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.

There are few products that Carling Technologies hasn't turned "ON" and fewer industries that haven't turned to Carling for solutions. With ISO and TS registered manufacturing facilities and technical sales offices worldwide, Carling ranks among the world's largest manufacturers of circuit breakers, switches, power distribution units, digital switching systems and electronic controls.

SWITCHES & CONTROLS
- Rocker
- 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

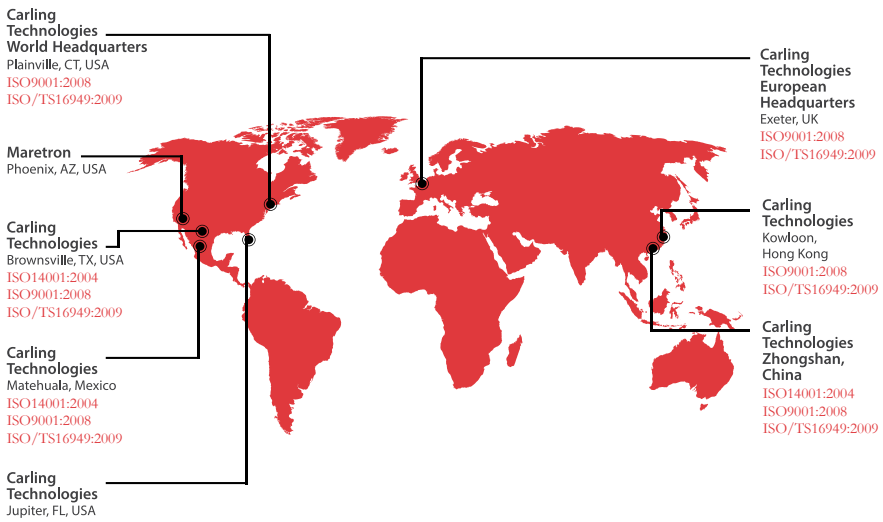
STRATEGIC MARKETS SERVED:

On/Off Highway | Marine | Telecom/Datacom | Military | Renewable Energy

OTHER SERVED INDUSTRIES:

Medical | Industrial Control | Audio / Visual | Commercial Food | HVAC | Floor Care | Generators | Small Appliances | Security Systems | Test & Measurment

GLOBAL LOCATIONS:



WORLDWIDE NUMBERS:

2200+ EMPLOYEES

150+ ENGINEERS

70+ DISTRIBUTORS

50+ REP FIRMS

COMPETITIVE ADVANTAGES+

Vertical Integration | Reliable & On-Time Delivery | Excellent Customer Service | Innovative & Eco-Friendly Products

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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Time Delay Values

Glossary

	 *M-Series*	 *MS-Series*	 *H-Series*	 *A-Series*
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 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	0.02-15FLA@32VDC,125VAC, 1 pole 15.1-25GPA@32VDC,125VAC, 1 pole 0.02-15FLA@65VDC, 250VAC, 2 pole 15.1-25GPA@65VDC, 250VAC, 2 pole 0.02-12FLA@250VAC, 1 pole 0.02-7.5GPA@50VDC, 1 pole 0.02-30GPA@65VDC, 80VDC, 1 pole 31-50GPA@80VDC, parallel	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	1,000A@65VDC, 2 pole 1,000A@32VDC, 1 pole 1,000A@250VAC, 2 pole 1,000A@125VAC, 1 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

	 B-Series	 C-Series	 D-Series	 G-Series
Number of Poles	1-6	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	sealed metal toggle handle rocker	solid color curved rocker (1 per unit) two color visi-rocker (1 per unit) handle (1 per pole or 1 per unit)	handle
Available Delays	**AC, DC, AC/DC:** instantaneous, ultra-short, short, medium & long **AC, DC:** high inrush-short, medium & long	**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	**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	**UL Listed:** 50000A@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@125VAC 0.1A@125VAC (gold contacts) 0.5A@65VDC 0.1A@80VDC	10.1A@250VAC 0.1A@125VAC (gold contacts) 0.5A@80VDC	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, 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	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	rear mounted on DIN rail or front panel mounted	rear mounted on DIN rail
Agency Approvals	UL, CSA, VDE, TUV (rocker), UL1500, UL489, UL489A	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	1-2, + auxiliary switch pole	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. It's 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 it's 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)

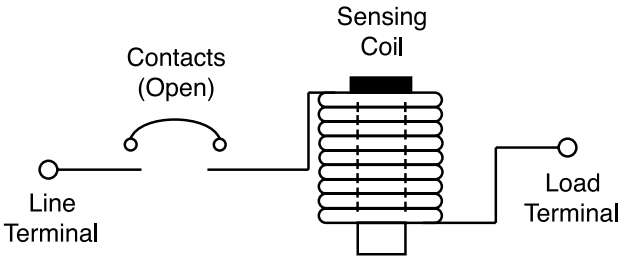


Figure 1

Inside the coil is a non-magnetic delay tube, housing a 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)

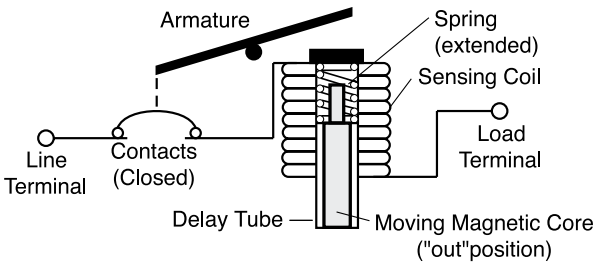


Figure 2 - Rated Current or Less

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)

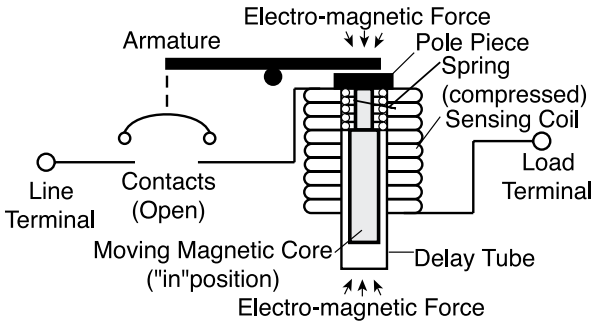


Figure 3 - Moderate Overload with Induced Delay

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)

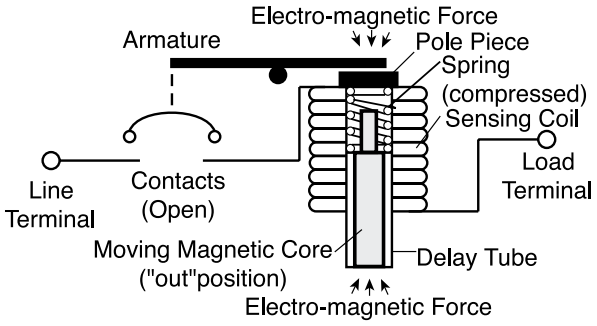


Figure 4 - Short Circuit Condition - No Induced Delay

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.

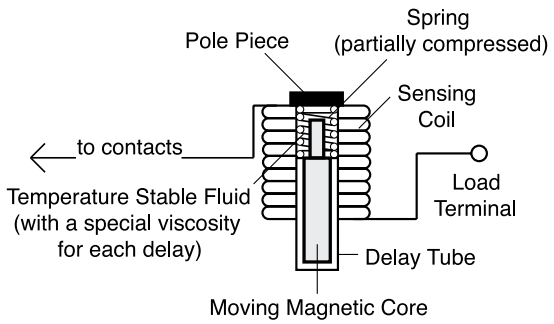


Figure 5 - Rated Current or Less

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.

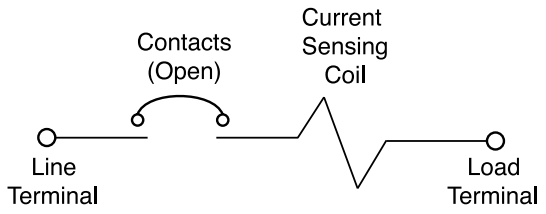
By use of magnetic "shunt" plates within the magnetic circuit, it is possible to divert magnetic flux resulting in higher "inrush withstanding capability" (or high inrush delays). These delays disregard short duration, high pulse surges (typically 8ms or less and up to 25x rated current), characteristic 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

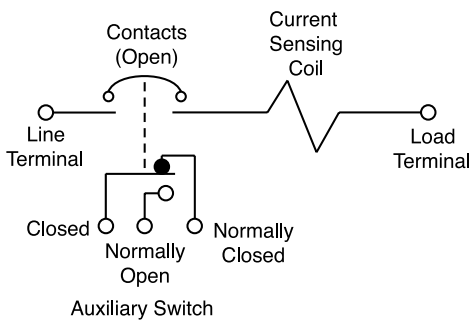
Series Trip

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

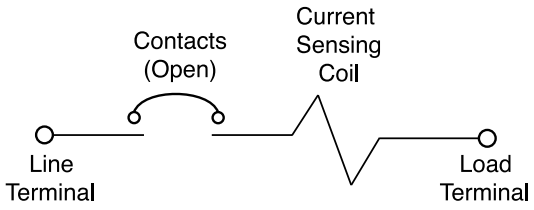
Inside the coil is a non-magnetic delay tube, housing a springbiased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is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



Series Mid-Trip with Auxiliary / Alarm Switch

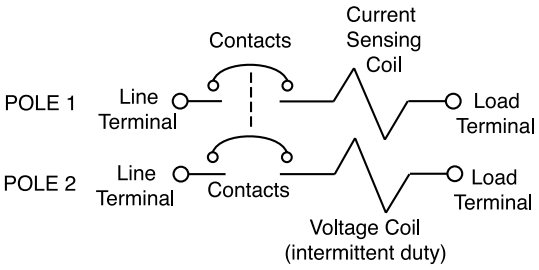
Similar to "Series Trip with Auxiliary Switch" except the S.P.D.T. auxiliary switch is actuated only upon electrical trip of the breaker. Upon electrical trip, the "N.O." contact closes and the "N.C." contact opens. This can be used to remotely signal the "TRIPPED" status of the breaker. Also, upon electrical 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.



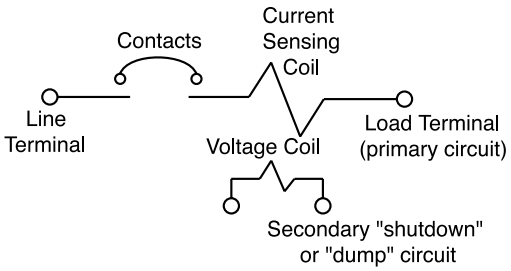
Series Trip with Remote Shutdown

(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.

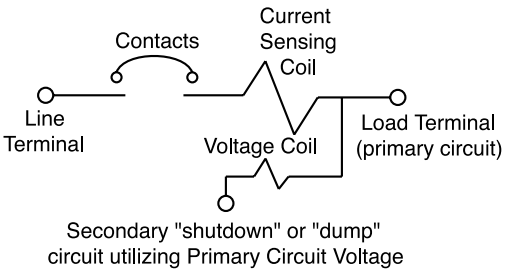


Dual Coil with Remote Shutdown

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.



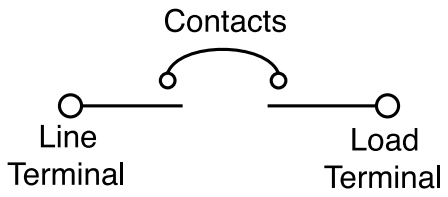
The other circuit option is the "**Shunt Trip Dual Coil**", a three terminal device with one side of the voltage coil internally connected to the primary circuit. The other side of the voltage coil is connected to an external third terminal on the bottom of the breaker. This circuit option uses line 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.

