
 - Printed circuit board available with UL recognized approval only.
 - Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

6 CURRENT RATING (AMPERES) 8

CODE	AMPERES						
020	0.020	225	0.250	420	2.000	710	10.500
025	0.025	230	0.300	522	2.250	611	11.000
030	0.030	235	0.350	425	2.500	711	11.500
035	0.035	240	0.400	527	2.750	612	12.000
040	0.040	245	0.450	430	3.000	712	12.500
045	0.045	250	0.500	435	3.500	613	13.000
050	0.050	255	0.550	440	4.000	614	14.000
055	0.055	260	0.600	445	4.500	615	15.000
060	0.060	265	0.650	450	5.000	616	16.000
065	0.065	270	0.700	455	5.500	617	17.000
070	0.070	275	0.750	460	6.000	618	18.000
075	0.075	280	0.800	465	6.500	620	20.000
080	0.080	285	0.850	470	7.000	622	22.000
085	0.085	290	0.900	475	7.500	624	24.000
090	0.090	295	0.950	480	8.000	625	25.000
090	0.095	410	1.000	485	8.500	630	30.000
210	0.100	512	1.250	490	9.000		
215	0.150	415	1.500	495	9.500		
220	0.200	517	1.750	610	10.000		

7 TERMINAL 8

1	Push-On 0.250 Tab (Q.C.)	A 11	Push-In Stud
2 10	Screw 8-32 with Upturned Lugs	P 12	Printed Circuit Board
3 10	Screw 8-32 (Bus Type)		

8 ACTUATOR COLOR & LEGEND 5

Gloss Handle	Push-Button	Actuator Color
1	A	White
2	B	Black
3	C	Red
4	D	Green
5	E	Blue
6	F	Yellow
8	H	Orange

9 FRONT PANEL HARDWARE 6

	Handle	Push-Button
No outer Panel Hardware	A	1
Knurled Nut		
Bright nickel	B	2
Bright nickel with locking ring	C	
Black	D	
Black with locking ring	E	
Panel Dress Nut		
Bright nickel	F	
Bright nickel with locking ring	G	
Black	H	
Black with locking ring	J	

10 LEGEND PLATE / BUTTON MARKING

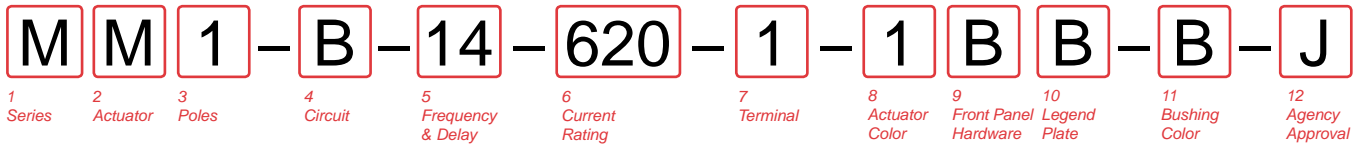
Handle Actuator Legend Plate (Actuator Styles M & N)
A No Legend Plate
B ON - OFF Vertical
C ON - OFF Horizontal
D I - O Vertical
E I - O Horizontal

Push-Pull Actuator Button Cap (Actuator Styles T & V)
1 No Marking
2 Rated Amps Horizontal
3 Rated Amps Line Side Down
4 Rated Amps Line Side Up

Push-to-Reset Actuator Button (Actuator Styles U & W)
1 No Marking



11 BUSHING COLOR 7
B Black

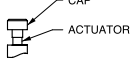

12 AGENCY APPROVAL 9
C UL Recognized & CSA Accepted
D VDE Certified, UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted





1 SERIES
M

2 ACTUATOR 1

Handle
M Paddle  N Baton 

Push Button
T Push-Pull  U⁸ Push To Reset 

Push Button with Snap-In Mounting
V Push-Pull  W⁸ Push To Reset 

3 POLES
1 One

4 CIRCUIT

without Auxiliary Switch
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts
M Series Trip (Current) Aux Switch
S³ Series Trip (Current)
T^{3,4} Series Trip (Current)
U^{3,13} Series Trip, Maintained Contacts

with Auxiliary Switch, Gold Contacts
4^{2,3} Series Trip (Current)
5^{3,12} Series Trip, Maintained Contacts
9 Series Trip (Current) Aux Switch

Terminal Type:
.110 QC x .020 QC
.060 Dia, Round Solder Turret
.058 Dia, Round Q.C.
.080 Dia x .020 Flat Q.C.

5 FREQUENCY & DELAY

10 DC Instantaneous	72 DC, Short, Hi-Inrush
12 DC Short	74 DC, Medium, Hi-Inrush
14 DC Medium	

6 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	425	2.500
035	0.035	240	0.400	527	2.750
040	0.040	245	0.450	430	3.000
045	0.045	250	0.500	435	3.500
050	0.050	255	0.550	440	4.000
055	0.055	260	0.600	445	4.500
060	0.060	265	0.650	450	5.000
065	0.065	270	0.700	455	5.500
070	0.070	275	0.750	460	6.000
075	0.075	280	0.800	465	6.500
080	0.080	285	0.850	470	7.000
085	0.085	290	0.900	475	7.500
090	0.090	295	0.950	480	8.000
090	0.095	410	1.000	485	8.500
210	0.100	512	1.250	490	9.000
215	0.150	415	1.500	495	9.500
220	0.200	517	1.750	610	10.000

7 TERMINAL 4

1 Push-On 0.250 Tab (Q.C.)	A ¹⁰ Push-In Stud
2 Screw 8-32 with Uptumed Lugs	P ¹¹ Printed Circuit Board
3 Screw 8-32 (Bus Type)	

8 ACTUATOR COLOR & LEGEND 5

Gloss Handle	Push-Button	Actuator Color
1	A	White
2	B	Black
3	C	Red
4	D	Green
5	E	Blue
6	F	Yellow
8	H	Orange

9 FRONT PANEL HARDWARE 6

	Handle	Push-Button
No outer Panel Hardware	A	1
Knurled Nut		
Bright nickel	B	2
Bright nickel with locking ring	C	
Black	D	
Black with locking ring	E	
Panel Dress Nut		
Bright nickel	F	
Bright nickel with locking ring	G	
Black	H	
Black with locking ring	J	

10 LEGEND PLATE / BUTTON MARKING

Handle Actuator Legend Plate (Actuator Styles M & N)

A No Legend Plate
B ON - OFF Vertical
C ON - OFF Horizontal
D I - O Vertical
E I - O Horizontal

Push-Pull Actuator Button Cap (Actuator Styles T & V)

1⁸ No Marking
2 Rated Amps Horizontal
3 Rated Amps Line Side Down
4 Rated Amps Line Side Up

Push-to-Reset Actuator Button (Actuator Styles U & W)

1⁸ No Marking

11 BUSHING COLOR 7

B Black

12 AGENCY APPROVAL 9

J UL489A Listed, TUV Certified
M UL Recognized, CSA Accepted
N UL Recognized, TUV Certified
T UL489A Listed

1 One actuator is located in the center of each multi-pole breaker. Actuator codes V & W limited to single pole breakers only.
2 One Auxiliary Switch is supplied per breaker. On two-pole breakers, standard Auxiliary Switch mounting is in pole one. Auxiliary Switch option limited to Series Trip and Switch Only circuits. Not available with Back Connected Screw or Push-in Stud terminals.
3 Mates with AMP .058" diameter pin receptacles including 60983-1 (gold plated) and 60983-3 (tin plated).
4 Screw terminals or Push-in Stud recommended above 20 amps.
5 Actuator color is only visible in the OFF position on Push-Pull actuators.
6 All units have one hex nut installed on bushing for use behind the panel.
7 Other colors available. Consult factory.
8 Not available with UL489A Listed breakers.
9 TUV certified to 25 amps. UL Recognized, CSA Accepted and UL Listed to 30 amps.
10 Terminal code A available with circuit codes A & B only.
11 Printed circuit board available with UL recognized approval only.
12 Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

Circuit & Terminal Diagrams: in. [mm]

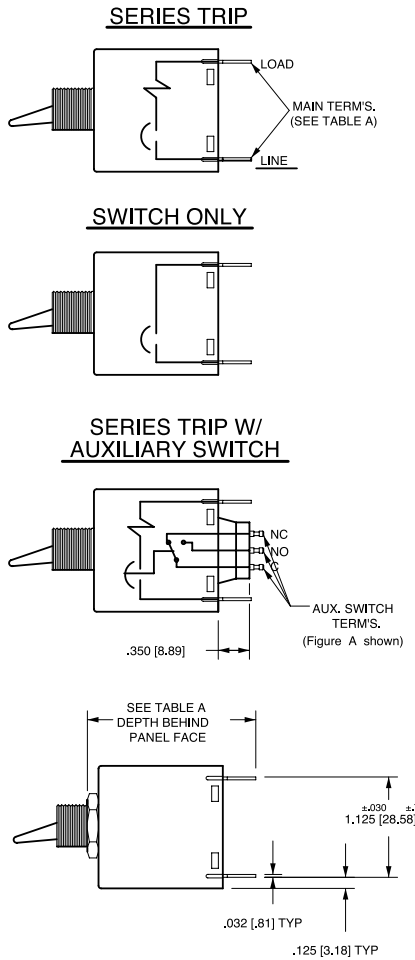


TABLE A		
	TERMINAL DESCRIPTION	DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C.)	1.890 [48.00]
	SCREW (#8-32)	1.930 [49.03]
	PUSH-IN STUD	2.520 [64.00]
AUX. **	DOUBLE SOLDER TURRET TYPE	2.035 [51.69]
	ROUND Q.C TYPE	2.025 [51.44]
	FLAT QUICK-CONNECT	2.129 [54.08]
	FLAT SOLDER LUG	2.012 [51.10]

*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS.

**WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN IN FIG. A

MULTI-POLE IDENTIFICATION SCHEME

SOLDER TURRET AND ROUND QC AUX SWITCH TERMINALS

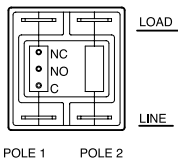


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCHTERMINALS

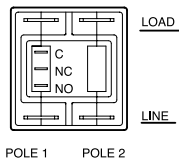
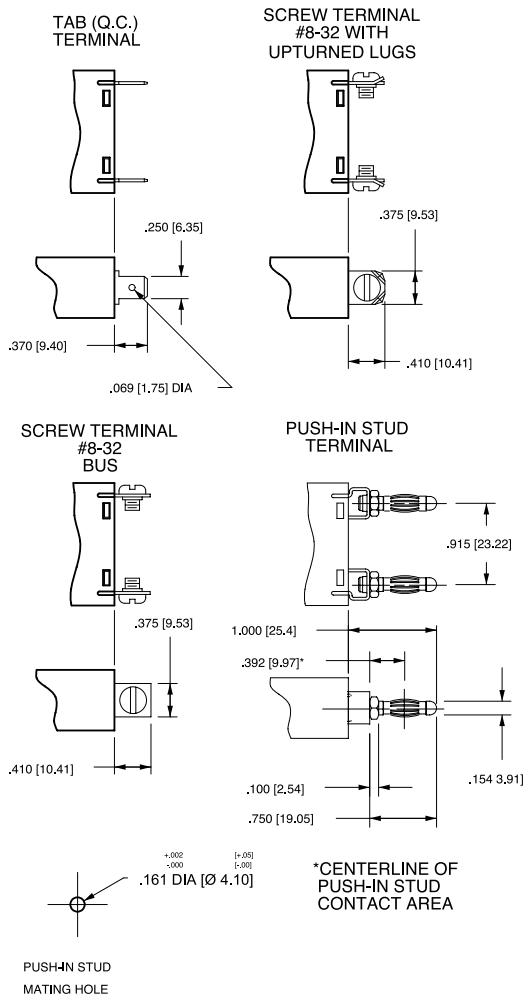
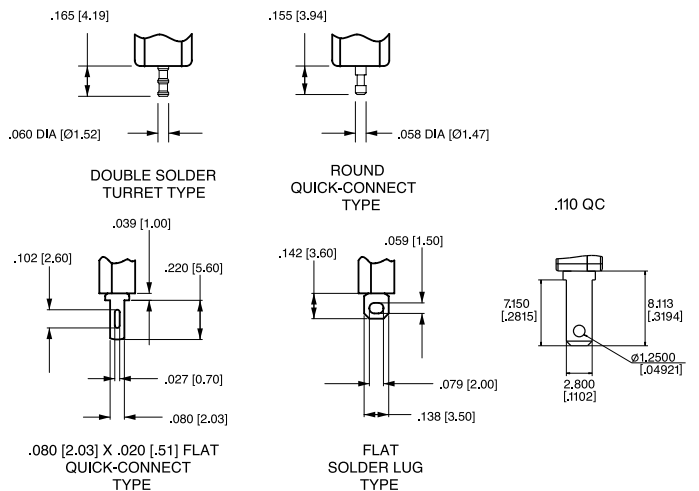


FIG. B

TERMINAL DIMENSIONAL DETAIL



AUXILIARY SWITCH TERMINALS



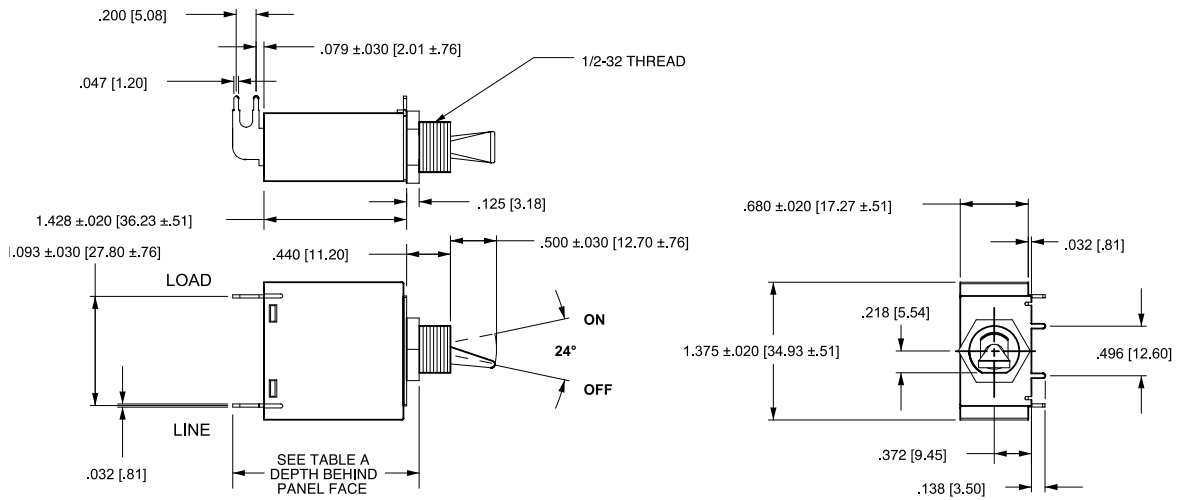
*AVAILABLE THROUGH SPECIAL CATALOG PART NUMBER

Notes:

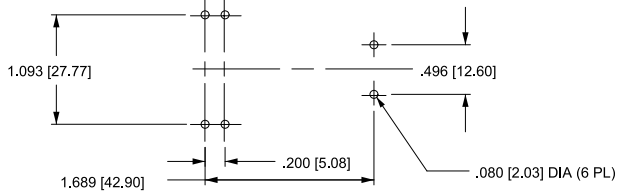
- All dimensions are in inches [millimeters].
- Tolerance ±.020 [.51] unless otherwise specified.

PC Terminal Diagrams: in. [mm]

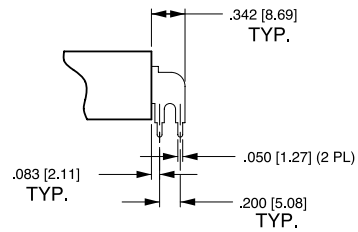
HANDLE TYPE SHOWN WITHOUT AUX. SWITCH



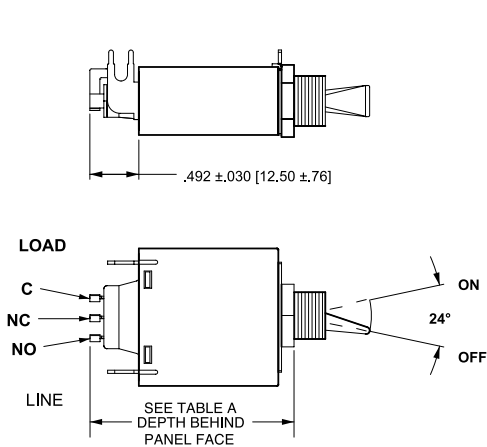
P.C. FOOTPRINT



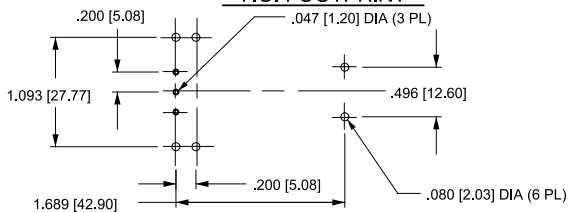
P.C. TERMINAL



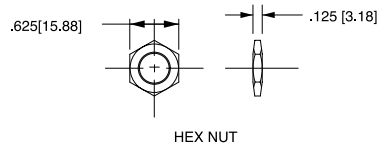
HANDLE TYPE SHOWN WITH AUX. SWITCH



P.C. FOOTPRINT



PANEL HARDWARE



HEX NUT

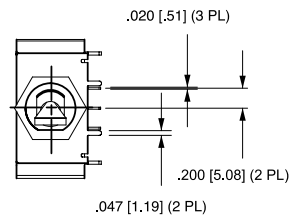


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	PRINTED CIRCUIT BOARD	1.957 [49.71]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.449 [62.20]

*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

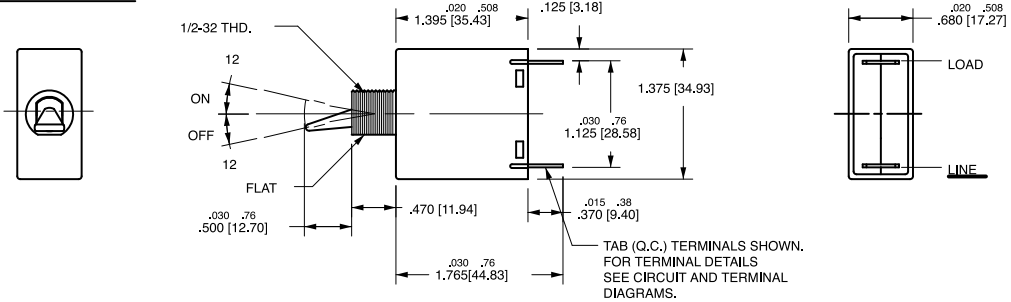
Notes:

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

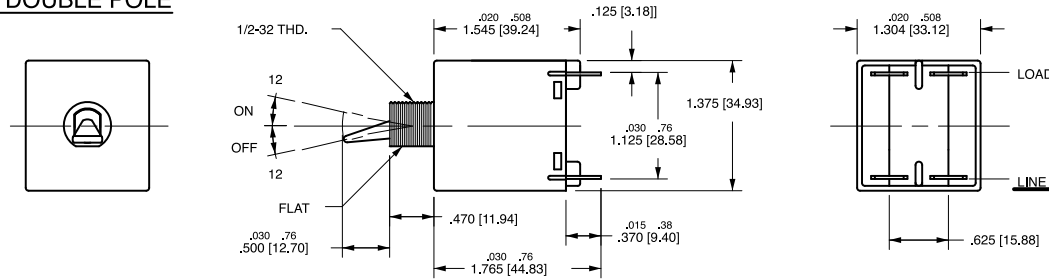
Dimensional Specifications: in. [mm]

PADDLE ACTUATOR STYLE

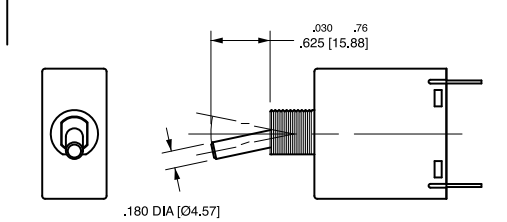
SINGLE POLE



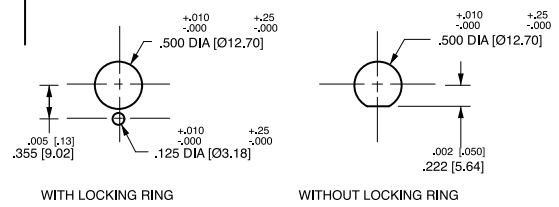
DOUBLE POLE



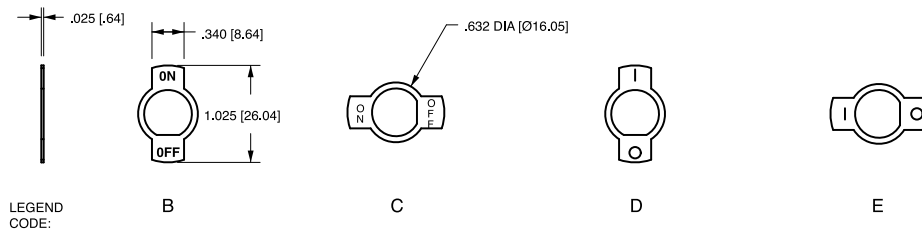
BATON ACTUATOR STYLE



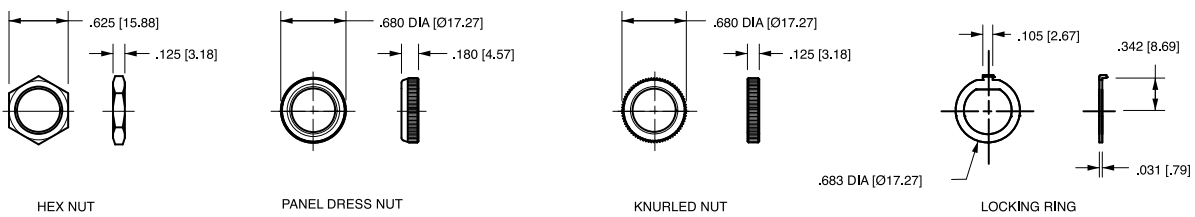
MOUNTING DETAILS



LEGEND PLATES



PANEL HARDWARE



Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

Circuit & Terminal Diagrams: in. [mm]

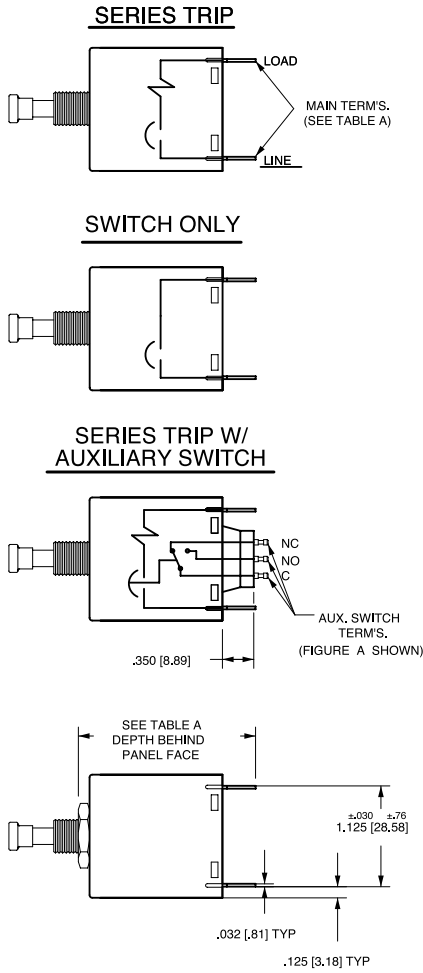


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C.)	1.952 [49.57]
	SCREW (#8-32)	1.992 [50.60]
	PUSH-IN STUD	2.582 [65.58]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.097 [53.26]
	ROUND Q.C. TYPE	2.087 [53.01]
	FLAT QUICK-CONNECT	2.191 [55.65]
	FLAT SOLDER LUG	2.074 [52.68]

*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS.

** WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN IN FIG. A

MULTI-POLE IDENTIFICATION SCHEME

SOLDER TURRET AND ROUND QC AUX SWITCH TERMINALS

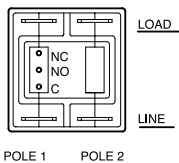


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCH TERMINALS

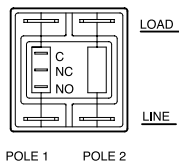
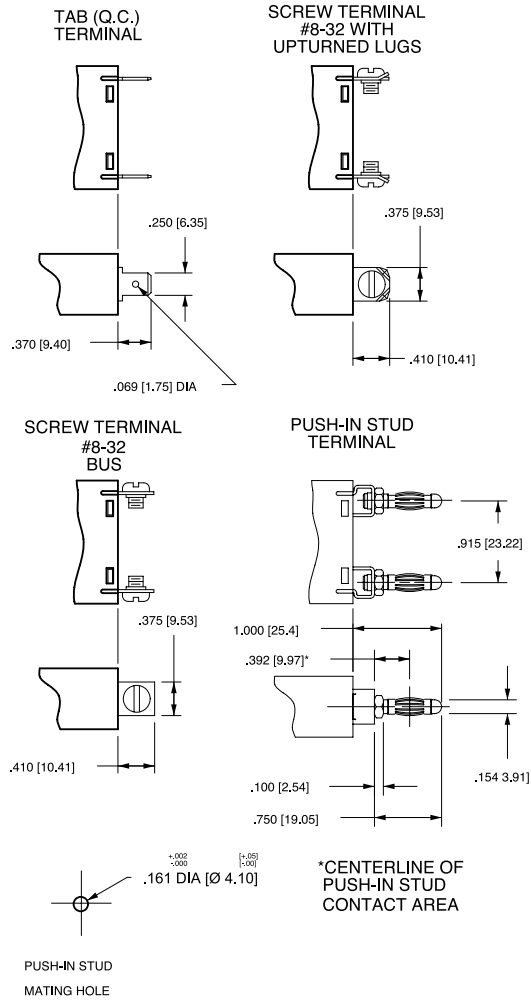


FIG. B

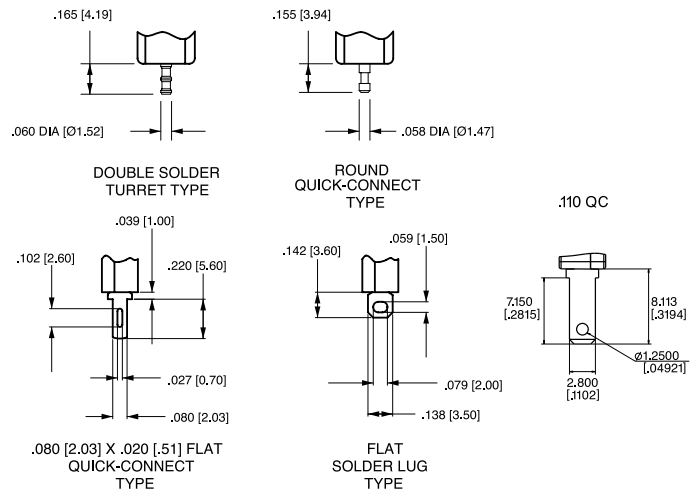
Notes:

- All dimensions are in inches [millimeters].
- Tolerance $\pm .020$ [.51] unless otherwise specified.

TERMINAL DIMENSIONAL DETAIL

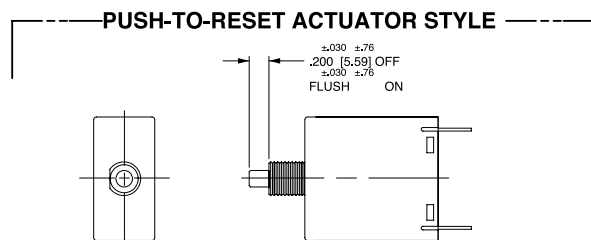
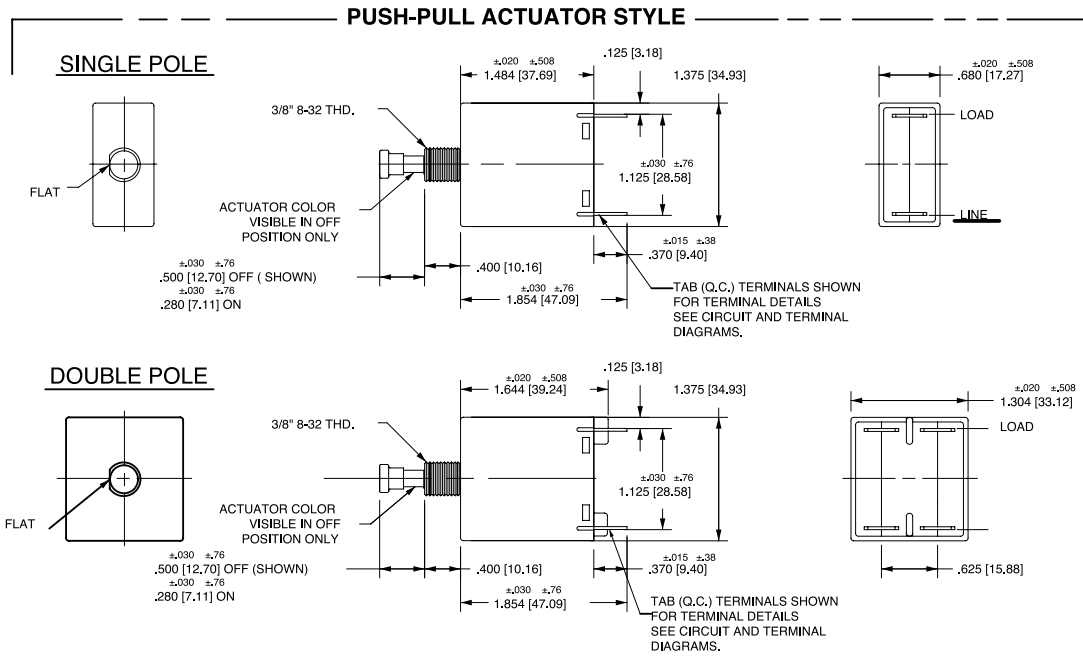


AUXILIARY SWITCH TERMINALS

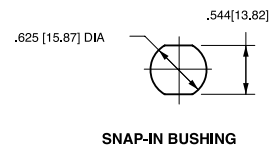
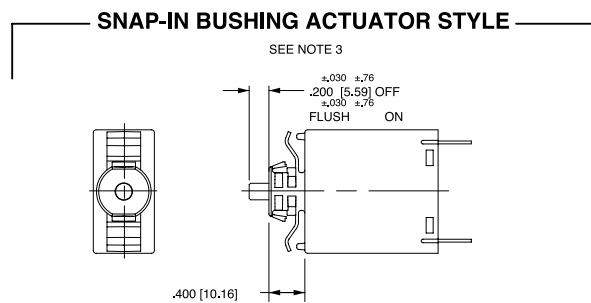
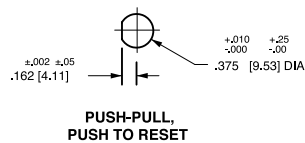


*AVAILABLE THROUGH SPECAL CATALOG PART NUMBER

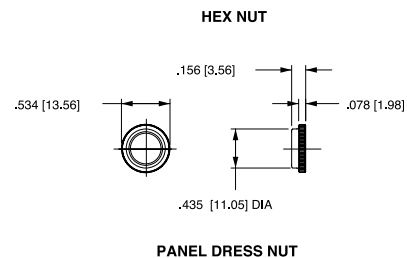
Dimensional Specifications: in. [mm]



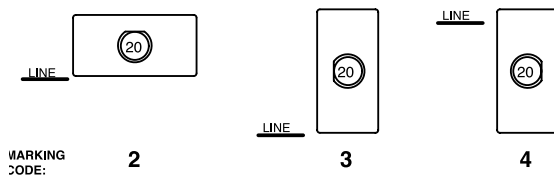
MOUNTING DETAILS



PANEL HARDWARE



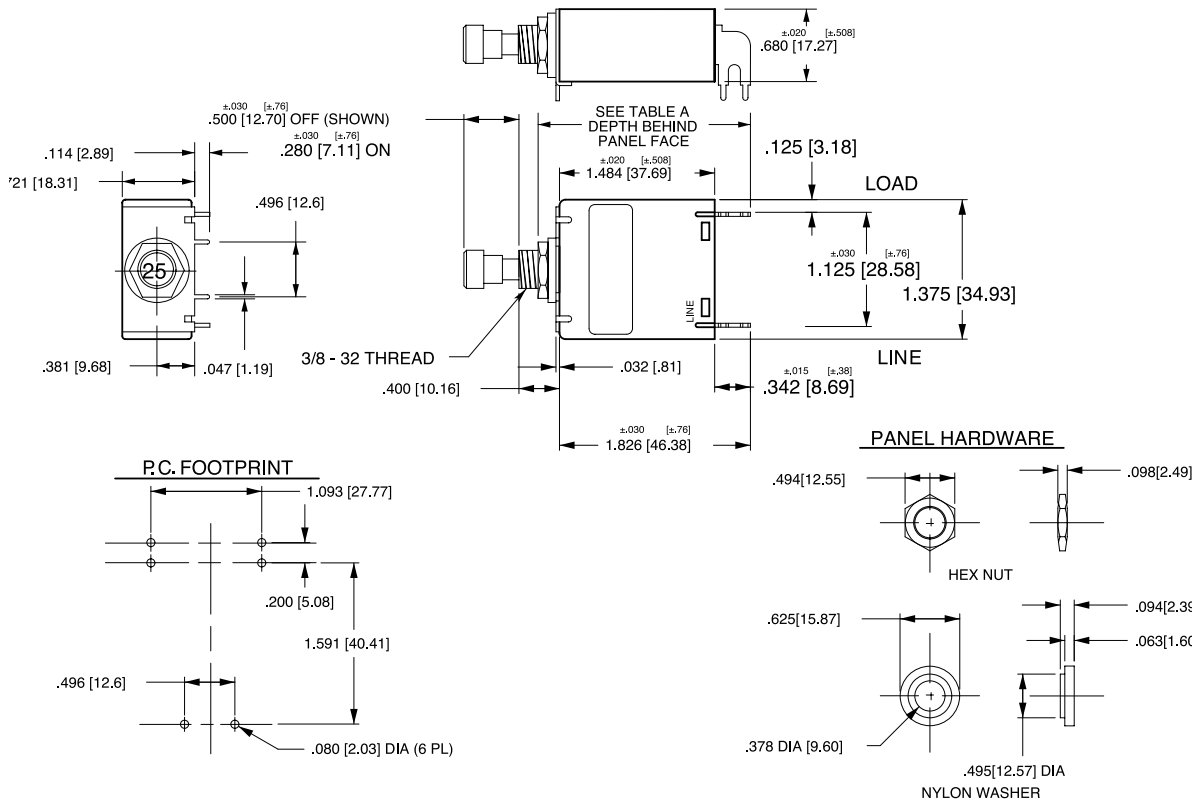
BUTTON MARKING ORIENTATION (PUSH-PULL ONLY)



Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.20 [.51] unless otherwise specified.
 3 Available with Push-Pull or Push-to-Reset Actuators

PC Terminal Diagrams: in. [mm]

PUSH-PULLTYPE SHOWN WITHOUT AUX. SWITCH



PUSH-PULL TYPE SHOWN WITH AUX. SWITCH

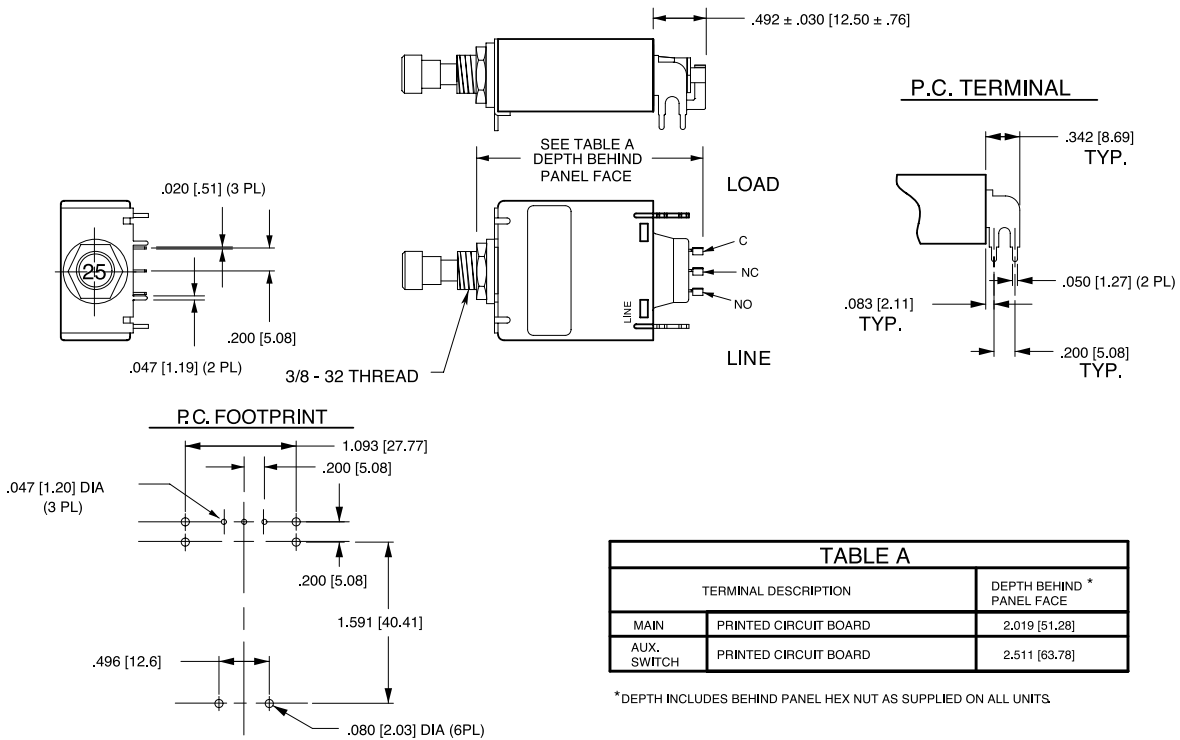


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND * PANEL FACE
MAIN	PRINTED CIRCUIT BOARD	2.019 [51.28]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.511 [63.78]

*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [.51] unless otherwise specified.



1 SERIES
M

2 ACTUATOR 1

Non-Illuminated single color
A Angled
B Flat

Two Color Visi-Rocker
D Indicate ON
E Indicate OFF

illuminated single color
F Angled
G Flat

STYLE	INDICATE "ON" (CODE: D)	INDICATE "OFF" (CODE: E)	FLAT (CODE: B)	ANGLED (CODE: A)
VERTICAL				
HORIZONTAL				

3 POLES
1 One 2 Two

4 CIRCUIT 2
without Auxiliary Switch
A Switch Only (no coil), Maintained Contacts
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts **Terminal Type:**
M Series Trip (Current) Aux Switch .110 QC x .020 QC
P 3 Switch Only, Maintained Contacts .060 Dia, Round Solder Turret
Q 3,4 Switch Only, Maintained Contacts .058 Dia, Round Q.C.
R 3,16 Switch Only, Maintained Contacts .080 Dia x .020 Flat Q.C.
S 3 Series Trip (Current) .060 Dia, Round Solder Turret
T 3,4 Series Trip (Current) .058 Dia, Round Q.C.
U 3,16 Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.

with Auxiliary Switch, Gold Contacts
2 3,4 Switch Only, Maintained Contacts .058 Dia, Round Q.C.
3 3,16 Switch Only, Maintained Contacts .080 Dia x .020 Flat Q.C.
3,4 Series Trip (Current) .058 Dia, Round Q.C.
5 3,16 Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.
9 Series Trip (Current) Aux Switch .110 QC x .020 QC

5 FREQUENCY & DELAY

03	DC	50/60Hz, Switch Only	32	DC, 50/60Hz Short
10	DC	Instantaneous	34	DC, 50/60Hz Medium
12	DC	Short	62	50/60Hz Short, Hi-Inrush
14	DC	Medium	64	50/60Hz Medium, Hi-Inrush
20	50/60Hz	Instantaneous	72	DC, Short, Hi-Inrush
22	50/60Hz	Short	74	DC, Medium, Hi-Inrush
24	50/60Hz	Medium	92	DC, 50/60Hz Short, Hi-Inrush
30	DC, 50/60Hz	Instantaneous	94	DC, 50/60Hz Medium, Hi-Inrush

VOLTAGE			FULL LOAD AMP RATING		GENERAL PURPOSE AMP RATING		TUNGSTEN LAMP RATING		POLES BREAKING
MAX. RATING	FREQUENCY	PHASE	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	
32	DC	-	15	615	25	625	-	-	1
50	DC	-	-	-	7.5	Consult Factory	-	-	1
65	DC	-	15	615	25	625	-	-	2
125	50/60HZ	1	15	615	25	625	15	615	1
250	50/60HZ	1	12	612	-	-	-	-	1
250	50/60HZ	1	15	615	25	625	-	-	2

- Notes:
- One actuator is located in the center of each multi-pole breaker.
 - For Switch Only circuits, select Current Coil Rating from the above chart.
 - One Auxiliary Switch is supplied per breaker. On two-pole breakers, standard Auxiliary Switch mounting is in pole one. Auxiliary Switch option limited to Series Trip & Switch Only circuits, & is not available in single pole illuminated breakers, or Back Connected Screw or Push-in Stud terminals.
 - Mates with AMP .058" diameter pin receptacles: 60983-1 (gold plated) & 60983-2 (tin plated).
 - For neon bulb applications at 120VAC @ 47K, 1/4 WATT and for 250VAC applications @ 150K, 1/4 WATT, external resistors must be supplied by customer.
 - On Visi-Rocker breakers, Visi portion of rocker cannot be the same color as the bezel. For LED (DC or rectified AC) applications, LED is mounted in the center of the rocker actuator with electrical characteristics: 100 millicandela at 20mA; Maximum power dissipation = 75mW at 25°C; Maximum forward current = 25mA; Typical forward voltage = 2.1V at 20mA; Typical reverse current = 100uA at 3V. Customer supplies the proper external resistor limiting current to these values.
 - Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent or match color of LED or neon lamp.
 - Other colors available. Consult factory.
 - TUV 20A, VDE 15A. UL Recognized and CSA Accepted to 30 amps.
 - Screw Terminals or Push-in Stud recommended above 20 amps.
 - TUV or VDE Certified must have I-O or Dual Legends.
 - Legend required on Visi-Rocker breakers.
 - 30 amp rating not available with delay's 30, 32, 34, 92 or 94.
 - Screw Terminals are VDE certified only with use of ring terminal attached to wire.
 - Terminal code A available with circuit codes A & B only.
 - Terminal code B available with UL recognized approval only.
 - Printed circuit board available with UL recognized approval only.
 - Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

6 CURRENT RATING (AMPERES)

CODE	AMPERES						
020	0.020	225	0.250	420	2.000	710	10.500
025	0.025	230	0.300	522	2.250	611	11.000
030	0.030	235	0.350	425	2.500	711	11.500
035	0.035	240	0.400	527	2.750	612	12.000
040	0.040	245	0.450	430	3.000	712	12.500
045	0.045	250	0.500	435	3.500	613	13.000
050	0.050	255	0.550	440	4.000	614	14.000
055	0.055	260	0.600	445	4.500	615	15.000
060	0.060	265	0.650	450	5.000	616	16.000
065	0.065	270	0.700	455	5.500	617	17.000
070	0.070	275	0.750	460	6.000	618	18.000
075	0.075	280	0.800	465	6.500	620	20.000
080	0.080	285	0.850	470	7.000	622	22.000
085	0.085	290	0.900	475	7.500	624	24.000
090	0.090	295	0.950	480	8.000	625	25.000
090	0.095	410	1.000	485	8.500	630 ¹²	30.000
210	0.100	512	1.250	490	9.000		
215	0.150	415	1.500	495	9.500		
220	0.200	517	1.750	610	10.000		

7 TERMINAL

1	Push-On 0.250 Tab (Q.C.)	A ¹⁴	Push-In Stud
2	10 Screw 8-32 with Upturned Lugs	P ¹⁵	Printed Circuit Board
3	10 Screw 8-32 (Bus Type)		

8 ROCKER ILLUMINATION

Non-illuminated Neon⁵

without resistor, 120VAC/250VAC	A	Neon	Green Glow ⁸
LED ^{7,8}	B	Red	Green
without resistor	C		Amber
with resistor, 4-8 VDC	D	Green	K
with resistor, 9-16 VDC	E	Blue	L
	F	Orange	M

9 ACTUATOR & LEGEND COLOR

Solid Color	Actuator	Legend
1	White	Black
2	Black	White
3	Red	White
4	Green	White
5	Blue	White
6	Yellow	Black
7	Gray	Black
8	Orange	Black
Visi-Rocker ⁶	Visi & Legend (remainder of rocker same color as bezel)	
1	White	
2	Black	
3	Red	
4	Green	
5	Blue	
6	Yellow	
7	Gray	
8	Orange	
Illuminated ⁸	Actuator	Legend
A	Clear	White
B	Red Transparent	White
C	Green Transparent	White
D	Amber Transparent	White
E	Smoke Gray Transparent	White
F	White Translucent	Black

10 LEGEND¹¹

1	No Legend	4	I - O Vertical
2	ON - OFF Vertical	5	I - O Horizontal
3	ON - OFF Horizontal	6	Dual Vertical
		7	Dual Horizontal

11 BEZEL COLOR / STYLE⁹

Color	without Rockerguard	with Rockerguard
White	A	1
Black	B	2
Gray	G	7

12 AGENCY APPROVAL¹⁰

C	UL Recognized & CSA Accepted
D	VDE Certified, UL Recognized & CSA Accepted
E	TUV Certified, UL Recognized & CSA Accepted



1 SERIES
M

2 ACTUATOR 1

Non-Illuminated single color
A Angled
B Flat

Two Color Visi-Rocker
D Indicate ON
E Indicate OFF

Illuminated single color
F Angled
G Flat

STYLE	INDICATE "ON" (D/E/F/G)	INDICATE "OFF" (D/E/F/G)	FLAT (D/E/F/G)	ANGLED (F/G)
VERTICAL				
HORIZONTAL				

3 POLES
1 One

4 CIRCUIT 2

without Auxiliary Switch
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts
M Series Trip (Current) Aux Switch

with Auxiliary Switch, Gold Contacts
S³ Series Trip (Current)
T^{3,4} Series Trip (Current)
U^{3,16} Series Trip, Maintained Contacts

Terminal Type:
.110 QC x .020 QC
.060 Dia, Round Solder Turret
.058 Dia, Round Q.C.
.080 Dia x .020 Flat Q.C.

5 FREQUENCY & DELAY

10	DC Instantaneous	14	DC Medium
12	DC Short	72	DC, Short, Hi-Inrush
		74	DC, Medium, Hi-Inrush

6 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	425	2.500
035	0.035	240	0.400	527	2.750
040	0.040	245	0.450	430	3.000
045	0.045	250	0.500	435	3.500
050	0.050	255	0.550	440	4.000
055	0.055	260	0.600	445	4.500
060	0.060	265	0.650	450	5.000
065	0.065	270	0.700	455	5.500
070	0.070	275	0.750	460	6.000
075	0.075	280	0.800	465	6.500
080	0.080	285	0.850	470	7.000
085	0.085	290	0.900	475	7.500
090	0.090	295	0.950	480	8.000
090	0.095	410	1.000	485	8.500
210	0.100	512	1.250	490	9.000
215	0.150	415	1.500	495	9.500
220	0.200	517	1.750	610	10.000

- Notes:
- One actuator is located in the center of each multi-pole breaker.
 - One Auxiliary Switch is supplied per breaker. Auxiliary Switch option limited to Series Trip & Switch Only circuits, and is not available in single pole illuminated breakers, or with Back Connected Screw or Push-in Stud terminals.
 - Mates with AMP .058" diameter pin receptacles: 60983-1 (gold plated) & 60983-1 (tin plated).
 - For neon bulb applications at 120VAC @ 47K, 1/4 WATT and for 250VAC applications @ 150K, 1/4 WATT, external resistors must be supplied by customer.
 - For LED (DC or rectified AC) applications, LED is mounted in the center of the rocker actuator with electrical characteristics as follows: 100 millicandela at 20mA; Maximum power dissipation = 75mW at 25°C; Maximum forward current = 25mA; Typical forward voltage = 2.1V at 20mA; Typical reverse current = 100uA at 3V. Customer supplies the proper external resistor limiting current to these values.
 - On Visi-Rocker breakers, Visi portion of rocker cannot be the same color as the bezel.
 - Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent or match color of LED or neon lamp.
 - Other colors available. Consult factory.
 - TUV Certified to 25 amps. UL Recognized, CSA Accepted and UL489A Listed to 30 amps. Screw Terminals recommended above 20 amps.
 - UL489A Listed must have ON-OFF or Dual legends. TUV Certified approvals must have I - O or Dual legends.
 - Terminal code A available with circuit codes A & B only.
 - Printed circuit board available with UL recognized approval only.
 - Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

7 TERMINAL

1	Push-On 0.250 Tab (Q.C.)	A ¹¹	Push-In Stud
2	Screw 8-32 with Upturned Lugs	P ¹²	Printed Circuit Board
3	Screw 8-32 (Bus Type)		

8 ROCKER ILLUMINATION

Non-Illuminated
Neon⁴
without resistor, 120VAC/250VAC
LED^{7, 8}
without resistor
with resistor, 4-8 VDC
with resistor, 9-16 VDC

A	Neon	Green Glow ⁸
B	Red	Green
C	Amber	
D	Green	K
E	Amber	L
F	White	M

9 ACTUATOR & LEGEND COLOR

Solid Color	Actuator	Legend
1	White	Black
2	Black	White
3	Red	White
4	Green	White
5	Blue	White
6	Yellow	Black
7	Gray	Black
8	Orange	Black
Visi-Rocker ⁶	Visi & Legend (remainder of rocker same color as bezel)	
1	White	
2	Black	
3	Red	
4	Green	
5	Blue	
6	Yellow	
7	Gray	
8	Orange	
Illuminated ⁷	Actuator	Legend
A	Clear	White
B	Red Transparent	White
C	Green Transparent	White
D	Amber Transparent	White
E	Smoke Gray Transparent	White
F	White Translucent	Black

10 LEGEND 10

1	No Legend (Single Color or Illuminated Rocker Options Only)
2	ON - OFF Vertical
3	ON - OFF Horizontal
4	I - O Vertical
5	I - O Horizontal
6	Dual Vertical
7	Dual Horizontal

11 BEZEL COLOR / STYLE 8

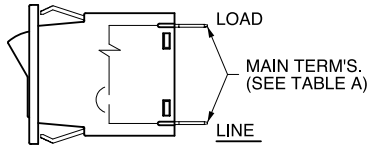
Color	without Rockerguard	with Rockerguard
White	A	1
Black	B	2
Gray	G	7

12 AGENCY APPROVAL 9

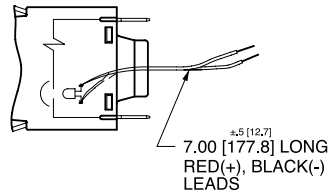
J	UL489A Listed & TUV Certified
M	UL Recognized & CSA Accepted
N	TUV Certified, UL Recognized & CSA Accepted
T	UL489A Listed

Circuit & Terminal Diagrams: in. [mm]

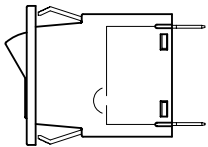
SERIES TRIP



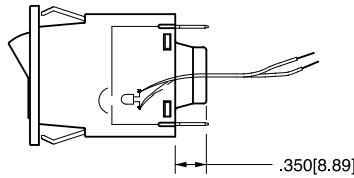
SERIES TRIP W/ ILLUMINATED ROCKER



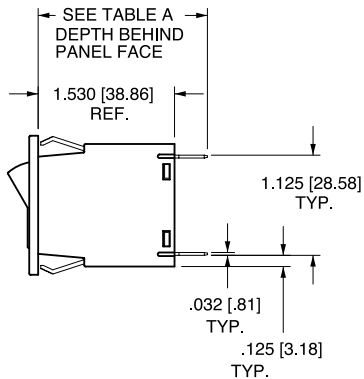
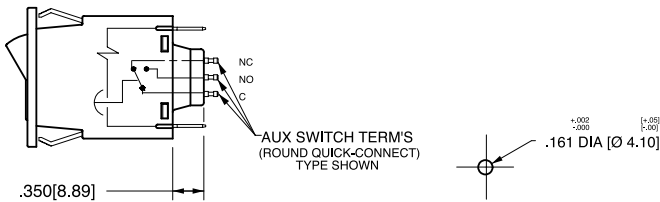
SWITCH ONLY



SWITCH ONLY W/ ILLUMINATED ROCKER



SERIES TRIP W/ AUXILIARY SWITCH



TERMINAL DIMENSIONAL DETAIL

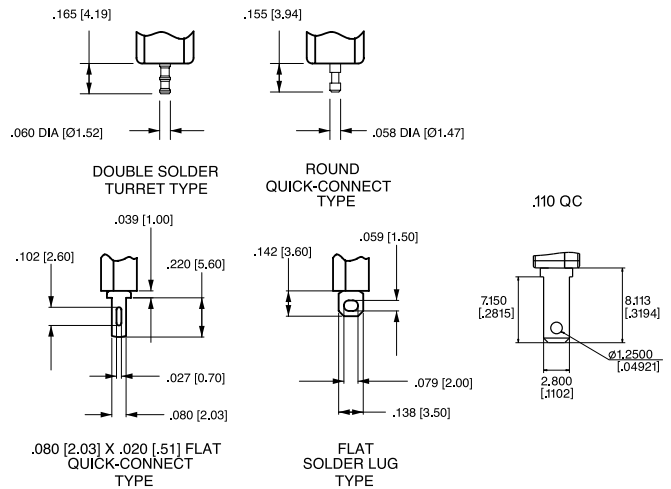
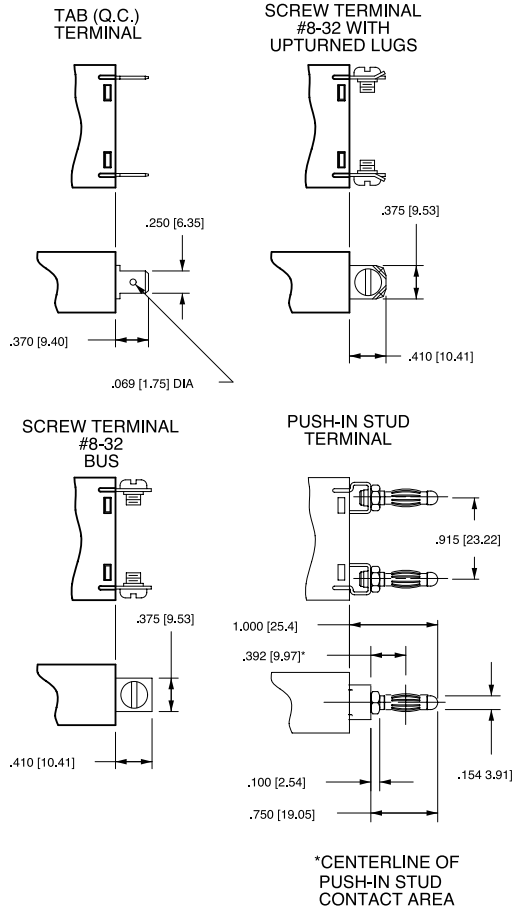


TABLE - A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE
MAIN	TAB (Q.C.)	1.900 [48.26]
	SCREW (#8-32)**	1.940 [49.28]
	PUSH-IN STUD	2.530 [64.26]
*AUX. SWITCH	DOUBLE SOLDER TURRET TYPE	2.045 [51.94]
	ROUND Q.C. TYPE	2.035 [51.69]
	FLAT QUICK CONNECT	2.139 [54.33]
	FLAT SOLDER LUG	2.022 [51.36]

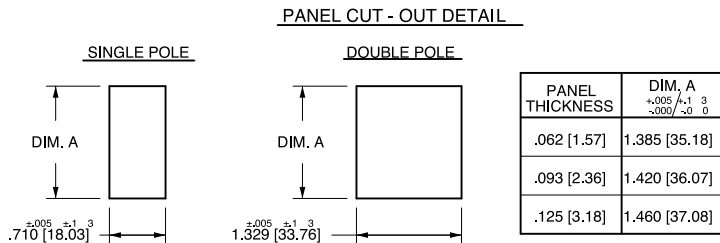
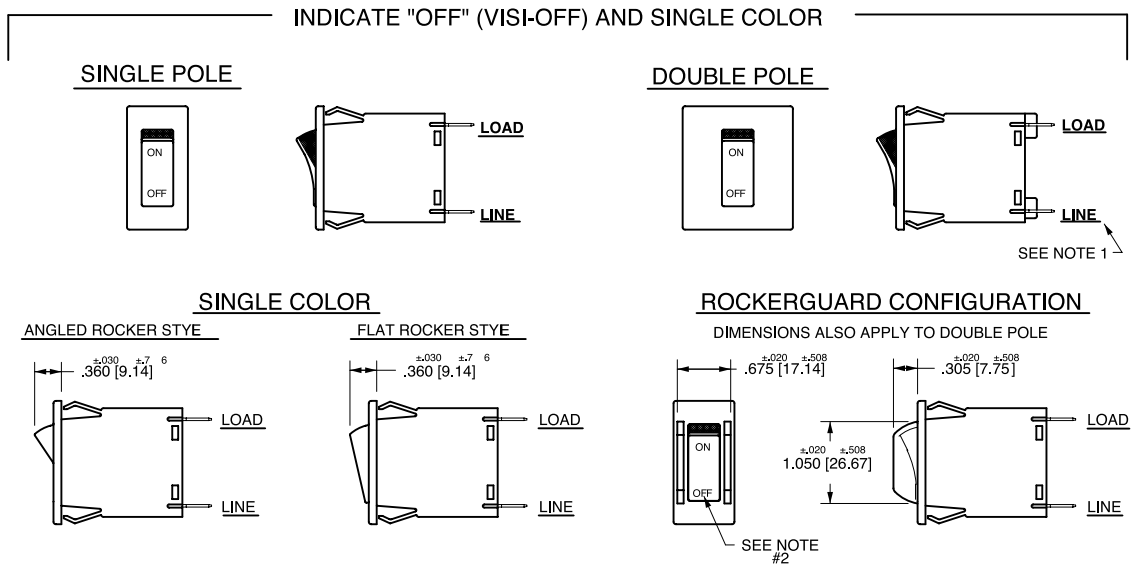
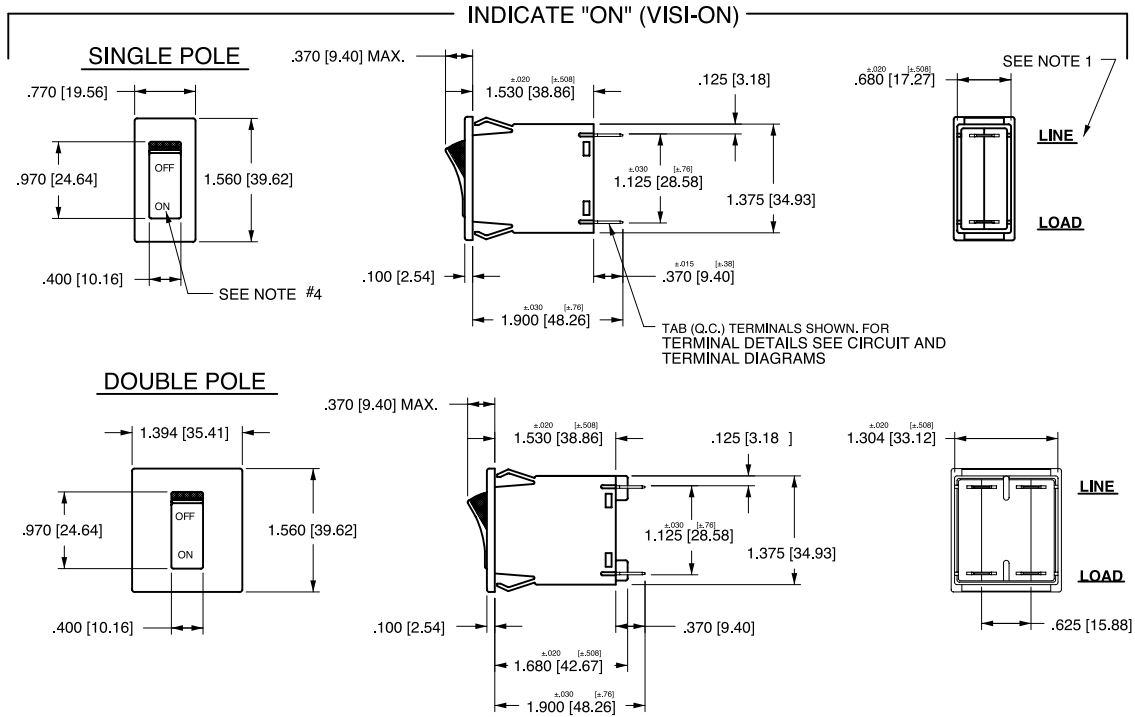
* AUX. SWITCH IS NOT AVAILABLE ON SINGLE POLE ILLUMINATED UNITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN ON CLA-8003.

** RECOMMENDED TIGHTENING TORQUE 12-15 IN LBS [1.4-2.7 NM]

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [.51] unless otherwise specified.
- 3 Schematic shown represents current trip circuit.

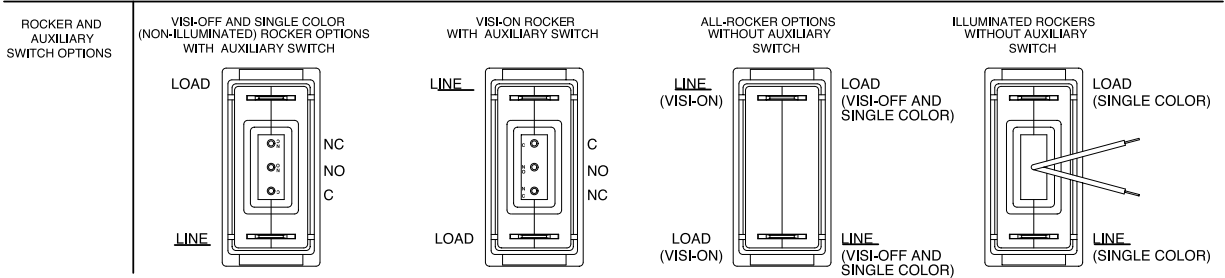
Dimensional Specifications: in. [mm]



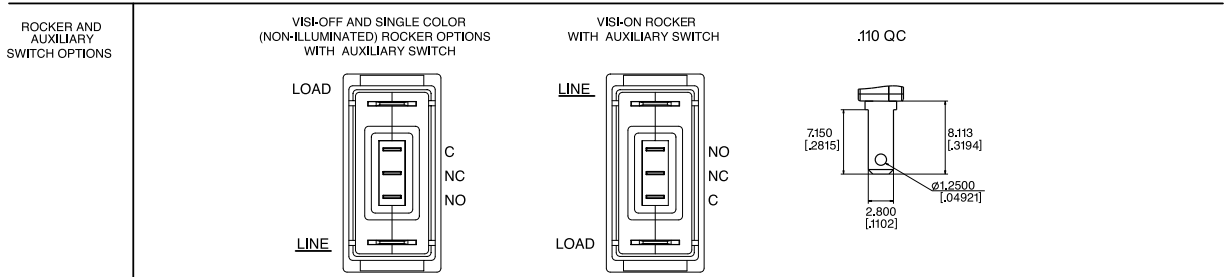
- Notes:
- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
 - 2 I-O, ON-OFF or dual legends available for vertical or horizontal mounting. For pole orientation with horizontal legend, rotate front view clockwise 90°.
 - 3 All dimensions are in inches [millimeters].
 - 4 Tolerance ± 0.20 [5.1] unless otherwise specified.

ONE POLE

SINGLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX. SWITCH TERMINALS

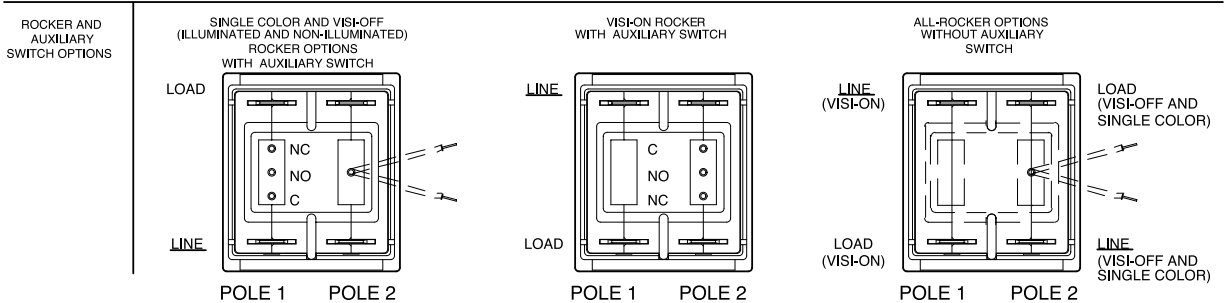


SINGLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX. SWITCH TERMINALS

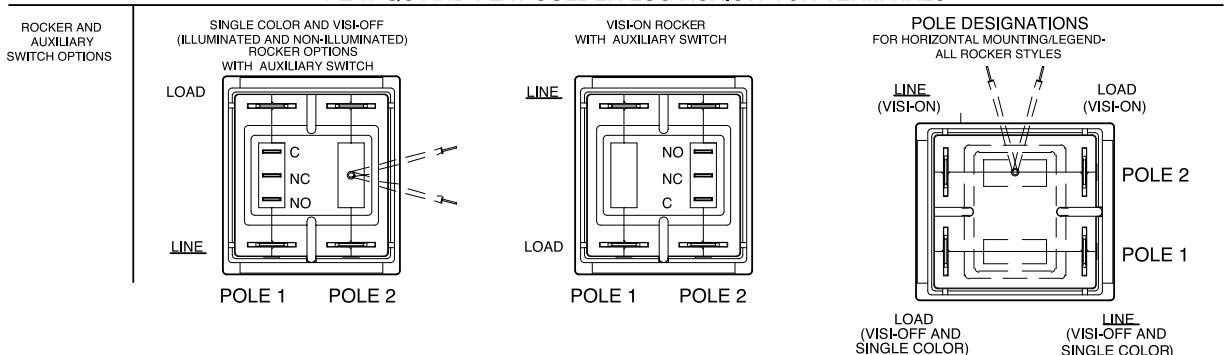


TWO POLE

DOUBLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX. SWITCH TERMINALS



DOUBLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX. SWITCH TERMINALS



MS-Series

CIRCUIT BREAKER

Designed and tested to operate flawlessly in the harshest of environments, the MS-Series sealed toggle circuit breaker is ideally suited for COTS (commercial off the shelf) military applications. Our space saving envelope meets IP68 requirements and features a durable metal and sealed mounting bushing with MIL-PRF-39019F ingress protection when mounted in a panel.

This class-leading, affordable circuit breaker was designed in accordance with the requirements of MIL-PRF-55629 and MIL STD 202, making it the best choice for those applications where shock, vibration, moisture resistance, salt spray and thermal shock are of the utmost consideration. The MS-Series' compact size and reliability make it ideal for crucial communication equipment and other mission critical components.

1-3 poles; 0.20-30 amps; 65VDC, 240VAC, 120/240VAC; UL, CUL recognized & TUV pending.



Resources:

[Download 3D CAD Files](#)

[IGS >](#) [STP >](#)

[Watch Product Video](#)



Product Highlights:

- Sealed Toggle Actuator
- MIL-PRF-39019F Ingress Protection
- MIL-PRF-55629 and MIL STD 202 Compliant
- Compact Design

Typical Applications:

- COTS Military
 - Communication Equipment
- Off Highway Equipment
 - Construction, Mining & Agriculture
- Generators & Power Supplies
- Harsh Environment Applications

MS-Series

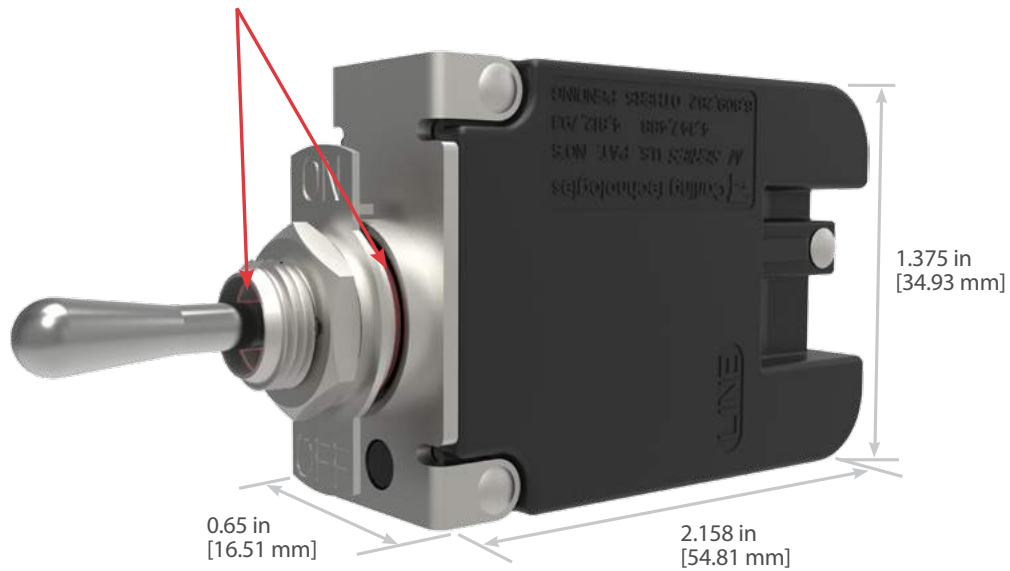
DESIGN FEATURES

SEALS

IP68 Designed and tested to comply with MIL-PRF-39019F Ingress Protection

COMPACT SIZE

Max performance in compact size: 0.20-30 Amps; 65 VDC, 240 VAC 120/240 VAC

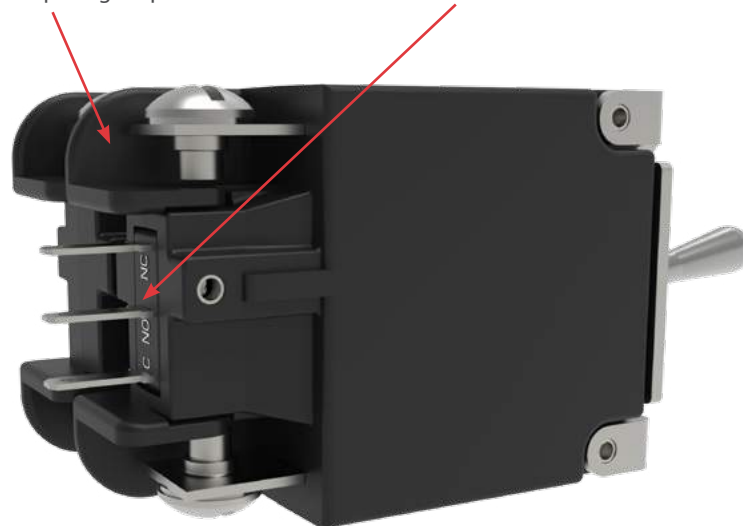


TERMINAL BARRIERS

Meet UL 1077 Spacing Requirements

OPTIONAL AUXILIARY SWITCH

Provides Breaker Status Indication



Electrical Tables

Table A: Lists UL & cUL Configuration & Performance Capabilities

MS-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS							
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps) ¹	
	Max Rating	Frequency	Phase	General Purpose Amps	Poles Breaking	UL / cUL	
						U1	U3
Series	65	DC	---	0.02 - 30	1	3000	300
	240	50 / 60	1	0.02 - 30	1, 2	2000	300
	120 / 240	50 / 60	1	0.02 - 30	2 or 3	2000	300

Notes:

1 Short Circuit Current Rating (SC) Codes — The short-circuit current rating, followed by a letter and number designating the test conditions and any calibration following the short-circuit test as defined below:

U - Indicates that the short circuit test was performed without a series fuse

1 - Indicates that a re-calibration was not performed as part of the short circuit testing

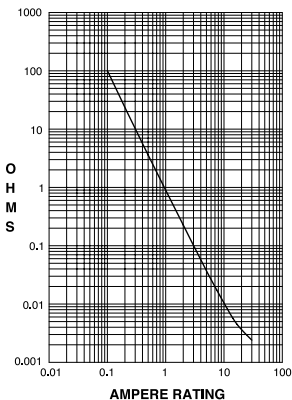
3 - Indicates that the protector has proven to be suitable for further use after the short circuit test

Re-calibration, dielectric strength and voltage withstand tests were performed after the short circuit testing

Electrical

Current Ratings .02 - 30 Amps
 Voltage Rating 65VDC, 240VAC, 120/240VAC
 Short Circuit Rating See Table A
 Auxiliary Switch Rating 5A @ 125VAC, 3A @ 32VDC, .1A @ 125VAC, 32VDC
 Dielectric Strength UL, CSA 1500V, 50/60 Hz for one minute between all electrically isolated terminals.
 Insulation Resistance Minimum of 100 Megohms @ 500VDC
 Time Delay See delay curve
 Impedance

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



CURRENT (AMPS)	TOLERANCE (%)
0.20 - 30.0	25

Physical

Number of Poles 1-3 poles
 Weight Approximately 1.8 oz (50 G) per pole
 Dimensions See form & fit drawing

Agency Certifications

UL Standard 1077



CUL Standard C22.2

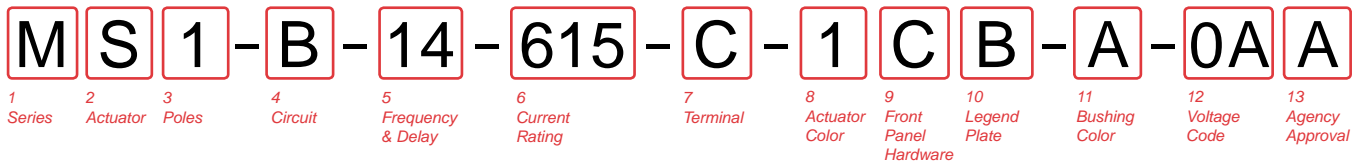
*Manufacturer reserves the right to change product specification without prior notice.

Mechanical

Current Ratings 10,000 On-Off operations @ 6 per minute with rated current and voltage.
 Trip Free Trips on short circuit and overload, even when the actuator is forcibly held in the "On" position.
 Trip Indication The operating handle moves positively to the "Off" position when a short circuit or overload causes the circuit breaker to trip.

Environmental

Designed in accordance with requirements of specification MIL PRF-55629 & MIL-STD-202G as follows:
 Shock Withstands 100G's, 6ms, saw tooth while carrying rated current per Method 213, Condition I. Instantaneous curves tested at 80% of rated current.
 Vibration Withstands 0.060" excursion from 10-55 Hz, and 10G's 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous curves tested at 80% of rated current.
 Salt Spray Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs)
 Moisture Resistance Method 106G
 Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C)
 Operating Temperature -40°C to +85°C
 Ingress Protection Level MIL-PRF-55629C when mounted in panel.
 Other Materials used in this product are non-nutrient to fungus growth.



1 SERIES
M

2 ACTUATOR
S Sealed Toggle

3 POLES
1 One 2 Two 3 Three

4 CIRCUIT
A Switch Only (no coil)^{1,2}
B Series Trip (current)
M Series Trip (current) Aux switch .110 QC x 0.20 QC (silver contacts)
9 Series Trip (current) Aux switch .110 QC x 0.20 QC (gold contacts)

5 FREQUENCY & DELAY

03 DC, 50/60 Hz, Switch Only ¹	32 DC, 50/60 Hz Short
10 DC, Instantaneous	34 DC, 50/60 Hz Medium
12 DC, Short	62 50/60 Hz Short, Hi-Inrush ⁴
14 DC, Medium	64 50/60 Hz Medium, Hi-Inrush ⁴
20 50/60 Hz Instantaneous	72 DC, Short, High-Inrush ⁴
22 50/60 Hz Short	74 DC, Medium, High-Inrush ⁴
24 50/60 Hz Medium	92 DC, 50/60 Hz Short, Hi-Inrush ⁴
30 DC, 50/60 Hz Instantaneous	94 DC, 50/60 Hz Medium, In-rush ⁴

6 CURRENT RATING (AMPERES)

CODE	AMPERES				
220	0.200	295	0.950	460	6.00
225	0.250	410	1.00	465	6.50
230	0.300	512	1.25	470	7.00
235	0.350	415	1.50	475	7.50
240	0.400	517	1.75	480	8.00
245	0.450	420	2.00	485	8.50
250	0.500	522	2.25	490	9.00
255	0.550	425	2.50	495	9.50
260	0.600	527	2.75	610	10.00
265	0.650	430	3.00	710	10.50
270	0.700	435	3.50	611	11.00
275	0.750	440	4.00	711	11.50
280	0.800	445	4.50	612	12.00
285	0.850	450	5.00	712	12.50
290	0.900	455	5.50	613	13.00

7 TERMINAL
1 Push-On 0.250 Tab (QC)
2 Screw 8-32 (Upturned Lugs)
3 Screw 8-32 (Bus Type)
C Screw Terminal M4 (Upturned Lugs)
E Screw Terminal M4 (Bus Type)
L Solder Lug

8 ACTUATOR & MARKING COLOR
1 Dull Metallic

9 FRONT PANEL HARDWARE
A No Outer Panel Hardware
B Hex Nut, Nickel Plated
C Hex Nut, Nickel Plated with Locking Ring
F Panel Dress Nut, Nickel Plated
G Panel Dress Nut, Nickel Plated with Locking Ring

10 LEGEND PLATE
A No Legend Plate
B On-Off Vertical
C On-Off Horizontal
D I-O Vertical
E I-O Horizontal
F Dual Vertical
G Dual Horizontal

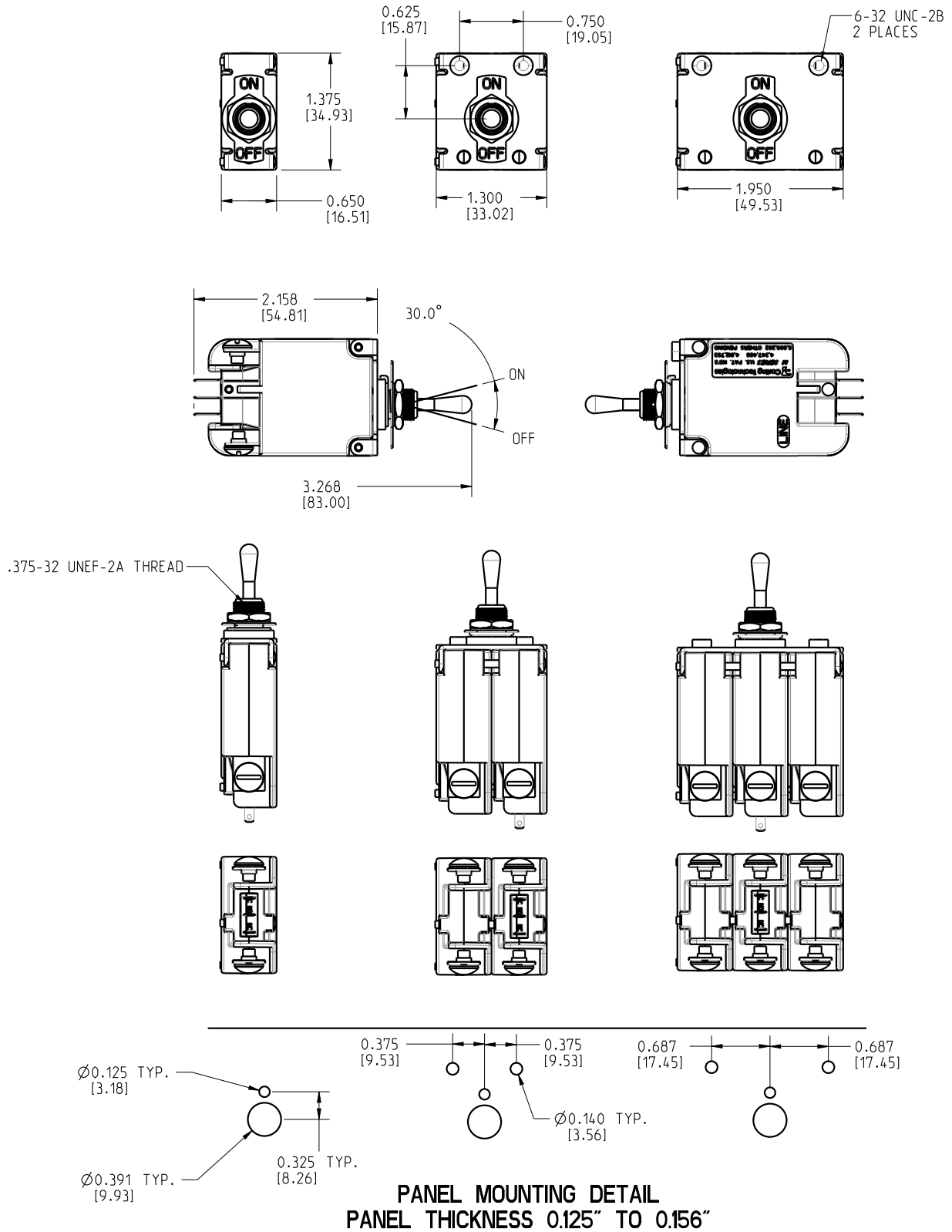
11 BUSHING COLOR
A Nickel Plated / Multipole Version

12 VOLTAGE CODE
0A 65 VDC
0D 240 VAC
0C 120/240 VAC³
0N 65 VDC / 120/240 VAC³
17 65 VDC / 240 VAC

13 AGENCY APPROVAL
A Without approvals
B UL Recognized
C UL & cUL Recognized

Notes:
1 Series code "A" only available with delay code "03"
2 Only available when tied to a protected pole
3 Requires a 2 or 3 pole device
4 Only available without agency approvals (Approval Code A)

Dimensional Specifications: in. [mm]



Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ±0.020 [.51] unless otherwise specified.

H-Series

CIRCUIT BREAKER

The H-Series hydraulic-magnetic circuit breaker provides maximum and dependable circuit protection, while providing a cost effective, compact solution. By meeting the IEC spacing requirements, the H-Series is the ideal choice for international market applications. It also features a “trip-free” mechanism, which will open the contacts when a fault condition occurs, even if the handle is held in the ON position.

1-3 poles; 1-35 amps; 65VDC, 80VDC, 250VAC; UL recognized, CSA accepted, TUV & CCC certified.



Resources:

[Download 3D CAD Files](#)

[IGS >](#)

[STP >](#)

Product Highlights:

- ◆ Choice of actuator styles
- ◆ UL1077, CCC, CSA, G22.2 and EN60934 approvals
- ◆ Compact size
- ◆ Temperature stable operation -40° C to +80° C
- ◆ Choice of terminals, including PCB
- ◆ Single or multi-pole configurations

Typical Applications:

- ◆ Telecom/Datacom
- ◆ Marine

Electrical Tables

Table A: Lists UL Recognized, CSA Accepted and TUV Certified configurations and performance capabilities as a Component Supplementary Protector.

H-SERIES: COMPONENT SUPPLEMENTARY PROTECTORS										
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps)			Application Codes	
	Max Rating	Frequency	Phase	Full Load Amps	Minimum Poles	UL	CSA	TUV	UL	CSA
						Without Backup Fuse	Without Backup Fuse	(Icn) Without Backup Fuse		
Series	65	DC	---	1 - 25	1	3000	3000	3000	TC1, OL1, U1	TC1, OL1, U1
	65	DC	---	26 - 35	1	3000	3000	3000	TC1, OL1, U3	TC1, OL1, U3
	80	DC	---	1 - 25	1	1000	1000	1000	TC1, OL1, U1	TC1, OL1, U1
	80 ¹	DC	---	26 - 35	1	1000	1000	1000	TC1, OL1, U3	TC1, OL1, U3
	250	50 / 60	1	1 - 35	1	1500	1500	500	TC1, OL1, U1	TC1, OL1, U3
	250	50 / 60	1	1 - 35	2	1500	1500	500	TC1, OL1, U3	TC1, OL1, U3
	250	50 / 60	3	1 - 35	3	1500	1500	500	TC1, OL0, U3	TC1, OL0, U3

Notes:
1 Polarity Sensitive

Electrical

Maximum Voltage 250VAC 50/60Hz 80 VDC
 Current Ratings Standard current coils: 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 32.0, 35.0
 SPDT: 10.1A-250VAC,
 Auxiliary Switch Rating 1.0A-65VDC/0.5A-80VDC, 0.1A-125VAC (with gold contacts)

Typical Protector Resistance

DCR and Impedance values are based on measurements by the voltmeter ammeter method. Rated current is applied for one hour at a voltage not less than 20 volts. Ambient temperature: 25 °C; Tolerance: Below 10 amps +/- 25%; Above 10 amps +/-35%

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated current & voltage

Physical

Number of Poles 1-3
 Weight Approx. 48 grams/pole (1.7 oz)
 Internal Circuit Config. Series and Switch Only (with or without auxiliary switch)

Impedance Chart

Current Rating (Amps)	Series	
	DC-Ohms	50/60Hz-Ohms
1	0.85	0.87
2.5	0.13	0.15
5	0.035	0.036
7.5	0.018	0.019
10	0.010	0.011
15	0.006	0.0061
20	0.005	0.0051
25	0.003	0.0035
30	0.0025	0.0026
35	0.0021	0.0022

Agency Approvals

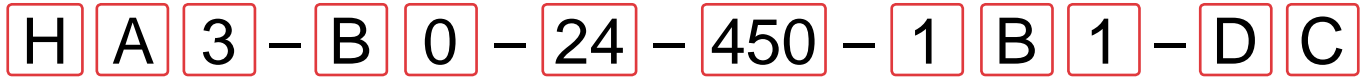
UL Recognized under the Component Recognition Program as Protectors, Supplementary (Guide QVNU2 File E75596)
 UL standard 1077

CCC certified, Certificate No. 2010010307447291

CSA Accepted Supplementary Protector
 CSA standard C22.2 No. 235

TUV certified to EN60934, Certificate No. R50204086

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



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 Bezel/Barrier 11 Rating 12 Agency Approval

1 SERIES
H

2 ACTUATOR 1
A Handle, one per pole B Handle, one per unit

3 POLE 2
1 One 2 Two 3 Three

4 CIRCUIT
A Switch Only (no coil) C⁴ Series Trip (voltage)
B Series Trip (current) G⁴ Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH
0 without Aux Switch 3³ 0.110 Q.C. term with gold contacts
1³ 0.110 Q.C. term 4³ 0.110 PC term
2³ 0.110 Solder Lug

6 FREQUENCY & DELAY

03 ³ DC 50/60Hz, Switch Only	30 DC, 50/60Hz, Instantaneous
10 DC, Instantaneous	31 DC, 50/60Hz, Ultra Short
11 DC, Ultra Short	32 DC, 50/60Hz, Short
12 DC, Short	34 DC, 50/60Hz, Medium
14 DC, Medium	36 DC, 50/60Hz, Long
16 DC, Long	42 ⁴ 50/60 Hz Hi-Inrush Short
20 50/60 Hz Instantaneous	44 ⁴ 50/60 Hz Hi-Inrush Medium
21 50/60 Hz Ultra Short	46 ⁴ 50/60 Hz Hi-Inrush Long
22 50/60 Hz Short	52 ⁴ DC Hi-Inrush Short
24 50/60 Hz Medium	54 ⁴ DC Hi-Inrush Medium
26 50/60 Hz Long	56 ⁴ DC Hi-Inrush Long

7 CURRENT RATING (AMPERES) 5

CODE	AMPERES				
410	1.00	445	4.50	610	10.00
512	1.25	450	5.00	710	10.50
415	1.50	455	5.50	611	11.00
517	1.75	460	6.00	711	11.50
420	2.00	465	6.50	612	12.00
522	2.25	470	7.00	712	12.50
425	2.50	475	7.50	613	13.00
527	2.75	480	8.00	614	14.00
430	3.00	485	8.50	615	15.00
435	3.50	490	9.00	616	16.00
440	4.00	495	9.50	617	17.00

VOLTAGE RATING

CODE	RATING	TRIP VOLTS			
A06	6DC	5DC	A65	65DC	55DC
A12	12DC	10DC	J06	6AC	5AC
A18	18DC	15DC	J12	12AC	10AC
A24	24DC	20DC	J18	18AC	15AC
A32	32DC	25DC	J24	24AC	20AC
A48	48DC	40DC	J48	48AC	40AC
			J65	65AC	55AC
			K20	120AC	65AC
			L40	240AC	130AC
			B10	110DC	59DC
			B20	120DC	65DC

8 TERMINAL 6

1 Push ON 0.250 Tab (Q.C.)		Printed Circuitboard Terminals
2 Screw 8-32 with upturned lugs	L	90 Facing Left
3 Screw 8-32 (bus type)	R	90 Facing Right
A Screw M4 with upturned lugs	S	Straight
B Screw M4 (bus type)	T	Straight, Long

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 / BARRIERS

MOUNTING STYLE	BARRIERS	BEZEL
Threaded Insert		
1 6-32 x 0.195 inches	no	domed
A 6-32 x 0.195 inches	yes	domed
2 ISO M3 x 5mm	no	domed
B ISO M3 x 5mm	yes	domed
3 6-32 x 0.195 inches	no	flat
C 6-32 x 0.195 inches	yes	flat
4 ISO M3 x 5mm	no	flat
D ISO M3 x 5mm	yes	flat

11 MAX. APPLICATION RATING

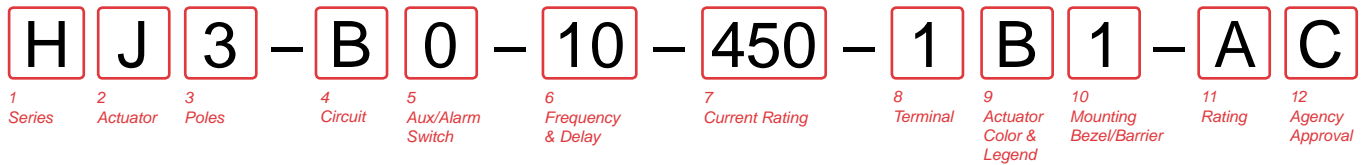
A 65VDC
D 250VAC
M ⁶ 80VDC
4 ⁷ 80VDC / 250VAC

12 AGENCY APPROVAL

A Without approvals
C UL Recognized, CSA Accepted
E UL Recognized, CSA Accepted, TUV Certified
5 UL Recognized, CSA Accepted, TUV Certified, CCC Certified

Notes:

- Actuator Option A: handle tie pin, spacer & retainers provided unassembled on multiple units.
Actuator Option B: Handle location as viewed from front of panel: 2 pole: left pole; 3 pole: center pole
- Standard multipole units have all poles identical, except when specifying auxiliary switch
- Auxiliary switch available on Series Trip and Switch Only circuits to 32A. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole.
- Separate Pole Type Voltage Coils not rated for continuous duty. Available only with delay code 10 & 20. Only Available with Agency code C.
- For other current ratings, consult factory.
- 26-35A Polarity sensitive, only available as 1 pole unit.
- Voltage code 4 available to 25A max.