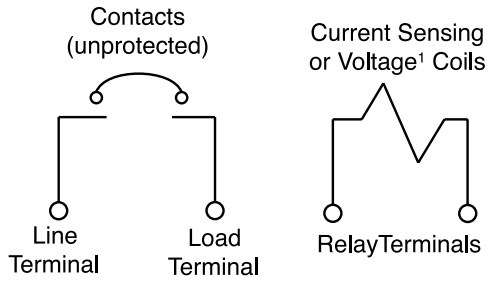
Switch Only

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

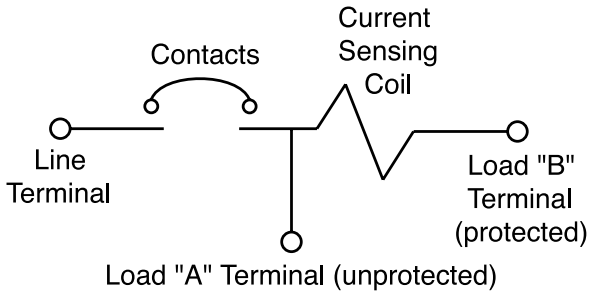
A four terminal device in which the contact and coil circuits are electrically isolated but mechanically linked. An overload in the coil circuit will cause the contact circuit to open. These circuits may be of opposite polarity. Commonly used in dump circuit, panic circuit, and remote shutdown applications.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



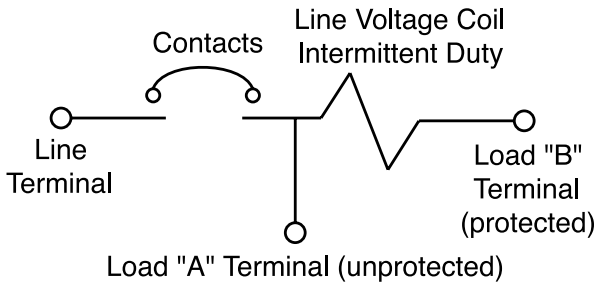
1. Voltage coils rated for intermittent duty only, and must be disconnected after being pulsed.

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 the 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 Elektrotecchniker), and TUV (Technisher Uberwachungs-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.

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:

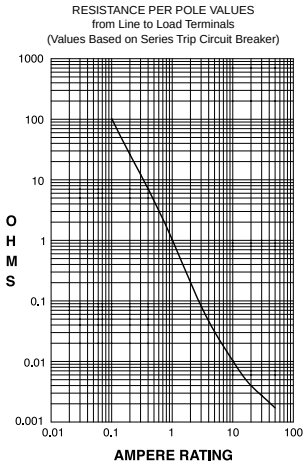
- Parallel pole configuration fits in one rack unit
- MIL-PRF-55629
- MIL STD 202 compliant
- MIL-PRF-39019F ingress protection
- Sealed toggle actuator
- Compact design

Typical Applications:

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

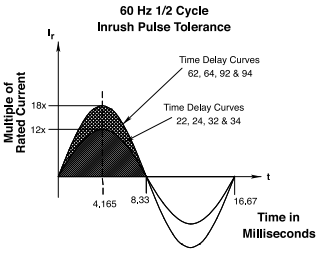
Electrical

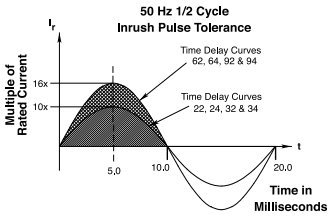
Maximum Voltage	125/250 VAC 50/60 Hz, 80 VDC (See Rating Tables.)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00 thru 15.0 in 1 amp increments, 18.0, 20.0, 25.0, 30.0. Other ratings available - see Ordering Scheme.
Auxiliary Switch Rating	SPDT; 7A 250VAC, 7A (Res) 28VDC, 4A (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.



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 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 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.a

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

*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	
							UL / CSA			
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps		With Backup Fuse	Without Backup Fuse	UL	CSA
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
	65	DC	---	0.02 - 15	---	2	---	1000	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 25	2	---	1000	TC1, 2, OL0, U1	TC1, 2, OL0, U1
	65 [1,2]	DC	---	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
	65	DC	---	0.02 - 15	---	2	5000 [3]	---	TC1, 2, OL1, C1	TC1, 2, OL1, C1
				---	15.1 - 25	2	5000 [3]	---	TC1, 2, OL0, C1	TC1, 2, OL0, C1
	80 [1]	DC	---	0.02 - 15	---	1	---	600	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 30	1	---	600	TC1, 2, OL0, U1	TC1, 2, OL0, 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	
							UL / CSA		VDE / TUV			
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps		With Backup Fuse	Without Backup Fuse	With Backup Fuse	Without Backup Fuse	UL	CSA
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
	65	DC	---	0.02 - 15	---	2	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 25	2	---	1000	3000	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
	65 [3]	DC	---	0.02 - 15	---	2	5000	---	3000	500	TC1, 2, OL1, C1	TC1, 2, OL1, C1
				---	15.1 - 30	2	5000	---	3000	500	TC1, 2, OL0, C1	TC1, 2, OL0, C1
	80 [1]	DC	---	0.02 - 15	---	1	---	600 [4]	---	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				---	15.1 - 30	1	---	600 [4]	---	500	TC1, 2, OL0, U1	TC1, 2, OL0, U1
	125	50 / 60	1	0.02 - 15	---	1	---	1000	3000	500	TC1, 2, OL1, U1	TC1, 2, OL1, U1
				1 - 15	---	1	---	360	3000	500	TC1, OL1, U2	TC3, OL1, U3
	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 - 25	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)

UL Listed
UL Standard 489A
Communications Equipment (Guide CCN/DITT, File E189195)

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

VDE Certified
EN60934, VDE 0642 under File 10537

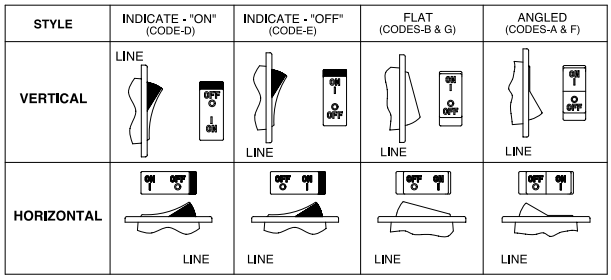
TUV Certified
EN60934, under License No. R9671109

M	E	2	–	P	–	D2	–	650	–	5	–	A	1	2	–	B	–	T
1 Series	*2 Actuator*	*3 Poles*		*4 Circuit*		*5 Frequency & Delay*		*6 Current Rating*		*7 Terminal*		*8 Illumination*	*9 Actuator Color & Legend*	*10 Legend*		*11 Bezel Color*		*12 Agency Approval*

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



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

M	M	2	–	P	–	D2	–	650	–	5	–	1	B	B	–	B	–	T
1 Series	*2 Actuator*	*3 Poles*		*4 Circuit*		*5 Frequency & Delay*		*6 Current Rating*		*7 Terminal*		*8 Actuator Color*	*9 Front Panel Hardware*	*10 Legend Plate/ Marking*		*11 Brushing Color*		*12 Agency Approval*

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

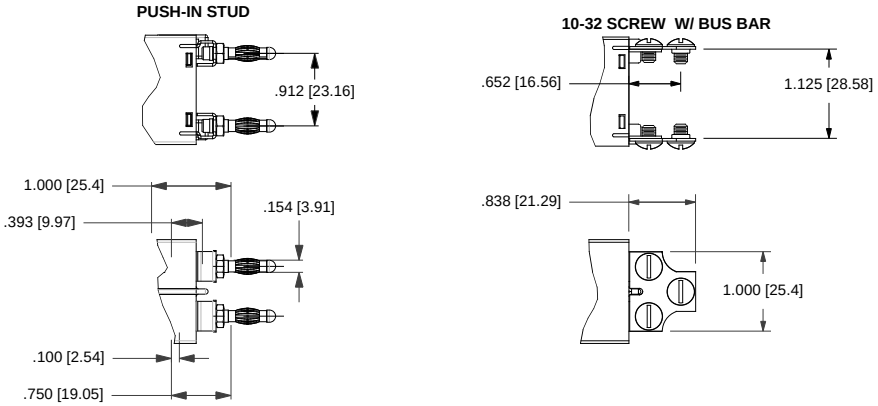
11 BUSHING COLOR
B Black

12 AGENCY APPROVAL
T UL 489A Listed

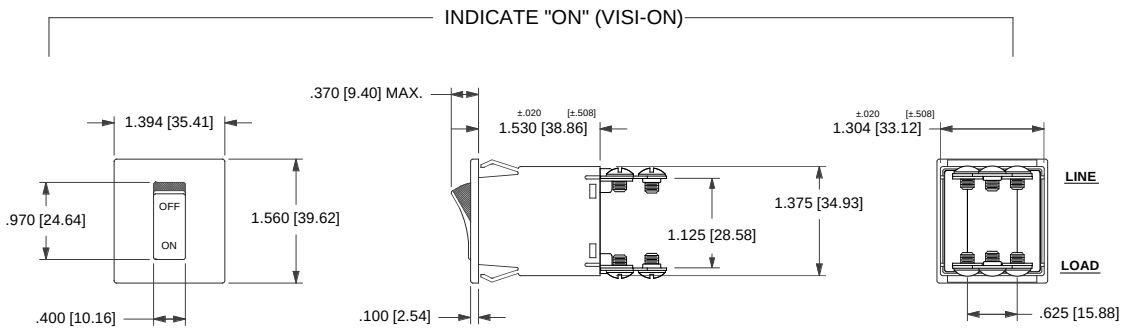
Notes:
1 Aux Switch only available with screw terminals

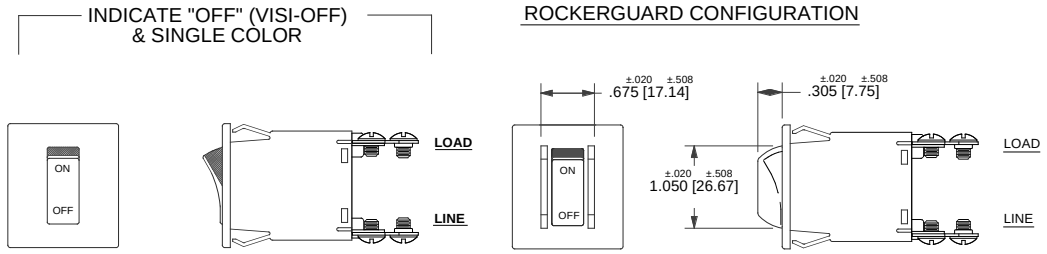
Dimensional Specifications: in. [mm]

PARALLEL POLE TERMINAL OPTIONS



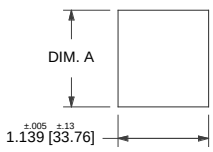
ROCKER ACTUATOR DETAIL





PANEL CUT - OUT DETAIL (ROCKER)

DOUBLE POLE

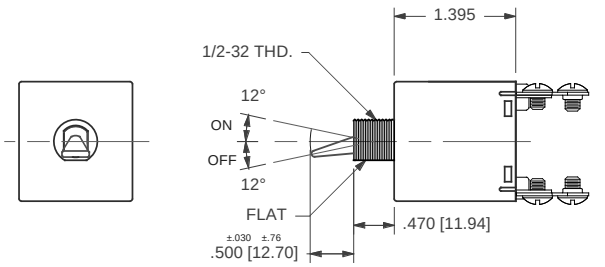


PANEL THICKNESS	DIM. A +.005/+.13 -.000/-.00
.062 [1.57]	1.385 [35.18]
.093 [2.36]	1.420 [36.07]
.125 [3.18]	1.460 [37.08]

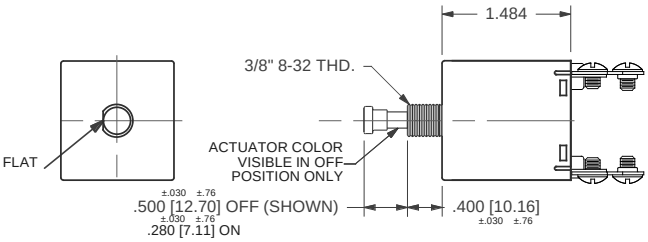
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.010 [.25] unless otherwise specified.
3 Dimensions apply to both rocker styles.
4 I-o, on-off or dual legends available for vertical or horizontal mounting.
5 Notice that circuit breaker line and load terminal orientation on indicate “off” is opposite that of indicate “on”.