1 SERIES (VISI ROCKER)
H

2 ACTUATOR ¹
J Vertical - Indicator OFF **K** Vertical - Indicator ON

3 POLE ²
1 One **2** Two **3** Three

4 CIRCUIT
A Switch Only (no coil) **C⁴** Series Trip (voltage)
B Series Trip (current) **G⁴** Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH
0 without Aux Switch **3³** 0.110 Q.C. term with gold contacts
1³ 0.110 Q.C. term **4³** 0.110 PC term
2³ 0.110 Solder Lug

6 FREQUENCY & DELAY
03³ DC 50/60HZ, Switch Only **30** DC, 50/60Hz, Instantaneous
10 DC, Instantaneous **31** DC, 50/60Hz, Ultra Short
11 DC, Ultra Short **32** DC, 50/60Hz, Short
12 DC, Short **34** DC, 50/60Hz, Medium
14 DC, Medium **36** DC, 50/60Hz, Long
16 DC, Long **42⁴** 50/60 Hz Hi-Inrush Short
20 50/60 Hz Instantaneous **44⁴** 50/60 Hz Hi-Inrush Medium
21 50/60 Ultra Short **46⁴** 50/60 Hz Hi-Inrush Long
22 50/60 Hz Short **52⁴** DC Hi-Inrush Short
24 50/60 Hz Medium **54⁴** DC Hi-Inrush Medium
26 50/60 Hz Long **56⁴** DC Hi-Inrush Long

7 CURRENT RATING (AMPERES) ⁵

CODE	AMPERES
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
632	32.00
635	35.00

VOLTAGE RATING

CODE	RATING	TRIP VOLTS
A06	6DC	5DC
A12	12DC	10DC
A18	18DC	15DC
A24	24DC	20DC
A32	32DC	25DC
A48	48DC	40DC
A65	65DC	55DC
J06	6AC	5AC
J12	12AC	10AC
J18	18AC	15AC
J24	24AC	20AC
J48	48AC	40AC
J65	65AC	55AC
K20	120AC	65AC
L40	240AC	130AC
B10	110DC	59DC
B20	120DC	65DC

- Notes:
- Half guard construction have OFF protection for actuator
 - Standard multipole units have all poles identical, except when specifying auxiliary switch
 - Auxiliary switch available on Series Trip and Switch Only circuits to 32A. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole.
 - Separate Pole Type Voltage Coils not rated for continuous duty. Available only with delay code 10 & 20. Only Available with Agency code C.
 - For other current ratings, consult factory.
 - On Visi-Rocker, Visi portion of rocker cannot be the same color as the bezel. Remainder of rocker same color as bezel.
 - 26-35A Polarity sensitive, only available as 1 pole unit.
 - Voltage code 4 available to 25A max.

8 TERMINAL
1 Push ON 0.250 Tab (Q.C.) **L** 90 Facing Left
2 Screw 8-32 with upturned lugs **R** 90 Facing Right
3 Screw 8-32 (bus type) **S** Straight
A Screw M4 with upturned lugs **T** Straight, Long
B Screw M4 (bus type)

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING / BARRIERS ⁶

MOUNTING STYLE	BARRIERS	HALF ROCKER GUARD	BRACKET COLOR
Threaded Insert			
1	6-32 x 0.195 inches	no	no
A	6-32 x 0.195 inches	yes	no
2	ISO M3 x 5mm	no	no
B	ISO M3 x 5mm	yes	no
3	6-32 x 0.195 inches	no	yes
C	6-32 x 0.195 inches	yes	yes
4	ISO M3 x 5mm	no	yes
D	ISO M3 x 5mm	yes	yes
5	6-32 x 0.195 inches	no	no
E	6-32 x 0.195 inches	yes	no
6	ISO M3 x 5mm	no	no
F	ISO M3 x 5mm	yes	no
7	6-32 x 0.195 inches	no	yes
G	6-32 x 0.195 inches	yes	yes
8	ISO M3 x 5mm	no	yes
H	ISO M3 x 5mm	yes	yes
I	6-32 x 0.195 inches	no	no
J	6-32 x 0.195 inches	yes	no
P	ISO M3 x 5mm	no	no
K	ISO M3 x 5mm	yes	no
Q	6-32 x 0.195 inches	no	yes
L	6-32 x 0.195 inches	yes	yes
U	ISO M3 x 5mm	no	yes
M	ISO M3 x 5mm	yes	yes

11 MAX. APPLICATION RATING
A 65VDC
D 250VAC
M⁷ 80VDC
4⁸ 80VDC / 250VAC

12 AGENCY APPROVAL
A Without approvals
C UL Recognized, CSA Accepted
E UL Recognized, CSA Accepted, TUV Certified
5 UL Recognized, CSA Accepted, TUV Certified, CCC Certified



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 Bezel/Barrier 11 Rating 12 Agency Approval

1 SERIES

H

2 ACTUATOR ¹

3 Single Color Vertical 7 Push-to-Reset, Single Color Vertical
4 Single Color Horizontal 8 Push-to-Reset, Single Color Horizontal

3 POLE ²

1 One 2 Two 3 Three

4 CIRCUIT

A Switch Only (no coil) C⁴ Series Trip (voltage)
B Series Trip (current) G⁴ Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH

0 without Aux Switch 3³ 0.110 Q.C. term with gold contacts
1³ 0.110 Q.C. term 4³ 0.110 PC term
2³ 0.110 Solder Lug

6 FREQUENCY & DELAY

03 ³ DC 50/60HZ, Switch Only	30 DC, 50/60Hz, Instantaneous
10 DC, Instantaneous	31 DC, 50/60Hz, Ultra Short
11 DC, Ultra Short	32 DC, 50/60Hz, Short
12 DC, Short	34 DC, 50/60Hz, Medium
14 DC, Medium	36 DC, 50/60Hz, Long
16 DC, Long	42 ⁴ 50/60 Hz Hi-Inrush Short
20 50/60 Hz Instantaneous	44 ⁴ 50/60 Hz Hi-Inrush Medium
21 50/60 Ultra Short	46 ⁴ 50/60 Hz Hi-Inrush Long
22 50/60 Hz Short	52 ⁴ DC Hi-Inrush Short
24 50/60 Hz Medium	54 ⁴ DC Hi-Inrush Medium
26 50/60 Hz Long	56 ⁴ DC Hi-Inrush Long

7 CURRENT RATING (AMPERES) ⁵

CODE AMPERES

410 1.00	445 4.50	610 10.00	618 18.00
512 1.25	450 5.00	710 10.50	620 20.00
415 1.50	455 5.50	611 11.00	622 22.00
517 1.75	460 6.00	711 11.50	624 24.00
420 2.00	465 6.50	612 12.00	625 25.00
522 2.25	470 7.00	712 12.50	630 30.00
425 2.50	475 7.50	613 13.00	632 32.00
527 2.75	480 8.00	614 14.00	635 35.00
430 3.00	485 8.50	615 15.00	
435 3.50	490 9.00	616 16.00	
440 4.00	495 9.50	617 17.00	

VOLTAGE RATING

CODE RATING TRIP VOLTS

A06 6DC 5DC	A65 65DC 55DC	J65 65AC 55AC
A12 12DC 10DC	J06 6AC 5AC	K20 120AC 65AC
A18 18DC 15DC	J12 12AC 10AC	L40 240AC 130AC
A24 24DC 20DC	J18 18AC 15AC	B10 110DC 59DC
A32 32DC 25DC	J24 24AC 20AC	B20 120DC 65DC
A48 48DC 40DC	J48 48AC 40AC	X01 65AC <small>special catalog #</small>

8 TERMINAL

1 Push ON 0.250 Tab (Q.C.)	Printed Circuitboard Terminals
2 Screw 8-32 with upturned lugs	L 90 Facing Left
3 Screw 8-32 (bus type)	R 90 Facing Right
A Screw M4 with upturned lugs	S Straight
B Screw M4 (bus type)	T Straight, Long

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 / BARRIERS ⁶

MOUNTING STYLE	BARRIERS	HALF ROCKER GUARD	BRACKET COLOR
Threaded Insert			
1 6-32 x 0.195 inches	no	no	Black
A 6-32 x 0.195 inches	yes	no	Black
2 ISO M3 x 5mm	no	no	Black
B ISO M3 x 5mm	yes	no	Black
3 6-32 x 0.195 inches	no	yes	Black
C 6-32 x 0.195 inches	yes	yes	Black
4 ISO M3 x 5mm	no	yes	Black
D ISO M3 x 5mm	yes	yes	Black
5 6-32 x 0.195 inches	no	no	White
E 6-32 x 0.195 inches	yes	no	White
6 ISO M3 x 5mm	no	no	White
F ISO M3 x 5mm	yes	no	White
7 6-32 x 0.195 inches	no	yes	White
G 6-32 x 0.195 inches	yes	yes	White
8 ISO M3 x 5mm	no	yes	White
H ISO M3 x 5mm	yes	yes	White
9 6-32 x 0.195 inches	no	no	Gray
J 6-32 x 0.195 inches	yes	no	Gray
P ISO M3 x 5mm	no	no	Gray
K ISO M3 x 5mm	yes	no	Gray
Q 6-32 x 0.195 inches	no	yes	Gray
L 6-32 x 0.195 inches	yes	yes	Gray
U ISO M3 x 5mm	no	yes	Gray
M ISO M3 x 5mm	yes	yes	Gray

11 MAX. APPLICATION RATING

A 65VDC
D 250VAC
M⁷ 80VDC
4⁸ 80VDC / 250VAC

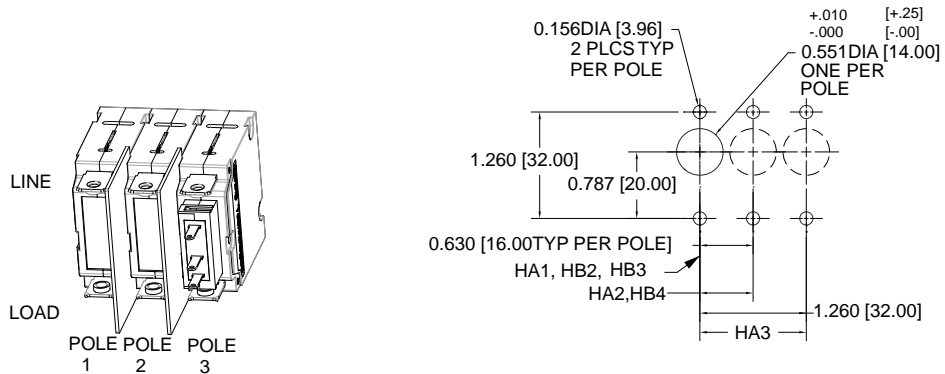
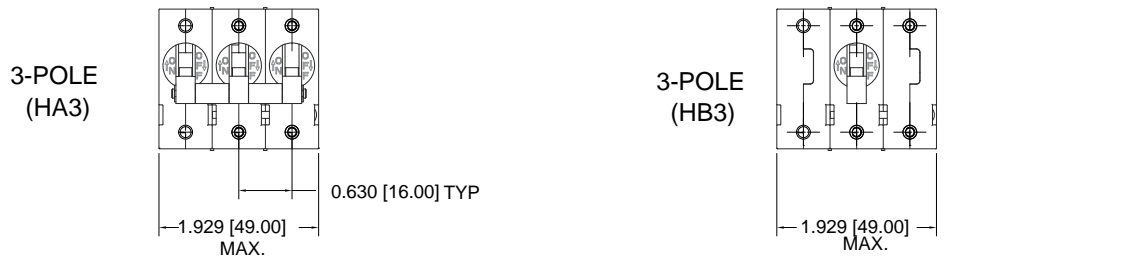
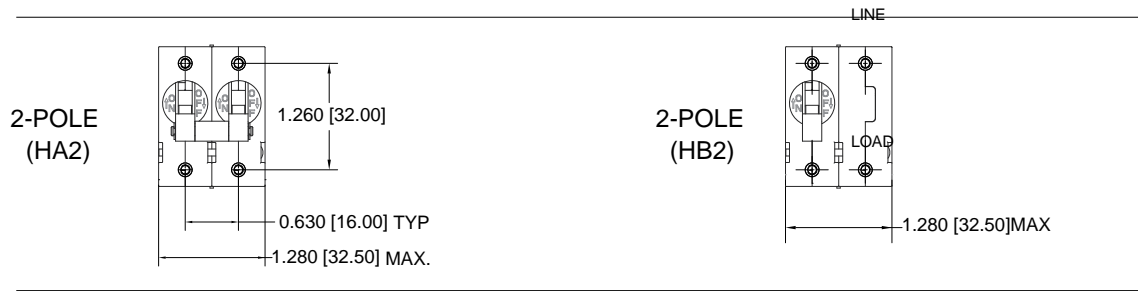
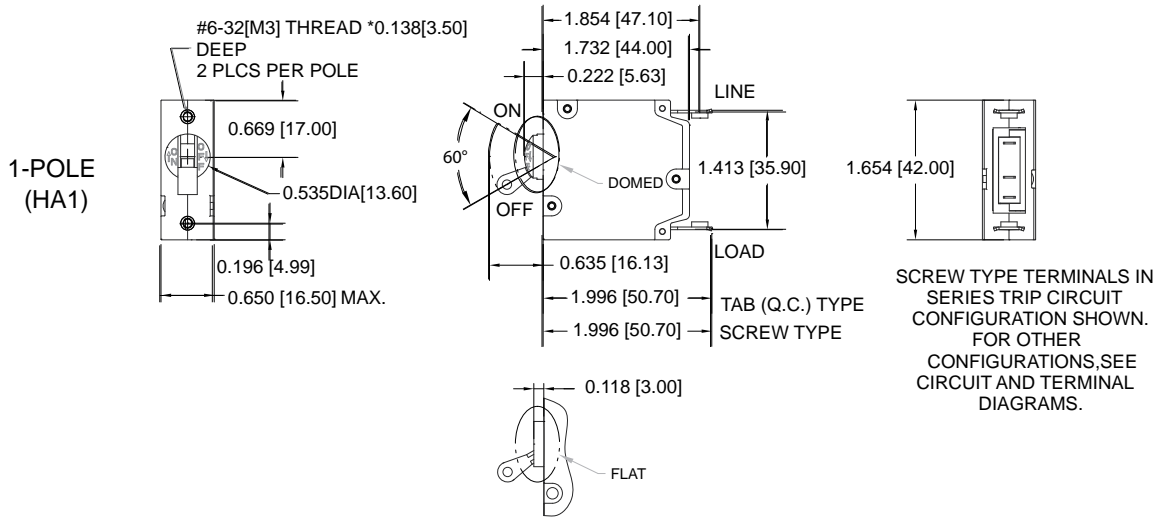
12 AGENCY APPROVAL

A Without approvals
C UL Recognized, CSA Accepted
E UL Recognized, CSA Accepted, TUV Certified
5 UL Recognized, CSA Accepted, TUV Certified, CCC Certified

Notes:

- 1 Push-To-Reset actuator shave OFF portion of rocker shrouded
- 2 Standard multipole units have all poles identical, except when specifying auxiliary switch
- 3 Auxiliary switch available on Series Trip and Switch Only circuits to 32A. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole
- 4 Separate Pole Type Voltage Coils not rated for continuous duty. Available only with delay code 10 & 20. Only Available with Agency code C.
- 5 For other current ratings, consult factory.
- 6 On Visi-Rocker, Visi portion of rocker cannot be the same color as the bezel. Remainder of rocker same color as bezel.
- 7 26-35A Polarity sensitive, only available as 1 pole unit.
- 8 Voltage code 4 available to 25A max.

Dimensional Specifications: in. [mm]



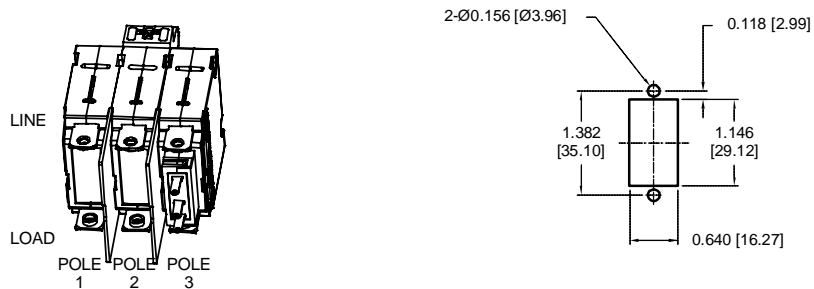
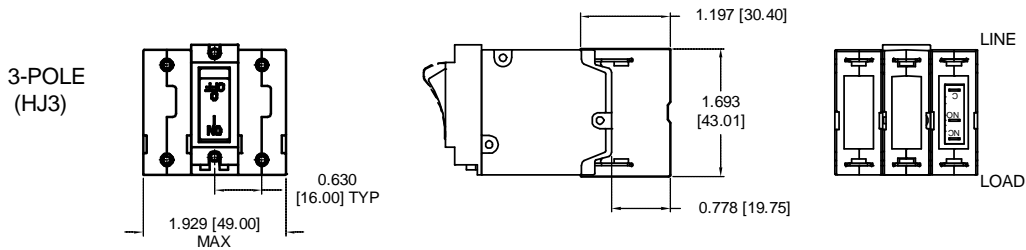
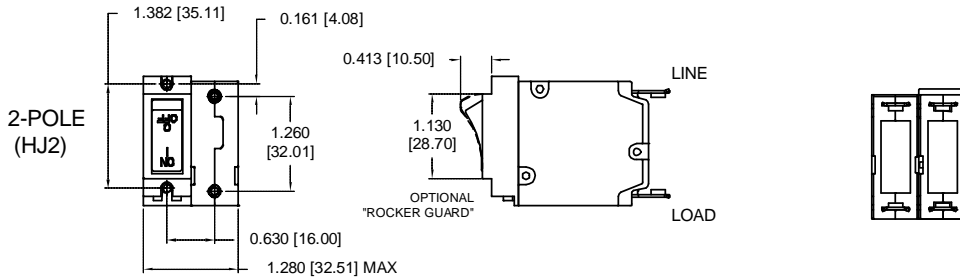
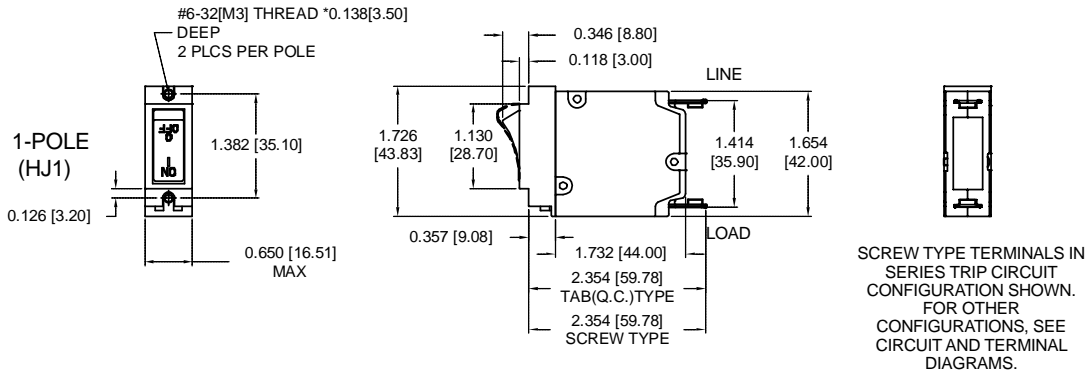
MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

PANEL CUTOUT DETAIL
TOLERANCES ±.005
[±.12]
UNLESS OTHERWISE SPECIFIED

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [51] unless otherwise specified.

Dimensional Specifications: in. [mm]



MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

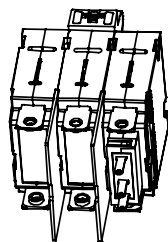
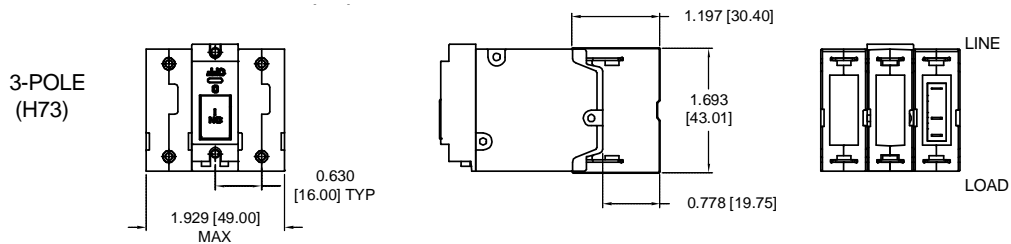
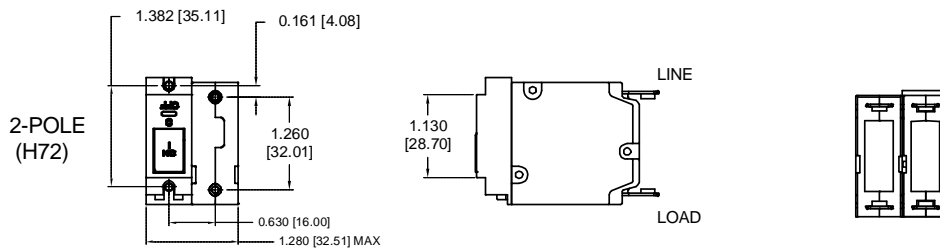
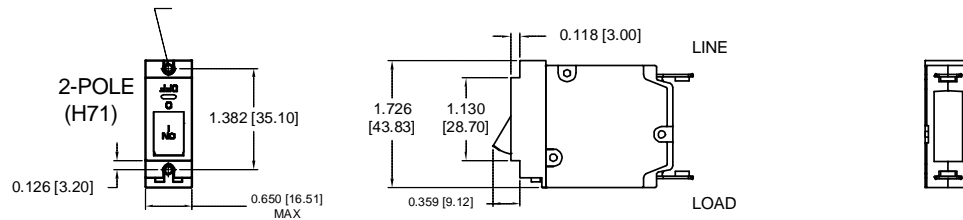
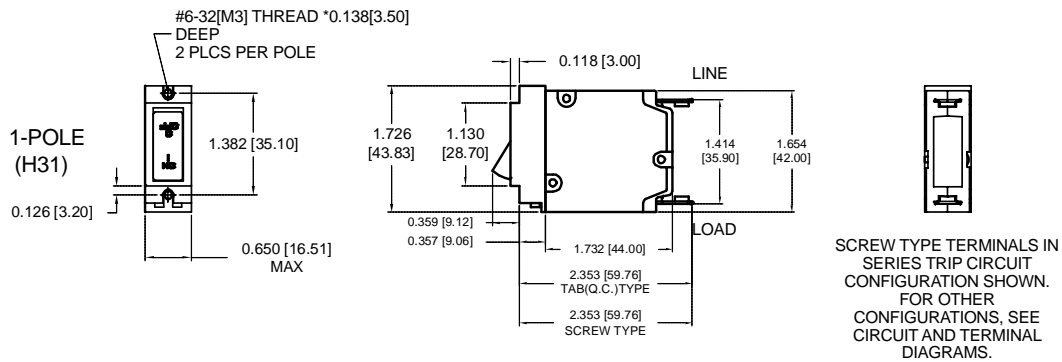
PANEL CUTOUT DETAIL
TOLERANCE ±.005[±.12]
UNLESS OTHERWISE SPECIFIED

Notes:

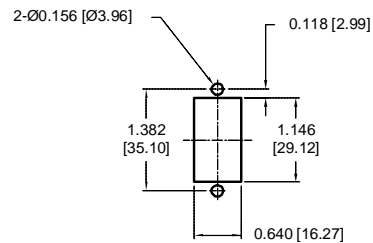
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [±.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

PUSH-TO-RESET ACTUATOR



MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.



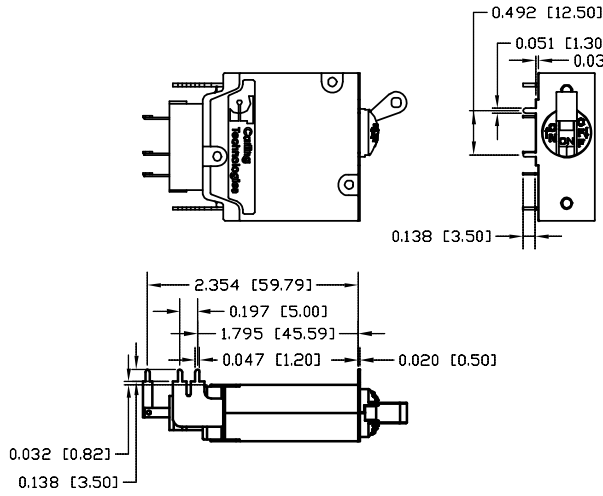
PANEL CUTOUT DETAIL TOLERANCE ±.005[±.12] UNLESS OTHERWISE SPECIFIED

Notes:

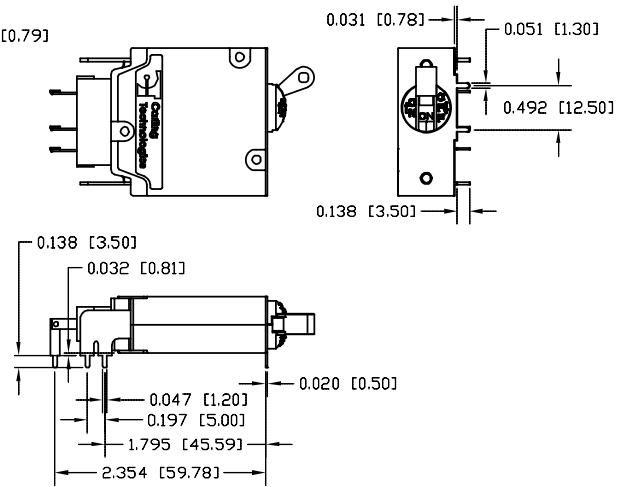
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [.51] unless otherwise specified.

PC Terminal Diagrams: in. [mm]

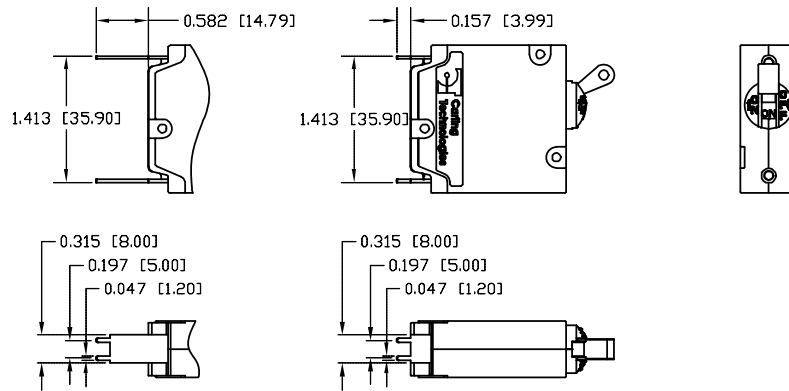
PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE R



PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE L



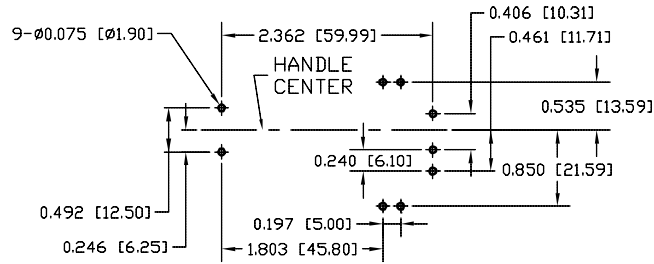
PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE S & T



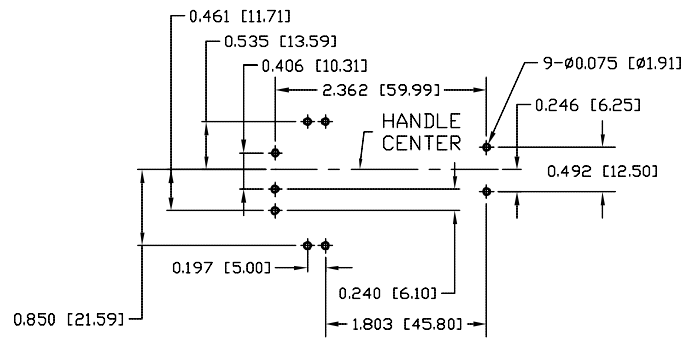
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

PC Terminal Diagrams: in. [mm]

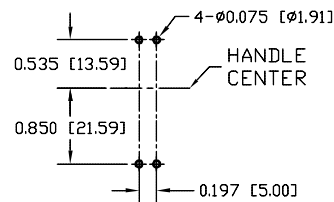
P.C. FOOT PRINT FOR TERMINAL CODE R



P.C. FOOT PRINT FOR TERMINAL CODE L



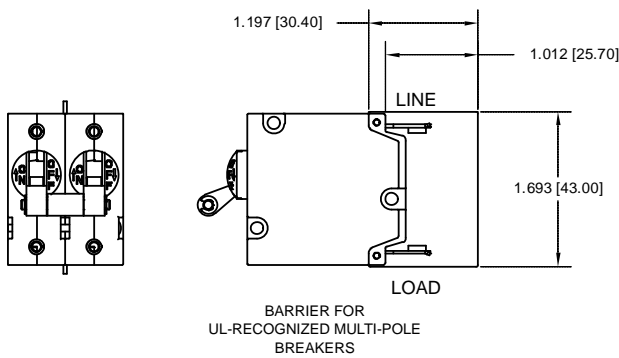
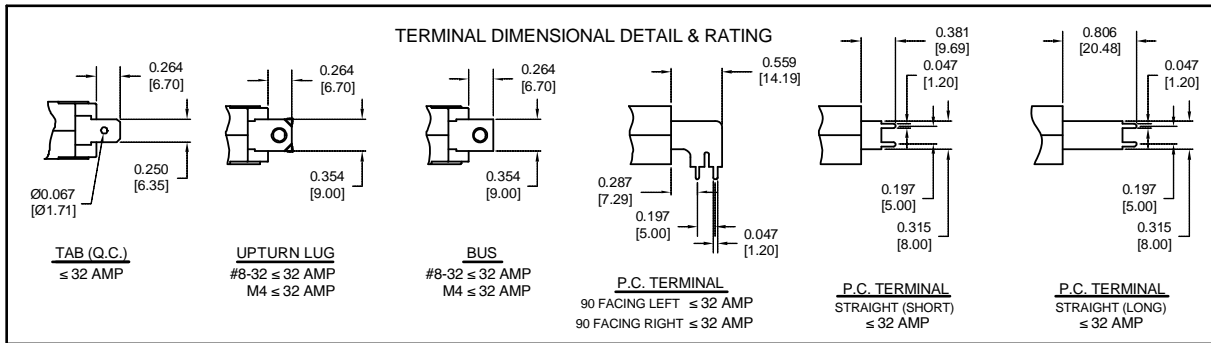
P.C. FOOT PRINT FOR TERMINAL CODE S & T



- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [0.51] unless otherwise specified.

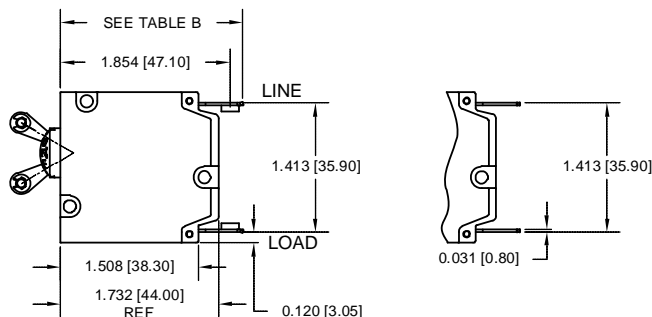
Circuit & Terminal Diagrams: in. [mm]

HANDLE POSITION VS. AUX SWITCH MODE		
STANDARD C/B		
CIRCUIT BREAKER MODE	HANDLE POSITION	AUX. SWITCH MODE
OFF		
ON		
ELECTRICAL TRIP		



THREAD SIZE	TORQUE
#6-32 & M3 MOUNTING HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#8-32 & M4 THREAD TERMINAL SCREW	12-15 IN-LBS [1.4-1.7 NM]

TERMINAL DESCRIPTION	DEPTH BEHIND PANEL
MAIN	
TAB (Q.C.)	1.996 [50.70]
SCREW TYPE	1.996 [50.70]
AUX. SWITCH*	
.110 TAB (Q.C.)	2.467 [62.67]
SOLDER TYPE	2.252 [57.19]



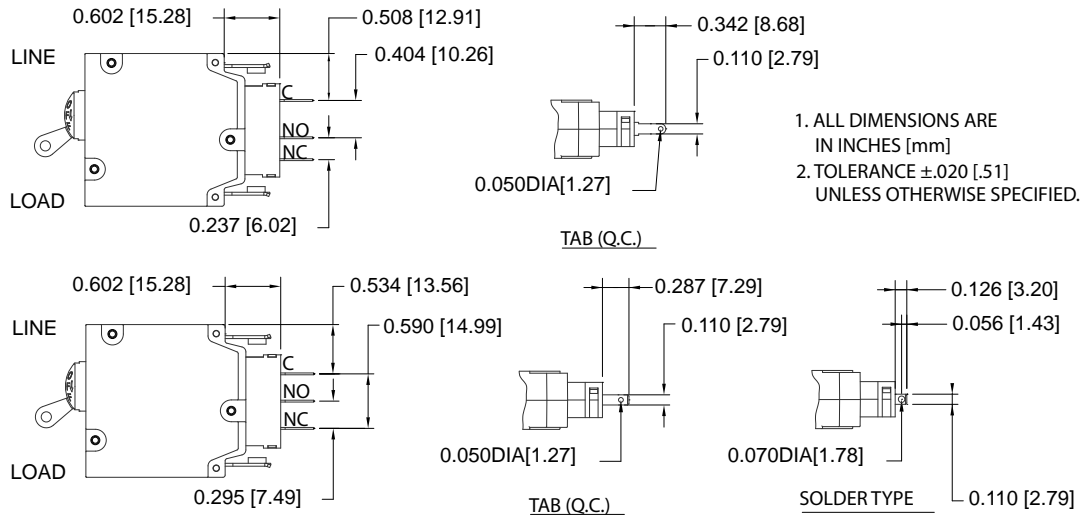
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

1. ALL DIMENSIONS ARE IN INCHES [mm]
2. TOLERANCE ±.020 [.51] UNLESS OTHERWISE SPECIFIED.

Circuit & Terminal Diagrams: in. [mm]

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		
	ANSI				ANSI	CIRCUIT CODE	AUX SWITCH CODE
	SWITCH ONLY (NO COIL)				SERIES TRIP		
2 TERMINALS 			A	0	B	0	
5 TERMINALS 0.377 [9.58] 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH 	SERIES TRIP WITH AUXILIARY 	A	1 2 3	B	1 2 3	
4 TERMINALS 	RELAY TRIP 		F G	0			

AUXILIARY SWITCH TERMINAL DETAIL

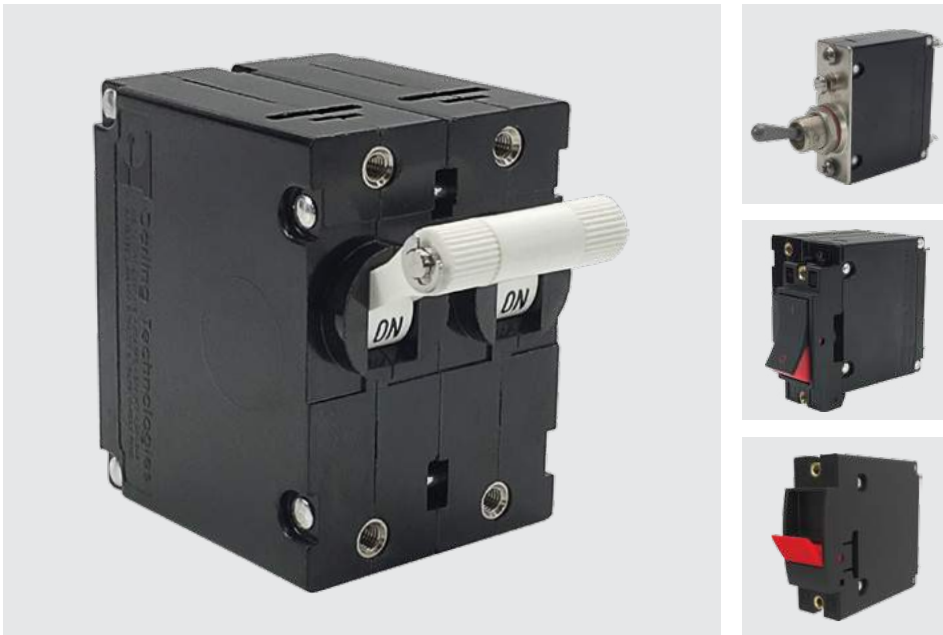


A-Series

CIRCUIT BREAKER

Well known for their proven reliability, Carling Technologies' A-Series hydraulic magnetic circuit breakers are compact, temperature stable and designed for precision operation in OEM markets requiring general purpose as well as full load amp applications. When front panel operation and aesthetics demand a clean, contemporary design, the visi-rocker or paddle actuators are ideally suitable. A sealed toggle actuator style is also available and ideal for harsh environment applications requiring additional sealing protection. Optional rocker-guard and push-to-reset bezels, which help prevent inadvertent actuation, are also available.

1-6 poles; ratings from 0.02 to 50 amps, up to 277VAC or 80VDC; UL Recognized, UL Listed, UL1500, UL1077, TUV, VDE & CSA



Product Highlights:

- Up to 50 amps in a compact size
- Various actuator styles
- Sealed metal toggle option tested to MIL-PRF-55629C. Meets IP68 Requirements

Typical Applications:

- Telecom/Datacom
- Marine
- Military
- Renewable Energy
- Generators & Welder

Electrical

Maximum Voltage 277VAC 50/60 Hz, 80VDC
 Current Ratings Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 50.0. Other ratings available - consult ordering scheme.
 Standard Voltage Coils DC-6V, 12V; AC-120V, Other ratings available, consult ordering scheme.
 Auxiliary Switch Rating SPDT; 10.1 A - 250VAC, 1.0 A-65VDC/0.5 A - 80 VDC, 0.1A - 125VAC (with gold contacts).
 Insulation Resistance Minimum: 100 Megohms at 500 VDC
 Dielectric Strength UL, CSA - 1500V 60 Hz for one minute between all electrically isolated terminals. A-Series rocker circuit breakers comply with the 8mm spacing & 3750V dielectric requirements from hazardous voltage to operator accessible surfaces per EN 60950 and VDE 0805.
 Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.
 Trip Free All A-Series Circuit Breakers will trip on overload, even when the actuator is forcibly held in the ON position.
 Trip Indication The operating actuator moves positively to the OFF position when an overload causes the circuit breaker to trip. When mid-trip handle is specified, the handle moves to the mid position on electrical trip of the circuit breaker. When mid-trip handle with alarm switch is specified, the handle moves to the mid position & the alarm switch actuates when the circuit breaker is electrically tripped.

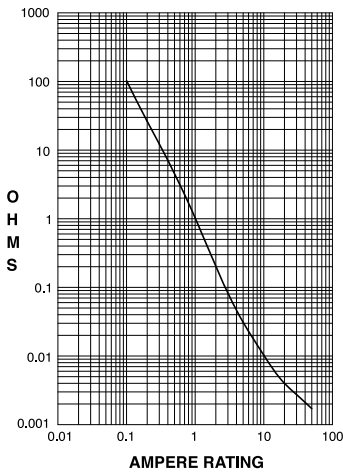
Physical

Number of Poles 1 - 6 Poles (handle) and 1-3 poles (rocker) at 30 Amps or less. 1 and 2 poles at 31 Amps thru 50 Amps.
 Internal Circuit Config. Series, (with or without auxiliary switch), Shunt and Relay with current or voltage trip coils, Dual Coil, Switch Only with or without auxiliary switch.
 Weight Approximately 65 grams/pole. (Approximately 2.32 ounces/pole)
 Standard Colors Housing - Black; Actuator- See Ordering Scheme.

Environmental

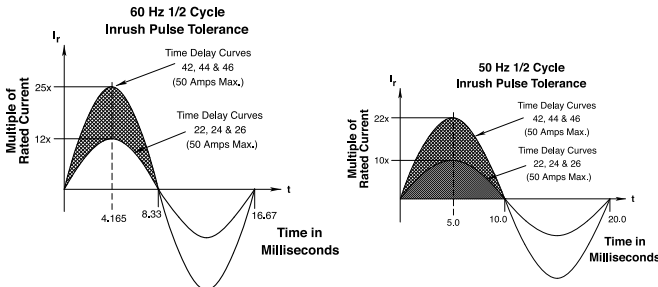
Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:
 Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultra-short curves tested @ 90% of rated current.
 Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current.
 Moisture Resistance Method 106D; ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.56 days @ +85°C, 85% RH.
 Salt Spray Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).
 Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).
 Operating Temperature -40° C to +85° C

RESISTANCE PER POLE VALUES from Line to Load Terminals (Values Based on Series Trip Circuit Breaker)



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

Pulse Tolerance Curves



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

Electrical Tables

Table A: Lists UL Recognized & CSA Accepted configurations and performance capabilities as a Component Supplementary Protector.

A-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps)		Application Codes		Construction Notes
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps	UL / CSA		UL	CSA	
						With Backup Fuse	Without Backup Fuse			
Series	32	DC	---	0.02 - 15	---	---	5000	TC1, OL1, U2	TC1, OL1, U2	
	65	DC	---	31 - 50	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	80	DC	---	0.02 - 30	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
				---	31 - 50	---	7500	TC1, 2, OL0, U1	TC1, 2, OL0, U1	
	125	50 / 60	1	0.02 - 30	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Rocker Version
	125	50 / 60	1	1 - 50	---	---	2000	TC1, OL1, U2	TC1, OL1, U2	
	125	50 / 60	1 ⁴	1 - 50	---	---	1000	TC1, OL1, U2	TC3, OL1, U3	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1, 2, OL1, U2	TC1, 2, OL1, U2	Rocker Version
	125 / 250	50 / 60	1 ³	0.02 - 50	---	---	3000	TC1, 2, OL1, U2	TC1, 2, OL1, U2	Handle
	250	50 / 60	1	0.02 - 30	---	---	1500	TC1, 2, OL0, U2	TC1, 2, OL0, U2	Single Pole Break
				0.02 - 30	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Two Pole Break
				---	---	---	3000	TC1, 2, OL0, U1	TC1, 2, OL0, U1	
			1 ⁴	1 - 50	---	1000	TC1, OL1, U2	TC3, OL1, U3		
			3	0.02 - 30	---	5000 ²	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
			31 - 50	---	2000 ¹	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1		
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1		
Dual Coil	32	DC	---	0.02 - 50	---	---	5000	TC1, OL1, U2	TC1, OL1, U2	
	65	DC	---	0.02 - 50	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	80	DC	---	0.02 - 30	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
				---	31 - 50	---	7500	TC1, 2, OL0, U1	TC1, 2, OL0, U1	
	125	50 / 60	1	0.02 - 30	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Rocker Version
				1 - 50	---	---	2000	TC1, OL1, U2	TC1, OL1, U2	
	125	50 / 60	1 ⁴	0.02 - 30	---	---	1000	TC1, OL1, U2	TC3, OL1, U3	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Rocker Version
	125 / 250	50 / 60	1 ³	0.02 - 50	---	---	3000	TC1, 2, OL1, U2	TC1, 2, OL1, U2	
	250	50 / 60	1	0.02 - 30	---	---	1500	TC1, OL0, U2	TC1, OL0, U2	Single Pole Break
				0.02 - 30	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Two Pole Break
				---	31 - 50	---	3000	TC1, 2, OL0, U1	TC1, 2, OL0, U1	
			1 ⁴	1 - 50	---	1000	TC1, OL1, U2	TC3, OL1, U3		
			3	0.02 - 30	---	5000 ²	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
			31 - 50	---	2000 ¹	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1		
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1, 2, OL1, U1	TC1, 2, OL1, U1		
Shunt	80	DC	---	0.02 - 30	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	125 / 250	50 / 60	1	0.02 - 30	---	---	3000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	250	50 / 60	1	0.02 - 30	---	---	3000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
			3	0.02 - 30	---	5000 ²	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
	277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
Relay	80	DC	---	0.02 - 30	---	---	7500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
	250	50 / 60	1	0.02 - 30	---	---	3000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	
			3	0.02 - 30	---	5000 ²	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
	277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	
Switch Only	65	DC	---	0.02 - 50	---	not applicable				
	80	DC	---	0.02 - 30	---					
	250	50 / 60	1	---	31 - 50					
			3	0.02 - 50	---					
	277	50 / 60	1	0.02 - 30	31 - 50					

Notes:

- 1 Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse (15A minimum) at no more than 4 times the rating of the protector.
- 2 Same as note 1, except that backup fuse is limited to 80 A maximum.
- 3 2 pole protector required (with one pole per power line) for: 125/250 VAC, 1 pole protector required for: 125 VAC, 1Ø Power System.
- 4 Satisfies the requirements of clause 11.2.8.2.5 of CSA STD C22.2 No 100 for the use of supplementary protectors with portable generators.

Electrical Tables

Table B: Lists UL Recognized, CSA Accepted, VDE & TUV Certified configurations & performance capabilities as a Component Supplementary Protector.

A-SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS																
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)						APPLICATION CODES		VDE CONSTRUCTION NOTES		
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS ¹	UL/CSA		VDE		TUV		UL	CSA			
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Inc) WITHOUT BACKUP	(Inc) WITH BACKUP FUSE	(Inc) WITHOUT BACKUP					
SERIES	65	DC	—	0.10 - 50	—	—	7500	—	—	5000	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	World Market Breaker TUV Only		
	80	DC	—	0.10 - 30	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Handle Version 1 Pole Only		
				31 - 50	31 - 50	—	7500	3000	1500	3000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1	Handle Version 1 Pole Only		
				0.10 - 30	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		
				31 - 32	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 2 Pole Only		
				31 - 50	31 - 50	—	7500	3000	1500	3000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1	Rocker Version 1 Pole Only		
	250	50 / 60	1	0.10 - 30	—	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		
				31 - 50	31 - 50	—	3000	—	—	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1	Rocker Version 1 - 3 Poles		
				31 - 32	—	—	3000	6000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 2 Pole Only		
				1	0.10 - 30	—	—	3000	6000	1500	5000	1500	TC1, OL1,U2	TC1, OL1,U2	Rocker Version 2 Pole Only	
				1 ⁴	1 - 50	—	—	1000	—	—	5000	1500	TC1, OL1,U2	TC3, OL1,U3	Rocker Version 1 - 3 Poles	
				3	0.10 - 30	—	—	5000 ³	—	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles
					31 - 50	—	—	2000 ²	—	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles
					0.10 - 30	—	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles	
				DUAL COIL	80	DC	—	0.10 - 30	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1
250	50 / 60	1	0.10 - 30		—	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		
			30 - 50		31 - 50	—	3000	—	—	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1	Rocker Version 1 - 3 Poles		
			0.10 - 30		—	—	5000 ³	—	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles	
			31 - 50		—	—	2000 ²	—	—	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles		
SHUNT	80	DC	—	0.10 - 30	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Handle Version 1 Pole Only		
				0.10 - 30	—	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		
	250	50 / 60	1	0.10 - 30	—	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		
				30 - 50	31 - 50	—	3000	—	—	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1	Rocker Version 1 - 3 Poles		
				0.10 - 30	—	—	5000 ³	—	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles	
				31 - 50	—	—	2000 ²	—	—	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles		
				0.10 - 30	—	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	Rocker Version 1 - 3 Poles		

Notes:

- 1 General Purpose Ratings for UL/CSA Only.
- 2 Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse (15A minimum) at no more than 4 times the rating of the protector.
- 3 Same as note 2, except that backup fuse is limited to 80 A maximum.
- 4 Satisfies the requirements of clause 11.2.8.2.5 of CSA STD C22.2 No 100 for the use of supplementary protectors with portable generators.

Electrical Tables

Table C: Lists UL Recognized, CSA Accepted configurations and performance capabilities as Protectors, Supplementary for Marine Electrical and Fuel Systems (Guide PEQZ2, File E75596). Ignition Protected per UL 1500. UL Classified Small Craft Electrical Devices, Marine in accordance with ISO 8846 (Guide UZMK, File MQ1515) as Marine Supplementary Protectors.

A-SERIES TABLE C: UL1500 (Marine Ignition Protected)							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY (AMPS)	APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE	UL	CSA
SERIES	14 ¹	DC	---	0.02 - 50	5000	TC1,OL1,U1	TC1,OL1,U1
	32 ¹	DC	---	0.02 - 50	5000	TC1,OL1,U2	TC1,OL1,U2
	65	DC	---	0.02 - 50	3000	TC1,OL1,U1	TC1,OL1,U1
	125	50 / 60	1	0.02 - 50	3000	TC1,OL1,U2	TC1,OL1,U2
	125 / 250	50 / 60	1 ²	0.02 - 50	3000	TC1,OL1,U2	TC1,OL1,U2
	250	50 / 60	1	0.02 - 30	1500	TC1,OL1,U1	TC1,OL1,U1

Notes:

1 Available with special catalog number only (consult factory).

2 2 pole protector required (with one per power line) for 125 / 250 VAC. 1 pole protector required for 125 VAC 1 phase power system

Table D: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (Guide DITT, File E189195), under UL489A.

A-SERIES TABLE D: UL489A (COMMUNICATIONS EQUIPMENT)				
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	GENERAL PURPOSE AMPS	WITHOUT BACKUP FUSE
SERIES	80	DC	0.10 - 50	5000
	80	DC	60 - 90 ¹	5000

Notes:

1 Parallel Pole Construction

Agency Certifications

UL Recognized

UL Standard 1077



Component Recognition Program as Protectors Supplementary (Guide CCN/QVNU2, File E75596)

UL Standard 508



Switches, Industrial Control (Guide CCN/NRNT2, File E148683)

UL Standard 1500



Protectors, Supplementary for Marine Electrical & Fuel Systems (Guide PEQZ2, File E75596) Ignition Protection

UL Listed

UL Standard 489A



Communications Equipment (Guide CCN/DITT, File E189195)

CSA Accepted



Component Supplementary Protector under Class 3215 30, File 047848 0 000 CSA Standard C22.2 No. 235

TUV Certified

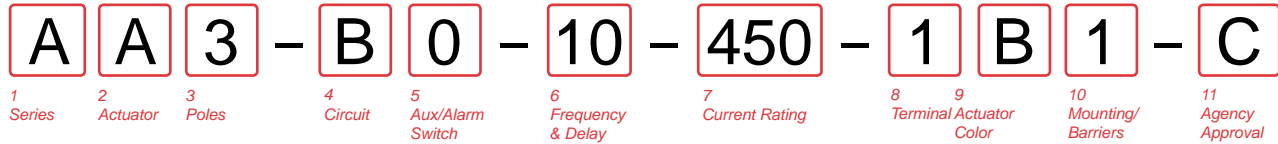


EN60934, under License No. R72103448

VDE Certified



EN60934, VDE 0642 under File No. 10537



1 SERIES
A

2 ACTUATOR 1

- A Handle, one per pole
- B Handle, one per multipole unit
- S Mid-Trip Handle, one per pole
- T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES

- | | | |
|-------|---------|--------|
| 1 One | 3 Three | 5 Five |
| 2 Two | 4 Four | 6 Six |

4 CIRCUIT

- | | |
|--------------------------------------|---|
| A ² Switch Only (No Coil) | F ³ Relay Trip (Current) |
| B Series Trip (Current) | G ³ Relay Trip (Voltage) |
| C Series Trip (Voltage) | H ^{3,4} Dual Coil with Shunt Trip Voltage Coil |
| D ³ Shunt Trip (Current) | K ^{3,4} Dual Coil with Relay Trip Voltage Coil |
| E ³ Shunt Trip (Voltage) | |

5 AUXILIARY / ALARM SWITCH 5

- | | |
|--|--|
| 0 without Aux Switch | 5 S.P.S.T., 0.093 Q.C. Term. (Gold Contacts) |
| 1 S.P.D.T., 0.093 Q.C. Term. | 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts) |
| 2 S.P.D.T., 0.110 Q.C. Term. | 8 S.P.S.T., 0.187 Q.C. Term. |
| 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) | 9 S.P.D.T., 0.187 Q.C. Term. |

6 FREQUENCY & DELAY

- | | |
|----------------------------|---|
| 03 DC 50/60Hz, Switch Only | 30 DC, 50/60Hz Instantaneous |
| 10 DC Instantaneous | 31 DC, 50/60Hz Ultra Short |
| 11 DC Ultra Short | 32 DC, 50/60Hz Short |
| 12 DC Short | 34 DC, 50/60Hz Medium |
| 14 DC Medium | 36 DC, 50/60Hz Long |
| 16 DC Long | 42 ⁷ 50/60Hz Short, Hi-Inrush |
| 20 50/60Hz Instantaneous | 44 ⁷ 50/60Hz Medium, Hi-Inrush |
| 21 50/60Hz Ultra Short | 46 ⁷ 50/60Hz Long, Hi-Inrush |
| 22 50/60Hz Short | 52 ⁷ DC, Short, Hi-Inrush |
| 24 50/60Hz Medium | 54 ⁷ DC, Medium, Hi-Inrush |
| 26 50/60Hz Long | 56 ⁷ DC, Long, Hi-Inrush |

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	527	2.750
035	0.035	240	0.400	430	3.000
040	0.040	245	0.450	435	3.500
045	0.045	250	0.500	440	4.000
050	0.050	255	0.550	445	4.500
055	0.055	260	0.600	450	5.000
060	0.060	265	0.650	455	5.500
065	0.065	270	0.700	460	6.000
070	0.070	275	0.750	465	6.500
075	0.075	280	0.800	470	7.000
080	0.080	285	0.850	475	7.500
085	0.085	290	0.900	480	8.000
090	0.090	295	0.950	485	8.500
095	0.095	410	1.000	490	9.000
210	0.100	512	1.250	495	9.500
215	0.150	415	1.500	610	10.000
220	0.200	517	1.750	710	10.500

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 6

CODE	AMPERES				
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

8 TERMINAL 9

- | | |
|---|---|
| 1 ¹⁰ Push-On 0.250 Tab (Q.C.) | E ¹¹ Screw M4 (Bus Type) |
| 2 Screw 8-32 with upturned lugs | F Screw M5 with upturned lugs & 30° bend |
| 3 ¹¹ Screw 8-32 (Bus Type) | G Screw M5 (Bus Type) & 30° bend |
| 4 Screw 10-32 with upturned lugs | H ¹¹ Screw M5 (Bus Type) |
| 5 ¹¹ Screw 10-32 (Bus Type) | L ¹² 0.250 Q.C./ Solder Lug |
| 6 Screw 8-32 with upturned lugs & 30° bend | M ¹¹ M6 Threaded Stud |
| 7 Screw 10-32 (Bus Type) & 30° bend | Q ¹⁴ Push-In Stud |
| 8 Screw 10-32 with upturned lugs & 30° bend | R Screw M4 with upturned lugs & 30° bend |
| 9 Screw 10-32 (Bus Type) & 30° bend | T ¹¹ Screw M4 (Bus Type) & 30° bend |
| B Screw M5 with upturned lugs | P ¹³ Printed Circuit Board Terminals |
| C Screw M4 with upturned lugs | S ¹³ Push-On 0.110 Tab (Q.C.) |

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
Black (short handle) ¹⁵	T	U	9	White

10 MOUNTING / BARRIERS

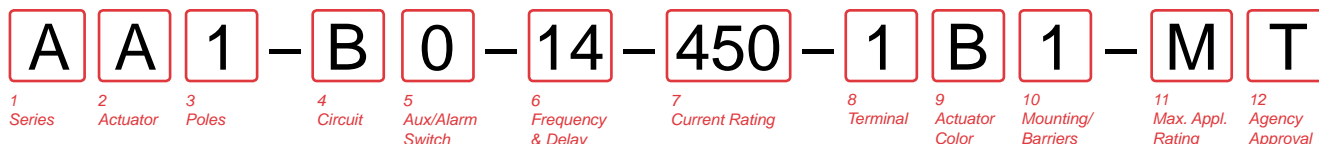
MOUNTING STYLE	BARRIERS
Threaded Insert, 2 per pole	
1 6-32 x 0.195 inches	no
A 6-32 x 0.195 inches	yes
2 ISO M3 x 5mm	no
B ISO M3 x 5mm (multipole only)	yes
Front panel Snap-In, 0.75" wide bezel	
5 without Handleguard	no
6 without Handleguard (multipole only)	yes
Front panel Snap-In, 0.96" wide bezel	
7 without Handleguard, 1-pole 0.96" wide; multipole units have .105" bezel overhang on all sides	no
8 without Handleguard, 1-pole 0.96" wide; (multipole only) .105" bezel overhang on all sides	yes

11 AGENCY APPROVAL

- C UL Recognized & CSA Accepted
- D VDE Certified, UL Recognized & CSA Accepted
- E TUV Certified, UL Recognized & CSA Accepted
- I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

Notes:

- 1 Actuator Code:
A: Handle tie pin spacer(s) and retainers provided un-assembled with multi-pole units.
B: Handle location as viewed from front of breaker:
2 pole - left pole 3 pole - center pole 4 pole - two handles at center poles
5 pole - three handles at center poles 6 pole - four handles at center poles
S: Handle moves to mid-position only upon electrical trip of the breaker. Available with circuit codes B, C, D, E, F, G, H and K.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker. Available with circuit codes B & C.
- 2 Switch Only circuits, rated up to 50 amps and 6 poles, and only available when tied to a protected pole (Circuit Code B, C, D or H.). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 3 Available with terminal Codes 1, 2 and 3. Current Rating limited to 50A amps maximum.
- 4 Consult factory for available Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 5 Auxiliary Switch breakers with Series Trip & Switch Only circuits: ≤ 30A - supplied with standard half shells. 35-50A - supplied with extended boat (B-Style) half shells. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 6 Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10 and 20.
- 7 Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- 8 VDE Certification available with single pole breakers with DC Delay only. UL Recognition and CSA Accepted available in one and two pole breakers.
- 9 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, M and Q.
- 10 Terminal Code 1: VDE Certification up to 25 amps and UL Recognition and CSA Certification up to 30 amps, but not recommended over 20 amps.
- 11 Terminal Codes 3, 5, E and H (Bus Type) with VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only VDE Certified when the washers are used.
- 12 Terminal Code L: VDE Certified available up to 12A. UL Recognized & CSA Accepted available up to 30A.
- 13 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL Recognition and CSA Accepted, with Circuit Codes A, B and C. Two pole breakers with Terminal Code P (Printed Circuit Board) are available up to 40 amps with UL Recognition and CSA Accepted with Circuit Codes A, B and C.
- 14 Terminal Code Q not available with VDE certification.
- 15 Single pole only.



1 SERIES
A

2 ACTUATOR 1
A Handle, one per pole
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES 2
1 One
2 Two
3 Three
4 Four

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH 2
0 without Aux Switch
1 S.P.D.T., 0.093 Q.C. Term.
2 S.P.D.T., 0.110 Q.C. Term.

7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
8 S.P.S.T., 0.187 Q.C. Term.
9 S.P.D.T., 0.187 Q.C. Term.

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

52 ³ DC, Short, Hi-Inrush
54 ³ DC, Medium, Hi-Inrush
56 ³ DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	285	0.850	455	5.500	613	13.000
215	0.150	290	0.900	460	6.000	614	14.000
220	0.200	295	0.950	465	6.500	615	15.000
225	0.250	410	1.000	470	7.000	616	16.000
230	0.300	512	1.250	475	7.500	617	17.000
235	0.350	415	1.500	480	8.000	618	18.000
240	0.400	517	1.750	485	8.500	620	20.000
245	0.450	420	2.000	490	9.000	622	22.000
250	0.500	522	2.250	495	9.500	624	24.000
255	0.550	527	2.750	610	10.000	625	25.000
260	0.600	430	3.000	710	10.500	630	30.000
265	0.650	435	3.500	611	11.000	635	35.000
270	0.700	440	4.000	711	11.500	640	40.000
275	0.750	445	4.500	612	12.000	645	45.000
280	0.800	450	5.000	712	12.500	650	50.000

8 TERMINAL 5
1 ⁶ Push-On 0.250 Tab (Q.C.)
2 Screw 8-32 with upturned lugs
3 ⁷ Screw 8-32 (Bus Type)
4 Screw 10-32 with upturned lugs
5 ⁷ Screw 10-32 (Bus Type)
6 Screw 8-32 with upturned lugs & 30° bend
7 Screw 8-32 (Bus Type) & 30° bend
8 Screw 10-32 with upturned lugs & 30° bend

9 Screw 10-32 (Bus Type) & 30° bend
B Screw M5 with upturned lugs
F Screw M5 with upturned lugs & 30° bend
G Screw M5 (Bus Type) & 30° bend
H Screw M5 (Bus Type)
M ⁷ M6 Threaded Stud
P ⁸ Printed Circuit Board Terminals
Q ⁹ Push-In Stud

9 ACTUATOR COLOR & LEGEND

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black
Black (short handle) ¹⁰	U	9	White

10 MOUNTING / BARRIERS

MOUNTING STYLE	BARRIERS
Threaded Insert, 2 per pole	
1 6-32 x 0.195 inches	no
A 6-32 x 0.195 inches	yes
2 ISO M3 x 5mm	no
B ISO M3 x 5mm (multipole only)	yes
Front panel Snap-In, 0.75" wide bezel	
5 without Handleguard	no
6 without Handleguard (multipole only)	yes
Front panel Snap-In, 0.96" wide bezel	
7 without Handleguard, 1-pole 0.96" wide;	no
multipole units have .105" bezel overhang on all sides	
8 without Handleguard, 1-pole 0.96" wide;	yes
(multipole only) .105" bezel overhang on all sides	

11 MAXIMUM APPLICATION RATING
M 80 DC

12 AGENCY APPROVAL
T UL489A Listed
K UL489A Listed, VDE Certified
J UL489A Listed, TUV Certified

Notes:

- Actuator Code:
 A: Handle tie pin spacer(s) and retainers provided un-assembled with multi-pole units.
 S: Handle moves to mid-position only upon electrical trip of the breaker.
 T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker.
- On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- VDE Certified to 30 amps. UL489A Listed to 50 amps.
- VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
- Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9 G, H, M and Q.
- Terminal Code 1 (Push-On) available up to 25 amps with VDE Certification and 30 amps with UL489A Listing, but is not recommended over 20 amps.
- Terminal Codes 3, 5 and H (Bus Type) with VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only VDE Certified when the washers are used.
- Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL489A Listing.
- Terminal Code Q not available with VDE certification.
- Single pole only.



1 SERIES

A

2 ACTUATOR 1

A Handle, one per pole
B Handle, one per multipole unit
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES

1 One **3** Three **5** Five
2 Two **4** Four **6** Six

4 CIRCUIT

A² Switch Only (No Coil) **D**³ Shunt Trip (Current)
B Series Trip (Current) **E**³ Shunt Trip (Voltage)
C Series Trip (Voltage) **H**^{3,4} Dual Coil with Shunt Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH 5

0 without Aux Switch
2 S.P.D.T., 0.110 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)

6 FREQUENCY & DELAY

03 DC 50/60Hz, Switch Only	30 DC, 50/60Hz Instantaneous
10 DC Instantaneous	31 DC, 50/60Hz Ultra Short
11 DC Ultra Short	32 DC, 50/60Hz Short
12 DC Short	34 DC, 50/60Hz Medium
14 DC Medium	36 DC, 50/60Hz Long
16 DC Long	42 ⁷ 50/60Hz Short, Hi-Inrush
20 50/60Hz Instantaneous	44 ⁷ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short	46 ⁷ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short	52 ⁷ DC, Short, Hi-Inrush
24 50/60Hz Medium	54 ⁷ DC, Medium, Hi-Inrush
26 50/60Hz Long	56 ⁷ DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES		CODE	AMPERES		CODE	AMPERES	
210	0.100	285 0.850	455	5.500	613	13.000		
215	0.150	290 0.900	460	6.000	614	14.000		
220	0.200	295 0.950	465	6.500	615	15.000		
225	0.250	410 1.000	470	7.000	616	16.000		
230	0.300	512 1.250	475	7.500	617	17.000		
235	0.350	415 1.500	480	8.000	618	18.000		
240	0.400	517 1.750	485	8.500	620	20.000		
245	0.450	420 2.000	490	9.000	622	22.000		
250	0.500	522 2.250	495	9.500	624	24.000		
255	0.550	527 2.750	610	10.000	625	25.000		
260	0.600	430 3.000	710	10.500	630	30.000		
265	0.650	435 3.500	611	11.000	635 ⁸	35.000		
270	0.700	440 4.000	711	11.500	640 ⁸	40.000		
275	0.750	445 4.500	612	12.000	645 ⁸	45.000		
280	0.800	450 5.000	712	12.500	650 ⁸	50.000		

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 6

CODE	AMPERES		CODE	AMPERES		CODE	AMPERES	
A06	6 DC	A32 32 DC	J12	12 AC	J65	65 AC		
A12	12 DC	A48 48 DC	J18	18 AC	K20	120 AC		
A18	18 DC	A65 65 DC	J24	24 AC	L40	240 AC		
A24	24 DC	J06 6 AC	J48	48 AC				

8 TERMINAL 9

1 ¹⁰ Push-On 0.250 Tab (Q.C.)	B Screw M5 with upturned lugs
2 Screw 8-32 with upturned lugs	C Screw M4 with upturned lugs
3 ¹¹ Screw 8-32 (Bus Type)	E ¹¹ Screw M4 (Bus Type)
4 Screw 10-32 with upturned lugs	F Screw M5 with upturned lugs & 30° bend
5 ¹¹ Screw 10-32 (Bus Type)	G Screw M5 (Bus Type) & 30° bend
6 Screw 8-32 with upturned lugs & 30° bend	H ¹¹ Screw M5 (Bus Type)
7 Screw 8-32 (Bus Type) & 30° bend	R Screw M4 with upturned lugs & 30° bend
8 Screw 10-32 with upturned lugs & 30° bend	T ¹¹ Screw M4 (Bus Type) & 30° bend
9 Screw 10-32 (Bus Type) & 30° bend	

9 ACTUATOR COLOR & LEGEND

Actuator Color	I-O	Dual	Legend Color
White	A	1	Black
Black	C	2	White
Red	F	3	White
Green	H	4	White
Blue	K	5	White
Yellow	M	6	Black
Gray	P	7	Black
Orange	R	8	Black
Black (short handle) ¹⁵	T	9	White

10 MOUNTING / BARRIERS

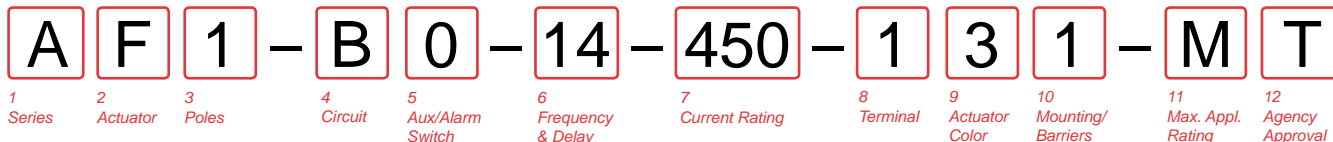
MOUNTING STYLE	BARRIERS
Threaded Insert, 2 per pole	
1 6-32 x 0.195 inches	no
A 6-32 x 0.195 inches	yes
2 ISO M3 x 5mm	no
B ISO M3 x 5mm (multipole only)	yes
Front panel Snap-In, 0.75" wide bezel	
5 without Handguard	no
6 without Handguard (multipole only)	yes
Front panel Snap-In, 0.96" wide bezel	
7 without Handguard, 1-pole 0.96" wide;	no
multipole units have .105" bezel overhang on all sides	
8 without Handguard, 1-pole 0.96" wide;	yes
(multipole only) .105" bezel overhang on all sides	

11 AGENCY APPROVAL

P TUV Certified, UL Recognized & CSA Accepted
Q UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

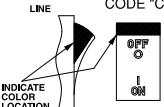
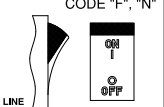
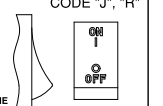
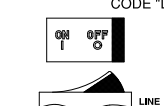
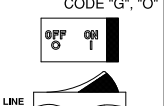
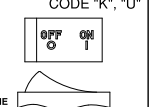
Notes:

- 1 Actuator Code:
A: Handle tie pin spacer(s) and retainers provided unassembled with multi-pole units.
S: Handle moves to mid-position only upon electrical trip of the breaker. Available with circuit codes B, C, D, E, and H.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker. Available with circuit codes B & C.
- 2 Switch Only circuits, rated up to 50 amps and 6 poles, and only available when tied to a protected pole (Circuit Code B, C, D or H.). For .01 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 3 Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 4 Consult factory for available Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 5 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 6 Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10, 20 & 30.
- 7 Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- 8 Available up to two poles with AC or DC delays.
- 9 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G and H.
- 10 Terminal Code 1: TUV Certification up to 30 amps, but not recommended over 20 amps.
- 11 Terminal Codes 3, 5, 7, 9, E, G and H (Bus Type) are supplied with Lock Washers. These breakers are only TUV Certified when the washers are used.
- 12 Single pole only.



1 SERIES
A

2 ACTUATOR 1
Two Color Visi-Rocker
C Indicate ON, vertical legend
D Indicate ON, horizontal legend
F Indicate OFF, vertical legend
G Indicate OFF, horizontal legend
Single color
J Vertical legend
K Horizontal legend
Push-To-Reset, Visi-Rocker
N Indicate OFF, vertical legend
O Indicate OFF, horizontal legend
Push-To-Reset, Single color
R Vertical legend
U Horizontal legend

ROCKER STYLE DESCRIPTIONS			
	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR
VERTICAL STYLE	 LINE CODE "C" INDICATE COLOR LOCATION	 LINE CODE "F", "N"	 LINE CODE "J", "R"
	 CODE "D"	 LINE CODE "G", "O"	 LINE CODE "K", "U"

3 POLES 2
1 One
2 Two
3 Three

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 2
0 without Aux Switch
1 S.P.D.T., 0.093 Q.C. Term.
2 S.P.D.T., 0.110 Q.C. Term.
7 S.P.S.T., 0.110 Q.C. Term.
8 S.P.S.T., 0.187 Q.C. Term.
9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
52 DC, Short, Hi-Inrush
54 DC, Medium, Hi-Inrush
56 DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES	285	0.850	455	5.500	613	13.000
210	0.100	290	0.900	460	6.000	614	14.000
215	0.150	295	0.950	465	6.500	615	15.000
220	0.200	410	1.000	470	7.000	616	16.000
225	0.250	512	1.250	475	7.500	617	17.000
230	0.300	515	1.500	480	8.000	618	18.000
235	0.350	517	1.750	485	8.500	620	20.000
240	0.400	420	2.000	490	9.000	622	22.000
245	0.450	522	2.250	495	9.500	624	24.000
250	0.500	527	2.750	610	10.000	625	25.000
255	0.550	430	3.000	710	10.500	630	30.000
260	0.600	435	3.500	611	11.000	635	35.000
265	0.650	440	4.000	711	11.500	640	40.000
270	0.700	445	4.500	612	12.000	645	45.000
275	0.750	450	5.000	712	12.500	650	50.000
280	0.800						

8 TERMINAL 5
1⁶ Push-On 0.250 Tab (Q.C.)
2 Screw 8-32 with upturned lugs
3⁷ Screw 8-32 (Bus Type)
4 Screw 10-32 with upturned lugs
5⁷ Screw 10-32 (Bus Type)
6 Screw 8-32 with upturned lugs & 30° bend
7 Screw 8-32 (Bus Type) & 30° bend
8 Screw 10-32 with upturned lugs & 30° bend
9 Screw 10-32 (Bus Type) & 30° bend
B Screw M5 with upturned lugs
F Screw M5 with upturned lugs & 30° bend
G Screw M5 (Bus Type) & 30° bend
H Screw M5 (Bus Type)
M⁷ M6 Threaded Stud
P⁸ Printed Circuit Board Terminals
Q⁹ Push-In Stud

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color ¹⁰	Marking:		Marking Color	
	ON-OFF	Dual ¹⁰	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS 11

	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole	BARRIERS
1	6-32 x 0.195 inches	no
A	6-32 X 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm (multi-pole units only)	yes
	ROCKERGUARD & PUSH-TO-RESET BEZEL Threaded Insert, 2 per pole	
3	6-32 x 0.195 inches	no
C	6-32 x 0.195 inches (multi-pole units only)	yes
4	ISO M3 x 5mm	no
D	ISO M3 x 5mm (multi-pole units only)	yes
	FRONT PANEL SNAP-IN BRACKET, 0.744" [18.90mm] wide bezel	
8	without Rockerguard (single pole units only)	no
H	with Rockerguard (single pole units only)	no
	FRONT PANEL SNAP-IN BRACKET, 0.96" [24.48mm] wide bezel	
9	without Rockerguard (single pole units only)	no
J	with Rockerguard (single pole units only)	no

11 MAXIMUM APPLICATION RATING
M 80 DC

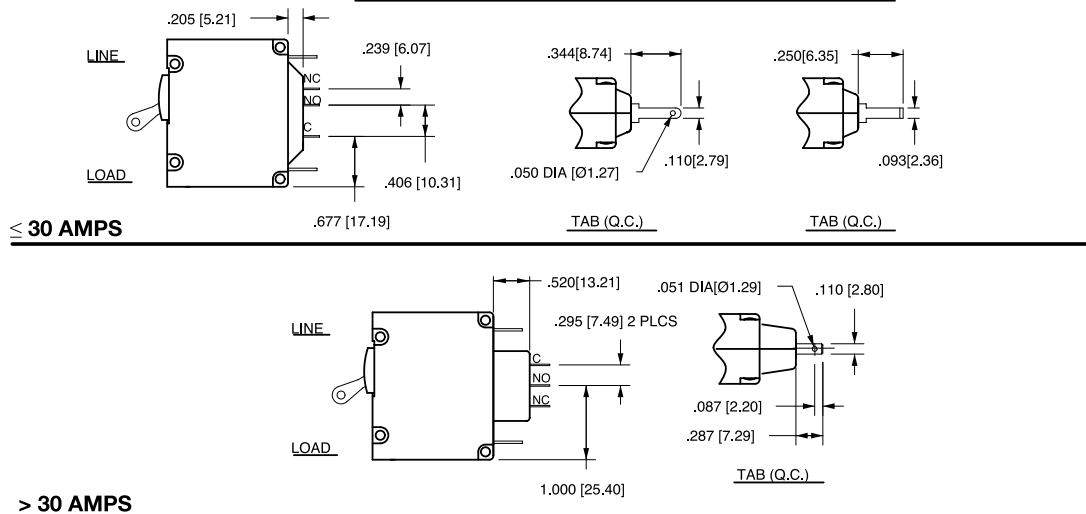
12 AGENCY APPROVAL
T UL489A Listed
K UL489A Listed, VDE Certified
J UL489A Listed, TUV Certified

Notes:
 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
 2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
 3 Auxiliary Switch breakers with Series Trip circuits: ≤ 30A, are supplied with standard half shells. 30-50A are supplied with extended boat (B-Style) half shells.
 4 VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
 5 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, M and Q.
 6 Terminal Code 1 (Push-On) available up to 25 amps with TUV or VDE Certification and 30 amps with UL489A Listing, but is not recommended over 20 amps.
 7 Terminal Codes 3, 5 and H (Bus Type) with TUV or VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only TUV or VDE Certified when the washers are used.
 8 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL489A Listing.
 9 Terminal Code Q not available with VDE certification.
 10 Color shown is Visi and Legend with remainder of rocker black. Dual = ON-OFF/I-O legend.
 11 Legend on Push-to-reset bezel/shroud is white with single color actuator codes R & U. Legend on Push-To-Reset bezel/shroud matches Visi-Color of rocker with actuator codes N & O. Rockerguard available with actuator codes C through K

Circuit & Terminal Diagrams: in. [mm]

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	ANSI	ANSI	ANSI		
2 TERMINALS 	SWITCH ONLY (NO COIL) 	SWITCH ONLY (NO COIL) A 0	SERIES TRIP 	BC 0		
5 TERMINALS 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH 	A 1 2 3 4	SERIES TRIP WITH (3) AUXILIARY/ALARM SWITCH 	BC 1 2 3 4		
3 TERMINALS 	SHUNT TRIP 	DE 0	DUAL COIL; SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL 	H 0		
4 TERMINALS 	RELAY TRIP 	FG 0	DUAL COIL; SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL 	K 0		

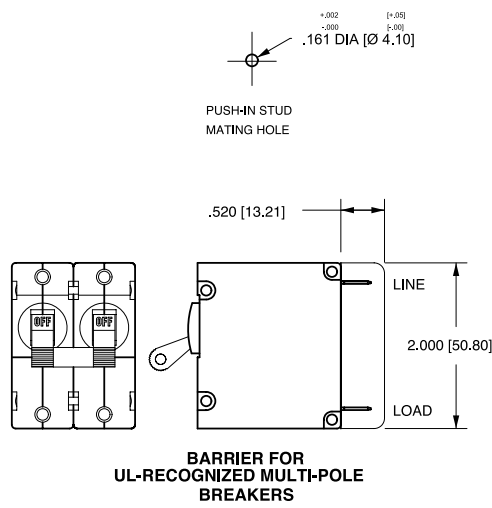
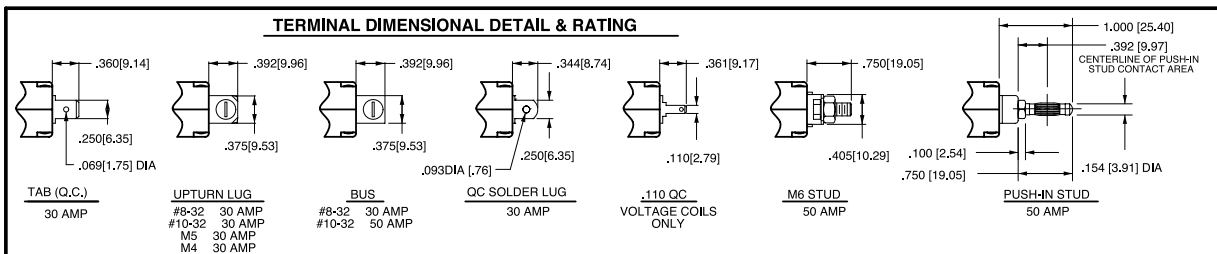
AUXILIARY/ALARM SWITCH TERMINAL DETAIL



- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance $\pm .020$ [.51] unless otherwise specified.
 - Alarm Switch available with .110 x .020 Q.C. & Solder Lug Terminals Only.

Circuit & Terminal Diagrams: in. [mm]

HANDLE POSITION VS. AUX/ALARM SWITCH MODE						
CIRCUIT BREAKER MODE	STANDARD C/B		MID TRIP C/B		MID TRIP C/B	
	HANDLE POSITION	AUX. SWITCH MODE	HANDLE POSITION	ALARM SWITCH MODE	HANDLE POSITION	AUX. SWITCH MODE (w/o ALARM SWITCH)
OFF						
ON						
ELECTRICAL TRIP						



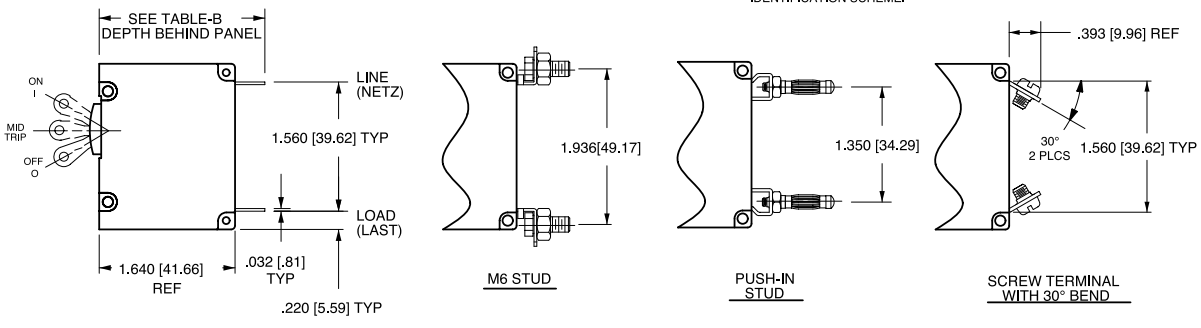
**TABLE A
TIGHTENING TORQUE SPECIFICATIONS**

THREAD SIZE	TORQUE
#6-32 & M3 MOUNTING HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#8-32 & M4 THREAD TERMINAL SCREW	12-15 IN-LBS [1.4-1.7 NM]
#10-32 & M5 THREAD TERMINAL SCREW	15-20 IN-LBS [1.7-2.3 NM]

TABLE B

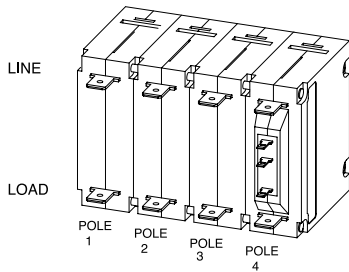
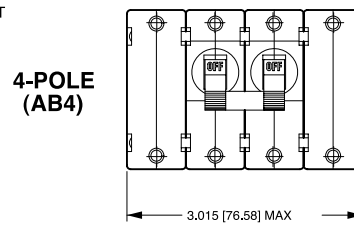
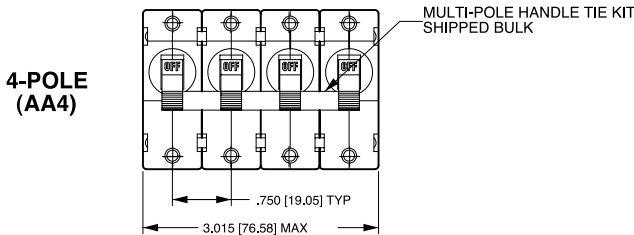
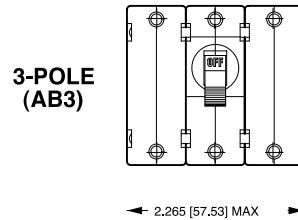
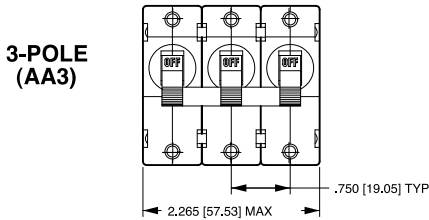
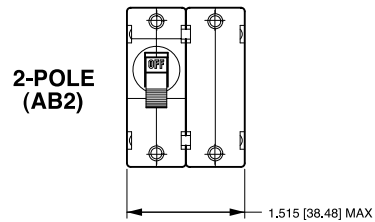
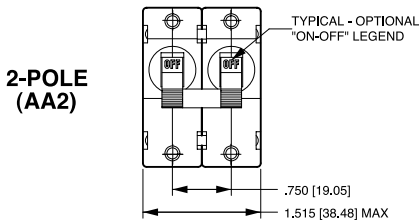
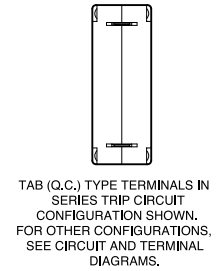
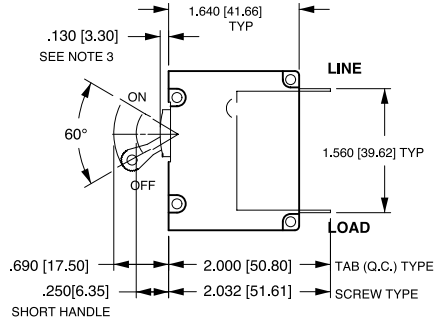
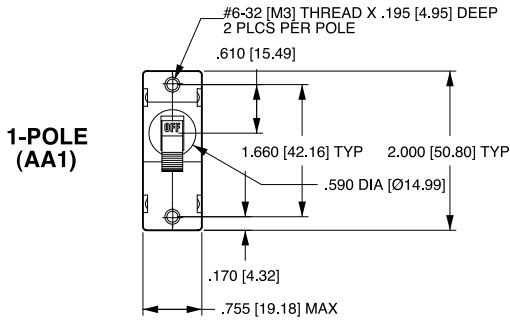
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.000 [50.80]
	SCREW TYPE	2.032 [51.60]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.207 [56.10]
	SCREW #8-32 W/UPTURNED LUGS	2.364 [60.05]
AUX. SWITCH*	.093 TAB (Q.C.)	2.095 [53.20]
	.110 TAB (Q.C.)	2.189 [55.60]
	SOLDER TYPE	1.970 [50.00]

* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

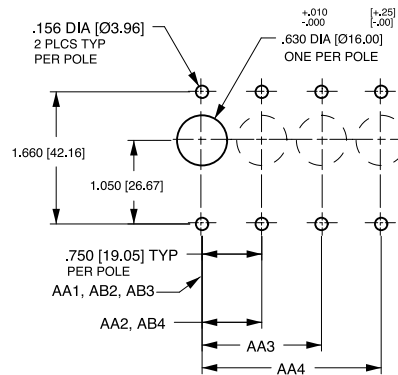


- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance ±.020 [.51] unless otherwise specified.
 - Alarm Switch available with .110 x .020 QC & solder lug terminals only.