Dimensional Specifications: in. [mm]

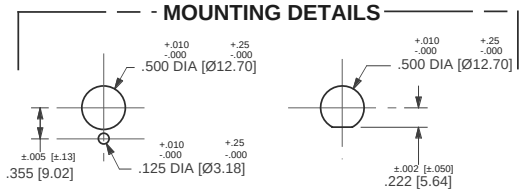
PADDLE ACTUATOR STYLE



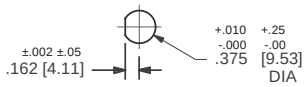
PUSH-PULL ACTUATOR STYLE



MOUNTING DETAILS

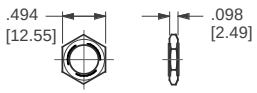


MOUNTING DETAILS

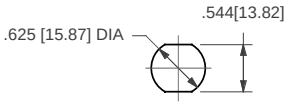


PUSH-PULL,
PUSH TO RESET

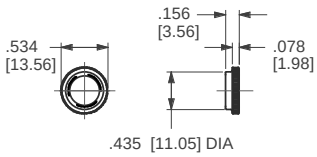
PANEL HARDWARE



HEX NUT

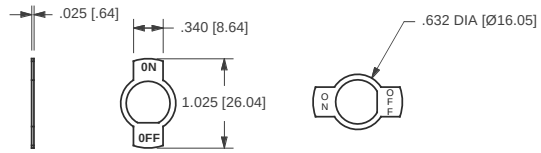


SNAP-IN BUSHING



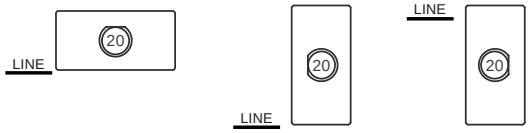
PANEL DRESS NUT

LEGEND PLATES



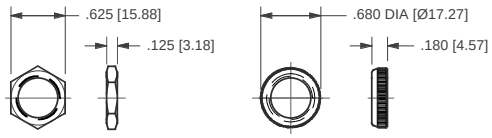
LEGEND CODE: B C

BUTTON MARKING ORIENTATION

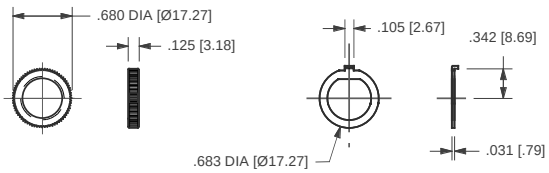


MARKING CODE: 2 3 4

PANEL HARDWARE

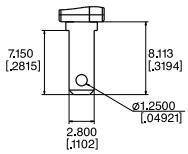


HEX NUT PANEL DRESS NUT



KNURLED NUT LOCKING RING

.110QC AUXILIARY SWITCH TERMINALS



Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.010 [.25] 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”.

M	M	1	–	B	34	–	260	–	1	–	1	B	B	–	C	–	B
1 Series	2 Actuator	3 Poles		4 Circuit	5 Frequency & Delay		6 Current Rating		7 Terminal		8 Actuator Color	9 Front Panel Hardware	10 Legend Plate		11 Bushing Color		12 Agency Approval

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		**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 [3,13]	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

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:
1 One actuator is located in the center of each multi-pole breaker. Actuator codes V & W limited to single pole breakers only.
2 Switch Only circuits are not available with Push-To-Reset actuators. For Switch Only circuits, select Current Coil Rating from the above chart:
3 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.
4 Mates with AMP .058" diameter pin receptacles including 60983-1 (gold plated) and 60983-2 (tin plated).
5 Actuator color is only visible in the OFF position on Push-Pull actuators.
6 All units except snap-in mounting have one hex nut installed on bushing for use behind the panel.
7 Other colors available. Consult factory.
8 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.
9 30 amp rating not available with delay's 30, 32, 34, 92 or 94.
10 Screw Terminals are VDE certified only with use of ring terminal attached to wire.
11 Terminal code A available with circuit codes A & B only.
12 Printed circuit board available with UL recognized approval only.
13 Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

6 CURRENT RATING (AMPERES) [8]

CODE	AMPERES	CODE	AMPERES	CODE	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**	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

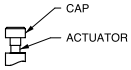
12 AGENCY APPROVAL [9]
C UL Recognized & CSA Accepted
D VDE Certified, UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted

M	M	1	–	B	14	–	620	–	1	–	1	B	B	–	B	–	J
1 Series	2 Actuator	3 Poles		4 Circuit	5 Frequency & Delay		6 Current Rating		7 Terminal		8 Actuator Color	9 Front Panel Hardware	10 Legend Plate		11 Bushing Color		12 Agency Approval

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 [8] Push To Reset 

W [8] Push To Reset 

3 POLES
1 One

4 CIRCUIT

without Auxiliary Switch		
B	Series Trip (Current)	
with Auxiliary Switch, Silver Contacts		**Terminal Type:**
M	Series Trip (Current) Aux Switch	.110 QC x .020 QC
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		
4 [2,3]	Series Trip (Current)	.058 Dia, Round Q.C.
5 [3,12]	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

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	CODE	AMPERES	CODE	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**	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 [4]

1	Push-On 0.250 Tab (Q.C.)	**A** [10]	Push-In Stud
2	Screw 8-32 with Upturned 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)
1 [8] 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 [8] No Marking

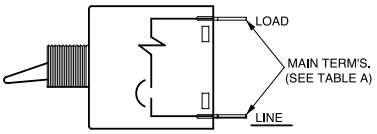
11 BUSHING COLOR [7]
B Black

12 AGENCY APPROVAL [9]
J UL489A Listed, TUV Certified
M UL Recognized, CSA Accepted
N UL Recognized, TUV Certified
T UL489A Listed

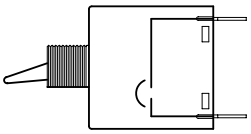
1 One actuator is located in the center of each multi-pole breaker. Actuator codes V & W limited to single pole breakers only.
2 One Auxiliary Switch is supplied per breaker. On two-pole breakers, standard Auxiliary Switch mounting is in pole one. Auxiliary Switch option limited to Series Trip and Switch 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]

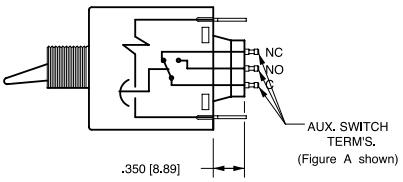
SERIES TRIP



SWITCH ONLY



SERIES TRIP W/ AUXILIARY SWITCH



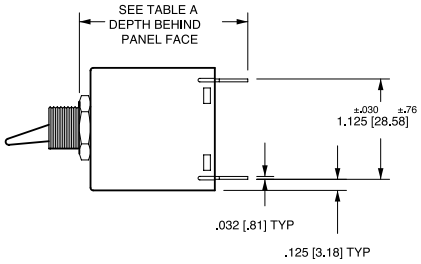


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C)	1.890 [48.00]
	SCREW (#8-32)	1.930 [49.03]
	PUSH-IN STUD	2.520 [64.00]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.035 [51.69]
	ROUND Q.C TYPE	2.025 [51.44]
	FLAT QUICK-CONNECT	2.129 [54.08]
	FLAT SOLDER LUG	2.012 [51.10]

*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

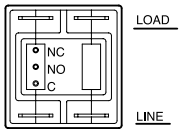


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCHTERMINALS

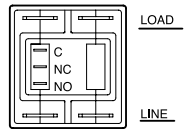
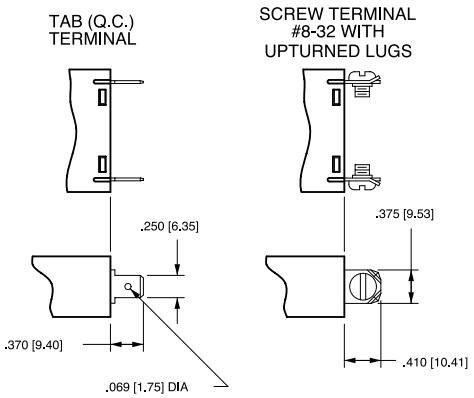
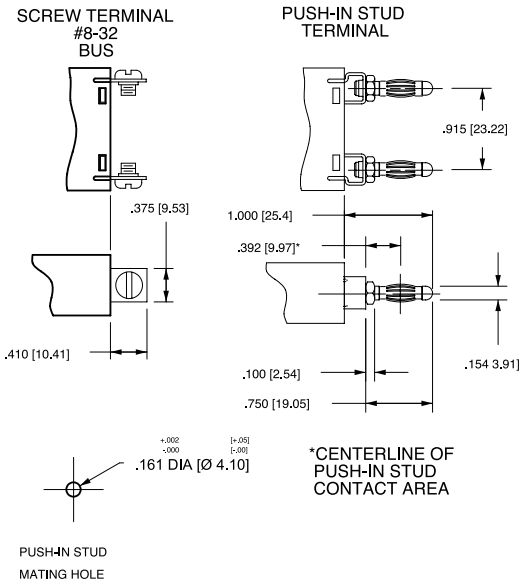


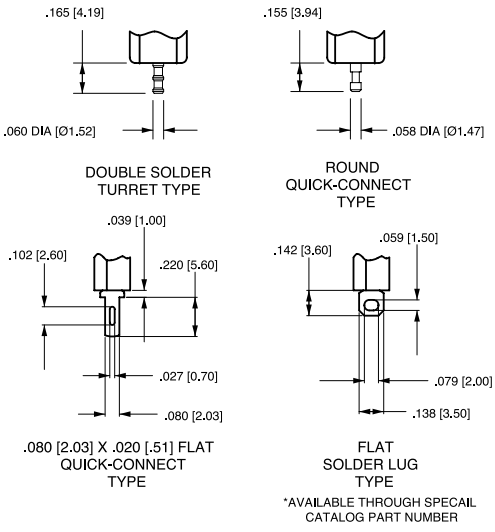
FIG. B

TERMINAL DIMENSIONAL DETAIL





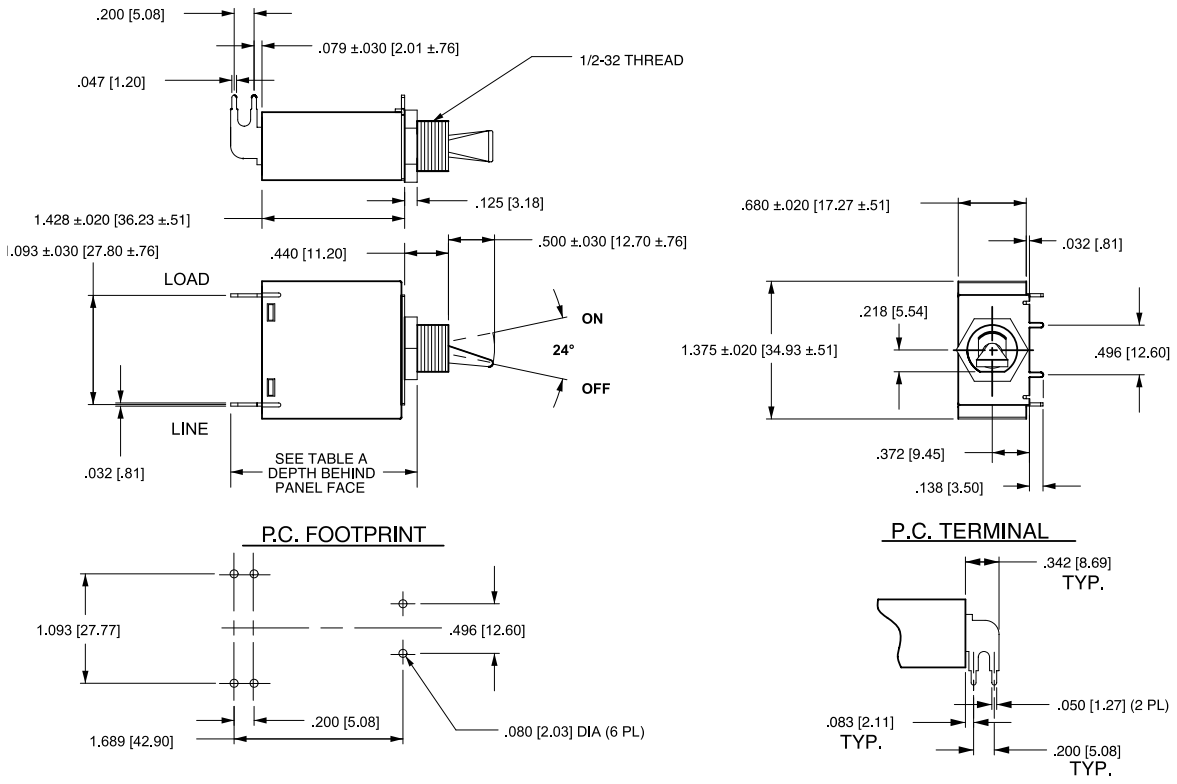
AUXILIARY SWITCH TERMINALS



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

PC Terminal Diagrams: in. [mm]