Dimensional Specifications: in. [mm]



MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

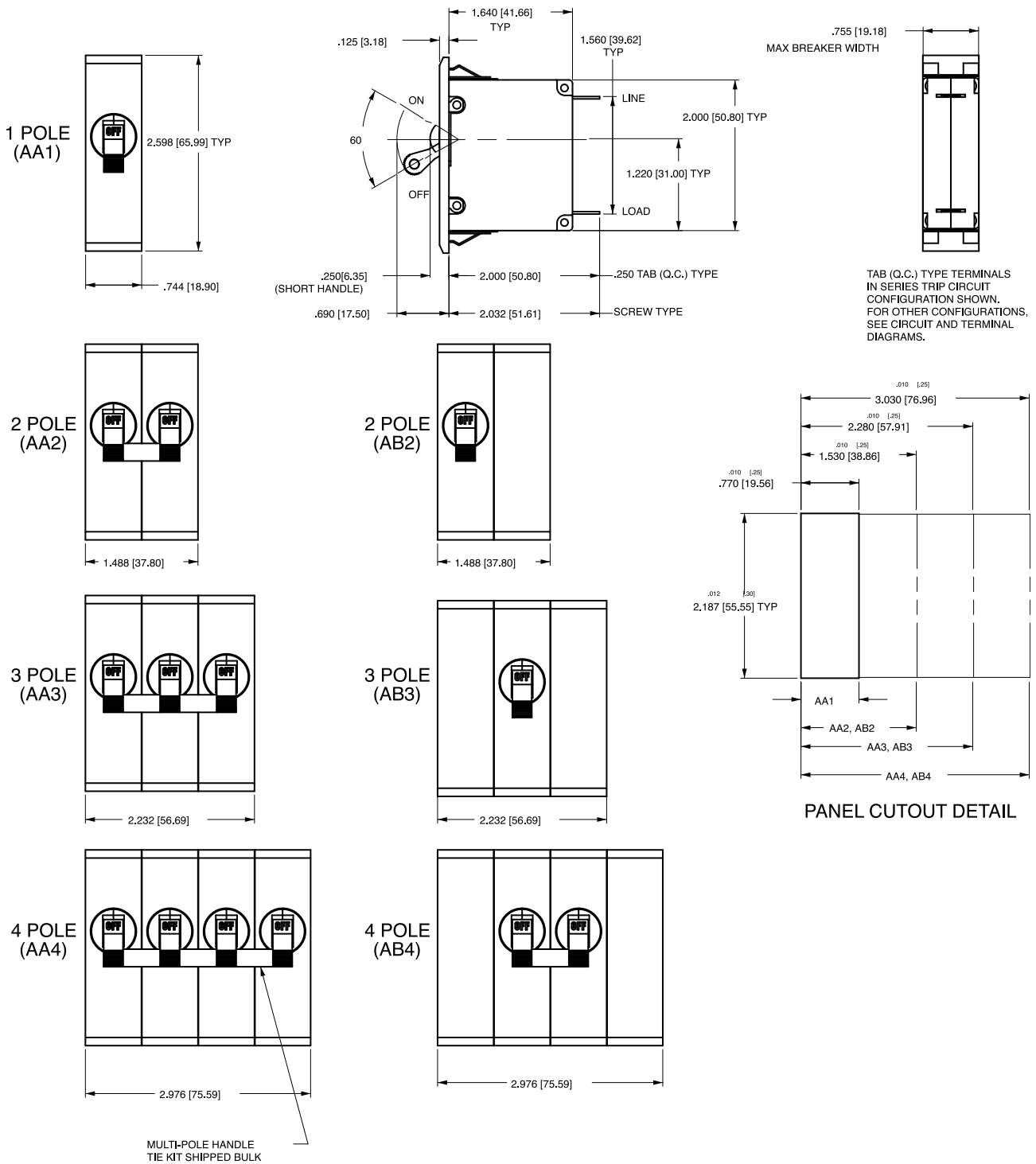


PANEL CUTOUT DETAIL
TOLERANCES ±.005 [±.12] UNLESS OTHERWISE SPECIFIED

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.20 [5.1] unless otherwise specified.
- 3 For agency code P = .150 [3.81].

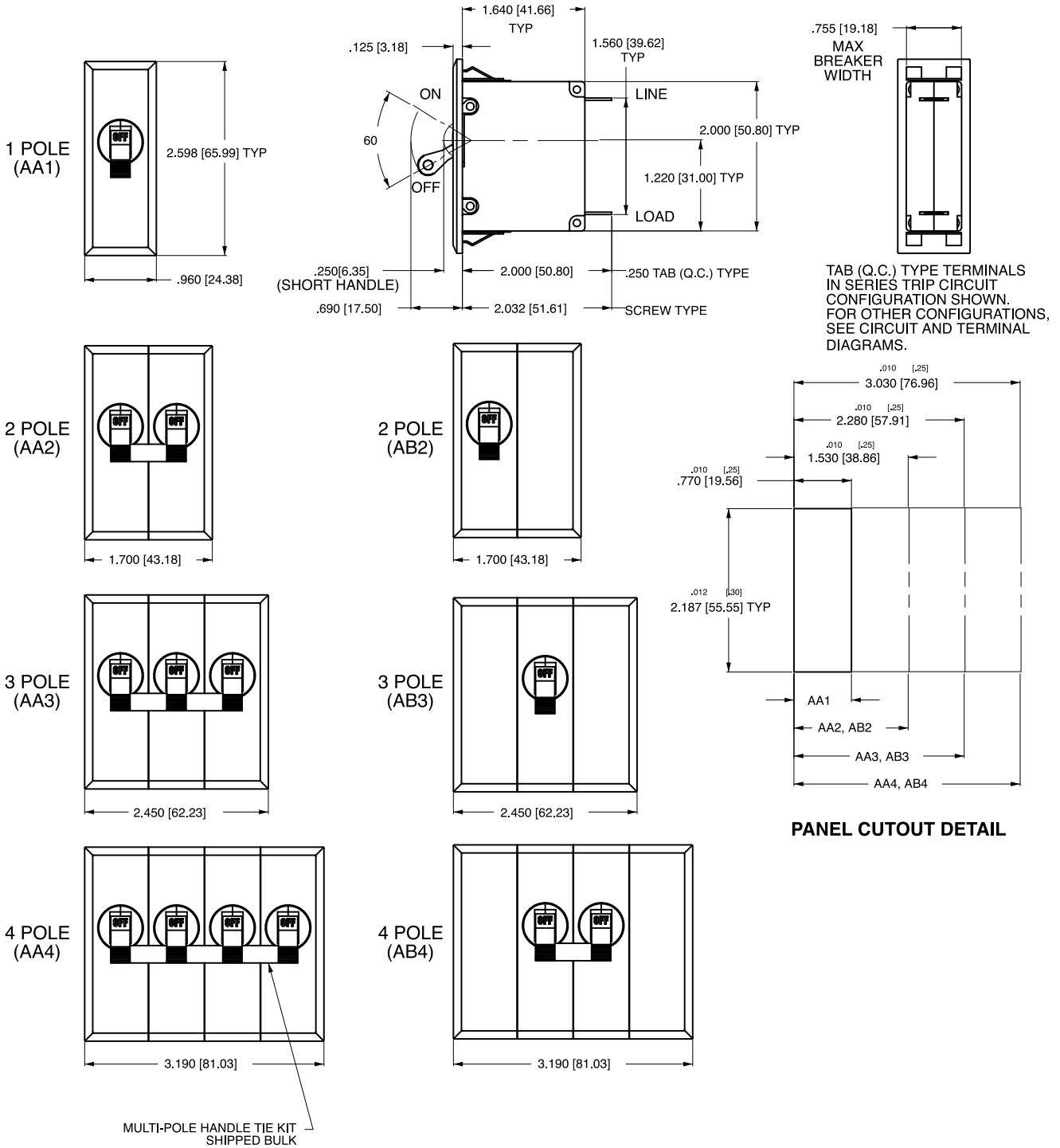
Dimensional Specifications: in. [mm]



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
- 3 Tolerance $\pm .020$ [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



- Notes:
 1 All dimensions are in inches [millimeters].
 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
 3 Tolerance ± 0.020 [.51] unless otherwise specified.



1 SERIES
A

2 ACTUATOR 1

M Sealed Toggle, one per unit

3 POLES

- 1 One
- 2 Two
- 3 Three

4 CIRCUIT

- | | |
|---|--|
| A ² Switch Only (No Coil) | F ³ Relay Trip (Current) |
| B Series Trip (Current) | G ³ Relay Trip (Voltage) |
| C Series Trip (Voltage) | H ^{3,4} Dual Coil with Shunt Trip Voltage Coil |
| D ³ Shunt Trip (Current) | K ^{3,4} Dual Coil with Relay Trip Voltage Coil |
| E ³ Shunt Trip (Voltage) | |

5 AUXILIARY / ALARM SWITCH⁵

- | | |
|---|---|
| 0 without Aux Switch | 5 S.P.S.T., 0.093 Q.C. Term. (Gold Contacts) |
| 1 S.P.D.T., 0.093 Q.C. Term. | 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts) |
| 2 S.P.D.T., 0.110 Q.C. Term. | 8 S.P.S.T., 0.187 Q.C. Term. |
| 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) | 9 S.P.D.T., 0.187 Q.C. Term. |

6 FREQUENCY & DELAY

- | | |
|-----------------------------------|--|
| 03 DC 50/60Hz, Switch Only | 30 DC, 50/60Hz Instantaneous |
| 10 DC Instantaneous | 31 DC, 50/60Hz Ultra Short |
| 11 DC Ultra Short | 32 DC, 50/60Hz Short |
| 12 DC Short | 34 DC, 50/60Hz Medium |
| 14 DC Medium | 36 DC, 50/60Hz Long |
| 16 DC Long | 42 ⁷ 50/60Hz Short, Hi-Inrush |
| 20 50/60Hz Instantaneous | 44 ⁷ 50/60Hz Medium, Hi-Inrush |
| 21 50/60Hz Ultra Short | 46 ⁷ 50/60Hz Long, Hi-Inrush |
| 22 50/60Hz Short | 52 ⁷ DC, Short, Hi-Inrush |
| 24 50/60Hz Medium | 54 ⁷ DC, Medium, Hi-Inrush |
| 26 50/60Hz Long | 56 ⁷ DC, Long, Hi-Inrush |

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	230	0.300	425	2.500
025	0.025	235	0.350	527	2.750
030	0.030	240	0.400	430	3.000
035	0.035	245	0.450	435	3.500
040	0.040	250	0.500	440	4.000
045	0.045	255	0.550	445	4.500
050	0.050	260	0.600	450	5.000
055	0.055	265	0.650	455	5.500
060	0.060	270	0.700	460	6.000
065	0.065	275	0.750	465	6.500
070	0.070	280	0.800	470	7.000
075	0.075	285	0.850	475	7.500
080	0.080	290	0.900	480	8.000
085	0.085	295	0.950	485	8.500
090	0.090	410	1.000	490	9.000
095	0.095	512	1.250	495	9.500
210	0.100	415	1.500	610	10.000
215	0.150	517	1.750	710	10.500
220	0.200	420	2.000	611	11.000
225	0.250	522	2.250	711	11.500

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁶

CODE	AMPERES				
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

8 TERMINAL⁹

- | | |
|--|--|
| 1 ¹⁰ Push-On 0.250 Tab (Q.C.) | E Screw M4 (Bus Type) |
| 2 Screw 8-32 with upturned lugs | F Screw M5 with upturned lugs & 30° bend |
| 3 Screw 8-32 (Bus Type) | G Screw M5 (Bus Type) & 30° bend |
| 4 Screw 10-32 with upturned lugs | H Screw M5 (Bus Type) |
| 5 Screw 10-32 (Bus Type) | L ¹² 0.250 Q.C./ Solder Lug |
| 6 Screw 8-32 with upturned lugs & 30° bend | M M6 Threaded Stud |
| 7 Screw 8-32 (Bus Type) & 30° bend | Q Push-In Stud |
| 8 Screw 10-32 with upturned lugs & 30° bend | R Screw M4 with upturned lugs & 30° bend |
| 9 Screw 10-32 (Bus Type) & 30° bend | T Screw M4 (Bus Type) & 30° bend |
| B Screw M5 with upturned lugs | P ¹² Printed Circuit Board Terminals |
| C Screw M4 with upturned lugs | S Push-On 0.110 Tab (Q.C.) |

9 LEGEND PLATE

0 No legend plate

10 MOUNTING / BARRIERS

- | | |
|--|-----------------|
| MOUNTING STYLE | BARRIERS |
| 1 Standard Hex Nut | no |
| A Standard Hex Nut (multipole only) | yes |

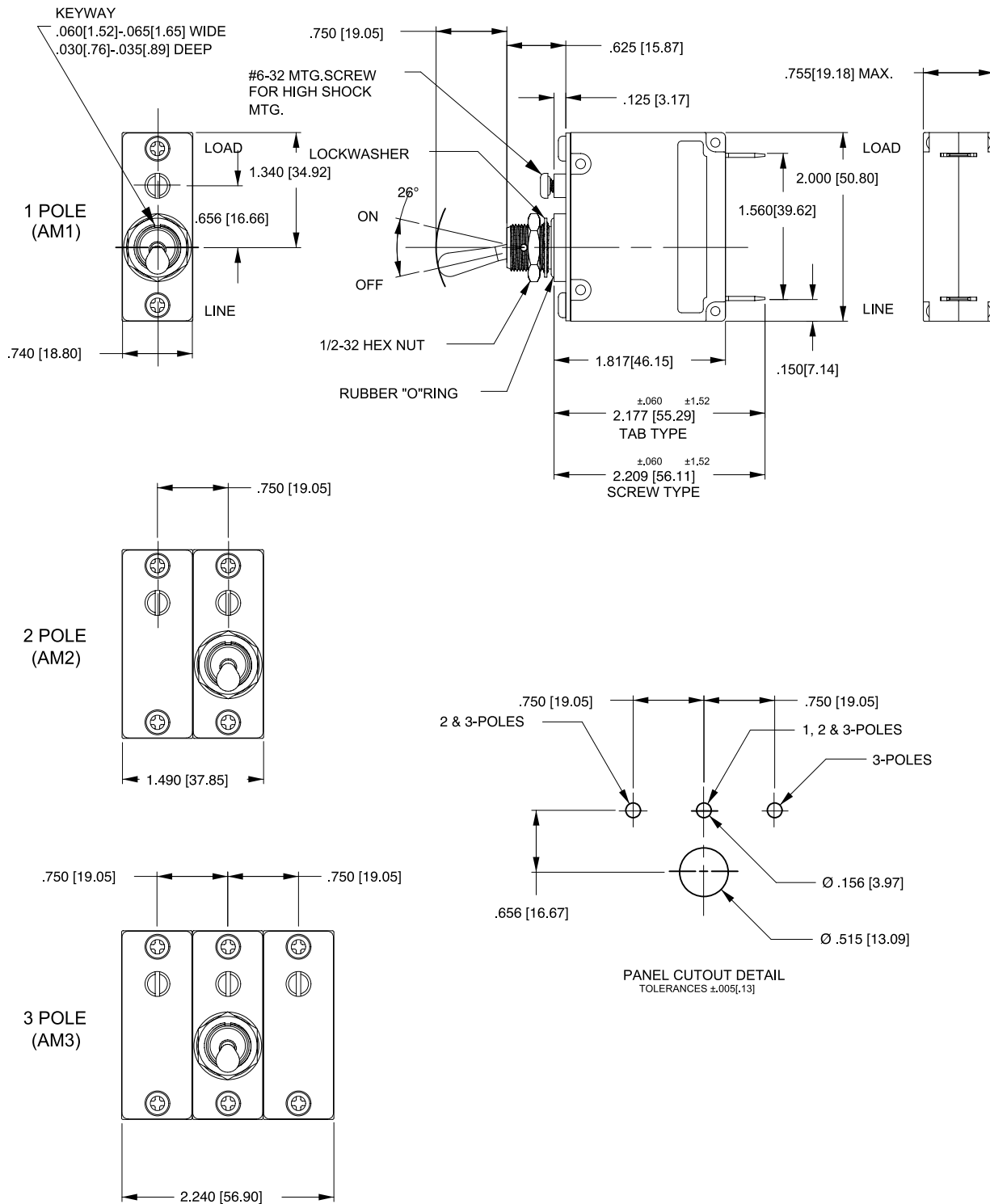
11 AGENCY APPROVAL

- C** UL Recognized & CSA Accepted
- I** UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

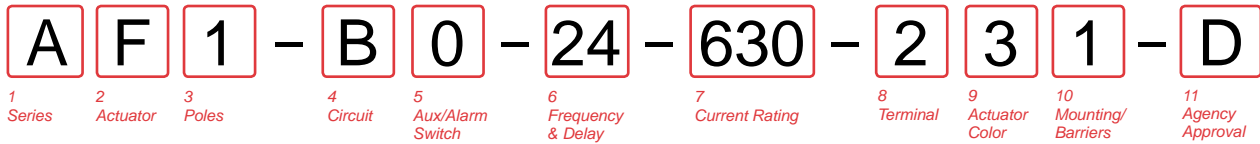
Notes:

- 1 Actuator Code M: Handle location as viewed from front of panel:
2 pole - right pole 3 pole - center pole
- 2 Switch Only circuits, rated up to 50 amps and 3 poles. Only available when tied to a protected pole. For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 3 Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 4 Consult factory for available Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 5 Auxiliary Switch available on Series Trip & Switch Only circuits, limited to 30 amps. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 6 Voltage coils not rated for continuous duty. Available only with delay codes 10 and 20.
- 7 Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- 8 UL Recognition and CSA Certification available on one and two pole breakers.
- 9 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, B, F, G, H, M and Q.
- 10 Terminal Code 1: UL Recognition and CSA Certification up to 30 amps, but not recommended over 20 amps.
- 11 Terminal Code L: available up to 30A.
- 12 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 50 amps, with Circuit Codes A, B and C. Two pole breakers with Terminal Code P (Printed Circuit Board) are available up to 40 amps with Circuit Codes A, B and C.

Dimensional Specifications: in. [mm]



- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ±.020 [.51] unless otherwise specified.



1 SERIES

A

2 ACTUATOR 1

- Two Color Visi-Rocker**
C Indicate ON, vertical legend
D Indicate ON, horizontal legend
F Indicate OFF, vertical legend
G Indicate OFF, horizontal legend
H Indicate OFF, no legend
Push-To-Reset, Visi-Rocker
N Indicate OFF, vertical legend
O Indicate OFF, horizontal legend
P Indicate OFF, no legend
Single color
J Vertical legend
K Horizontal legend
L No legend
Push-To-Reset, Single color
R Vertical legend
U Horizontal legend
V No legend

ROCKER STYLE DESCRIPTIONS	
HORIZONTAL STYLE	VERTICAL STYLE
<p>INDICATE "ON"</p> <p>CODE "D", "F"</p>	<p>INDICATE "ON"</p> <p>CODE "C", "N"</p>
<p>INDICATE "OFF"</p> <p>CODE "G", "O"</p>	<p>INDICATE "OFF"</p> <p>CODE "H", "P"</p>
<p>SINGLE COLOR</p> <p>CODE "K", "U"</p>	<p>SINGLE COLOR</p> <p>CODE "L", "V"</p>

3 POLES

- 1** One **2** Two **3** Three

4 CIRCUIT

- A**³ Switch Only (No Coil) **F**⁴ Relay Trip (Current)
B Series Trip (Current) **G**⁴ Relay Trip (Voltage)
C Series Trip (Voltage) **H**^{4,5} Dual Coil with Shunt Trip Voltage Coil
D⁴ Shunt Trip (Current) **K**^{4,5} Dual Coil with Relay Trip Voltage Coil
E⁴ Shunt Trip (Voltage)

5 AUXILIARY / ALARM SWITCH 6,7

- 0** without Aux Switch **5** S.P.S.T., 0.093 Q.C. Term. (Gold Contacts)
1 S.P.D.T., 0.093 Q.C. Term. **7** S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
2 S.P.D.T., 0.110 Q.C. Term. **8** S.P.S.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) **9** S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only **30** DC, 50/60Hz Instantaneous
10 DC Instantaneous **31** DC, 50/60Hz Ultra Short
11 DC Ultra Short **32** DC, 50/60Hz Short
12 DC Short **34** DC, 50/60Hz Medium
14 DC Medium **36** DC, 50/60Hz Long
16 DC Long **42**⁹ 50/60Hz Short, Hi-Inrush
20 50/60Hz Instantaneous **44**⁹ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short **46**⁹ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short **52**⁹ DC, Short, Hi-Inrush
24 50/60Hz Medium **54**⁹ DC, Medium, Hi-Inrush
26 50/60Hz Long **56**⁹ DC, Long, Hi-Inrush

Notes:

- Push-To-Reset actuators have OFF portion of rocker shrouded.
- Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- Switch Only circuits, rated up to 50 amps & 3 poles, are available only when tied to a protected pole (Circuit Code B, C, D or H), For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- Consult factory for Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- Auxiliary Switch breakers with Series Trip & Switch Only circuits: ≤ 30A, are supplied with standard half shells. 30-50A are supplied with extended boat (B-Style) half shells.
- On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- Series Trip current ratings: VDE Certification available with single pole breakers with DC Delay only. UL Recognition & CSA Accepted available in one and two pole breakers.
- Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, M and Q.
- Terminal Code 1: VDE Certification up to 25 amps and UL Recognition and CSA Accepted up to 30 amps, but not recommended over 20 amps.
- Terminal Codes 3, 5 E & H (Bus Type) with VDE, are supplied with Lock Washers; Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only VDE Certified when the washers are used.
- VDE Cert. available up to 12 amps. UL Rec. & CSA Accepted available up to 30 amps.
- Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL Recognition and CSA Accepted, with Circuit Codes A, B & C. Two pole breakers with Terminal Code P (Printed Circuit Board) are available up to 40 amps with UL Recognition and CSA Certification with Circuit Codes A, B and C.
- Terminal Code Q not available with VDE.
- Terminal Code S used on voltage coil circuit constructions only.
- Color shown is visi and legend with remainder of rocker black.
- Dual = ON-OFF/I-O legend with actuator. None = no legend on actuator
- Legend on Push-to-reset bezel/shroud is white with single color actuator codes R, & U. Legend on Push-to-reset bezel/shroud matches Visi-color of rocker with actuator codes N & O. Rockerguard available with actuator codes C through L.

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
020	0.020	225	0.250	420	2.000	611	11.000
025	0.025	230	0.300	522	2.250	711	11.500
030	0.030	235	0.350	527	2.750	612	12.000
035	0.035	240	0.400	430	3.000	712	12.500
040	0.040	245	0.450	435	3.500	613	13.000
045	0.045	250	0.500	440	4.000	614	14.000
050	0.050	255	0.550	445	4.500	615	15.000
055	0.055	260	0.600	450	5.000	616	16.000
060	0.060	265	0.650	455	5.500	617	17.000
065	0.065	270	0.700	460	6.000	618	18.000
070	0.070	275	0.750	465	6.500	620	20.000
075	0.075	280	0.800	470	7.000	622	22.000
080	0.080	285	0.850	475	7.500	624	24.000
085	0.085	290	0.900	480	8.000	625	25.000
090	0.090	295	0.950	485	8.500	630	30.000
095	0.095	410	1.000	490	9.000	635	35.000
210	0.100	512	1.250	495	9.500	640	40.000
215	0.150	415	1.500	610	10.000	645	45.000
220	0.200	517	1.750	710	10.500	650	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 8

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
A06	6 DC	A32	32 DC	J12	12 AC	J65	65 AC
A12	12 DC	A48	48 DC	J18	18 AC	K20	120 AC
A18	18 DC	A65	65 DC	J24	24 AC	L40	240 AC
A24	24 DC	J06	6 AC	J48	48 AC		

8 TERMINAL 11

- | | |
|--|--|
| 1 ¹² Push-On 0.250 Tab (Q.C.) | E ¹³ Screw M4 (Bus Type) |
| 2 Screw 8-32 with upturned lugs | F Screw M5 with upturned lugs & 30° bend |
| 3 ¹³ Screw 8-32 (Bus Type) | G Screw M5 (Bus Type) & 30° bend |
| 4 Screw 10-32 with upturned lugs | H ¹³ Screw M5 (Bus Type) |
| 5 ¹³ Screw 10-32 (Bus Type) | L ¹⁴ 0.250 Q.C./ Solder Lug |
| 6 Screw 8-32 with upturned lugs & 30° bend | M ¹³ M6 Threaded Stud |
| 7 Screw 8-32 (Bus Type) & 30° bend | P ¹⁵ Printed Circuit Board Terminals |
| 8 Screw 10-32 with upturned lugs & 30° bend | Q ¹⁶ Push-In Stud |
| 9 Screw 10-32 (Bus Type) & 30° bend | R Screw M4 with upturned lugs & 30° bend |
| B Screw M5 with upturned lugs | S ¹⁷ Push-On 0.110 Tab (Q.C.) & 30° bend |
| C Screw M4 with upturned lugs | T Screw M4 (Bus Type) & 30° bend |

9 ACTUATOR COLOR & LEGEND

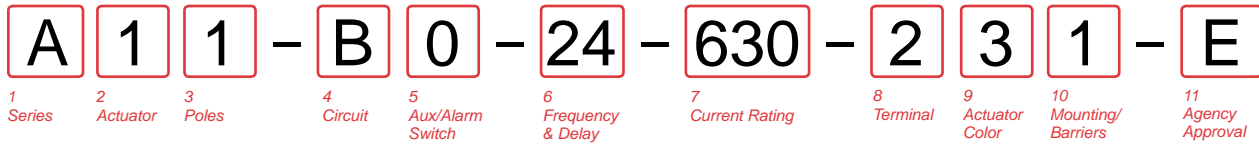
Actuator or Visi-Color ¹²	Marking:		Marking Color	
	ON-OFF	Dual ¹²	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS 20

	STANDARD ROCKER BEZEL	BARRIERS
	Threaded Insert, 2 per pole	
1	6-32 x 0.195 inches	no
A	6-32 X 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm (multi-pole units only)	yes
	ROCKERGUARD & PUSH-TO-RESET BEZEL	
	Threaded Insert, 2 per pole	
3	6-32 x 0.195 inches	no
C	6-32 x 0.195 inches (multi-pole units only)	yes
4	ISO M3 x 5mm	no
D	ISO M3 x 5mm (multi-pole units only)	yes
	FRONT PANEL SNAP-IN BRACKET, 0.744" [18.90mm] wide bezel	
8	without Rockerguard (single pole units only)	no
H	with Rockerguard (single pole units only)	no
	FRONT PANEL SNAP-IN BRACKET, 0.96" [24.48mm] wide bezel	
9	without Rockerguard (single pole units only)	no
J	with Rockerguard (single pole units only)	no

11 AGENCY APPROVAL

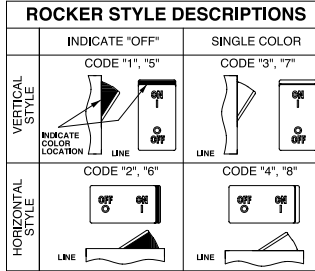
- C** UL Recognized & CSA Accepted
D VDE Certified, UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted



1 SERIES
A

2 ACTUATOR 1

- Two Color Visi-Rocker**
- 1 Indicate OFF, vertical legend
- 2 Indicate OFF, horizontal legend
- Single color**
- 3 Vertical legend
- 4 Horizontal legend
- Push-To-Reset, Visi-Rocker**
- 5 Indicate OFF, vertical legend
- 6 Indicate OFF, horizontal legend
- Push-To-Reset, Single color**
- 7 Vertical legend
- 8 Horizontal legend



3 POLES 2

- 1 One
- 2 Two
- 3 Three

4 CIRCUIT

- A³ Switch Only (No Coil)
- B Series Trip (Current)
- C Series Trip (Voltage)
- D⁴ Shunt Trip (Current)
- E⁴ Shunt Trip (Voltage)
- F⁴ Relay Trip (Current)
- G⁴ Relay Trip (Voltage)
- H^{4,5} Dual Coil with Shunt Trip Voltage Coil
- K^{4,5} Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH 6,7

- 0 without Aux Switch
- 1 S.P.D.T., 0.093 Q.C. Term.
- 2 S.P.D.T., 0.110 Q.C. Term.
- 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
- 5 S.P.S.T., 0.093 Q.C. Term. (Gold Contacts)
- 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
- 8 S.P.S.T., 0.187 Q.C. Term.
- 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 03 DC 50/60Hz, Switch Only
- 10⁶ DC Instantaneous
- 11 DC Ultra Short
- 12 DC Short
- 14 DC Medium
- 16 DC Long
- 20⁶ 50/60Hz Instantaneous
- 21 50/60Hz Ultra Short
- 22 50/60Hz Short
- 24 50/60Hz Medium
- 26 50/60Hz Long
- 30 DC, 50/60Hz Instantaneous
- 31 DC, 50/60Hz Ultra Short
- 32 DC, 50/60Hz Short
- 34 DC, 50/60Hz Medium
- 36 DC, 50/60Hz Long
- 42⁹ 50/60Hz Short, Hi-Inrush
- 44⁹ 50/60Hz Medium, Hi-Inrush
- 46⁹ 50/60Hz Long, Hi-Inrush
- 52⁹ DC, Short, Hi-Inrush
- 54⁹ DC, Medium, Hi-Inrush
- 56 DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	527	2.750
035	0.035	240	0.400	430	3.000
040	0.040	245	0.450	435	3.500
045	0.045	250	0.500	440	4.000
050	0.050	255	0.550	445	4.500
055	0.055	260	0.600	450	5.000
060	0.060	265	0.650	455	5.500
065	0.065	270	0.700	460	6.000
070	0.070	275	0.750	465	6.500
075	0.075	280	0.800	470	7.000
080	0.080	285	0.850	475	7.500
085	0.085	290	0.900	480	8.000
090	0.090	295	0.950	485	8.500
095	0.095	410	1.000	490	9.000
210	0.100	512	1.250	495	9.500
215	0.150	415	1.500	610	10.000
220	0.200	517	1.750	710	10.500
				611	11.000
				711	11.500
				612	12.000
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635	35.000
				640	40.000
				645	45.000
				650	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 8

CODE	AMPERES				
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

8 TERMINAL 11

- 1¹² Push-On 0.250 Tab (Q.C.)
- 2 Screw 8-32 with upturned lugs
- 3¹³ Screw 8-32 (Bus Type)
- 4 Screw 10-32 with upturned lugs
- 5¹³ Screw 10-32 (Bus Type)
- 6 Screw 8-32 with upturned lugs & 30° bend
- 7 Screw 8-32 (Bus Type) & 30° bend
- 8 Screw 10-32 with upturned lugs & 30° bend
- 9 Screw 10-32 (Bus Type) & 30° bend
- B Screw M5 with upturned lugs
- C Screw M4 with upturned lugs
- E¹³ Screw M4 (Bus Type)
- F Screw M5 with upturned lugs & 30° bend
- G Screw M5 (Bus Type) & 30° bend
- H¹³ Screw M5 (Bus Type)
- L¹⁴ 0.250 Q.C./ Solder Lug
- M¹³ M6 Threaded Stud
- P¹⁵ Printed Circuit Board Terminals
- Q Push-In Stud
- R Screw M4 with upturned lugs & 30° bend
- S¹⁶ Push-On 0.110 Tab (Q.C.)
- T Screw M4 (Bus Type) & 30° bend

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color 17	Marking:		Marking Color	
	ON-OFF	Dual 17	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS 18

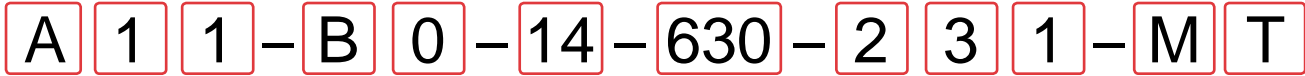
	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole	FLAT ROCKER ACTUATOR	BARRIERS
1	6-32 x 0.195 inches		no
A	6-32 X 0.195 inches (multi-pole units only)		yes
2	ISO M3 x 5mm		no
B	ISO M3 x 5mm (multi-pole units only)		yes
	RECESSED OFF SIDE ROCKER ACTUATOR 19		
5	6-32 x 0.195 inches		no
E	6-32 x 0.195 inches (multi-pole units only)		yes
6	ISO M3 x 5mm		no
F	ISO M3 x 5mm (multi-pole units only)		yes
	PUSH-TO-RESET BEZEL, Threaded Insert, 2 per pole		
3	6-32 x 0.195 inches		no
C	6-32 x 0.195 inches (multi-pole units only)		yes
4	ISO M3 x 5mm		no
D	ISO M3 x 5mm (multi-pole units only)		yes

11 AGENCY APPROVAL

- C UL Recognized & CSA Accepted
- E TUV Certified, UL Recognized & CSA Accepted
- I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

Notes:

- 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
- 2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- 3 Switch Only circuits, rated up to 50 amps & 3 poles. Only available when tied to a protected pole. For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 4 Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 5 Consult factory for Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 6 Auxiliary Switch breakers with Series Trip & Switch Only circuits: ≤30A, are supplied with standard half shells. 30-50A are supplied with extended boat (B-Style) half shells.
- 7 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 8 Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- 9 Available with Circuit Codes B & D only. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- 10 UL Recognition, CSA Acceptance & TUV Certification available in one and two pole breakers.
- 11 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, M and Q.
- 12 Terminal Code 1: Available up to 30 amps, but not recommended over 20 amps.
- 13 Terminal Codes 3, 5 E & H (Bus Type) with TUV, are supplied with Lock Washers; Terminal Code M (M6 Threaded Stud) with TUV is supplied with Lock and Flat Washers. These breakers are only TUV Certified when the washers are used.
- 14 TUV Cert. available up to 12 amps. UL Rec. & CSA Accepted available up to 30 amps.
- 15 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 50 amps with UL Recognition, CSA Accepted & TUV Certification, with Circuit Codes A, B and C. Two pole breakers with Terminal Code P (Printed Circuit Board) are available up to 40 amps with UL Recognition and CSA Accepted with Circuit Codes A, B and C.
- 16 Terminal Code S used on voltage coil circuit constructions only.
- 17 Color shown is visi and legend with remainder of rocker black, Dual = ON-OFF/I/O legend.
- 18 Legend on Push-to-reset bezel/shroud is white with single color actuator codes 7 & 8. Legend on Push-To-Reset bezel/shroud matches Visi-Color of rocker with actuator codes 5 & 6.
- 19 Recessed "off-side" available with actuator codes 1, 2, 3 & 4. Legends on rocker are available in ink stamping only.

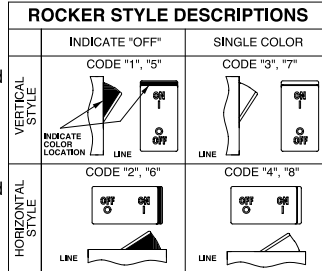


1 Series 2 Actuator 3 Poles 4 Circuit 5 Aux/Alarm Switch 6 Frequency & Delay 7 Current Rating 8 Terminal 9 Actuator Color 10 Mounting/Barriers 11 Max. Appl. Rating 12 Agency Approval

1 SERIES
A

2 ACTUATOR 1

- Two Color Visi-Rocker**
 1 Indicate OFF, vertical legend
 2 Indicate OFF, horizontal legend
Single color
 3 Vertical legend
 4 Horizontal legend
Push-To-Reset, Visi-Rocker
 5 Indicate OFF, vertical legend
 6 Indicate OFF, horizontal legend
Push-To-Reset, Single color
 7 Vertical legend
 8 Horizontal legend



3 POLES 2

- 1 One 2 Two 3 Three

4 CIRCUIT

- B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 3

- 0 without Aux Switch 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
 1 S.P.D.T., 0.093 Q.C. Term. 8 S.P.S.T., 0.187 Q.C. Term.
 2 S.P.D.T., 0.110 Q.C. Term. 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 11 DC Ultra Short 52 DC, Short, Hi-Inrush
 12 DC Short 54 DC, Medium, Hi-Inrush
 14 DC Medium 56 DC, Long, Hi-Inrush
 16 DC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	527	2.750
035	0.035	240	0.400	430	3.000
040	0.040	245	0.450	435	3.500
045	0.045	250	0.500	440	4.000
050	0.050	255	0.550	445	4.500
055	0.055	260	0.600	450	5.000
060	0.060	265	0.650	455	5.500
065	0.065	270	0.700	460	6.000
070	0.070	275	0.750	465	6.500
075	0.075	280	0.800	470	7.000
080	0.080	285	0.850	475	7.500
085	0.085	290	0.900	480	8.000
090	0.090	295	0.950	485	8.500
095	0.095	410	1.000	490	9.000
210	0.100	512	1.250	495	9.500
215	0.150	415	1.500	610	10.000
220	0.200	517	1.750	710	10.500
				611	11.000
				711	11.500
				612	12.000
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635	35.000
				640	40.000
				645	45.000
				650	50.000

8 TERMINAL 5

- 1⁶ Push-On 0.250 Tab (Q.C.) 9 Screw 10-32 (Bus Type) & 30° bend
 2 Screw 8-32 with upturned lugs B Screw M5 with upturned lugs
 3⁷ Screw 8-32 (Bus Type) F Screw M5 with upturned lugs & 30° bend
 4 Screw 10-32 with upturned lugs G Screw M5 (Bus Type) & 30° bend
 5⁷ Screw 10-32 (Bus Type) H Screw M5 (Bus Type)
 6 Screw 8-32 with upturned lugs & 30° bend M⁷ M6 Threaded Stud
 7 Screw 8-32 (Bus Type) & 30° bend P⁸ Printed Circuit Board Terminals
 8 Screw 10-32 with upturned lugs & 30° bend Q⁹ Push-In Stud

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color 11	Marking:		Marking Color	
	ON-OFF	Dual 11	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS 12

	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole FLAT ROCKER ACTUATOR	BARRIERS
1	6-32 x 0.195 inches	no
A	6-32 X 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm (multi-pole units only)	yes
	RECESSED OFF SIDE ROCKER ACTUATOR	
5	6-32 x 0.195 inches	no
E	6-32 x 0.195 inches (multi-pole units only)	yes
6	ISO M3 x 5mm	no
F	ISO M3 x 5mm (multi-pole units only)	yes
	PUSH-TO-RESET BEZEL, Threaded Insert, 2 per pole	
3	6-32 x 0.195 inches	no
C	6-32 x 0.195 inches (multi-pole units only)	yes
4	ISO M3 x 5mm	no
D	ISO M3 x 5mm (multi-pole units only)	yes

11 MAXIMUM APPLICATION RATING

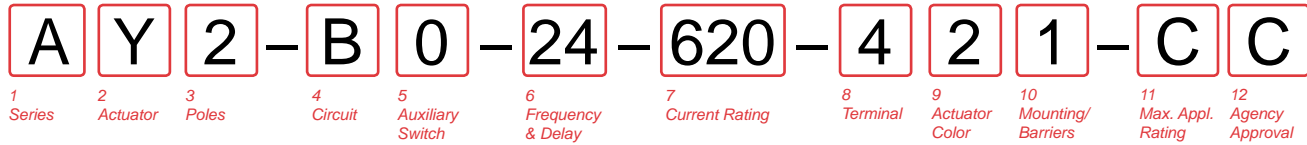
- M 80 DC

12 AGENCY APPROVAL

- T UL489A Listed
 J UL489A Listed, TUV Certified

Notes:

- 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
- 2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- 3 Auxiliary Switch breakers with Series Trip circuits: ≤ 30A, are supplied with standard half shells. 30-50A are supplied with extended boat (B-Style) half shells.
- 4 VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
- 5 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, M and Q.
- 6 Terminal Code 1 (Push-On) available up to 25 amps with TUV or VDE Certification and 30 amps with UL489A Listing, but is not recommended over 20 amps.
- 7 Terminal Codes 3, 5 and H (Bus Type) with TUV or VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only TUV or VDE Certified when the washers are used.
- 8 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL489A Listing.
- 9 Terminal Code Q not available with VDE certification.
- 10 Color shown is Visi and Legend with remainder of rocker black. Dual = ON-OFF/I-O legend.
- 11 Legend on Push-to-reset bezel/shroud is white with single color actuator codes R & U.
- 12 Legend on Push-To-Reset bezel/shroud matches Visi-Color of rocker with actuator codes N & O. Rockerguard available with actuator codes C through K



1 SERIES
A

2 ACTUATOR¹
Y Single Color Recessed Paddle Actuator with Vertical Legends

3 POLES²
1 One 2 Two 3 Three

4 CIRCUIT
 A Switch-Only (No Coil) F Relay Trip (Current)
 B Series Trip (Current) G Relay Trip (Voltage)
 C Series Trip (Voltage) H Dual Coil with Shunt Trip Voltage Coil
 D Shunt Trip (Current) K Dual Coil with Shunt Trip Current Coil
 E Shunt Trip (Voltage)

5 AUXILIARY SWITCH
 0 without Aux Switch
 1 S.P.D.T. with 0.093 Q.C. Terminals
 2 S.P.D.T. with 0.110 Q.C. Terminals
 3 S.P.D.T. with 0.139 Solder Lug Terminals
 4 S.P.D.T. with 0.110 Q.C. Terminals (Gold Contacts)
 5 S.P.D.T. with 0.093 Q.C. Terminals (Gold Contacts)
 6 S.P.S.T.-N.O. with 0.139 Solder Lug Terminals
 7 S.P.S.T.-N.O. with 0.110 Q.C. Terminals (Gold Contacts)
 8 S.P.S.T.-N.O. with 0.187 Q.C. Terminals
 9 S.P.D.T. with 0.187 Q.C. Terminals

6 FREQUENCY & DELAY³	22 50/60 Hz Short
3 DC, 50/60 Hz Switch Only	24 50/60 Hz Medium
10 DC Instantaneous	26 50/60 Hz Long
11 DC Ultra Short	42 50/60 Hz Short Hi-Inrush
12 DC Short	44 50/60 Hz Medium Hi-Inrush
14 DC Medium	46 50/60 Hz Long Hi-Inrush
16 DC Long	52 DC, Short, Hi-Inrush
20 50/60 Hz Instantaneous	54 DC, Medium, Hi-Inrush
21 50/60 Hz Ultra Short	56 DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)⁴

CODE	AMPERES	295	0.950	460	6.000	614	14.000
220	0.200	410	1.000	465	6.500	615	15.000
225	0.250	512	1.250	470	7.000	616	16.000
230	0.300	415	1.500	475	7.500	617	17.000
235	0.350	517	1.750	480	8.000	618	18.000
240	0.400	420	2.000	485	8.500	620	20.000
245	0.450	522	2.250	490	9.000	622	22.000
250	0.500	425	2.500	495	9.500	624	24.000
255	0.550	527	2.750	610	10.000	625	25.000
260	0.600	430	3.000	710	10.500	630	30.000
265	0.650	435	3.500	611	11.000	635	35.000
270	0.700	440	4.000	711	11.500	640	40.000
275	0.750	445	4.500	612	12.000	645	45.000
280	0.800	450	5.000	712	12.500	650	50.000
285	0.850	455	5.500	613	13.000		
290	0.900						

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)

CODE	AMPERES	A06	6 DC	A32	32 DC	J12	12 AC	J65	65 AC
A06	6 DC	A48	48 DC	J18	18 AC	K20	120 AC	L40	240 AC
A12	12 DC	A65	65 DC	J24	24 AC				
A18	18 DC	J06	6 AC	J48	48 AC				
A24	24 DC								

8 TERMINAL
 1 Push-On 0.250 Tab (Q.C.) C Screw, M4 with upturned lugs
 2 Screw 8-32 with upturned lugs E Screw, M4 (Bus Type)
 3 Screw 8-32 (Bus Type) F Screw M5 with upturned lugs & 30° bend
 4 Screw 10-32 with upturned lugs G Screw M5 (Bus Type) & 30° bend
 5 Screw 10-32 (Bus Type) H Screw M5 (Bus Type)
 6 Screw 8-32 with upturned lugs & 30° bend L 0.250 Q.C./Solder Lug
 7 Screw 8-32 (Bus Type) & 30° bend M M6 Threaded Stud
 8 Screw 10-32 with upturned lugs & 30° bend P Printed Circuit Board Terminals
 9 Screw 10-32 (Bus Type) & 30° bend Q Push-In Stud
 B Screw M5 with upturned lugs R Screw, M4 with upturned lugs & 30° Bend
 S Screw, M5 with upturned lugs
 T Screw, M4 with upturned lugs

9 ACTUATOR COLOR & LEGEND⁵

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 / BARRIERS

		BARRIERS
1	6-32 x 0.195 inches	no
A	6-32 X 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm (multi-pole units only)	yes

11 MAXIMUM APPLICATION RATING⁶
 A 65 VDC
 C 120/240 VAC (Available only on 2 or 3-Pole units)
 K 120 VAC
 M 80 DC

12 AGENCY APPROVAL⁷
 A Without Approvals
 C UL Recognized and CSA Accepted
 T UL 489A

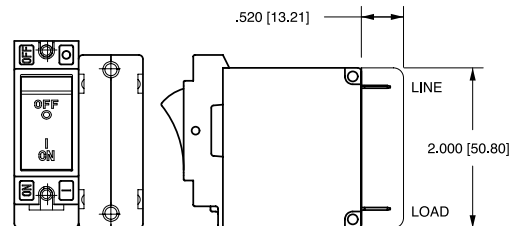
Notes:
 1 All standard catalog numbers are supplied with Vertical Legends. For Horizontal or other non-standard legends, choose "X" and order as a special catalog number.
 2 For rating (T) 2 & 3 Pole not available.
 3 Frequency and Time Delay ratings of (03, 20, 21, 22, 24, 26, 42, 44, 46) not available with approval T.
 4 Voltage Coil Ratings starting with (J, K, or L) not available with approval T.
 5 "OFF and/or "O" Legends are on Bracket and are only visible when the Paddle Actuator is in the off position.
 6 Maximum Application Ratings (C & K) not available with approval T.
 7 Not all approvals are available in all constructions. Consult factory for details.

Circuit & Terminal Diagrams: in. [mm]

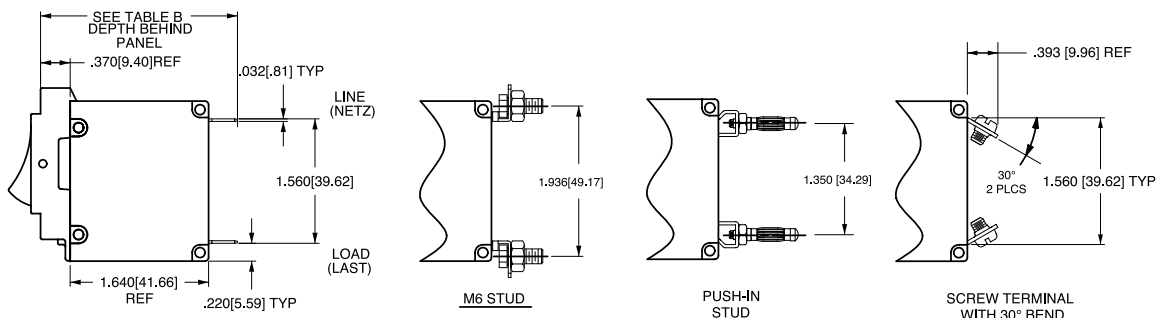
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX. SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX. SWITCH CODE
	ANSI	IEC			ANSI	IEC		
2 TERMINALS 	SWITCH ONLY (NO COIL) 	IEC 	A	0	SERIES TRIP 	IEC 	B C	0
5 TERMINALS 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH (4) 	IEC 	A	1 2 3 4	SERIES TRIP WITH AUXILIARY SWITCH (4) 	IEC 	B C	1 2 3 4
3 TERMINALS 	SHUNT TRIP 	IEC 	D E	0	DUAL COIL; SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL 	IEC 	H	0
4 TERMINALS 	RELAY TRIP 	IEC 	F G	0	DUAL COIL; SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL 	IEC 	K	0

TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.370 [60.20]
	SCREW TYPE	2.402 [61.01]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.577 [65.46]
	SCREW #8-32 W/UPTURNED LUGS	2.734 [69.44]
AUX. SWITCH*	.093 TAB (Q.C.)	2.465 [62.61]
	.110 TAB (Q.C.)	2.559 [65.00]
	SOLDER TYPE	2.340 [59.44]

* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS VIEWED IN MULTI-POLE IDENTIFICATION SCHEME.



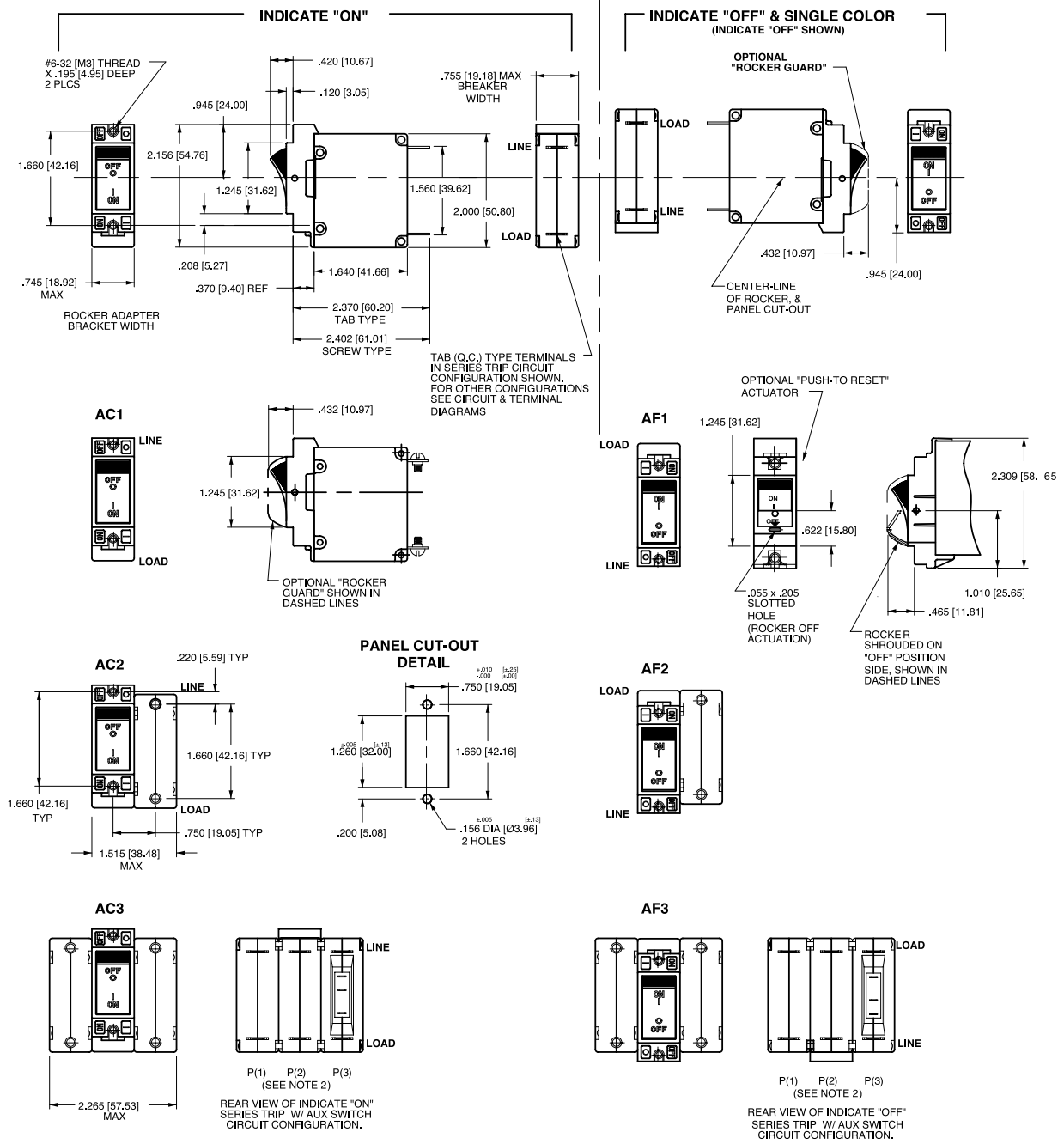
BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [.51] unless otherwise specified.
- 3 Schematic shown represents current trip circuit.
- 4 Circuits shown for >30 amps / VDE.

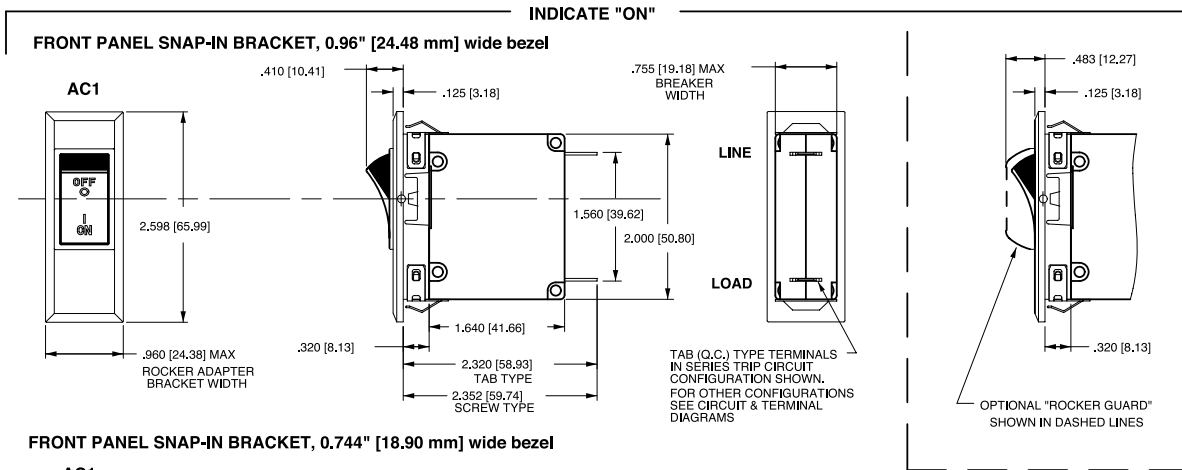
Dimensional Specifications: in. [mm]



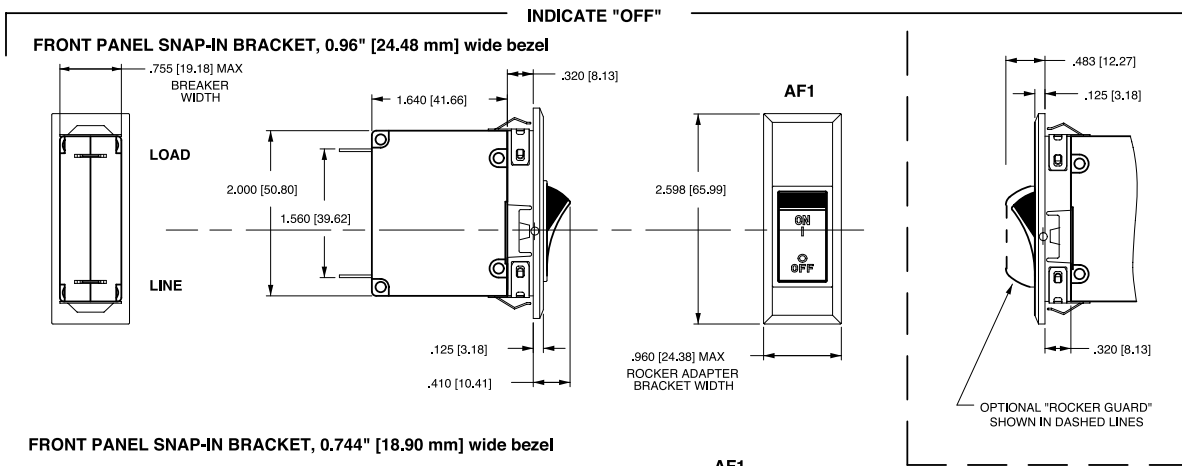
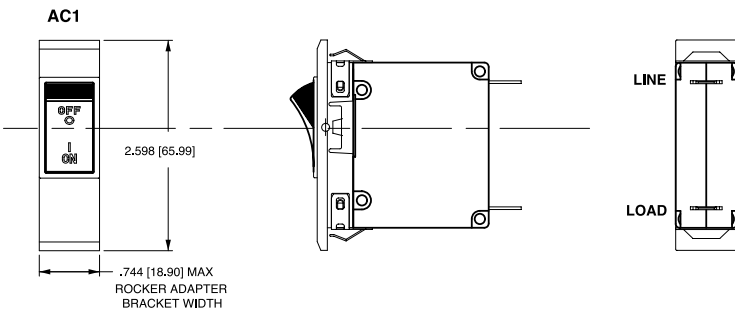
Notes:

- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
- 3 All dimensions are in inches [millimeters].
- 4 Tolerance ± 0.20 [.51] unless otherwise specified.

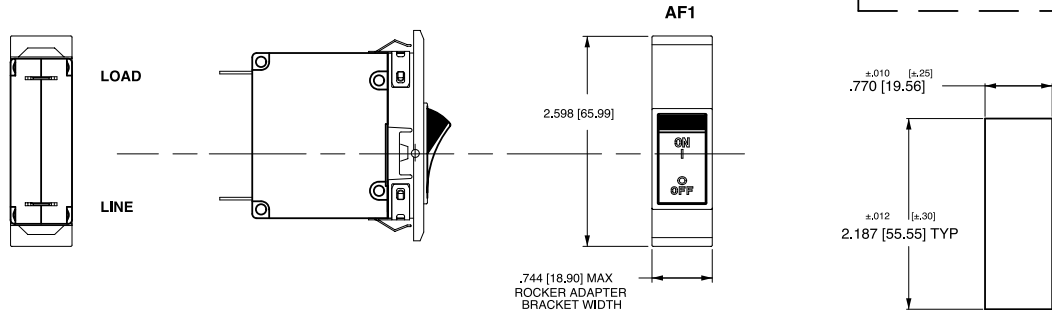
Dimensional Specifications: in. [mm]



FRONT PANEL SNAP-IN BRACKET, 0.744" [18.90 mm] wide bezel



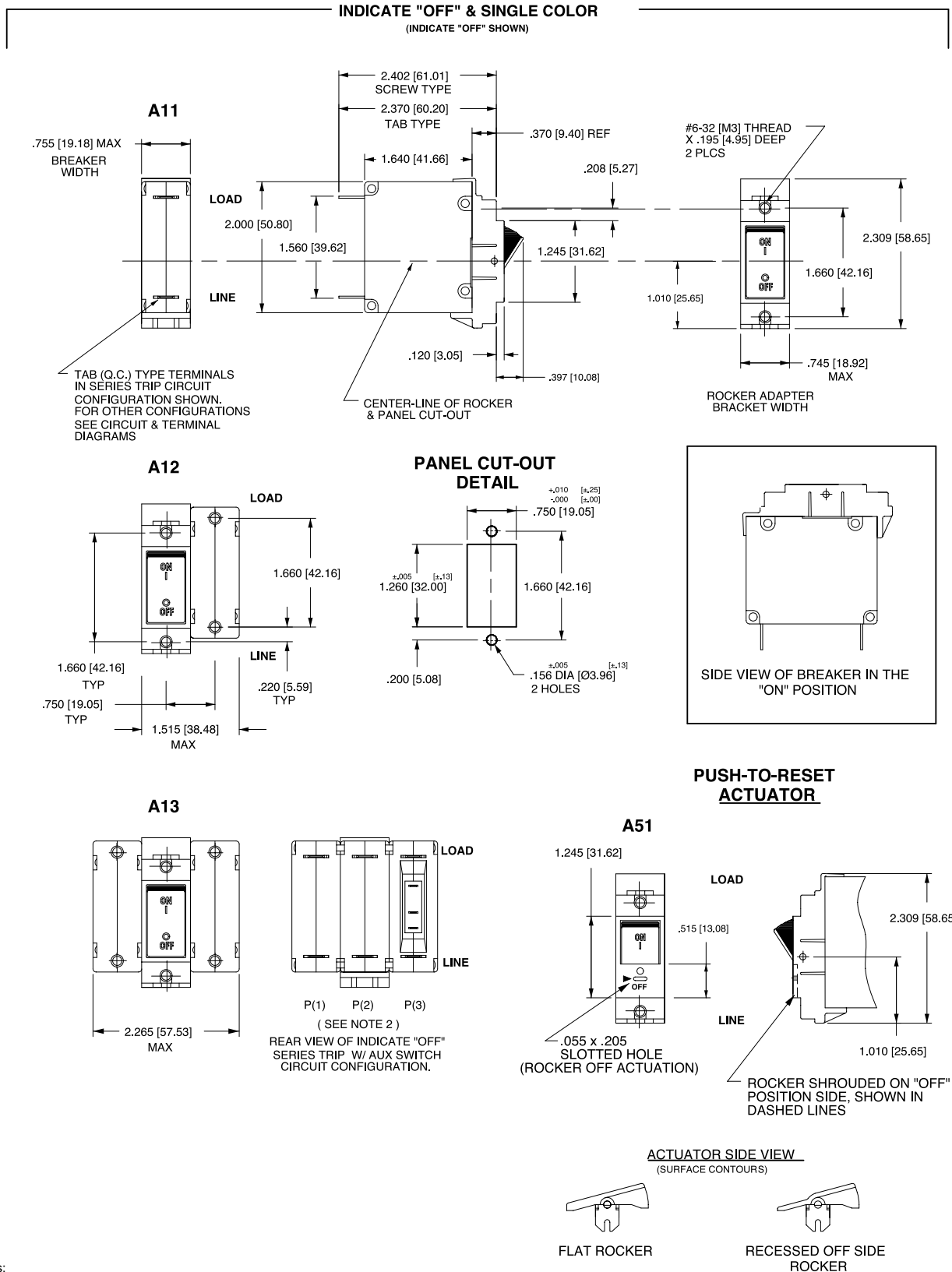
FRONT PANEL SNAP-IN BRACKET, 0.744" [18.90 mm] wide bezel



Notes:

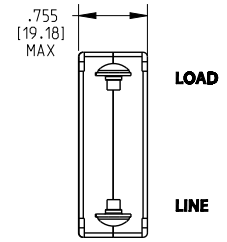
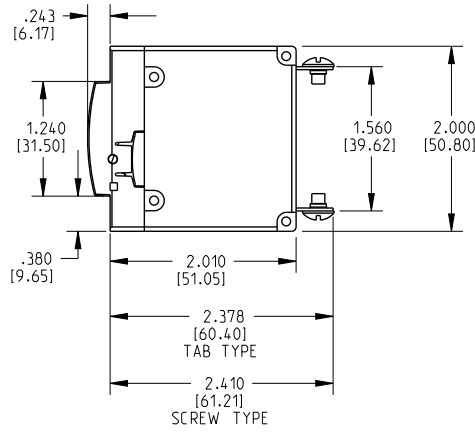
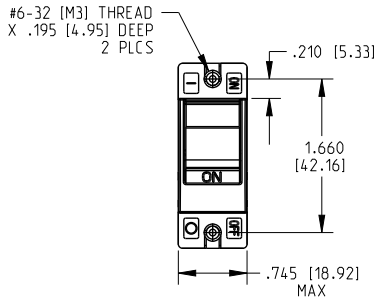
- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90°. Orientation on indicate "OFF" is opposite of indicate "ON"
- 3 Recommended panel thickness: .040 [1.02] to .100 [2.54]
- 4 All dimensions are in Inches [millimeters].
- 5 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

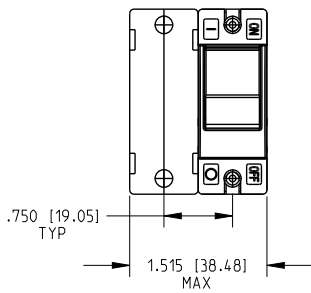


- Notes:
 1 All dimensions are in inches [millimeters].
 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
 3 Tolerance ± 0.20 [5.1] unless otherwise specified.

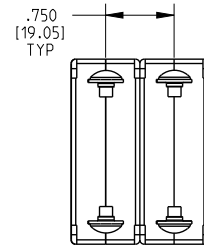
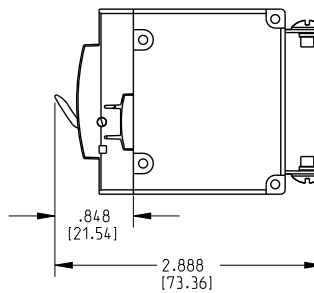
Dimensional Specifications: in. [mm]



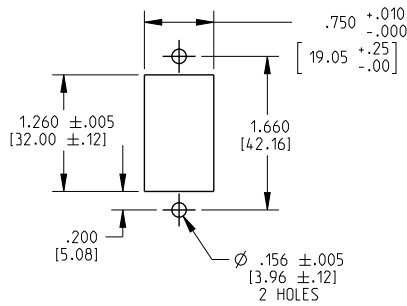
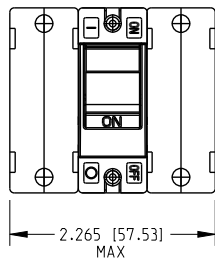
BREAKER SHOWN IN THE OFF POSITION



BREAKER SHOWN IN THE OFF POSITION



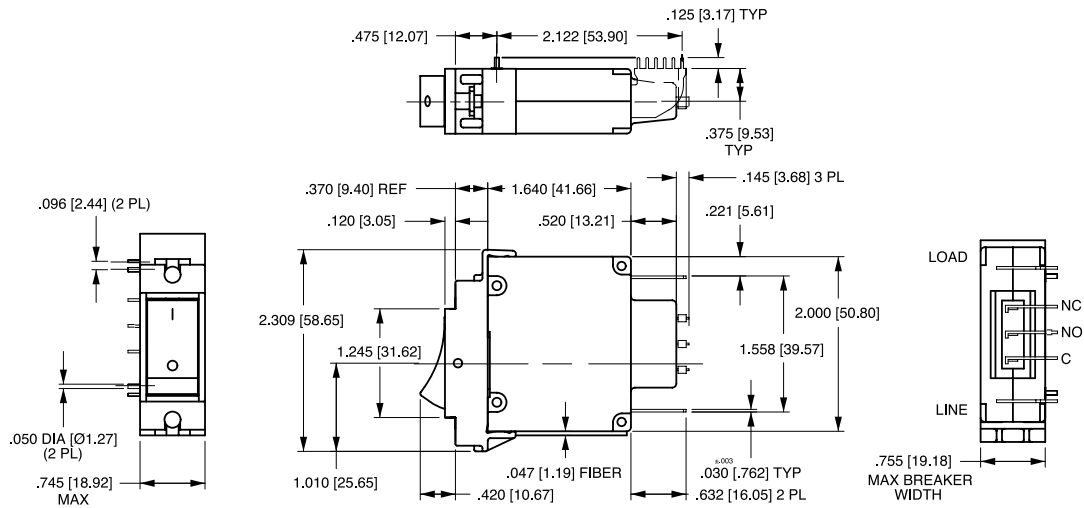
PANEL CUT-OUT DETAIL



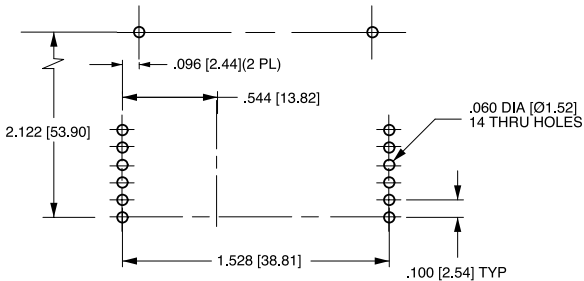
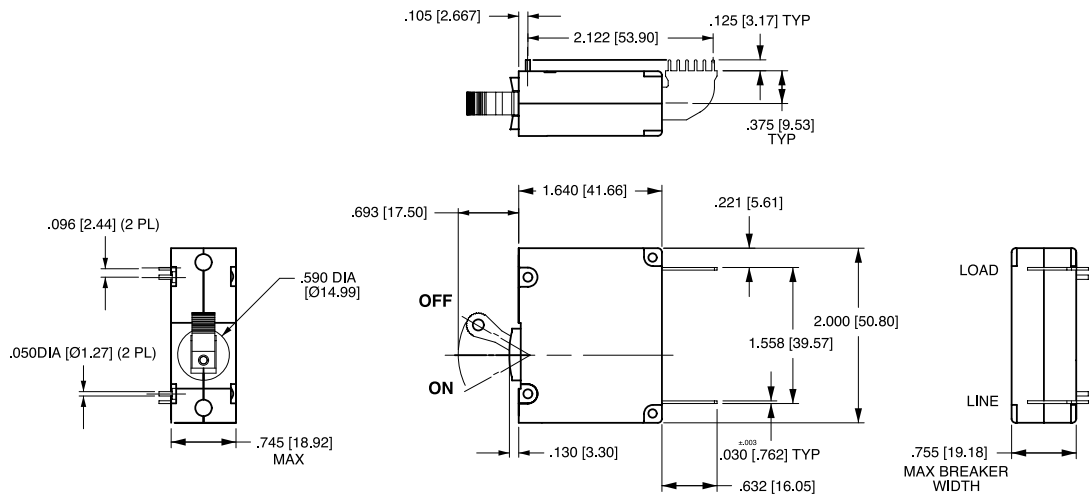
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ±0.20 [51] unless otherwise specified

PC Terminal Diagrams: in. [mm]

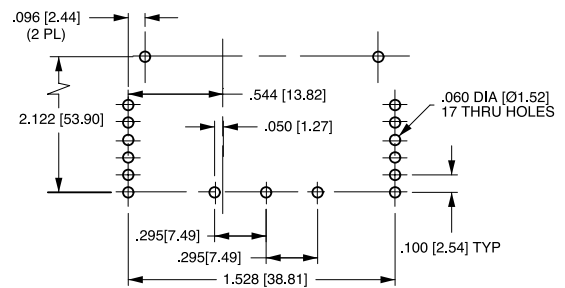
A-SERIES ROCKER



A-SERIES HANDLE



P.C. FOOT PRINT



P.C. FOOT PRINT WITH AUX. SWITCH

- Notes:
- 1 Drawing illustrates A-Series with VDE certification.
 - 2 All dimensions are in inches [millimeters].
 - 3 Tolerance ± 0.20 [.51] unless otherwise specified

B-Series

CIRCUIT BREAKER

Carling Technologies' B-Series hydraulic magnetic circuit breakers are specifically designed for applications requiring extra insulation and tongue and groove half-shell constructions. The B-Series carries global regulatory safety approvals for spacing requirements and are ideal for use as general purpose as well as full load amp applications. Available with various choices of time delays, terminals, actuator styles, with a wide range of standard colors and imprinting.

1-6 poles; ratings from 0.02 to 50 amps, up to 277VAC or 80VDC; UL recognized, CSA, VDE -0642, TUV, UL-1500, UL489A Listed



Product Highlights:

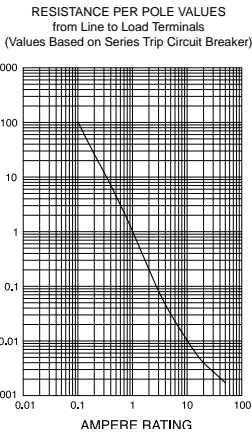
- Meet CSA Standard 22.2 No. 100 for the Generator & Welder markets
- Extra insulation and tongue & groove half-shell constructions
- UL Recognized - UL Standard 508, 1077, 1500
- UL Listed - UL Standard 489, 489A
- CSA Accepted
- TUV Certified
- VDE Certified

Typical Applications:

- Power Supplies
- Medical Equipment
- Generators & Welders
- Office Equipment
- Control Panels
- Marine
- Military

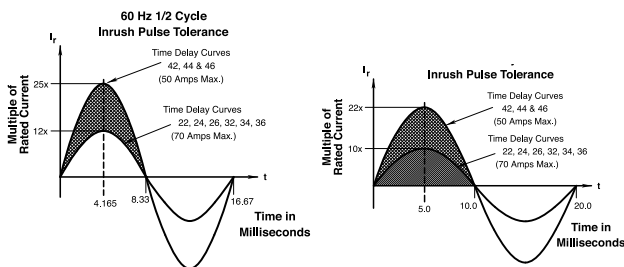
Electrical

Maximum Voltage 277VAC 50/60 Hz, 80VDC
 Current Ratings Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 and 50.0 amps. Other ratings available, see ordering scheme.
 Standard Voltage Coils DC - 6V, 12V; AC - 120V, other ratings available, see ordering scheme.
 Auxiliary Switch Rating SPDT; 10.1 AMPS - 250VAC, 1.0A 65 VDC or 0.5A 80 VDC, 0.1 Amps - 125VAC (with gold contacts). VDE-1.0 Amp - 125VAC.
 Insulation Resistance Minimum of 100 Megohms at 500 VDC.
 Dielectric Strength UL, CSA-1500 V 50/60 Hz for one minute between all electrically isolated terminals. B-Series circuit breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.
 Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.



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

Pulse Tolerance Curves



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

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.
 Trip Free All B-Series Circuit Breakers will trip on overload, even when Handle 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.
 Number of Poles 1 - 6 poles at 30 Amps or less. 1 and 2 poles at 31 Amps thru 50 Amps.
 Internal Circuit Config. Series, (with or without auxiliary switch), Shunt and Relay with current or voltage trip coils, Dual Coil, Switch Only (with or without auxiliary switch).
 Weight Approximately 65 grams/pole. (Approximately 2.32 ounces/pole.)
 Standard Colors Housing- Black; Actuator - See Ordering Scheme.

Physical

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:
 Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultra-short curves tested @ 90% of rated current.
 Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current.
 Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.
 Salt Spray Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).
 Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).
 Operating Temperature -40° C to +85° C

Electrical Tables

Table A: Lists UL Recognized & CSA Certified configurations and performance capabilities as a Component Supplementary Protector.

B -SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA	
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE			
SERIES	65	DC	---	31 - 50	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	80	DC	---	0.02 - 30	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	31 - 50	---	7500	TC1,2, OL0,U1	TC1,2, OL0,U1	
	125	50 / 60	1	1 - 50	---	---	2000	TC1, OL1,U2	TC1, OL1,U2	
	125	50 / 60	1 ⁴	1 - 50	---	---	1000	TC1, OL1,U2	TC3, OL1,U3	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				0.02 - 30	---	---	1500	TC1, OL0,U2	TC1, OL0,U2	Single Pole Break
				0.02 - 30	---	---	3000	TC1, OL1,U2	TC1, OL1,U2	Two Pole Break
				---	31 - 50	---	3000	TC1,2, OL0,U1	TC1,2, OL0,U1	
				1 ⁴	1 - 50	---	1000	TC1, OL1,U2	TC3, OL1,U3	
3				0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1	
277	50 / 60	1	0.02 - 30	---	2000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
DUAL COIL	65	DC	---	0.02 - 50	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	80	DC	---	0.02 - 30	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	31 - 50	---	7500	TC1,2, OL0,U1	TC1,2, OL0,U1	
	125	50 / 60	1	1 - 50	---	---	2000	TC1, OL1,U2	TC1, OL1,U2	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				0.02 - 30	---	---	1500	TC1, OL0,U2	TC1, OL0,U2	Single Pole Break
				0.02 - 30	---	---	3000	TC1, OL1,U2	TC1, OL1,U2	Two Pole Break
				---	31 - 50	---	3000	TC1,2, OL0,U1	TC1,2, OL0,U1	
				1 ⁴	1 - 50	---	1000	TC1, OL1,U2	TC3, OL1,U3	
				3	0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1
277	50 / 60	1	0.02 - 30	---	2000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
SHUNT	80	DC	---	0.02 - 30	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	31 - 50	---	3000	TC1,2, OL0,U1	TC1,2, OL0,U1	
	250	50 / 60	1	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				3	0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
RELAY	80	DC	---	0.02 - 30	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	125 / 250	50 / 60	1 ³	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	31 - 50	---	3000	TC1,2, OL0,U1	TC1,2, OL0,U1	
	250	50 / 60	1	0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				3	0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1
277	50 / 60	1	0.02 - 30	---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
SWITCH ONLY	65	DC	---	0.02 - 50	---	---	---	---	---	
	80	DC	---	0.02 - 30	---	---	---	---	---	
				---	31 - 50	---	---	---	---	
	250	50 / 60	1	0.02 - 50	---	---	---	---	---	
				3	0.02 - 50	---	---	---	---	
277	50 / 60	1	0.02 - 30	31 - 50	---	---	---	---		

Notes:

- 1 Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse (15A minimum) at no more than 4 times the rating of the protector.
- 2 Same as note 1, except that backup fuse is limited to 80A maximum.
- 3 2 pole protector required (with one pole per power line) for: 250/125 VAC, 125/250 VAC and 208Y/120 VAC Power Systems. 1 pole protector required for : 125 VAC, 1Ø Power System.
- 4 Satisfies the requirements of clause 11.2.8.2.5 of CSA STD C22.2 No 100 for the use of supplementary protectors with portable generators.

Electrical Tables

Table B: Lists UL Recognized, CSA, VDE & TUV Certified configurations & performance capabilities as a Component Supplementary Protector.

B-SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS															
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)						APPLICATION CODES		CONSTRUCTION NOTES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS ¹	UL/CSA		VDE		TUV		UL	CSA		
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Inc) WITHOUT BACKUP	(Inc) WITH BACKUP FUSE	(Inc) WITHOUT BACKUP				
SERIES	80	DC	—	0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				31 - 50	31 - 50	—	7500	3000	1500	3000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1		
				0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				31 - 32	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				31 - 50	31 - 50	—	7500	3000	1500	3000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1		
				0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
	250	50 / 60	1	0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1		
				31 - 32	---	—	3000	6000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				0.10 - 30	---	—	1500	3000	1500	5000	1500	TC1, OL0,U2	TC1, OL0,U2	Single Pole Break	
				0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1, OL1,U2	TC1, OL1,U2	Two Pole Break	
				3	0.10 - 30	---	5000 ³	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	
				415	50 / 60	3	0.10 - 30	---	—	1000	3000	1500	3000	1500	TC1,2, OL1,C1
DUAL COIL	80	DC	—	0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				30 - 50	31 - 50	—	3000	—	—	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1		
	250	50 / 60	1	0.10 - 30	---	5000 ³	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1		
				31 - 50	---	2000 ²	---	—	—	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1		
				3	0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
SHUNT	80	DC	—	0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1		
				1	0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	1	30 - 50	31 - 50	—	3000	—	—	5000	1500	TC1,2, OL0,U1	TC1,2, OL0,U1		
				3	0.10 - 30	---	5000 ³	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	
				31 - 50	---	2000 ²	---	—	—	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1		

Notes:
 1 General Purpose Ratings for UL/CSA Only.
 2 Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse (15A minimum) at no more than 4 times the rating of the protector.
 3 Same as note 1, except that backup fuse is limited to 80 A maximum.

Table C: Lists UL Recognized, CSA Certified configurations and performance capabilities as Protectors, Supplementary for Marine Electrical and Fuel Systems (CCN/Guide PEQZ2, File E75596). Ignition Protected per UL 1500. UL Classified Small Craft Electrical Devices, Marine in accordance with ISO 8846 (CCN/Guide UZMK, File MQ1515) as Marine Supplementary Protectors.

B-SERIES TABLE C: UL1500 (Marine Ignition Protected)							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY (AMPS)	APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE			FULL LOAD AMPS	WITHOUT BACKUP FUSE
SERIES	14 ¹	DC	—	0.02 - 50	5000	TC1,2,OL1,U1	TC1,2,OL1,U1
	32 ¹	DC	—	0.02 - 50	5000	TC1,2,OL1,U2	TC1,2,OL1,U2
	65	DC	—	0.02 - 50	3000	TC1,2,OL1,U1	TC1,2,OL1,U1
	125 / 250	50 / 60	1 ²	0.02 - 50	1500	TC1,2,OL1,U1	TC1,2,OL1,U1
	250	50 / 60	1	0.02 - 30	1000	TC1,2,OL1,U1	TC1,2,OL1,U1

Notes:
 1 Available with special catalog number only (consult factory).
 2 2 pole protector required (with one pole per power line) for: 250/125 VAC, 125/250 VAC and 208Y/120 VAC Power Systems. 1 pole protector required for: 125 VAC, 1Ø Power System.

Table D: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (CCN/ Guide DITT, File E189195), under UL489A

B-SERIES TABLE D: UL489A (COMMUNICATIONS EQUIPMENT)				
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	GENERAL PURPOSE AMPS	WITHOUT BACKUP FUSE
SERIES	80	DC	0.10 - 50	5000
	80	DC	60 - 90 ¹	5000

Notes:
¹ Parallel Pole Construction

Table E: Lists UL Listed (489) configuration and performance capabilities as a Molded Case Circuit Breaker.

B SERIES TABLE E : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	INTERRUPTING CAPACITY (AMPS)	CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE	
SERIES	120	50 / 60	1	0.10 - 30	5,000	1 Pole
	120 / 240	50 / 60	1	0.10 - 30	5,000	2 Poles
	120 / 240	50 / 60	1	0.10 - 30	5,000	2 or 3 Poles (1 Pole of a 3 Pole Unit is for Neutral Break)
SHUNT TRIP DUAL COIL	120	50 / 60	1	0.10 - 30	5,000	1 Pole
	120 / 240	50 / 60	1	0.10 - 30	5,000	2 Poles
	120 / 240	50 / 60	1	0.10 - 30	5,000	2 or 3 Poles (1 Pole of a 3 Pole Unit is for Neutral Break)

Agency Certifications

UL Recognized

UL Standard 1077



Component Recognition Program as Protectors Supplementary (Guide CCN/QVNU2, File E75596)

CSA Accepted



Component Supplementary Protector under Class 3215 30, File 047848 0 000 CSA Standard C22.2 No. 235

UL Standard 508



Switches, Industrial Control (Guide CCN/NRNT2, File E148683)

TUV Certified



EN60934, under License No. R72103448

UL Standard 1500



Protectors, Supplementary for Marine Electrical & Fuel Systems (Guide PEQZ2, File E75596) Ignition Protection

VDE Certified



EN60934, VDE 0642 under File No. 10537

UL Listed

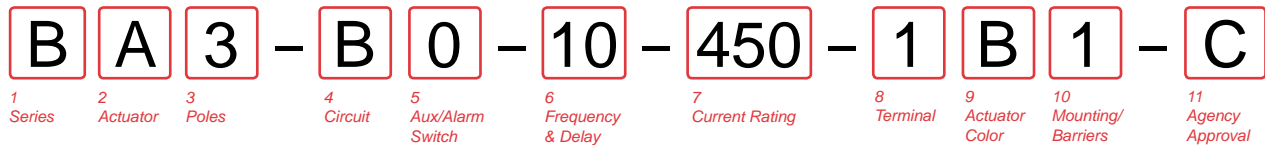
UL Standard 489



Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)

UL Standard 489A

Communications Equipment (Guide CCN/DITT, File E189195)



1 SERIES
B

2 ACTUATOR

- A Handle, one per pole
- B Handle, one per multipole unit
- S Mid-Trip Handle, one per pole
- T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES

- | | | |
|-------|---------|--------|
| 1 One | 3 Three | 5 Five |
| 2 Two | 4 Four | 6 Six |

4 CIRCUIT

- | | |
|--------------------------------------|---|
| A ² Switch Only (No Coil) | G ³ Relay Trip (Voltage) |
| B Series Trip (Current) | H ^{3,4} Dual Coil with Shunt Trip Voltage Coil |
| C Series Trip (Voltage) | K ^{3,4} Dual Coil with Relay Trip Voltage Coil |
| D ³ Shunt Trip (Current) | |
| E ³ Shunt Trip (Voltage) | |
| F ³ Relay Trip (Current) | |

5 AUXILIARY / ALARM SWITCH⁵

- | | |
|--|--|
| 0 without Aux Switch | 5 S.P.S.T., 0.093 Q.C. Term. (Gold Contacts) |
| 1 S.P.D.T., 0.093 Q.C. Term. | 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts) |
| 2 S.P.D.T., 0.110 Q.C. Term. | 8 S.P.S.T., 0.187 Q.C. Term. (Gold Contacts) |
| 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) | 9 S.P.D.T., 0.187 Q.C. Term. |

6 FREQUENCY & DELAY

- | | |
|---|---|
| 03 ² DC 50/60Hz, Switch Only | 30 DC, 50/60Hz Instantaneous |
| 10 ⁶ DC Instantaneous | 31 DC, 50/60Hz Ultra Short |
| 11 DC Ultra Short | 32 DC, 50/60Hz Short |
| 12 DC Short | 33 DC, 50/60Hz Medium |
| 14 DC Medium | 36 DC, 50/60Hz Long |
| 16 DC Long | 42 ⁷ 50/60Hz Short, Hi-Inrush |
| 20 ⁶ 50/60Hz Instantaneous | 44 ⁷ 50/60Hz Medium, Hi-Inrush |
| 21 50/60Hz Ultra Short | 46 ⁷ 50/60Hz Long, Hi-Inrush |
| 22 50/60Hz Short | 52 ⁷ DC, Short, Hi-Inrush |
| 24 50/60Hz Medium | 54 ⁷ DC, Medium, Hi-Inrush |
| 26 50/60Hz Long | 56 ⁷ DC, Long, Hi-Inrush |

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	527	2.750
035	0.035	240	0.400	430	3.000
040	0.040	245	0.450	435	3.500
045	0.045	250	0.500	440	4.000
050	0.050	255	0.550	445	4.500
055	0.055	260	0.600	450	5.000
060	0.060	265	0.650	455	5.500
065	0.065	270	0.700	460	6.000
070	0.070	275	0.750	465	6.500
075	0.075	280	0.800	470	7.000
080	0.080	285	0.850	475	7.500
085	0.085	290	0.900	480	8.000
090	0.090	295	0.950	485	8.500
095	0.095	410	1.000	490	9.000
210	0.100	512	1.250	495	9.500
215	0.150	415	1.500	610	10.000
220	0.200	517	1.750	710	10.500
611	11.000	612	12.000	613	13.000
711	11.500	614	14.000	615	15.000
616	16.000	617	17.000	618	18.000
619	19.000	620	20.000	622	22.000
624	24.000	625	25.000	630	30.000
635	35.000	640	40.000	645	45.000
650	50.000	655	55.000	660	60.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁶

CODE	AMPERES				
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
J65	65 AC	K20	120 AC	L40	240 AC

8 TERMINAL⁹

- | | |
|---|---|
| 1 ¹⁰ Push-On 0.250 Tab (Q.C.) | F Screw M5 with upturned lugs & 30° bend |
| 2 Screw 8-32 with upturned lugs | G Screw M5 (Bus Type) & 30° bend |
| 3 ¹¹ Screw 8-32 (Bus Type) | H Screw M5 (Bus Type) |
| 4 Screw 10-32 with upturned lugs | J Screw M5 Back Connect |
| 5 ¹¹ Screw 10-32 (Bus Type) | K Screw 10-32 Back Connect |
| 6 Screw 8-32 with upturned lugs & 30° bend | L ¹² 0.250 Q.C./ Solder Lug |
| 7 Screw 8-32 (Bus Type) & 30° bend | M ¹¹ M6 Threaded Stud |
| 8 Screw 10-32 with upturned lugs & 30° bend | N Screw M4 Back Connect |
| 9 Screw 10-32 (Bus Type) & 30° bend | P ¹³ Printed Circuit Board Terminals |
| B Screw M5 with upturned lugs | Q ¹⁶ Push-In Stud |
| C Screw M4 with upturned lugs | R Screw M4 with upturned lugs & 30° bend |
| E ¹¹ Screw M4 (Bus Type) | S ¹⁵ Push-On 0.110 Tab (Q.C.) & 30° bend |
| | T Screw M4 (Bus Type) & 30° bend |
| | Y Screw 8-32 Back Connect |

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 / BARRIERS

MOUNTING STYLE	BARRIERS
Threaded Insert, 2 per pole	
1 6-32 x 0.195 inches	no
A 6-32 x 0.195 inches (<i>multi-pole units only</i>)	yes
2 ISO M3 x 5mm	no
B ISO M3 x 5mm	yes
Rectangular Adapter Plate with mounting centers of 2.062 inches [52.37mm] and Threaded insert, 2 per pole	
3 ¹⁴ 6-32 x 0.225 inches	no
C ¹⁴ 6-32 X 0.225 inches (<i>multi-pole units only</i>)	yes
4 ¹⁴ ISO M3 x 6.5mm	no
D ¹⁴ ISO M3 x 6.5mm	yes
Front panel Snap-In, 0.75" [19.05mm] wide bezel	
5 without Handleguard	no
6 without Handleguard (multipole only)	yes
Front panel Snap-In, 0.96" wide bezel	
7 without Handleguard, 1-pole 0.96" wide;	no
8 multipole units have .105" bezel overhang on all sides	yes
without Handleguard, 1-pole 0.96" wide;	yes
(multipole only) .105" bezel overhang on all sides	

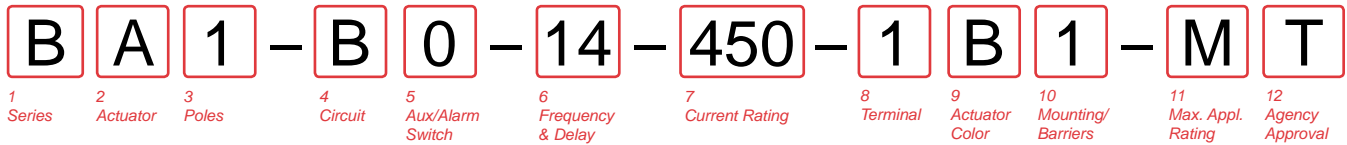
11 AGENCY APPROVAL

- C UL Recognized & CSA Accepted
- D VDE Certified, UL Recognized & CSA Accepted
- E TUV Certified, UL Recognized & CSA Accepted
- I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

Notes:

- 1 Actuator Code:
 - A: Handle tie pin spacer(s) and retainers provided unassembled with multi-pole units.
 - B: Handle location as viewed from front of breaker:

2 pole - left pole	3 pole - center pole
4 pole - two handles at center poles	5 pole - three handles at center poles
6 pole - four handles at center poles	
 - S: Handle moves to mid-position only upon electrical trip of the breaker. Available with circuit codes B, C, D, E, F, G, H and K.
 - T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker. Available with circuit codes B & C.
- 2 Switch Only circuits, rated up to 50 amps and 6 poles, and only available with VDE Certification when tied to a protected pole (Circuit Code B, C, D or H.). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 3 Available with Terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 4 Consult factory for available Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 5 Auxiliary Switch breakers with Series Trip and Switch Only circuits. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 6 Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10 and 20.
- 7 Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized and CSA Accepted to 50 amps.
- 8 VDE Certification available with single pole breakers with DC Delay only. UL Recognition and CSA Accepted available in one and two pole breakers.
- 9 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, J, K, M and Q.
- 10 VDE Certification up to 25 amps and UL Recognition and CSA Acceptance up to 30 amps, but not recommended over 20 amps.
- 11 Terminal Codes 3, 5 E and H (Bus Type) with VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with VDE is supplied with Lock and Flat Washers. These breakers are only VDE Certified when the washers are used.
- 12 VDE Cert. available up to 12 amps. UL Rec. & CSA Acceptance available up to 30 amps.
- 13 Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL Recognition and CSA Acceptance, with Circuit Codes A, B and C. Two pole breakers with Terminal Code P (Printed Circuit Board) are available up to 40 amps with UL Recognition and CSA Acceptance with Circuit Codes A, B and C.
- 14 Available with Actuator Codes A, S and T.
- 15 Available with voltage coils only.
- 16 Terminal Code Q not available with VDE approvals.