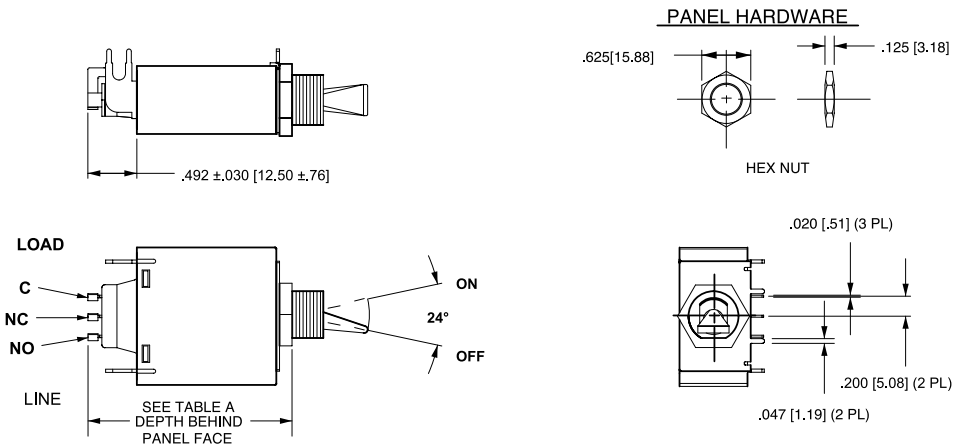
HANDLE TYPE SHOWN WITHOUT AUX. SWITCH



P.C. FOOTPRINT

P.C. TERMINAL

HANDLE TYPE SHOWN WITH AUX. SWITCH



PANEL HARDWARE

P.C. FOOTPRINT

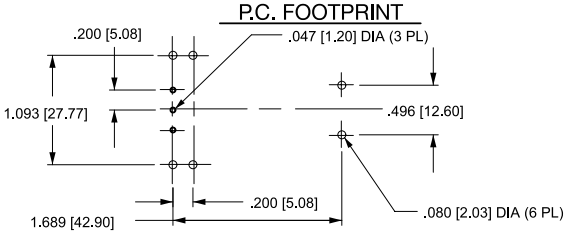


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	PRINTED CIRCUIT BOARD	1.957 [49.71]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.449 [62.20]

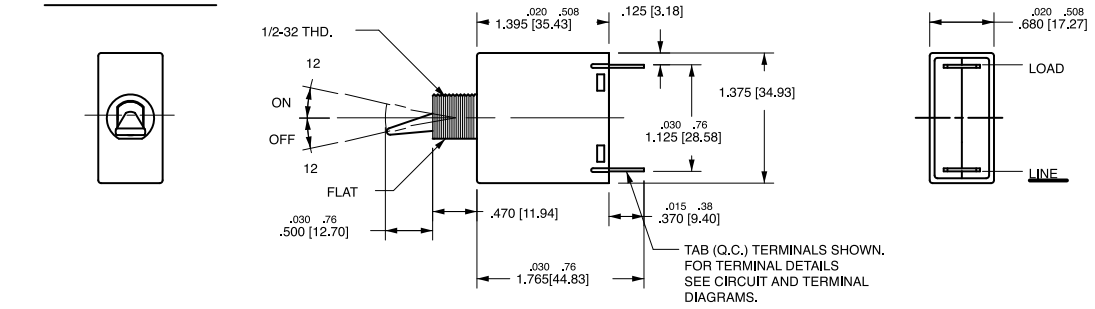
*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

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

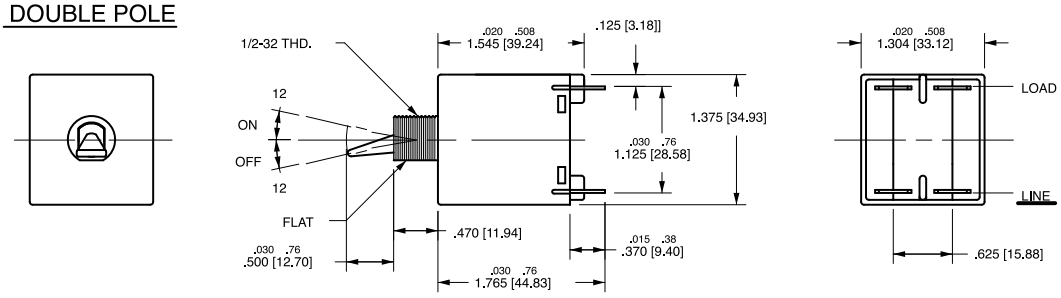
Dimensional Specifications: in. [mm]

PADDLE ACTUATOR STYLE

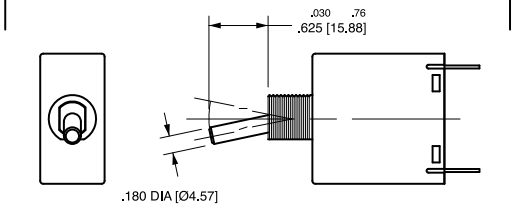
SINGLE POLE



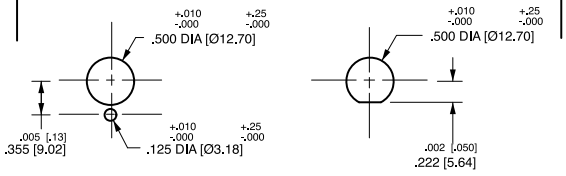
DOUBLE POLE



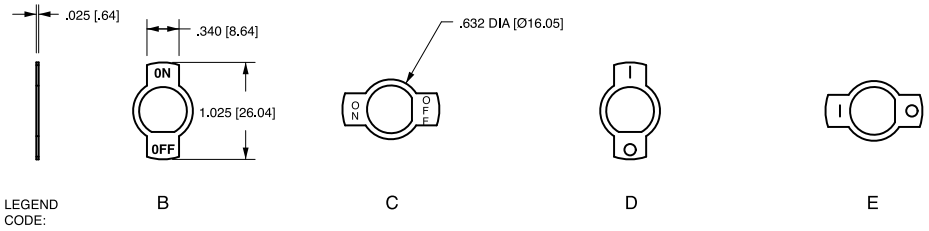
BATON ACTUATOR STYLE



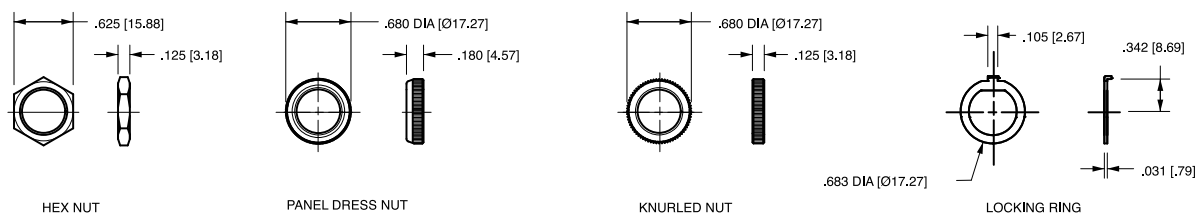
MOUNTING DETAILS



LEGEND PLATES



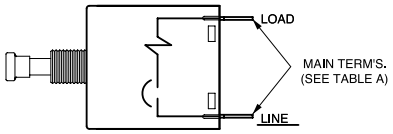
PANEL HARDWARE



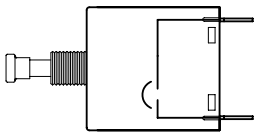
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Circuit & Terminal Diagrams: in. [mm]

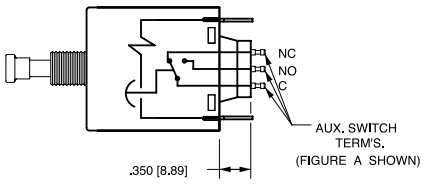
SERIES TRIP



SWITCH ONLY



SERIES TRIP W/ AUXILIARY SWITCH



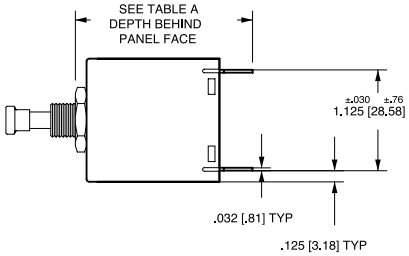


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C)	1.952 [49.57]
	SCREW (#8-32)	1.992 [50.60]
	PUSH-IN STUD	2.582 [65.58]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.097 [53.26]
	ROUND Q.C TYPE	2.087 [53.01]
	FLAT QUICK-CONNECT	2.191 [55.65]
	FLAT SOLDER LUG	2.074 [52.68]

*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

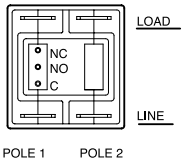


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCHTERMINALS

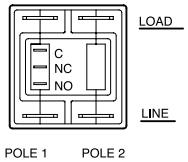
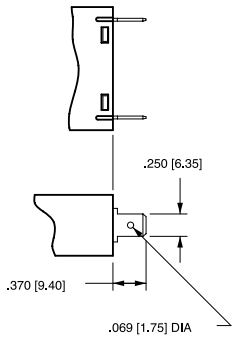


FIG. B

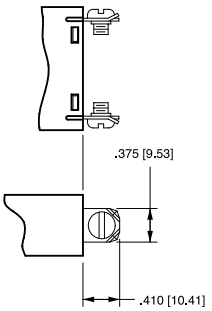
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