1 SERIES			
B			
2 ACTUATOR ¹			
A	Handle, one per pole		
B	Handle, one per multipole unit		
S	Mid-Trip Handle, one per pole		
T	Mid-Trip Handle, one per pole & Alarm Switch		
3 POLES ²			
1	One	3	Three
2	Two	4	Four
4 CIRCUIT			
B Series Trip (Current)			
5 AUXILIARY / ALARM SWITCH ²			
0	without Aux Switch	7	S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	8	S.P.S.T., 0.187 Q.C. Term.
2	S.P.D.T., 0.110 Q.C. Term.	9	S.P.D.T., 0.187 Q.C. Term.
3	S.P.D.T., 0.110 Solder Lug		
6 FREQUENCY & DELAY ⁴			
11	DC Ultra Short	52	DC, Short, Hi-Inrush
12	DC Short	54	DC, Medium, Hi-Inrush
14	DC Medium	56	DC, Long, Hi-Inrush
16	DC Long		
7 CURRENT RATING (AMPERES)			
CODE	AMPERES		
210	0.100	285	0.850
215	0.150	290	0.900
220	0.200	295	0.950
225	0.250	410	1.000
230	0.300	512	1.250
235	0.350	415	1.500
240	0.400	517	1.750
245	0.450	420	2.000
250	0.500	522	2.250
255	0.550	527	2.750
260	0.600	430	3.000
265	0.650	435	3.500
270	0.700	440	4.000
275	0.750	445	4.500
280	0.800	450	5.000
455	5.500	613	13.000
460	6.000	614	14.000
465	6.500	615	15.000
470	7.000	616	16.000
475	7.500	617	17.000
480	8.000	618	18.000
485	8.500	620	20.000
490	9.000	622	22.000
495	9.500	624	24.000
610	10.000	625	25.000
710	10.500	630	30.000
611	11.000	635	³ 35.000
711	11.500	640	³ 40.000
612	12.000	645	³ 45.000
712	12.500	650	³ 50.000
8 TERMINAL ⁴			
1	⁵ Push-On 0.250 Tab (Q.C.)	B	Screw M5 with upturned lugs & 30° bend
2	Screw 8-32 with upturned lugs	F	Screw M5 with upturned lugs & 30° bend
3	⁶ Screw 8-32 (Bus Type)	G	Screw M5 (Bus Type) & 30° bend
4	Screw 10-32 with upturned lugs	H	Screw M5 (Bus Type)
5	⁶ Screw 10-32 (Bus Type)	J	Screw M5 Back Connect
6	Screw 8-32 with upturned lugs & 30° bend	K	Screw 10-32 Back Connect
7	Screw 8-32 (Bus Type) & 30° bend	M	⁶ M6 Threaded Stud
8	Screw 10-32 with upturned lugs & 30° bend	N	Screw M4 Back Connect
9	Screw 10-32 (Bus Type) & 30° bend	P	⁷ Printed Circuit Board Terminals
		Q	⁸ Push-In Stud
		Y	Screw 8-32 Back Connect

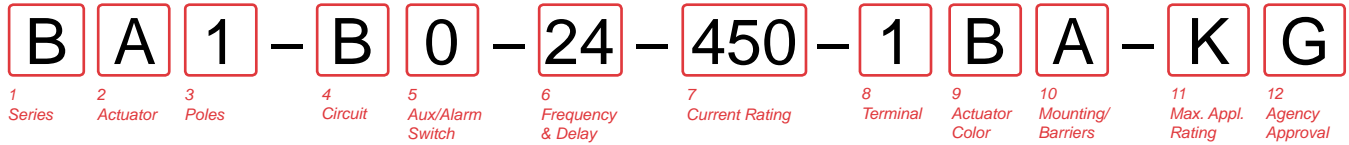
9 ACTUATOR COLOR & LEGEND			
Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

10 MOUNTING / BARRIERS		
	MOUNTING STYLE	BARRIERS
	Threaded Insert, 2 per pole	
1	6-32 x 0.195 inches	no
A	6-32 x 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm	yes
	Rectangular Adapter Plate with mounting centers of 2.062 inches [52.37mm] and Threaded insert, 2 per pole	
3	6-32 x 0.225 inches	no
C	6-32 X 0.225 inches (multi-pole units only)	yes
4	ISO M3 x 6.5mm	no
D	ISO M3 x 6.5mm	yes
	Front panel Snap-In, 0.75" [19.05mm] wide bezel	
5	without Handguard	no
6	without Handguard (multipole only)	yes
	Front panel Snap-In, 0.96" wide bezel	
7	without Handguard, 1-pole 0.96" wide; multipole units have .105" bezel overhang on all sides	no
8	without Handguard, 1-pole 0.96" wide; (multipole only) .105" bezel overhang on all sides	yes

11 MAXIMUM APPLICATION RATING	
M	80 DC

12 AGENCY APPROVAL	
T	UL489A Listed
K	UL489A Listed, VDE Certified
J	UL489A Listed, TUV Certified

- Notes:
- Actuator Code:
A: Handle tie pin spacer(s) and retainers provided unassembled with multi-pole units.
S: Handle moves to mid-position only upon electrical trip of the breaker.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker.
 - On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
 - VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
 - Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G, H, J, K, M and Q.
 - Terminal Code 1 (Push-On) available up to 25 amps with TUV or VDE Certification and 30 amps with UL489A Listing, but is not recommended over 20 amps.
 - Terminal Codes 3, 5 and H (Bus Type) with TUV or VDE, are supplied with Lock Washers, and Terminal Code M (M6 Threaded Stud) with TUV or VDE is supplied with Lock and Flat Washers. These breakers are only TUV or VDE Certified when the washers are used.
 - Single pole breakers with Terminal Code P (Printed Circuit Board) are available up to 30 amps with VDE Certification and 50 amps with UL489A Listing.
 - Terminal Code Q not available with VDE approvals.



1 SERIES
B

2 ACTUATOR 1
A Handle, one per pole
B Handle, one per multipole unit
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES 2
1 One 2 Two 3³ Three

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 4
0 without Aux Switch 3 S.P.D.T., 0.110 Solder Lug
1 S.P.D.T., 0.093 Q.C. Term. 8 S.P.S.T., 0.187 Q.C. Term.
2 S.P.D.T., 0.110 Q.C. Term. 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
21 AC Ultra Short 42 AC, Short, Hi-Inrush
22 AC Short 44 AC, Medium, Hi-Inrush
24 AC Medium 46 AC, Long, Hi-Inrush
26 AC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
210	0.100	280	0.800	445	4.500
215	0.150	285	0.850	450	5.000
220	0.200	290	0.900	455	5.500
225	0.250	295	0.950	460	6.000
230	0.300	410	1.000	465	6.500
235	0.350	512	1.250	470	7.000
240	0.400	415	1.500	475	7.500
245	0.450	517	1.750	480	8.000
250	0.500	420	2.000	485	8.500
255	0.550	522	2.250	490	9.000
260	0.600	527	2.750	495	9.500
265	0.650	430	3.000	610	10.000
270	0.700	435	3.500	710	10.500
275	0.750	440	4.000	611	11.000
				630	30.000

8 TERMINAL 4

1	Push-On 0.250 Tab (Q.C.)	A	Load Terminal #8 Screw with QC Combination (Special Catalog #)
2	Screw 8-32 with upturned lugs	B	Screw M5 with upturned lugs & 30° bend
3	Screw 8-32 (Bus Type)	F	Screw M5 with upturned lugs & 30° bend
4	Screw 10-32 with upturned lugs	G	Screw M5 (Bus Type) & 30° bend
5	Screw 10-32 (Bus Type)	H	Screw M5 (Bus Type)
6	Screw 8-32 with upturned lugs & 30° bend	J	Screw M5 Back Connect & 30° bend
7	Screw 8-32 (Bus Type) & 30° bend	K	Screw 10-32 Back Connect & 30° bend
8	Screw 10-32 with upturned lugs & 30° bend	M	M6 Threaded Stud
9	Screw 10-32 (Bus Type) & 30° bend	N	Screw M4 Back Connect
		Q	Push-In Stud
		Y	Screw 8-32 Back Connect

9 ACTUATOR COLOR & LEGEND 6

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

10 MOUNTING / BARRIERS

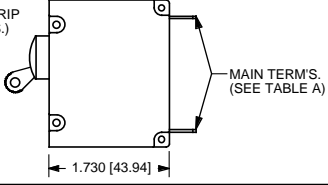
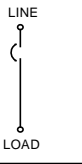
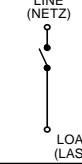
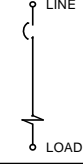
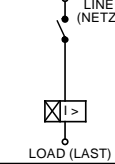
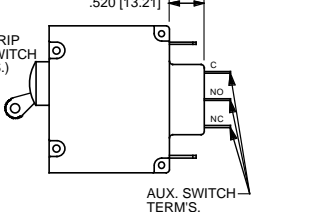
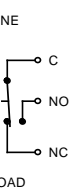
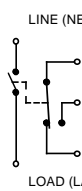
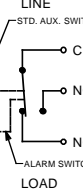
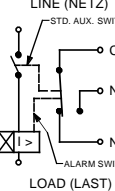
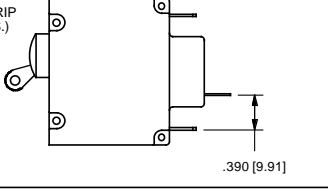
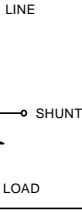
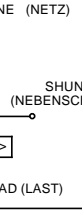
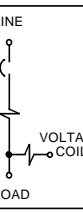
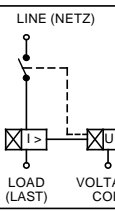
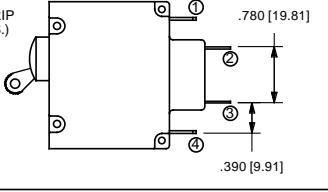

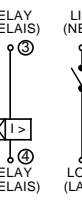
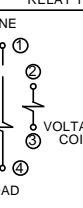
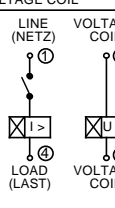
MOUNTING STYLE	BARRIERS
Threaded Insert, 2 per pole	
A 6-32 x 0.195 inches (multi-pole units only)	yes
B ISO M3 x 5mm	yes
Rectangular Adapter Plate with mounting centers of 2.062 inches [52.37mm] and Threaded insert, 2 per pole 7	
C 6-32 X 0.225 inches (multi-pole units only)	yes
D ISO M3 x 6.5mm	yes
6 Front panel Snap-In, 0.75" [19.05mm] wide bezel without Handleguard (multipole only)	yes
8 Front panel Snap-In, 0.96" wide bezel without Handleguard, 1-pole 0.96" wide; (multipole only) .105" bezel overhang on all sides	yes

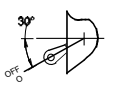
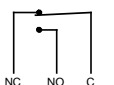
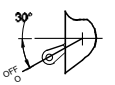
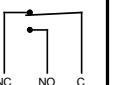
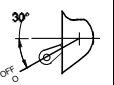
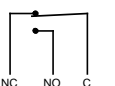
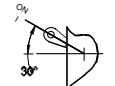

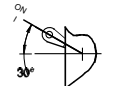
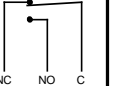
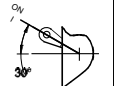
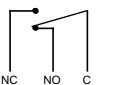
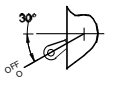
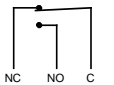
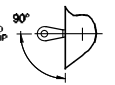
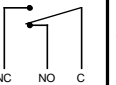
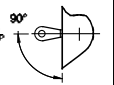
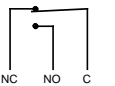
11 MAXIMUM APPLICATION RATING
C⁸ 120/240VAC
K 120VAC

12 AGENCY APPROVAL
G UL489 Listed
3 UL489 Listed, TUV Certified

- Notes:
- Actuator Code:
A: Handle tie pin spacer(s) and retainers provided un-assembled with multi-pole units.
B: Handle location as viewed from front of breaker:
2 pole - left pole 3 pole - center pole
S: Handle moves to mid-position only upon electrical trip of the breaker. Available with circuit codes B, C, D, E, F, G, H and K.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker. Available with circuit codes B & C.
 - All poles must be same polarity.
 - 3 pole units available only when 1 of 3 poles is neutral.
 - Auxiliary/Alarm Switch circuit must be same polarity as the main circuit. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
 - Screw Terminals are recommended on ratings greater than 20 amps.
 - Standard actuator colors are black and white.
 - Adapter plate with mounting centers of 2.082 inches. Available with Actuator Codes A, S and T.
 - Voltage Rating available with 2 and 3-pole breakers only.
 - Barriers supplied on multi-pole units only.

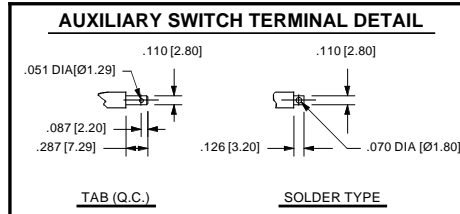
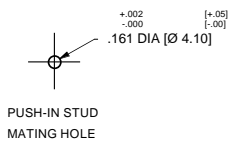
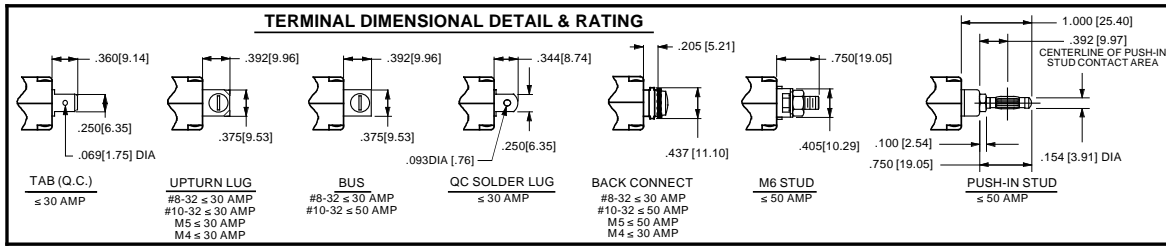
Circuit & Terminal Diagrams: in. [mm]

	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
SERIES TRIP (2 TERM'S.) 	SWITCH ONLY (NO COIL)  		A	O	SERIES TRIP  		C/B	O
SERIES TRIP W AUX SWITCH (5 TERM'S.) 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH  		A	2 3 4	SERIES TRIP WITH AUXILIARY / ALARM SWITCH  		B C	2 3 4
SHUNT TRIP (3 TERM'S.) 	SHUNT TRIP  		D E	0	DUAL COIL: SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL  		H	0
RELAY TRIP (4 TERM'S.) 	RELAY TRIP  		F G	0	DUAL COIL: SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL  		K	0

HANDLE POSITION VS. AUX/ALARM SWITCH MODE						
CIRCUIT BREAKER MODE	STANDARD C/B		MID TRIP C/B		MID TRIP C/B	
	HANDLE POSITION	AUX. SWITCH MODE	HANDLE POSITION	ALARM SWITCH MODE	HANDLE POSITION	AUX. SWITCH MODE (w/ALARM SWITCH)
OFF						
ON						
ELECTRICAL TRIP						

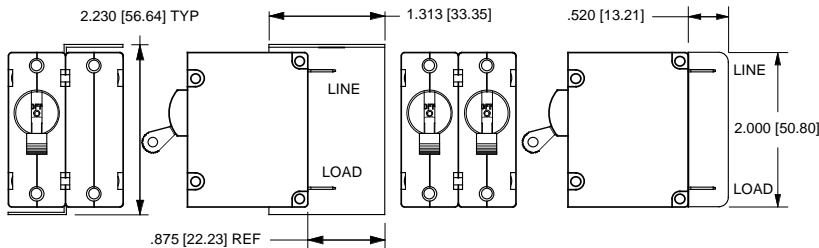
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance $\pm .020$ [.51] unless otherwise specified.
 3 Alarm Switch available with .110 x .020 Q.C. & Solder Lug Terminals Only.

Circuit & Terminal Diagrams: in. [mm]



**TABLE A
TIGHTENING TORQUE SPECIFICATIONS**

THREAD SIZE	TORQUE
#6-32 & M3 MOUNTING HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#8-32 & M4 THREAD TERMINAL SCREW	12-15 IN-LBS [1.4-1.7 NM]
#10-32 & M5 THREAD TERMINAL SCREW	15-20 IN-LBS [1.7-2.3 NM]



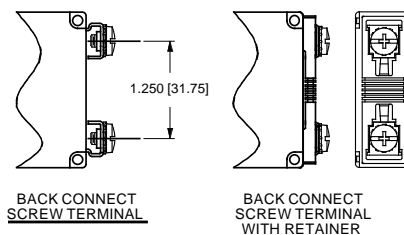
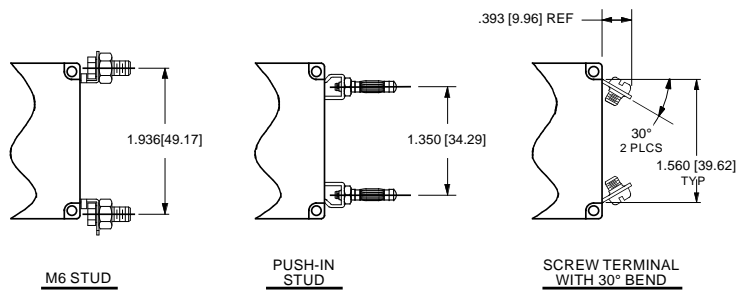
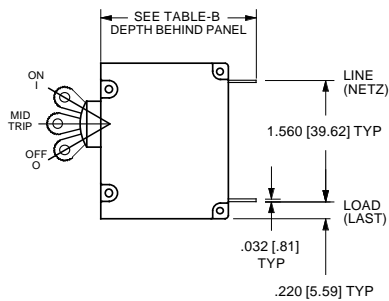
**BARRIER FOR
UL-489 MULTI-POLE
BREAKERS**

**BARRIER FOR
UL-RECOGNIZED MULTI-POLE
BREAKERS**

TABLE B

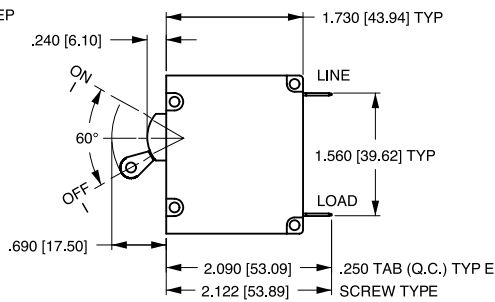
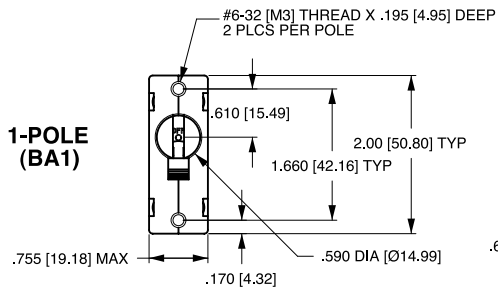
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.090 [53.09]
	SCREW TYPE	2.122 [53.90]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.612 [66.35]
	SCREW #8-32 W/UPTURNED LUGS	2.644 [67.16]
AUX. SWITCH*	TAB (Q.C.) .110 x .020	2.537 [64.44]
	SOLDER TYPE	2.348 [59.64]

* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

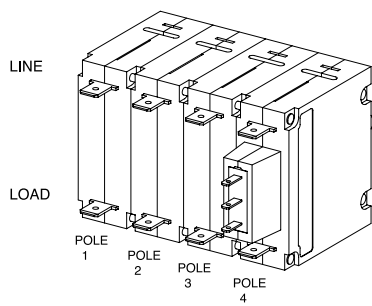
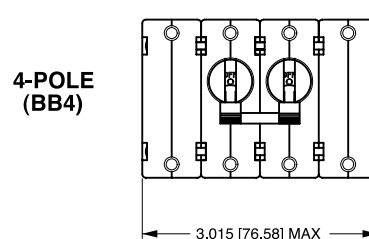
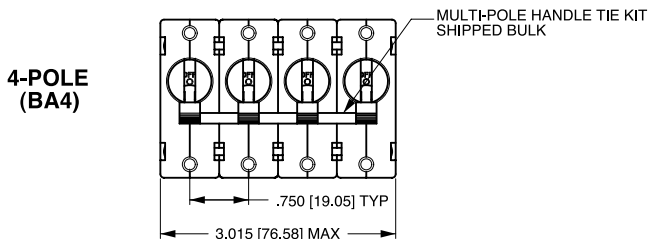
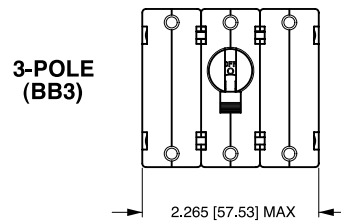
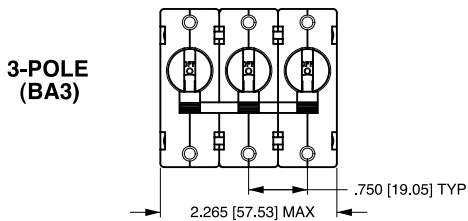
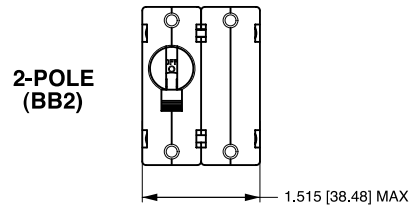
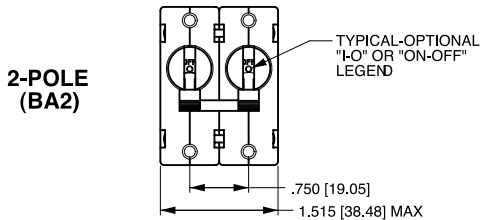


- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance ±.020 [.51] unless otherwise specified.

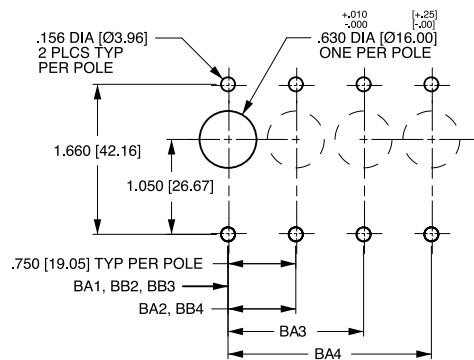
Dimensional Specifications: in. [mm]



TAB (Q.C.) TYPE TERMINALS
IN SERIES TRIP CIRCUIT
CONFIGURATION SHOWN.
FOR OTHER CONFIGURATIONS,
SEE CIRCUIT AND TERMINAL
DRAWINGS.



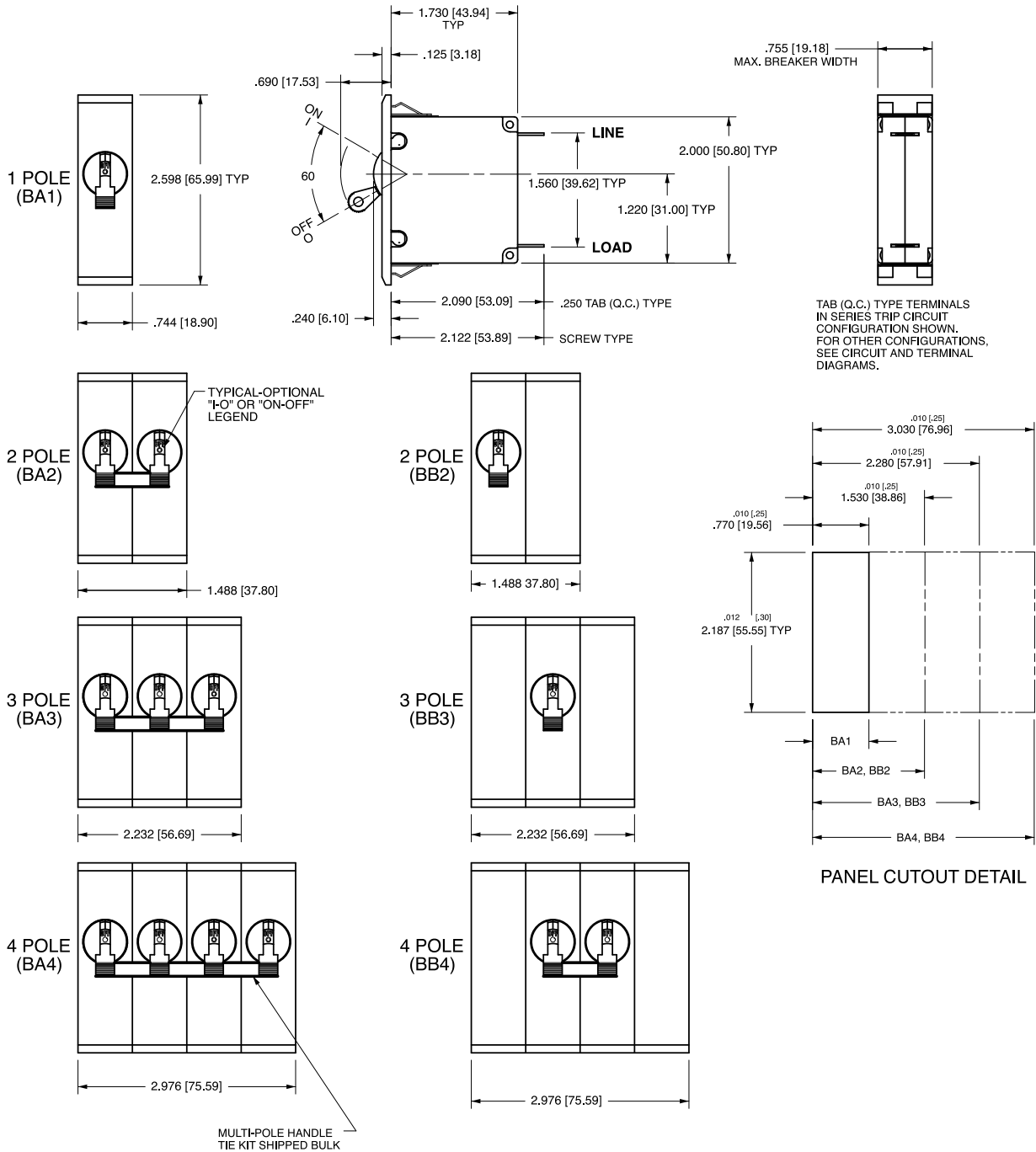
MULTI-POLE IDENTIFICATION SCHEME
AS VIEWED FROM TERMINAL END OF BREAKER.



Notes:

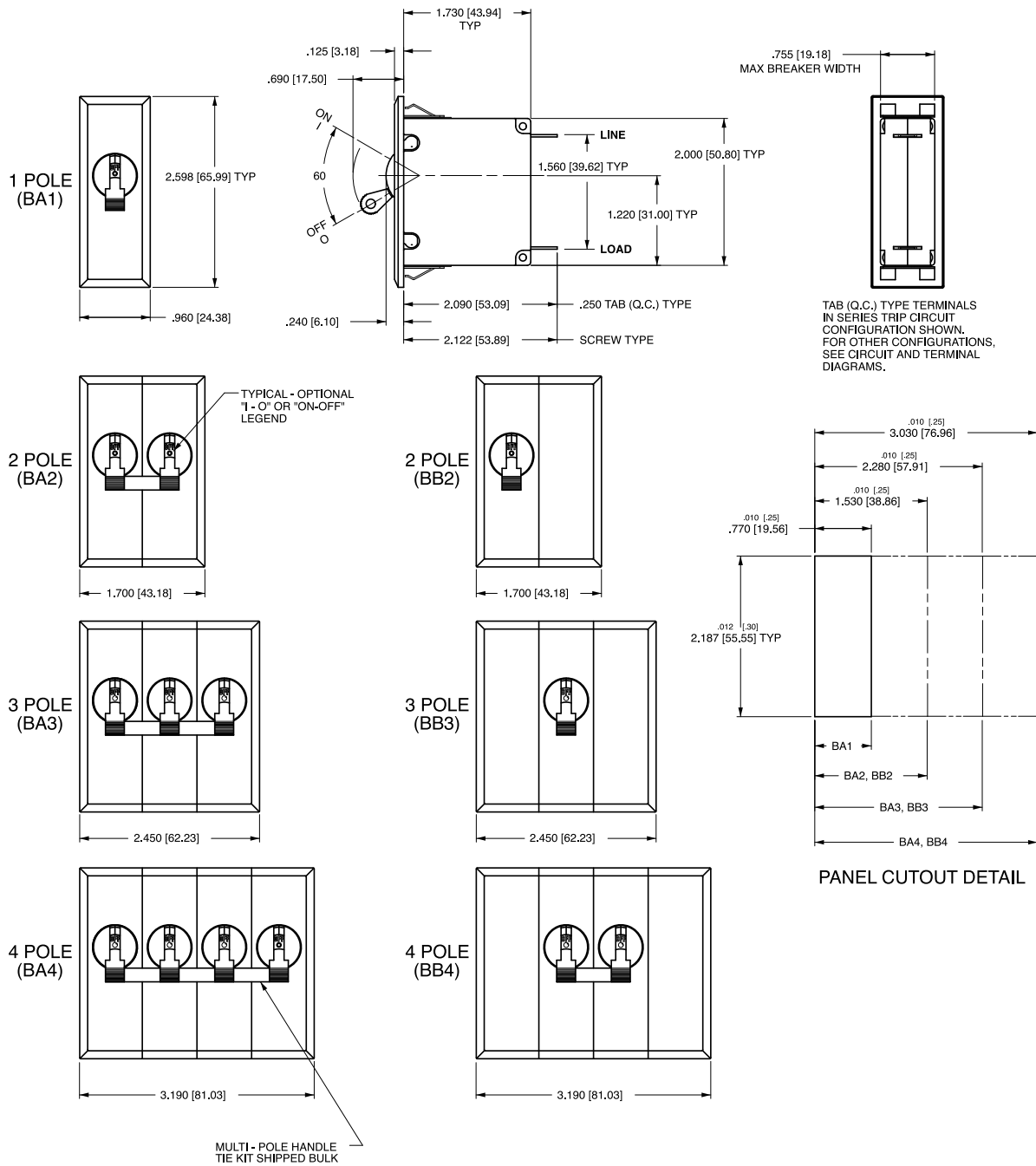
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.20 [51] unless otherwise specified.

Dimensional Specifications: in. [mm]



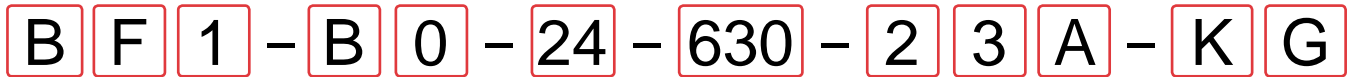
- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
 - 3 Tolerance $\pm .020$ [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
- 3 Tolerance ±.020 [.51] unless otherwise specified.



1 Series 2 Actuator 3 Poles 4 Circuit 5 Aux/Alarm Switch 6 Frequency & Delay 7 Current Rating 8 Terminal 9 Actuator Color 10 Mounting/Barriers 11 Max. Appl. Rating 12 Agency Approval

1 SERIES
B

2 ACTUATOR

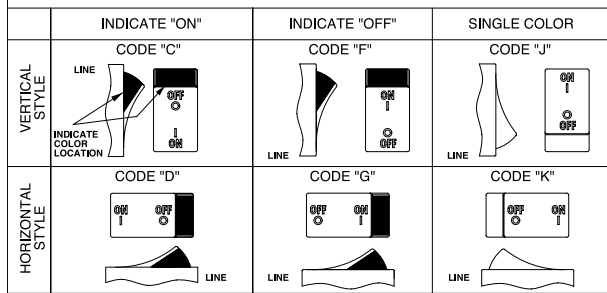
Two Color Visi-Rocker

- C Indicate ON, vertical legend
- D Indicate ON, horizontal legend
- F Indicate OFF, vertical legend
- G Indicate OFF, horizontal legend

Single color

- J Vertical legend
- K Horizontal legend

ROCKER STYLE DESCRIPTIONS



3 POLES 1,2

- 1 One 2 Two 3³ Three

4 CIRCUIT

- B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 4

- 0 without Aux Switch
- 1 S.P.D.T., 0.093 Q.C. Term.
- 2 S.P.D.T., 0.110 Q.C. Term.
- 3 S.P.D.T., 0.110 Solder Lug
- 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
- 8 S.P.S.T., 0.187 Q.C. Term.
- 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 21 AC Ultra Short 42 AC, Short, Hi-Inrush
- 22 AC Short 44 AC, Medium, Hi-Inrush
- 24 AC Medium 46 AC, Long, Hi-Inrush
- 26 AC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	220	0.200	415	1.500
025	0.025	225	0.250	517	1.750
030	0.030	230	0.300	420	2.000
035	0.035	235	0.350	522	2.250
040	0.040	240	0.400	527	2.750
045	0.045	245	0.450	430	3.000
050	0.050	250	0.500	435	3.500
055	0.055	255	0.550	440	4.000
060	0.060	260	0.600	445	4.500
065	0.065	265	0.650	450	5.000
070	0.070	270	0.700	455	5.500
075	0.075	275	0.750	460	6.000
080	0.080	280	0.800	465	6.500
085	0.085	285	0.850	470	7.000
090	0.090	290	0.900	475	7.500
095	0.095	295	0.950	480	8.000
210	0.100	410	1.000	485	8.500
215	0.150	512	1.250	490	9.000
				495	9.500
				610	10.000
				710	10.500
				611	11.000
				711	11.500
				612	12.000
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000

8 TERMINAL 5

- 1⁶ Push-On 0.250 Tab (Q.C.)
- 2 Screw 8-32 with upturned lugs
- 3 Screw 8-32 (Bus Type)
- 4 Screw 10-32 with upturned lugs & 30° bend
- 5 Screw 10-32 (Bus Type)
- 6 Screw 8-32 with upturned lugs & 30° bend
- 7 Screw 8-32 (Bus Type) & 30° bend
- 8 Screw 10-32 with upturned lugs & 30° bend
- 9 Screw 10-32 (Bus Type) & 30° bend
- B Screw M5 with upturned lugs
- C Screw M4 with upturned lugs
- F Screw M5 with upturned lugs & 30° bend
- G Screw M5 (Bus Type) & 30° bend
- H Screw M5 (Bus Type)
- J Screw M5 Back Connect
- K Screw 10-32 Back Connect
- N Screw M4 Back Connect
- Y Screw 8-32 Back Connect

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color 7	Marking:		Marking Color	
	ON-OFF	Dual 7	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS

- MOUNTING STYLE
- Threaded Insert, 2 per pole
- A 6-32 x 0.195 inches (multi-pole units only)
- B ISO M3 x 5mm
- ROCKERGUARD BEZEL
- Threaded Insert, 2 per pole
- C 6-32 X 0.225 inches (multi-pole units only)
- D ISO M3 x 6.5mm
- BARRIERS 9
- yes
- yes
- yes
- yes

11 MAXIMUM APPLICATION RATING

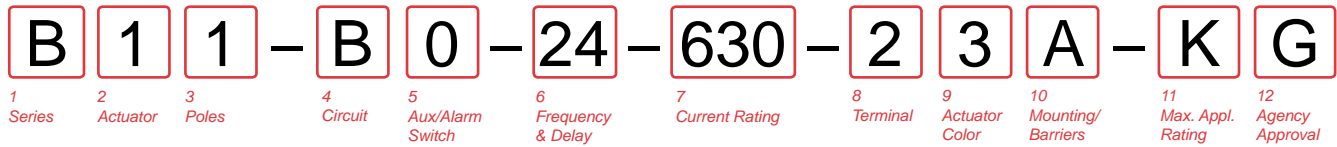
- C 8 120/240 VAC
- K 120 VAC

12 AGENCY APPROVAL

- G UL489 Listed
- 3 UL489 Listed, TUV Certified

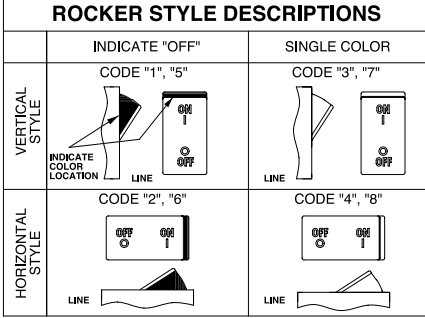
Notes:

- 1 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- 2 All poles must be same polarity.
- 3 3 pole units available only when 1 of 3 poles is neutral.
- 4 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 5 Screw Terminals are recommended on ratings greater than 20 amps.
- 6 Terminal Code 1 (Push-On) available up to 30 amps, but are not recommended over 20 amps.
- 7 Dual legend = ON-OFF/I-O
- 8 Voltage Rating available with 2 and 3-pole breakers only.
- 9 Barriers supplied on multi-pole units only.



1 SERIES
B

2 ACTUATOR 1
Two Color Visi-Rocker
 1 Indicate OFF, vertical legend
 2 Indicate OFF, horizontal legend
Single color
 3 Vertical legend
 4 Horizontal legend
Push-To-Reset, Visi-Rocker
 5 Indicate OFF, vertical legend
 6 Indicate OFF, horizontal legend
Push-To-Reset, Single color
 7 Vertical legend
 8 Horizontal legend



3 POLES 2,3
 1 One 2 Two 3⁴ Three

4 CIRCUIT
 B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 4
 0 without Aux Switch
 1 S.P.D.T., 0.093 Q.C. Term.
 2 S.P.D.T., 0.110 Q.C. Term.
 3 S.P.D.T., 0.110 Solder Lug
 7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
 8 S.P.S.T., 0.187 Q.C. Term.
 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
 21 AC Ultra Short 42 AC, Short, Hi-Inrush
 22 AC Short 44 AC, Medium, Hi-Inrush
 24 AC Medium 46 AC, Long, Hi-Inrush
 26 AC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	220	0.200	415	1.500
025	0.025	225	0.250	517	1.750
030	0.030	230	0.300	420	2.000
035	0.035	235	0.350	522	2.250
040	0.040	240	0.400	527	2.750
045	0.045	245	0.450	430	3.000
050	0.050	250	0.500	435	3.500
055	0.055	255	0.550	440	4.000
060	0.060	260	0.600	445	4.500
065	0.065	265	0.650	450	5.000
070	0.070	270	0.700	455	5.500
075	0.075	275	0.750	460	6.000
080	0.080	280	0.800	465	6.500
085	0.085	285	0.850	470	7.000
090	0.090	290	0.900	475	7.500
095	0.095	295	0.950	480	8.000
210	0.100	410	1.000	485	8.500
215	0.150	512	1.250	490	9.000
				495	9.500
				610	10.000
				710	10.500
				611	11.000
				711	11.500
				612	12.000
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000

8 TERMINAL 6
 1⁷ Push-On 0.250 Tab (Q.C.)
 2 Screw 8-32 with upturned lugs
 3 Screw 8-32 (Bus Type)
 4 Screw 10-32 with upturned lugs
 5 Screw 10-32 (Bus Type)
 6 Screw 8-32 with upturned lugs & 30° bend
 7 Screw 8-32 (Bus Type) & 30° bend
 8 Screw 10-32 with upturned lugs & 30° bend
 9 Screw 10-32 (Bus Type) & 30° bend
 B Screw M5 with upturned lugs
 C Screw M4 with upturned lugs
 F Screw M5 with upturned lugs & 30° bend
 G Screw M5 (Bus Type) & 30° bend
 H Screw M5 (Bus Type)
 J Screw M5 Back Connect
 K Screw 10-32 Back Connect
 N Screw M4 Back Connect
 Y Screw 8-32 Back Connect

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color 8	Marking: Dual 8		Marking Color	
	ON-OFF	Dual 8	Single Color	Visi-Rocker
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

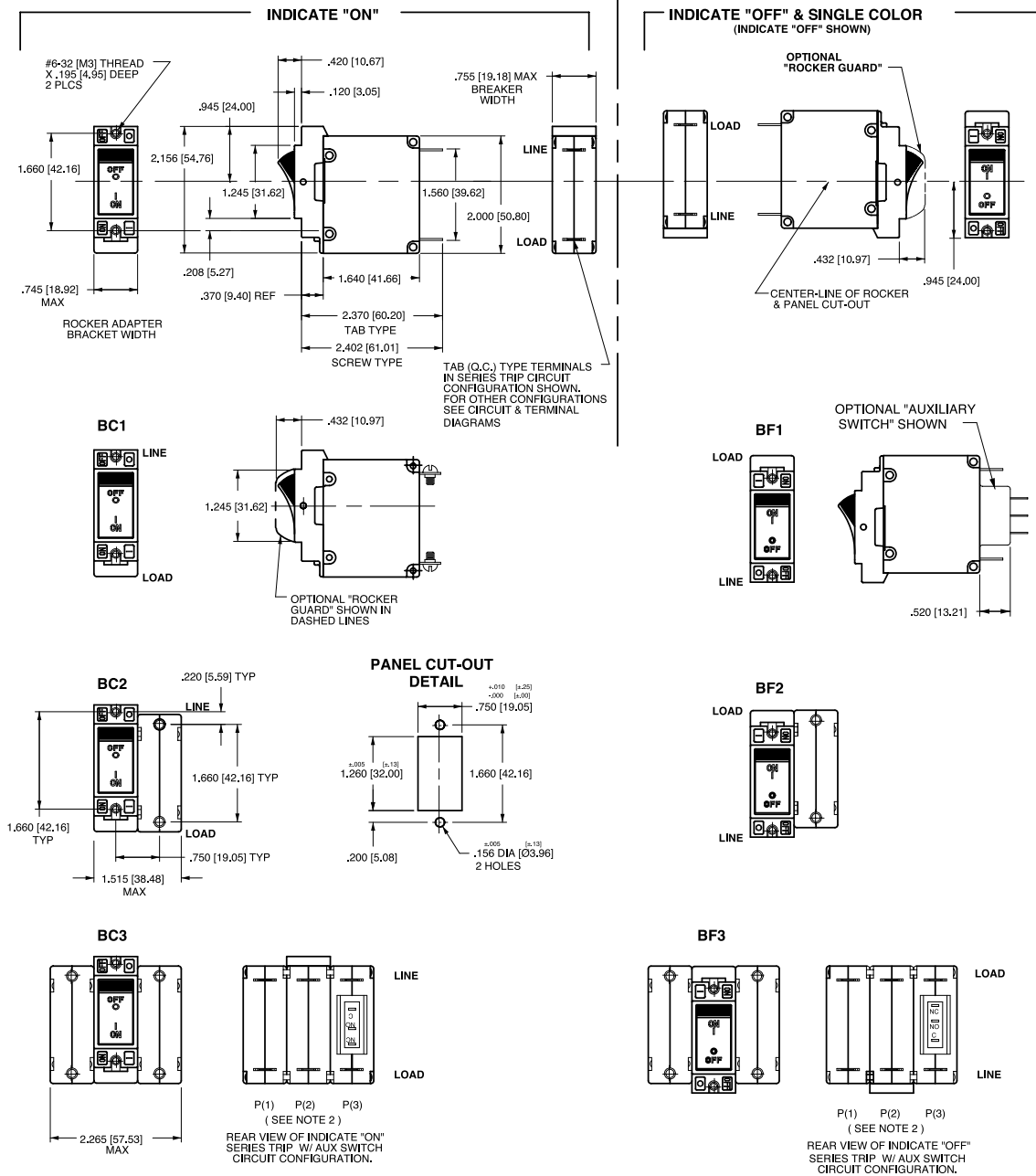
10 MOUNTING / BARRIERS 9
STANDARD ROCKER BEZEL
Threaded Insert, 2 per pole
FLAT ROCKER ACTUATOR
 A 6-32 x 0.195 inches (multi-pole units only) yes
 B ISO M3 x 5mm yes
RECESSED OFF SIDE ROCKER ACTUATOR 10
 E 6-32 X 0.225 inches (multi-pole units only) yes
 F ISO M3 x 6.5mm yes
PUSH-TO-RESET BEZEL, Threaded Insert, 2 per pole
 C 6-32 x 0.195 inches yes
 D ISO M3 x 5mm yes

11 MAXIMUM APPLICATION RATING
 C¹¹ 120/240 VAC
 K 120 VAC

12 AGENCY APPROVAL
 G UL489 Listed
 3 UL489 Listed, TUV Certified

Notes:
 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
 2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
 3 All poles must be same polarity.
 4 3 pole units available only when 1 of 3 poles is neutral.
 5 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
 6 Screw Terminals are recommended on ratings greater than 20 amps.
 7 Terminal Code 1 (Push-On) available up to 30 amps, but are not recommended over 20 amps.
 8 Color shown is visi and legend with remainder of rocker black, Dual = ON-OFF/I/O legend.
 9 Legend on Push-to-reset bezel/shroud is white with single color actuator codes 7 & 8. Legend on Push-To-Reset bezel/shroud matches Visi-Color of rocker with actuator codes 5 & 6.
 10 Recessed "off-side" available with actuator codes 1, 2, 3 & 4. Legends on rocker are available in ink stamping only.
 11 Voltage rating available with 2 & 3-pole breakers only.
 12 Barriers supplied on multi-pole units only.

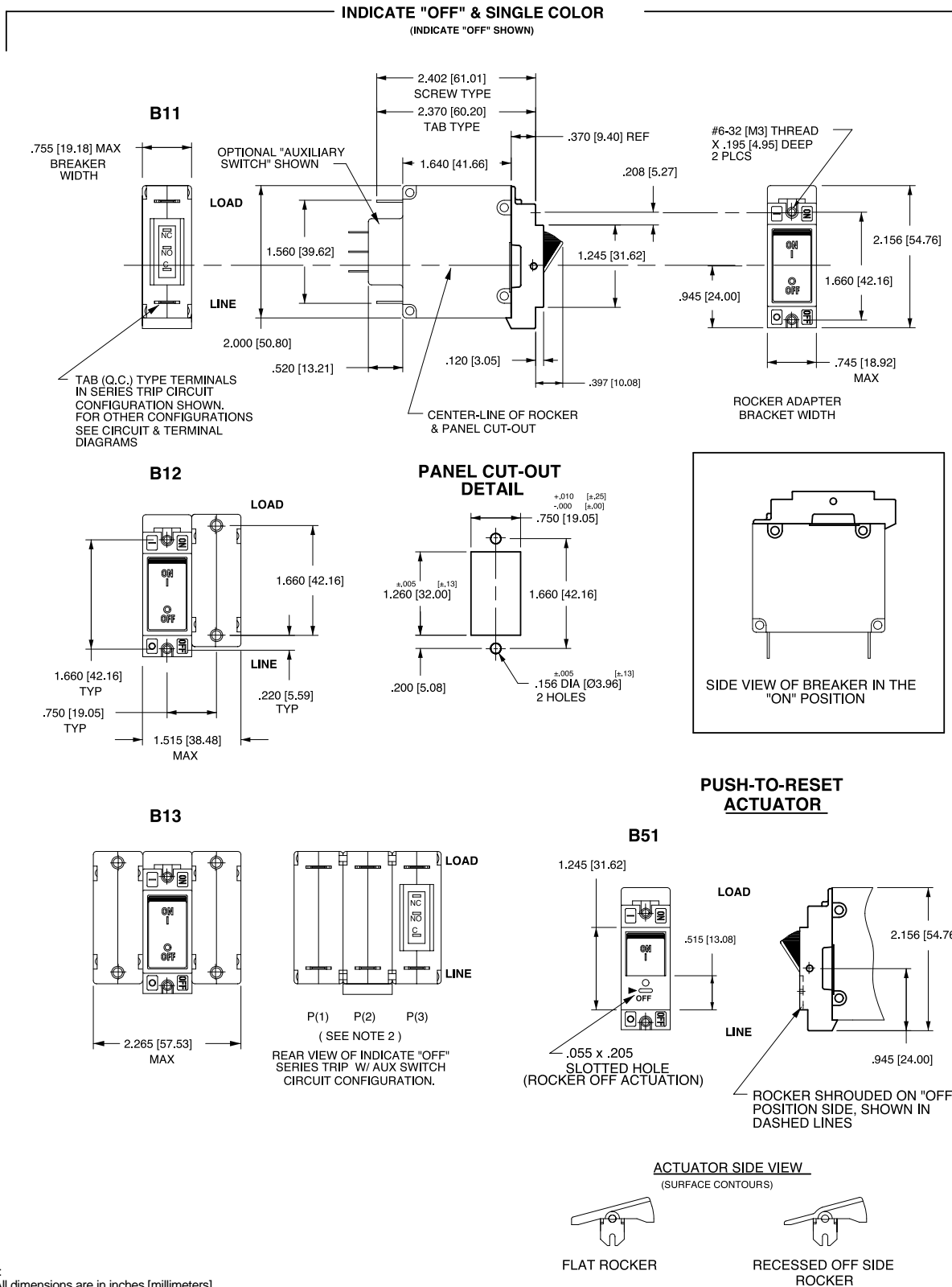
Dimensional Specifications: in. [mm]



Notes:

- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate "OFF" is opposite of indicate "ON".
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
- 3 All dimensions are in inches [millimeters].
- 4 Tolerance ±.020 [.51] unless otherwise specified.

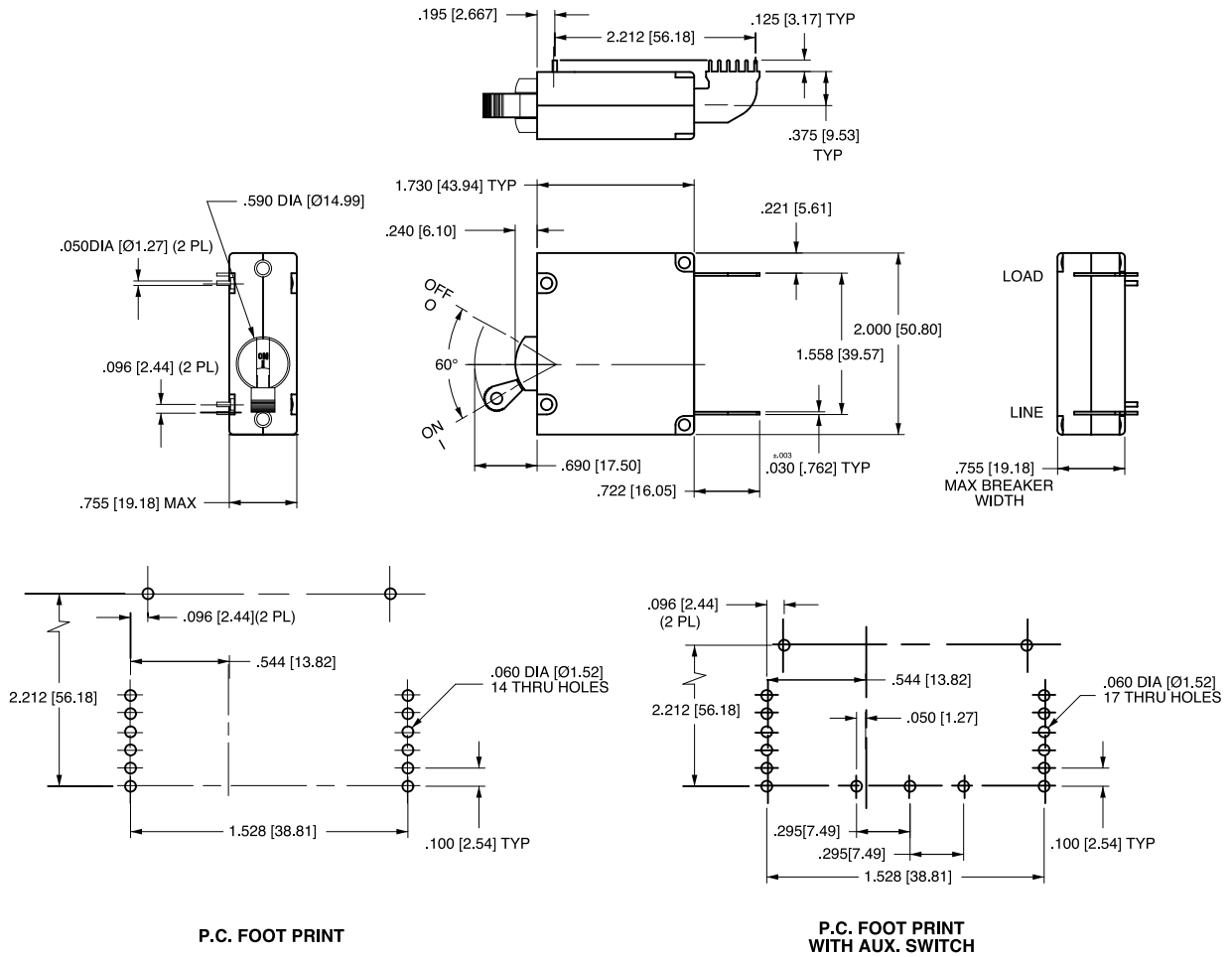
Dimensional Specifications: in. [mm]



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
- 3 Tolerance $\pm .010$ [$\pm .25$] unless otherwise specified.

PC Terminal Diagrams: in. [mm]



P.C. FOOT PRINT

P.C. FOOT PRINT WITH AUX. SWITCH

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90° .
- 3 Tolerance $\pm 0.10 [2.54]$ unless otherwise specified.

TB-Series

TB-Series CIRCUIT BREAKER

The TB-Series is a space saving, tandem pole circuit breaker specifically designed to fit a two pole breaker into a one rack unit, making it ideal for datacom and PDU applications.

The TB-Series is designed with a common trip linkage ensuring if one pole trips, the tandem pole simultaneously trips. It also features a trip-free mechanism, a safety feature making it impossible to manually hold the contacts closed during overcurrent or fault conditions. TB-Series options include available handle guard to prevent inadvertent actuation and an auxiliary switch.

2 poles; ratings from 0.10 to 20 amps, 120/240VAC; UL 489 Listed, TUV, IEC/EN 60947-2.



Resources:

[Download 3D CAD Files](#)

[IGS >](#) [STP >](#)

[Watch Product Video](#)



Product Highlights:

- Fits in 1RU
- 2 Pole Protection in a 1 Pole Package
- Common Trip Included
- Optional Auxiliary Switch

Typical Applications:

- Datacom
- Power Distribution Units

Electrical Tables

Table A: Voltage and Current Rating

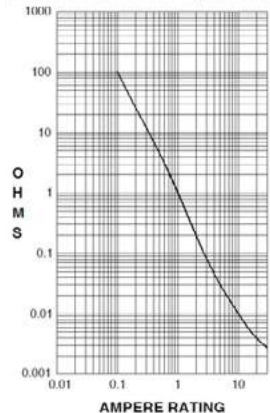
TB SERIES TABLE A : UL489 LISTED, cUL and TUV CERTIFIED CIRCUIT BREAKERS						
Circuit Configuration	Voltage			Current Rating	Interrupting Capacity (Amps)	
	Max Rating	Frequency	Phase	Full Load Amps	UL / cUL	TUV
Series	120/240	50 / 60	1	0.10 - 20	10,000	5,000
	240 ¹	50 / 60	1	0.10 - 20	---	5,000

Notes:
 1 Voltage rating requires wiring configuration according to TUV, see Dimensional Specifications drawings for wiring diagram.

Electrical

Maximum Voltage	120/240VAC 50/60 Hz
Current Ratings	Standard current coils: 0.200, 0.350, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0 Amps. Other ratings available - consult ordering scheme.
Auxiliary/Alarm Switch Rating(s)	10.1A 250VAC 0.1A 80VDC
Dielectric Strength	Meets UL and CSA Requirements and can withstand 1500 VAC, 60Hz for one minute between all electrically isolated terminals. Breakers to hold 100%, and must trip at 125% of rated current and greater within the time limit shown on Table B. Data shown represents breaker response at ambient temperature of 77° F (25° C) with no preloading. Breakers are mounted vertically in standard wall-mount position.
Insulation Resistance	Minimum of 100 Megohms @ 500VDC
Overload	50 operations @ 600% rated current
Inrush Pulse Tolerance	Standard delays 12x rated current, high inrush delays 25x for 1/2 cycle @ 60 Hz
Resistance / Impedance	(Across circuit breaker terminals)

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



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15
5.1 - 20.0	± 25

Agency Approvals

UL Listed (489) as Molded Case Circuit Breakers
 TUV Certified IEC/EN 60947-2
 CUL Certified CAN/CSA 22.2 No. 5

Mechanical

Endurance	6,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage. 4,000 ON-OFF operations with no load.
Trip Free	All TB-Series Circuit Breakers will trip on overload, even when Handle is forcibly held in the ON position.
Trip Indication	The operating Actuator moves positively to the OFF position when an overload causes the breaker to trip.

Physical

Internal Circuit Configurations	Series, with or without auxiliary / alarm switch
Weight	Approximately 170g/5.75oz per unit
Standard Colors	Housing – Black Actuator – White or Black with contrasting ON-OFF legends
Mounting	Refer to the dimensional specifications page

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:	
Shock	Withstands 100G's, 6ms sawtooth while carrying rated current per Method 213B, Test Condition "I". Instantaneous and ultra short curves tested @ 90% rated current.
Vibration	Withstands 0.060" excursion from 10-55Hz, and 10G's 55-500Hz, at rated current per Method 204D, Test Condition A. Instantaneous and ultrashort curves tested @ 90% of rated current.
Moisture Resistance/ Humidity	Method 106G, i.e. ten 24-hour cycles @ +25°C to +65°C, 80-98% RH
Salt Spray	Method 101E, Condition A (90-95% RH@ 5% NaCl Solution, 96 hours)
Thermal Shock	Method 107G, Condition A (Five cycles @ -55°C to +25°C to +85°C to 25°C)
Operating Temperature	-20° C to +85° C
Storage Temperature	-40° C to +85° C

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

T **B** **2** - **B** **0** - **24** - **620** - **J** **2** **1** - **C** **3**

1 Type 2 Series 3 Poles 4 Circuit 5 Auxiliary Switch 6 Frequency & Delay 7 Current Rating 8 Terminal 9 Actuator Color 10 Mounting/Barriers 11 Application Rating 12 Agency Approval

1 TYPE

T Tandem Breaker

2 SERIES

B B-Series Circuit Breaker

3 POLES

2 Two

4 CIRCUIT

B Series Trip (Current)

5 AUXILIARY SWITCH ³

- 0** without Aux Switch
- 1** S.P.D.T., 0.093 Q.C. Term.
- 2** S.P.D.T., 0.110 Q.C. Term.
- 3** S.P.D.T., 0.110 Solder Lug
- 8** S.P.S.T., 0.187 Q.C. Term.
- 9** S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & TIME DELAY

- 21** 50/60Hz Ultra Short
- 22** 50/60Hz Short
- 24** 50/60Hz Medium
- 26** 50/60Hz Long
- 42** 50/60Hz Short, Hi-Inrush
- 44** 50/60Hz Medium, Hi-Inrush
- 46** 50/60Hz Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES	
210	0.10	280 0.80 440 4.00 611 11.00
215	0.15	285 0.85 445 4.50 711 11.50
220	0.20	290 0.90 450 5.00 612 12.00
225	0.25	295 0.95 455 5.50 712 12.50
230	0.30	410 1.00 460 6.00 613 13.00
235	0.35	512 1.25 465 6.50 614 14.00
240	0.40	415 1.50 470 7.00 615 15.00
245	0.45	517 1.75 475 7.50 616 16.00
250	0.50	420 2.00 480 8.00 617 17.00
255	0.55	522 2.25 485 8.50 618 18.00
260	0.60	425 2.50 490 9.00 620 20.00
265	0.65	527 2.75 495 9.50
270	0.70	430 3.00 610 10.00
275	0.75	435 3.50 710 10.50

8 TERMINAL ¹

- J** Screw M5 Back Connect
- K** Screw 10-32 Back Connect
- N** Screw M4 Back Connect
- Y** Screw 8-32 Back Connect

9 ACTUATOR COLOR & LEGEND

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

10 MOUNTING ²

HORIZONTAL MOUNTING STYLE		BARRIER
1	6-32 x .195 in. Threaded Inserts	Offset
3	6-32 x .195 in. Threaded Inserts	Standard
A	6-32 x .195 in. Threaded Inserts with Actuator Guard	Offset
C	6-32 x .195 in. Threaded Inserts with Actuator Guard	Standard
2	ISO M3 x 5 mm Threaded Inserts	Offset
4	ISO M3 x 5 mm Threaded Inserts	Standard
B	ISO M3 x 5 mm Threaded Inserts with Actuator Guard	Offset
D	ISO M3 x 5 mm Threaded Inserts with Actuator Guard	Standard
VERTICAL MOUNTING STYLE		BARRIER
5	6-32 x .195 in. Threaded Inserts	Offset
7	6-32 x .195 in. Threaded Inserts	Standard
E	6-32 x .195 in. Threaded Inserts with Actuator Guard	Offset
G	6-32 x .195 in. Threaded Inserts with Actuator Guard	Standard
6	ISO M3 x 5 mm Threaded Inserts	Offset
8	ISO M3 x 5 mm Threaded Inserts	Standard
F	ISO M3 x 5 mm Threaded Inserts with Actuator Guard	Offset
H	ISO M3 x 5 mm Threaded Inserts with Actuator Guard	Standard

11 APPLICATION RATING

C 120/240 VAC

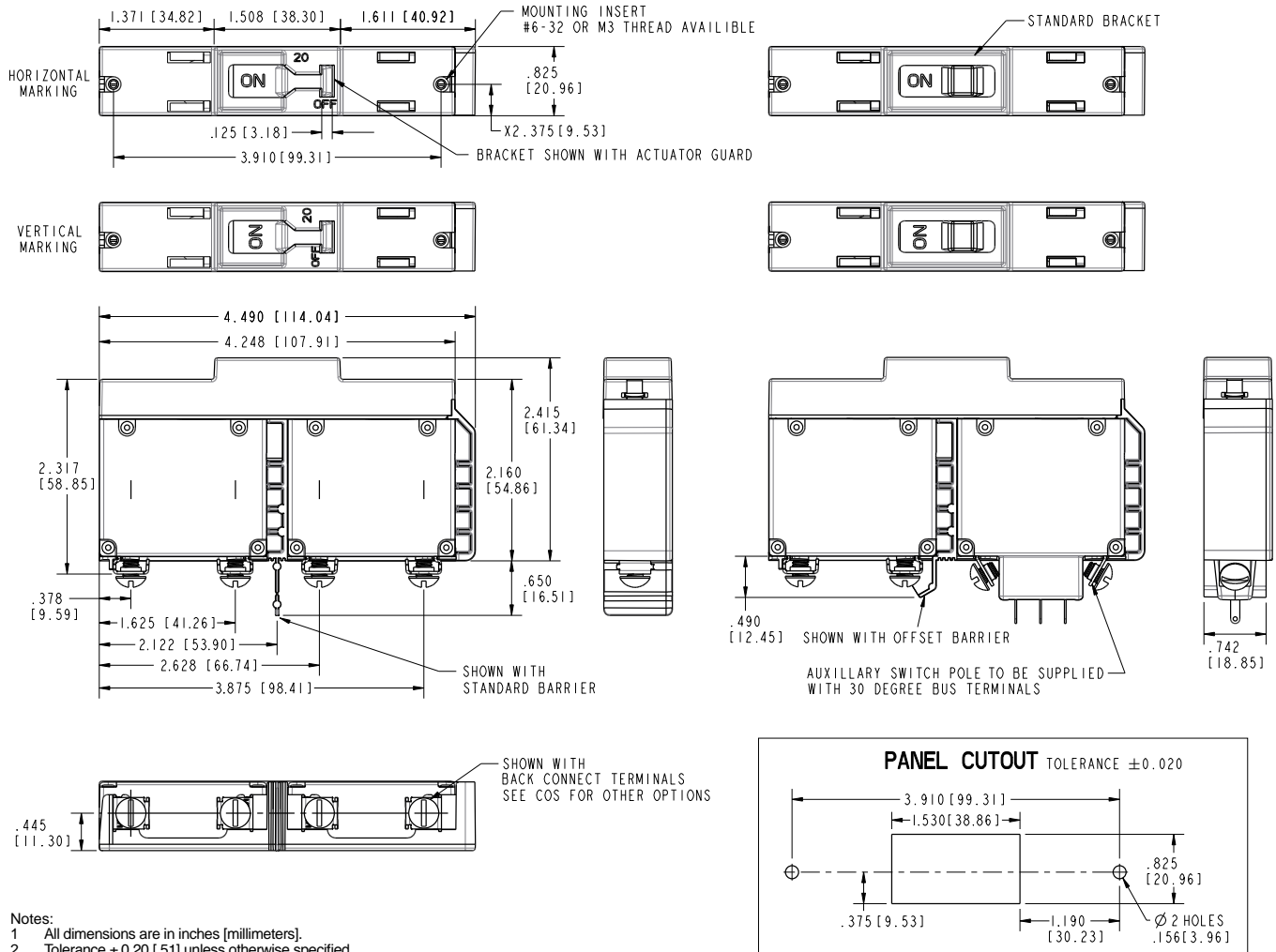
12 AGENCY APPROVAL

- A** Without Approvals
- G** UL489 Listed
- 3 4** UL489 Listed, TUV Certified

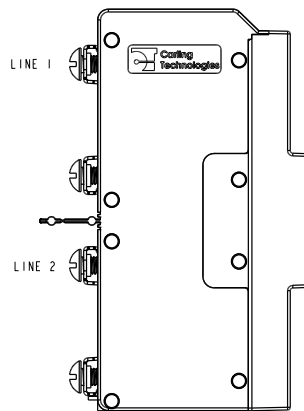
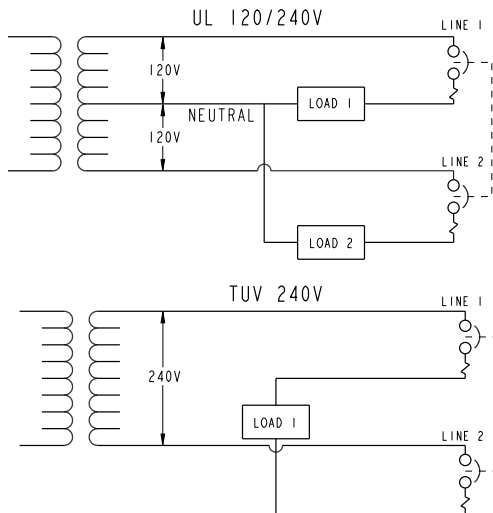
Notes:

- 1 Pole with auxiliary switch is supplied with 30 degree bus terminals.
- 2 Only available with terminal codes J,K,N,Y.
- 3 Supplied with one auxiliary switch. See dimensional specs drawings for location.
- 4 TUV certification only available with I/O ON/OFF markings (Actuator code: 1,2,3,4,5,6,7,8)

Dimensional Specifications: in. [mm]



Wiring Diagrams:



C-Series

CIRCUIT BREAKER

The C-Series hydraulic-magnetic circuit breakers are ideal for applications that require higher amperage and voltage handling capability in a smaller package. They are available in 1-6 poles, 0.02-100amps, UL Recognized up to 480VAC or 150VDC, UL489 Listed up to 240VAC or 125VDC, with choice of time delays, terminal options, actuator styles and colors. The C-Series employs a unique arc chute design which allows for higher interrupting capacities of up to 10,000 amps. Thermoset glass filled polyester half shell construction provides for increased mechanical and electrical strength. The wiping contacts mechanical linkage, with two step actuation, cleans contacts providing high, positive contact pressure and longer contact life. Available with American Standard or Metric Threaded Stud terminals, or Saddle Clamp screw terminals. The optional mid-trip handle style actuator allows a visual indication of electrical overload with or without alarm feature.



Product Highlights:

- Extensive list of Agency Approvals
- Available with Standard or Metric Stud terminals, or Saddle Clamp screw terminals
- Optional mid-trip handle style actuator
- Unique arc chute design which allows for higher interrupting capacities of up to 10,000 amps
- Exclusive Rockerguard and Push-To-Reset bezel
- Available with new solid color and two-color Visi-rocker® actuators
- New thermoset glass filled polyester half shell construction

Typical Applications:

- Marine
- Telecom/Datacom
- Military
- Renewable Energy
- Generators & Welders

Electrical

Maximum Voltage AC, 480 WYE/277 VAC, 50/60 Hz (see Table A.)
 UL489: AC,240 VAC. (See Table D), 50/60 Hz, 125 VDC

Current Rating Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 25.0, 30.0, 35.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0 and 100 amps. Other ratings available, see Ordering Scheme.

Standard Voltage Coils DC - 6V, 12V; AC - 120V; other ratings available, see Ordering Scheme.

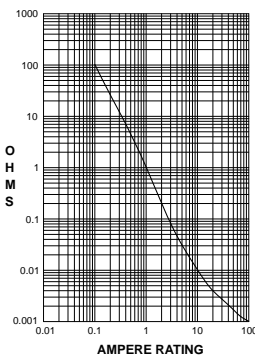
Auxiliary Switch Rating SPDT; 10.1 amps-250VAC, DC Aux. Switch 1.0A, 65 VDC. 0.5A, 80VDC, 1/4 HP, 125VAC, VDE & TUV 1.0 125 VAC.

Insulation Resistance Minimum of 100 Megohms at 500 VDC.

Dielectric Strength UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. C-Series Circuit Breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.

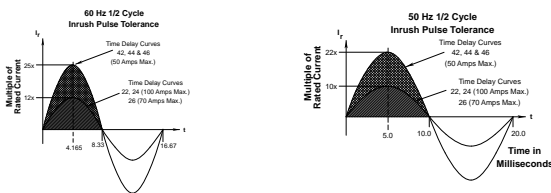
Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.

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



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

Pulse Tolerance Curves



Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated current & voltage.

Trip Free All C-Series circuit breakers will trip on overload, even when actuator is forcibly held in the ON position.

Trip Indication The operating actuator moves positively to the OFF position when an overload causes the breaker to trip. With mid-trip, handle moves to the mid position on electrical trip of the circuit breaker. With mid trip handle with alarm switch, handle moves to the mid position and the alarm switch actuates when the circuit breaker is electrically tripped.

Physical

Number of Poles 1-6 poles ≤ 50A; 1-4 poles @ 51-70A; 1-2 poles 71-100A. UL489 Handle: 1 pole ≤ 100A, 2 pole ≤ 50A; Rocker: 1 pole ≤ 100A.

Internal Circuit Config. Series (with or without auxiliary switch, mid trip & mid trip with alarm switch) Shunt & Relay with current or voltage trip coils, Dual Coil, Switch Only (with or without aux. switch). UL489: Series (with or without auxiliary switch, mid-trip & midtrip with alarm switch).

Weight Approx. 112 grams/pole (3.95 oz).

Standard Colors Housing: Black

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:

Shock Withstands 100 Gs, 6ms sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultrashort curves tested @ 90% of rated current.

Vibration Withstands 0.060" excursion from 10-55 Hz & 10 Gs 55-500 Hz, @ rated current per Method 204C, Test Cond. A. Instantaneous & ultrashort curves tested @ 90% of rated current.

Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ +25°C to +65°C, 80-98% RH.

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

Thermal Shock Method 107D, Condition A (five cycles @ -55°C to +25°C to +85°C to +25°C).

Operating Temperature -40°C to +85°C

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

Electrical Tables

Table A: Lists UL Recognized & CSA Accepted configurations and performance capabilities as a component supplementary protector

C-SERIES TABLE A: Component Supplementary Protectors												
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps)		Application Codes		Construction Notes		
	Max. Rating	Frequency	Phase	Full Load Amps	General Purpose Amps	UL / CSA		UL	CSA			
						With Backup Fuse	Without Backup Fuse					
Series	32	DC	---	0.02 - 100	---	---	5,000	TC1, OL1, U2	TC1, OL1, U2	---		
	48	DC	---	110 - 150	---	---	5,000	---	---	---		
	65	DC	---	0.02 - 70	---	71 - 100	---	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---	
				-	---				TC1, 2, OL0, U1	TC1, 2, OL0, U1	---	
	80	DC	---	0.02 - 70	---	71 - 100	---	7,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---	
				---	---				TC1, 2, OL0, U1	TC1, 2, OL0, U1	---	
				0.02 - 70	---				10,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L"
	---	71 - 100	---	TC1, 2, OL0, U1	TC1, 2, OL0, U1							
	125	DC	---	0.02 - 50	---	---	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L"		
	125/250	DC	---	0.02 - 50	---	---	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L"		
	250	DC	---	0.02 - 50	---	---	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L". 250 volts requires 2 pole		
	125	50 / 60	1	0.02 - 100	---	---	---	3,000	TC1, OL1, U2	TC1, OL1, U2	Per pole rating	
					5,000			TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L"		
	150	DC	---	---	80 - 100	---	---	5,000	TC1, 2, OL0, U3	---	Must have Agency "L"	
					101 - 175						---	Must have Agency "L" parallel pole
	125/250	50 / 60	1	0.02 - 100	---	---	---	3,500	TC1, OL1, U2	TC1, OL1, U2	---	
				0.02 - 50				---	3,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	2 or 3 poles breaking single phase
				51 - 100				---	1,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	2 or 3 poles breaking single phase
				0.02 - 100				---	5,000	TC1, 2, OL1, U2	TC1, 2, OL1, U2	2 or 3 poles breaking single phase. Agency "L"
	250	50 / 60	1	0.02 - 50	---	---	---	3,500	TC1, 2, OL1, U2	TC1, 2, OL1, U2	Per pole rating	
				0.02 - 100				---	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	Must have Agency "L"
				51 - 70				---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	---
			---	0.02 - 100	---	3,000	TC1, 2, OL0, U2	TC1, 2, OL0, U2	---			
			---	0.02 - 70	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase			
	---	0.02 - 90	---	5,000	TC1, 2, OL0, U1	TC1, 2, OL0, U1	Must have Agency "L"					
	277	50 / 60	1	0.02 - 50	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	---		
	480/277	50 / 60	3	0.02 - 30	---	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase	
---				---	---	---	TC1, 2, OL0, C1	TC1, 2, OL0, C1	---			
480	50 / 60	1	0.02 - 30	---	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	2 poles breaking 1 phase		
			---	---	---	---	TC1, 2, OL0, C1	TC1, 2, OL0, C1	---			
Dual Coil	80	DC	---	0.02 - 50	---	---	7,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---		
	125	50 / 60	1	0.02 - 50	---	---	3,000	TC1, OL1, U2	TC1, OL1, U2	Per pole rating		
	125/250	50 / 60	1	0.02 - 50	---	---	---	3,500	TC1, OL1, U2	TC1, OL1, U2	2 or 3 poles breaking single phase	
								3,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	2 or 3 poles breaking single phase	
	250	50 / 60	1	0.02 - 50	---	---	---	3,500	TC1, OL1, U2	TC1, OL1, U2	---	
			3					---	3,000	TC1, OL0, U2	TC1, OL0, U2	Per pole rating
277	50 / 60	1	0.02 - 50	---	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase		
Shunt	80	DC	---	0.02 - 50	---	---	7,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---		
	277	50 / 60	1	0.02 - 50	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	---		
	250	50 / 60	3	0.02 - 50	---	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase	
				0.02 - 30	---	---	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase		
	480/277	50 / 60	3	---	31 - 50	---	---	5,000	TC1, 2, OL0, C1	TC1, 2, OL0, C1	---	
				0.02 - 30	---	---	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1	2 poles breaking 1 phase		
480	50 / 60	1	---	31 - 50	---	---	5,000	TC1, 2, OL0, C1	TC1, 2, OL0, C1	---		
Relay	80	DC	---	0.02 - 50	---	---	7,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---		
	277	50 / 60	1	0.02 - 50	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	---		
	250	50 / 60	3	0.02 - 50	---	---	5,000	TC1, 2, OL1, C1	TC1, 2, OL1, C1	3 poles breaking 3 phase		
Switch Only	65	DC	---	71 - 100	---	---	---	---	---	---		
				---	---	---	---	---	---			
	80	DC	---	71 - 100	---	---	---	---	---	---		
	125	50 / 60	1	0.02 - 100	---	---	---	---	---	---		
	125/250	50 / 60	1	0.02 - 100	---	---	---	---	---	---	2 or 3 poles breaking single phase	
			1	0.02 - 100	---	---	---	---	---	---	---	
	250	50 / 60	3	0.02 - 70	---	---	---	---	---	---	---	
3			0.02 - 70	---	---	---	---	---	---	---		
277	50 / 60	1	0.02 - 50	---	---	---	---	---	---			
480/277	50 / 60	3	0.02 - 30	---	---	---	---	---	---	3 poles breaking 3 phase		
			---	31 - 50	---	---	---	---	---	---		

Notes:

- 1. Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amps not to exceed 125A for 50 Amp or less rating and not to exceed 175 for 51 through 100 Amp rating

Electrical Tables

Table B: Lists UL Recognized and CSA Accepted configurations and performance capabilities as a Manual Motor Controller.

C-SERIES TABLE B: Manual Motor Controllers					
Circuit Configuration	Voltage			Current Rating	Horsepower Ratings
	Max. Rating	Frequency	Phase	Full Load Amps	Max. HP
Series, Shunt & Relay Switch Only	120 ¹	50 / 60	1	0.02 - 50	7 ½
	250 ¹	50 / 60	1	0.02 - 20	3
			3	0.02 - 20	5
	277 ¹	50 / 60	1	0.02 - 20	3
480 ²	50 / 60	3	0.02 - 20	5	

- Notes:
- Requires branch circuit backup with a UL Listed Type K5 or RK5 fuse rated 15A Minimum and no more than 4 times full load amps not to exceed 125A for 50 Amp or less rating and not to exceed 175A for 51 through 100A rating.
 - UL Recognized and CSA Certified at 480V refers to 3 and 4 pole versions used in a 3Ø, WYE connected circuit or a 2 pole version with 2 poles breaking 1Ø and backed up with a series fusing as stated in note 1.
- * Shunt and Relay Trip - Voltage Coil Construction not current coils

Table C: Lists UL Recognized, CSA Accepted, VDE and TUV Certified configurations and performance capabilities as a Component Supplementary Protector.

C-SERIES TABLE C: Component Supplementary Protectors														
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps)						Application Codes UL / CSA	Construction Notes	
	Max. Rating	Frequency	Phase	Full Load Amps	General Purpose Amps ¹	UL / CSA		VDE		TUV				
						With Backup Fuse	Without Backup Fuse	(Inc) With Backup Fuse	(Inc) Without Backup Fuse	(Inc) With Backup Fuse	(Inc) Without Backup Fuse			
Series	80	DC	---	0.10 - 70	---	---	7,500	---	5,000	5,000	1,500	TC1,2,OL1,U1	---	
			---	71 - 100	71 - 100	---	10,000	---	5,000	---	5,000	TC1,2,OL0,U1	Agency F, H, J or R	
	125	DC	---	1 - 50	---	---	5,000	---	---	---	5,000	TC1,2,OL1,U1	Agency J or R	
			250	50 / 60	1	0.10 - 50	---	---	5,000	---	---	5,000	TC1,2,OL1,U1	2P, Agency J or R
						0.10 - 70	---	---	---	---	---	---		---
			3	0.10 - 100	---	---	---	---	---	---	---	---	---	
		3	0.10 - 90	---	---	---	---	---	---	---	---	Agency J or R		
	415	50 / 60	3	0.10 - 30	---	5,000 ²	---	3,000	1,500	3,000	1,500	TC1,2,OL1,C1	Rocker Handle, Agency F, H, J or R	
Dual Coil	80	DC	---	0.10 - 30	---	---	7,500	---	1,500	5,000	1,500	TC1,2,OL1,U1	---	
	250	50 / 60	1 & 3				5,000	3,000	3,000	3,000	---	---	---	---
Shunt	80	DC	---	0.10 - 70	---	---	7,500	---	5,000	5,000	1,500	TC1,2,OL1,U1	---	
	250	50 / 60	1 & 3	0.10 - 70	---	---	5,000	3,000	1,500	3,000	1,500	TC1,2,OL1,U1	---	
	415	50 / 60	3	0.10 - 30	---	5,000 ²	---	3,000	1,500	3,000	1,500	TC1,2,OL1,C1	Rocker Handle, Agency F, H, J or R	

- Notes:
- General Purpose ratings for UL/CSA only.
 - Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amps not to exceed 125A for 50 Amp or less rating and not to exceed 175 for 51 through 100 Amp rating.

Table D: Lists UL Listed (489), CSA Certified (C22.2 No. 5.1-M) configuration and performance capabilities as a Molded Case Circuit Breaker.

C-SERIES TABLE D: UL489 Listed Branch Circuit Breakers							
Circuit Configuration	Voltage			Current Rating	Interrupting Capacity (Amps)	Construction Notes	
	Max. Rating	Frequency	Phase	Full Load Amps	Without Backup Fuse		
Series	80	DC	---	0.10 - 100	50,000 ¹	Limited to 2 Poles Max from 71 - 100 Amps	
					10,000		
				101 - 150	10,000		2 Poles - Parallel Poles
				151 - 250	10,000		3 Poles - Parallel Poles
	125	DC	---	0.10 - 100	5,000	1 - 3 Poles	
	125 / 250	DC	---	0.10 - 50	5,000	1 or 2 Poles (2 poles required for 250 Volts)	
					10,000		
	120	50 / 60	1	0.10 - 50	5,000	1 - 3 Poles	
					51 - 70		5,000
	120 / 240	50 / 60	1	0.10 - 50	5,000	2 or 3 Poles (1 pole of a 3 pole unit is neutral)	
10,000 ¹							
240	50 / 60	1	0.10 - 30	5,000	1 Pole		
				10,000	2 Poles		
277	50 / 60	1	0.10 - 20	10,000	1 Pole		
Dual Coil	120	50 / 60	1	0.10 - 30	10,000	---	

- Notes:
- Special catalog number required. Consult factory.

Electrical Tables

Table E: Lists UL Recognized, CSA Accepted configurations and performance capabilities as Protectors, Supplementary for Marine Electrical and Fuel Systems (Guide PEQZ2, File E75596). Ignition Protected per UL 1500. UL Classified Small Craft Electrical Devices, Marine in accordance with ISO 8846 (Guide UZMK, File MQ1515) as Marine Supplementary Protectors.

C-SERIES TABLE E: UL1500 (Marine Ignition Protection)								
Circuit Configuration	Voltage			Current Rating	Interrupting Capacity (Amps)	Application Codes		Construction Notes
	Max. Rating	Frequency	Phase	Full Load Amps	Without Backup Fuse	UL	CSA	
Series	48	DC	---	0.02 - 100	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---
				101 - 150				
	65	DC	---	0.02 - 100	1,500	TC1, 2, OL0, U1	TC1, 2, OL0, U1	---
	80	DC	---	0.02 - 70	1,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---
	125	50 / 60	1	0.02 - 70	5,000	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---
				71 - 100	1,500			
	250	50 / 60	1	0.02 - 70	1,500	TC1, 2, OL1, U1	TC1, 2, OL1, U1	---
				71 - 100				2 Poles Breaking Single Phase

Table F: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (Guide DITT, File E189195), under UL489A.