TERMINAL DIMENSIONAL DETAIL

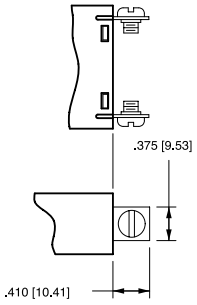
TAB (Q.C.) TERMINAL



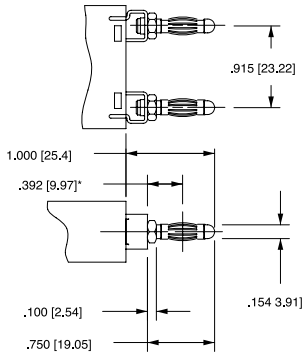
SCREW TERMINAL #8-32 WITH UPTURNED LUGS

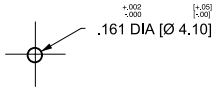


SCREW TERMINAL #8-32 BUS



PUSH-IN STUD TERMINAL

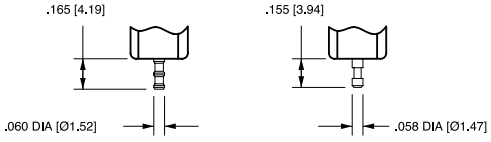




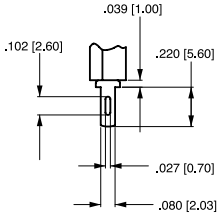
PUSH-IN STUD MATING HOLE

*CENTERLINE OF PUSH-IN STUD CONTACT AREA

AUXILIARY SWITCH TERMINALS

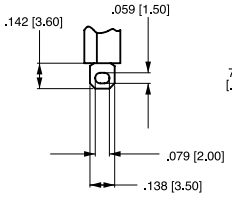


DOUBLE SOLDER TURRET TYPE



.080 [2.03] X .020 [.51] FLAT QUICK-CONNECT TYPE

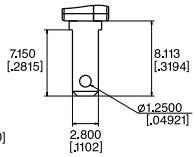
ROUND QUICK-CONNECT TYPE



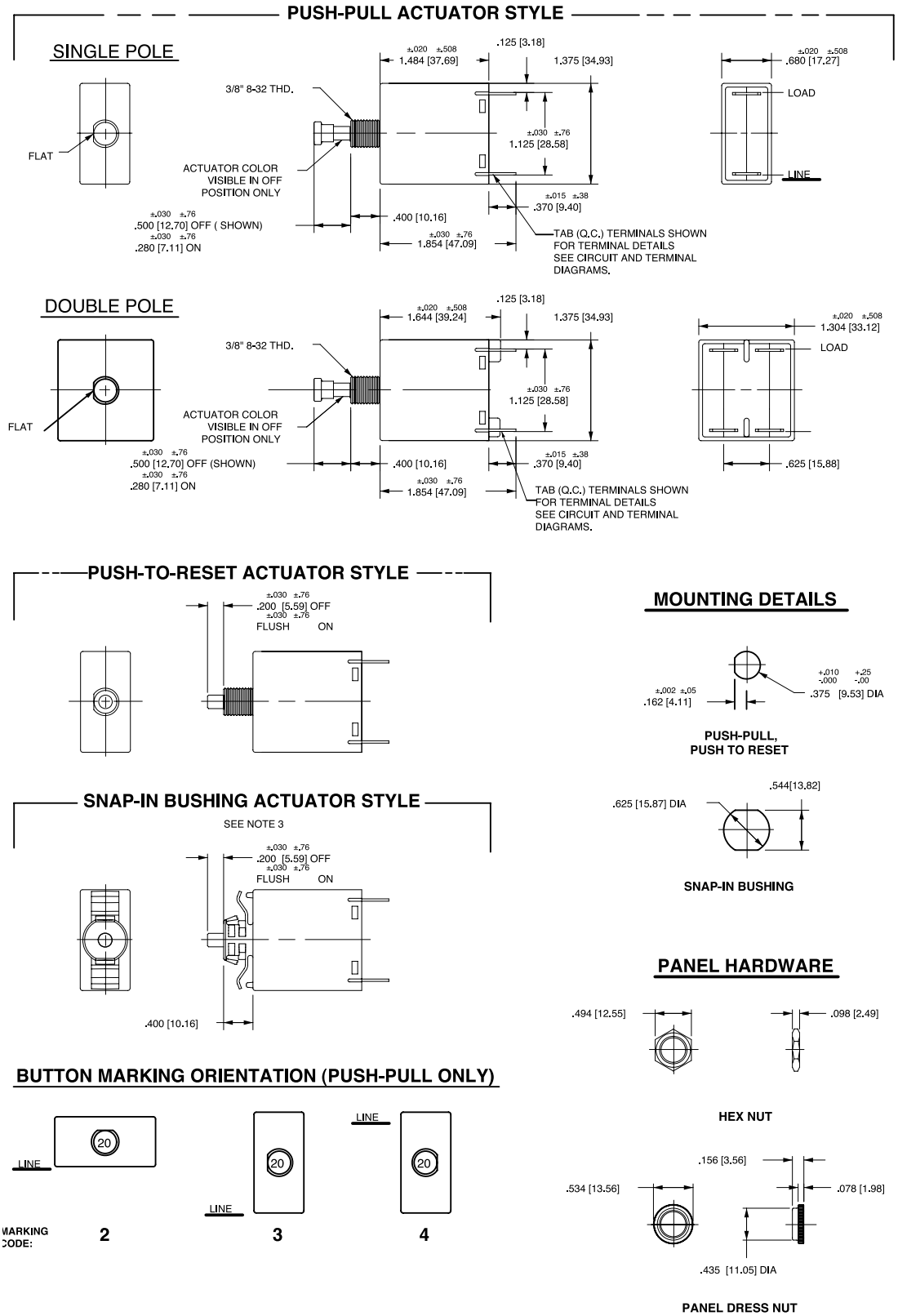
FLAT SOLDER LUG TYPE

*AVAILABLE THROUGH SPECAIL CATALOG PART NUMBER

.110 QC

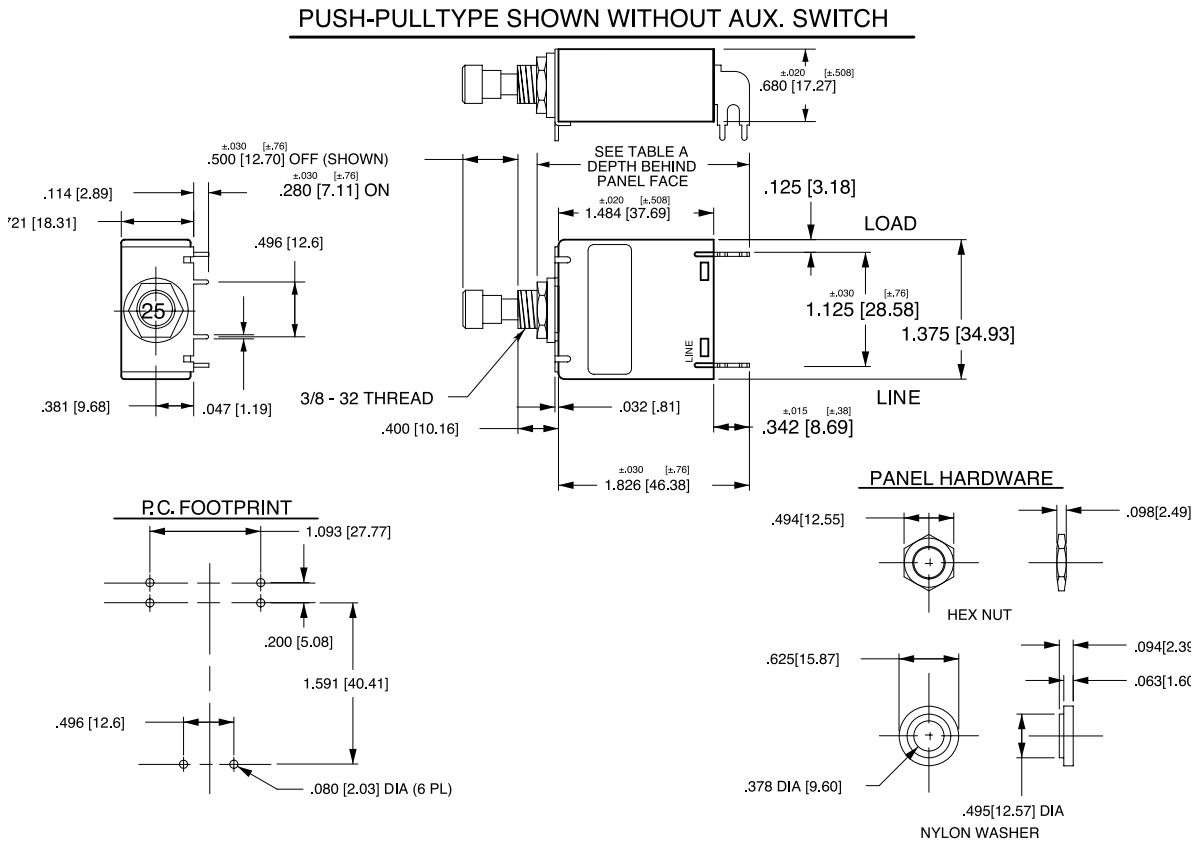


Dimensional Specifications: in. [mm]



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]



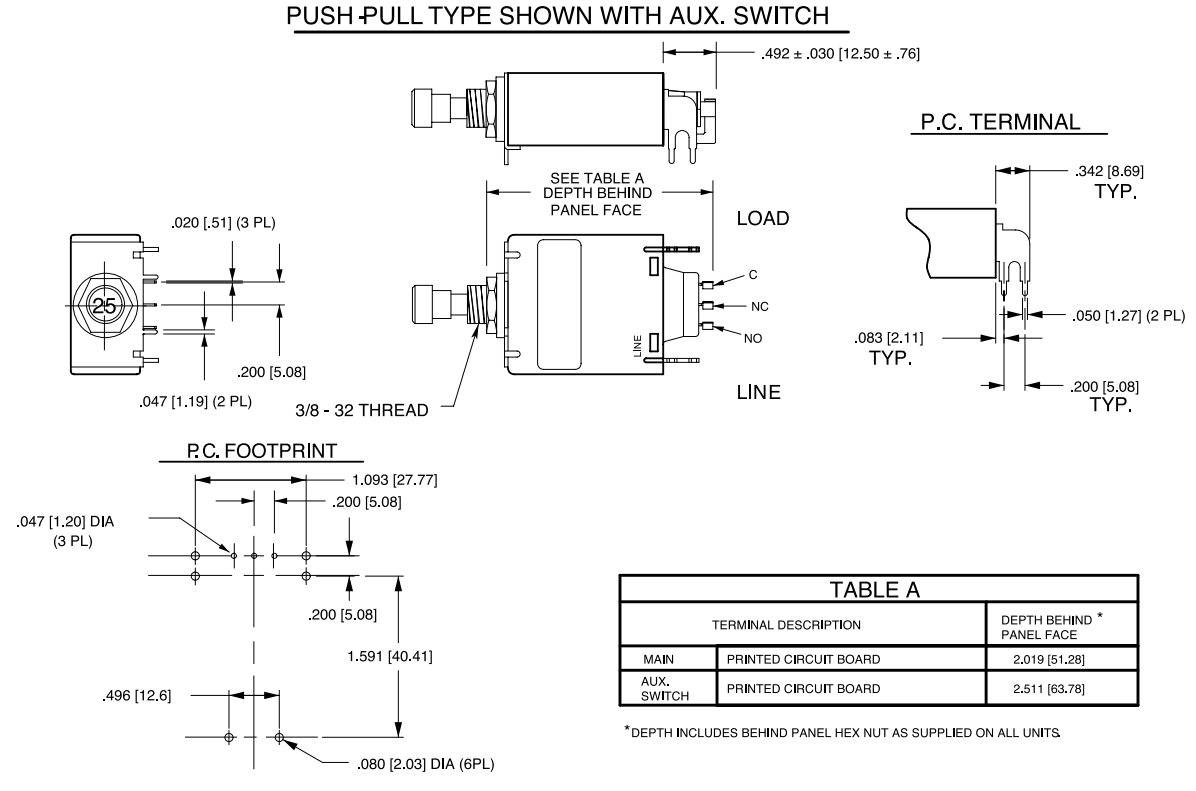


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND * PANEL FACE
MAIN	PRINTED CIRCUIT BOARD	2.019 [51.28]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.511 [63.78]

*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.

M	G	2	–	B	34	–	620	–	1	–	H	C	6	–	7	–	C
1 Series	2 Actuator	3 Poles		4 Circuit	5 Frequency & Delay		6 Current Rating		7 Terminal		8 Illumination	9 Actuator Color	10 Legend		11 Bezel Color		12 Agency Approval

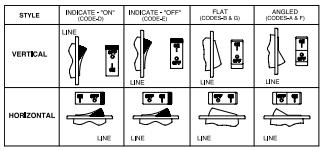
1 SERIES
M

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



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.
4 [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		
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:	POLES BREAKING
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:
1. One actuator is located in the center of each multi-pole breaker.
2. For Switch Only circuits, select Current Coil Rating from the above chart:
3. 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.
4. Mates with AMP .058" diameter pin receptacles: 60983-1 (gold plated) & 60983-2 (tin plated).
5. 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.
6. On Visi-Rocker breakers, Visi portion of rocker cannot be the same color as the bezel.
7. 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.
8. Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent or match color of LED or neon lamp.
9. Other colors available. Consult factory.
10. TUV 20A, VDE 15A. UL Recognized and CSA Accepted to 30 amps. Screw Terminals or Push-in Stud recommended above 20 amps.
11. TUV or VDE Certified must have I-O or Dual Legends. Legend required on Visi-Rocker breakers.
12. 30 amp rating not available with delay's 30, 32, 34, 92 or 94.
13. Screw Terminals are VDE certified only with use of ring terminal attached to wire.
14. Terminal code A available with circuit codes A & B only.
15. Printed circuit board available with UL recognized approval only.
16. Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

6 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	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	**A**		
Neon [5] without resistor, 120VAC/250VAC	**B** Red	**C** Green Glow [8]	
LED [7, 8]	Red	Green	Amber
without resistor	**D**	**G**	**K**
with resistor, 4-8 VDC	**E**	**H**	**L**
with resistor, 9-16 VDC	**F**	**J**	**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 LEGEND [11]

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 / STYLE [9]

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

12 AGENCY APPROVAL [10]

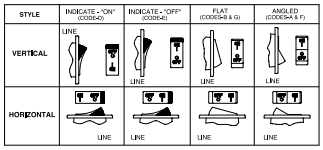
- **C** UL Recognized & CSA Accepted
- **D** VDE Certified, UL Recognized & CSA Accepted
- **E** TUV Certified, UL Recognized & CSA Accepted

M	A	1	–	B	14	–	620	–	1	–	A	1	6	–	2	–	J
1 Series	*2 Actuator*	*3 Poles*		*4 Circuit*	*5 Frequency & Delay*		*6 Current Rating*		*7 Terminal*		*8 Illumination*	*9 Actuator Color*	*10 Legend*		*11 Bezel Color*		*12 Agency Approval*

1 SERIES
M

2 ACTUATOR [1]

Non-Illuminated single color		Two Color Visi-Rocker		illuminated single color	
A	Angled	**D**	Indicate ON	**F**	Angled
B	Flat	**E**	Indicate OFF	**G**	Flat



3 POLES

1	One

4 CIRCUIT [2]

without Auxiliary Switch		
B	Series Trip (Current)	
with Auxiliary Switch, Silver Contacts		**Terminal Type:**
M	Series Trip (Current) Aux Switch	.110 QC x .020 QC
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		
4 [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

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	**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

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	**A**		
Neon [4] without resistor, 120VAC/250VAC	Neon **B**	Green Glow [8] **C**	
LED [7, 8]	Red	Green	Amber
without resistor	**D**	**G**	**K**
with resistor, 4-8 VDC	**E**	**H**	**L**
with resistor, 9-16 VDC	**F**	**J**	**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**

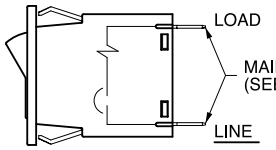
12 AGENCY APPROVAL [9]

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

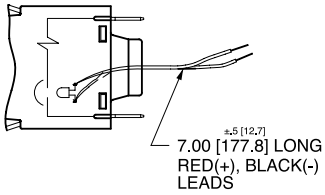
Notes:
1 One actuator is located in the center of each multi-pole breaker.
2 One Auxiliary Switch is supplied per breaker. Auxiliary Switch option limited to Series Trip & Switch Only circuits, and is not available in single pole illuminated breakers, or with Back Connected Screw or Push-in Stud terminals.
3 Mates with AMP .058" diameter pin receptacles: 60983-1 (gold plated) & 60983-1 (tin plated).
4 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.
5 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.
6 On Visi-Rocker breakers, Visi portion of rocker cannot be the same color as the bezel.
7 Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent or match color of LED or neon lamp.
8 Other colors available. Consult factory.
9 TUV Certified to 25 amps. UL Recognized, CSA Accepted and UL489A Listed to 30 amps. Screw Terminals recommended above 20 amps.
10 UL489A Listed must have ON-OFF or Dual legends. TUV Certified approvals must have I - O or Dual legends.
11 Terminal code A available with circuit codes A & B only.
12 Printed circuit board available with UL recognized approval only.
13 Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

Circuit & Terminal Diagrams: in. [mm]

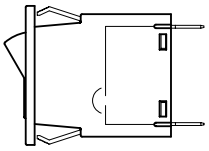
SERIES TRIP



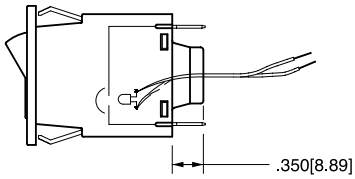
SERIES TRIP W/ ILLUMINATED ROCKER



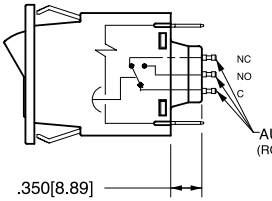
SWITCH ONLY

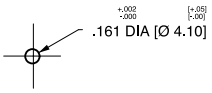


SWITCH ONLY W/ ILLUMINATED ROCKER



SERIES TRIP W/ AUXILIARY SWITCH





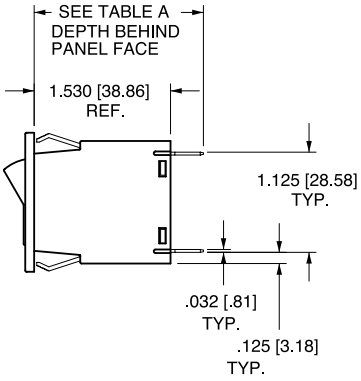
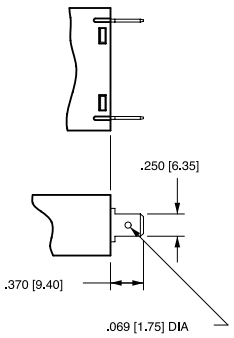


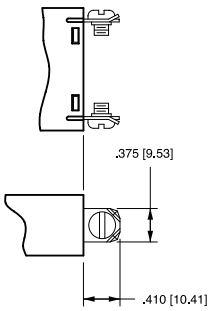
TABLE - A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE
MAIN	TAB (Q.C.)	1.900 [48.26]
	SCREW (#8-32)**	1.940 [49.28]
	PUSH-IN STUD	2.530 [64.26]
*AUX. SWITCH	DOUBLE SOLDER TURRET TYPE	2.045 [51.94]
	ROUND Q.C. TYPE	2.035 [51.69]
	FLAT QUICK CONNECT	2.139 [54.33]
	FLAT SOLDER LUG	2.022 [51.36]

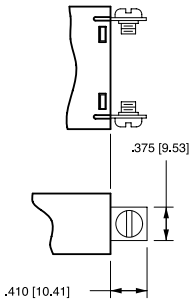
* AUX. SWITCH IS NOT AVAILABLE ON SINGLE POLE ILLUMINATED UNITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN ON CLA-8003.

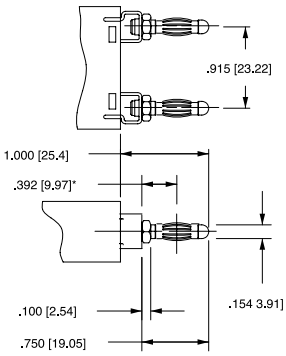
**RECOMMENDED TIGHTENING TORQUE 12-15 IN LBS [1.4-2.7 NM]

TERMINAL DIMENSIONAL DETAIL



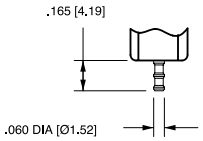




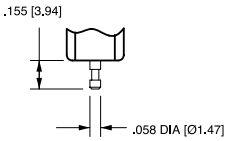


*CENTERLINE OF PUSH-IN STUD CONTACT AREA

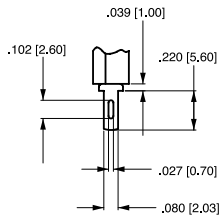
AUXILIARY SWITCH TERMINALS



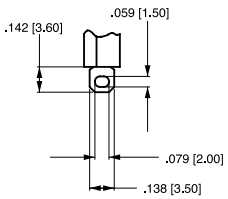
DOUBLE SOLDER TURRET TYPE



ROUND QUICK-CONNECT TYPE



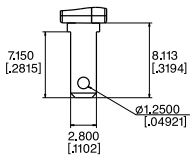
.080 [2.03] X .020 [.51] FLAT QUICK-CONNECT TYPE



FLAT SOLDER LUG TYPE

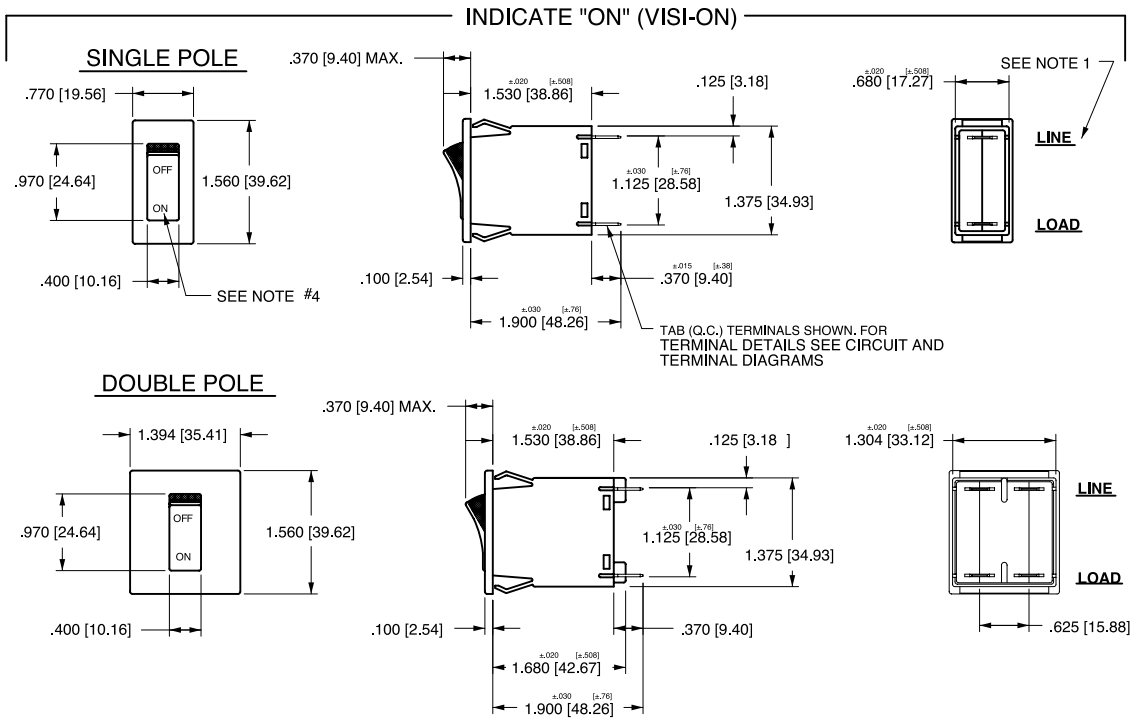
*AVAILABLE THROUGH SPECAIL CATALOG PART NUMBER

.110 QC



Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuit.