C-SERIES TABLE F: PARALLEL POLE CONSTRUCTION UL489A Listed for Communications Equipment				
Circuit Configuration	Voltage		Current Rating	Interrupting Capacity (Amps)
	Max. Rating	Frequency	General Purpose Amps	Without Backup Fuse
Series	80	DC	100 - 250	10,000

Agency Certifications

UL Recognized
UL Standard 1077


Component Recognition Program as Protectors Supplementary (Guide CCN/QVNU2, File E75596)

CSA Accepted



Component Supplementary Protector under Class 3215 30, File 047848 0 000 CSA Standard C22.2 No. 235

UL Standard 508


Switches, Industrial Control (Guide CCN/NRNT2, File E148683)

CSA Certified



Circuit Breaker Model Case (Class 1432 01, File 093910), CSA Standard C22.2 No. 5.1 - M

UL Standard 1500


Protectors, Supplementary for Marine Electrical & Fuel Systems (Guide PEQZ2, File E75596) Ignition Protection

TUV Certified



EN60934, under License No. R72040875

UL Listed
UL Standard 489


Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)

VDE Certified


EN60934, VDE 0642 under File No. 10537

UL Standard 489A


Communications Equipment (Guide CCN/DITT, File E189195)



1 SERIES
C

2 ACTUATOR 1
A Handle, one per pole
B Handle, one per multipole unit
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES 2
1 One 3 Three 5 Five
2 Two 4 Four 6 Six

4 CIRCUIT 3
A³ Switch Only (No Coil) F⁴ Relay Trip (Current)
B Series Trip (Current) G⁴ Relay Trip (Voltage)
C Series Trip (Voltage) H^{4,5} Dual Coil with Shunt Trip Voltage Coil
D⁴ Shunt Trip (Current) K^{4,5} Dual Coil with Relay Trip Voltage Coil
E⁴ Shunt Trip (Voltage)

5 AUXILIARY / ALARM SWITCH
0 without Aux Switch
2 S.P.D.T., 0.110 Q.C. Term. 6 S.P.S.T., 0.139 Solder Lug
3 S.P.D.T., 0.139 Solder Lug 8 S.P.S.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
03³ DC 50/60Hz, Switch Only 30 DC 50/60Hz Instantaneous
10⁷ DC Instantaneous 31 DC 50/60Hz Ultra Short
11 DC Ultra Short 32 DC 50/60Hz Short
12 DC Short 34 DC 50/60Hz Medium
14 DC Medium 36 DC 50/60Hz Long
16 DC Long 42⁸ 50/60Hz Short, Hi-Inrush
20⁷ 50/60Hz Instantaneous 44⁸ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short 46⁸ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short 52⁸ DC Short, Hi-Inrush
24 50/60Hz Medium 54⁸ DC Medium, Hi-Inrush
26 50/60Hz Long 56 DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES)
CODE AMPERES

025	0.020	235	0.350	430	3.000	614	14.000
025	0.025	240	0.400	435	3.500	615	15.000
030	0.030	245	0.450	440	4.000	616	16.000
035	0.035	250	0.500	445	4.500	617	17.000
040	0.040	255	0.550	450	5.000	618	18.000
045	0.045	260	0.600	455	5.500	620	20.000
050	0.050	265	0.650	460	6.000	622	22.000
055	0.055	270	0.700	465	6.500	624	24.000
060	0.060	275	0.750	470	7.000	625	25.000
065	0.065	280	0.800	475	7.500	630	30.000
070	0.070	285	0.850	480	8.000	635	35.000
075	0.075	290	0.900	485	8.500	640	40.000
080	0.080	295	0.950	490	9.000	650	50.000
085	0.085	410	1.000	495	9.500	660 ⁹	60.000
090	0.090	512	1.250	610	10.000	670 ⁹	70.000
095	0.095	415	1.500	710	10.500	680 ⁹	80.000
210	0.100	517	1.750	611	11.000	685 ⁹	85.000
215	0.150	420	2.000	711	11.500	690 ⁹	90.000
220	0.200	522	2.250	612	12.000	695 ⁹	95.000
225	0.250	425	2.500	712	12.500	810 ⁹	100.000
230	0.300	527	2.750	613	13.000		

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 7
CODE AMPERES

A06	6 DC	A32	32 DC	J12	12 AC	J65	65 AC
A12	12 DC	A48	48 DC	J18	18 AC	K20	120 AC
A18	18 DC	A65	65 DC	J24	24 AC	L40	240 AC
A24	24 DC	J06	6 AC	J48	48 AC		

8 TERMINAL 15

1 ¹⁰	Stud 10-32	6 ¹²	Stud M6
2 ¹¹	Screw 10-32	7 ^{13,15}	0.250 Double Click Connect
3 ¹²	Stud 1/4-20	9 ¹⁵	7/16" Clip Terminal
4 ¹¹	Stud M5 x 0.8	A ¹⁴	Plug-In Stud
5 ¹¹	Screw M5 x 0.8	C ^{11,15}	5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND 16

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
Black (short handle) ¹⁷	T	U	9	White

10 MOUNTING / BARRIERS

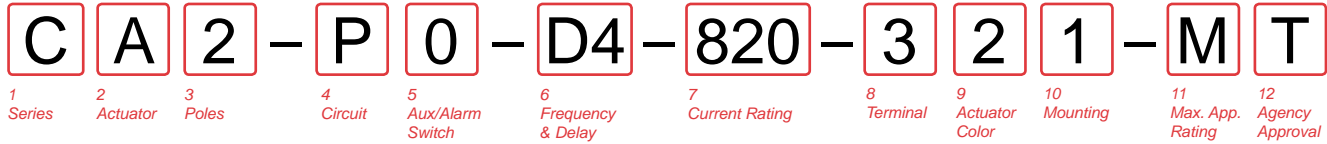
MOUNTING STYLE	BARRIERS	VOLTAGE
Threaded Insert		
1 6-32 x 0.195 inches	no	< 300
A 6-32 X 0.195 inches	yes	< 300
C 18 6-32 X 0.195 inches	yes	≥ 300
2 ISO M3 x 5mm	no	< 300
B ISO M3 x 5mm	yes	< 300
D 18 ISO M3 x 5mm	yes	≥ 300
Front panel Snap-In, 1.00" [25.4mm] wide bezel		
E 17 with Handguard	no	< 300

11 AGENCY APPROVAL

C	UL Recognized, CSA Accepted
D	VDE Certified, UL Recognized, CSA Accepted
E	TUV Certified, UL Recognized, CSA Accepted
H	UL489 Construction: VDE Certified, UL Recognized, CSA Accepted
I	UL Recognized STD 1077, UL Recognized 1500 (ignition protected), CSA Accepted
L	UL489 Construction: UL Recognized, CSA Accepted
R	UL489 Construction: TUV Certified, UL Recognized, CSA Accepted

Notes:

- Actuator Code:
A: Handle tie pin spacer(s) and retainers provided assembled with multi-pole units.
B: Handle location as viewed from front of breaker:
2 pole - left pole 3 pole - center pole 4 pole - two handles at center poles
5 pole - three handles at center poles 6 pole - four handles at center poles
S: Handle moves to mid-position only upon electrical trip of the breaker. Available with circuit codes B, C, D, E, F, G, H and K.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker. Available with circuit codes B & C.
- Standard multipole units have all poles identical except when specifying auxiliary switch and/or mixed poles. 4 pole max with VDE. 5th pole available as Series Trip with Voltage Coil only.
- Switch Only circuits, rated up to 50 amps and 6 poles, and only available with VDE Certification when tied to a protected pole (Circuit Code B, C, D or H.). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650. For 55-70 amps, select Current Code 670. For 75-100 amps, select Current Code 810. Circuit Codes D,E,F,G,H & K available with Terminal Codes 1,2,4 & 5 only. Circuit Codes D, F, H & K available up to 50 amps maximum Current Rating.
- Consult factory for available Dual Coil options, as special catalog number is required. Dual Coil Voltage Coils with Shunt Trip Construction trip instantaneously on line voltage. Dual Coil Voltage Coils require 30VA minimum power to trip instantaneously and are rated for intermittent duty only.
- Auxiliary Switch available with Series Trip and Switch Only circuits. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- Voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- Available with Circuit Codes B & D only, and up to 50 amps maximum.
- Current Ratings 60 - 70 are available up to four poles maximum. Ratings 71 - 100 are available up to two poles maximum.
- Terminal Code 1 available to 60 amps maximum.
- Terminal Codes 2, 4, 5 and C available to 50 amps maximum.
- Terminal Codes 3, 6 & 9 available to 100 amps maximum.
- Terminal Code 7 available to 25 amps maximum.
- Terminal Code A available to 100 amps maximum.
- Terminal Codes 7, 9 & C are not VDE approved.
- No marking available. Consult factory. VDE/TUV Approval requires dual (I-O, ON-OFF) or I-O markings on all handles.
- Single pole only.
- VDE/TUV: 30 amps max.; UL/CSA: 50 amps max.; Available in 2 - 4 poles only and limited to AC Delays. "General Purpose amps" not rated for "full load amps" or to be used in applications with a motor.



1 SERIES
C

2 ACTUATOR
A Handle, one per pole
S Mid-Trip Handle, one per pole ¹
T Mid-Trip, one per pole & Alarm Switch ¹

3 POLES ⁴
1 One
2 Two
3 Three

4 CIRCUIT
P Series Trip (parallel pole)

5 AUXILIARY / ALARM SWITCH

0 without Aux Switch	6 S.P.S.T., 0.139 Solder Lug
2 S.P.D.T., 0.110 Q.C. Term.	7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
3 S.P.D.T., 0.139 Solder Lug	8 S.P.S.T., 0.187 Q.C. Term. (Gold Contacts)
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	9 S.P.D.T., 0.187 Q.C. Term.
5 S.P.S.T., N.O., 0.110 Q.C. Term. (Gold Contacts)	

6 FREQUENCY & DELAY
D1 DC Ultra Short
D2 DC Short
D4 DC Medium
D6 DC Long

7 CURRENT RATING (AMPERES) ⁴

CODE	AMPERES				
810	100.00	813	130.00	817	170.00
811	110.00	814	140.00	817	175.00
812	120.00	815	150.00	818	180.00
812	125.00	816	160.00	819	190.00
				820	200.00
				922	225.00
				825	250.00

8 TERMINAL ⁵
3 1/4-20 threaded Stud
6 M6 threaded Stud
A Plug-In Stud ³

9 ACTUATOR COLOR ²

	LEGEND	ON-OFF	Dual	Legend Color
White	B	1		Black
Black	D	2		White
Red	G	3		White
Green	J	4		White
Blue	L	5		White
Yellow	N	6		Black
Gray	Q	7		Black
Orange	S	8		Black

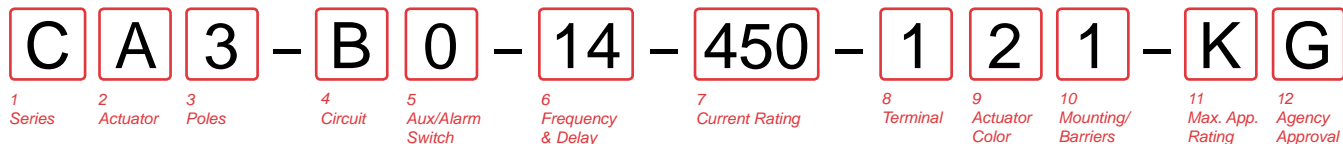
10 MOUNTING
Threaded Insert
1 6-32 x 0.195 inches
2 ISO M3 x 5mm

11 MAXIMUM APPLICATION RATING
M 80 DC

12 AGENCY APPROVAL ⁶
A Without Approval
G UL489 Listed
J UL489A Listed, TUV Certified
K UL489A Listed, VDE Certified
T UL489A Listed
7 UL489A Listed, TUV Certified

Notes:

- Handle moves to Mid-Position only upon electrical trip of C/B when Actuator S is specified. When Actuator Code T is specified, handle moves to Mid Position and Alarm Switch actuates only upon electrical trip of C/B. Code T is only available with Circuit Code N.
- Standard Handle colors are White, Black, Red & Yellow.
- Breakers with Terminal Codes 3 & 6 are supplied with bus bars connecting the Line and Load Terminals. For Terminal Code A, Line and Load Terminals must be connected to a copper bus bar having a minimum cross-section of 0.078 square inches. Terminal Code A is not available on the single pole unit.
- Ratings for 101 to 125 amps are available in 1-pole. Ratings from 110 to 200 amps are available in 2-pole. For ratings from 225-300 amps, specify 3-pole.
- 1 pole only available with terminal codes 3 and 6.
- Agency codes K and 7 are not available with 1 pole. Agency code J is only available with 1 pole. Agency code G is only available in 2 and 3 pole. Circuit P, ratings 101-150 amps (2 pole) and ratings 151-250 amps (3 pole).



1 SERIES
C

2 ACTUATOR 1
A Handle, one per pole
B Handle, one per multipole unit
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES 2
2 Two 3 Three

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY / ALARM SWITCH 3
0 without Aux Switch
2 S.P.D.T., 0.110 Q.C. Term. 6 S.P.S.T., 0.139 Solder Lug
3 S.P.D.T., 0.139 Solder Lug 8 S.P.S.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
11 DC Ultra Short 26 50/60Hz Long
12 DC Short 42 4 50/60Hz Short, Hi-Inrush
14 DC Medium 44 4 50/60Hz Medium, Hi-Inrush
16 DC Long 46 4 50/60Hz Long, Hi-Inrush
21 50/60Hz Ultra Short 52 4 DC Short, Hi-Inrush
22 50/60Hz Short 54 4 DC Medium, Hi-Inrush
24 50/60Hz Medium 56 4 DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
210	0.100	295	0.950	470	7.000
215	0.150	410	1.000	475	7.500
220	0.200	512	1.250	480	8.000
225	0.250	415	1.500	485	8.500
230	0.300	517	1.750	490	9.000
235	0.350	420	2.000	495	9.500
240	0.400	522	2.250	610	10.000
245	0.450	425	2.500	710	10.500
250	0.500	527	2.750	611	11.000
255	0.550	430	3.000	711	11.500
260	0.600	435	3.500	612	12.000
265	0.650	440	4.000	712	12.500
270	0.700	445	4.500	613	13.000
275	0.750	450	5.000	614	14.000
280	0.800	455	5.500	615	15.000
285	0.850	460	6.000	616	16.000
290	0.900	465	6.500	617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635	35.000
				640	40.000
				660	60.000
				670	70.000
				680	80.000
				685	85.000
				690	90.000
				695	95.000
				810	100.00

8 TERMINAL 6

1 7	Stud 10-32	6 9	Stud M6
2 8	Screw 10-32	9 9	7/16" Clip Terminal
3 9	Stud 1/4-20	A 10	Plug-In Stud
4 8	Stud M5 x 0.8	C 8	5/16" Clip Terminal
5 8	Screw M5 x 0.8		

9 ACTUATOR COLOR & LEGEND 11

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

10 MOUNTING / BARRIERS

MOUNTING STYLE	BARRIERS 12
Threaded Insert	
1 6-32 x 0.195 inches	yes
2 ISO M3 x 5mm	yes

11 MAXIMUM APPLICATION RATING

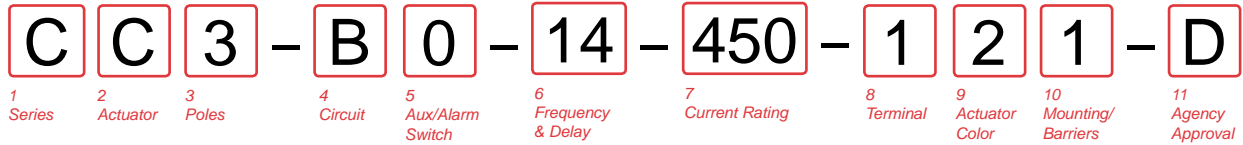
A	65 DC
B	125 DC
C	120/240 AC 2
D	240 AC
K	120 AC
F	277 AC
M	80 DC

12 AGENCY APPROVAL 11

A	without approvals
F	UL489 Listed, CSA Certified & VDE Certified
G	UL489 Listed & CSA Certified
J	UL489 Listed, CSA Certified & TUV Certified

Notes:

- Actuator Code:
A: Handle tie pin spacer(s) and retainers provided assembled with multi-pole units.
B: Handle located, as viewed from front of breaker in left pole. 2 pole maximum.
S: Handle moves to mid-position only upon electrical trip of the breaker.
T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker.
- Standard multipole units have all poles identical except when specifying auxiliary switch and/or mixed poles.
2 & 3 pole circuit breakers required for 120/240 VAC (Maximum application rating code C) applications, have all poles identical except when specifying auxiliary / alarm switch which is normally supplied in extreme right pole per figure B. Terminal barriers are required on all multipole breakers.
Third pole is for 120/240 VAC applications requiring neutral disconnect. The 3rd pole has the same construction as poles 1 & 2.
- On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
VDE approval on auxiliary switch codes 2, 3 & 4 only.
Auxiliary / Alarm Switch with Independent Circuit ie: separate from breaker circuit, only available with circuit breakers rated 50 amp maximum at 80 VDC, 125 VDC, and 120 VAC. Auxiliary / Alarm Switch with Dependent Circuit ie: same as circuit breaker, is supplied from factory with common terminal of auxiliary / alarm switch connected to line terminal on 120/240 and 240 VAC ratings. Circuit breakers rated 120 VAC 50 amp maximum can be supplied with Auxiliary/Alarm switch common terminal connected to breaker line terminal. Consult factory for special catalog number.
- Available up to 50 amps maximum.
- Current ratings 71 - 100 with VDE approvals are available up to two poles maximum.
- Terminal Codes 9 & C are not VDE approved.
- Terminal Code 1 available to 60 amps maximum.
- Terminal Codes 2, 4, 5 & C available to 50 amps maximum.
- Terminal Codes 3, 6 & 9 available to 100 amps maximum.
- Terminal Code A available to 100 amps maximum.
- VDE and TUV approvals require Dual (I-O, ON-OFF) markings on all handles.
- Barriers supplied on multi-pole units only.



1 SERIES

C

2 ACTUATOR 1

Two Color Visi-Rocker

- C** Indicate ON, vertical legend
- D** Indicate ON, horizontal legend
- E** Indicate ON, no legend
- F** Indicate OFF, vertical legend
- G** Indicate OFF, horizontal legend
- H** Indicate OFF, no legend

Push-To-Reset, Visi-Rocker

- N** Indicate OFF, vertical legend
- O** Indicate OFF, horizontal legend
- P** Indicate OFF, no legend

Single color

- J** Vertical legend
- K** Horizontal legend
- L** No legend

Push-To-Reset, Single color

- R** Vertical legend
- U** Horizontal legend
- V** No legend

ROCKER STYLE DESCRIPTIONS

	HORIZONTAL STYLE	VERTICAL STYLE
INDICATE "ON"	CODE "D" 	CODE "C"
INDICATE "OFF"	CODE "G", "O" 	CODE "F", "N"
SINGLE COLOR	CODE "K", "U" 	CODE "J", "R"

3 POLES 2

- 1** One
- 2** Two
- 3** Three

4 CIRCUIT

- A**³ Switch Only (No Coil)
- B** Series Trip (Current)
- C** Series Trip (Voltage)
- D**⁴ Shunt Trip (Current)
- E**⁴ Shunt Trip (Voltage)
- F**⁴ Relay Trip (Current)
- G**⁴ Relay Trip (Voltage)
- H**^{4,5} Dual Coil with Shunt Trip Voltage Coil
- K**^{4,5} Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH 6

- 0** without Aux Switch
- 1** S.P.D.T., 0.110 Q.C. Term.
- 2** S.P.D.T., 0.139 Solder Lug
- 3** S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
- 6** S.P.S.T., 0.139 Solder Lug
- 8** S.P.S.T., 0.187 Q.C. Term.
- 9** S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only
- 10**⁷ DC Instantaneous
- 11** DC Ultra Short
- 12** DC Short
- 14** DC Medium
- 16** DC Long
- 20**⁷ 50/60Hz Instantaneous
- 21** 50/60Hz Ultra Short
- 22** 50/60Hz Short
- 24** 50/60Hz Medium
- 26** 50/60Hz Long
- 30** DC 50/60Hz Instantaneous
- 31** DC 50/60Hz Ultra Short
- 32** DC 50/60Hz Short
- 34** DC 50/60Hz Medium
- 36** DC 50/60Hz Long
- 42**⁸ 50/60Hz Short, Hi-Inrush
- 44**⁸ 50/60Hz Medium, Hi-Inrush
- 46**⁸ 50/60Hz Long, Hi-Inrush
- 52**⁸ DC Short, Hi-Inrush
- 54**⁸ DC Medium, Hi-Inrush
- 56**⁸ DC Long, Hi-Inrush

Notes:

- 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
- 2 Multi-pole breakers have all poles identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker. Rocker location as viewed from front panel: 2 pole – left pole; 3 pole – center pole.
- 3 Switch Only circuits, rated up to 50 amps and 3 poles, and only available with VDE Certification when tied to a protected pole (Circuit Code B, C, D or H.). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650. For 55-70 amps, select Current Code 670. For 75-100 amps, select Current Code 810.
- 4 Circuit Codes D,E,F,G,H & K available with Terminal Codes 1,2,4 & 5 only. Circuit Codes D,F,H & K available up to 50 amps maximum Current Rating.
- 5 Consult factory for available Dual Coil options, as special catalog number is required. Dual Coil Voltage Coils with Shunt Trip Construction trip instantaneously on line voltage. Dual Coil Voltage Coils require 30VA minimum power to trip instantaneously and are rated for intermittent duty only.
- 6 Auxiliary Switch available with Series Trip and Switch Only circuits. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole. Auxiliary switch codes 2, 3 & 4 are VDE approved.
- 7 Voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- 8 Available with Circuit Codes B & D only, and up to 50 amps maximum.
- 9 Current Ratings 60-70 are available up to four poles maximum. Ratings 71-100 are available up to two poles maximum.
- 10 Terminal Code 1 available to 60 amps maximum.
- 11 Terminal Codes 2,4,5 & C available to 50 amps maximum.
- 12 Terminal Codes 3,6 & 9 available to 100 amps maximum.
- 13 Terminal Code 7 available to 25 amps maximum.
- 14 Terminal Code A available to 100 amps maximum.
- 15 Terminal Codes 7, 9 & C are not VDE approved.
- 16 Color shown is visi and legend with remainder of rocker black
- 17 Legend on Push-to-reset bezel/shroud is white when single color rocker is ordered. Dual = ON-OFF/I-O legend with actuator codes C - G, and J, K, N, O, R, & U. None = no legend with actuator codes H, L, P, V. Rockerguard available with actuator codes C - L. Push-to-reset available with actuator codes N, O, P, R, U, V.
- 18 VDE/TUV approval requires Dual (I-O, ON-OFF) or I-O markings on rocker.
- 19 VDE/TUV: 30 amps max.; UL/CSA: 50 amps max.; Available in 2 - 4 poles only and limited to AC Delays. "General Purpose amps" not rated for "full load amps" or to be used in applications with a motor.

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
020	0.020	235	0.350	430	3.000	614	14.000
025	0.025	240	0.400	435	3.500	615	15.000
030	0.030	245	0.450	440	4.000	616	16.000
035	0.035	250	0.500	445	4.500	617	17.000
040	0.040	255	0.550	450	5.000	618	18.000
045	0.045	260	0.600	455	5.500	620	20.000
050	0.050	265	0.650	460	6.000	622	22.000
055	0.055	270	0.700	465	6.500	624	24.000
060	0.060	275	0.750	470	7.000	625	25.000
065	0.065	280	0.800	475	7.500	630	30.000
070	0.070	285	0.850	480	8.000	635	35.000
075	0.075	290	0.900	485	8.500	640	40.000
080	0.080	295	0.950	490	9.000	650	50.000
085	0.085	410	1.000	495	9.500	660	60.000
090	0.090	512	1.250	610	10.000	670	70.000
095	0.095	415	1.500	710	10.500	680	80.000
210	0.100	517	1.750	611	11.000	685	85.000
215	0.150	420	2.000	711	11.500	690	90.000
220	0.200	522	2.250	612	12.000	695	95.000
225	0.250	425	2.500	712	12.500	810	100.000
230	0.300	527	2.750	613	13.000		

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 7

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
A06	6 DC	A32	32 DC	J12	12 AC	J65	65 AC
A12	12 DC	A48	48 DC	J18	18 AC	K20	120 AC
A18	18 DC	A65	65 DC	J24	24 AC	L40	240 AC
A24	24 DC	J06	6 AC	J48	48 AC		

8 TERMINAL

- 1**¹⁰ Stud 10-32
- 2**¹¹ Screw 10-32
- 3**¹² Stud 1/4-20
- 4**¹¹ Stud M5 x 0.8
- 5**¹¹ Screw M5 x 0.8
- 6**¹² Stud M6
- 7**¹³ 0.250 Double Quick Connect
- 9** 7/16" Clip Terminal
- A**¹⁴ Plug-In Stud
- C** 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND 16,17,18

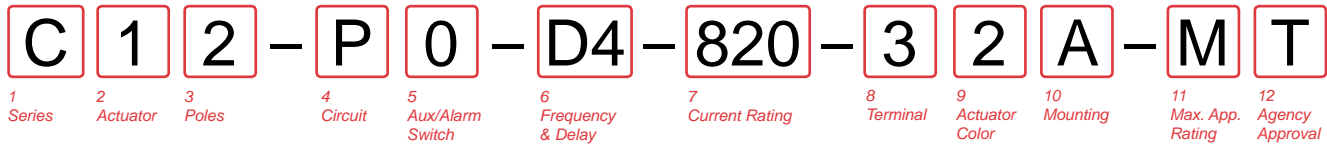
Actuator or Visi-Color	Marking:	Marking Color:		
Color:	I-O ON-OFF	Dual/None	Rocker/Handle	Visi-Rocker
White	A B	1	Black	White
Black	C D	2	White	n/a
Red	F G	3	White	Red
Green	H J	4	White	Green
Blue	K L	5	White	Blue
Yellow	M N	6	Black	Yellow
Gray	P Q	7	Black	Gray
Orange	R S	8	Black	Orange

10 MOUNTING / BARRIERS 1

	STANDARD ROCKER BEZEL	BARRIERS	VOLTAGE
1	6-32 x 0.195 inches	no	<300
2	6-32 x 0.195 inches	yes	<300
3	6-32 x 0.195 inches	yes	≥300
4	ISO M3 x 5mm	no	<300
5	ISO M3 x 5mm	yes	<300
6	ISO M3 x 5mm	yes	≥300
ROCKERGARD BEZEL			
A	6-32 x 0.195 inches	no	<300
C	6-32 x 0.195 inches	yes	<300
E	6-32 x 0.195 inches	yes	≥300
G	ISO M3 x 5mm	no	<300
J	ISO M3 x 5mm	yes	<300
L	ISO M3 x 5mm	yes	≥300
PUSH-TO-RESET BEZEL			
B	6-32 x 0.195 inches	no	<300
D	6-32 x 0.195 inches	yes	<300
F	6-32 x 0.195 inches	yes	≥300
H	ISO M3 x 5mm	no	<300
J	ISO M3 x 5mm	yes	<300
M	ISO M3 x 5mm	yes	≥300

11 AGENCY APPROVAL

- C** UL Recognized & CSA Accepted
- D** VDE Certified, UL Recognized & CSA Accepted
- E** TUV Certified, UL Recognized & CSA Accepted
- H** UL489 Construction: VDE Certified, UL Recognized & CSA Accepted
- I** UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted
- L** UL489 Construction: UL Recognized & CSA Accepted
- R** UL489 Construction: TUV Certified, UL Recognized & CSA Accepted



1 SERIES
C

- 2 ACTUATOR**
- C Curved Rocker, Two Color Visi, Indicate On, Vertical Legend
 - D Curved Rocker, Two Color Visi, Indicate On, Horizontal Legend
 - F Curved Rocker, Two Color Visi, Indicate Off, Vertical Legend
 - G Curved Rocker, Two Color Visi, Indicate Off, Horizontal Legend
 - J Curved Rocker, Single Color, Vertical Legend
 - K Curved Rocker, Single Color, Horizontal Legend
 - N Curved Rocker, Push To Reset, Two Color Visi, Vertical Legend
 - O Curved Rocker, Push To Reset, Two Color Visi, Horizontal Legend
 - 1 Flat Rocker, Two Color Visi, Vertical Legend
 - 2 Flat Rocker, Two Color Visi, Horizontal Legend
 - 3 Flat Rocker, Single Color, Vertical Legend
 - 4 Flat Rocker, Single Color, Horizontal Legend
 - 5 Flat Rocker, Push To Reset, Two Color Visi, Vertical Legend
 - 6 Flat Rocker, Push To Reset, Two Color Visi, Horizontal Legend
 - 7 Flat Rocker, Push To Reset, Single Color, Vertical Legend
 - 8 Flat Rocker, Push To Reset, Single Color, Horizontal Legend

- 3 POLES ²**
- | | | | | | |
|---|-----|---|-----|---|-------|
| 1 | One | 2 | Two | 3 | Three |
|---|-----|---|-----|---|-------|

- 4 CIRCUIT**
- P Series Trip (parallel pole)

- 5 AUXILIARY/ALARM SWITCH**
- | | | | |
|---|--|---|--|
| 0 | without Aux Switch | 6 | S.P.S.T., 0.139 Solder Lug |
| 2 | S.P.D.T., 0.110 Q.C. Term. | 7 | S.P.S.T., 0.110 Q.C. Term. (Gold Contacts) |
| 3 | S.P.D.T., 0.139 Solder Lug | 8 | S.P.S.T., 0.187 Q.C. Term. (Gold Contacts) |
| 4 | S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) | 9 | S.P.D.T., 0.187 Q.C. Term. |
| 5 | S.P.S.T., N.O., 0.110 Q.C. Term. (Gold Contacts) | | |

- 6 FREQUENCY & DELAY**
- D1 DC Ultra Short
 - D2 DC Short
 - D4 DC Medium
 - D6 DC Long

7 CURRENT RATING (AMPERES) ²

CODE	AMPERES	
810	100.00	813 130.00
811	110.00	814 140.00
812	120.00	815 150.00
813	130.00	816 160.00
814	140.00	817 170.00
815	150.00	818 180.00
816	160.00	819 190.00
817	170.00	820 200.00
818	180.00	822 225.00
819	190.00	825 250.00

- 8 TERMINAL ³**
- 3 Stud 1/4-20
 - 6 Stud M6
 - A Plug-In Stud ¹

9 ACTUATOR COLOR

	LEGEND	ON-OFF	Dual	Legend Color
White	B	1		Black
Black	D	2		White
Red	G	3		White
Green	J	4		White
Blue	L	5		White
Yellow	N	6		Black
Gray	Q	7		Black
Orange	S	8		Black

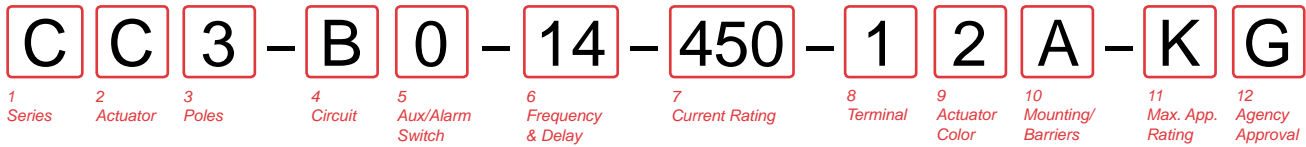
- 10 MOUNTING**
- ROCKER / MOUNTING INSERT STYLE**
- A Standard Rocker Bezel - 6-32 Inserts
 - B Standard Rocker Bezel - M3 Inserts
 - C Rocker Guard Bezel - 6-32 Inserts
 - D Rocker Guard Bezel - M3 Inserts
 - E Standard Bezel with recessed Off Side Flat Rocker - 6-32 Inserts
 - F Standard Bezel with recessed Off Side Flat Rocker - M3 Inserts
 - G Push to Reset Bezel - 6-32 Inserts
 - H Push to Reset Bezel - M3 Inserts

- 11 MAXIMUM APPLICATION RATING**
- M 80 DC

- 12 AGENCY APPROVAL ⁴**
- A Without Approval
 - G UL489 Listed
 - J UL489A Listed, TUV Certified
 - T UL489A Listed
 - 7 UL489A Listed, TUV Certified

Notes:

- Breakers with Terminal Codes 3 & 6 are supplied with bus bars connecting the Line and Load Terminals. For Terminal Code A, Line and Load Terminals must be connected to a copper bus bar having a minimum cross-section of 0.078 square inches. Terminal Code A is not available on the single pole unit.
- Ratings for 101 to 125 amps are available in 1-pole. Ratings from 110 to 200 amps are available in 2-pole. For ratings from 225-300 amps, specify 3-pole.
- 1 pole only available with terminal codes 3 and 6.
- Agency codes K and 7 are not available with 1 pole. Agency code J is only available with 1 pole. Agency code G is only available in 2 and 3 pole. Circuit P, ratings 101-150 amps (2 pole) and ratings 151-250 amps (3 pole).



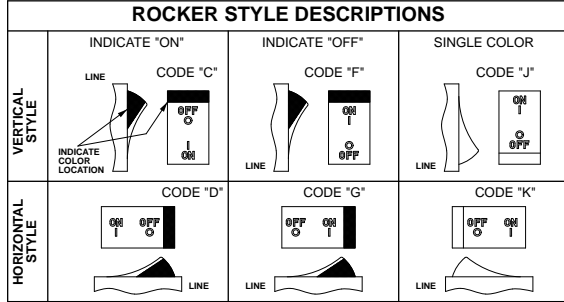
1 SERIES
C

2 ACTUATOR 1

Two Color Visi-Rocker

Single color

- C Indicate ON, vertical legend
- D Indicate ON, horizontal legend
- F Indicate OFF, vertical legend
- G Indicate OFF, horizontal legend
- J Vertical legend
- K Horizontal legend



3 POLES 1

- 1 One
- 2 Two
- 3 Three

4 CIRCUIT

- B Series Trip (current)

5 AUXILIARY / ALARM SWITCH 2

- 0 without Aux Switch
- 2 S.P.D.T., 0.110 Q.C. Term.
- 3 S.P.D.T., 0.139 Solder Lug
- 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
- 6 S.P.S.T., 0.139 Solder Lug
- 8 S.P.S.T., 0.187 Q.C. Term.
- 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 11 DC Ultra Short
- 12 DC Short
- 14 DC Medium
- 16 DC Long
- 21 50/60Hz Ultra Short
- 22 50/60Hz Short
- 24 50/60Hz Medium
- 26 50/60Hz Long
- 42⁸ 50/60Hz Short, Hi-Inrush
- 44⁸ 50/60Hz Medium, Hi-Inrush
- 46⁸ 50/60Hz Long, Hi-Inrush
- 52⁸ DC Short, Hi-Inrush
- 54⁸ DC Medium, Hi-Inrush
- 56 DC Long, Hi-Inrush

Notes:

- 1 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- 2 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 3 Available up to 50 amps maximum.
- 4 Current ratings 71 - 100 with VDE approvals are available up to two poles maximum.
- 5 Terminal Code 1 available to 60 amps maximum.
- 6 Terminal Codes 2, 4, 5 & C available to 50 amps maximum.
- 7 Terminal Codes 3, 6, 9 & A available to 100 amps maximum.
- 8 Terminal Codes 9 & C are not VDE approved.
- 9 Color shown is visi and legend with remainder of rocker black
- 10 Dual = ON-OFF/I-O legend on actuator.
- 11 VDE and TUV approval requires Dual (I-O, ON-OFF) markings on rocker.
- 12 Rockerguard available with all actuator codes.
- 13 Barriers supplied on multi-pole units only.
- 14 2 & 3 pole circuit breakers required for 120/240 AC rating.

7 CURRENT RATING (AMPERES) 4

CODE	AMPERES				
210	0.100	295	0.950	470	7.000
215	0.150	410	1.000	475	7.500
220	0.200	512	1.250	480	8.000
225	0.250	415	1.500	485	8.500
230	0.300	517	1.750	490	9.000
235	0.350	420	2.000	495	9.500
240	0.400	522	2.250	610	10.000
245	0.450	425	2.500	710	10.500
250	0.500	527	2.750	611	11.000
255	0.550	430	3.000	711	11.500
260	0.600	435	3.500	612	12.000
265	0.650	440	4.000	712	12.500
270	0.700	445	4.500	613	13.000
275	0.750	450	5.000	614	14.000
280	0.800	455	5.500	615	15.000
285	0.850	460	6.000	616	16.000
290	0.900	465	6.500	617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635	35.000
				640	40.000
				650	50.000
				660	60.000
				670	70.000
				680	80.000
				685	85.000
				690	90.000
				695	95.000
				810	100.000

8 TERMINAL

- 1⁵ Stud 10-32
- 2⁶ Screw 10-32 with saddle & washer clamps
- 3⁷ Stud 1/4-20
- 4⁶ Stud M5 x 0.8
- 5⁶ Screw M5 x 0.8 with saddle & washer clamps
- 6⁷ Stud M6
- 9^{7,8} 7/16" Clip Terminal & washer clamps
- A^{7,8} Plug-In Stud
- C^{6,8} 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND 11

Actuator or Visi-Color	Marking:		Marking Color: Single Color	Visi-Rocker
Color:	ON-OFF	Dual 10	Rocker/Handle	
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS 12

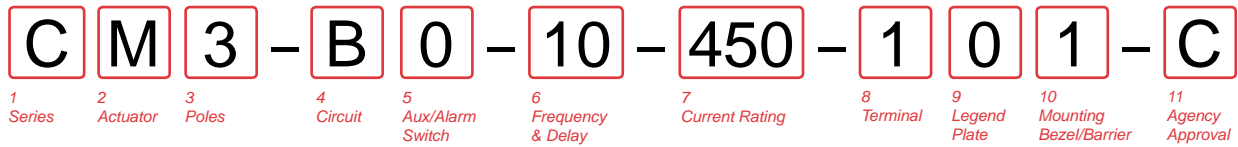
	Standard Rocker Bezel Threaded Insert, 2 per pole	BARRIERS 13
A	6-32 X 0.195 inches & washer clamps	yes
C	ISO M3 x 5mm	yes
	Rockerguard Bezel Threaded Insert, 2 per pole	
B	6-32 x 0.195 inches & washer clamps	yes
D	ISO M3 x 5mm	yes

11 MAXIMUM APPLICATION RATING

- A 65 DC
- B 125 DC
- C 120/240 AC 14
- D 240 AC
- F 277 AC
- K 120 AC
- M 80 DC

12 AGENCY APPROVAL

- A without approvals
- F UL 489 Listed, CSA Certified, & VDE Certified
- G UL 489 Listed & CSA Certified
- J UL489 Listed, CSA Certified & TUV Certified



1 SERIES
C

2 ACTUATOR 1
M Sealed Toggle, one per pole

3 POLES
1 One **2** Two **3** Three

4 CIRCUIT
A² Switch Only (no coil) **F**³ Relay Trip (current)
B Series Trip (current) **G**³ Relay Trip (voltage)
C Series Trip (voltage) **H**^{3,4} Dual Coil with Shunt Trip Voltage Coil
D³ Shunt Trip (current) **K**^{3,4} Dual Coil with Relay Trip Voltage Coil
E³ Shunt Trip (voltage)

5 AUXILIARY / ALARM SWITCH
0 without Aux Switch **6** S.P.S.T., 0.139 Solder Lug
2 S.P.D.T., 0.110 Q.C. Term. **8** S.P.S.T., 0.187 Q.C. Term.
3 S.P.D.T., 0.139 Solder Lug **9** S.P.D.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)

6 FREQUENCY & DELAY
03² DC 50/60Hz, Switch Only **30** DC 50/60Hz Instantaneous
10⁶ DC Instantaneous **31** DC 50/60Hz Ultra Short
11 DC Ultra Short **32** DC 50/60Hz Short
12 DC Short **34** DC 50/60Hz Medium
14 DC Medium **36** DC 50/60Hz Long
16 DC Long **42**⁷ 50/60Hz Short, Hi-Inrush
20⁶ 50/60Hz Instantaneous **44**⁷ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short **46**⁷ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short **52**⁷ DC Short, Hi-Inrush
24 50/60Hz Medium **54**⁷ DC Medium, Hi-Inrush
26 50/60Hz Long **56** DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES)⁹

CODE	AMPERES				
020	0.020	235	0.350	430	3.000
025	0.025	240	0.400	435	3.500
030	0.030	245	0.450	440	4.000
035	0.035	250	0.500	445	4.500
040	0.040	255	0.550	450	5.000
045	0.045	260	0.600	455	5.500
050	0.050	265	0.650	460	6.000
055	0.055	270	0.700	465	6.500
060	0.060	275	0.750	470	7.000
065	0.065	280	0.800	475	7.500
070	0.070	285	0.850	480	8.000
075	0.075	290	0.900	485	8.500
080	0.080	295	0.950	490	9.000
085	0.085	410	1.000	495	9.500
090	0.090	512	1.250	610	10.000
095	0.095	415	1.500	710	10.500
210	0.100	517	1.750	611	11.000
215	0.150	420	2.000	711	11.500
220	0.200	522	2.250	612	12.000
225	0.250	425	2.500	712	12.500
230	0.300	527	2.750	613	13.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁷

CODE	AMPERES				
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

8 TERMINAL

1 ⁹	Stud 10-32	6 ¹¹	Stud M6
2 ¹⁰	Screw 10-32	7 ¹²	0.250 Double Click Connect
3 ¹¹	Stud 1/4-20	9 ¹¹	7/16" Clip Terminal
4 ¹⁰	Stud M5 x 0.8	A ¹³	Plug-In Stud
5 ¹⁰	Screw M5 x 0.8	C ¹⁰	5/16" Clip Terminal

9 LEGEND PLATE
0 No Legend

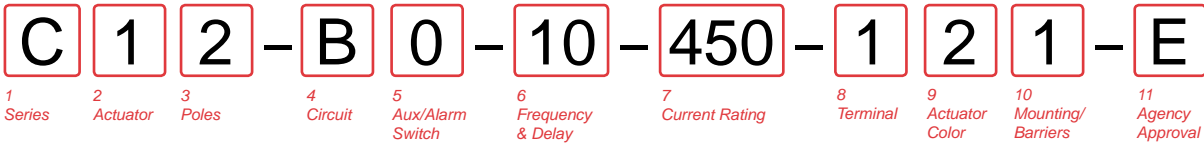
10 MOUNTING / BARRIERS

	MOUNTING STYLE	BARRIERS
1	Standard Hex Nut	no
A	Standard Hex Nut (multi-pole units only)	yes

11 AGENCY APPROVAL
C UL Recognized & CSA Accepted
I UL Recognized & CSA Accepted, UL1500 ignition protection
L UL Recognized & CSA Accepted with listed construction

Notes:

- Actuator Code M: Handle location as viewed from front of breaker:
2 pole - right pole 3 pole - center pole
- Switch Only circuits, rated up to 50 amps and 3 poles, and only available with VDE. For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650. For 55-70 amps, select Current Code 670. For 75-100 amps, select Current Code 810.
- Circuit Codes D,E,F,G,H & K available with Terminal Codes 1,2,4 & 5 only.
- Consult factory for available Dual Coil options, as special catalog number is required. Dual Coil Voltage Coils with Shunt Trip Construction trip instantaneously on line voltage. Dual Coil Voltage Coils require 30VA minimum power to trip instantaneously and are rated for intermittent duty only.
- Auxiliary Switch available with Series Trip and Switch Only circuits. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- Voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- Available with Circuit Codes B & D only, and up to 50 amps maximum.
- Consult factory for current ratings 71-100, in three pole units, available as special catalog number only.
- Terminal Code 1 available to 60 amps maximum.
- Terminal Codes 2, 4, 5 and C available to 50 amps maximum.
- Terminal Codes 3, 6 & 9 available to 100 amps maximum.
- Terminal Code 7 available to 25 amps maximum.
- Terminal Code A available to 100 amps maximum.



1 SERIES
C

2 ACTUATOR 1
Two Color Visi-Rocker
1 Indicate OFF, vertical legend
2 Indicate OFF, horizontal legend
Single color
3 Vertical legend
4 Horizontal legend
Push-To-Reset, Visi-Rocker
5 Indicate OFF, vertical legend
6 Indicate OFF, horizontal legend
Push-To-Reset, Single color
7 Vertical legend
8 Horizontal legend

ROCKER STYLE DESCRIPTIONS		
	INDICATE "OFF"	
	SINGLE COLOR	
VERTICAL STYLE	CODE "1", "5" 	CODE "3", "7"
	INDICATE COLOR LOCATION 	CODE "4", "8"
HORIZONTAL STYLE	CODE "2", "6" 	CODE "4", "8"
	LINE 	LINE

3 POLES 2
1 One 2 Two 3 Three

4 CIRCUIT
A³ Switch Only (No Coil) F⁴ Relay Trip (Current)
B Series Trip (Current) G⁴ Relay Trip (Voltage)
C Series Trip (Voltage) H^{4,5} Dual Coil with Shunt Trip Voltage Coil
D⁴ Shunt Trip (Current) K^{4,5} Dual Coil with Relay Trip Voltage Coil
E⁴ Shunt Trip (Voltage)

5 AUXILIARY / ALARM SWITCH 6
0 without Aux Switch
2 S.P.D.T., 0.110 Q.C. Term. 6 S.P.S.T., 0.139 Solder Lug
3 S.P.D.T., 0.139 Solder Lug 8 S.P.S.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts) 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
03 DC 50/60Hz, Switch Only 30 DC 50/60Hz Instantaneous
10⁷ DC Instantaneous 31 DC 50/60Hz Ultra Short
11 DC Ultra Short 32 DC 50/60Hz Short
12 DC Short 34 DC 50/60Hz Medium
14 DC Medium 36 DC 50/60Hz Long
16 DC Long 42⁸ 50/60Hz Short, Hi-Inrush
20⁷ 50/60Hz Instantaneous 44⁸ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short 46⁸ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short 52⁸ DC Short, Hi-Inrush
24 50/60Hz Medium 54⁸ DC Medium, Hi-Inrush
26 50/60Hz Long 56⁸ DC Long, Hi-Inrush

- Notes:
1 Push-to-reset actuators have OFF portion of rocker shrouded.
2 Multi-pole breakers have all poles identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker. Rocker location as viewed from front panel: 2 pole – left pole; 3 pole – center pole.
3 Switch Only circuits, rated up to 50 amps and 3 poles, and only available with VDE Certification when tied to a protected pole (Circuit Code B, C, D or H.). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650. For 55-70 amps, select Current Code 670. For 75-100 amps, select Current Code 810.
4 Circuit Codes D,E,F,G,H & K available with Terminal Codes 1,2,4 & 5 only. Circuit Codes D,F,H & K available up to 50 amps maximum Current Rating.
5 Consult factory for available Dual Coil options, as special catalog number is required. Dual Coil Voltage Coils with Shunt Trip Construction trip instantaneously on line voltage. Dual Coil Voltage Coils require 30VA minimum power to trip instantaneously and are rated for intermittent duty only.
6 Auxiliary Switch available with Series Trip and Switch Only circuits. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole. Auxiliary switch codes 2, 3 & 4 are VDE approved.
7 Voltage coils not rated for continuous duty. Available only with delay codes 10 and 20.
8 Available with Circuit Codes B & D only, and up to 50 amps maximum.
9 Current ratings 60-70 are available up to four poles maximum. Current ratings 71 - 100 are available up to two poles maximum.
10 Terminal Code 1 available to 60 amps maximum.
11 Terminal Codes 2,4,5 & C available to 50 amps maximum.
12 Terminal Codes 3,6 & 9 available to 100 amps maximum.
13 Terminal Code 7 available to 25 amps maximum.
14 Terminal Code A available to 100 amps maximum.
15 Terminal Codes 7, 9 & C are not VDE approved.
16 Color shown is visi & legend with remainder of rocker black. Dual = ON-OFF/I-O legend.
17 Legend on Push-to-reset bezel/shroud is white with single color actuator codes 7 & 8. Legend on Push-to-reset bezel/shroud matches visi-color of rocker with actuator codes 5 & 6.
18 VDE/TUV approval requires Dual (I-O, ON-OFF) or I-O markings on rocker.
19 VDE/TUV: 30 amps max.; UL/CSA: 50 amps max.; Available in 2 & 3 poles only and limited to AC Delays. "General Purpose amps" not rated for "full load amps" or to be used in applications with a motor.
20 Recessed "OFF SIDE" available with actuator codes 1,2,3&4. Legends on rocker are available in ink stamping only.

7 CURRENT RATING (AMPERES) 9

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
020	0.020	235	0.350	430	3.000
025	0.025	240	0.400	435	3.500
030	0.030	245	0.450	440	4.000
035	0.035	250	0.500	445	4.500
040	0.040	255	0.550	450	5.000
045	0.045	260	0.600	455	5.500
050	0.050	265	0.650	460	6.000
055	0.055	270	0.700	465	6.500
060	0.060	275	0.750	470	7.000
065	0.065	280	0.800	475	7.500
070	0.070	285	0.850	480	8.000
075	0.075	290	0.900	485	8.500
080	0.080	295	0.950	490	9.000
085	0.085	410	1.000	495	9.500
090	0.090	512	1.250	610	10.000
095	0.095	415	1.500	710	10.500
210	0.100	517	1.750	611	11.000
215	0.150	420	2.000	711	11.500
220	0.200	522	2.250	612	12.000
225	0.250	425	2.500	712	12.500
230	0.300	527	2.750	613	13.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 7

CODE	AMPERES	CODE	VOLTS	CODE	VOLTS
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

8 TERMINAL
1¹⁰ Stud 10-32 6¹² Stud M6
2¹¹ Screw 10-32 7¹³ 0.250 Double Quick Connect
3¹² Stud 1/4-20 9¹⁵ 7/16" Clip Terminal
4¹¹ Stud M5 x 0.8 A¹⁴ Plug-In Stud
5¹¹ Screw M5 x 0.8 C¹⁵ 5/16" Clip Terminal

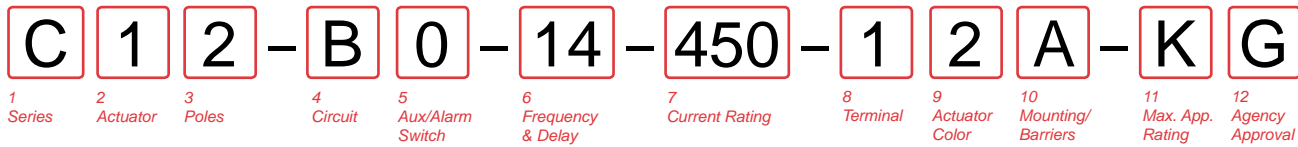
9 ACTUATOR COLOR & LEGEND 16,17,18

Actuator or Visi-Color	Marking:	Marking Color:
Color:	I-O ON-OFF Dual/None	Single Color
White	A B 1	Rocker/Handle
Black	C D 2	Black
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
		White
		n/a
		Red
		Green
		Blue
		Yellow
		Gray
		Orange

10 MOUNTING / BARRIERS 1

	STANDARD ROCKER BEZEL	BARRIERS	VOLTAGE
1	6-32 x 0.195 inches	no	<300
2	6-32 x 0.195 inches	yes	<300
3 ¹⁹	6-32 x 0.195 inches	yes	≥300
4	ISO M3 x 5mm	no	<300
5	ISO M3 x 5mm	yes	<300
6 ¹⁹	ISO M3 x 5mm	yes	≥300
	RECESSED OFF ROCKER		
7	6-32 x 0.195 inches	no	<300
8	6-32 x 0.195 inches	yes	<300
9	6-32 x 0.195 inches	yes	≥300
A	ISO M3 x 5mm	no	<300
C	ISO M3 x 5mm	yes	<300
E	ISO M3 x 5mm	yes	≥300
	PUSH-TO-RESET BEZEL		
B	6-32 x 0.195 inches	no	<300
D	6-32 x 0.195 inches	yes	<300
F ¹⁹	6-32 x 0.195 inches	yes	≥300
H	ISO M3 x 5mm	no	<300
J	ISO M3 x 5mm	yes	<300
M ¹⁹	ISO M3 x 5mm	yes	≥300

11 AGENCY APPROVAL
C UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted
L UL489 Construction: UL Recognized & CSA Accepted
R UL489 Construction: TUV Certified, UL Recognized & CSA Accepted



1 SERIES
C

2 ACTUATOR 1

Two Color Visi-Rocker

- 1 Indicate OFF, vertical legend
- 2 Indicate OFF, horizontal legend

Single color

- 3 Vertical legend
- 4 Horizontal legend

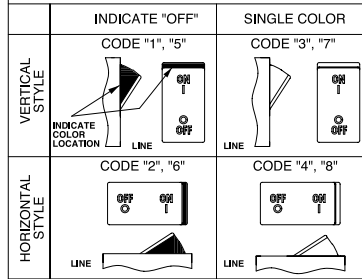
Push-To-Reset, Visi-Rocker

- 5 Indicate OFF, vertical legend
- 6 Indicate OFF, horizontal legend

Push-To-Reset, Single color

- 7 Vertical legend
- 8 Horizontal legend

ROCKER STYLE DESCRIPTIONS



3 POLES 2

- 1 One
- 2 Two
- 3 Three

4 CIRCUIT

- B Series Trip (current)

5 AUXILIARY / ALARM SWITCH 3

- 0 without Aux Switch
- 2 S.P.D.T., 0.110 Q.C. Term.
- 3 S.P.D.T., 0.139 Solder Lug
- 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
- 6 S.P.S.T., 0.139 Solder Lug
- 8 S.P.S.T., 0.187 Q.C. Term.
- 9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 11 DC Ultra Short
- 12 DC Short
- 14 DC Medium
- 16 DC Long
- 21 50/60Hz Ultra Short
- 22 50/60Hz Short
- 24 50/60Hz Medium
- 26 50/60Hz Long
- 42 50/60Hz Short, Hi-Inrush
- 44 50/60Hz Medium, Hi-Inrush
- 46 50/60Hz Long, Hi-Inrush
- 52 DC Short, Hi-Inrush
- 54 DC Medium, Hi-Inrush
- 56 DC Long, Hi-Inrush

Notes:

- 1 Push-to-reset actuators have OFF portion of rocker shrouded.
- 2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
- 3 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- 4 Available up to 50 amps maximum.
- 5 Current ratings 71 - 100 with VDE approvals are available up to two poles maximum.
- 6 Terminal Code 1 available to 60 amps maximum.
- 7 Terminal Codes 2, 4, 5 & C available to 50 amps maximum.
- 8 Terminal Codes 3, 6, 9 & A available to 100 amps maximum.
- 9 Terminal Codes 9 & C are not VDE approved.
- 10 Color shown is visi and legend with remainder of rocker black
- 11 Dual = ON-OFF/I-O legend on actuator.
- 12 TUV approval requires Dual (I-O, ON-OFF) markings on rocker.
- 13 Legend on push-to-reset bezel/shroud is white when single color rocker is ordered. Legend on push-to-reset bezel/shroud matches visi-color of rocker with actuator codes 5 & 6.
- 14 Recessed "OFF-SIDE" available with actuator codes 1, 2, 3, & 4. Legends on rocker are available in ink stamping only.
- 15 Barriers supplied on multi-pole units only.
- 16 2 & 3 pole circuit breakers required for 120/240 AC rating.

7 CURRENT RATING (AMPERES) 5

CODE	AMPERES				
210	0.100	295	0.950	470	7.000
215	0.150	410	1.000	475	7.500
220	0.200	512	1.250	480	8.000
225	0.250	415	1.500	485	8.500
230	0.300	517	1.750	490	9.000
235	0.350	420	2.000	495	9.500
240	0.400	522	2.250	610	10.000
245	0.450	425	2.500	710	10.500
250	0.500	527	2.750	611	11.000
255	0.550	430	3.000	711	11.500
260	0.600	435	3.500	612	12.000
265	0.650	440	4.000	712	12.500
270	0.700	445	4.500	613	13.000
275	0.750	450	5.000	614	14.000
280	0.800	455	5.500	615	15.000
285	0.850	460	6.000	616	16.000
290	0.900	465	6.500	617	17.000
		618	18.000	620	20.000
		622	22.000	624	24.000
		625	25.000	630	30.000
		635	35.000	640	40.000
		650	50.000	660	60.000
		670	70.000	680	80.000
		685	85.000	690	90.000
		695	95.000	810	100.000

8 TERMINAL

- 1 6 Stud 10-32
- 2 7 Screw 10-32
- 3 8 Stud 1/4-20
- 4 7 Stud M5 x 0.8
- 5 7 Screw M5 x 0.8
- 6 8 Stud M6
- 9 8,9 7/16" Clip Terminal
- A 8 Plug-In Stud
- C 7,9 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND 10

Actuator or Visi-Color	Marking:	Marking Color:	Single Color	Visi-Rocker
Color:	ON-OFF	Dual 11,12	Rocker/Handle	
White	B	1	Black	White
Black	D	2	White	n/a
Red	G	3	White	Red
Green	J	4	White	Green
Blue	L	5	White	Blue
Yellow	N	6	Black	Yellow
Gray	Q	7	Black	Gray
Orange	S	8	Black	Orange

10 MOUNTING / BARRIERS

	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole	BARRIERS 15
A	6-32 X 0.195 inches	yes
C	ISO M3 x 5mm	yes
	RECESSED OFF ROCKER 14	
	Threaded Insert, 2 per pole	
E	6-32 x 0.195 inches	yes
F	ISO M3 x 5mm	yes
	PUSH-TO-RESET BEZEL 13	
	Threaded Insert, 2 per pole	
B	6-32 x 0.195 inches	yes
D	ISO M3 x 5mm	yes

11 MAXIMUM APPLICATION RATING

- A 65 DC
- B 125 DC
- C 120/240 AC 16
- D 240 AC
- F 277 AC
- K 120 AC
- M 80 DC

12 AGENCY APPROVAL 12

- A without approvals
- G UL 489 Listed & CSA Certified
- J UL489 Listed, CSA Certified & TUV Certified

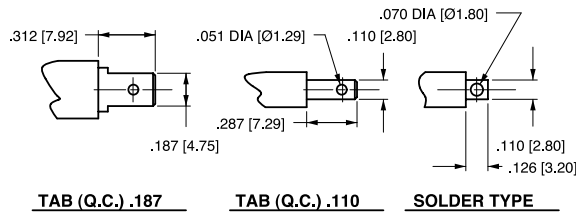
Circuit & Terminal Diagrams: in. [mm]

DESCRIPTION	CODE	DIMENSIONAL DETAIL	RATING (AMPS)		
			25	50	100
#10-32 STUD	1				
M5 STUD	4				
#1/4-20 STUD	3				
M6 STUD	6				
#1/4-20 STUD	3				
M6 STUD	6				
#10-32 SCREW	2				
M-5 SCREW	5				

DESCRIPTION	CODE	DIMENSIONAL DETAIL	RATING (AMPS)		
			25	50	100
.250 DOUBLE Q.C.	7				
7/16" CLIP TERMINALS	9				
PUSH-IN STUD	A				

NOTES: TOLERANCE ON STUD LENGTHS IS ± 0.031 [± 0.79] UNLESS OTHERWISE SPECIFIED.

AUXILIARY / ALARM SWITCH TERMINAL DETAIL³



TIGHTENING TORQUE SPECIFICATIONS	
THREAD SIZE	TORQUE
#6-32 [M3] MOUNTING INSERTS	7-9 IN-LBS [0.8-1.0 NM]
#10-32 & M5 THD STUDS	15-20 IN-LBS [1.7-2.3 NM]
#10-32 THD SCREW	15-20 IN-LBS [1.7-2.3 NM]
#1/4-20 & M6 THD STUDS	30-35 IN-LBS [3.4-4.0 NM]

TERMINAL HARDWARE				
TERMINAL DESCRIPTION	CODE	AGENCY APPROVAL	AMPERE RATING	HARDWARE SUPPLIED
#10-32 STUD	1	ALL	.02 - 50	LOCK WASHER - FLAT WASHER - NUT
M5 STUD	4	ALL	.02 - 50	LOCK WASHER - FLAT WASHER - NUT
#1/4-20 STUD	3	ALL	.02 - 80	LOCK WASHER - FLAT WASHER - NUT
			81 - 100	LOCK WASHER - NUT - (2)FLAT WASHER - NUT
M6 STUD	6	ALL	.02 - 80	LOCK WASHER - FLAT WASHER - NUT
			81 - 100	LOCK WASHER - NUT - (2)FLAT WASHER - NUT
#10-32 SCREW	2 & 5	UL RECOGNIZED	.02 - 50	* SADDLE CLAMP - FLAT WASHER - SCREW
		UL-489 LISTED	.02 - 50	LOCK WASHER - FLAT WASHER - SCREW
		TUV & VDE CERTIFIED	.02 - 16	* SADDLE CLAMP - FLAT WASHER - SCREW
		TUV & VDE CERTIFIED	16.1 - 50	LOCK WASHER - FLAT WASHER - SCREW

* THE SADDLE CLAMP IS FOR DIRECT WIRE CONNECTION USE. DISCARD SADDLE CLAMP IF WIRE TERMINAL LUG IS USED

- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.
 3 Available on Series Trip and Switch Only Circuits when called for on multi-pole units.
 Only one auxiliary switch is normally supplied, as viewed in multi-pole identification scheme.

Circuit & Terminal Diagrams: in. [mm]

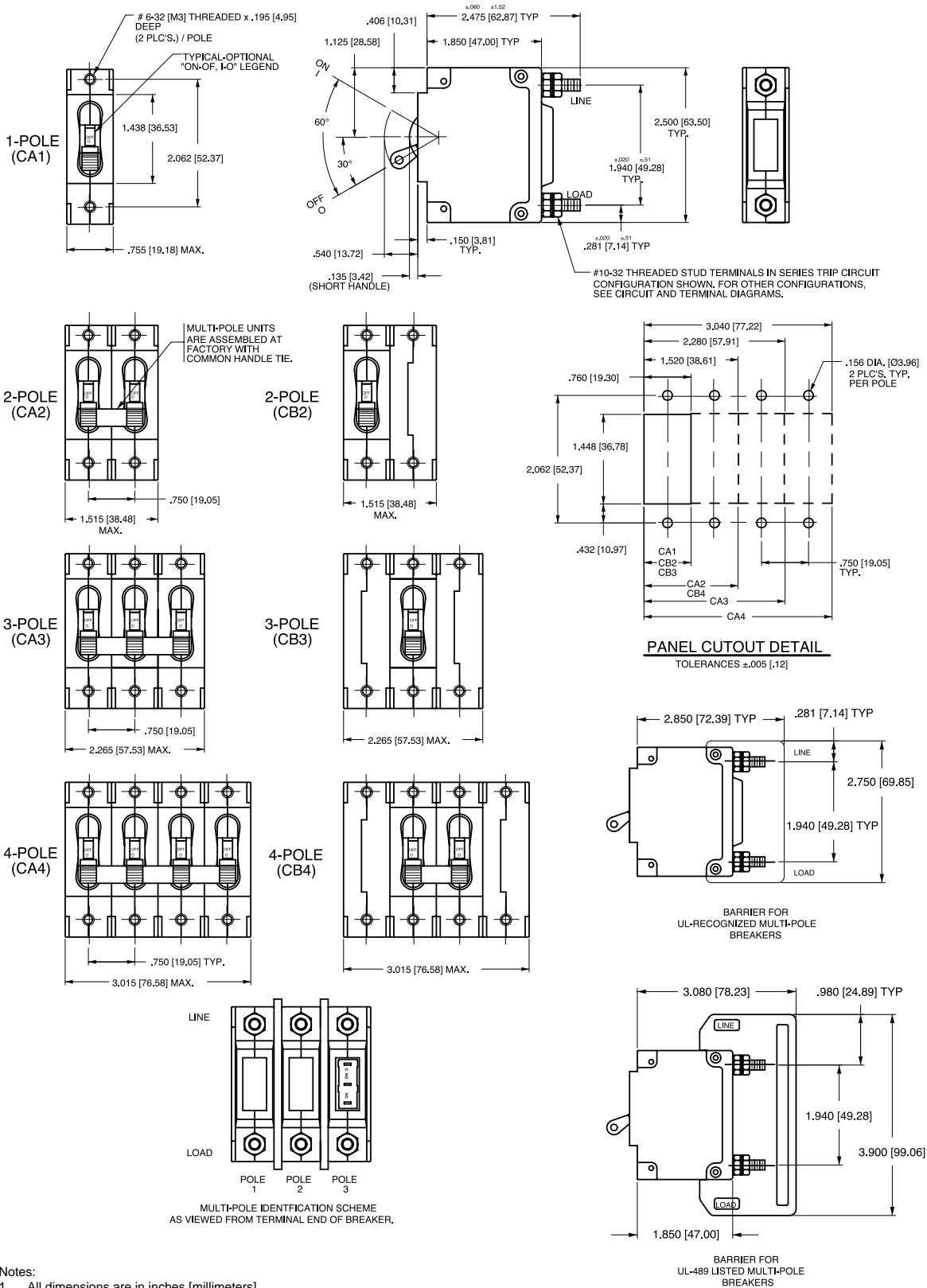
Terminal Diagram	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
			A	O			B C	O
			A	2 3 4			B C	2 3 4
			D E	0			H	0
			F G	0			K	0

HANDLE POSITION VS. AUX/ALARM SWITCH MODE					
CIRCUIT BREAKER MODE	STANDARD C/B		MID TRIP C/B		
	HANDLE POSITION	AUX. SWITCH MODE	HANDLE POSITION	STANDARD ALARM SWITCH MODE	REVERSE ALARM SWITCH MODE ⁴
OFF					
ON					
ELECTRICAL TRIP					

Notes:

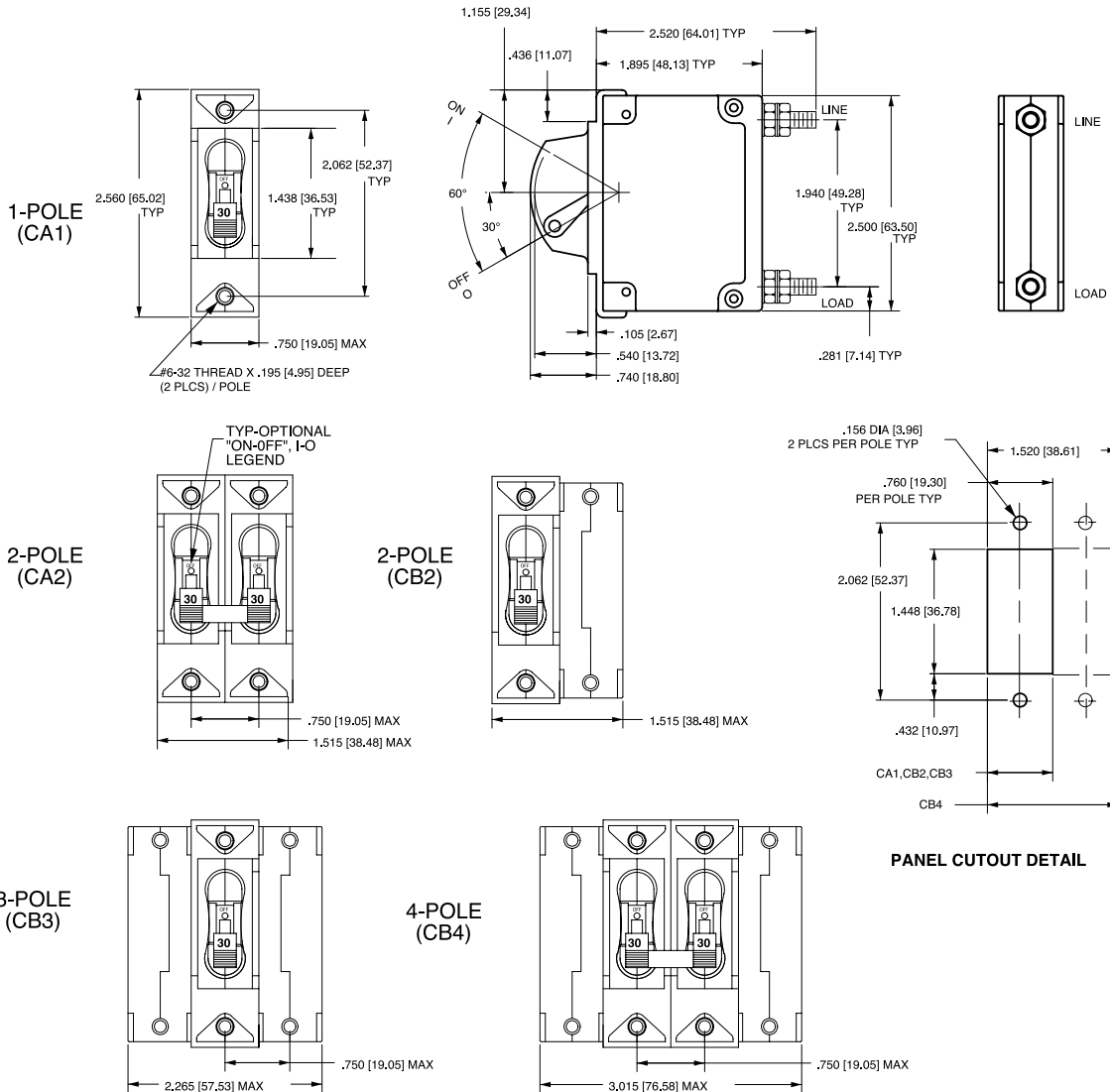
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [.51] unless otherwise specified.
- 3 Schematic shown represents current trip circuits.
- 4 Available only as special catalog number.

Dimensional Specifications: in. [mm]

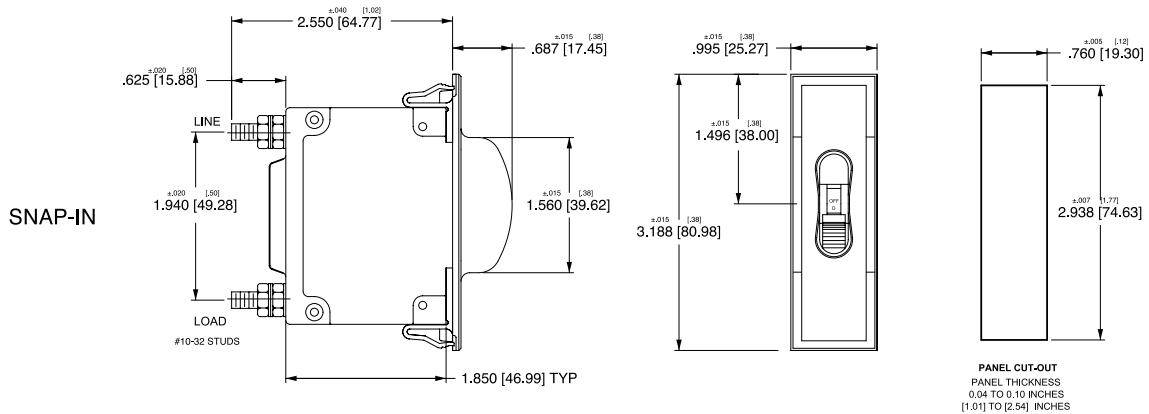


- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



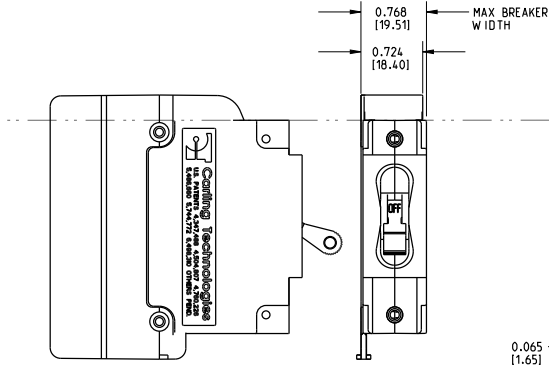
*Handguard available as special catalog number only



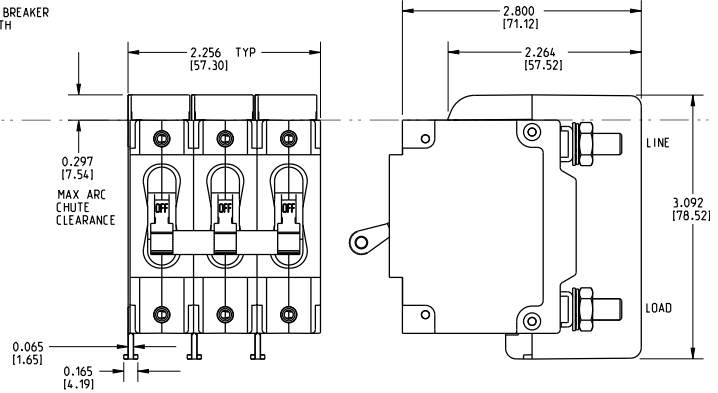
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

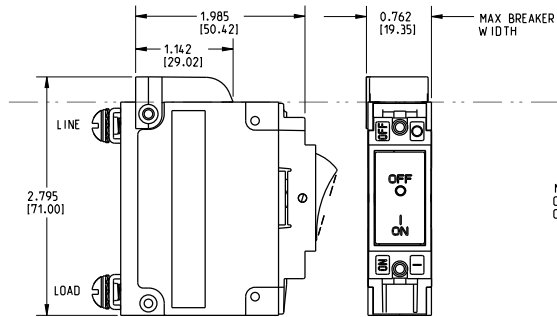
1-POLE (CA1)
w/ ARC CHUTE BARRIER



3-POLE (CA3)
w/ ARC CHUTE BARRIER

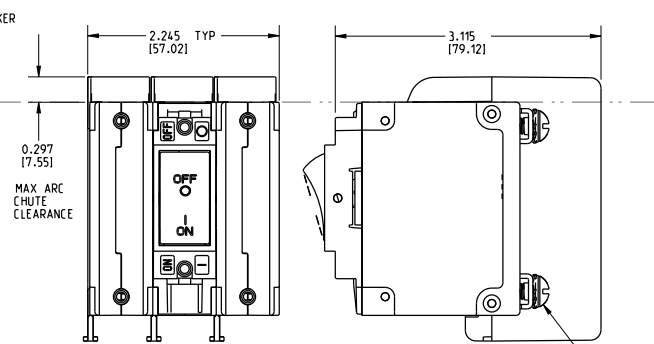


1-POLE (CC1, CD1)
w/ ARC CHUTE (NO BARRIER)



INDICATE "ON"

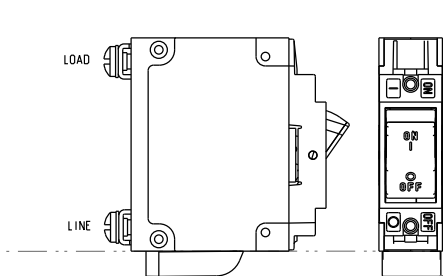
3-POLE (CC3, CD3)
w/ ARC CHUTE BARRIER



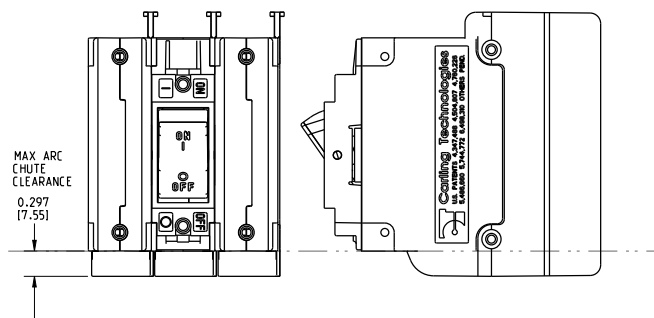
SCREW TYPE TERMINALS IN SERIES TRIP CIRCUIT CONFIGURATION SHOWN.

INDICATE "OFF" / SINGLE COLOR

1-POLE (CF1, CG1, C11, C21)
w/ ARC CHUTE (NO BARRIER)



3-POLE (CF3, CG3, C13, C23)
w/ ARC CHUTE BARRIER

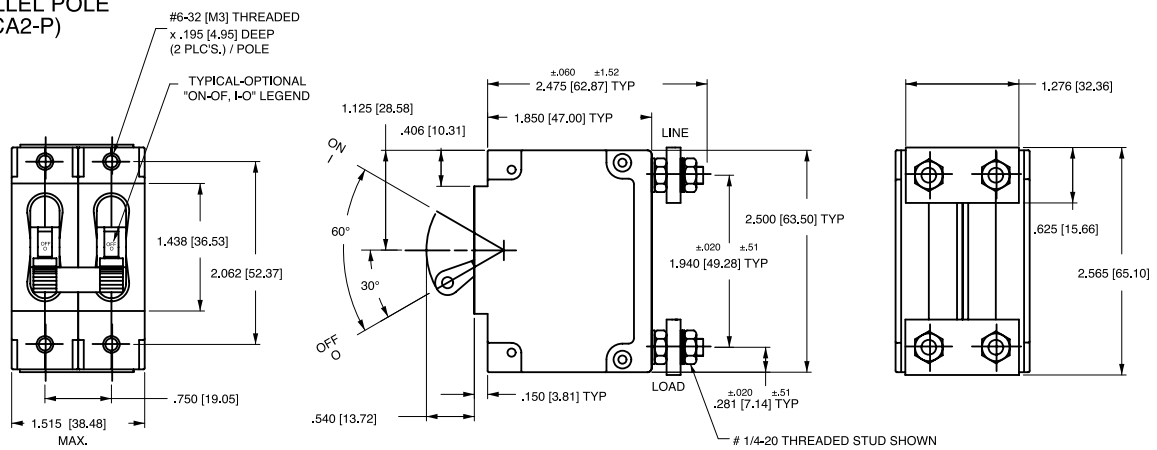


Notes:

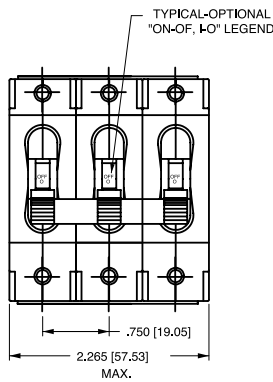
- 1 Only 1-pole and 3-pole configurations shown. Arc chute (without barrier) and arc chute barrier also available for 2-pole construction.
- 2 Dimensions apply to all variations shown.
- 3 Notice that line and load terminal orientation for indicate on and indicate off rocker circuit breakers are opposite.
- 4 Screw type terminals shown for Rocker style (CF1, C11, etc) circuit breakers. For other terminal configurations see circuit and terminal diagrams.
- 5 All dimensions are in inches [millimeters].
- 6 Tolerance $\pm .020$ unless otherwise specified.
- 7 Must be ordered under a special catalog number.

Dimensional Specifications: in. [mm]

PARALLEL POLE (CA2-P)

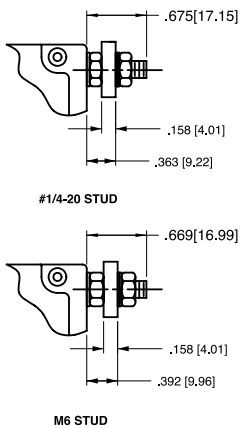
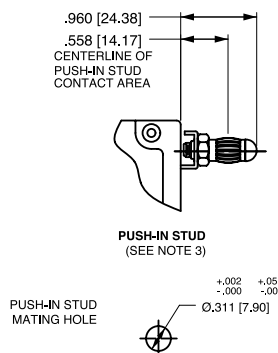


PARALLEL POLE (CA3-P)

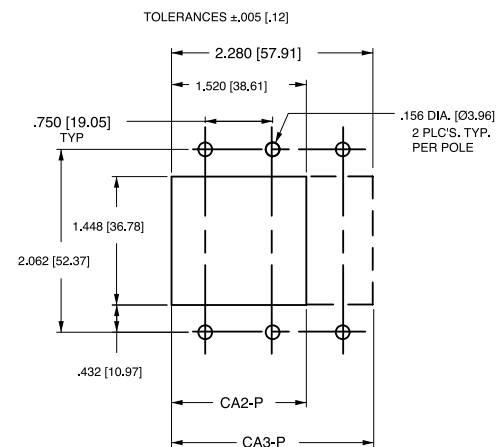


CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC (CA2-P SHOWN)		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC		
	SERIES TRIP 		P	0
	SERIES TRIP WITH AUXILIARY SWITCH 		P	2 3 4

TERMINAL DETAILS

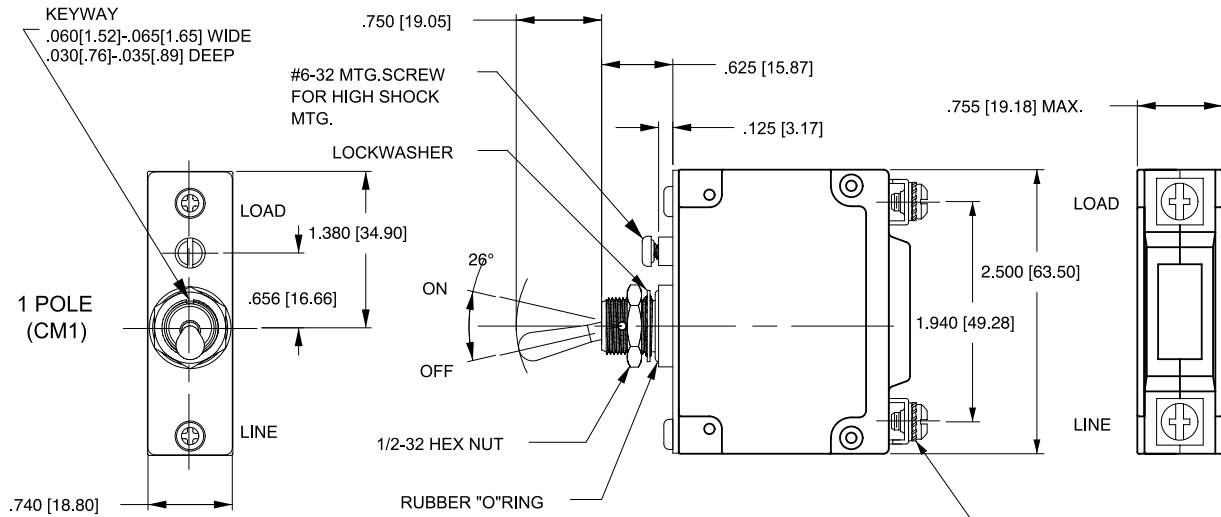


PANEL CUTOUT DETAIL

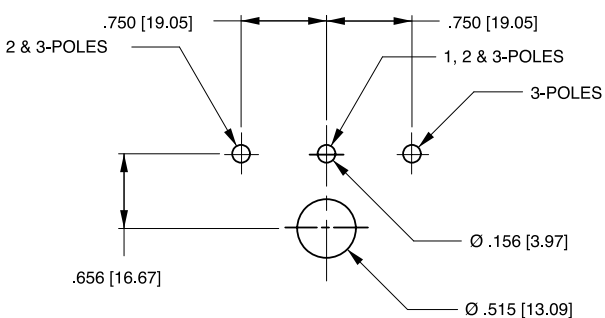
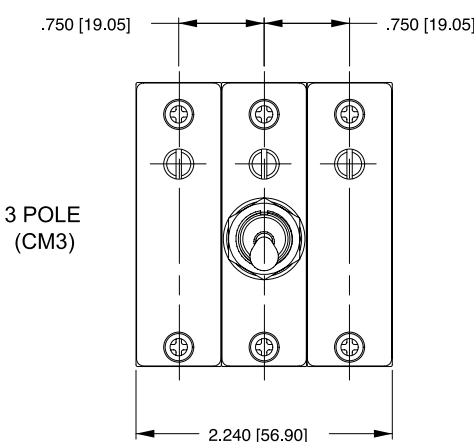
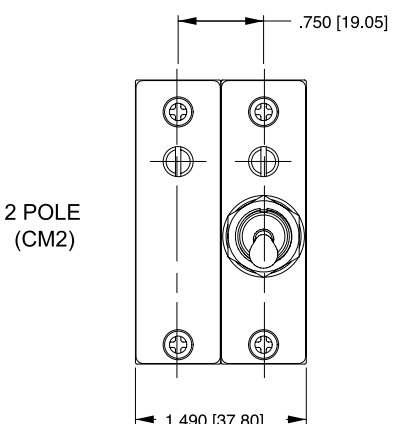


- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [1.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



SCREW TYPE TERMINALS
IN SERIES TRIP CIRCUIT
CONFIGURATION SHOWN.
FOR OTHER CONFIGURATIONS
SEE CIRCUIT & TERMINAL
DIAGRAMS

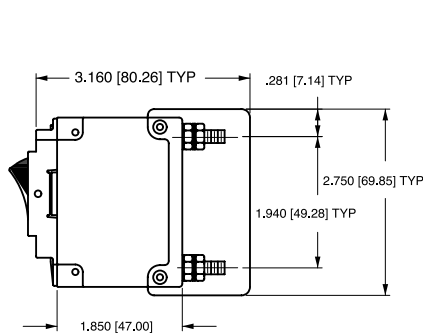


PANEL CUTOUT DETAIL
TOLERANCES ±.005[.13]

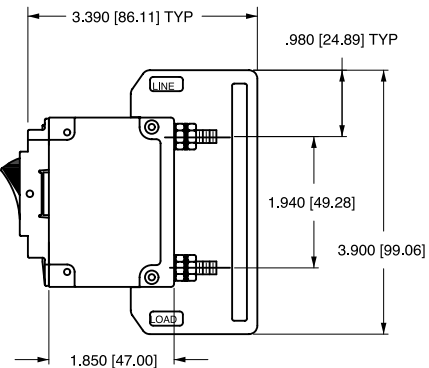
- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ±.020 [.51] unless otherwise specified.

Circuit & Terminal Diagrams: in. [mm]

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>2.160 [54.86] TYP</p> <p>LINE</p> <p>MAIN TERM'S. (SEE TABLE A)</p> <p>LOAD</p> <p>SERIES TRIP (2 TERM'S.)</p> <p>.625 [15.88] TYP</p>	<p>SWITCH ONLY (NO COIL)</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ), LOAD (LAST)</p>		A	0	<p>SWITCH TRIP</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ) (3), LOAD (LAST)</p>		BC	0
<p>.675 [17.15] TYP</p> <p>.970 [24.64]</p> <p>C</p> <p>NO</p> <p>NC</p> <p>1.265 [32.13]</p> <p>AUX. SWITCH TERM'S.(3 PLCS.)</p> <p>SERIES TRIP W/AUX. SWITCH (5 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH</p> <p>ANSI: LINE, C, NO, NC, LOAD</p> <p>IEC: LINE (NETZ), C, NO, NC, LOAD (LAST)</p>		A	3 4	<p>SERIES TRIP WITH AUXILIARY SWITCH</p> <p>ANSI: LINE, C, NO, NC, LOAD</p> <p>IEC: LINE (NETZ) (3), C, NO, NC, LOAD (LAST)</p>		BC	3 4
<p>SHUNT TRIP (3 TERM'S.)</p>	<p>SHUNT TRIP</p> <p>ANSI: LINE, SHUNT, LOAD</p> <p>IEC: LINE (NETZ) (3), SHUNT (NEBENSCHLUSS), LOAD (LAST)</p>		DE	0	<p>DUAL COIL; SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL</p> <p>ANSI: LINE, SHUNT, LOAD</p> <p>IEC: LINE (NETZ), SHUNT, VOLTAGE COIL, LOAD (LAST), VOLTAGE COIL</p>		H	0
<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>.646 [16.41]</p> <p>.812 [20.62] TYP</p> <p>.646 [16.41] TYP</p> <p>SHUNT TRIP (4 TERM'S.)</p>	<p>RELAY TRIP</p> <p>ANSI: LINE (1), LOAD (2), RELAY (3), RELAY (4)</p> <p>IEC: RELAY (RELAIS) (3), LINE (NETZ) (1), RELAY (RELAIS) (4), LOAD (LAST) (2)</p>		FG	0	<p>DUAL COIL; SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL</p> <p>ANSI: LINE (1), LOAD (2), RELAY (3), RELAY (4)</p> <p>IEC: LINE (NETZ) (1), RELAY (RELAIS) (4), LOAD (LAST) (2), VOLTAGE COIL (3)</p>		K	0



BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

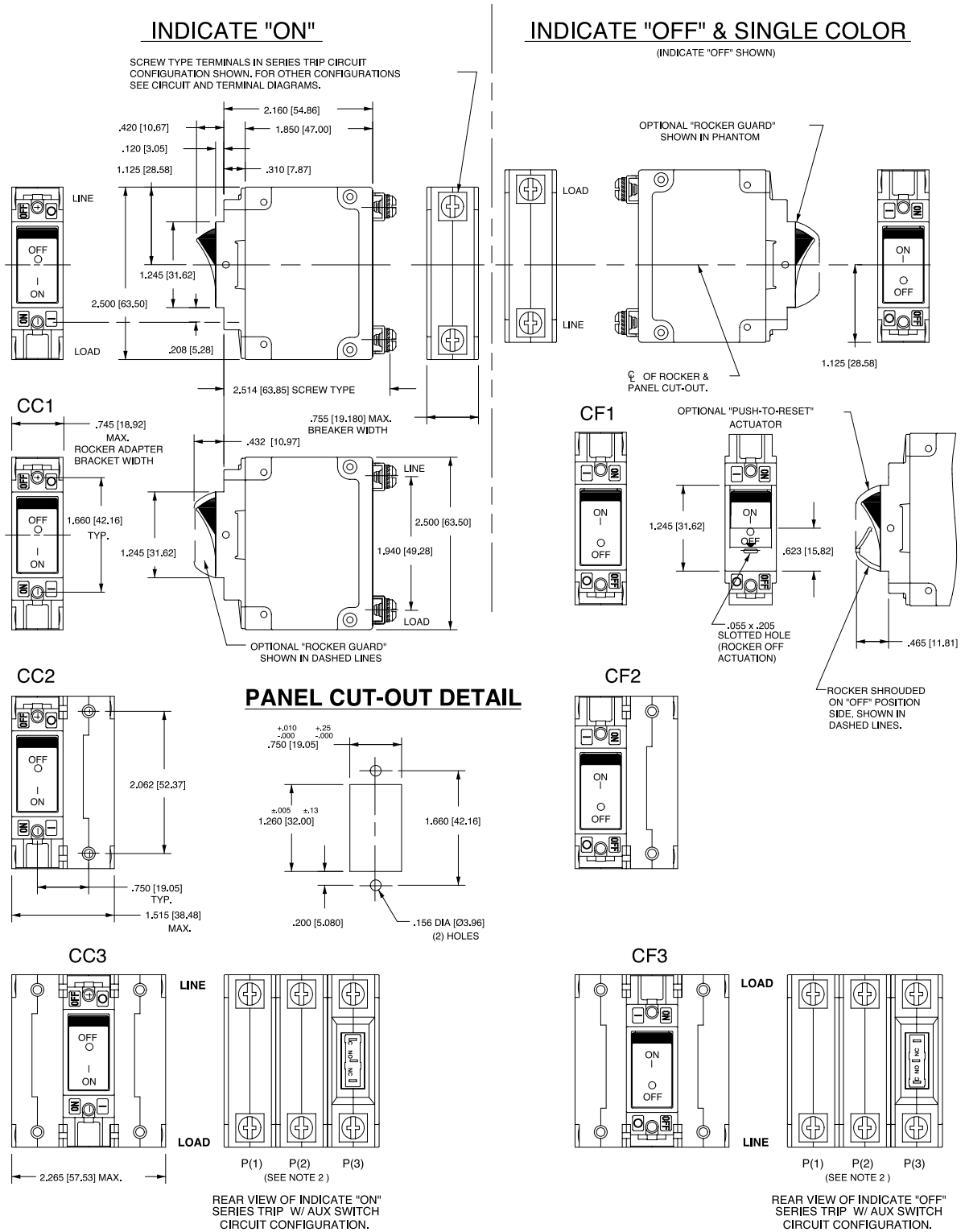


BARRIER FOR UL-489 LISTED MULTI-POLE BREAKERS

Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance $\pm .020$ [.51] unless otherwise specified.
- 3 Schematic shown represents current trip circuit.