Dimensional Specifications: in. [mm]

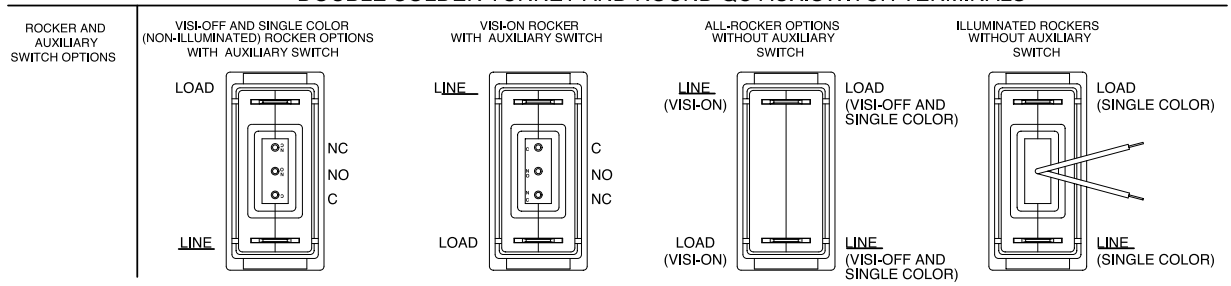


PANEL THICKNESS	DIM. A
.062 [1.57]	1.385 [35.18]
.093 [2.36]	1.420 [36.07]
.125 [3.18]	1.460 [37.08]

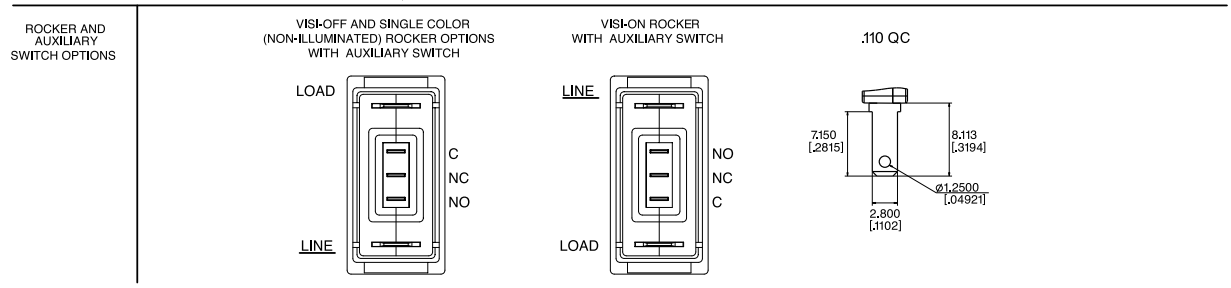
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
2 I-O, ON-OFF or dual legends available for vertical or horizontal mounting. For pole orientation with horizontal legend, rotate front view clockwise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

ONE POLE

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

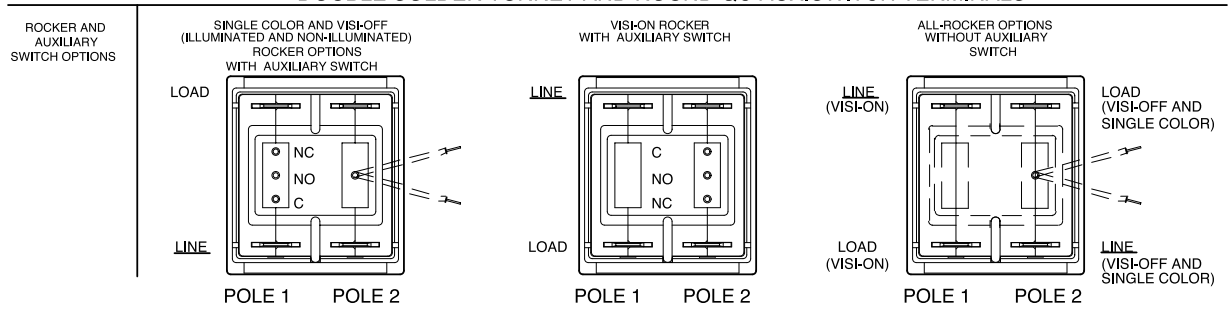


SINGLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX.SWITCH TERMINALS

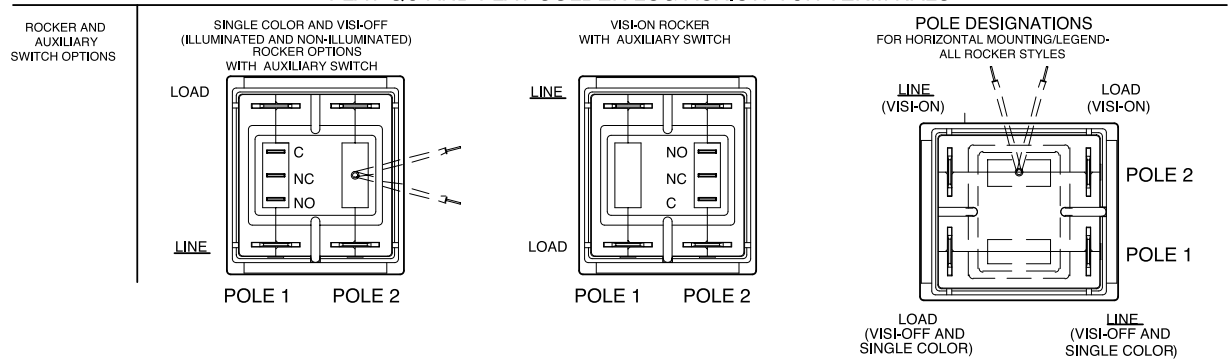


TWO POLE

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

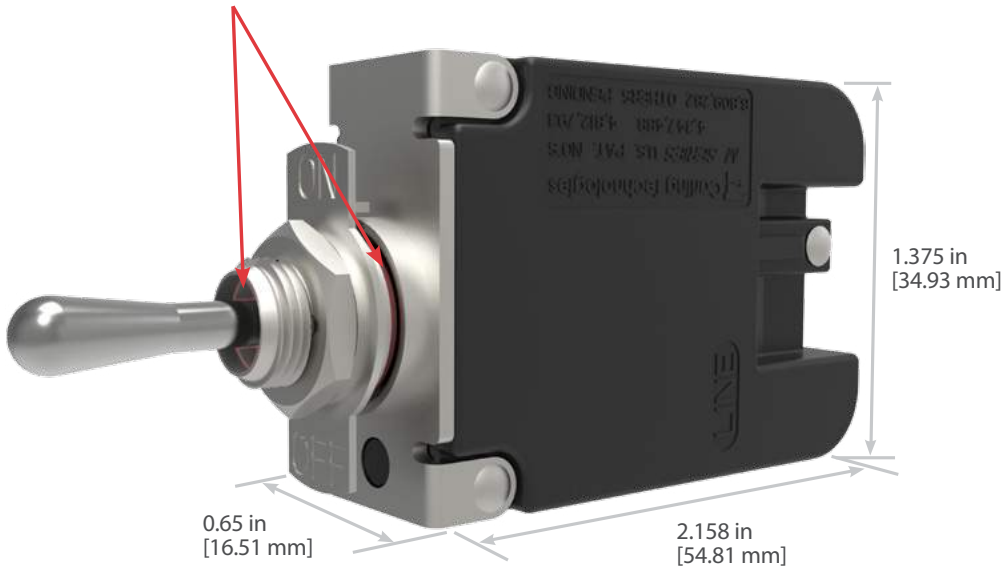
Typical Applications:

- 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

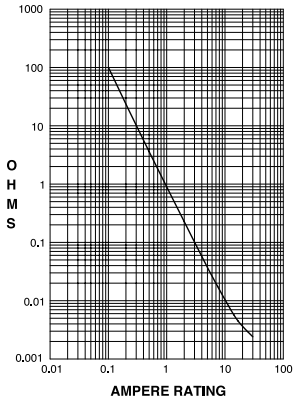
MS-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS							
	Voltage			Current Rating		Short Circuit Capacity (Amps)[1]	
Circuit Configuration	Max Rating	Frequency	Phase	General Purpose Amps	Poles Breaking	UL / cUL	
						U1	U3
Series	65	DC	---	0.02 - 30	1	3000	300
	240	50 / 60	1	0.02 - 30	1, 2	2000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

M	S	1	–	B	–	14	–	615	–	C	–	1	C	B	–	A	–	0A	A
1 Series	2 Actuator	3 Poles		4 Circuit		5 Frequency & Delay		6 Current Rating		7 Terminal		8 Actuator Color	9 Front Panel Hardware	10 Legend Plate		11 Bushing Color		12 Voltage Code	13 Agency Approval

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

6 CURRENT RATING (AMPERES)

CODE	AMPERES						
220	0.200	**295**	0.950	**460**	6.00	**614**	14.00
225	0.250	**410**	1.00	**465**	6.50	**615**	15.00
230	0.300	**512**	1.25	**470**	7.00	**616**	16.00
235	0.350	**415**	1.50	**475**	7.50	**617**	17.00
240	0.400	**517**	1.75	**480**	8.00	**717**	17.50
245	0.450	**420**	2.00	**485**	8.50	**618**	18.00
250	0.500	**522**	2.25	**490**	9.00	**619**	19.00
255	0.550	**425**	2.50	**495**	9.50	**620**	20.00
260	0.600	**527**	2.75	**610**	10.00	**622**	22.00
265	0.650	**430**	3.00	**710**	10.50	**624**	24.00
270	0.700	**435**	3.50	**611**	11.00	**625**	25.00
275	0.750	**440**	4.00	**711**	11.50	**630**	30.00
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		

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)

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

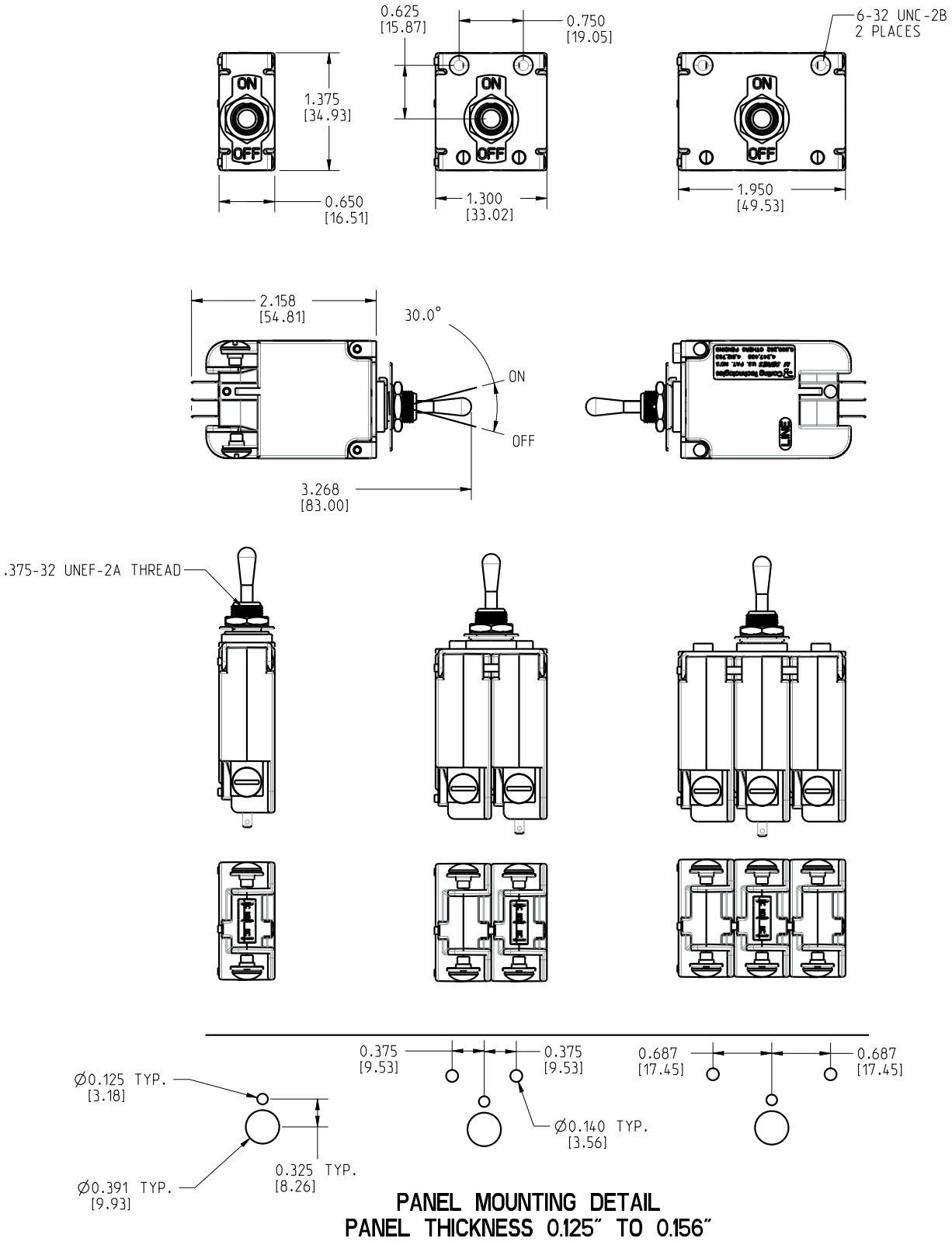
10 LEGEND PLATE
A No Legend Plate
B On-Off Vertical
C On-Off Horizontal
D I-O Vertical
E I-O Horizontal
F Dual Vertical
G Dual Horizontal