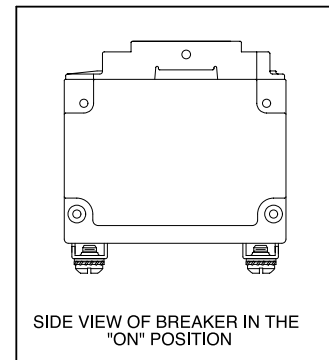
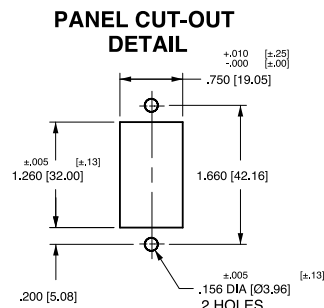
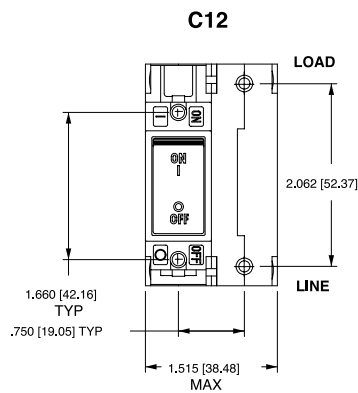
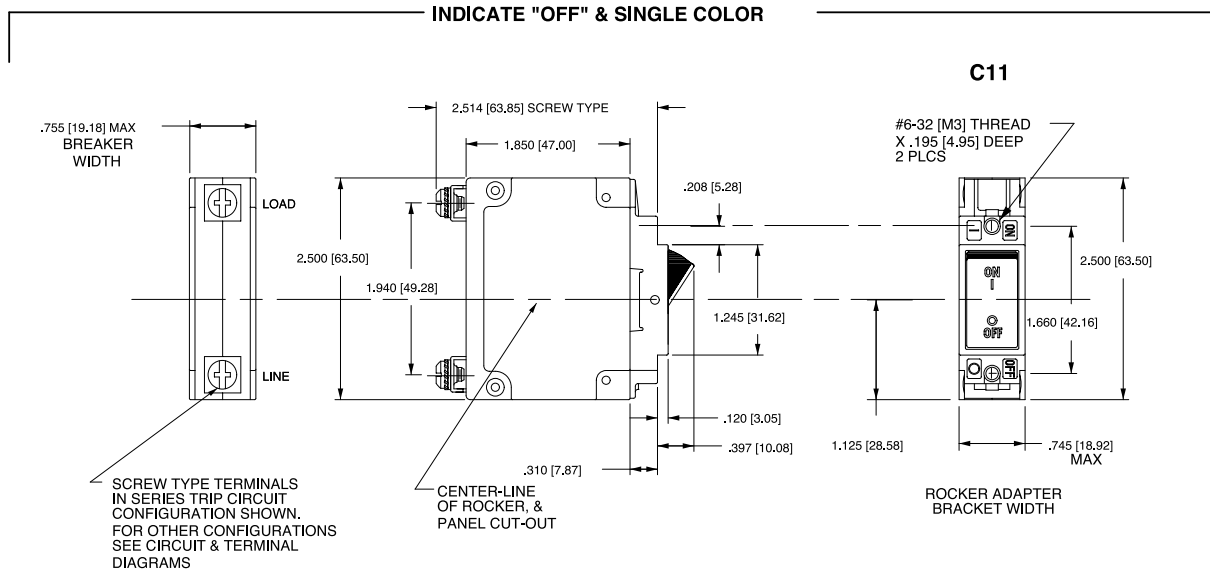
Dimensional Specifications: in. [mm]



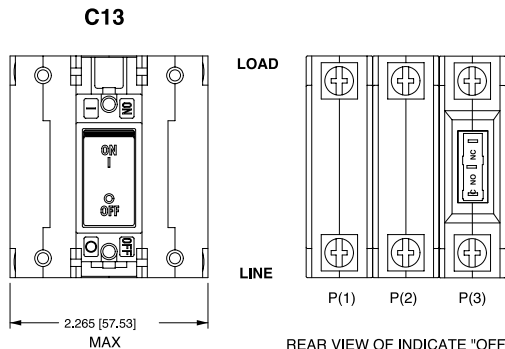
Notes:

- 1 Dimensions apply to all variations shown. Notice that circuit breaker line and load terminal orientation on indicate OFF is opposite of indicate ON.
- 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
- 3 All dimensions are in inches [millimeters].
- 4 Tolerance ±.020 [.51] unless otherwise specified.

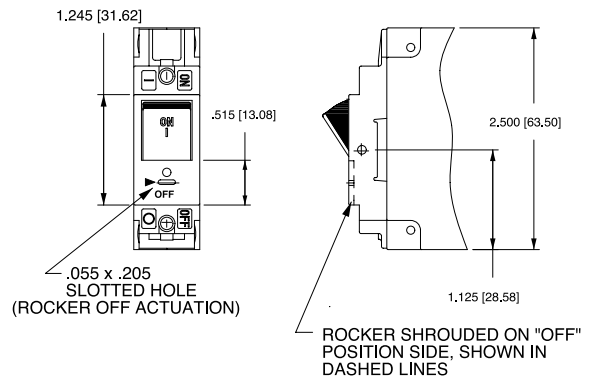
Dimensional Specifications: in. [mm]



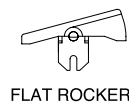
PUSH-TO-RESET ACTUATOR



REAR VIEW OF INDICATE "OFF" SERIES TRIP W/ AUX SWITCH CIRCUIT CONFIGURATION.



ACTUATOR SIDE VIEW
(SURFACE CONTOURS)



Notes:

- 1 For pole orientation with horizontal legend, rotate front view clockwise 90°.
- 2 All dimensions are in inches [millimeters].
- 3 Tolerance $\pm.020$ [.51] unless otherwise specified.

D-Series

CIRCUIT BREAKER

Designed for snap-on-back panel rail mounting on either a 35mm x 7.5mm, or a 35mm x 15mm Symmetrical Din Rail, allowing rapid and simple mounting and removal of the breaker. It features recessed, wire-ready, touch-proof, shock-resistant terminals, suitable for automatic screwdriver assembly, as well as “Dead Front” construction characteristics.

Available with a Visi-Rocker two-color actuator, which can be specified to indicate either the ON or the TRIPPED/OFF mode, or solid color rocker or handle type actuators. All actuator types fit in the same industry standard panel cutouts.



Product Highlights:

- ◆ 0.02 - 50 Amps
- ◆ 480 VAC or 65 VDC
- ◆ 1-4 poles (Handle)
- ◆ 1-3 poles (Rocker)
- ◆ Choice of Time Delays
- ◆ DIN rail mounting
- ◆ Precise temperature independent operation
- ◆ Wiping contacts – mechanical linkage with two-step
- ◆ Finger safe terminals
- ◆ Common trip linkage between poles ensures that an overload in one pole will trip all adjacent poles

Typical Applications:

- ◆ Industrial Controls
- ◆ Renewable Energy

Electrical

Maximum Voltage AC, 480 wye/277 VAC (See Table A), 50/60 Hz, 65VDC

Standard Current Coils 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 & 50.0. Other ratings available - consult factory.

Standard Voltage Coils DC - 6V, 12V; AC - 120V, other ratings available, see ordering scheme.

Insulation Resistance Minimum of 100 Megohms at 500 VDC.

Dielectric Strength UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. D-Series circuit breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between adjacent poles per Publications EN 60950 and VDE 0805.

Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.

Trip Free All D-Series Circuit Breakers will trip on overload, even when actuator is forcibly held in the ON position.

Trip Indication The operating actuator moves positively to the OFF position when an overload causes the breaker to trip.

Physical

Number of Poles Rocker Type: 1-3; Handle Type: 1-4

Internal Circuit Config. Switch Only and Series Trip with current or voltage trip coils.

Weight Approximately 128 grams/pole (Approximately 4.57 ounces/pole)

Standard Colors Housing - Black; Actuator - See Ordering Scheme.

Mounting Mounts on a standard 35mm Symmetrical DIN Rail (35 x 7.5 or 35 x 15mm per DIN EN5002).

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:

Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultra-short curves tested @ 90% of rated current.

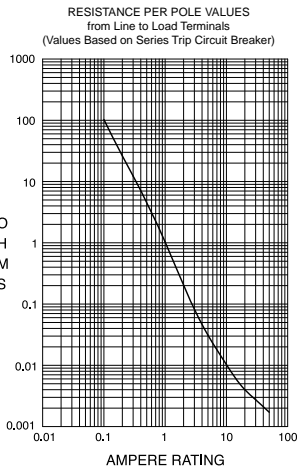
Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultra-short curves tested at 90% of rated current.

Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.

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

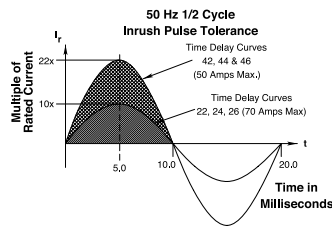
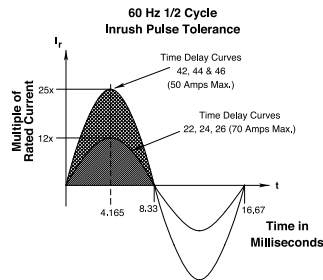
Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).

Operating Temperature -40° C to +85° C



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

Pulse Tolerance Curves



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

Electrical Tables

Table A: Lists UL Recognized, CSA Accepted and VDE Certified configurations and performance capabilities as a Component Supplementary Protector.

D-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	SHORT CIRCUIT CAPACITY (AMPS)				APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE ¹		UL/CSA		VDE		UL	CSA
				WITH BACKUP FUSE	WITH BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Inc) WITHOUT BACKUP FUSE			
SERIES	65	DC	---	0.02 - 50	---	5,000	5,000	1,500	TC1,2, OL1, U1	TC1,2, OL1, U1
	80	DC	---	0.02 - 50	---	5,000	5,000	1,500	TC1,2, OL1, U1	TC1,2, OL1, U1
	125 / 250	50 / 60	1	0.02 - 50	---	3,000	---	---	TC1,2, OL1, U1	TC1,2, OL1, U1
	250	50 / 60	1 & 3	0.02 - 50	5,000 ²	---	5,000	1,500	TC1,2, OL1, C1	TC1,2, OL1, C1
	277	50 / 60	1	0.02 - 50	5,000 ²	---	---	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	480 Y ³	50 / 60	1 & 3	0.02 - 50	5,000 ²	---	---	---	TC1,2, OL1, C1	TC1,2, OL1, C1
SWITCH ONLY	65	DC	---	0.02 - 50						
	250	50 / 60	3	0.02 - 50						
	277	50 / 60	1	0.02 - 50						
	480 Y ³	50 / 60	1 & 3	0.02 - 30						

Notes:

- DC and 1 Phase 277 V ratings are 1 or 2 poles breaking. Three phase ratings are 3 poles breaking.
- Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amps not to exceed 150 A for 250V rating and 125 A for 277 and 480 V ratings.
- UL recognition and CSA Acceptance at 480 volts refers to 3 and 4 pole versions, used only in a 3 phase WYE connected circuit or 2 pole versions connected with 2 poles breaking 1 phase and backed up with series fusing per note 2

Agency Certifications

UL Recognized
UL Standard 1077


Component Recognition Program as Protectors, Supplementary (Guide QVNU2, File E75596)

CSA Accepted

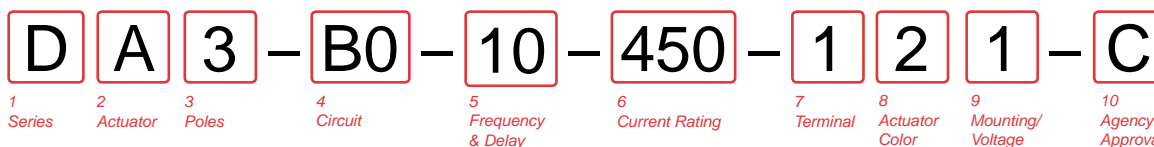

Component Supplementary Protector under Class 3215 30, File 047848 0 000
CSA Standard C22.2 No. 235

UL Listed
UL Standard 508


Switches, Industrial Control (Guide NRNT2, File E148683)

VDE Certified


EN60934, VDE 0642 under File No. 10537



1 SERIES

D

2 ACTUATOR 1

Handle 2

- A** Handle, one per pole
- B** Handle, one per multipole unit

Visi-Rocker 3

- C** Indicate ON, vertical legend
- D** Indicate ON, horizontal legend
- E** Indicate ON, no legend (VDE approval not available with no legend)
- F** Indicate OFF, vertical legend
- G** Indicate OFF, horizontal legend
- H** Indicate OFF, no legend (VDE approval not available with no legend)

Single Color Rocker 3

- J** Vertical legend
- K** Horizontal legend
- L** No legend (VDE approval not available with no legend)

ROCKER STYLE DESCRIPTIONS

	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR
VERTICAL STYLE	<p>LINE</p> <p>INDICATE COLOR LOCATION</p>	<p>LINE</p>	<p>LINE</p>
HORIZONTAL STYLE	<p>LINE</p>	<p>LINE</p>	<p>LINE</p>

3 POLES

- 1 One
- 2 Two
- 3 Three
- 4 Four

4 CIRCUIT

- A0** Switch Only (No Coil) 4
- B0** Series Trip (Current)
- C0** Series Trip (Voltage)

5 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only
- 10** 5 DC Instantaneous
- 11** DC Ultra Short
- 12** DC Short
- 14** DC Medium
- 16** DC Long
- 20** 5 50/60Hz Instantaneous
- 21** 50/60Hz Ultra Short
- 22** 50/60Hz Short
- 24** 50/60Hz Medium
- 26** 50/60Hz Long
- 32** DC, 50/60Hz Short
- 34** DC, 50/60Hz Medium
- 36** DC, 50/60Hz Long
- 42** 6 50/60Hz Short, Hi-Inrush
- 44** 6 50/60Hz Medium, Hi-Inrush
- 46** 6 50/60Hz Long, Hi-Inrush
- 52** 6 DC, Short, Hi-Inrush
- 54** 6 DC, Medium, Hi-Inrush
- 56** 6 DC, Long, Hi-Inrush

Notes:

- 1 Handle breakers available up to four poles. Rocker breakers available up to three poles.
- 2 Actuator Code:
 - A: Multi-pole units factory assembled with common handle tie.
 - B: Handle location as viewed from front of breaker:
 - 2 pole - left pole
 - 3 pole - center pole
 - 4 pole - two handles at center poles
- 3 Multipole rocker breakers have one rocker per breaker, as viewed from the front of the panel. Two pole - left pole. Three pole - center pole
- 4 ≤ 30A, select Current Rating code 630. 31-50A, select Current Rating code 650.
- 5 Voltage coil only available with delay codes 10 & 20.
- 6 Available to 50A max with circuit code B0 only.
- 7 Color shown is visi and legend with remainder of rocker black.
- 8 ≥ 300V: Three pole breaker 3Ø or 2 pole breaker 1Ø, UL/CSA limited to 30 FLA max.
- 9 VDE Approval requires Dual (I-O, ON-OFF) or I-O markings

7 CURRENT RATING (AMPERES) 9

CODE AMPERES

020	0.020	275	0.750	450	5.000	616	16.000
025	0.025	280	0.800	455	5.500	617	17.000
030	0.030	285	0.850	460	6.000	618	18.000
050	0.050	410	1.000	465	6.500	619	19.000
075	0.075	512	1.250	470	7.000	620	20.000
080	0.080	413	1.300	572	7.250	621	21.000
085	0.085	414	1.400	475	7.500	622	22.000
210	0.100	415	1.500	480	8.000	623	23.000
215	0.150	517	1.750	485	8.500	624	24.000
220	0.200	420	2.000	490	9.000	625	25.000
225	0.250	522	2.250	495	9.500	626	26.000
230	0.300	425	2.500	610	10.000	627	27.000
235	0.350	527	2.750	710	10.500	628	28.000
240	0.400	430	3.000	611	11.000	629	29.000
245	0.450	532	3.250	711	11.500	630	30.000
250	0.500	435	3.500	612	12.000	632	32.000
255	0.550	436	3.600	712	12.500	635	35.000
260	0.600	440	4.000	613	13.000	640	40.000
265	0.650	445	4.500	614	14.000	645	45.000
270	0.700	547	4.750	615	15.000	650	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) 7

CODE AMPERES

A06	6 DC, 5 DC	A48	48 DC, 40 DC	J24	24 AC, 20 AC
A12	12 DC, 10 DC	A65	65 DC, 55 DC	J48	48 AC, 40 AC
A18	18 DC, 15 DC	J06	6 AC, 5 AC	K20	120 AC, 65 AC
A24	24 DC, 20 DC	J12	12 AC, 10 AC	L40	240 AC, 130 AC
A32	32 DC, 25 DC	J18	18 AC, 15 AC		

7 TERMINAL

- 1 #10 Screw & Pressure Plate for Direct Wire Connection
- 2 #10 Screw without Pressure Plate

8 ACTUATOR COLOR & LEGEND

Actuator or

Visi-Color Marking:

Marking Color:

Color	I-O	ON-OFF	Dual	Single Color Rocker/Handle	Visi-Rocker (Actuator Black) 7
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

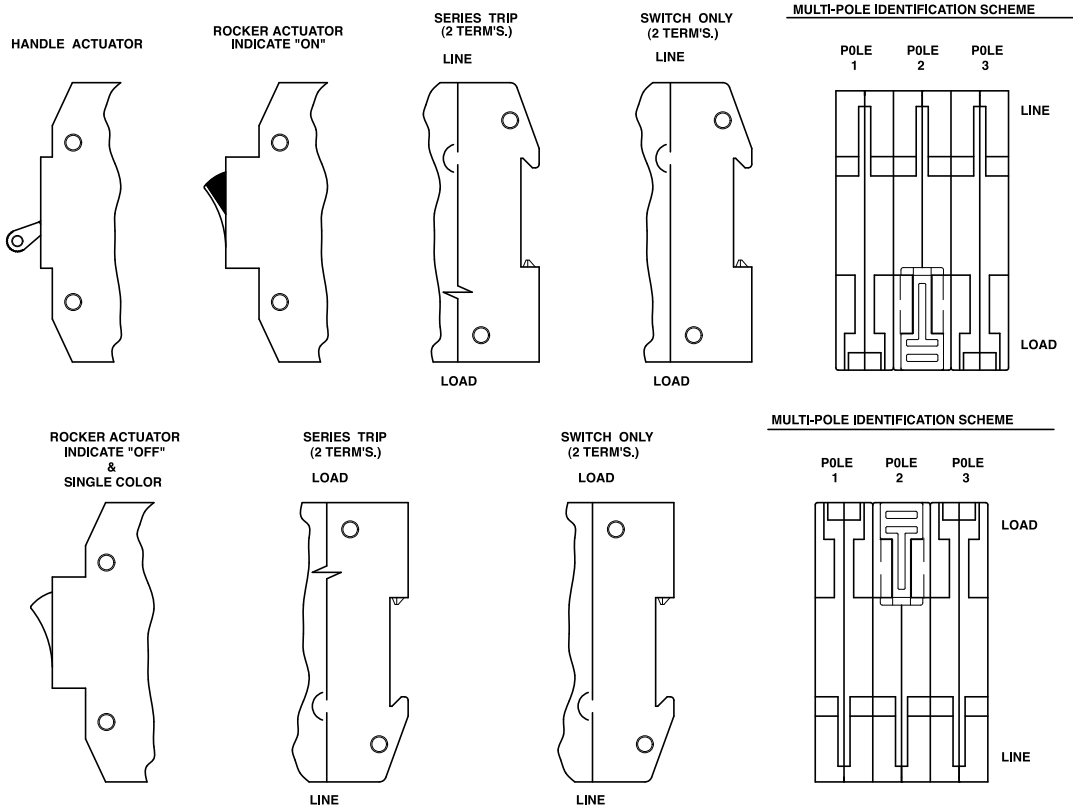
9 MOUNTING / VOLTAGE

MOUNTING STYLE	VOLTAGE
1	Threaded Insert
1	6-32 x 0.195 inches < 300
C 8	6-32 X 0.195 inches ≥ 300
2	ISO M3 x 5mm < 300
D 8	ISO M3 x 5mm ≥ 300

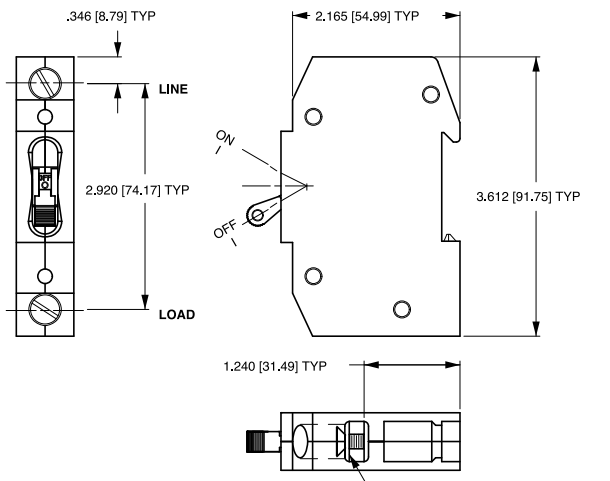
10 AGENCY APPROVAL

- C** UL Recognized & CSA Accepted
- D 9** VDE Certified, UL Recognized & CSA Accepted

Circuit & Terminal Diagrams: in. [mm]



(HANDLE ACTUATOR SHOWN)

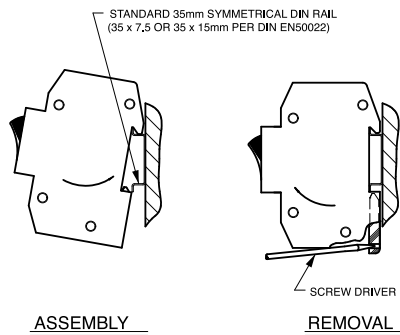
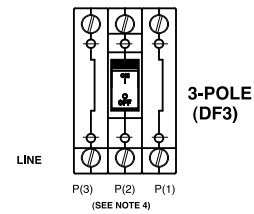
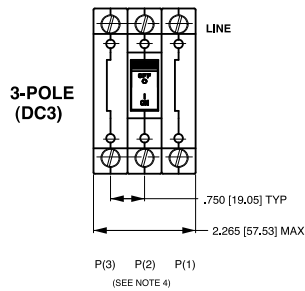
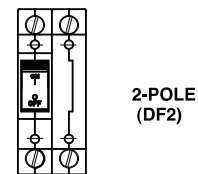
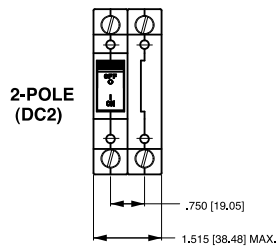
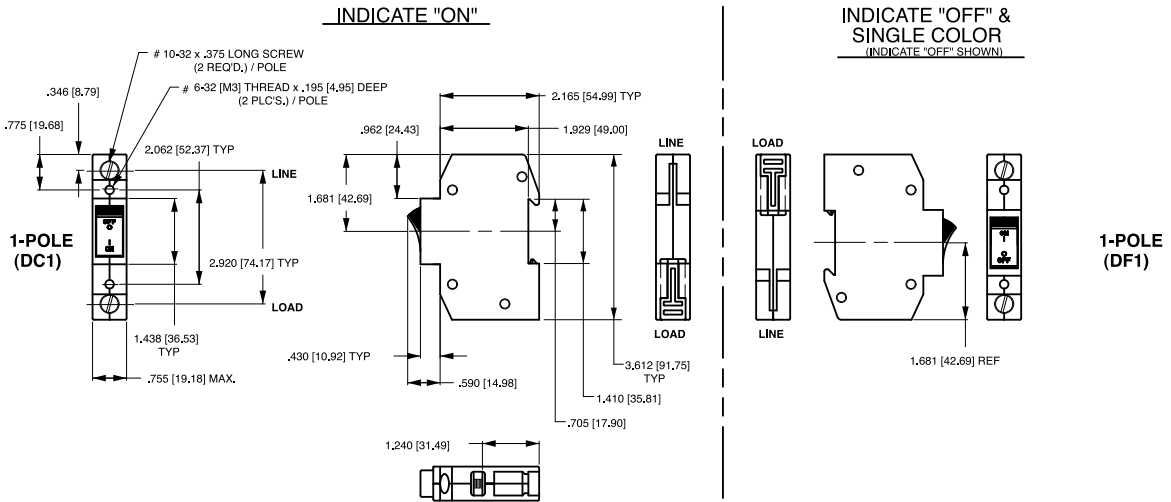


TERMINALS ARE SUPPLIED WITH #10-32 SCREW AND PRESSURE PLATE PER TERMINAL

TABLE A TIGHTENING TORQUE SPECIFICATIONS	
THREAD SIZE	TORQUE
#6-32 [M3] HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#10-32 THD TERMINAL SCREW	15-20 IN-LBS [1.7-2.3 NM]

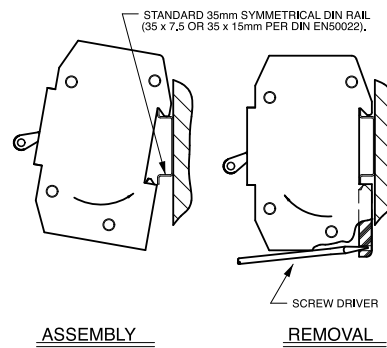
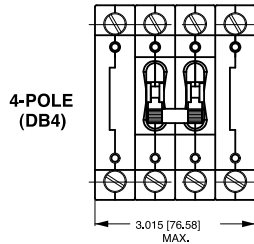
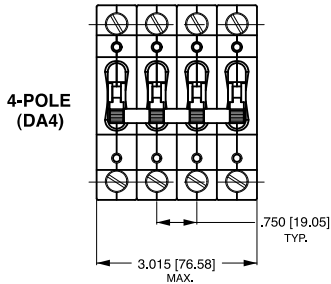
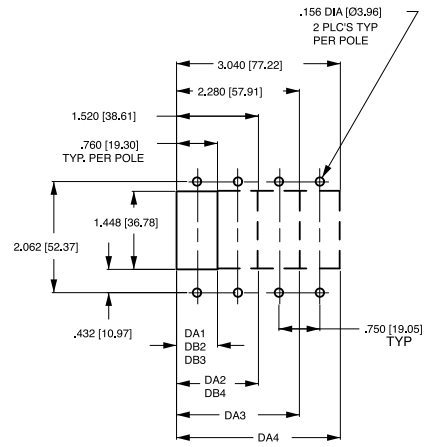
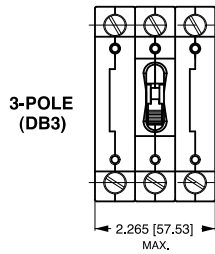
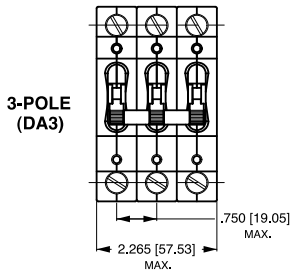
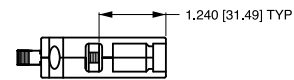
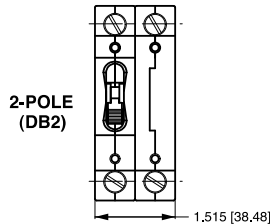
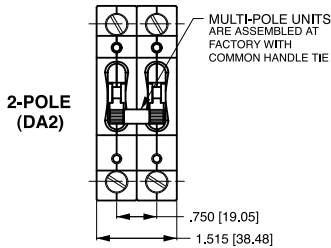
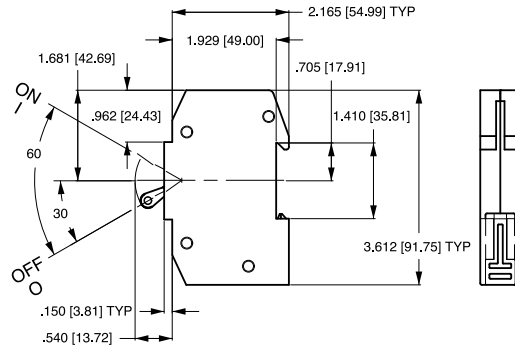
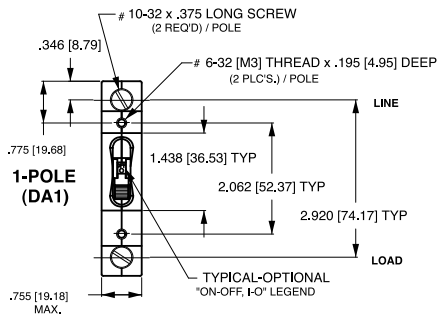
- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [0.51] unless otherwise specified.
 - 3 Dimensions apply to all variations shown. Notice that circuit breaker line and load terminal orientation on indicate OFF is opposite of indicate ON.
 - 4 For pole orientation with horizontal legend, rotate front view clockwise 90°.

Dimensional Specifications: in. [mm]



- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.10 [.25] unless otherwise specified.

G-Series

DIN-RAIL CIRCUIT BREAKER

The G-Series hydraulic-magnetic circuit breaker insures maximum protection by integrating wiping contacts for longevity; a common trip linkage between poles; a unique terminal bus connection system; and optional integrated auxiliary switch. It is also suitable for reverse feed and provides finger safe terminals. This DIN rail mount circuit breaker accommodates either a 35mm x 7.5mm, or a 35mm x 15mm symmetrical din rails.

G-Series DIN Rail Circuit Breaker:

UL 489 Listed: 1 to 3 poles; 1-50 Amps; 125 VDC, 240 VAC;

UL 1077 Recognized: 1 to 4 poles; 0.1-63 Amps; 80 VDC, 240 VAC/480VAC; cUL, TUV, CSA & CCC.



Resources:

Download 3D CAD Files

[IGS >](#)

[STP >](#)

Product Highlights:

- ◆ DIN Rail Mounting
- ◆ UL 489 Listed
- ◆ UL 1077 Recognized, cUL, TUV, CSA & CCC
- ◆ Wiping Contacts
- ◆ Common Trip Linkage Between Poles
- ◆ Optional Integrated Auxiliary Switch

Typical Applications:

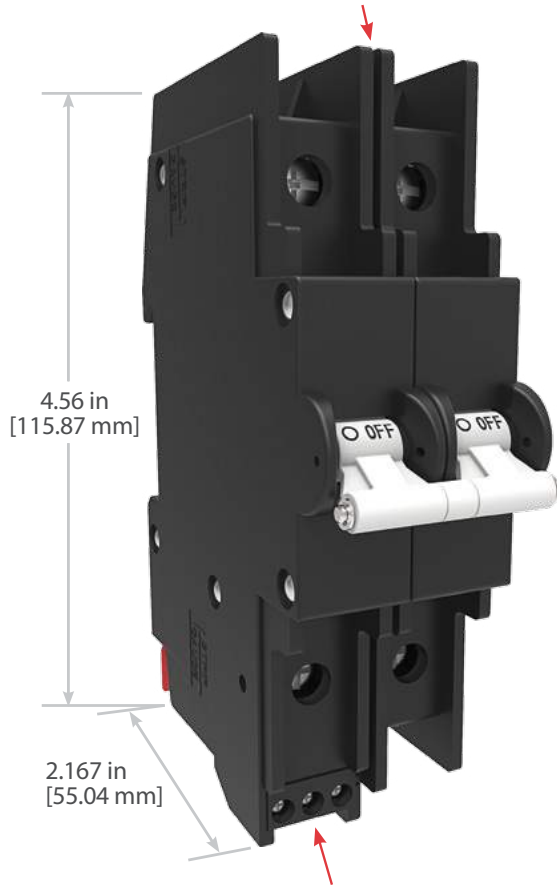
- ◆ Renewable Energy
- ◆ Telecom
- ◆ Control Panels
- ◆ Industrial Automation Controls

G-Series

DESIGN FEATURES

TERMINAL BARRIERS

Meet UL 489 Spacing Requirements



OPTIONAL AUXILIARY SWITCH

Provides Breaker Status Indication



DIN RAIL MOUNTING

Snap on Back Panel Rail Mounting for either 35 x 7.5 mm or 35 x 15 mm

DIN RAIL LOCK

Secures Circuit Breaker to the DIN Rail

Auxiliary Switch with Internal Connector

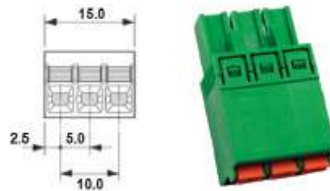


Advantages:

- Pre-wiring is possible
- Easy interchangeable
- Time saving solution
- Various connection methods
- Many different plugs

Example Plugs:

Spring clamp terminals



Dimensions in mm

- | | |
|--------------------------------------|----------------------------|
| Wire size solid wire | 0.2 - 1.5 mm ² |
| Wire size stranded wire | 0.2 - 2.5 mm ² |
| Wire size stranded wire with ferrule | 0.25 - 1.5 mm ² |
| Wire stripping length | 10 mm |

Screw terminals



Screw terminals 45° angle



The auxiliary contact with internal connector can be used with Phoenix Combicon plugs. Phoenix item number internal connector: 1753453. The circuit breaker is standard delivered without plugs.

Electrical Tables

Table A: Lists UL Recognized, CSA Accepted and TUV Certified capabilities as a Component Supplementary Protector.

G-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS									
Circuit Configuration	Voltage				Current Rating Full Load Amps	Short Circuit Capacity (Amps)		Application Codes	
	Max Rating	Frequency	Phase	Minimum Poles		Without Backup Fuse		UL	CSA
					UL/CSA	TUV			
Series	80	DC	---	1	.1 - 63	3000	1500	TC1, OL1, U1	TC1, OL1, U1
	240	50 / 60	1	1	.1 - 63	3000	1500	TC1, OL1, U1	TC1, OL1, U1
	240	50 / 60	1	2	.1 - 63	3000	1500	TC1, OL1, U1	TC1, OL1, U1
	480	50 / 60	3	3	.1 - 63	1500	415V, 1000	TC1, OL1, U1	TC1, OL1, U1

Table B: Lists UL Listed (489) configuration and performance capabilities.

G-SERIES TABLE B: UL 489 LISTED BRANCH CIRCUIT BREAKERS						
Circuit Configuration	Voltage				Current Rating Full Load Amps	Interrupting Capacity (Amps RMS)
	Max Rating	Frequency	Phase	Poles		
Series	80	DC	---	1	1 - 50	5000
	125	DC	---	2	1 - 50	5000
	120	50 / 60	1	1	1 - 50	5000
	120 / 240	50 / 60	1	1 - 3 ¹	1 - 50	5000
	240	50 / 60	1	1	1 - 25	5000

¹ One pole out of the three poles must be a neutral break.

Electrical

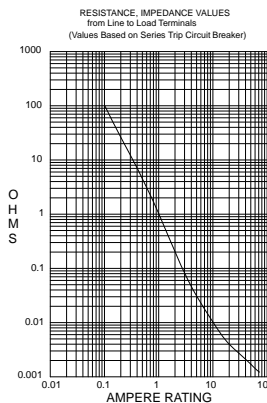
Maximum Voltage AC: 240VAC (single pole), 480VAC (3 poles, additional pole shall be dedicated for neutral break)
DC: 80VDC (single pole & multipole)

Current Rating 0.1 – 63A. Other ratings available, see Ordering Scheme.

Auxiliary Switch Rating (optional) Integrated, load side. SPST, 3A – 125VAC, 2A – 30VDC. Auxiliary switch senses the on & off position of circuit breaker handle, as well as contact arm position. Switch connections are screw terminals.

Insulation Resistance Dielectric Strength Minimum of 100 Megohms at 500 VDC
UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. G-Series circuit breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.

Resistance, Impedance Values from Line to Load Terminal - based on series trip circuit breaker.



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	15
5.1 - 20.0	25
20.1 - 63.0	35

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated current & voltage.

Trip Free All G-Series circuit breakers will trip on overload, even when actuator is forcibly held in the ON position.

Trip Indication The operating actuator moves positively to the OFF position when an overload causes the breaker to trip. With mid-trip, the handle moves to the mid position on electrical trip of the circuit breaker. With mid trip handle with alarm switch, handle moves to the mid position and the alarm switch actuates when the circuit breaker is electrically tripped.

Physical

Number of Poles 1 pole ≤ 63A, 2 poles ≤ 63A per pole

Weight Approx. 172 grams/pole (4.13 oz).

Standard Colors Housing: Black

Environmental

Designed in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:

Shock Withstands 100 Gs, 6ms sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultrashort curves tested @ 90% of rated current.

Vibration Withstands 0.060" excursion from 10-55 Hz & 10 Gs 55-500 Hz, @ rated current per Method 204C, Test Cond. A. Instantaneous & ultrashort curves tested @ 90% of rated current.

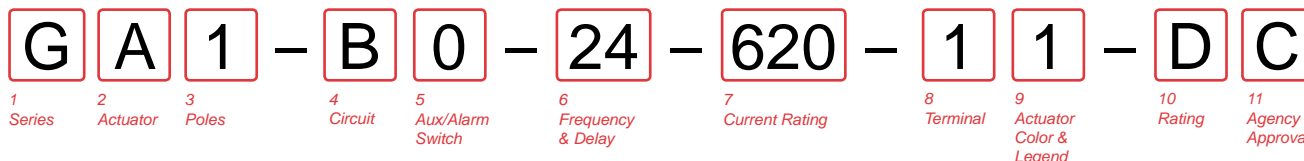
Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ +25°C to +65°C, 80-98% RH.

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

Thermal Shock Method 107D, Condition A (five cycles @ -55°C to +25°C to +85°C to +25°C).

Operating Temperature -40°C to +85°C

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



1 SERIES
G

2 ACTUATOR
A Handle, one per pole
S Mid-Trip Handle, one per pole

3 POLES
1 One 3 Three
2 Two 4 Four

4 CIRCUIT
A¹ Switch Only (no coil)
B Series Trip (current)

5 AUXILIARY / ALARM SWITCH ³
0 without Aux Switch
1 S.P.D.T., Screw Terminal
3 S.P.D.T. Screw Terminal (Gold Contacts)
5 Plug-in Terminal
6 Plug-in Terminal (Gold Contacts)

6 FREQUENCY & DELAY

03 Switch Only	26 50/60 Hz Long
10 DC, Instantaneous	42 50/60 Hz Hi-Inrush Short ²
11 DC, Ultra Short	44 50/60 Hz Hi-Inrush Medium
12 DC, Short	46 50/60 Hz Hi-Inrush Long
14 DC, Medium	52 DC Hi-Inrush Short
16 DC, Long	54 DC Hi-Inrush Medium
20 50/60 Hz Instantaneous	56 DC Hi-Inrush Long
21 50/60 Ultra Short	
22 50/60 Hz Short	
24 50/60 Hz Medium	

6 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	410	1.000	470	7.000	617	17.000
220	0.200	512	1.250	475	7.500	618	18.000
225	0.250	415	1.500	480	8.000	620	20.000
230	0.300	517	1.750	485	8.500	622	22.000
235	0.350	420	2.000	490	9.000	624	24.000
240	0.400	522	2.250	495	9.500	625	25.000
245	0.450	425	2.500	610	10.000	630	30.000
250	0.500	527	2.750	710	10.500	635	35.000
255	0.550	430	3.000	611	11.000	640	40.000
260	0.600	435	3.500	711	11.500	650	50.000
265	0.650	440	4.000	612	12.000	655	55.000
270	0.700	445	4.500	712	12.500	660	60.000
275	0.750	450	5.000	613	13.000	663	63.000
280	0.800	455	5.500	614	14.000		
285	0.850	460	6.000	615	15.000		
290	0.900	465	6.500	616	16.000		

8 TERMINAL
1 Screw Terminal

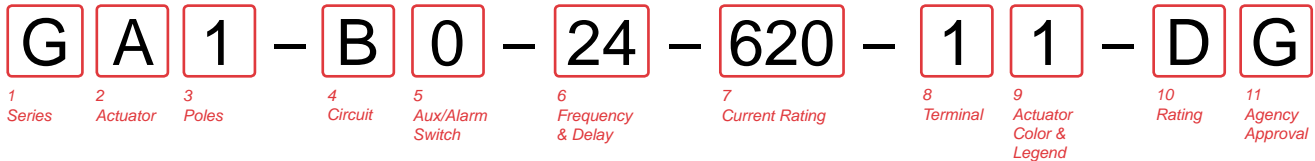
9 ACTUATOR COLOR & LEGEND

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 APPLICATION RATING
B 125 VDC ⁵
D 240 VAC
H 480 VAC ⁴
M 80 VDC

11 AGENCY APPROVAL
A Without Approvals
C UL Recognized
E TUV Certified, UL Recognized

Notes:
1 Switch only circuit only available when tied to a protected pole (Circuit code B)
- for .2 to 30 amps select current code 630
- for 31 to 50 amps select current code 650
- for 51 to 63 amps select current code 663
- Use delay 03 for all switch only poles
2 Hi Inrush Delays limited to 50A max
3 On multi-pole breakers one auxiliary switch is supplied, mounted in the extreme left pole when viewed from front of panel
4 480 VAC rating requires 3 or 4 pole break 3Φ and 2 pole break 1Φ
5 This construction is polarity sensitive when constructed as a single pole unit, 125 VDC is only available without agency approvals



1 SERIES
G

2 ACTUATOR
A Handle, one per pole
S¹ Mid-Trip Handle, one per pole

3 POLES
1 One
2 Two
3 Three

4 CIRCUIT
B Series Trip (current)

5 AUXILIARY / ALARM SWITCH³
0 without Aux Switch
1 S.P.D.T., Screw Terminal
3 S.P.D.T. Screw Terminal (Gold Contacts)
5 Plug-in Terminal
6 Plug-in Terminal (Gold Contacts)

6 FREQUENCY & DELAY
11 DC, Ultra Short **42** 50/60 Hz Hi-Inrush Short⁴
12 DC, Short **44** 50/60 Hz Hi-Inrush Medium⁴
14 DC, Medium **46** 50/60 Hz Hi-Inrush Long⁴
16 DC, Long **52** DC Hi-Inrush Short⁴
21 50/60 Ultra Short **54** DC Hi-Inrush Medium⁴
22 50/60 Hz Short **56** DC Hi-Inrush Long⁴
24 50/60 Hz Medium
26 50/60 Hz Long

6 CURRENT RATING (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	

8 TERMINAL
1 Screw Terminal

9 ACTUATOR COLOR & LEGEND

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

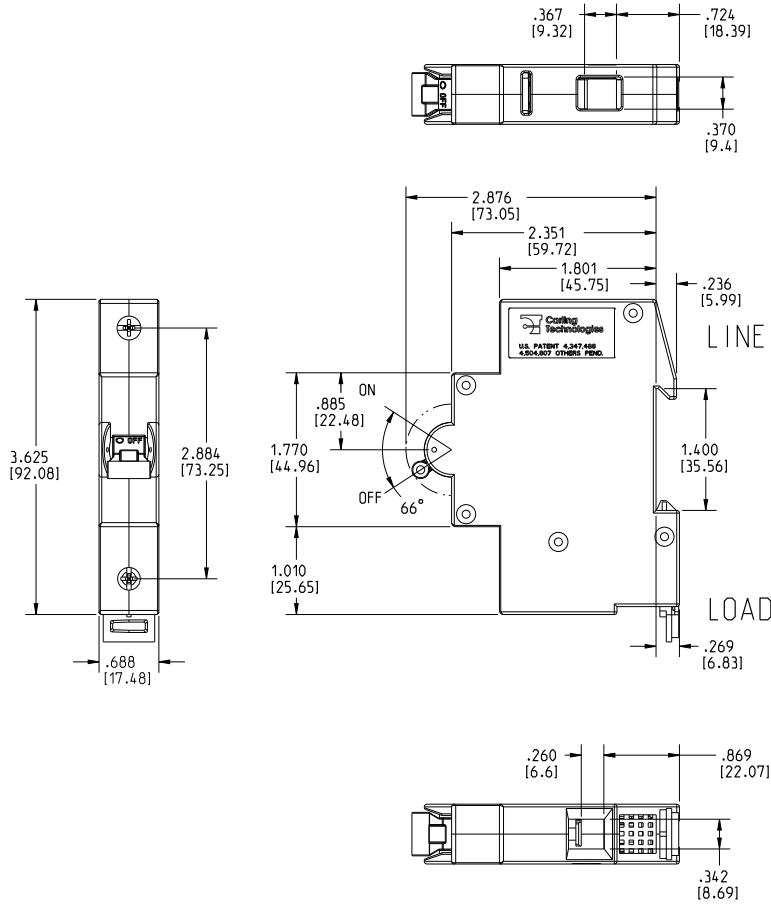
10 APPLICATION RATING
B 125 VDC⁵
C 120/240 VAC⁶
D 240 VAC⁷
K 120 VAC⁸
M 80 VDC⁹

11 AGENCY APPROVAL
A Without Approvals
G UL489 Listed

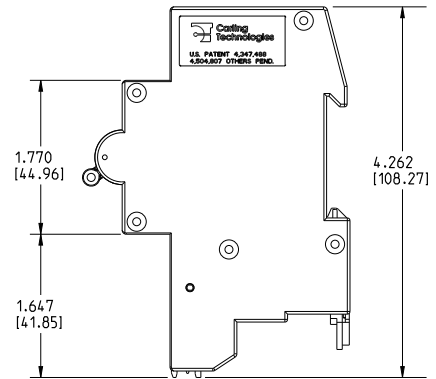
Notes:
1 Mid-trip Handle(s) available at 1 pole unit and 2 pole unit only.
2 Third pole of a 3 pole unit is switch only pole.
3 On multi-pole breakers one auxiliary switch is supplied, mounted in the extreme left pole when viewed from front of panel.
4 Hi Inrush Delays limited to 50A maximum.
5 125VDC for 2 pole unit only.
6 120/240VAC for 2 pole and 3 pole unit only. Limited to 50A maximum, and third pole of a 3-pole unit is switch only pole.
7 240VAC for 1 pole unit only, limited to 25A maximum
8 120VAC for 1 pole unit only, limited to 50A maximum.
9 80VDC for 1 pole unit only

Dimensional Specifications: in. [mm]

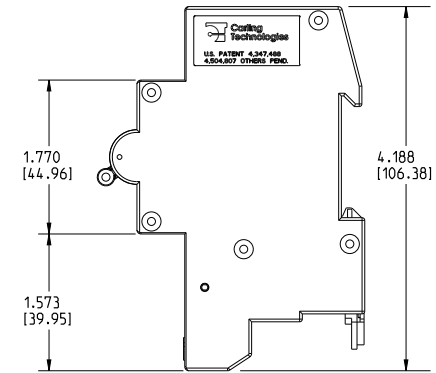
1 POLE WITHOUT AUXILIARY SWITCH



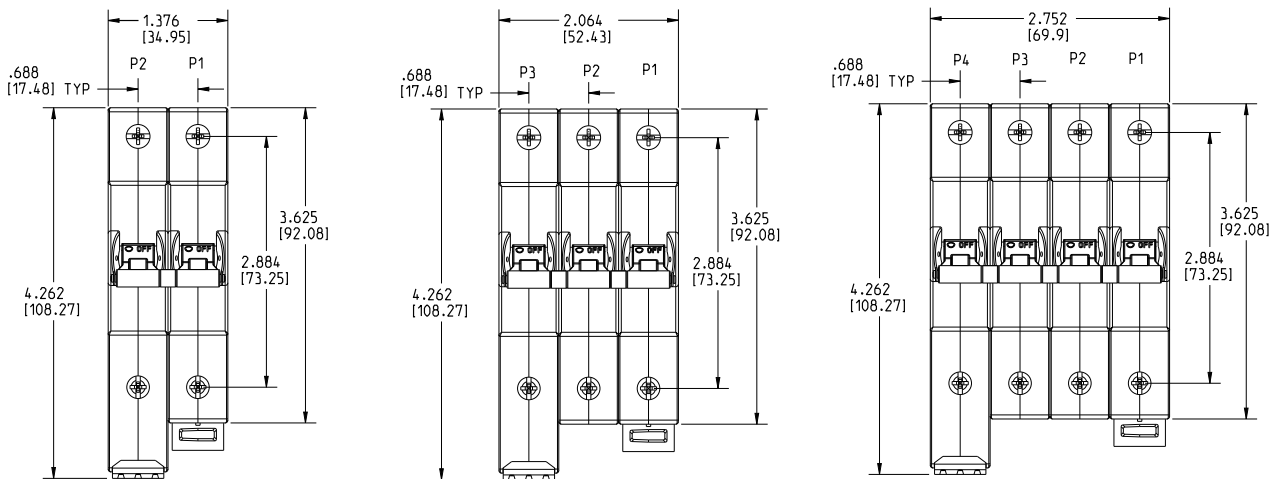
1 POLE WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



1 POLE WITH AUXILIARY SWITCH (SCREW TERMINAL BLOCK)



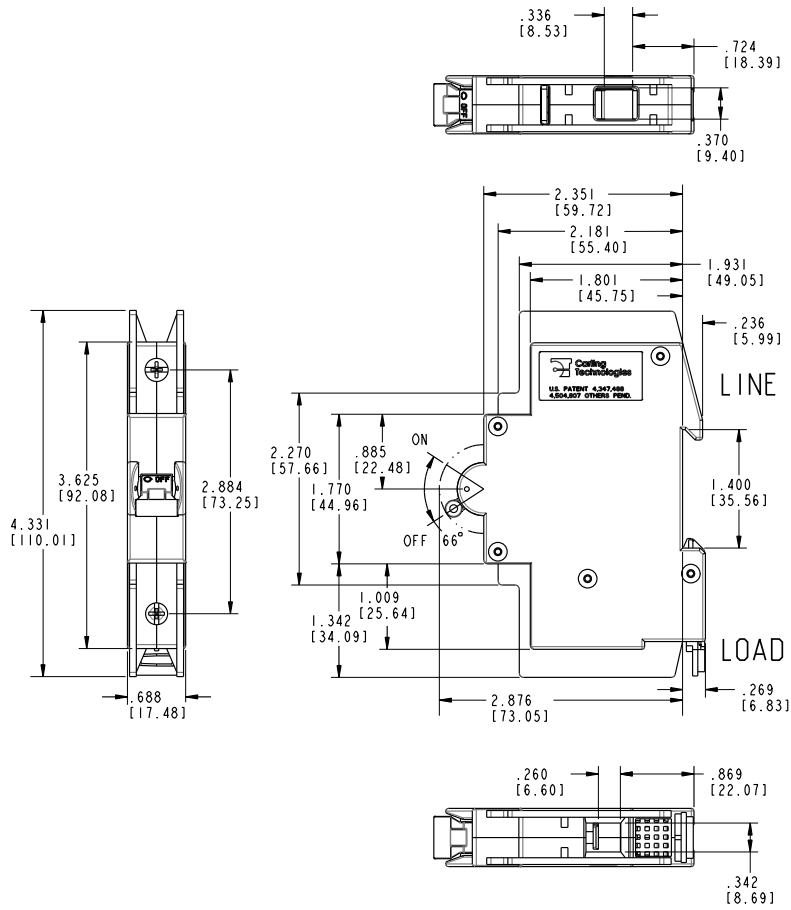
MULTIPLE POLES WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



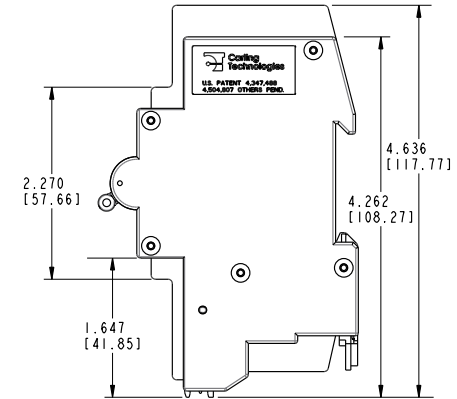
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

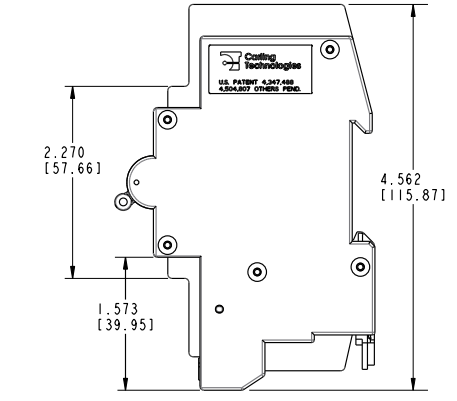
1 POLE WITHOUT AUXILIARY SWITCH



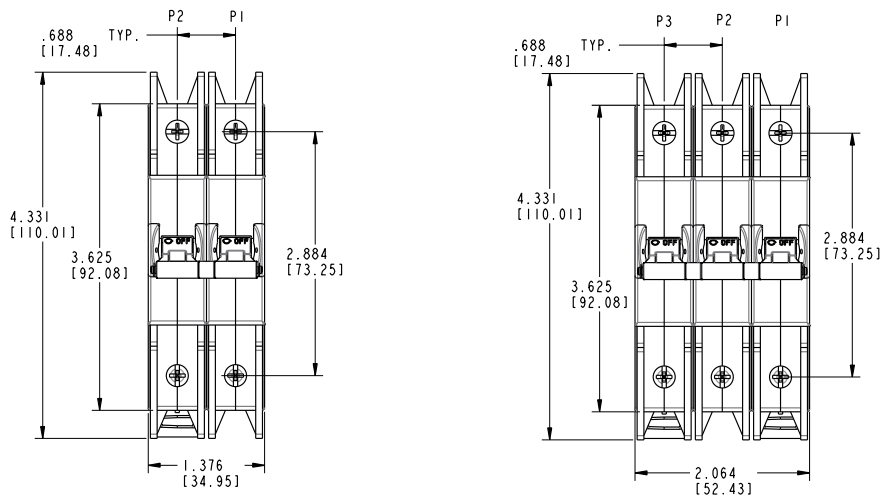
1 POLE WITH AUXILIARY SWITCH (PENDING)
(PLUG-IN TERMINAL BLOCK)



1 POLE WITH AUXILIARY SWITCH (PENDING)
(SCREW TERMINAL BLOCK)



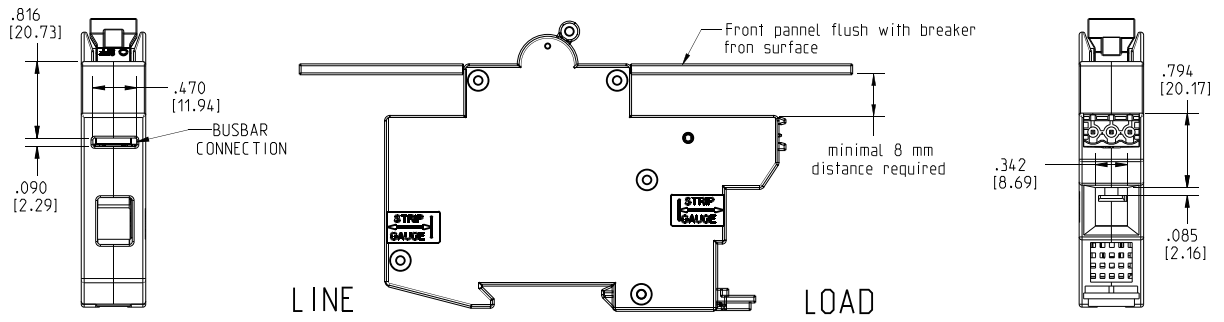
MULTIPLE POLES WITH AUXILIARY SWITCH (PENDING) (PLUG-IN TERMINAL BLOCK)



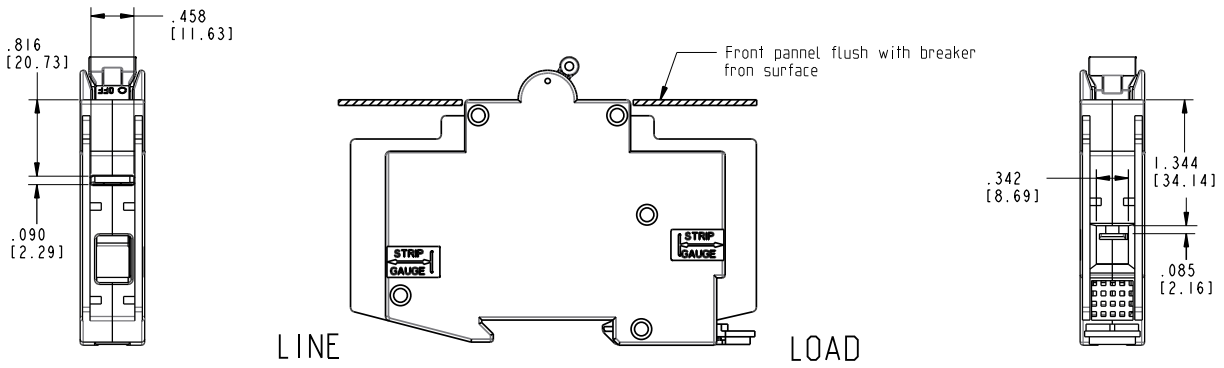
Notes:

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

UL RECOGNIZED



UL489



Notes:

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

L-Series

CIRCUIT BREAKER

The L-Series high performance, compact hydraulic- magnetic circuit breaker is ideally suited for the rigors and confined spaces found in today's telecom/datacom power distribution units and rack systems. It provides best in class performance in an innovative low profile, space saving package complementing the overall spatial objectives required by telecommunications and data-communications systems designers in their quest to reduce the overall size of equipment, while increasing transmission capacity.

With the integration of an optional current transformer, the L-Series is capable of sensing current down to a level of 1%. This optional capability provides precise current monitoring and reporting required for back billing of the actual power consumed by datacenter storage and routing devices. This feature also facilitates load adjustments and maximizes efficiency.

Further, a patent pending flush rocker actuator design and optional push-to-reset guard offers additional protection against accidental switching.

Number of poles: 1-3 poles; Max current/voltage ratings: .1-32A, 120/240-240VAC. Max interrupting capacity: 5000 Amps



Resources:

[Download 3D CAD Files](#)

[IGS >](#)

[STP >](#)

[Watch Product Video](#)



Product Highlights:

- Optional current transformer
- Ultra low profile design saves valuable space
- Optional handle guard actuator
- UL 489 LISTED Branch Circuit breaker
- Designed for worldwide datacenter compatibility with up to 240VAC ratings

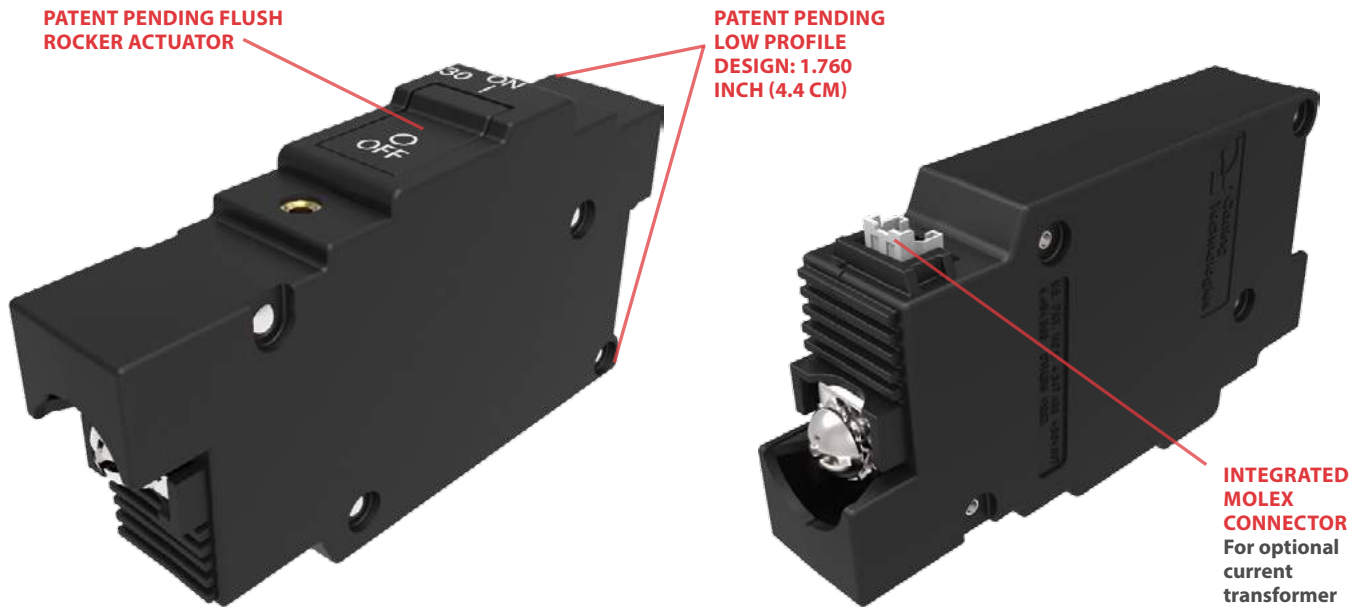
Typical Applications:

- Telecom/Datacom

L-Series

DESIGN FEATURES

1-Pole Configuration with Low Profile Rocker Actuator



2-Pole Configuration with Push-To-Reset Guard



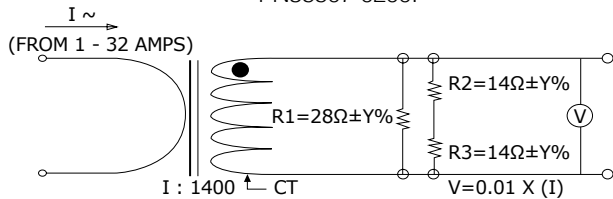
Electrical

Maximum Voltage AC, 415Y/240VAC (see table A)
 UL489, AC, 240VAC (see table A)

Current Metering Integrated current transformer.
 Measurement range: 1-32 Amps
 Voltage output: 10mV per Amp according to the formula below:
 $2 \text{ (Amp)} \leq I \leq 32 \text{ (Amp)}$
 $V = 0.01 \times I \pm 2\%$
 (with current metering codes 1 or 2)
 $V = 0.01 \times I \pm 1\%$
 (with current metering codes 3 or 4)

$$\left| \frac{\frac{V - V_{10}}{I - I_{10}}}{\frac{V_{10}}{I_{10}}} \right| \leq 0.85\%$$

Where V=CT output in volts V₁₀=CT output in volts with I=I₁₀=10 (A); I=primary current in amperage (50/60 Hz). Phase shift between primary current and CT output is 0.25±0.25°. Maximum crest factor of primary current is 1.73.
 R1 shall be integrated in the breaker. R2 and R3 are provided by end user and external to the breaker.
 Connection: below Load Terminal.
 2-pin connector, Molex 35362-0250.
 Mating Connector housing – Molex PN35507-0200.



Note: When current metering code is 1 or 2; Y to equal 1.0
 When current metering code is 3 or 4; Y to equal 0.1

Dielectric Strength UL, CSA-1960V 50/60 Hz for one minute between all electrically isolated terminals. Comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between main circuits of adjacent poles per Publications EN 60950 & VDE 0805

Impedance See next page

Insulation Resistance Minimum of 100 Megohms@500VDC

Overload 50 operations @ 600% of rated

Interrupt Capacity See Table A

Environmental

Environmental MIL-PRF-55629 and MIL-STD-202G
 Operating Temp -40°C to +85 °C
 Vibration Withstands 0.06” excursion from 10-55 Hz and 10Gs 55-500 Hz at rated current per MIL-PRF-55629 and MIL-STD-202G, Method 204D, Test Condition A. Instantaneous and ultra-short curves tested at 90% of rated current.

Shock Withstands 100 Gs, 6 ms saw tooth while carrying rated current per MIL-PRF-55629 and MIL-STD-202G, Method 213B, Test Condition “I”. Instantaneous and ultra short curves tested at 90% of rated current.

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).

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 @ 5% NaCl Solution, 96hrs)

Physical

Number of Poles 1-3 poles

Termination Screw Terminals with the following thread sizes: 10-32, 8-32, M5, M4 Standard for 2 & 3 poles
 Threaded Insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per Pole)

Termination Barrier Rocker, with or without guard

Mounting Series Trip

Actuator Housing - Glass Filled Polyester
 Internal Circuit Config. Rocker – Nylon 6/6

Materials Line/Load Terminals – Copper Alloy; Bright Acid Tin Plated
 ~107 Grams (~3.76 Ounces) per pole
 Housing - Black
 Rocker - Black

Weight

Standard Color

Mechanical

Endurance 10,000 “On-Off” Operations @ 6 per minute; with rated Current & Voltage.

Trip Free Trips on overload even when actuator is forcibly held in the “On” position.

Trip Indication The operating actuator moves positively to the “Off” position when an overload causes the breaker to trip

Agency Approvals

UL489, cUL, TUV (EN60934)

Electrical Tables

Table A: Voltage, Current and IC Ratings

L-SERIES TABLE A: VOLTAGE, CURRENT AND AIC RATINGS							
VOLTAGE	CURRENT (AMPS)	NUMBER OF POLES	PHASE	CURRENT METERING	INTERRUPT CAPACITY (AMPS)		
					UL 489 (Amps)	EN60934	
						Icn	Inc
240 VAC	0.1 - 32	1	1	Yes	5000	3000	10000
240 VAC	0.1 - 32	2*	1	Yes	5000	3000	10000
240 VAC	0.1 - 20	3	3	Yes	5000	3000	5000
415/240 VAC	0.1 - 20	3	3	Yes	---	3000	5000
120/240 VAC	0.1 - 32	2	1	Yes	5000	N/A	N/A
120/240 VAC	0.1 - 32	3**	1	Yes	5000	N/A	N/A

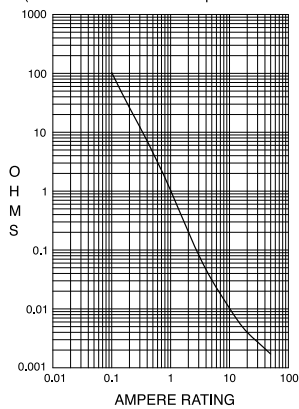
Notes:

* Breaking both sides of the line

** 3rd pole to be neutral break

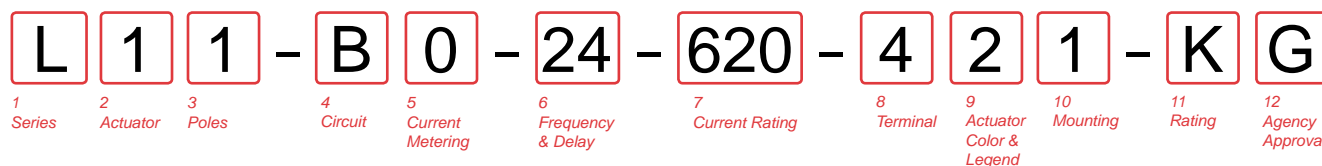
Electrical: Impedance (Across circuit breaker main terminals)

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



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	+/- 15
5.1 - 32.0	+/- 25

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



1 SERIES
L

2 ACTUATOR
 1 Single Color Low Profile Rocker, Vertical Legend
 2 Single Color Low Profile Rocker, Horizontal Legend
 3 Single Color Push to Reset Low Profile Rocker, Vertical Legend
 4 Single Color Push to Reset Low Profile Rocker, Horizontal Legend

3 POLES
 1 One
 2 Two
 3 Three

4 CIRCUIT
 B Series Trip (current)

5 CURRENT METERING
 0 Without Current Transformer
 1² Integrated Current Transformer, +/- 2%, 1 per unit
 2 Integrated Current Transformer, +/- 2%, 1 per pole
 3^{2,6} Integrated Current Transformer, +/- 1%, 1 per unit
 4⁶ Integrated Current Transformer, +/- 1%, 1 per pole

6 FREQUENCY & DELAY
 20⁵ 50/60Hz Instantaneous
 21 50/60Hz Ultra Short
 22 50/60Hz Short
 24 50/60Hz Medium
 26 50/60Hz Long
 42 50/60Hz Short, Hi-Inrush
 44 50/60Hz Medium, Hi-Inrush
 46 50/60Hz Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
410	1.000	460	6.000	613	13.000
512	1.250	465	6.500	614	14.000
415	1.500	470	7.000	615	15.000
517	1.750	475	7.500	616	16.000
420	2.000	480	8.000	617	17.000
522	2.250	485	8.500	618	18.000
425	2.500	490	9.000	620	20.000
527	2.750	495	9.500	622	22.000
430	3.000	610	10.000	624	24.000
435	3.500	710	10.500	625	25.000
440	4.000	611	11.000	630	30.000
445	4.500	711	11.500	632	32.000
450	5.000	612	12.000		
455	5.500	712	12.500		

8 TERMINAL
 2 Screw Terminal, 8-32 (Bus Type)
 4 Screw Terminal, 10-32 (Bus Type)
 E Screw Terminal, M4 (Bus Type)
 H Screw Terminal, M5 (Bus Type)

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

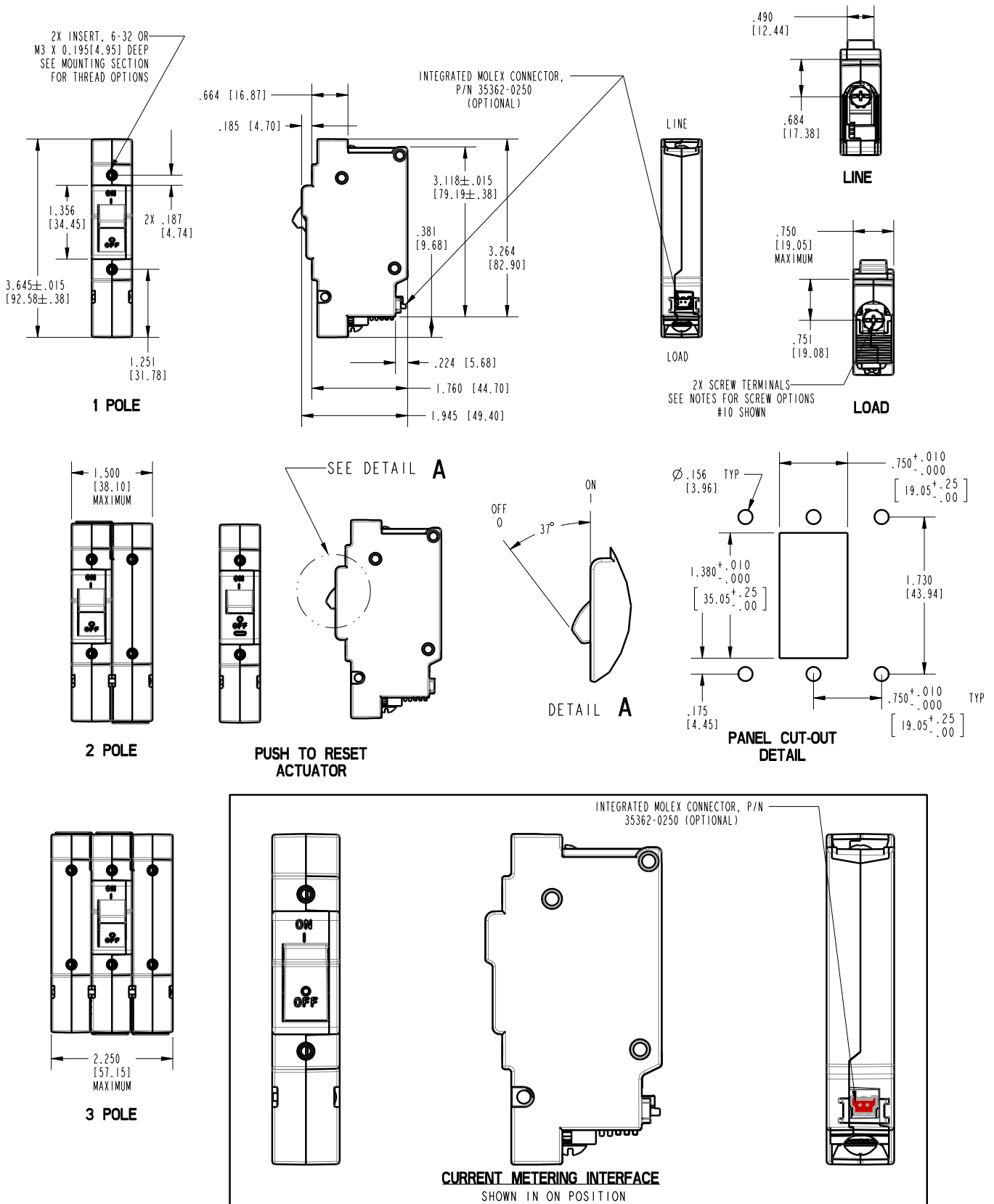
10 MOUNTING INSERTS ³
 1 6-32 X .195 Threaded Inserts
 A 6-32 X .195 Threaded Inserts with Terminal Barrier
 2 ISO M3 X 5 mm Threaded Inserts
 B ISO M3 X 5 mm Threaded Inserts with Terminal Barrier

11 MAX. APPLICATION RATING
 C¹ 120/240 VAC (2 or 3 Pole only)
 D 240 VAC
 P⁴ 415Y/240 VAC (TUV only) 240 VAC 3 phase Delta

12 AGENCY APPROVAL
 A Without approvals
 G UL 489 Listed
 3 UL 489 Listed, TUV Certified

- Notes:
- 3 Pole units available only when one of three poles is neutral
 - On Multi Pole units one current transformer is supplied on the actuator pole
 - Terminal barriers are required on multi poles breaker
 - Voltage rating P only available as a 3 pole device 20A max
 - Only available with approval code "A"
 - +/-1% tolerance only available when used with +/-0.1% tolerance external burden resistor.

Dimensional Specifications: in. [mm]



- Notes:
- All dimensions are in inches [millimeters].
 - Screws have combination head
 - Screw thread options: #8-32, #10-32, M4X.7, M5X.8

N-Series

CIRCUIT BREAKER

Carling Technologies' high-performance N-Series hydraulic-magnetic circuit breaker is ideally suited for the rigors and confined spaces of telecom and datacom power distribution units and rack systems. Its innovative, low profile design features easily accessible load and line terminals and sliding barriers for effortless installation.

With the integration of an optional current transformer, the N-Series is capable of sensing current down to a level of 1%. This optional capability provides precise current monitoring and reporting required for back billing of the actual power consumed by datacenter storage and routing devices. This feature also facilitates load adjustments and maximizes efficiency.

A patent pending, flush-rocker actuator and push-to-reset guard offer additional protection against accidental switching.

1-2 poles; ratings: 1-30 amps up to 240 VAC, 277 VAC, 120/240 VAC; 22,000 Amps Max Interrupting Capacity; UL 489 Compliant Sliding Terminal Barriers; EN60947-2 Certified



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

- ♦ 240 VAC, 277 VAC, 120/240 VAC
- ♦ UL 489 Compliant Sliding Terminal Barriers
- ♦ 22,000 Amps Max Interrupting Capacity
- ♦ 1 – 30 Amps Current Rating
- ♦ Optional Current Transformer
- ♦ EN60947-2 Certified

Typical Applications:

- ♦ Telecom/Datacom
 - PDU's
 - Data Servers
 - Data Storage

N-Series

DESIGN FEATURES

CURRENT TRANSFORMER

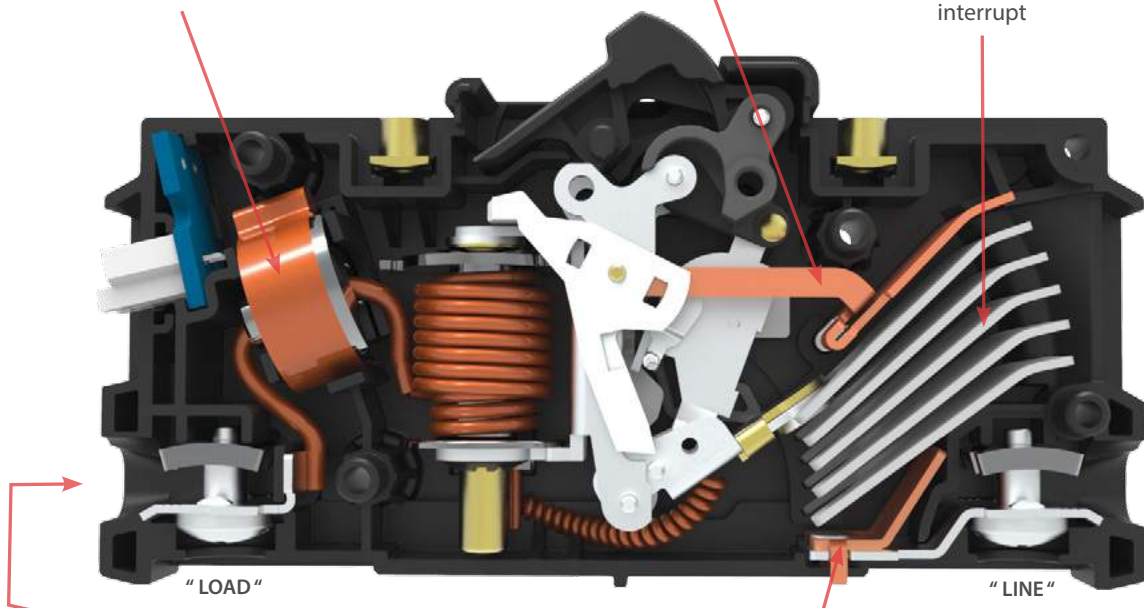
Remote current sensing via molex connector

UPPER ARC RUNNER

Optional, for 277 VAC rated breakers

GRIDS (5x)

Arc deionizing splitter plates that increase arc voltage for quick interrupt



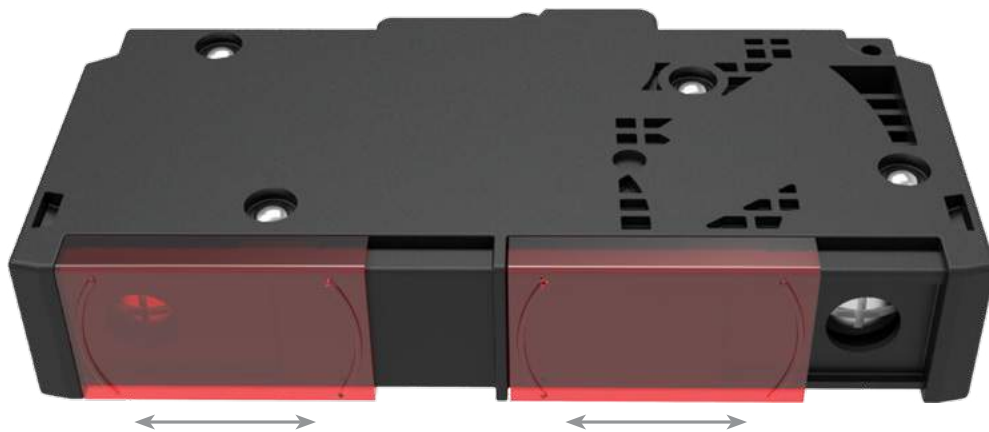
TERMINAL

Allows for easy hook-up of wires on both sides of the breaker

LOWER ARC RUNNER

Motivates arc off of the stationary contact

SLIDING TERMINAL BARRIERS



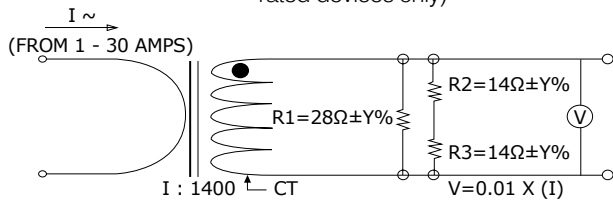
Electrical

Current Metering

Integrated current transformer.
 Measurement range: 1-30 Amps.
 Voltage output: 10mV per Amp according to the formula below:
 $2(\text{Amp}) \leq I \leq 30(\text{Amp})$
 $V = 0.01 \times I \pm 2\%$
 (with current metering codes 1 or 2)
 $V = 0.01 \times I \pm 1\%$
 (with current metering codes 3 or 4)

$$\left| \frac{\frac{V}{I} - \frac{V_{10}}{I_{10}}}{\frac{V_{10}}{I_{10}}} \right| \leq 0.85\%$$

Where V=CT output in volts
 V_{10} =CT output in volts with $I=I_{10}=10$ (A); I =primary current in amperage (50/60 Hz). Phase shift between primary current and CT output is $0.25 \pm 0.25^\circ$. Maximum crest factor of primary current is 1.73. R1 shall be integrated in the breaker. R2 and R3 are provided by end user and external to the breaker.
 Connection: below Load Terminal.
 2-pin connector, Molex 35362-0250.
 Mating Connector housing – Molex PN35507-0200.
 (Current metering is available on AC rated devices only)



Note: When current metering code is 1 or 2; Y to equal 1.0
 When current metering code is 3 or 4; Y to equal 0.1

Dielectric Strength

UL, CSA-1960V 50/60 Hz for one minute between all electrically isolated terminals. Comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between main circuits of adjacent poles per Publications EN 60950 and VDE 0805

Impedance

See next page

Insulation Resistance

Minimum of 100 Megohms @ 500VDC

Overload

50 operations @ 600% of rated current for AC rated devices

Interrupt Capacity

See table A

Mechanical

Endurance

10,000 "On-Off" operations @ 6 per minute; with rated current & voltage

Trip Free

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

Trip Indication

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

Environmental

Environmental
 Operating Temperature
 Vibration

MIL-PRF-55629 and MIL-STD-202G
 -40°C to +85°C
 Withstands 0.06" excursion from 10-55 Hz and 10Gs 55-500 Hz at rated current per MIL-PRF-55629 and MIL-STD-202G, Method 204D, Test Condition A. Instantaneous and ultra-short curves tested at 90% of rated current

Shock

Withstands 50 Gs, 6 ms saw tooth while carrying rated current per MIL-PRF-55629 and MIL-STD-202G, Method 213B, test condition "I". Instantaneous and ultra short curves tested at 90% of rated current

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)

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

Salt Spray

Physical

Number of Poles
 Termination

1 - 2 poles
 Wire ready and touch proof wire clamp (See Figure 1). Accepts up to (2) #10 AWG wires per terminal. Designed for use with solid, stranded and flexible stranded wires, with or without ferrule or pin terminals. Also accepts straight fork and flanged fork terminals.

Termination Torque
 Termination Barrier

15-20 in-lbs (Line & Load terminals)
 Integral sliding barrier to comply with spacing requirements (See figure 1)

Mounting

Threaded Insert: #6-32 UNC-2B, or M3X0.5-6H B ISO

Insert Termination Torque
 Actuator

7-9 in-lbs
 Rocker, with or without guard (See figures 1, 2, and 4)

Internal Circuit Config.
 Materials

Series Trip
 Housing - Glass Filled Polyester
 Rocker - Nylon
 Line/Load Terminals - Copper Alloy;
 Bright Acid Tin Plated

Weight
 Standard Color

~107 grams (~3.76 ounces) per pole
 Housing - Black
 Rocker - Several
 (See ordering scheme for colors)

Agency Approvals

UL489, cUL, TUV EN60947-2

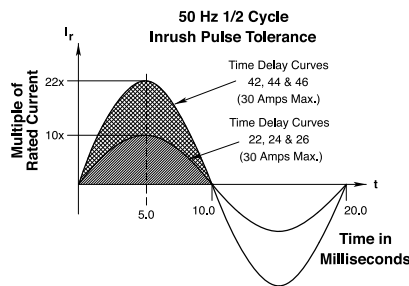
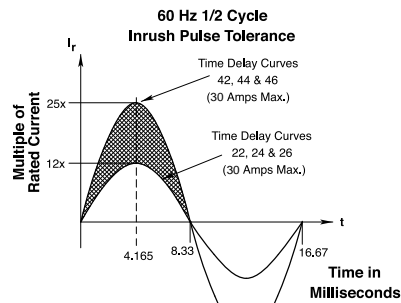
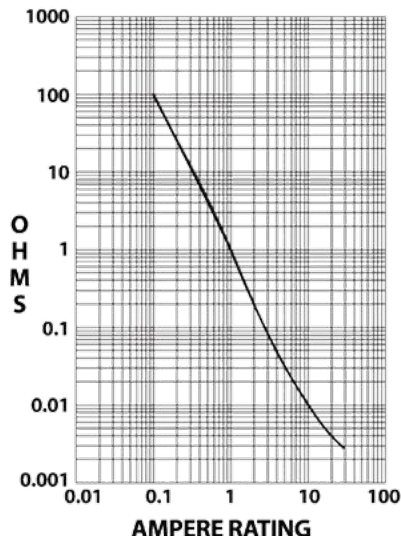
Electrical Tables

Table A: Voltage and Current Ratings

N-SERIES TABLE A: ELECTRICAL RATINGS								
VOLTAGE	CURRENT (AMPS)	NUMBER OF POLES	INTERRUPT CAPACITY (AMPS)					
			UL 489		EN60947-2			
			1-20 A	21-30 A	1-20 A		21-30 A	
					I _{cu}	I _{cs}	I _{cu}	I _{cs}
120/240 VAC	1 - 30	2	22000	5000	10000	5000	10000	5000
240 VAC	1 - 20	1	10000	N/A	10000	5000	5000	5000
277 VAC	1 - 20	1	10000	N/A	N/A		N/A	

Electrical: Impedance / Resistance

RESISTANCE, IMPEDANCE VALUES
Across Line and Load Terminals

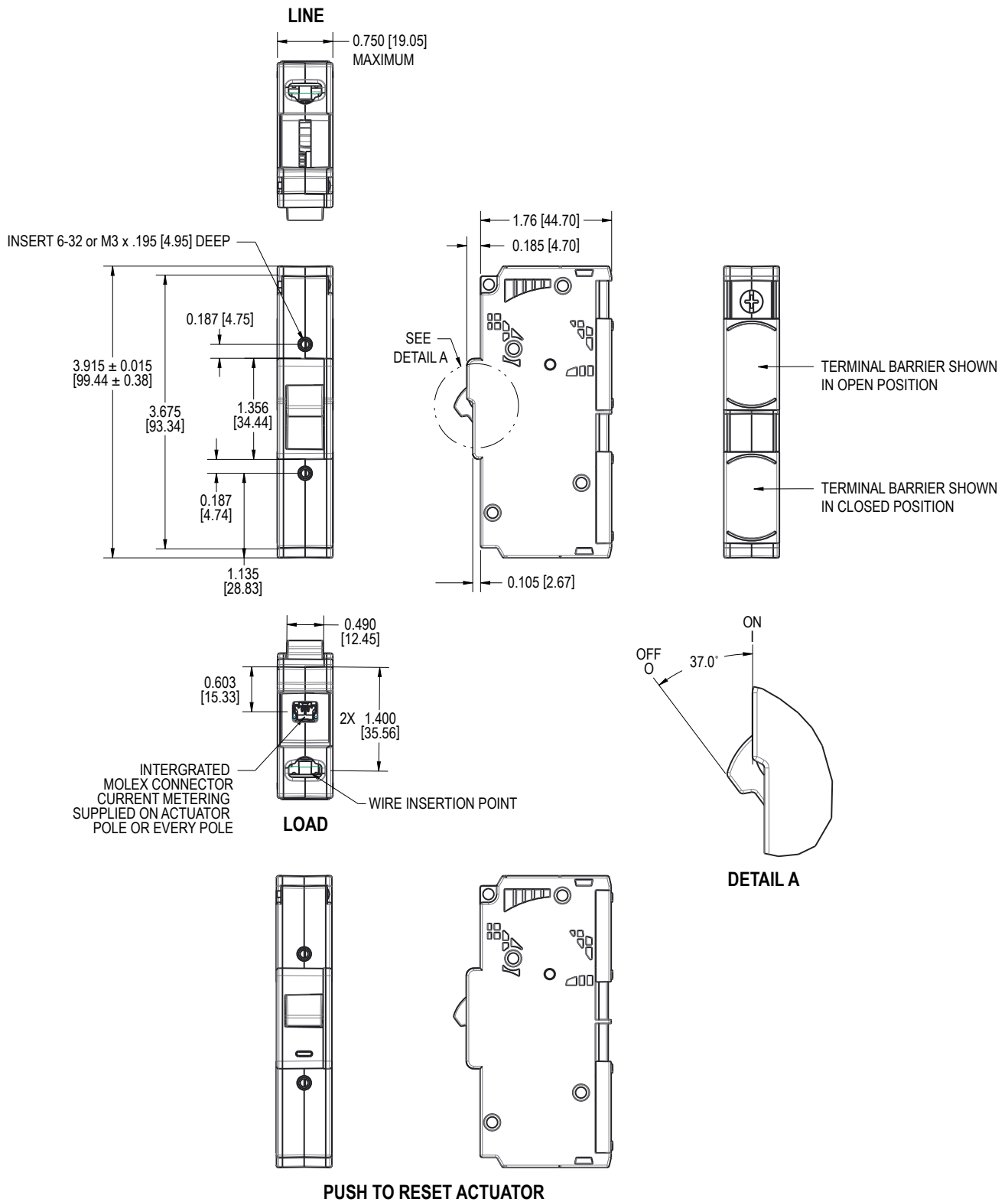


CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	+/- 15
5.1 - 30.0	+/- 25

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

Dimensional Specifications: in. [mm]

Figure 1. N-Series 1-Pole Construction



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

Figure 2. N-Series 2-Pole Construction

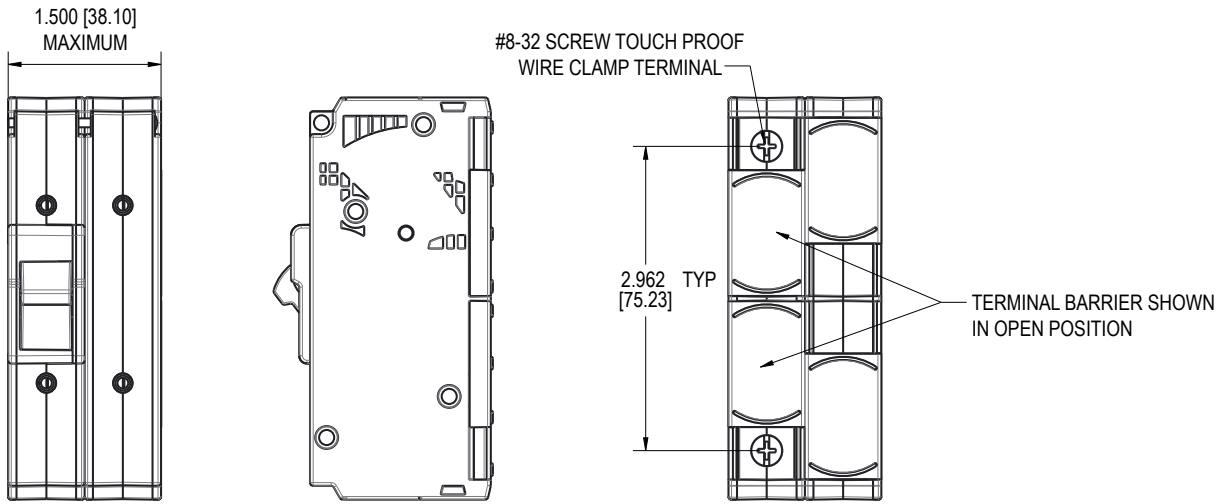
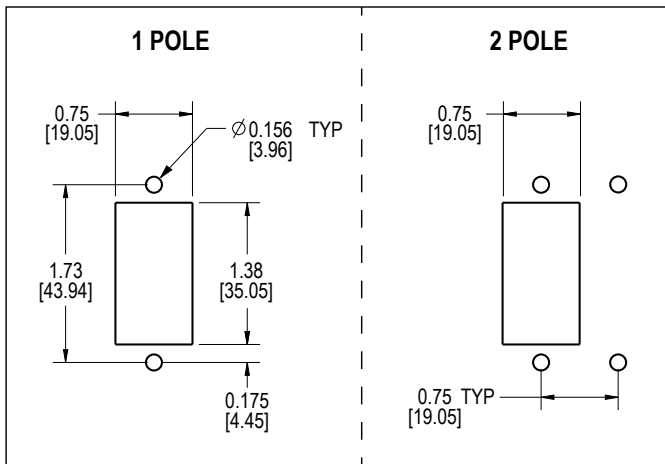


Figure 3. Panel Cutout Details



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [0.51] unless otherwise specified.

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.



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



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

Typical Applications:

- ♦ Renewable Energy
- ♦ Power Distribution Units

CX-Series

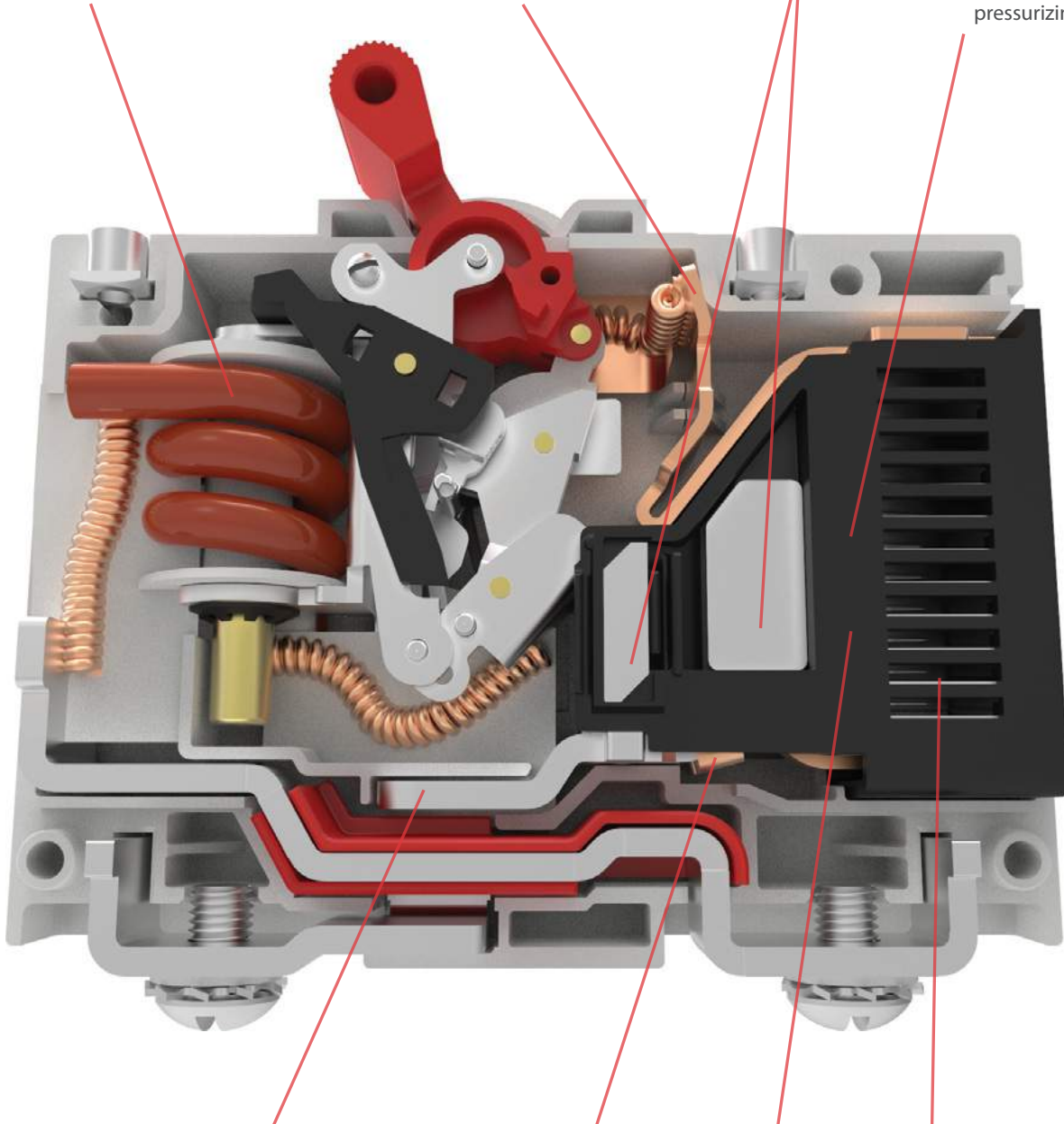
DESIGN FEATURES

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

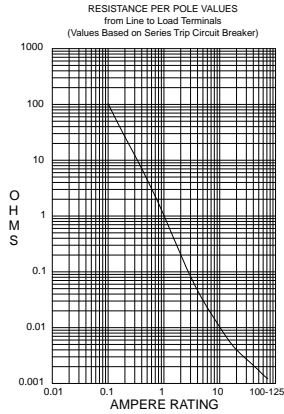
LOWER ARC RUNNER
Aids in motivating arc off of stationary contact and into arc chamber

LARGE ARC GAP
To generate high arc voltages

(12) ARC DEIONIZING SPLITTER PLATES

Electrical

Maximum Voltage 600 VDC
 Overload 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 1- 2 poles, + Auxiliary Switch Pole.
 Termination 10-32 or M5 Screw Terminals
 1/4-20 or M6 Threaded Stud Terminals
 Termination Barrier Standard with multi-pole constructions
 Mounting Threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)
 Actuator Handle, 1 per pole.
 Internal Circuit Config. Series Trip
 Materials Housing - Glass filled Polyester
 Handle - Glass filled Polyester
 Line/Load Terminals - Copper Alloy.
 ~150 Grams (~5.3 Ounces).
 Weight ~150 Grams (~5.3 Ounces).
 Standard Color Housing - Gray.
 Handle - White, Black, Red, Green,
 Blue, Yellow, Gray,

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
 Vibration Withstands 0.060" excursion from 10-55 Hz & 10 Gs 55-500 Hz, at rated current per MIL-PRF-55629 and MILSTD-202G, Method 240D, Test Cond. A. Instantaneous & ultrashort curves tested at 90% of rated current.
 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.

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 ¹	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 ¹	50 - 100	600	May have a third pole that is a voltage trip pole
	600	DC	4 ²	110 - 175	600	May have a fifth pole that is a voltage trip pole

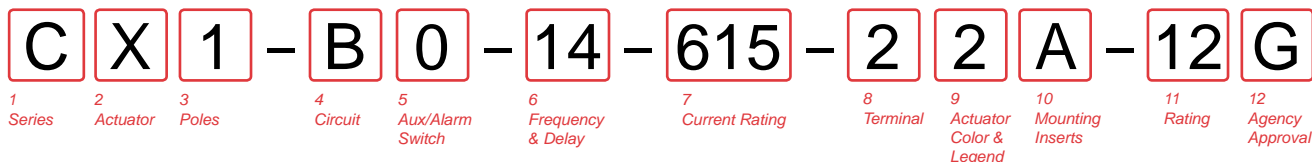
Notes:

- 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.



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

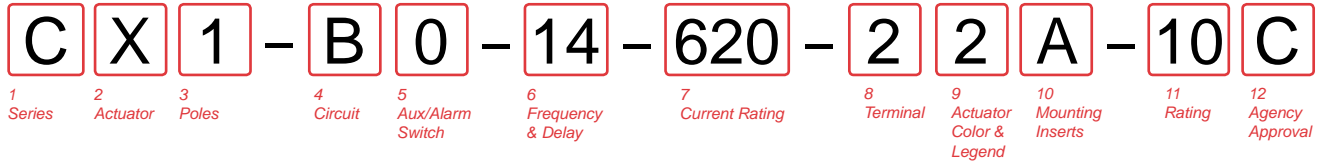
Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	A	B	1	Black
Black	C	D	2	White
Red	F	G	3	White
Green	H	J	4	White
Blue	K	L	5	White
Yellow	M	N	6	Black
Gray	P	Q	7	Black
Orange	R	S	8	Black

10 MOUNTING INSERTS
A 6-32 Thread
B M3 Thread

11 MAX. APPLICATION RATING
12 250 VDC
13 250/500 VDC ¹
15 205/410 VDC

12 AGENCY APPROVAL
A Without Approvals
G UL 489 Listed
S UL 489 Listed, TUV to IEC60947-2 ¹

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



1 SERIES
C

2 ACTUATOR
X Handle, one per pole

3 POLES 7
1 One
2 Two
3 Three
4 Four¹⁰

4 CIRCUIT
A Switch Only (no coil)^{1, 9}
B Series Trip (current)
G Relay Trip (voltage)^{1, 2, 3, 9}

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) 6

CODE	AMPERES						
220	0.200	415	1.500	490	9.000	630	30.000
225	0.250	517	1.750	495	9.500	635	35.000
230	0.300	420	2.000	610	10.000	640	40.000
235	0.350	522	2.250	710	10.500	650	50.000
240	0.400	425	2.500	611	11.000	660	60.000
245	0.450	527	2.750	711	11.500	665	65.000
250	0.500	430	3.000	612	12.000	670	70.000
255	0.550	435	3.500	712	12.500	675	75.000
260	0.600	440	4.000	613	13.000	680	80.000
265	0.650	445	4.500	614	14.000	685	85.000
270	0.700	450	5.000	615	15.000	690	90.000
275	0.750	455	5.500	616	16.000	695	95.000
280	0.800	460	6.000	617	17.000	810	100.000
285	0.850	465	6.500	618	18.000	911	115.000
290	0.900	470	7.000	620	20.000	912	125.000
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 8
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

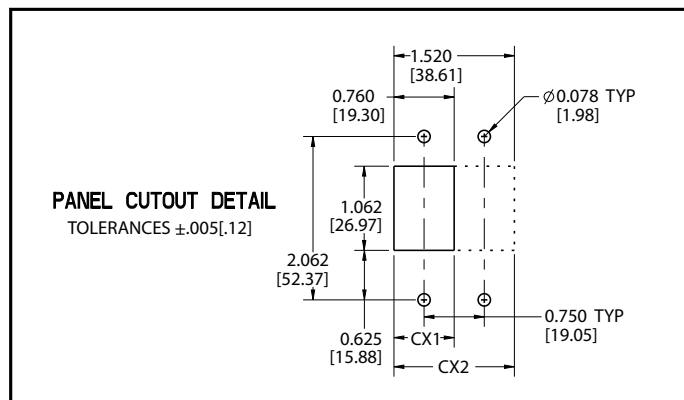
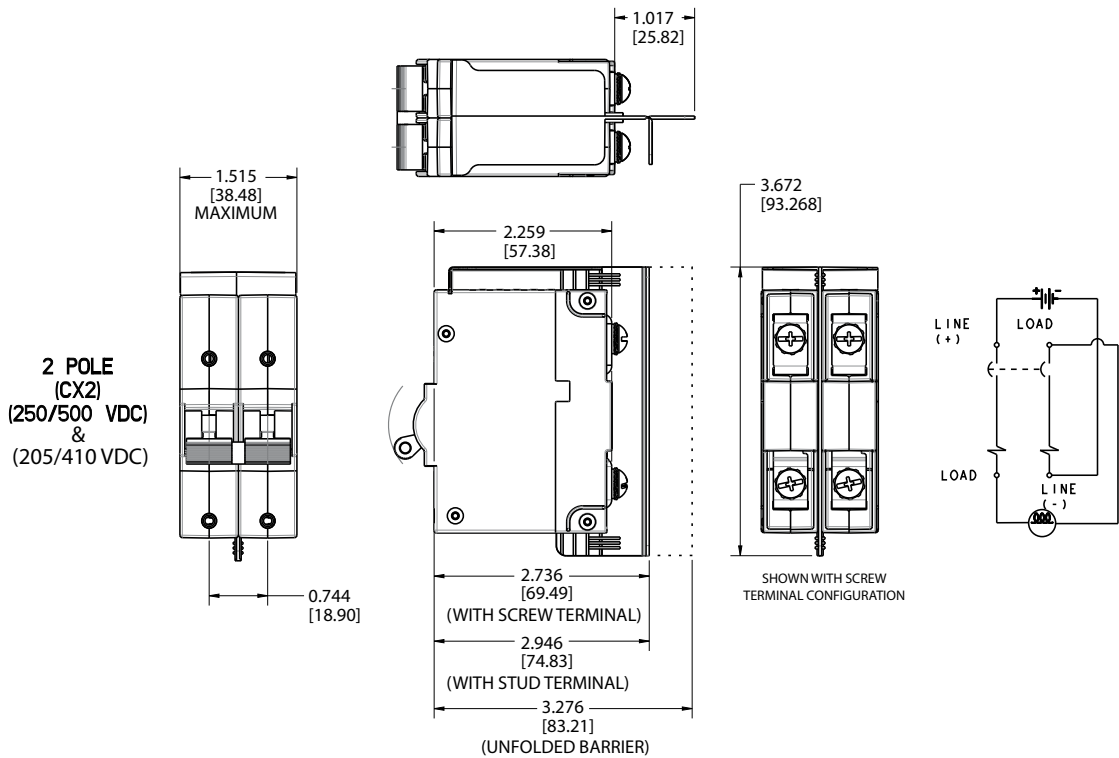
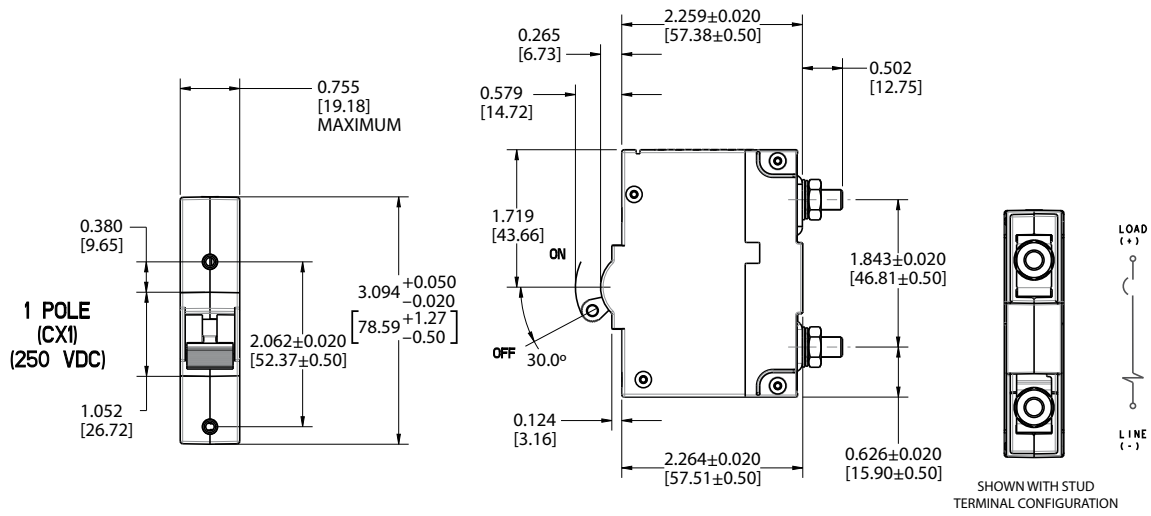
10 MOUNTING INSERTS
A 6-32 Thread
B M3 Thread

11 MAX. APPLICATION RATING
10 300VDC
11 440 VDC without factory installed terminal bus⁴
14 440VDC with factory installed terminal bus⁴
06 600VDC⁵

12 AGENCY APPROVAL
A Without Approvals
C UL 1077 Recognized
W UL 1077 Recognized & TUV Certified IEC/ EN 60947-2⁹

- 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)

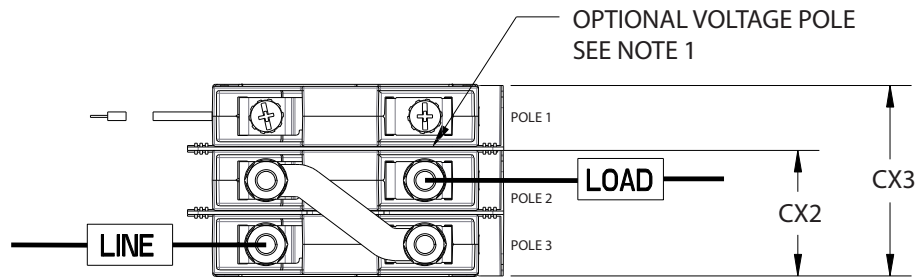
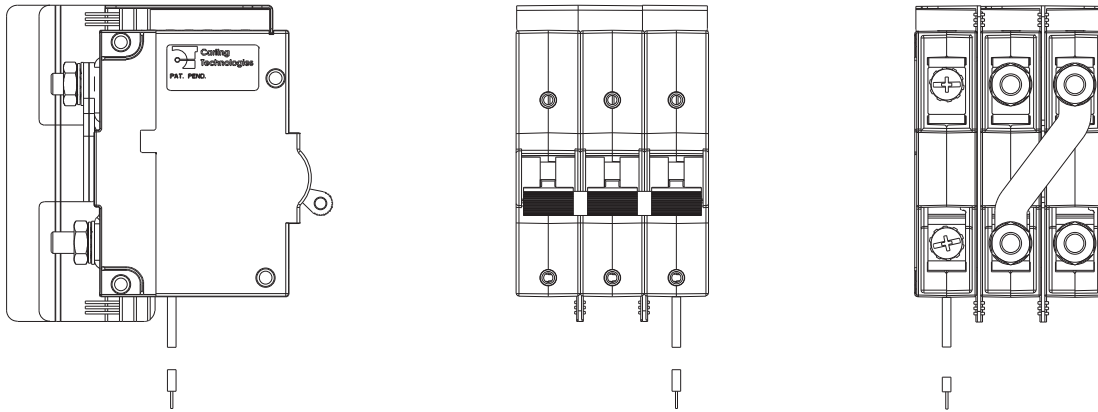
Dimensional Specifications: in. [mm]



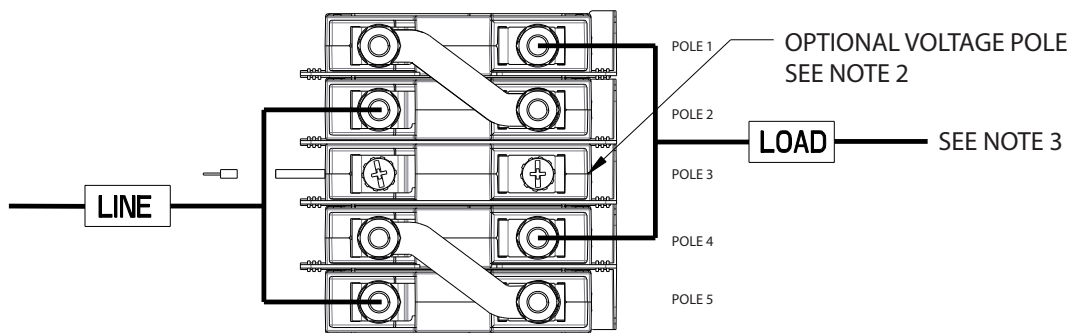
Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [0.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



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

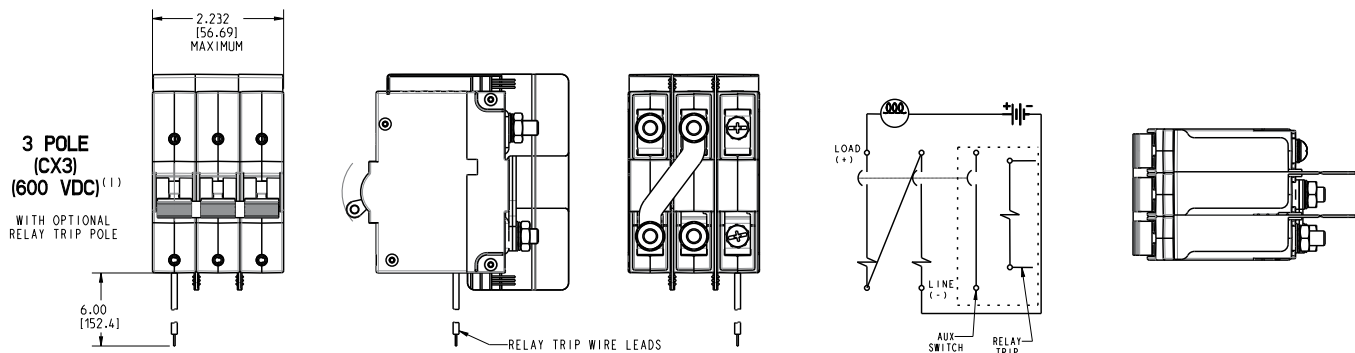
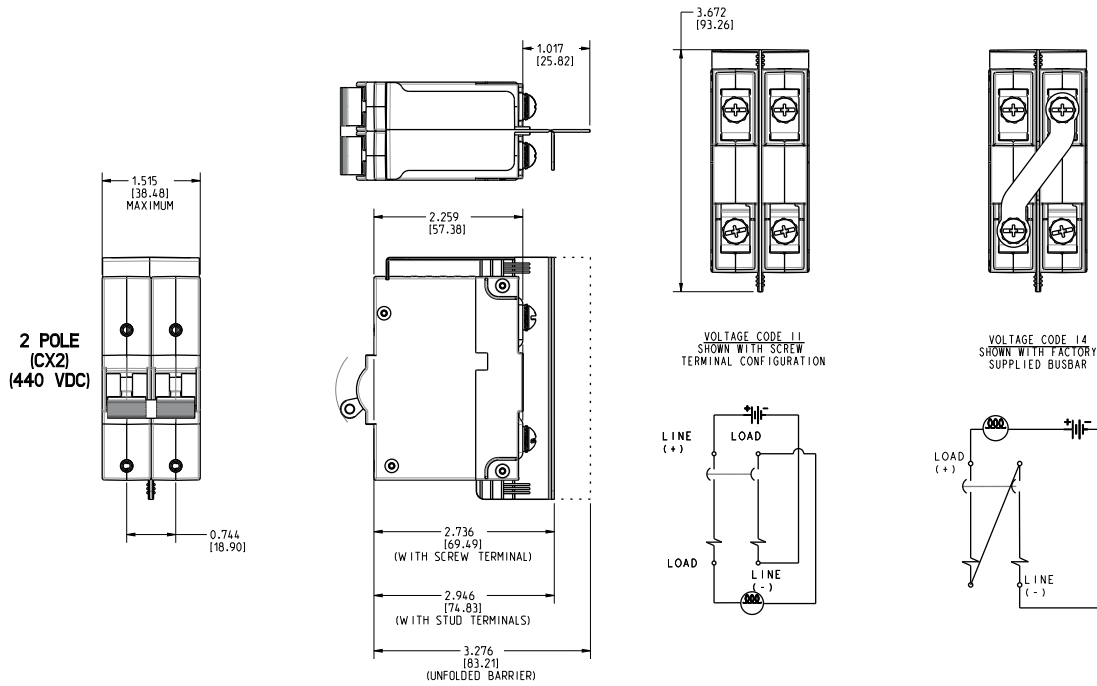
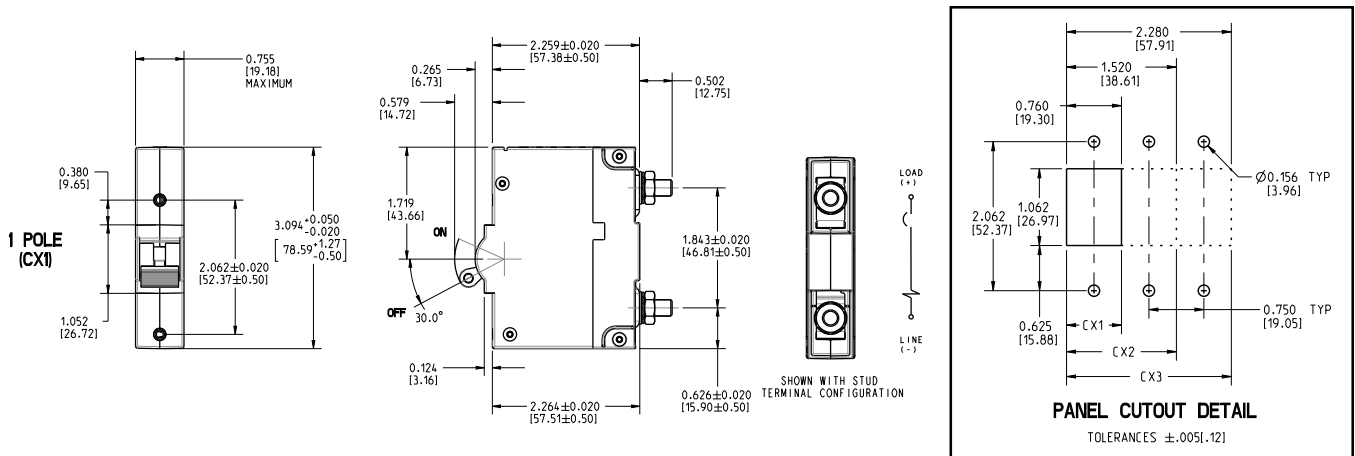


CX5 - 4 POLE SWITCH (CX4) SHOWN
WITH OPTIONAL VOLTAGE POLE
101A-175A DEVICE, 600VDC

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 in² (81.94 mm²)

Dimensional Specifications: in. [mm]



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

E-Series

E-Series

CIRCUIT BREAKER

The E-Series hydraulic-magnetic circuit breaker is ideally suited for higher current and voltage applications. It is UL listed and CSA certified for branch circuit protection, which does not require a fuse back up. It is also UL recognized and CSA certified as a supplementary protector and as a manual motor controller.

Its physical features include front and back mounting, screw and stud terminals and heavy duty box wire connectors for solid wire or a pressure plate connector for standard wire. The E-series is available with handle actuators and can be configured as .1-125 amps, up to 600VAC or 125VDC, with choice of time delays, actuator colors and 1 to 6 poles configuration. Additionally, a Power Selector device is also available.



Product Highlights:

- ◆ UL listed and CSA certified
- ◆ Certified for circuit branch protection
- ◆ Recognized as a supplementary protector and as a manual motor controller
- ◆ Optional power selector device

Typical Applications:

- ◆ High Voltage/High Current Applications
- ◆ Renewable Energy
- ◆ Military
- ◆ Industrial Controls
- ◆ Generators

Electrical

Maximum Voltage 600VAC 50/60 Hz, 125VDC (See Table A)

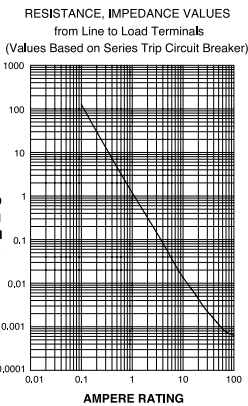
Current Ratings Standard current coils: 0.100, 0.250, 0.500, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 50.0, 60.0, 70.0 & 100 Amp.

Auxiliary Switch Rating SPDT; 10.1A 250VAC, 1.0A 65VDC; 0.5A 80VDC, 0.1A 125VAC (with gold contacts).

Insulation Resistance Minimum of 100 Megohms at 500 VDC.

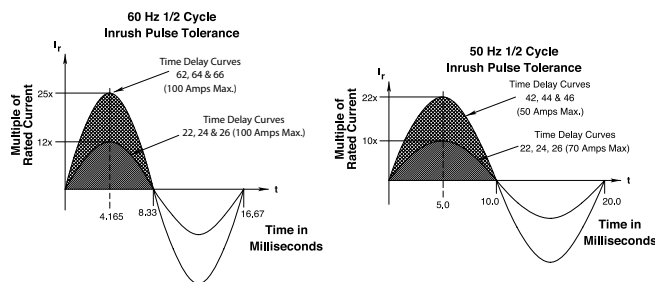
Dielectric Strength UL, CSA: 2200 V 50/60 Hz for one minute between all electrically isolated terminals. E-Series Circuit Breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.

Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.



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

Pulse Tolerance Curves



Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.

Trip Free All E-Series Circuit Breakers will trip on overload, even when Handle 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.

Physical

Number of Poles Mounting 1 - 6
A 3" minimum spacing must be provided between the circuit breaker arc venting area on back connected E-Series circuit breakers and grounded obstructions. E-Series circuit breakers must be mounted on a vertical surface.

Connectors, Box Type Front connected E-Series circuit breakers are supplied with box type pressure connectors that accept copper or aluminum conductors as follows: 1/0-14 Copper, 1/0-12 Aluminum.

Internal Circuit Configuration Series and Switch Only, (with or without auxiliary switch). Shunt with current coils.

Weight Approximately 252 grams/pole (Approximately 9 ounces/pole)

Standard Colors Housing-Black; Actuator - See Ordering Scheme.

Environmental

Designed in accordance with requirements of specification MIL PRF-55629 & MIL-STD-202G as follows:

Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I".

Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A.

Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.

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

Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).

Operating Temperature -40° C to +85° C

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

Electrical Tables

Table A: Lists UL Listed (489) & CSA Certified (C22.2 No. 5) configurations & performance capabilities as a Molded Case Circuit Breaker.

E SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	INTERRUPTING CAPACITY (AMPS)	HIGH INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE	
SERIES	80	DC	---	0.10 - 100	5,000	50,000
	125	DC	---	0.10 - 100	5,000	10,000
	125	DC	---	0.10 - 125	10,000	---
	120	50 / 60	1	0.10 - 125	10,000	---
	240	50 / 60	1	0.10 - 30	5,000	10,000
	240	50 / 60	1	31 - 100	5,000	---
	120 / 240	50 / 60	1	0.10 - 30	5,000	10,000
	120 / 240	50 / 60	1	31 - 100	5,000	---
	120 / 240	50 / 60	1	101 - 125	10,000	---
240	50 / 60	3	0.10 - 100	5,000	---	

Table B: Lists UL Recognized & CSA Accepted configurations & performance capabilities as a Component Supplementary Protector.

E -SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS									
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA
						WITH BACKUP FUSE ³	WITHOUT BACKUP FUSE		
SERIES & SHUNT	125	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
	125	DC	---	---	101 - 120	---	5,000	TC1,2, OL0, U1	TC1,2, OL0, U1
	150	DC	---	---	0.02 - 125	---	5,000	TC1, OL0, U3	TC1, OL0, U3
	160	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
	150 / 300	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
	120 / 240	50 / 60	1	---	0.02 - 100	---	5,000	TC1,2, OL0, U1	TC1,2, OL0, U1
	240	50 / 60	1	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
	250	50 / 60	1	0.02 - 100	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	277	50 / 60	1	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
	277	50 / 60	1	0.02 - 100	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	480	50 / 60	1 & 3	0.02 - 100	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	480 ¹	50 / 60	1 & 3	0.02 - 50	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
600	50 / 60	1 & 3	0.02 - 100	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1	
600 ²	DC	---	---	0.02 - 125	---	---	5,000	TC1, OL0, U3	TC1, OL0, U3
SWITCH ONLY	125	DC	---	0.02 - 120					
	160	DC	---	0.02 - 100					
	240	50 / 60	1	0.02 - 100					
	277	50 / 60	1	0.02 - 100					
	480	50 / 60	1 & 3	0.02 - 100					
	600	50 / 60	1 & 3	0.02 - 100					

Notes:
 1 Per pole opposite polarity rating - Delta Configuration.
 2 4 Poles connected in series
 3 Requires branch circuit backup with a UL Listed Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amp rating and not to exceed 225A.

Electrical Tables

Table C: Lists UL Recognized, CSA Accepted and VDE Certified configurations and performance capabilities as a Component Supplementary Protector.

E -SERIES TABLE C: COMPONENT SUPPLEMENTARY PROTECTORS WITH VDE										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	SHORT CIRCUIT CAPACITY (AMPS)			APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE		UL/CSA		VDE (Icn)	UL	CSA	
				WITH BACKUP FUSE ¹	WITHOUT BACKUP FUSE	WITHOUT BACKUP FUSE				
SERIES & SHUNT	125	DC	---	0.1 - 100	---	5,000	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	1 or 2 Poles
	240	50 / 60	1 & 3	0.1 - 100	---	5,000	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	1 - 5 Poles. Up to 4 Current Poles, 1 Voltage Pole
SHUNT	415	50 / 60	1 & 3	0.1 - 100	10,000	---	4,000	TC1,2, OL1, C1	TC1,2, OL1, C1	2 - 5 Poles. Up to 4 Current Poles, 1 Voltage Pole
SWITCH ONLY	125	DC	---	0.1 - 125						
	240	50 / 60	1 & 3	0.1 - 100						
	415	50 / 60	1 & 3	0.1 - 100						

Notes:
¹ Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amp rating and not to exceed 225 amps.

Table D: Lists UL Recognized, CSA Accepted configurations and performance capabilities as Protectors, Supplementary for Marine Electrical and Fuel Systems (Guide PEQZ2, File E75596). Ignition Protected per UL 1500. UL Classified Small Craft Electrical Devices, Marine in accordance with ISO 8846 (Guide UZMK, File MQ1515) as Marine Supplementary Protectors.

E SERIES TABLE D : UL1500 (Marine Ignition Protection)							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	SHORT CIRCUIT CAPACITY (AMPS) WITHOUT BACKUP FUSE	APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE			UL	CSA
				SERIES	65		
125	50 / 60	1	0.02 - 100		1,500	TC1,2,OL1,U1	TC1,2,OL1,U1
250	50 / 60	1	0.02 - 100		1,500	TC1,2,OL1,U1	TC1,2,OL1,U1

Agency Certifications

UL Recognized

UL Standard 1077



Component Recognition Program as Protectors, Supplementary (Guide QVNU2, File E75596)

CSA Accepted



Component Supplementary Protector (Class 3215 30, File 047848 0 000)
CSA Standard C22.2 No. 235

Component Recognition Program as Manual Motor Controls (Guide NLRV2, File E135367)

CSA Certified



Circuit Breaker Molded Case (Class 1432 01, File 093910),
CSA Standard C22.2 No. 5.1 - M

UL Standard 1500



Protectors, Supplementary for Marine Electrical & Fuel Systems (Guide PEQZ2, File E75596)
Ignition Protection

TUV Certified



EN60934 under License No. R72031056

UL Listed

UL Standard 489

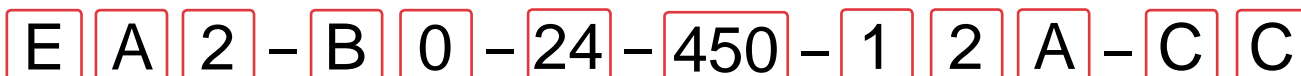


Circuit Breakers, Molded Case (Guide DIVQ, File E129899)

VDE Certified



EN60934, VDE 0642 under File No. 10537



1 Series 2 Actuator 3 Poles 4 Circuit 5 Auxiliary Switch 6 Frequency & Delay 7 Current Rating 8 Terminal 9 Actuator Color 10 Mounting/Barriers 11 Maximum Application Rating 12 Agency Approval

1 SERIES
E

2 ACTUATOR
A Handle, one per pole

3 POLES¹
1 One 3 Three 5 Five
2 Two 4 Four 6 Six

4 CIRCUIT²
B Series Trip (current)
C³ Series Trip (voltage)

5 AUXILIARY SWITCH⁴
0 without Auxiliary Switch 6 S.P.S.T. 0.110 Q.C. Terminals
2 S.P.D.T. 0.110 Q.C. Terminals 7 S.P.S.T. 0.110 Q.C. Terminals (Gold Contacts)
3 S.P.D.T. 0.139 Solder Lug 8 S.P.S.T. 0.187 Q.C. Terminals
4 S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts) 9 S.P.D.T. 0.187 Q.C. Terminals

6 FREQUENCY & DELAY
10⁵ DC Instantaneous 62 50/60Hz Short, Hi-Inrush
12 DC Short 64 50/60Hz Medium, Hi-Inrush
14 DC Medium 66 50/60Hz Long, Hi-Inrush
16 DC Long 72 DC, Short, Hi-Inrush
20⁵ 50/60Hz Instantaneous 74 DC, Medium, Hi-Inrush
22 50/60Hz Short 76 DC, Long, Hi-Inrush
24 50/60Hz Medium
26 50/60Hz Long

7 CURRENT RATING (AMPERES)⁷

CODE	AMPERES				
020	0.020	235	0.350	430	3.000
025	0.025	240	0.400	435	3.500
030	0.030	245	0.450	440	4.000
035	0.035	250	0.500	445	4.500
040	0.040	255	0.550	450	5.000
045	0.045	260	0.600	455	5.500
050	0.050	265	0.650	460	6.000
055	0.055	270	0.700	465	6.500
060	0.060	275	0.750	470	7.000
065	0.065	280	0.800	475	7.500
070	0.070	285	0.850	480	8.000
075	0.075	290	0.900	485	8.500
080	0.080	295	0.950	490	9.000
085	0.085	410	1.000	495	9.500
090	0.090	512	1.250	610	10.000
090	0.095	415	1.500	710	10.500
210	0.100	517	1.750	611	11.000
215	0.150	420	2.000	711	11.500
220	0.200	522	2.250	612	12.000
225	0.250	425	2.500	712	12.500
230	0.300	527	2.750	613	13.000
				912 ⁸	125.000

OR VOLTAGE COIL (MIN. TRIP RATING, VOLTS)⁵
A06 6 DC, 5 DC A65 65 DC, 55 DC J48 48 AC, 40 AC
A12 12 DC, 10 DC B25 125 DC, 100 DC J65 65 AC, 55 AC
A18 18 DC, 15 DC J06 6 AC, 5 AC K20 120 AC, 65 AC
A24 24 DC, 20 DC J12 12 AC, 10 AC L40 240 AC, 130 AC
A32 32 DC, 25 DC J18 18 AC, 15 AC
A48 48 DC, 40 DC J24 24 AC, 20 AC

8 TERMINAL⁷
BACK CONNECTED (FRONT MOUNTED ONLY) **MAX. RATING**
1⁸ 10-32 Stud (All Terminals) 50 A
2⁸ 1/4-20 Stud (All Terminals) 125 A

FRONT CONNECTED (BACK MOUNTED ONLY) **MAX. RATING**
3⁹ Box Wire Connector (Line & Load) 100 A
C¹⁰ Box Wire Connector with Pressure Plate (Line & Load) 100 A
4 10-32 Screw (Line & Load) 50 A
5 10-32 "Bus-Type" Screw (Line), 10-32 Screw (Load) 50 A
6⁹ 10-32 "Bus-Type" Screw (Line), Box Wire Connector (Load) 100 A
F¹⁰ 10-32 "Bus-Type" Screw (Line), Box Wire Connector with Pressure Plate (Load) 100 A
7 1/4-20 Screw (Line & Load) 125 A
8 1/4-20 "Bus-Type" Screw (Line), 1/4-20 Screw (Load) 100 A
9⁹ 1/4-20 "Bus-Type" Screw (Line), Box Wire Connector (Load) 100 A
J¹⁰ 1/4-20 "Bus-Type" Screw (Line), Box Wire Connector with Pressure Plate (Load) 100 A

9 ACTUATOR COLOR & LEGEND¹²

Actuator Color	ON-OFF	Dual	Legend Color
White	B	1	Black
Black	D	2	White
Red	G	3	White
Green	J	4	White
Blue	L	5	White
Yellow	N	6	Black
Gray	Q	7	Black
Orange	S	8	Black

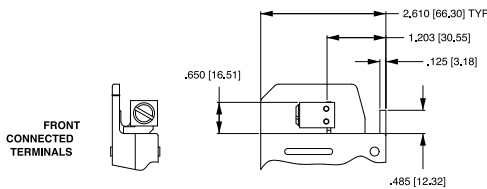
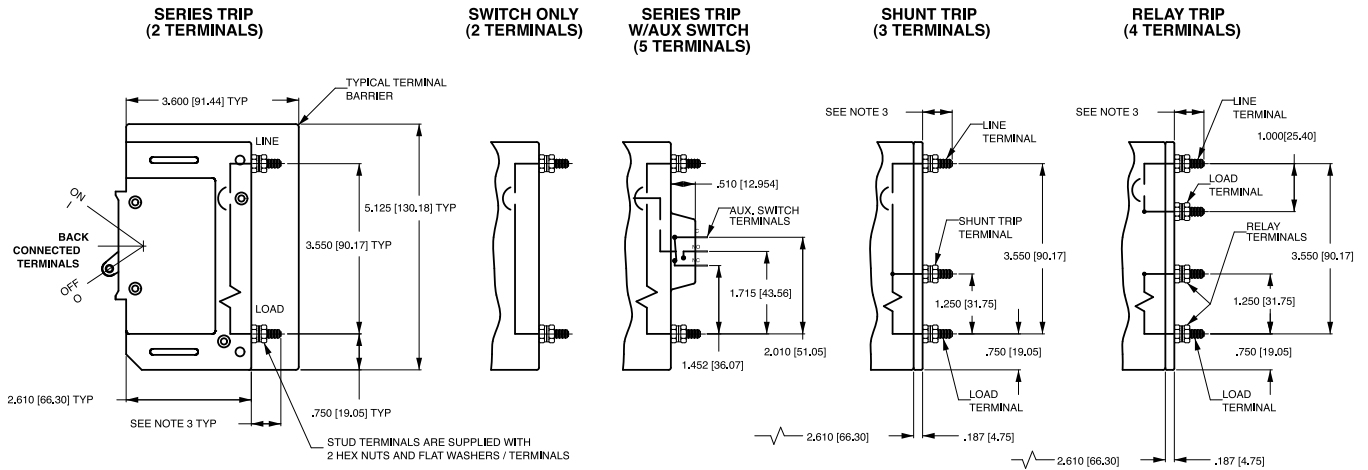
10 MOUNTING / BARRIERS
BACK CONNECTED (FRONT MOUNTED ONLY)
Mounting Inserts
A 6-32
B ISO M3
FRONT CONNECTED (BACK MOUNTED ONLY)¹¹
C Short **Back Mounting Foot Type** **Front Mounting Inserts (Optional Use)**
D Short ISO M3 6-32
E Long 6-32
F Long ISO M3

11 MAXIMUM APPLICATION RATING¹⁵
1 120 VAC
B 125 VDC, 120 A
C¹³ 120/240 VAC, 100 A
D 240 VAC, 100 A

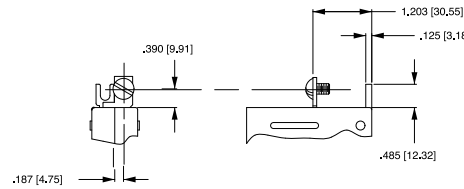
12 AGENCY APPROVAL
C UL 489 Listed & CSA Certified
F UL 489 Listed, CSA Certified, & VDE Certified

Notes:
1 Standard multi-pole units identical poles except when specifying auxiliary switch - (see Note 4). For mixed ratings, consult factory. VDE Certification on 1-5 poles only.
2 Series Trip construction available with either front or back connected terminals.
3 Series Trip construction with a voltage coil is not available as a single pole unit and must be tied to a protected pole.
4 On multi-pole units, only one auxiliary switch is normally supplied mounted in the extreme right pole per Figure A. Back mounted units require special mounting provisions when auxiliary switch is specified. VDE Certification on auxiliary switch codes 0, 2, 3 & 4 only.
5 Voltage Trip Coils are not rated for continuous duty. Available only with Frequency & Delay Codes 10 & 20.
6 Frequency & Delay Codes 92, 94 & 96 are not VDE Certified.
7 Current Ratings under 0.100 amps are not VDE Certified.
8 An Anti-Flash Over Barrier is supplied between poles on multi-pole units with 10-32 Stud (Terminal Code 1) or 1/4-20 Stud (Code 2) terminals per UL requirement.
9 Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
10 Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
11 Back Mounted breakers can also be front mounted by utilizing the proper front panel mounting inserts normally supplied. However, terminal connections must be made prior to mounting.
12 VDE Certification requires dual (I-O, ON-OFF) markings on all handles.
13 Not available with VDE Certification.

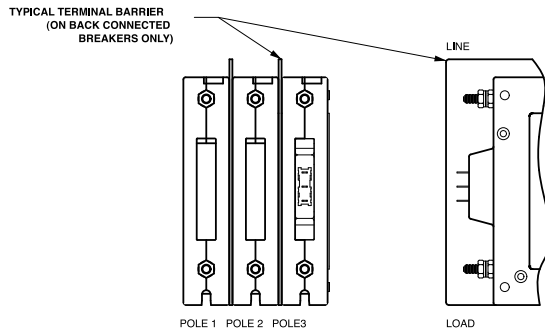
Circuit & Terminal Diagrams: in. [mm]



BOX TYPE WIRE CONNECTORS

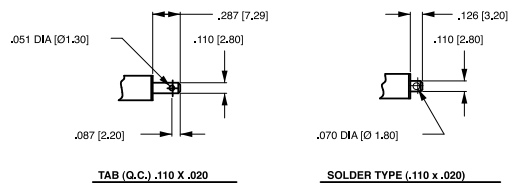


BUS TYPE SCREW TERMINALS



MULTI-POLE IDENTIFICATION SCHEME

AUXILIARY SWITCH TERMINALS



TAB (Q.C.) .110 X .020

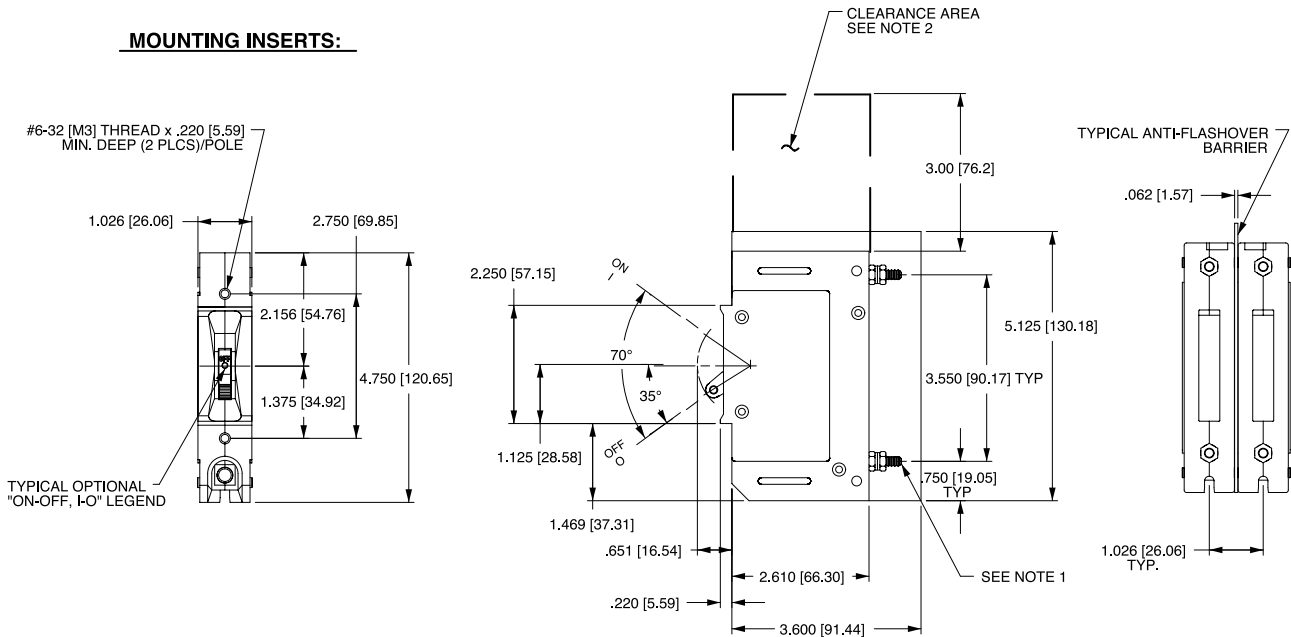
SOLDER TYPE (.110 x .020)

TABLE A TIGHTENING TORQUE SPECIFICATIONS		
THREAD SIZE TERMINAL TYPE	WIRE SIZE	TORQUE
#6-32 (M3) HARDWARE	—	7-9 IN-LBS (0.8-1.0 NM)
#10-32 THD TERMINAL SCREW	ALL	15-20 IN-LBS (1.7-2.3 NM)
1/4-20 THD TERMINAL SCREW	ALL	30-35 IN-LBS (3.4-4.0 NM)
#10-32 STUDS	ALL	15-20 IN-LBS (1.7-2.3 NM)
1/4-20 STUDS	ALL	30-35 IN-LBS (3.4-4.0 NM)
BOX WIRE CONNECTOR	14-10 AWG	35 IN-LBS (3.9 NM)
	6 AWG	40 IN-LBS (4.5 NM)
	6-4 AWG	45 IN-LBS (5.1 NM)
	3-1/0 AWG	50 IN-LBS (5.7 NM)

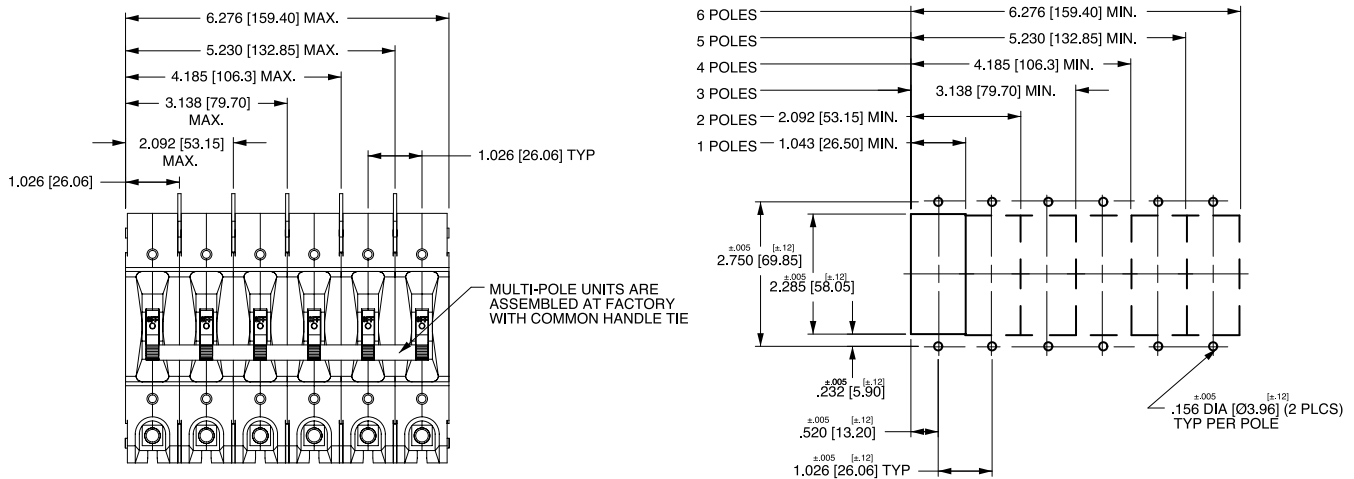
- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [.51] unless otherwise specified.
 - 3 0-50 amps: 10-32 & M5 Studs .625 \pm .062/15.88 \pm 1.574 long.
 - 4 51-120 amps: 1/4-20 & M6 Studs .750 \pm .062/19.05 \pm 1.574 long.

Dimensional Specifications: in. [mm]

MOUNTING INSERTS:



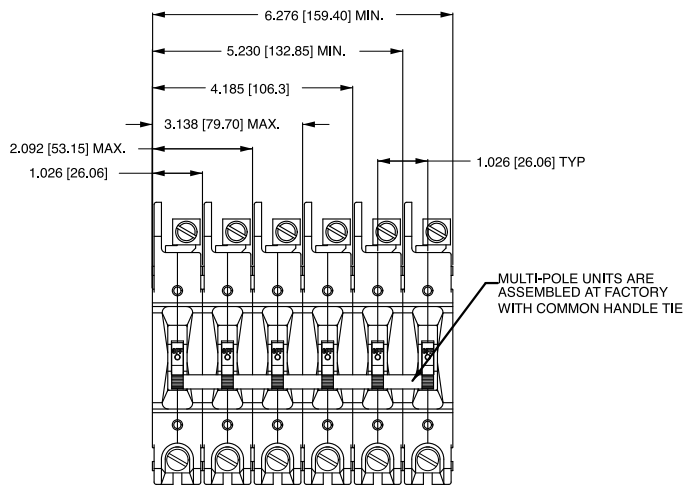
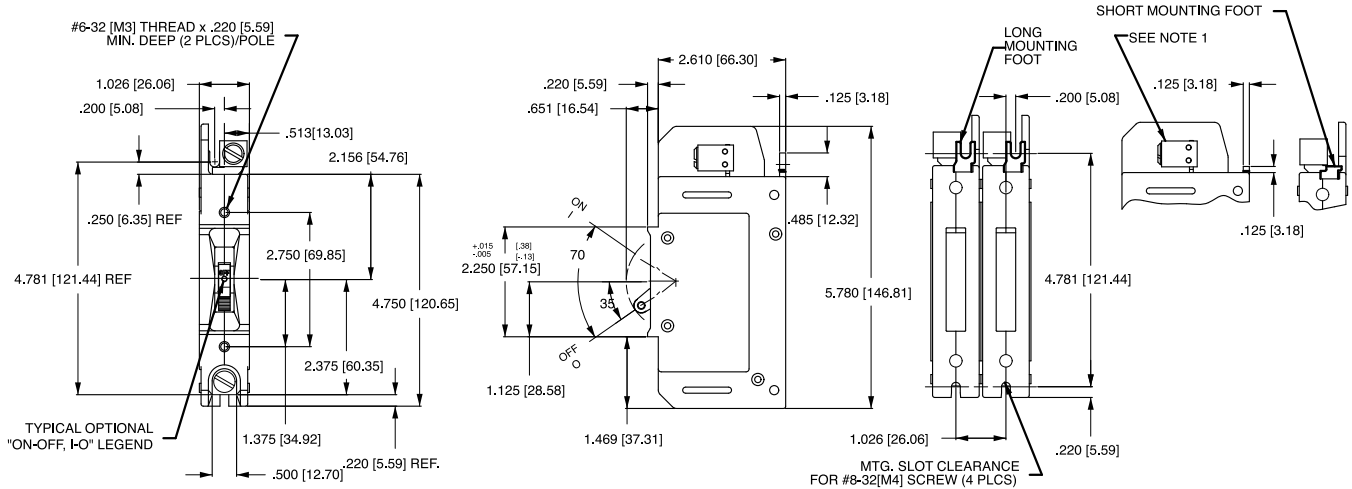
PANEL CUTOUT DETAIL



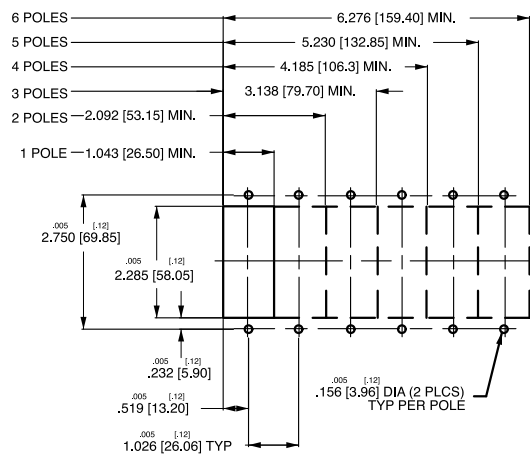
- Notes:
- 1/4 -20 stud terminal in Series Trip circuit configuration shown.
 - A 3" min spacing must be provided between the circuit breaker arc venting area of back connected E-Series circuit breaker and grounded obstructions.
 - All dimensions are in inches [millimeters].
 - Tolerance ±.020 [.51] unless otherwise specified.
 - Circuit breakers must be mounted on vertical surface.

Dimensional Specifications: in. [mm]

MOUNTING INSERTS:



PANEL CUTOUT DETAIL



Notes:

- 1 All dimensions are in inches [millimeters].
- 2 Tolerance $\pm .020$ [.51] unless otherwise specified.
- 3 Box wire connector terminal in Series Trip circuit configuration shown.
- 4 Circuit breakers must be mounted on vertical surface.

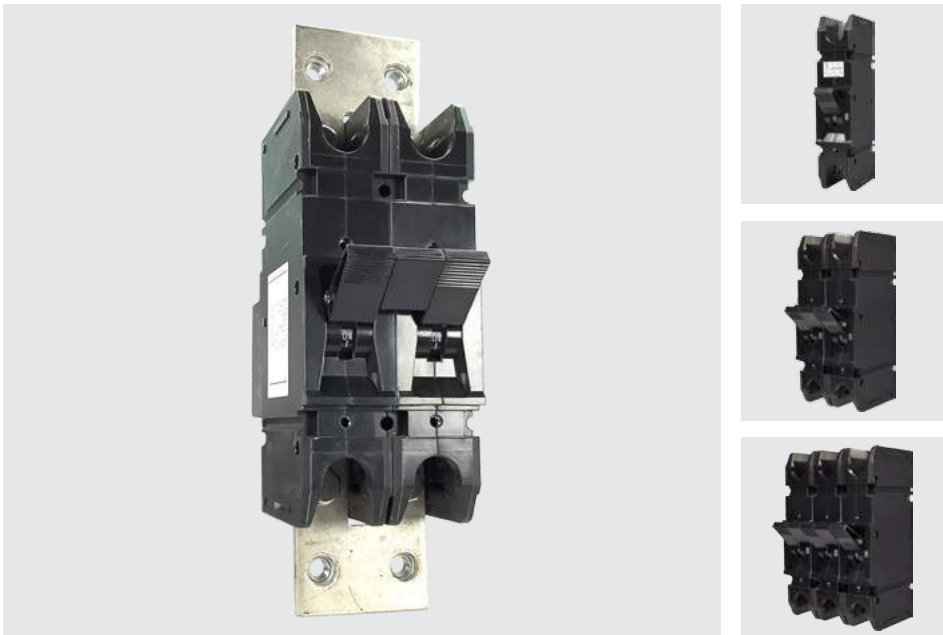
F-Series

F-Series

CIRCUIT BREAKER

The F-Series hydraulic-magnetic high amperage circuit breakers are designed to handle high current applications in extremely hot and/or cold locations. Due to its time-proven hydraulic-magnetic design, the F-Series load sensing mechanism is insensitive to changes in ambient or enclosure temperature, providing a consistent trip point over temperatures ranging from -40°C to +85°C. Additionally, the F-Series circuit breakers come with a choice of overload time delays, making them ideal for critical applications having inductive loads.

Further, the F-Series breakers are available up to 700A and an optional 25 millivolt metering shunt construction provides a safe method for monitoring current flowing through the breaker by simply connecting a meter with light gauge wire to the appropriate terminals located on the shunt housing at the rear of the breaker. Applications can be customized by measuring and displaying percentage of current, watts or safe/danger zones.



Product Highlights:

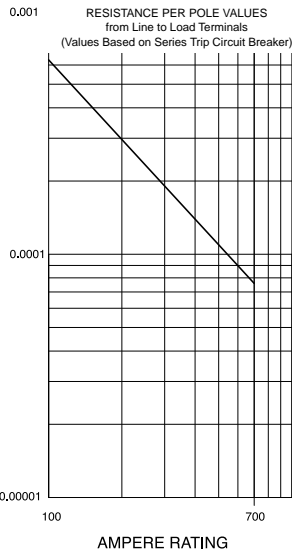
- ♦ AC ratings to UL 489
- ♦ DC voltage ratings up to 700A with metering shunt section
- ♦ Consistent trip point over temperatures ranging from -40°C to +85°C
- ♦ Optional 25 millivolt metering shunt construction

Typical Applications:

- ♦ Ideal for applications under extreme temperatures
- ♦ Higher Amperage Applications
- ♦ Battery Disconnect Systems
- ♦ Solar Power Systems
- ♦ Military

Electrical

Maximum Voltage 125VDC, 277VAC
 Current Ratings Standard current coils: 100, 125, 150, 175, 225, 250 amps. 300, 350, 400, 500, 600, 700 amps available as parallel pole construction.
 Auxiliary Switch Rating SPDT; 10.1 Amps @ 250VAC, 1.0 Amps @ 65VDC, 0.5 Amps @ 80VDC 0.1 Amps @ 125VAC (with gold contacts).
 Insulation Resistance Minimum: 100 Megohms at 500 VDC
 Dielectric Strength 1960 VAC, 50/60 Hz for one minute between all electrically isolated terminals, except 2500 VAC for one minute between alarm/aux. switch and main terminals with contacts in open and closed position. F-Series circuit breakers comply with the 8mm spacing & 3750VAC 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.
 Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.



CURRENT (AMPS)	TOLERANCE (%)
100 - 700	50

Mechanical

Endurance 4000 ON-OFF operations with rated Current & Voltage & 4000 operations with no load (8000 operations total) @ 5 per minute. Parallel Pole construction: 1000 operations with rated Current and Voltage @ 5 per minute.
 Trip Free All F-Series Circuit Breakers will trip on overload, even when the actuator is forcibly held in the ON position.
 Trip Indication The operating actuator moves positively to the OFF position when an overload causes the circuit breaker to trip.

Physical

Number of Poles 1 - 3 Poles Note: Ratings over 250 Amps only available with parallel pole.
 Internal Circuit Config. Series (with or without auxiliary switch), Switch Only (with or without auxiliary switch).
 Available Accessories Factory installed: DC Current Metering Shunt (25 mV @Ir)
 Weight Varies depending on construction. Consult factory.
 Standard Colors Housing - Black; Actuator- Black or White with contrasting ON-OFF legend.

Environmental

Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:
 Shock Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Test Condition "I". Instantaneous and ultra-short curves tested @ 90% of rated current.
 Vibration Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous and ultrashort curves tested at 90% of rated current.
 Moisture Resistance Method 106D; ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.56 days @ +85°C, 85% RH.
 Salt Spray Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).
 Thermal Shock Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).
 Operating Temperature -40° C to +85° C

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

Electrical Tables

Table A: Lists UL Listed (489) and CSA Certified (C22.2 N0. 5.1-M) configurations and performance capabilities as a Molded Case Circuit Breaker

F SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	INTERRUPTING CAPACITY (AMPS)	
	MAX RATING	FREQUENCY	PHASE		UL / CSA 1 - 3 POLES	TUV ² 1 or 2 POLES
SERIES	125	DC	---	50 - 250	50,000	25,000
	120 / 240 ¹	50 / 60	1	100 - 250	10,000	---
	277	50 / 60	1	100 - 250	10,000	---
	208Y / 120	50 / 60	3	100 - 250	10,000	---

Notes:
 1 120/240V rating available in 2 or 3 poles. In a 3 pole construction the center pole is Neutral.
 2 TUV constructions are not available with AC ratings and 150-250 amp ratings only.

Table B: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (Guide DITT, File E189195), under UL489A

F-SERIES TABLE B : UL489 LISTED BRANCH CIRCUIT BREAKERS				
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING FULL LOAD AMPS	INTERRUPTING CAPACITY (AMPS) WITHOUT BACKUP FUSE
	MAX. RATING	FREQUENCY		
SERIES	125	DC	251 - 700	50,000

Agency Certifications

UL Listed

UL 489



Circuit Breakers , Molded Case (Guide DIVQ, File E129899) Complies with the requirements of the CSA Standard for Molded Case Circuit Breakers,

TUV Certified

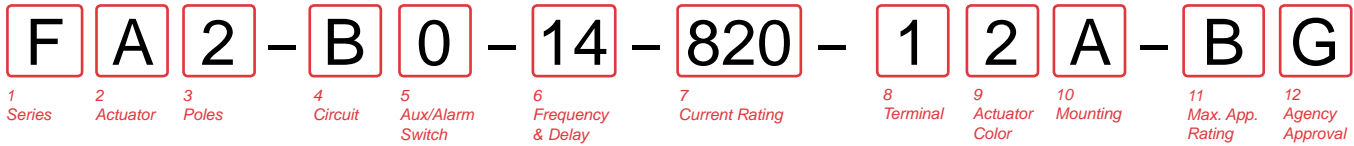


IEC 60947-2
 Low Voltage Switchgear and Control Gear under TUV License No. R72031058

UL 489A



CANCSA- C22.2 No. 5.1 -M Circuit Breakers for Use in Communications Equipment (Guide DITT, File E189195)



1 SERIES
F

2 ACTUATOR
A Handle, one per pole
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES
1 One 2 Two 3 Three

4 CIRCUIT
A¹ Switch Only (no coil)
B Series Trip (current)
C² Series Trip (voltage)
Parallel Pole Construction:
M^{3,4} Series Trip (Current) with Metering Shunt
N^{3,4} Switch Only with Metering Shunt
P³ Series Trip (Current)
Q³ Switch Only

5 AUXILIARY SWITCH⁵
0 without Auxiliary Switch
2 S.P.D.T. 0.110 Q.C. Terminals
3 S.P.D.T. 0.139 Solder Lug
4 S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)
5 S.P.S.T., 0.093 Q.C. Terminals (Gold Contacts)
6 S.P.S.T. 0.110 Q.C. Terminals
7 S.P.S.T. 0.110 Q.C. Terminals (Gold Contacts)
8 S.P.S.T. 0.187 Q.C. Terminals
9 S.P.D.T. 0.187 Q.C. Terminals
A⁶ S.P.S.T., 0.093 Round QC Terminals
B⁶ S.P.D.T., 0.093 Round QC Terminals

6 FREQUENCY & DELAY
03 DC 50/60Hz, Switch Only
10⁷ DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
22 AC Short
24 AC Medium
26 AC Long

7 CURRENT RATING (AMPERES)
CODE AMPERES
810 100.000 820 200.00 835⁸ 350.00 860⁸ 600.00
912 125.00 922 225.00 840⁸ 400.00 870⁸ 700.00
815 150.00 825 250.00 845⁸ 450.00
917 175.00 830⁸ 300.00 850⁸ 500.00
OR VOLTAGE COIL (MIN. TRIP RATING, VOLTS)⁷
CODE AMPERES
A06 6 DC, 5 DC A24 24 DC, 20 DC A65 65 DC, 55 DC
A12 12 DC, 10 DC A32 32 DC, 25 DC B25 125 DC, 100 DC
A18 18 DC, 15 DC A48 48 DC, 40 DC J06 6 AC, 5 AC

8 TERMINAL
Back Connected (Front Mounted Only)
1⁹ 3/8-16 Stud Max Rating 250A
2¹⁴ 3/8-16 Screw, Line & Load 700A
5¹⁴ 3/8-16 Short Stud 250A
Front Connected (Back Mounted Only)¹¹
3 Box Wire Connector, Line & Load 700A
4¹⁴ 3/8-16 Screw, Line & Load 700A

9 ACTUATOR COLOR & LEGEND^{12,13}
Actuator Color I-O ON-OFF Dual Marking Color
White A B 1 Black
Black C D 2 White

10 MOUNTING
Front Mounting Inserts **Back Mounting Inserts**
A 10-32 10-32 screw clearance holes
B ISO M5 10-32 screw clearance holes

11 MAXIMUM APPLICATION RATING
VOLTAGE CURRENT
B 125 VDC 700A
C 15 120/240 250A
F 277 VAC 250A
7¹⁶ 120/208 VAC 250A

12 AGENCY APPROVAL
A No approvals
G UL489 Listed & CUL Certified
J UL489 Listed, CUL Certified & TUV Certified
T UL489A (Telecom) Listed

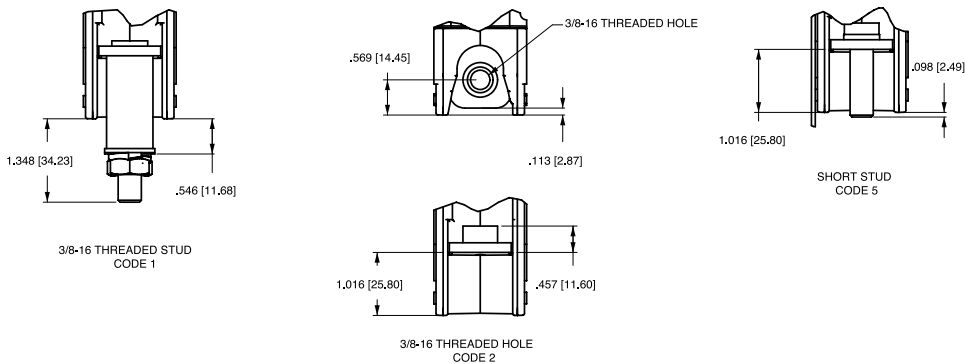
Notes:
1 For 100 to 250 amps, select Current Code 825. For 300-400 amps, select Current Code 840. For 450-700 amps, select Current Code 870.
2 Available with Frequency and Delay code 10 or 20 only, and are not rated for continuous duty. Delay 10 and 20 are only available with voltage coils.
3 Codes M, N, P & Q (Parallel Poles) are supplied with factory installed Bus Bar on Line and Load.
4 4 Metering terminals are female pin type, ref. Molex part number 02-09-1101, model 1189-T.
5 Auxiliary Switch breakers are only available with Series Trip and Switch Only circuits. On multi-pole breakers, one Auxiliary Switch is supplied, mounted in the extreme right pole per figure A. Back-Mounted breakers require special mounting provisions when an Auxiliary Switch is specified.
6 Available with parallel pole construction (circuit codes P and Q, and breakers with circuit codes M and N).
7 Frequency and delay code 10 is only available with Voltage Coils. Voltage Coils are not rated for continuous duty.
8 Ratings over 250 amps are only available with Agency Approval code T (UL489A) and are Parallel Pole configuration (circuit codes M, N, P and Q.) 300-450 amp ratings are available on two pole breakers. 500-700 amp ratings are available on three pole breakers.
9 Per UL requirement, an "Anti-Flash Over Barrier" is supplied between poles on multipole breakers with 3/8 - 16 stud terminals (Terminal Code 1) on AC rated breakers only.
10 Front connected breakers can also be front mounted by utilizing the supplied front panel mounting inserts. Terminal connections must be made before mounting.
11 Box Wire connector will accept #6 through 250 MCM copper wire.
12 Agency codes G & T must have ON-OFF or dual legends. Agency code J must have dual legend.
13 Other colors available. Consult factory.
14 Terminals 2,4 & 5 are shipped without terminal hardware.
15 2 or 3 Pole Circuit Breaker Required for 120/240 VAC Rating.
16 3 Pole Circuit Breaker Required for 120/208 VAC Rating.

Circuit & Terminal Diagrams: in. [mm]

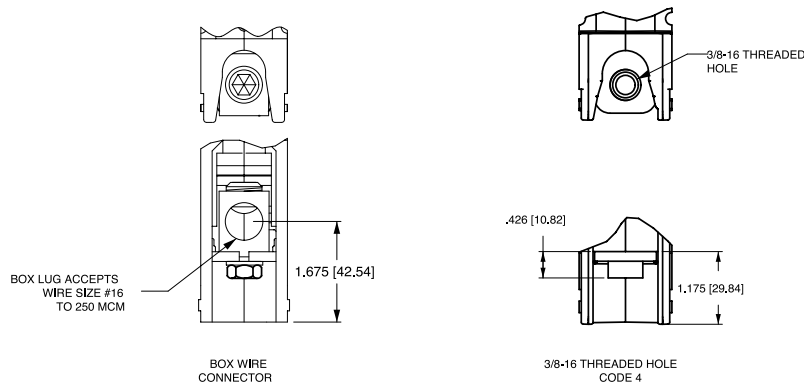
F SERIES NON-PARALLEL POLE CONSTRUCTION:

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>SERIES TRIP (2 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL)</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ), LOAD (LAST)</p>		A	0	<p>SWITCH TRIP</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ) (3), LOAD (LAST)</p>		BC	0
	<p>SERIES TRIP W/AUX. SWITCH (5 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH</p> <p>ANSI: LINE, NC, NO, C, LOAD</p> <p>IEC: LINE (NETZ), NC, NO, C, LOAD (LAST)</p>			A	2 3 4 5 9		

TERMINAL DETAILS BACK CONNECT



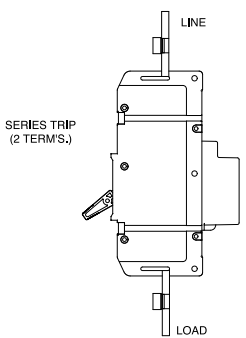
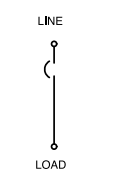
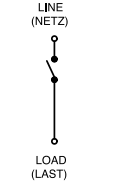
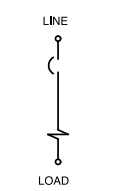
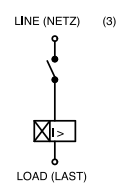
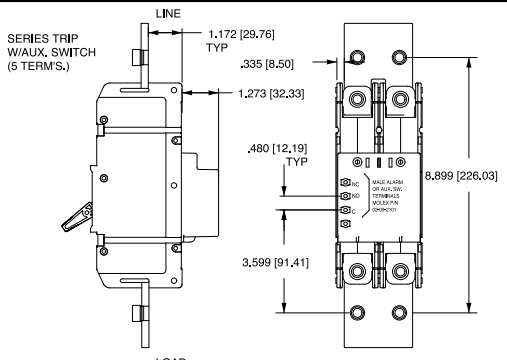
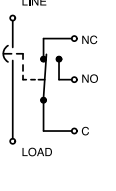
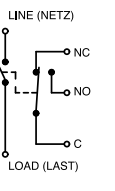
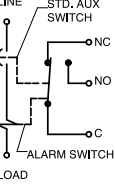
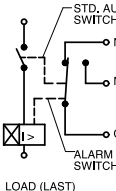
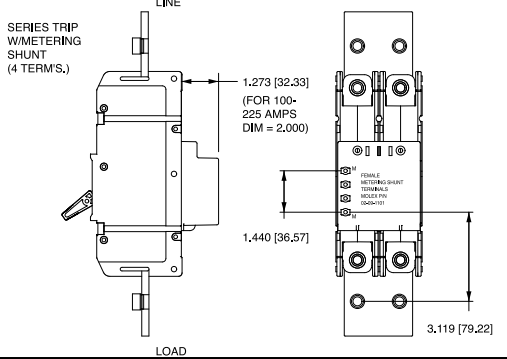
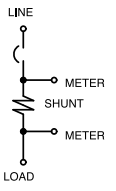
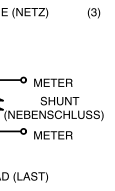
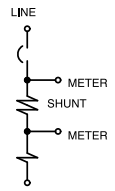
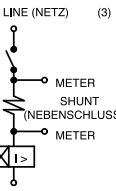
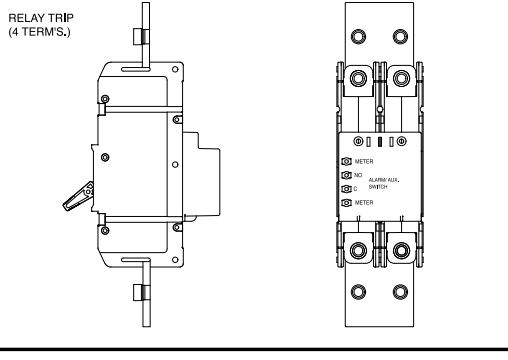
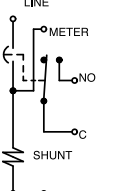
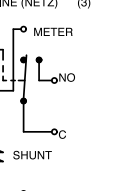
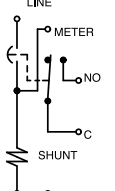
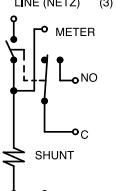
FRONT CONNECT



Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.20 [.51] unless otherwise specified.

Circuit & Terminal Diagrams: in. [mm]

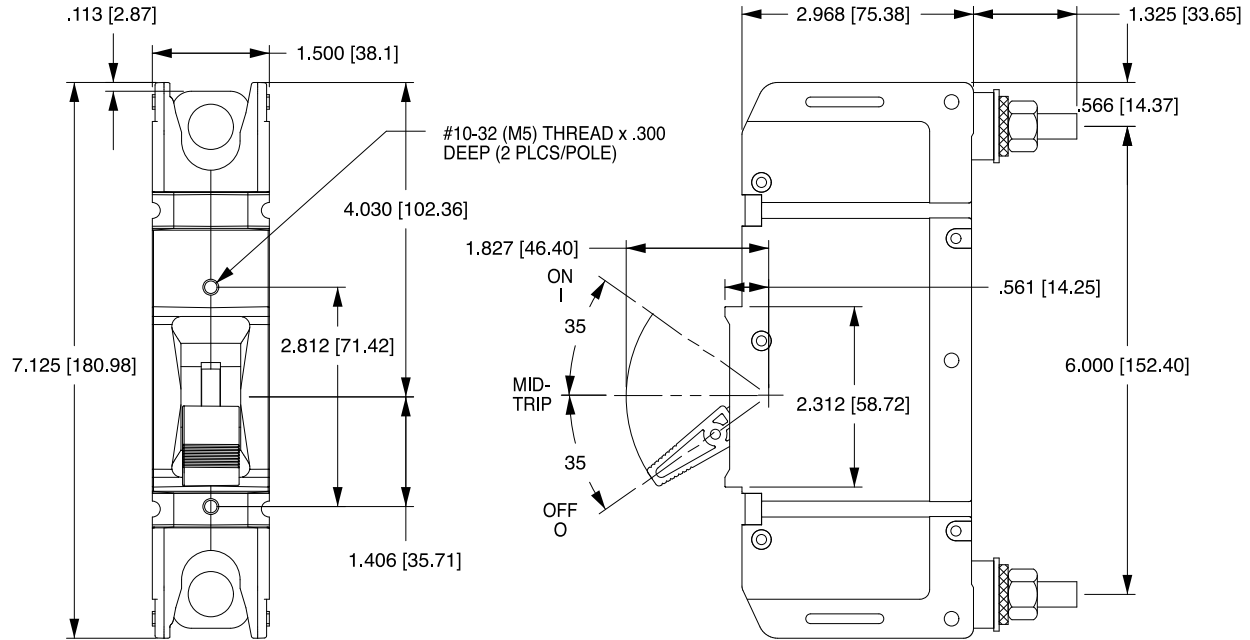
F-SERIES PARALLEL POLE CONSTRUCTION:

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>SERIES TRIP (2 TERMS.)</p> 	<p>SWITCH ONLY (NO COIL)</p>  		A	0	<p>SERIES TRIP</p>  		BC	0
<p>SERIES TRIP W/AUX. SWITCH (5 TERMS.)</p> 	<p>SWITCH ONLY (NO COIL) WITH ALARM OR AUX. SWITCH</p>  		A	B	<p>SERIES TRIP WITH ALARM OR AUX. SWITCH</p>  		BC	B
<p>SERIES TRIP W/METERING SHUNT (4 TERMS.)</p> 	<p>SWITCH ONLY (NO COIL) WITH METERING SHUNT</p>  		N	0	<p>SERIES TRIP CURRENT COIL WITH METERING SHUNT</p>  		M	0
<p>RELAY TRIP (4 TERMS.)</p> 	<p>SWITCH ONLY WITH ALARM OR AUX. SWITCH AND METERING SHUNT</p>  		N	A	<p>SERIES TRIP WITH ALARM OR AUX. SWITCH AND METERING SHUNT</p>  		M	A

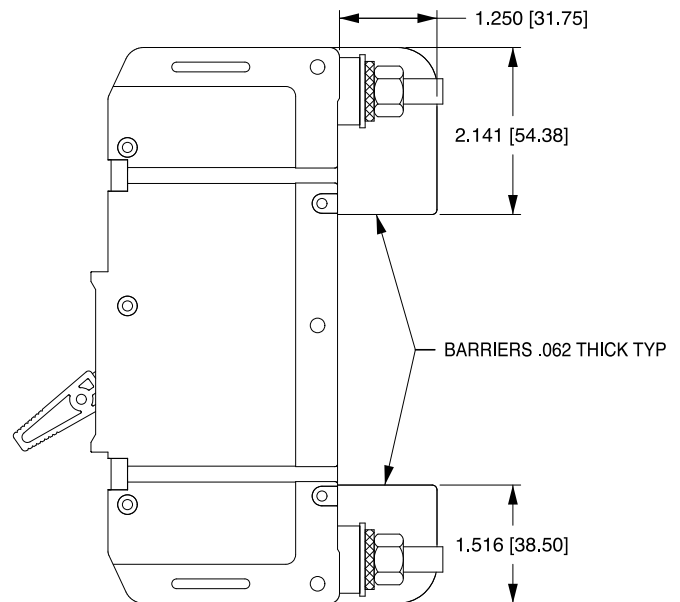
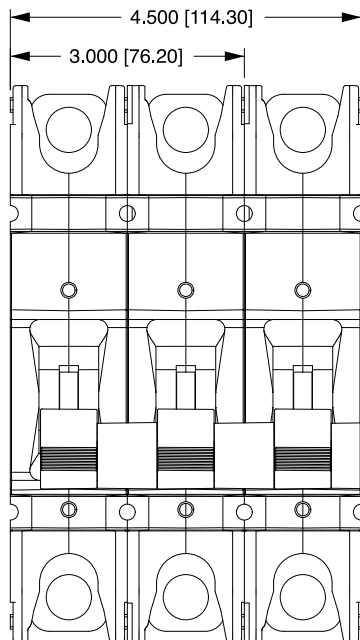
- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

SERIES TRIP BACK CONNECT (STUD TERMINALS SHOWN)



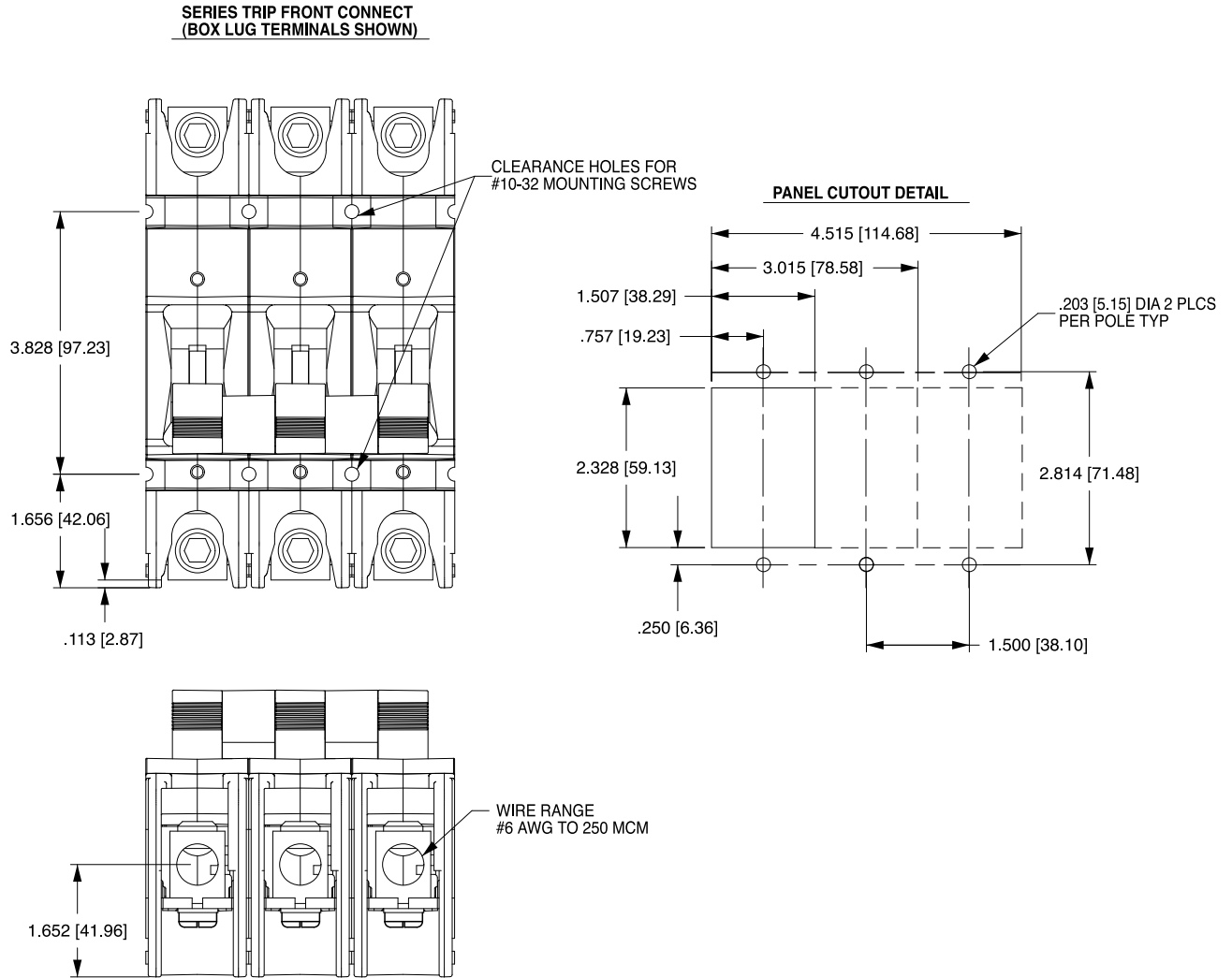
MULTIPOLE SERIES TRIP, SHOWING TERMINAL BARRIER



Notes:

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

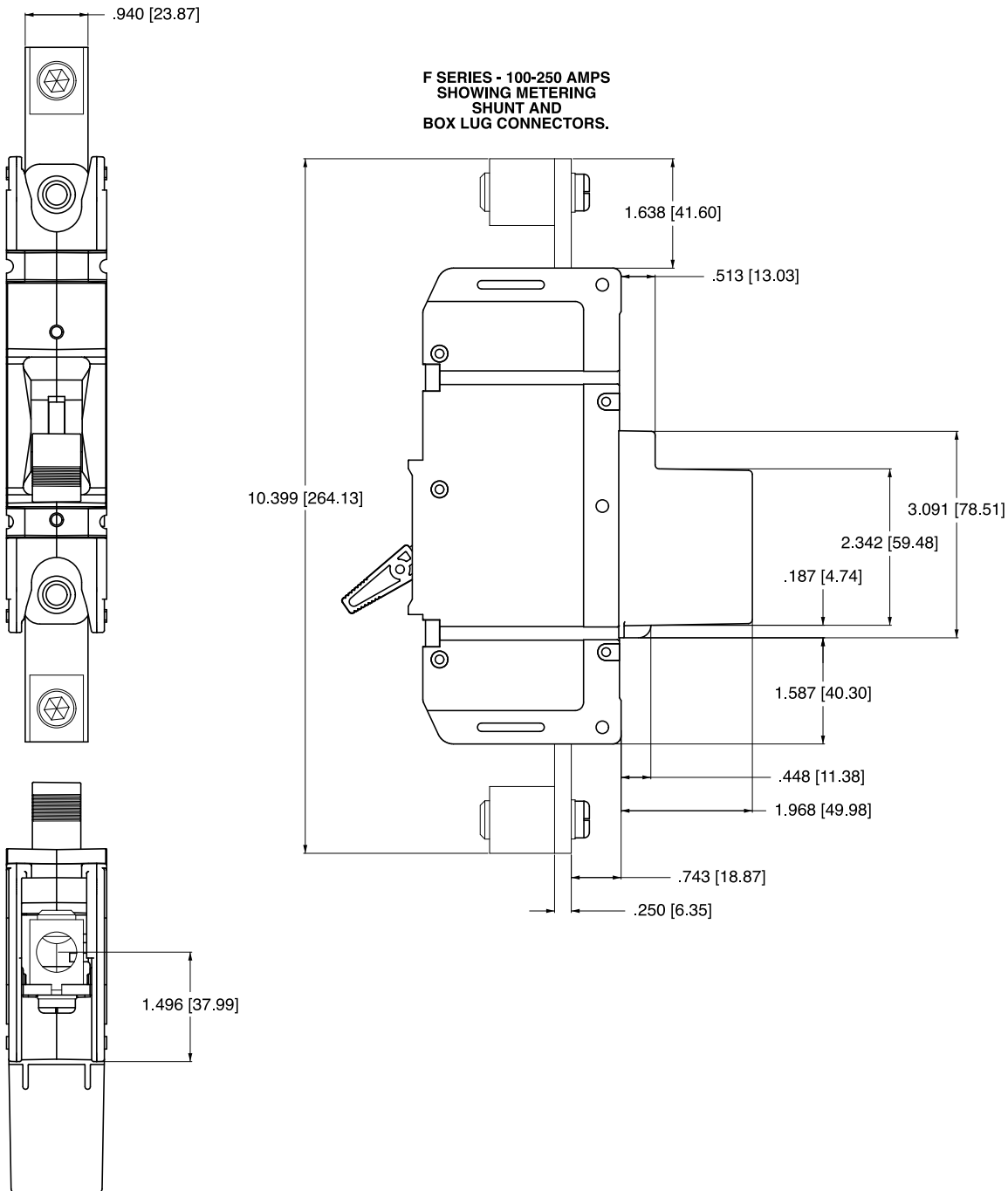
Dimensional Specifications: in. [mm]



Notes:

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

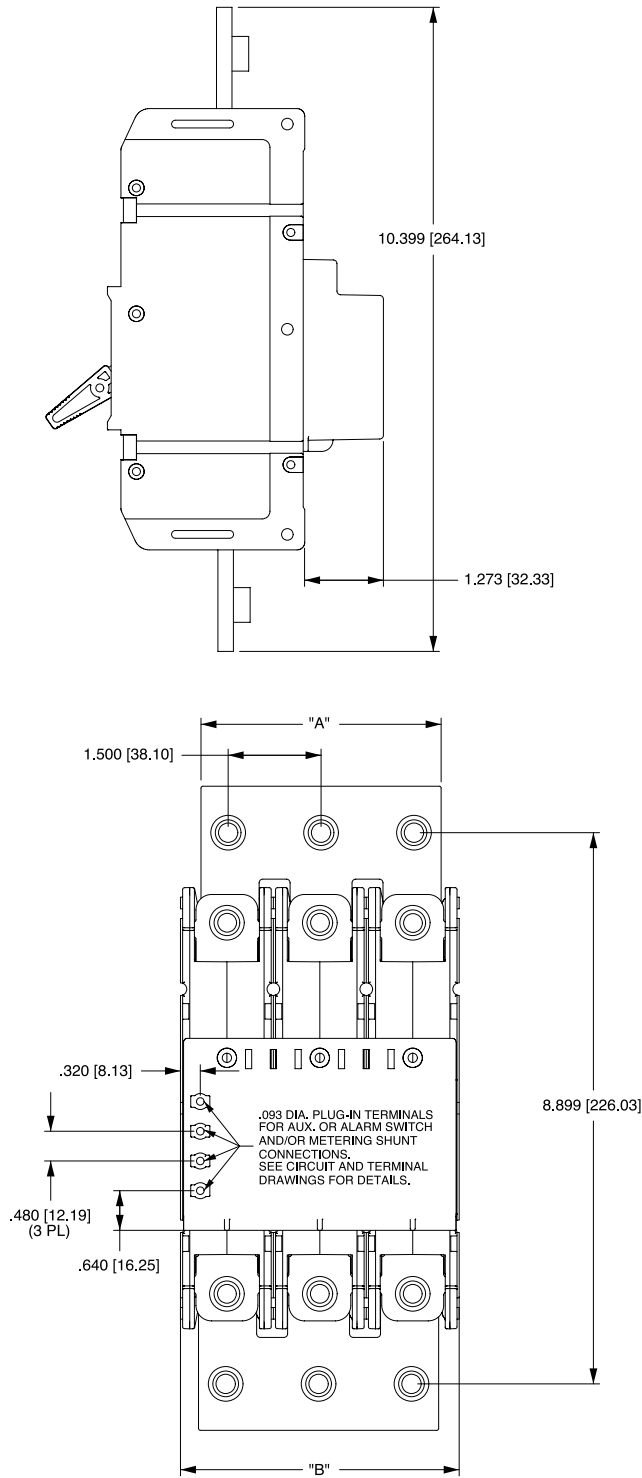
Dimensional Specifications: in. [mm]



F-Series breakers are available up to 700A, and are also available with a 25 millivolt metering shunt construction. This optional construction provides a safe method for monitoring current flowing through the breaker by simply connecting a meter with light gauge wire to the appropriate terminals located on the shunt housing at the rear of the breaker. You can customize the application by measuring and displaying percentage of current, watts or safe/danger zones.

- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.20 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



**F-SERIES PARALLEL POLE 250-700 AMPS
SHOWING FRONT CONNECT SCREW TERMINALS**

- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

C-Series

REMOTE OPERATED CIRCUIT BREAKER

The C-Series remote operated circuit breaker consists of a custom designed remote operated motor module (housed within a circuit breaker molding) coupled to a C-Series hydraulic-magnetic circuit breaker. The remote operated circuit breaker (ROCB) offers the convenience of remote ON, OFF, and Reset capability combined with the safety and accuracy of a standard magnetic current sensing device. This allows operation of the circuit breaker from various locations in a system, facility or site without sacrificing the ability to manually operate the breaker if required. Service, diagnostics, load shedding and power distribution control functions can now be performed in areas that were previously unattended, inaccessible.

The ROCB module can be mounted on either side of the host breaker, while occupying only the width of a standard C-Series pole. Several interface methods are available.



Product Highlights:

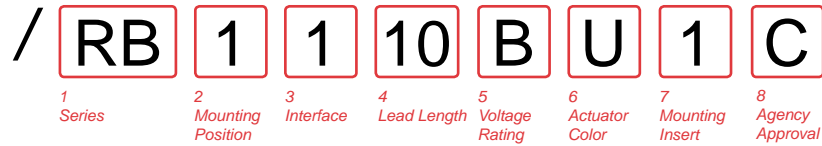
- ◆ ON-OFF and trip indication
- ◆ Load shedding
- ◆ Energy management
- ◆ Compact size
- ◆ Automatic reset capable
- ◆ Choice of interface styles
- ◆ Panel mounting
- ◆ Manual Operation Override
- ◆ Fits into industry standard cut-out

ROCB Motor Specifications:

- ◆ Voltage input: 12 VDC to 80 VDC
- ◆ Start current: < 1 amp
- ◆ Switching time: < 2 seconds
- ◆ Operating Temperature: -25°C to 80°C

To order a remote operated circuit breaker, add / plus the remote module part number to the end of the C-Series circuit breaker catalog number. ex. CA1BO24620121C/RB1110BU1C

Match color & mounting inserts of breaker.



1 SERIES
RB

2 MOUNTING POSITION
As viewed from back of breaker, line side up, pole 1 left.
1 Left Side
2 Right Side

3 INTERFACE
1 Flying Leads
2 Integral Connector
3 Flying Leads with 4 pin dual row connector (female)
4 Flying Leads with 4 pin dual row connector (male)

4 LEAD LENGTH		
00	No Lead	
01	1"	
02	2"	
03	3"	
04	4"	
05	5"	
06	6"	
07	7"	
08	8"	
09	9"	
10	10"	
11	11"	
12	12"	
13	13"	
14	14"	
15	15"	
16	16"	
17	17"	
18	18"	
19	19"	
20	20"	
21	21"	
22	22"	
23	23"	
24	24"	
25	25"	
26	26"	
27	27"	
28	28"	
29	29"	
30	30"	

5 VOLTAGE RATING
A 12 VDC
B 20-40 VDC
C 41-80 VDC

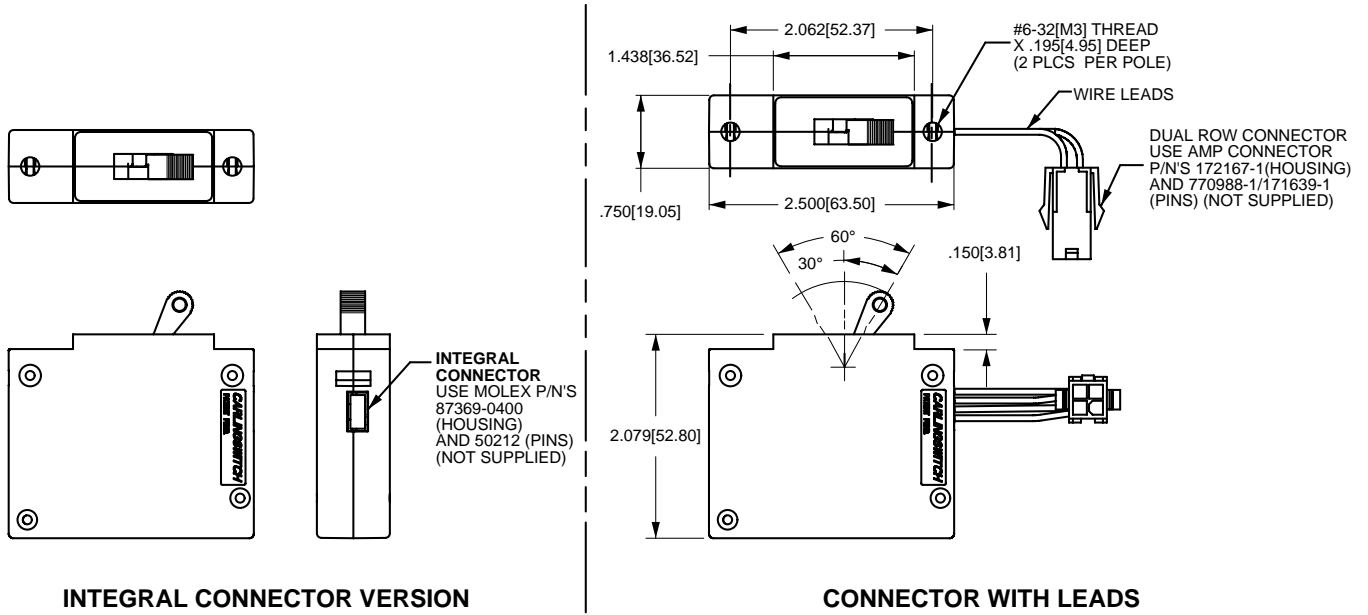
6 ACTUATOR COLOR
T White
U Black
V Red
W Yellow

7 MOUNTING INSERT
1 6-32 x 0.195"
2 ISO M3 x 5mm

8 AGENCY APPROVAL
C UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
G UL 489 Listed & CSA Certified
I UL 1500 Ignition Protected, UL Recognized & CSA Accepted
J UL 489 Listed, CSA Certified & TUV Certified

Notes:
Integral and 4-pin dual row connectors not available with agency approval J or G: UL 489.

Dimensional Specifications: in. [mm]

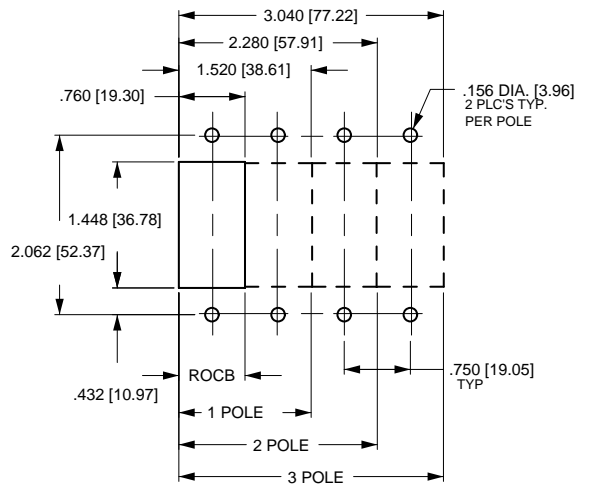
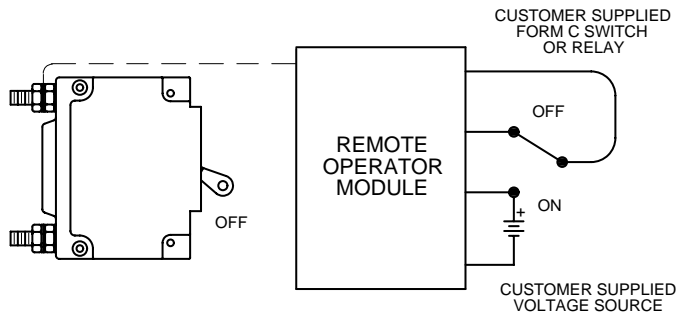


INTEGRAL CONNECTOR VERSION

CONNECTOR WITH LEADS

PANEL CUTOUT DETAIL

TOLERANCES ±.005 [.12]

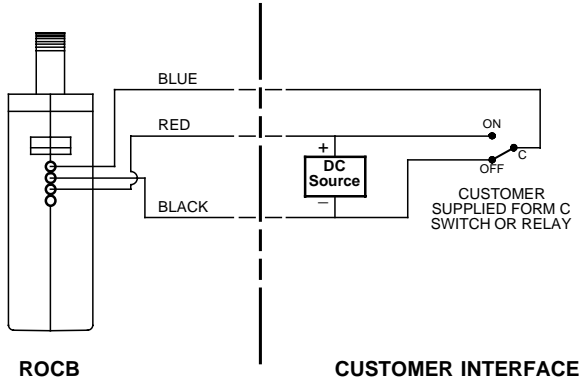


Notes:

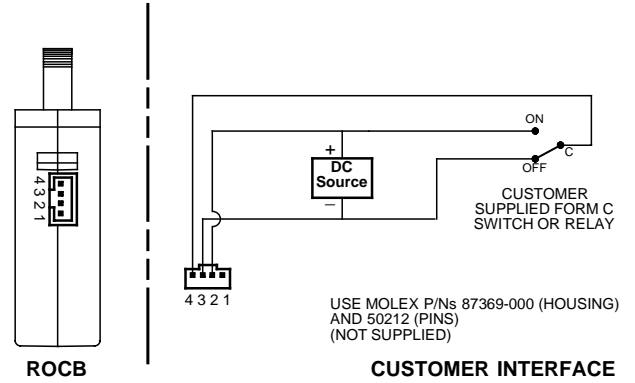
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [.51] unless otherwise specified.

Wire Instructions

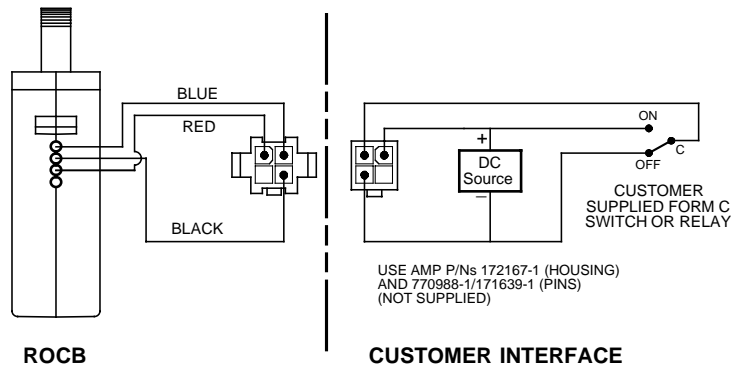
CATALOG INTERFACE OPTION 1 (FLYING LEADS) WIRING INSTRUCTIONS



CATALOG INTERFACE OPTION 2 (INTEGRAL CONNECTOR) WIRING INSTRUCTIONS

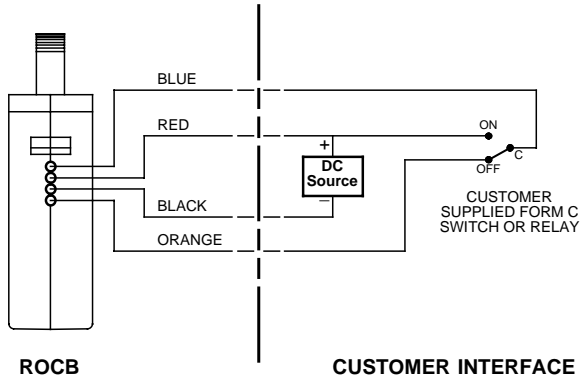


CATALOG INTERFACE OPTION 3 (FLYING LEADS WITH 4 PIN DUAL ROW CONNECTOR) WIRING INSTRUCTIONS

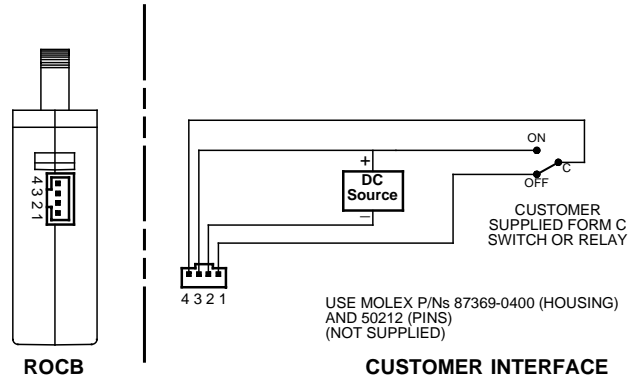


Wire Instructions

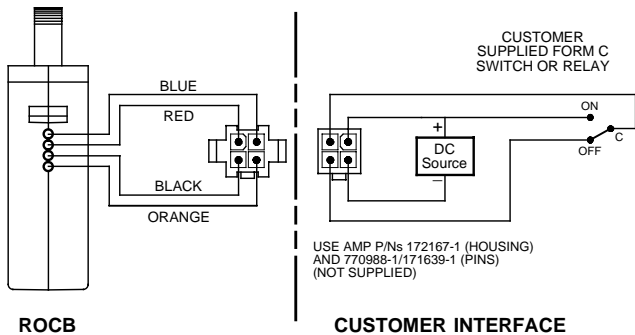
CATALOG INTERFACE OPTION 1 (FLYING LEADS) WIRING INSTRUCTIONS



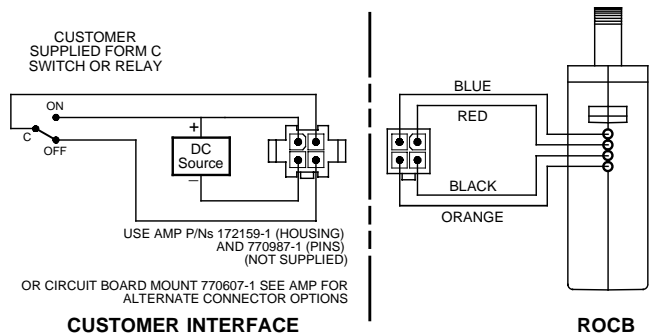
CATALOG INTERFACE OPTION 2 (INTEGRAL CONNECTOR) WIRING INSTRUCTIONS



CATALOG INTERFACE OPTION 3 (FLYING LEADS WITH FEMALE 4 PIN DUAL ROW CONNECTOR) WIRING INSTRUCTIONS

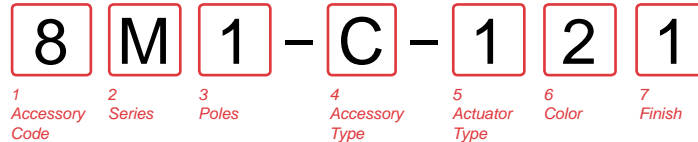


CATALOG INTERFACE OPTION 4 (FLYING LEADS WITH MALE 4 PIN DUAL ROW CONNECTOR) WIRING INSTRUCTIONS



Panel Hole Plug

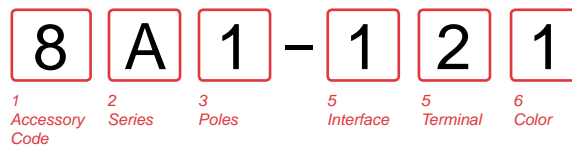
Threaded insert A & B-Series hole plugs are available in gloss finish. Snap-In A & B-Series hole plugs are available in matte finish.



<p>1 ACCESSORY CODE</p> <p>8</p>	<p>5 ACTUATOR TYPE & MOUNTING STYLE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Actuator Type</th> <th style="text-align: left;">Mounting Style</th> </tr> </thead> <tbody> <tr> <td>1 M-Series Rocker</td> <td>Front Panel Snap-In</td> </tr> <tr> <td>2 A & B-Series Rocker</td> <td>6-32 Threaded Insert</td> </tr> <tr> <td>3 A & B-Series Rocker</td> <td>ISO M3 Threaded Insert</td> </tr> <tr> <td>6 C & D-Series Handle</td> <td>6-32 Threaded Insert</td> </tr> <tr> <td>7 C & D-Series Handle</td> <td>ISO M3 Threaded Insert</td> </tr> <tr> <td>8 A, B, C & D-Series Handle</td> <td>Front Panel Snap-In</td> </tr> </tbody> </table>	Actuator Type	Mounting Style	1 M-Series Rocker	Front Panel Snap-In	2 A & B-Series Rocker	6-32 Threaded Insert	3 A & B-Series Rocker	ISO M3 Threaded Insert	6 C & D-Series Handle	6-32 Threaded Insert	7 C & D-Series Handle	ISO M3 Threaded Insert	8 A, B, C & D-Series Handle	Front Panel Snap-In
Actuator Type	Mounting Style														
1 M-Series Rocker	Front Panel Snap-In														
2 A & B-Series Rocker	6-32 Threaded Insert														
3 A & B-Series Rocker	ISO M3 Threaded Insert														
6 C & D-Series Handle	6-32 Threaded Insert														
7 C & D-Series Handle	ISO M3 Threaded Insert														
8 A, B, C & D-Series Handle	Front Panel Snap-In														
<p>2 SERIES</p> <p>A A & B-Series C C & D-Series M M-Series</p>	<p>6 COLOR</p> <p>1 White (M-Series only) 2 Black 7 Gray (M-Series only)</p>														
<p>3 POLES</p> <p>1 One Pole A, B, C & D-Series Front Panel Snap-In Only 2 Multi-Pole Inner 3 Multi-Pole Outer</p>	<p>7 FINISH</p> <p>1 Matte 2 Gloss (A & B-Series only)</p>														
<p>4 ACCESSORY TYPE</p> <p>C Panel Hole Plug</p>															

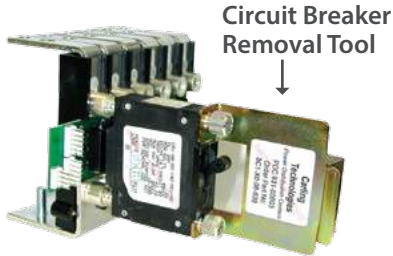
A & B-Series PCB Socket

The PCB socket is available with the A-Series Handle, DC up to 30 amps; A-Series Rocker, AC/DC up to 30 amps, and B-Series handle, AC/DC up to 30 amps.



<p>1 ACCESSORY CODE</p> <p>8</p>	<p>4 INTERFACE WITH AUXILIARY SWITCH</p> <p>1 Yes 2 No</p>
<p>2 SERIES</p> <p>A A & B-Series</p>	<p>5 AUXILIARY SWITCH TERMINAL TYPE</p> <p>1 TAB, 0.110 Inches (Symmetrical terminal spacings) 3 None</p>
<p>3 POLES</p> <p>1 One Pole</p>	<p>6 COLOR</p> <p>B Black</p>

C-Series with Push-In Stud Terminals Removal Tool



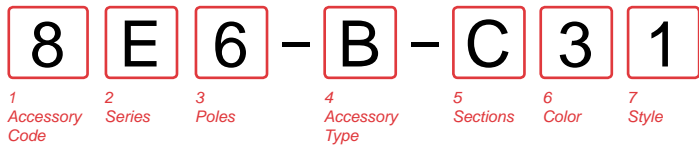
8C1-X0-08-639

1 Part Number

1 PART NUMBER	
8C1-X0-08-639	Removal Tool for 6-32 inserts
8C1-X0-09-593	Removal Tool for M3 inserts

C & E-Series Power Selector

The number of lockout sliding handles provided is one less than the number of sections specified, allowing one section to be live at a time.



1 ACCESSORY CODE
8

2 SERIES
C C & D-Series
E E-Series

3 POLES
4 4 Poles
6 6 Poles
9¹ 9 Poles

4 ACCESSORY TYPE
B Power Lockout Kit

5 SECTIONS & POLES PER SECTION		
	Number of Sections	Poles Per Section
B	Two	Two
C	Two	Three
F	Three	Two
G	Three	Three

6 COLOR
2 Black
3 Red

7 STYLE
1 Carling Logo

Notes:
1 9 Pole option only available on E-Series

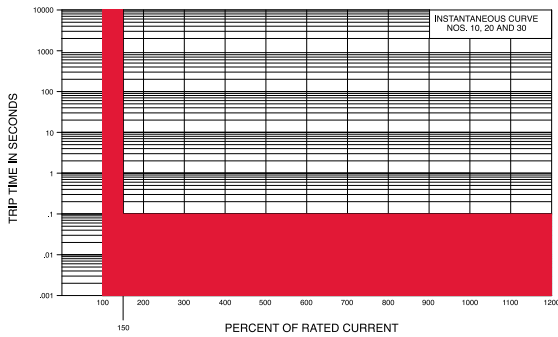
M, MS-SERIES TIME DELAY VALUES										
TRIP TIME SECONDS	PERCENT OF RATED CURRENT									
	Delay	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
		10, 20, 30	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
	12, 22, 32, 62, 72, 92	No Trip	.300 - 7.00	.200 - 5.00	.100 - 2.00	.030 - .500	.008 - .300	.006 - .150	.005 - .100	.005 - .100
	14, 24, 34, 64, 74, 94	No Trip	3.00 - 70.0	2.00 - 40.0	1.00 - 15.0	.100 - 4.00	.008 - 2.00	.006 - .800	.005 - .350	.005 - .160

Notes:

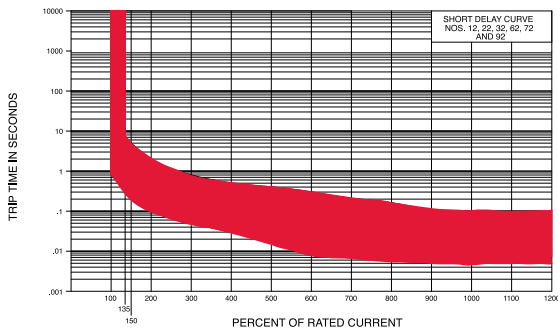
- 1 Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
- 2 Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
- 3 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.
- 4 The minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 18 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration, such as switching power supplies, highly capacitive loads and transformer loads.

Dual Rated AC/DC

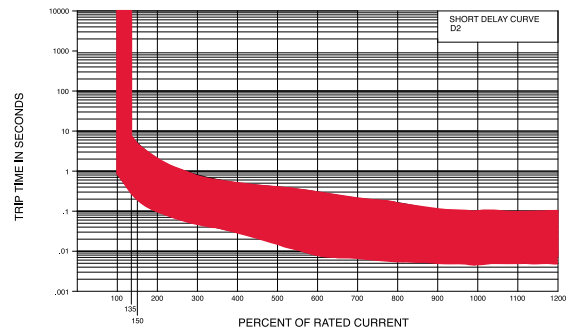
Instantaneous



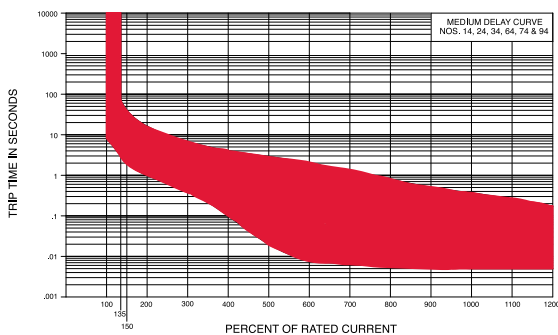
Short



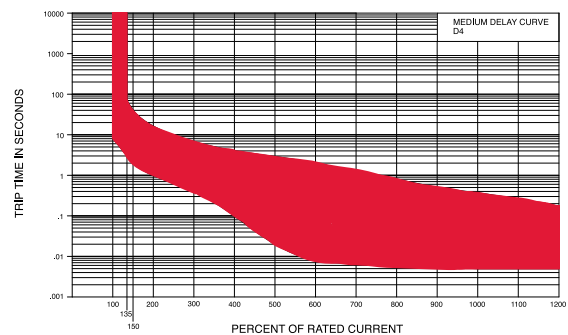
Short D2



Medium



Medium D4



A, B, C, CX, D, G, H, L, N-SERIES TIME VALUES											
TRIP TIME (SECONDS)	PERCENT OF RATED CURRENT										
	DELAY	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
10	No Trip	May Trip	---	.032 MAX	.024 MAX	.020 MAX	.018 MAX	.016 MAX	.015 MAX	.013 MAX	
11	No Trip	.013 - .125	---	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020	.004 - .020	
12	No Trip	.500 - 6.50	---	.300 - 3.00	.130 - 1.20	.031 - .220	.011 - .120	.004 - .090	.004 - .060	.004 - .040	
14	No Trip	2.00 - 60.0	---	1.20 - 40.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .100	.004 - .100	
16	No Trip	45.0 - 345	---	20.0 - 150	9.00 - 60.0	1.40 - 11.4	.150 - 5.80	.009 - 3.70	.005 - 1.70	.005 - .500	
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	
32	No Trip	May Trip	.400 - 8.00	.300 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .060	.004 - .040	
34	No Trip	May Trip	1.80 - 100	1.20 - 60.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .110	.004 - .100	
36	No Trip	May Trip	35.0 - 520	20.0 - 350	9.00 - 90.0	1.40 - 15.0	.150 - 7.00	.009 - 3.70	.005 - 2.00	.004 - 1.00	
42	No Trip	.700 - 12.0	---	.400 - 6.00	.180 - 2.30	.050 - .600	.026 - .300	.018 - .200	.014 - .150	.012 - .130	
44	No Trip	7.00 - 100	---	3.00 - 50.0	1.10 - 18.0	.220 - 3.00	.120 - 1.70	.075 - 1.20	.050 - .850	.042 - .720	
46	No Trip	50.0 - 700	---	31.0 - 350	12.0 - 150	1.50 - 20.0	.700 - 10.0	.404 - 7.90	.260 - 6.50	.198 - 5.80	
52	No Trip	.500 - 6.50	---	.340 - 4.50	.180 - 2.30	.051 - .600	.030 - .320	.018 - .220	.014 - .200	.012 - .130	
54	No Trip	1.50 - 50.0	---	.750 - 35.0	.350 - 18.0	.110 - 3.00	.070 - 1.70	.045 - 1.40	.039 - 1.30	.035 - 1.30	
56	No Trip	45.0 - 345	---	19.0 - 170	8.50 - 100	1.24 - 15.0	.410 - 9.00	.256 - 8.00	.210 - 5.50	.198 - 2.90	

Notes:

UL489 C-Series Breakers available with Delay Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46.

Delay Curves 11,12,14,16,21,22,24,26,42,44,46,52,54,56: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.

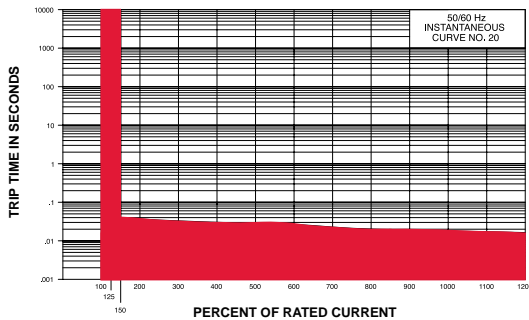
Delay Curves 32,34,36: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.

Delay Curves 10,20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.

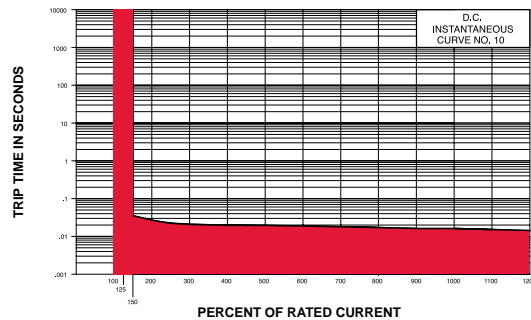
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.

On 50 amp and less current ratings, the minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 25 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents such as switching power supplies, highly capacitive loads and transformer loads.

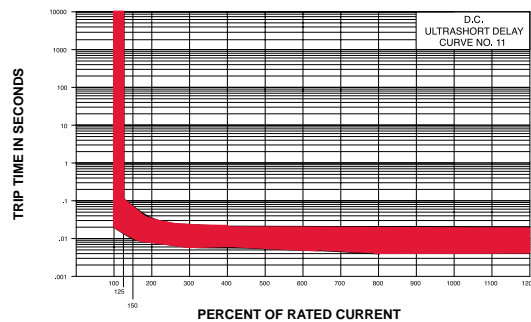
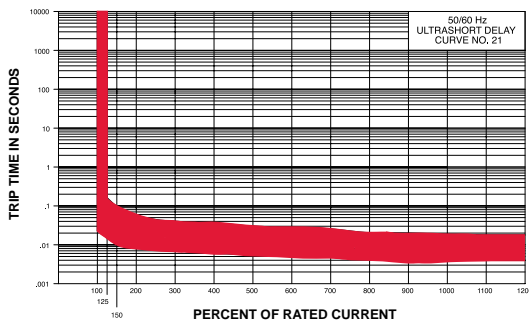
Instantaneous AC



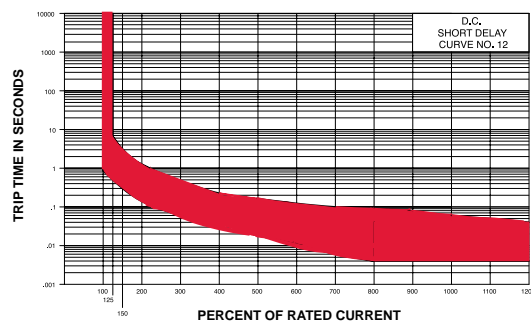
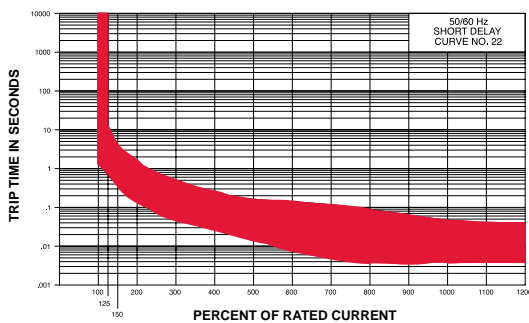
DC



Ultrashort

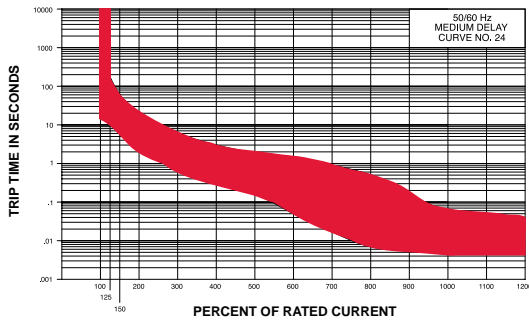


Short

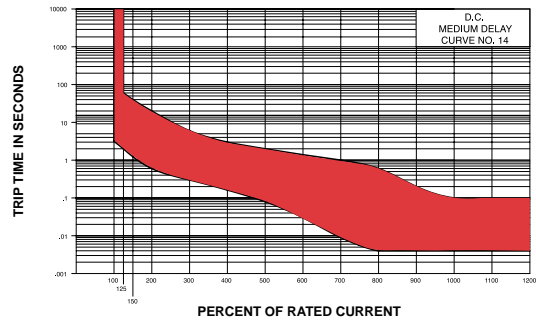


Medium

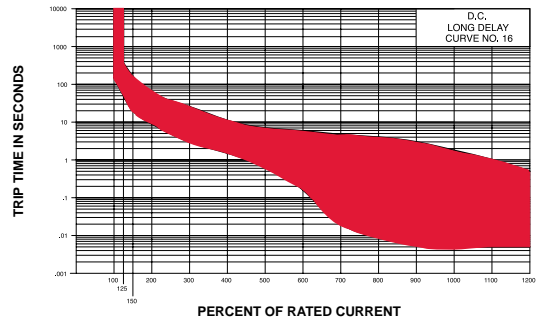
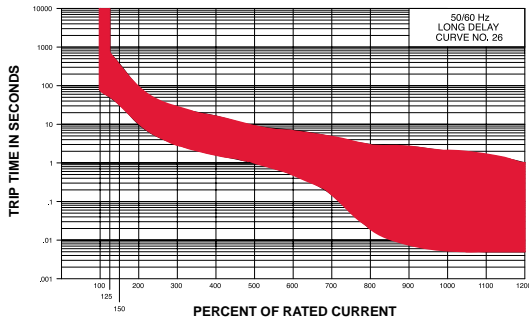
AC



DC

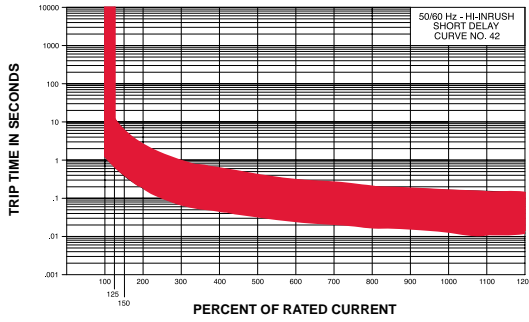


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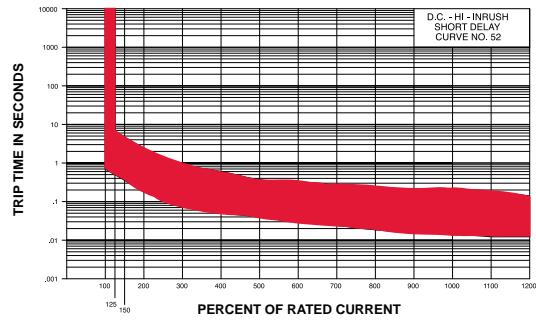


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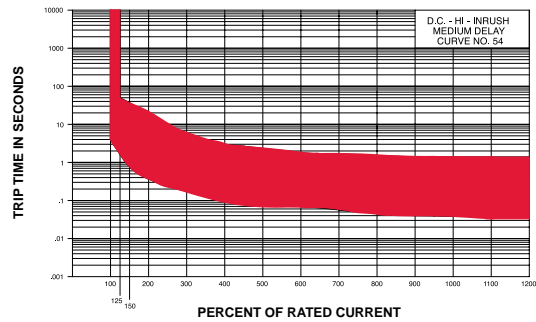
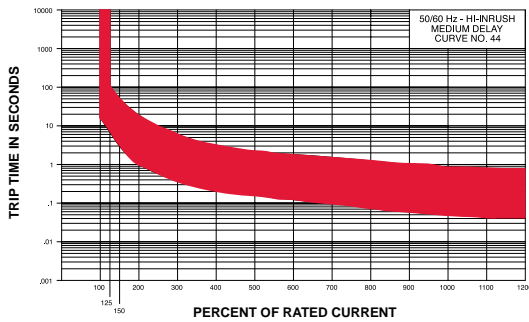
High Inrush AC



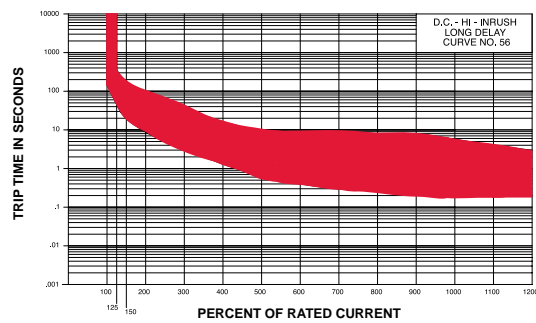
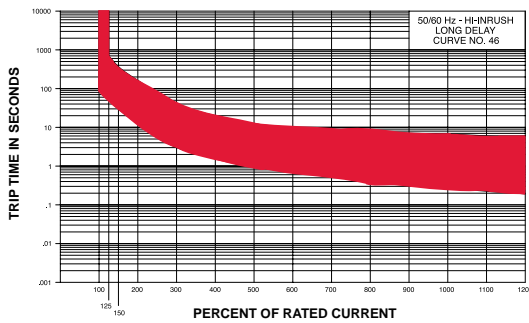
High Inrush DC



Medium

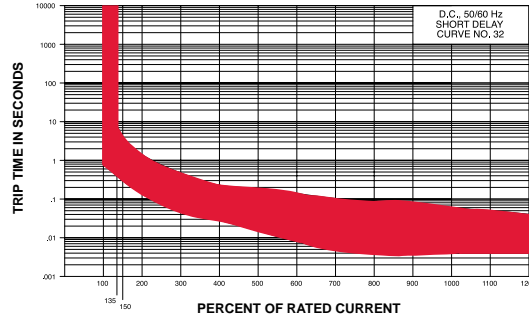


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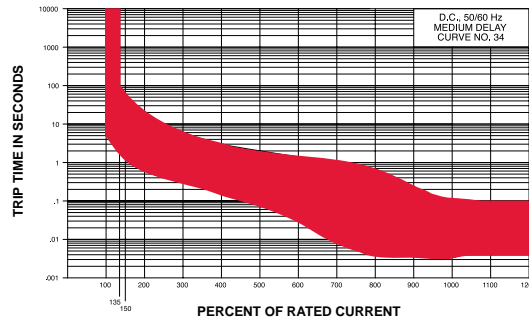


AC/DC

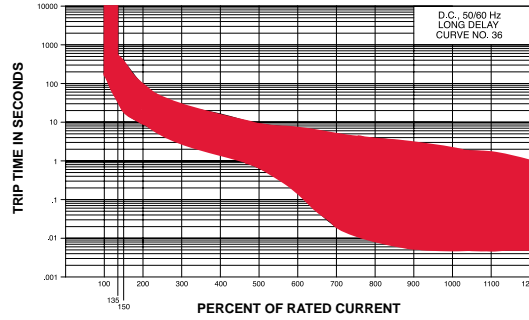
Short



Medium



Long



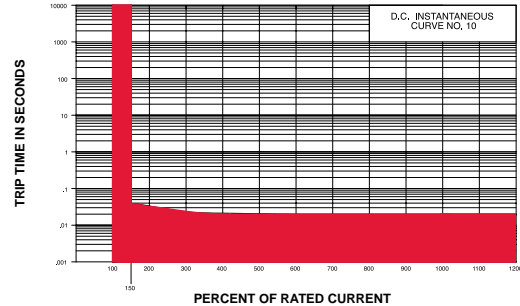
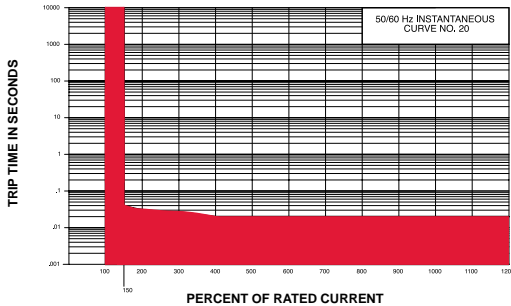
E-SERIES TIME DELAY VALUES											
TRIP TIME (SECONDS)	PERCENT OF RATED CURRENT										
	Delay	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
10	No Trip	May Trip	---	---	.001 - .038	.001 - .032	.001 - .021	.001 - .019	.001 - .019	.001 - .019	.001 - .019
12, 72	No Trip	.600 - 7.00	---	---	.330 - 2.00	.150 - .800	.033 - .160	.016 - .071	.010 - .048	.008 - .040	.008 - .040
14, 74	No Trip	11.0 - 110	---	---	6.00 - 45.0	3.00 - 18.0	.280 - 3.50	.013 - 1.50	.010 - .130	.009 - .090	.009 - .080
16, 76	No Trip	100 - 800	---	---	50.0 - 360	20.0 - 120	3.00 - 25.0	.020 - 11.0	.010 - .700	.009 - .230	.009 - .200
20	No Trip	May Trip	---	---	.001 - .040	.001 - .031	.001 - .020	.001 - .020	.001 - .020	.001 - .020	.001 - .020
22, 62	No Trip	.800 - 5.00	---	---	.400 - 2.30	.150 - .900	.034 - .170	.020 - .080	.012 - .051	.010 - .040	.009 - .040
24, 64	No Trip	7.20 - 90.0	---	---	4.40 - 35.0	2.00 - 15.0	.500 - 3.50	.025 - 1.60	.012 - .330	.010 - .070	.009 - .050
26, 66	No Trip	50.0 - 500	---	---	32.0 - 250	14.0 - 120	2.50 - 24.0	.320 - 7.00	.0125 - 3.10	.011 - .130	.010 - .055
30	No Trip	May Trip	---	---	.001 - .040	.001 - .032	.001 - .020	.001 - .020	.001 - .020	.001 - .020	.001 - .020
32, 92	No Trip	May Trip	.450 - 5.20	---	.330 - 2.30	.150 - .900	.033 - .170	.016 - .080	.009 - .051	.008 - .040	.008 - .040
34, 94	No Trip	May Trip	5.80 - 73.0	---	4.40 - 45.0	2.00 - 18.0	.280 - 3.60	.013 - 1.60	.010 - .330	.009 - .090	.009 - .080
36, 96	No Trip	May Trip	42.0 - 600	---	32.0 - 360	14.0 - 120	2.50 - 25.0	.020 - 11.0	.010 - 4.10	.009 - .330	.009 - .200

NOTES
 Delay Curves 10,20,30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in these curves.
 Delay Curves 12,14,16,22,24,26,62,64,66,72,74,76: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in these curves.
 Delay Curves 32,34,36,92,94,96: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in these curves.
 All curves: 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 capacity on the above standard delays is 16 times rated current & 20 times rated current for high inrush delays based on a 60Hz 1/2 cycle, 8.33 ms pulse.

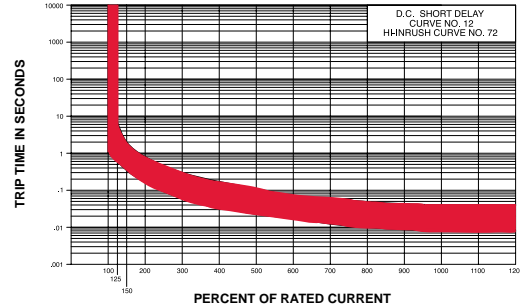
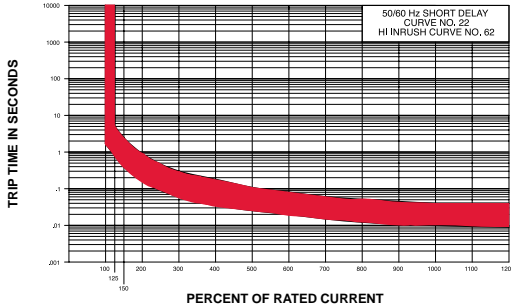
Instantaneous

AC

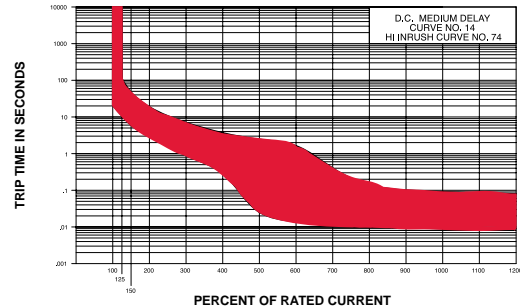
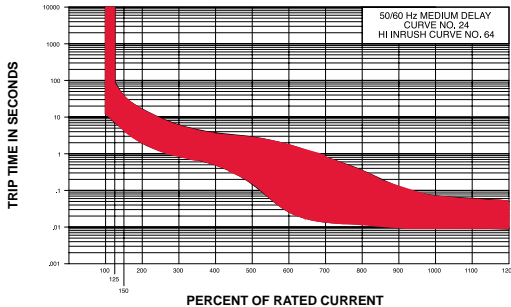
DC



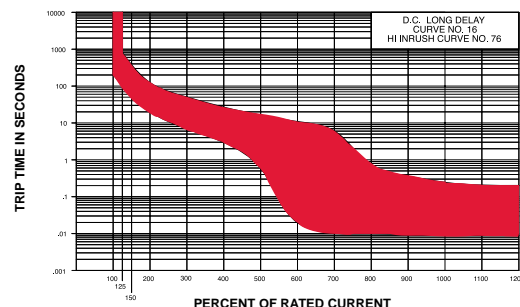
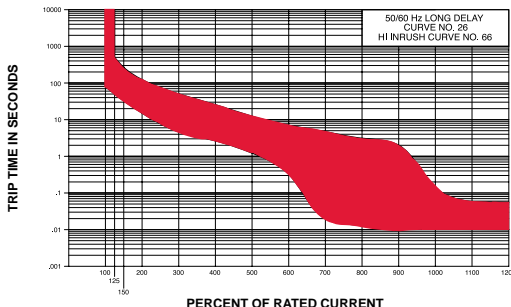
Short



Medium

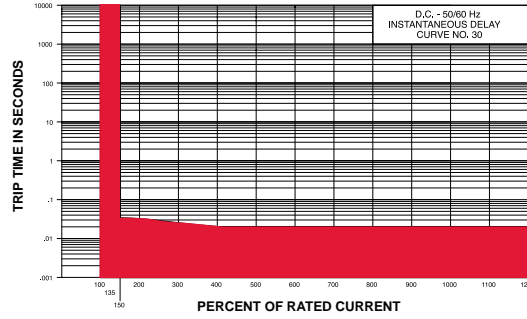


Long

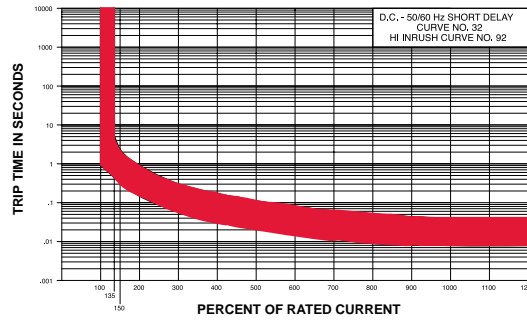


AC/DC

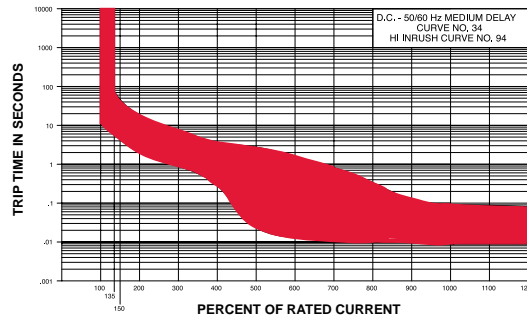
Instantaneous



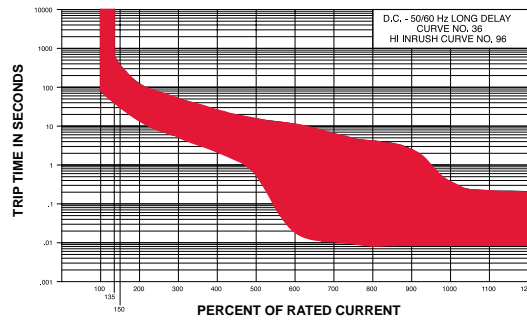
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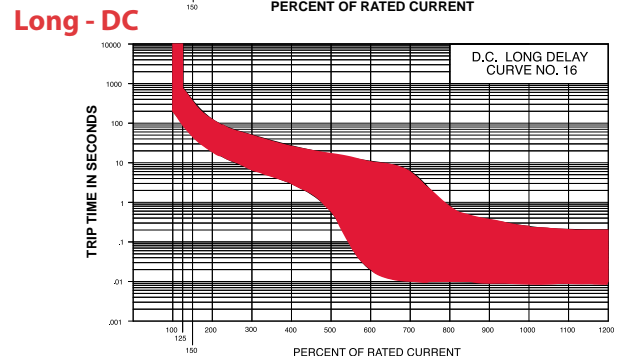
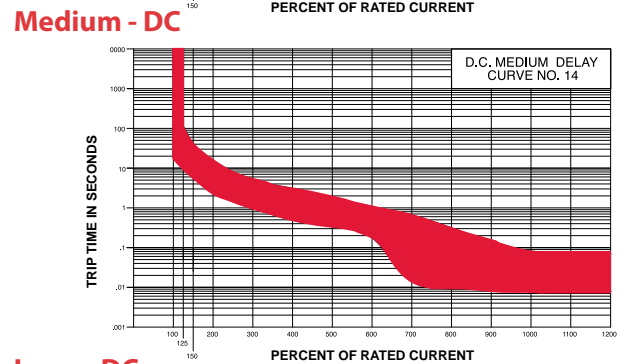
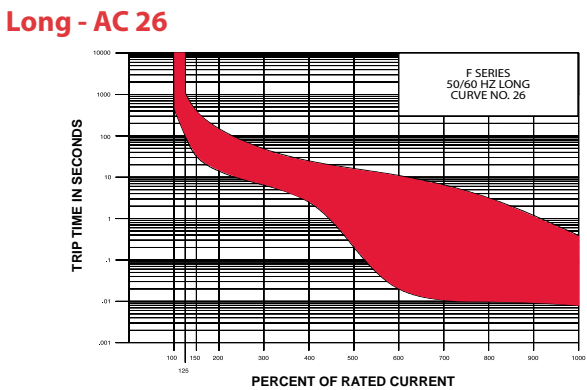
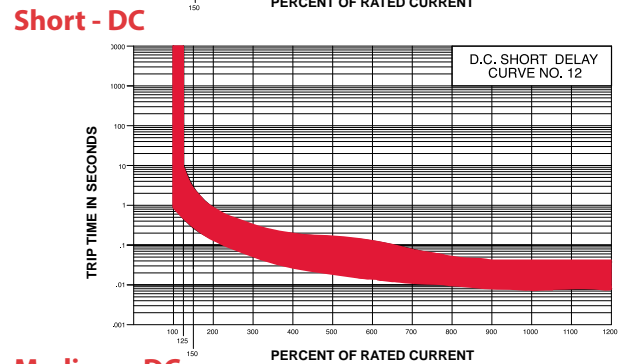
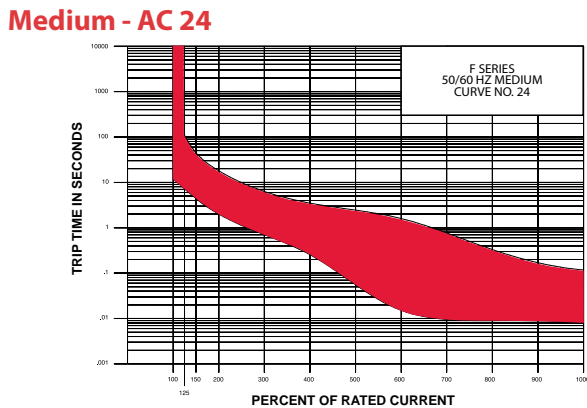
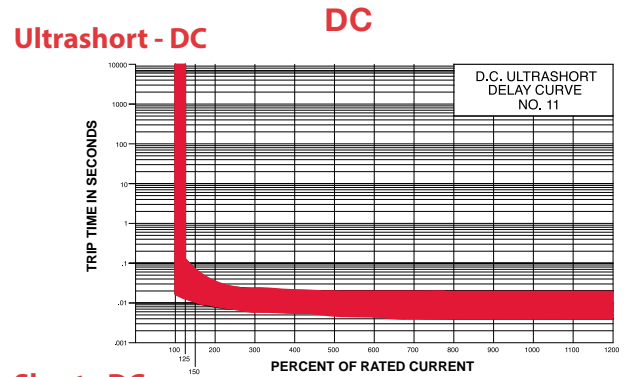
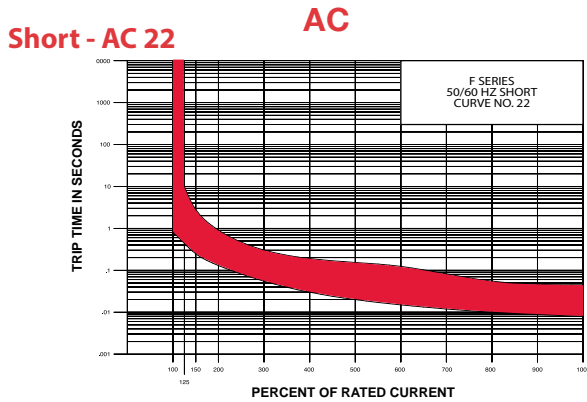
Medium



Long



F-SERIES TIME DELAY VALUES									
TRIP TIME SECONDS	PERCENT OF RATED CURRENT								
	Delay	100%	125%	150%	200%	400%	600%	800%	1000%
11	No Trip	.013 - .125	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020	.004 - .020
12	No Trip	.475 - 10.0	.275 - 2.80	.140 - .850	.030 - .190	.015 - .125	.010 - .050	.008 - .038	.008 - .038
14	No Trip	10.0 - 110	6.00 - 40.0	2.50 - 15.0	.500 - 3.00	.180 - 1.00	.010 - .280	.008 - .080	.008 - .080
16	No Trip	110 - 1000	60.0 - 400	22.0 - 150	4.00 - 25.0	1.00 - 5.50	.010 - 1.80	.008 - .390	.008 - .390
22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .045
24	No Trip	10.0 - 160	6.00 - 60.0	.220 - 20.0	.300 - 3.00	.050 - 1.30	.007 - .500	.005 - .060	.005 - .060
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	.006 - 2.00



A

Alternating Current

A periodic current (sine wave) whose average value over a cycle is zero. The current reverses at regular intervals of time and has alternately positive and negative values.

Ambient Temperature

The temperature of the medium in which the heat of a device is dissipated. The ambient temperature is often specified in standards for device performance (such as the UL Standards) as the basis for determining the heat rise of the component.

Ampacity

The current carrying capacity of a conductor or device.

Ampere *see coulomb*

1) The classic definition of an ampere is a unit of electric current flow equivalent to the motion of 1 coulomb of charge, or 6.28×10^{18} electrons, past any cross section in 1 second. This is an intuitive way to think about an ampere, it is the flow of a huge number of electrons through a conductor.

2) In 1948 this alternative definition was adopted: A unit of electric current in the meter-kilogram-second system. It is the steady current that when flowing in straight parallel wires of infinite length and negligible cross section, separated by a distance of one meter in free space, produces a force between the wires of 2×10^{-7} newtons per meter of length.

B

Battery *see cell*

Two or more cells connected together. Thus a group of batteries connected together can also be referred to as a battery

Battery Bank

When groups of 6V or 12V batteries are wired in series or parallel or a combination to increase voltage or capacity the entire group is referred to as a battery bank. When batteries are connected in series the amp-hour rating is the same and the voltage is additive. When batteries are connected in parallel the voltage is the same and the amp-hour rating is additive.

Battery State-Of-Charge

The term is used to describe and estimate of how much energy the battery is able to deliver. There have been many attempts to develop improved state-of-charge estimates. The most common methods include specific gravity, at-rest open-circuit voltage, and amp-hour measurement.

Branch Circuit *see main*

The portion of the wiring system after the main circuit protection device.

Break (rating)

The amount of current that can be passing through a set of contacts, such as those in a solenoid, when they open, without damaging the contacts. This can be a rating for a single event or over some number of cycles, generally 1000, 10,000 or 1000,000.

Bus, Busbar

A bus is a group of common connections, often consisting of a strip of copper or brass with a number of screws or bolt studs for the connection of wires. It may be a negative or a positive bus.

C

Cascade Circuit

A series arrangement of more than one protector connected between the power source and the load.

CE (Conformité Européen)

The CE marking is a conformity marking consisting of the letters "CE". The CE marking is applied to products regulated by certain European health, safety and environmental protection legislation. The CE marking is obligatory for products it applies to. The manufacturer affixes the marking certifying that the product conforms to applicable regulations, in order to be allowed to sell his product in the European market.

Cell

An electrochemical system that converts chemical energy into electrical energy. Typically consisting of two conductive plates with different galvanic potential immersed in an electrolyte.

Charge

Classically refers to an accumulation of electrons producing an electrostatic charge. In common use it often refers to restoring energy to a battery. Specifically, it would refer to the part of a multistage battery charging cycle when the voltage was held constant at or about the gassing voltage.

Circuit

A closed path of electrically, or electro-magnetically connected, components or devices that is capable of current flow. Typically consisting of loads, sources, conductors, and circuit protection (circuit breakers and fuses). For example: A battery, fuse, and bilge pump connected together with wire are a circuit. The path must be continuous and closed.

Circuit Breaker

A device that, like a fuse, interrupts a current in an electric circuit when the current becomes too high. Unlike a fuse, a circuit breaker can be reset after it has been tripped. When a high current passes through the circuit breaker, the heat it generates or the magnetic field it creates causes a trigger to rapidly separate the pair of contacts that normally conduct the current.

Circular Mills

A method of specifying wire size mathematically. One Circular Mil is a unit of area equal to that of a circle .001" in diameter.

The actual area of a Circular Mil is:

$$A = \pi r^2$$

$$A = 3.1428 \times (.0005)^2 \text{ inches}$$

$$A = .0000007857 \text{ square inches}$$

Cold Cranking Amperes (CCA) *see marine cranking amperes*

CCA is the discharge load in amps, which a battery can sustain for 30 seconds at 0° F. and not fall below 1.2 volts per cell (7.2V on 12V battery). This battery rating measures a burst of energy that an engine needs to start in a cold environment. This rating is used mainly for rating batteries for engine starting capacity and does not apply to NiCad batteries, NiMH batteries or Alkaline batteries.

Common Trip

A feature on a multi-pole protector in which an overload on any pole will cause all poles to open.

Conductivity

Conductance is the reciprocal of resistance, which depends on the receptivity constant of the material. Receptivity is the resistance of a conductor having unit cross section and unit length. Conductivity is the reciprocal of the receptivity. Its units are 1/ohm-cm or ohm/cm, or 1/ohm-circular mils/ft

Conductor

That part of an electrical circuit whose resistance relative to the balance of the circuit is zero. For example, in a circuit consisting of a light bulb and a battery, connected together with wire, the wire is referred to as the conductor.

Converter

An electrical device that converts one type of electrical energy into another. Battery chargers convert AC power to DC to charge the battery, inverters convert DC power into AC, both are converters. Often used in RV industry to mean a power supply that runs the domestic DC loads when shore power is available.

Coordination

The ability of the protector with the lowest rating in a cascade arrangement to trip before those with higher ratings (See Cascade Circuit).

Coulomb *see amperage*

The measurement unit of electric charge, which is determined by the number of electrons in excess (or less than) the number of protons. Classically a charge of 1 coulomb = 6.25×10^{18} electrons. The meter-kilogram-second unit of electrical charge equal to the quantity of charge transferred in one second by a steady current of one ampere.

Cranking (Starting)

Normally associated with "cranking current" which is the current required by the starter circuit prior to engine starting. The cranking current varies significantly during the starting cycle. Initially, there is a large surge of current required to overcome the inertia and compression of the engine. This surge can be two to four times the average cranking current. Once the engine is turning there are peaks and valleys as the pistons go through the compression and exhaust cycles. The cranking current rating is used for sizing batteries, cables, and battery switches.

Current *see amperage*

Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms. The common symbol for current is the uppercase letter I. The standard unit is the ampere, symbolized by A. Physicists consider current to flow from relatively positive points to relatively negative points; this is called conventional current or Franklin current. Electrons, the most common charge carriers, are negatively charged. They flow from relatively negative points to relatively positive points. Electric current can be either direct or alternating. Direct current (DC) flows in the same direction at all points in time, although the instantaneous magnitude of the current might vary. In an alternating current (AC), the flow of charge carriers reverses direction periodically. The number of complete AC cycles per second is the frequency, which is measured in hertz. An example of pure DC is the current produced by an electrochemical cell. The output of a power-supply rectifier, prior to filtering, is an example of pulsating DC. The output of common utility outlets is AC.

Current Limitation

A protective device that reduces the available short circuit peak current to a lesser value.

Current Rating

The maximum current in amperes that a device will carry continuously under defined conditions without exceeding specified performance limits.

Current Transformer *see ammeter*

The "CT", as current transformers are commonly referred to, is used by AC ammeters to "sense" current flow in a wire in an AC circuit. It is a toroidal coil of wire through which a wire whose current we wish to measure is passed. It is normally encapsulated and looks like a "doughnut", which is how electrician's commonly refer to it. The doughnut has two wires coming out of it, which are connected to the AC ammeter. As current flows in the AC wire we wish to measure, it induces a current flow in the current transformer. The magnitude of the current varies directly with the current flowing in the AC wire. Current transformers are rated by the number of maximum amps that can flow in the measured wire and the current generated, by the CT, at that current flow. For example: A 50:5 CT is rated for 50 amps flowing in the measured wire, and it generates 5 amps of current as a consequence.

D

Delay

A difference in time between the initiation of an event and its occurrence, or between an event's observation and enunciation of it. This is usually used to refer to the time between the application of overcurrent to a fuse or circuit breaker and the time when the device opens.

Derating

A decrease in a device's rating, usually amperage, due to its application in ambient conditions different from those in which it was tested or for which it was designed originally.

dielectric strength

The maximum voltage stress that a material can withstand without rupture.

Digital

A digital signal is one which has only two valid values denoted as 1 or 0. Commonly these are equated to distinctly different voltage. For example: A voltage of +5V would equal a 1 and a voltage of 0V would equal a 0. A digital meter is one that displays values as numerical values rather than as the position of a meter on a relative scale.

Direct Current (DC)

An electric current that always flows in the same direction. The magnitude may vary but the current direction is always the same. Commonly referred to as DC. Examples of direct current sources are batteries, fuel cells, and photovoltaic cells. DC sources such as battery chargers and alternators actually use rectified AC current as the source.

Discharge

Refers to the consumption of energy from a battery, or to the electrostatic discharge associated with a lightning bolt, capacitor, etc.

Double Pole

Indicates a switch, relay, or circuit breaker with two separate conductive paths, which are opened or closed when the device is operated.

Duty, Continuous

The requirement that demands operation at a constant load for an indefinite period of time.

Duty, Intermittent

The requirement that demands operation for alternate intervals of (1) load/no load; (2) load/rest; or (3) load/no load/rest.

E

Earth

The third planet from the sun in Astronomy, but in electrical terms it refers to a connection, which is made to a conductor that is connected to the planet Earth. In grounded electrical systems there is a connection, which is a copper rod or some other highly electrically conductive connection, to the actual Earth. This is to ensure a safe conductive path for a short circuit, which in turn helps prevent electrocution.

Electron *see coulomb*

A negatively charged subatomic particle, that is either free (not attached to any atom), or bound to the nucleus of an atom. In electrical conductors, current flow results from the movement of free electrons from atom to atom individually, and from negative to positive electric poles in general. The charge on a single electron is considered as the unit electrical charge. It is assigned negative polarity. Electrical charge quantity is not usually measured in terms of the charge on a single electron, as this is an extremely small charge. Instead, the standard unit of electrical charge quantity is the coulomb, symbolized by C, representing about 6.25×10^{18} electrons.

Electromotive Force (EMF)

Commonly referred to as voltage, electromotive force is the energy per unit of charge that is supplied by a source of electrical energy such as a battery, charger or alternator.

Electromagnetic Interference (EMI)

Noise generated by a load (typically by electrical switching action). Usually specified as meeting agency limits for conducted EMI (noise reflected back onto the power bus) or radiated EMI (noise emitted into the area surrounding a device).

Energy *see power*

The classically simple definition is, the capacity to do work. Energy may be manifested as, mechanical motion, thermal heat, or electrical power, which is consumed, radiated, dissipated, or stored over a period of time. The energy in a direct-current circuit is equal to the product of the voltage in volts, the current in amperes, and the time in seconds. The units for energy are Watt-hours. In alternating current (AC) circuits, the expression for energy is more complex.

Effective or RMS value

The value of alternating current that will produce the same amount of energy in a resistance as the corresponding value of direct current.

F

Fault

A defect in the normal circuit configuration, usually due to unintentional grounding. Commonly referred to as a short circuit.

Fault Current

The current that may flow in any part of a system under fault conditions.

Feeder

All circuit conductors between the service entrance equipment and the final branch circuit protector.

Field

Typically refers to a magnetic field. Specifically used when discussing the rotating electro-magnetic field associated with an alternator. By varying the field current, thus its strength, the output of the alternator may be controlled.

Frequency *see hertz*

For an oscillating or varying current, frequency is the number of complete cycles per second in alternating current direction. The standard unit of frequency is the hertz, abbreviated Hz. If a current completes one cycle per second, then the frequency is 1 Hz; 60 cycles per second equals 60 Hz (the standard alternating-current utility frequency).

Fuse

Safety device, consisting of a strip of low-melting-point alloy, which is inserted in an electric circuit to prevent excess current from flowing. If the current becomes too high the alloy strip melts, opening the circuit.

G

Generator

A rotating machine capable of generating electrical power. In the narrow definition generator refers to a DC machine and alternator refers to an AC machine. However, in common use the term generator is used to refer to AC machines as well.

Green Wire

The green wire is the non-current carrying safety grounding wire in an AC system in the United States. It is connected to an exposed metal part in the electrical system to provide a path for fault current in the case of a short circuit.

Ground Fault

GFI (Ground Fault Interruptor)

GFI is generic term referring to both GFCl and GFP

GFCl (Ground Fault Circuit Interruptor) *see* GFI

A device intended for the protection of personnel that functions to de-energize a circuit, or portion thereof, within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

GFP (Ground Fault Protector) *see* GFI

A device intended to protect equipment by interrupting the electric current to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protection device of that supply circuit.

ground, ground conductor

A point in a circuit which is at zero potential with respect to the Earth, or which is at the lowest potential in the system, (as with a floating ground).

grounding, grounding conductor

The AC conductor, not normally carrying current, used to connect the metallic non-current carrying parts of electrical equipment to the AC system and engine negative terminal, or its bus, and to the shore AC grounding conductor through the shore power cable. This term can also refer to the normally non-current carrying conductor used to connect metallic non-current carrying parts of direct current devices to the engine negative terminal, or its bus, to minimize stray current corrosion.

Grounded

The AC current carrying conductor that is intentionally maintained at ground potential, also called neutral.

H

Hertz *see frequency*

Hertz is a unit of frequency of one cycle per second. It replaces the earlier term of "cycle per second (cps)." The abbreviation for Hertz is Hz.

High Inrush (HI-INRUSH)

A load that exhibits, upon application of power, a steep wave front transient of very high current amplitude for a short duration.

Hot

Hot usually refers to the ungrounded current carrying conductors in an AC system. These would typically have a voltage of 120V or 240V in the United States. The term Hot is also used to describe a circuit that is energized, and has a potential greater than ground.

I

Inductance

An effect in electrical systems in which electrical currents store energy temporarily in magnetic fields before that energy is returned to the circuit.

Instantaneous Trip

Indicates that no intentional delay is purposely introduced in the opening time of a protector.

Interrupt Rating (AIC)

The fault current that a device, normally a fuse or circuit breaker is capable of interrupting without damage.

interrupting capacity

The maximum fault current that can be interrupted by a protective device without failure of the device.

inverter

An inverter converts DC power stored in a battery to AC power which is used by most household appliances.

IP ignition protection

Devices, which operate in a potentially explosive environment, must be ignition protected. This would include engine rooms with gasoline engines. There is a very specific set of tests which a device must pass to claim ignition protection. They include operating safely in an explosive mixture of propane and air.

isolation transformer

A transformer that is inserted in series with the incoming AC power to provide a magnetic coupling for power between the ship's systems and the AC grid. By magnetically coupling the power there is no direct connection by wires, which isolates the ships AC system from the AC grid.

L

Let-Through Current

The actual fault current passing through a protective device as compared to the current available to the device.

Line *see load*

The conductors that are at the supply of energy to a circuit. Line normally refers to the current carrying non-grounded conductor.

Line Loss *see voltage drop*

The power loss that occurs due to amperage flowing through the resistance of conductors over their length.

Listed (UL Listed)

Indicates that a device or component has met certain specifications as set forth by Underwriters Laboratory. Further, it means that the device or component has been tested for conformance and 'listed' with UL so it can use the UL logo and claim conformance to the specification.

Load *see line*

A device that consumes power and does work.

M

Make (Rating)

The current that a breaker, switch, or relay can connect without damaging the device.

Make Before Break

Describes a switch action that connects the new circuit before disconnecting the old. This type of switch action is required for battery switches in order to avoid an open circuit for the engine alternator, which can cause extreme voltages that can damage the alternator and accessory electronics.

N

NEC *see National Electrical Code*

NEMA

National Electrical Manufacturers Association

National Electrical Code (NEC)

The NEC is developed and maintained by the National Fire Protection Association which describes how residential, commercial, and RV electrical systems must be installed. The NEC is adopted, sometimes with revision, by states that also adopt the Uniform Building Code. Electrical inspections required by most building permits follow the NEC. While not required aboard boats, the NEC is a valuable guide to safe electrical systems. The goal of the NEC is personal safety and fire prevention.

Neutral (Ground) *see single phase*

The grounded current carrying conductor in a single phase, four wire, 120/240V AC system.

Neutral-to-Ground Bonding

Connecting the ground and the neutral together via an electrical conductor.

Nuisance Trip

A circuit breaker or fuse, which trips or blows without the circuit actually being overloaded. This may be due to a surge current which requires a slow tripping breaker or a slow blow fuse.

O

Ohm

The unit for resistance equals $V/I = \text{volt/current}$. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

Ohm's law

States that the ratio of the EMF (Electromotive Force) applied to a closed circuit to the current in the circuit is a constant. That constant is the resistance of the circuit. It may be stated as $V=IR$ (or $E=IR$, using E as the abbreviation of EMF whose units are volts). The unit of resistance is the ohm.

Open

Indicates a condition in an electric circuit in which there is a break in the conductive path. The break may be intentional such as an open switch or relay or it may be unintentional such as a broken wire or a blown fuse. In any case, the continuous conductive path required for an electric circuit is not available.

Overcurrent

When the current in a circuit exceeds the rating of the devices or conductors in it. Fuses and circuit breakers protect from overcurrent by opening the circuit if such a condition exists and persists.

Overload Current

The current value in excess of the rated current of the protective device.

Overload Rating (OL)

Designates whether the protector or family of protectors has been tested for general use or motor-starting applications:

OL0 - tested at 1.5 times amp rating for general use

OL1 - tested at 6 times amp rating or 10 times DC rating for motor starting application.

P

Panelboard

A collection of circuit breakers, switches, and instrumentation installed into a panel, which provides the central point for power distribution and monitoring for the electrical system. May also refer to a smaller panel, which is located remotely from the main panel, which is used to supply loads in the adjacent area. "Panelboard" is a term generally used only by NEC. In the marine industry they are usually called "panels", or "circuit breaker panels", or "distribution panels".

Parallel Circuit

An electrical circuit in which the positive connections are all in common and the negative connections are all in common. The voltage of the system appears across each branch of the circuit. The current varies as required by each load or source.

Pigtail

Wires which protrude from a device to connect it to the circuit. Often used in encapsulated products. Sometimes refers to a method of hooking up circuits in which a group of conductors are connected together and then one wire is connected to the circuit, this is done in order to simplify wiring.

Polarity

Refers to the electrical charge, which may be positive or negative. It also refers to the positive and negative terminals of a battery or load in a DC system. In AC systems it refers to the connections made to the hot and neutral. There is often a reverse polarity light that indicates if the neutral and hot are reversed.

Polarized System

An electrical system in which the positive and negative or the hot and neutral must be connected in a particular way and cannot be switched. Sometimes there are mechanical preventions to insure the correct polarity. For example, in an AC plug the physical configuration of the plug and receptacle force a polarized connection.

Pole *see toggle*

Indicates a conductive path in a switch or relay. Switches that are single pole have one conductive path; switches that are two pole have two conductive paths. Also refers to the magnetic poles on an electromagnet or a permanent magnet

Potential

The voltage across a circuit element. Implies the potential to do work.

Power

Electrical power is the rate at which electrical energy is converted to another form, such as motion, heat, or an electromagnetic field. The common symbol for power is the uppercase letter P. The standard unit is the watt, symbolized by W. In utility circuits, the kilowatt (kW) is often specified instead; 1 kW = 1000 W. Power in a direct current (DC) circuit is equal to the product of the voltage in volts and the current in amperes. This rule also holds for low-frequency alternating current (AC) circuits in which energy is neither stored nor released. At high AC frequencies, in which energy is stored and released (as well as dissipated or converted), the expression for power is more complex. In a DC circuit, a source of V volts, delivering I amperes, produces P watts according to the formula: $P = VI$. When a current of I amperes passes through a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = I^2 R$. When a potential difference of V volts appears across a component having a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = V^2 / R$.

Power Factor

In an AC circuit loads other than resistance shift the phase angle between the voltage and the current. This shift is the result of energy being stored and released in an inductor for example. To calculate the power consumed one must consider this phase shift. We do so by using the following formula $P = VI \cos \phi$, where ϕ is the difference in phase angle between the voltage and current. Cosine ϕ is called the power factor. For resistive loads the power factor is equal to 1 because the phase angle equals 0. For pure inductive loads the power factor is 0 because the phase angle is +90°.

R

Recognized (UL Recognized)

A device that is UL Recognized differs from a device that is UL Listed. A Recognized device is expected to be installed within a larger assembly by a manufacturer, not in the field, and this larger assembly is then expected to be tested by UL. The UL Recognition then allows UL to skip testing of the specific embedded Recognized component. UL Recognition has little value for end users installing devices in the field.

Rectifier

A device that allows current to flow in only one direction, such as a diode. Used to convert, or rectify AC current into DC.

Regulator (Voltage Regulator)

A device, which uses a feedback loop to control the output of an alternator or other source. By measuring the output voltage and controlling the alternator field current, for example, the regulator is able to continuously adjust the alternator output to the desired voltage.

Resistance

The opposition to the flow of current in an electric circuit as defined by Ohm's law. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

Reverse Polarity

Describes a situation where the neutral and hot wires of an AC system are reversed. Most AC panels have an indicator to announce this condition, as it can be very dangerous.

RMS (Root-Mean-Square)

Root-mean-square (RMS) refers to the most common mathematical method of defining the effective voltage or current of an AC wave. To determine RMS value, three mathematical operations are carried out on the function representing the AC waveform:

- (1) The square of the waveform function (usually a sine wave) is determined.
- (2) The function resulting from step (1) is averaged over time.
- (3) The square root of the function resulting from step (2) is found.

In a circuit whose impedance consists of a pure resistance, the RMS value of an AC wave is often called the effective value or DC-equivalent value. For example, if an AC source of 100 volts RMS is connected across a resistor, and the resulting current causes 50 watts of heat to be dissipated by the resistor, then 50 watts of heat will also be dissipated if a 100-volt DC source is connected to the resistor. For a sine wave, the rms value is 0.707 times the peak value, or 0.354 times the peak-to-peak value. Household utility voltages are expressed in RMS terms. A so-called "117-volt" AC circuit has a voltage of about 165 volts peak (pk), or 330 volts peak-to-peak (pk-pk).

S

Safety Green (Ground) Wire

The non-current carrying conductor in a three wire 120V or four wire 240V AC circuit, it provides a safe path for fault current. See also green ground wire.

Self-Limiting

A device whose ability to limit output power regardless of input power is intrinsic to its design.

Short Circuit

A conductive path of zero resistance. Typically refers to an unintentional connection between two conductors of opposite polarity. If a voltage is applied to a short circuit the current becomes very large and can start a fire, thus the need for short circuit, or overcurrent, protection in the form of fuses or circuit breakers.

Short-Circuit Current Rating (SC)

The short-circuit current rating in kiloamperes (kA), followed by a letter and number designating the test conditions and any calibration following the short-circuit test as defined below:

C - a short circuit test was conducted with series overcurrent protection

U - a short circuit test was conducted without series overcurrent protection

1 - a recalibration test and dielectric strength test were not conducted as part of short circuit testing

1a - the supplementary protector was permanently open after the short-circuit test. A dielectric strength test and a voltage withstand test were conducted. (CSA only)

2 - a recalibration test and dielectric strength test were conducted as part of short-circuit testing

3 - a recalibration test, dielectric strength test and voltage withstand test were conducted as part of short circuit testing. (CSA only) Note: The C3 rating is not available.

Sine Wave

A waveform that can be expressed as the graph of the equation $y = \sin x$. The utility AC power is a sine wave.

Single Phase

The typical 120/240V AC system in the United States is a single phase system, meaning that the current flow in the two conductors is in phase or that they both cross zero at the same time.

Stray Current

Unwanted current flows which occur due to a partial short circuit.

surge

A large amount of current during the initial starting phase of a motor for example.

Surge Capacity

The measurement of the ability to withstand surge currents without damage.

Switch

An electro-mechanical device that is intended to open an electrical circuit and thus turn a load or source on or off.

Switchboard *see panel board*

T

Terminal

A connection point or device for an electrical circuit. A terminal strip is a series of screws which may or may not be in common to which wires are connected. Also refers to the connecting device which may be crimped on the end of a wire to enable it to be connected to the circuit with a screw, such as a ring terminal.

Terminal Studs

A threaded bolt onto which ring terminals may be placed and then fastened with a nut. Normally used for high current connections.

Thermal

Thermal most commonly refers to a thermal circuit breaker, which uses the thermal effect of excess current flow to create differential expansion in a bi-metallic blade to open a circuit.

time-current curve *see delay*

A curve which depicts the relationship between the amount of current a fuse or breaker can withstand with respect to time.

Time Delay

The introduction of an intentional delay to the opening function of a protective device.

Toggle *see pole*

A switch which has a handle type actuator that can be placed in, at the most, three positions.

Total Clearing Time

The time elapsing from initiation of overload current to final current interruption.

Transfer Switch, AC *see selector switch, source isolation*

An electrical relay or manual switch which selects an AC source alternative, such as a generator, shore power, or inverter.

Transformer, isolation *see isolation transformer*

Trip Free

A circuit breaker designed to trip when subjected to a fault current, even if the reset lever is held in the ON position.

Tripping Current (TC)

Tripping current is coded as a percentage of the amp rating. Codes for UL & CSA products:

TC0 - tripping current is less than 125% of amp rating

TC1 - tripping current is between 125 and 135% of amp rating

TC2 - tripping current is more than 135% of amp rating

TC3 - tripping current is standardized at 135% and at 200% of amp rating (CSA only)

U

Ultimate Trip Current

The minimum value of current that will cause tripping of a protective device.

Ungrounded Conductor

Any conductor that is not connected to the Earth ground system.

V

Volt (Voltage)

The unit of electric potential and electromotive force, equal to the difference of electric potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

Voltage Drop

Conductor's voltage reduction due to resistance.

Voltage Rating

The maximum voltage at which a device is designed to operate.

Voltage Trip

A protective device that is factory calibrated to trip at a predetermined voltage value.

W

Watt

The measurement of electrical power. One watt is equal to one ampere of current flowing at one volt. Watts are typically rated as amps x volts; however, amps x volts, or volts-amps (v-a) ratings and watts are only equivalent when powering devices that absorb all the energy such as electric heating coils or incandescent light bulbs.

Wire Sizing

The process of selecting the appropriate sized conductor for the amount of current to be carried while considering the length of the circuit.

Withstand Voltage

The maximum voltage level that can be applied between circuits or components without causing a breakdown.

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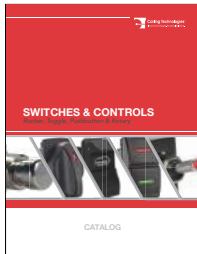
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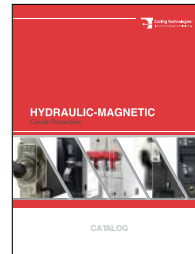
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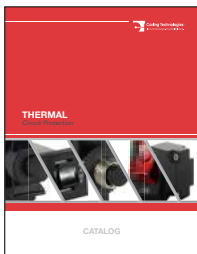
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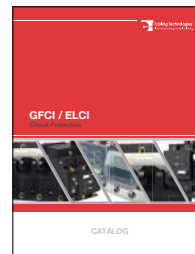
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