11 BUSHING COLOR
A Nickel Plated / Multipole Version

12 VOLTAGE CODE
0A 65 VDC
0D 240 VAC
0C 120/240 VAC [3]
0N 65 VDC / 120/240 VAC [3]
17 65 VDC / 240 VAC

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

Dimensional Specifications: in. [mm]



PANEL MOUNTING DETAIL
PANEL THICKNESS 0.125″ TO 0.156″

Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.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, C22.2 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	Minimum Poles	Short Circuit Capacity (Amps)			Application Codes	
	Max Rating	Frequency	Phase	Full Load Amps		UL	CSA	TUV		
						Without Backup Fuse	Without Backup Fuse	(Icn) Without Backup Fuse	UL	CSA
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
Auxiliary Switch Rating	SPDT: 10.1A-250VAC, 1.0A-65VDC/0.5A-80VDC, 0.1A-125VAC (with gold contacts)

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)

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

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%

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

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

H	A	3	–	B	0	–	24	–	450	–	1	B	1	–	D	C
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)	**C** [4]	Series Trip (voltage)
B	Series Trip (current)	**G** [4]	Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH
0	without Aux Switch	**3** [3]	0.110 Q.C. term with gold contacts
1 [3]	0.110 Q.C. term	**4** [3]	0.110 PC term
2 [3]	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			

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, CCC Certified
E	UL Recognized, CSA Accepted, TUV Certified
5	UL Recognized, CSA Accepted, TUV Certified, CCC Certified

Notes:
1. Actuator Option A: handle tie pin, spacer & retainers provided unassembled on multipole units.
   Actuator Option B: Handle location as viewed from front of panel: 2 pole: left pole; 3 pole: center pole
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. 26-35A Polarity sensitive, only available as 1 pole unit.
7. Voltage code 4 available to 25A max.

H	J	3	–	B	0	–	10	–	450	–	1	B	1	–	D	C
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 (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)	**C** [4]	Series Trip (voltage)
B	Series Trip (current)	**G** [4]	Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH
0	without Aux Switch	**3** [3]	0.110 Q.C. term with gold contacts
1 [3]	0.110 Q.C. term	**4** [3]	0.110 PC term
2 [3]	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			

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
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 ***Threaded Insert***	BARRIERS	HALF ROCKER GUARD	BRACKET COLOR
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
M [7]	80VDC
4 [8]	80VDC / 250VAC

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

Notes:
1. Half guard construction have OFF protection for actuator
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.

H	3	3	–	B	0	–	10	–	450	–	1	B	1	–	D	C
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)	**C** [4]	Series Trip (voltage)
B	Series Trip (current)	**G** [4]	Relay Trip (voltage)

5 AUXILIARY / ALARM SWITCH

0	without Aux Switch	**3** [3]	0.110 Q.C. term with gold contacts
1 [3]	0.110 Q.C. term	**4** [3]	0.110 PC term
2 [3]	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	*special catalog #*

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 ***Threaded Insert***	BARRIERS	HALF ROCKER GUARD	BRACKET COLOR
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
M [7]	80VDC
4 [8]	80VDC / 250VAC

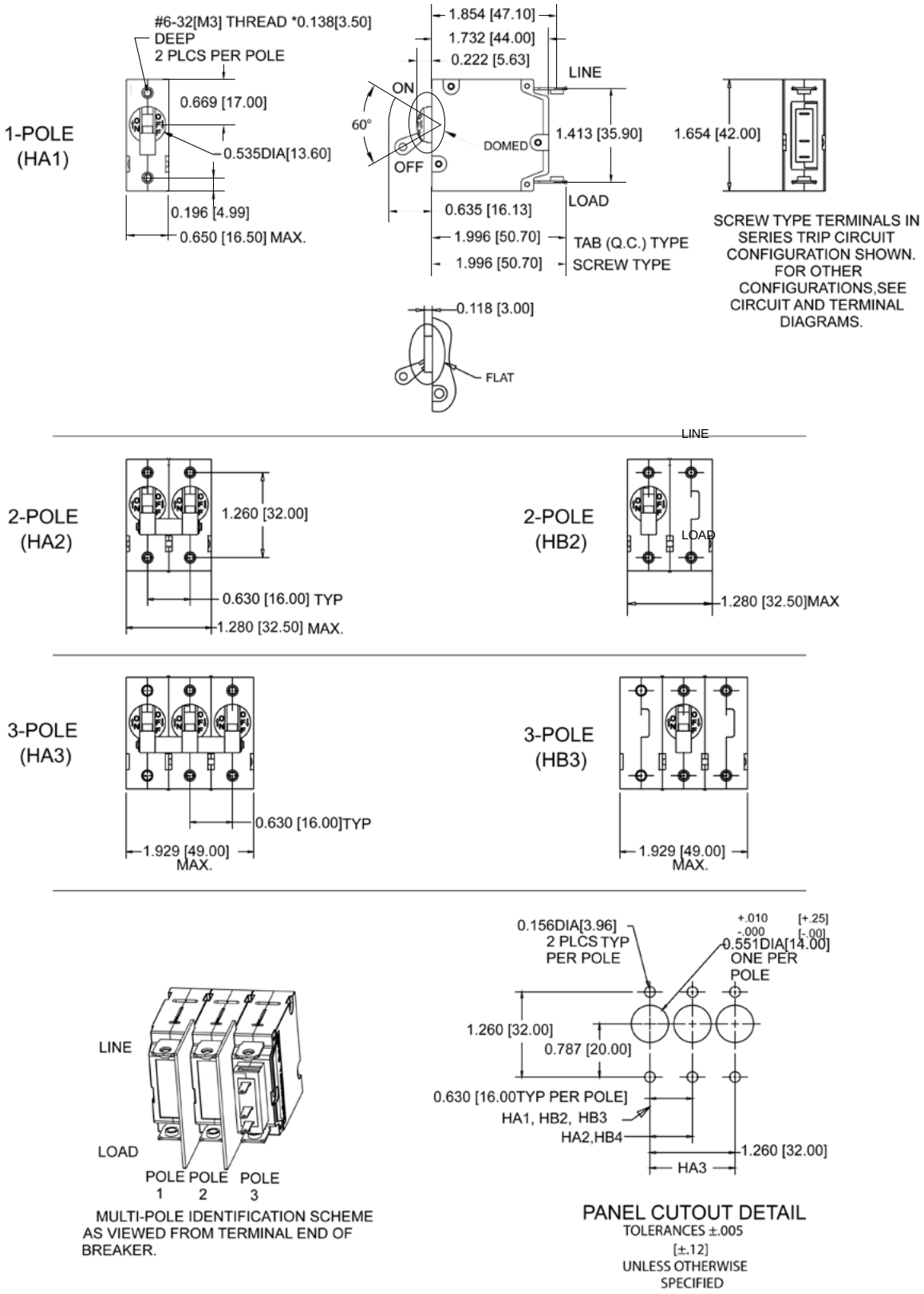
12 AGENCY APPROVAL

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

Notes:

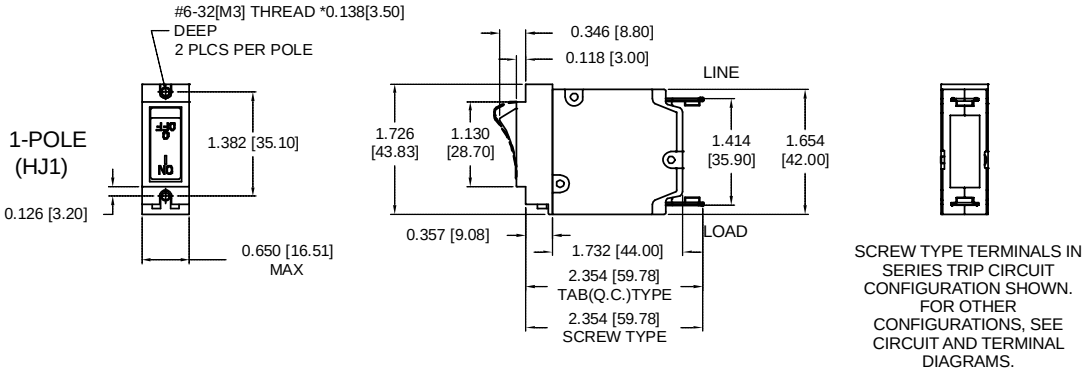
1. Push-To-Reset actuator shave OFF portion of rocker shrouded
2. Standard multipole units have all poles identical, except when specifying auxiliary switch
3. Auxiliary switch available on Series Trip and Switch Only circuits to 32A. On multipole units, only one auxiliary switch is normally supplied, 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.

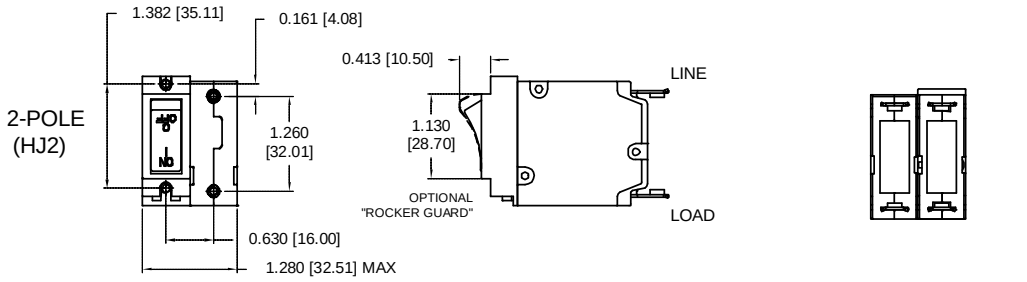
Dimensional Specifications: in. [mm]

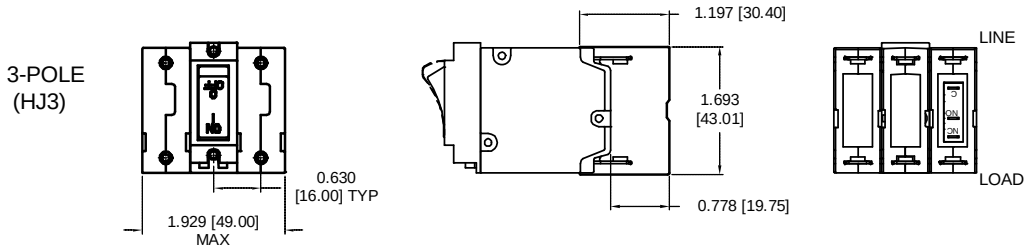


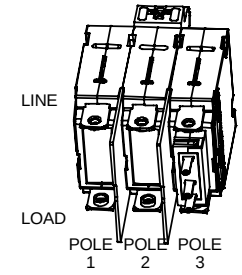
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

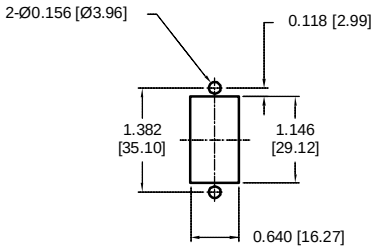








MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

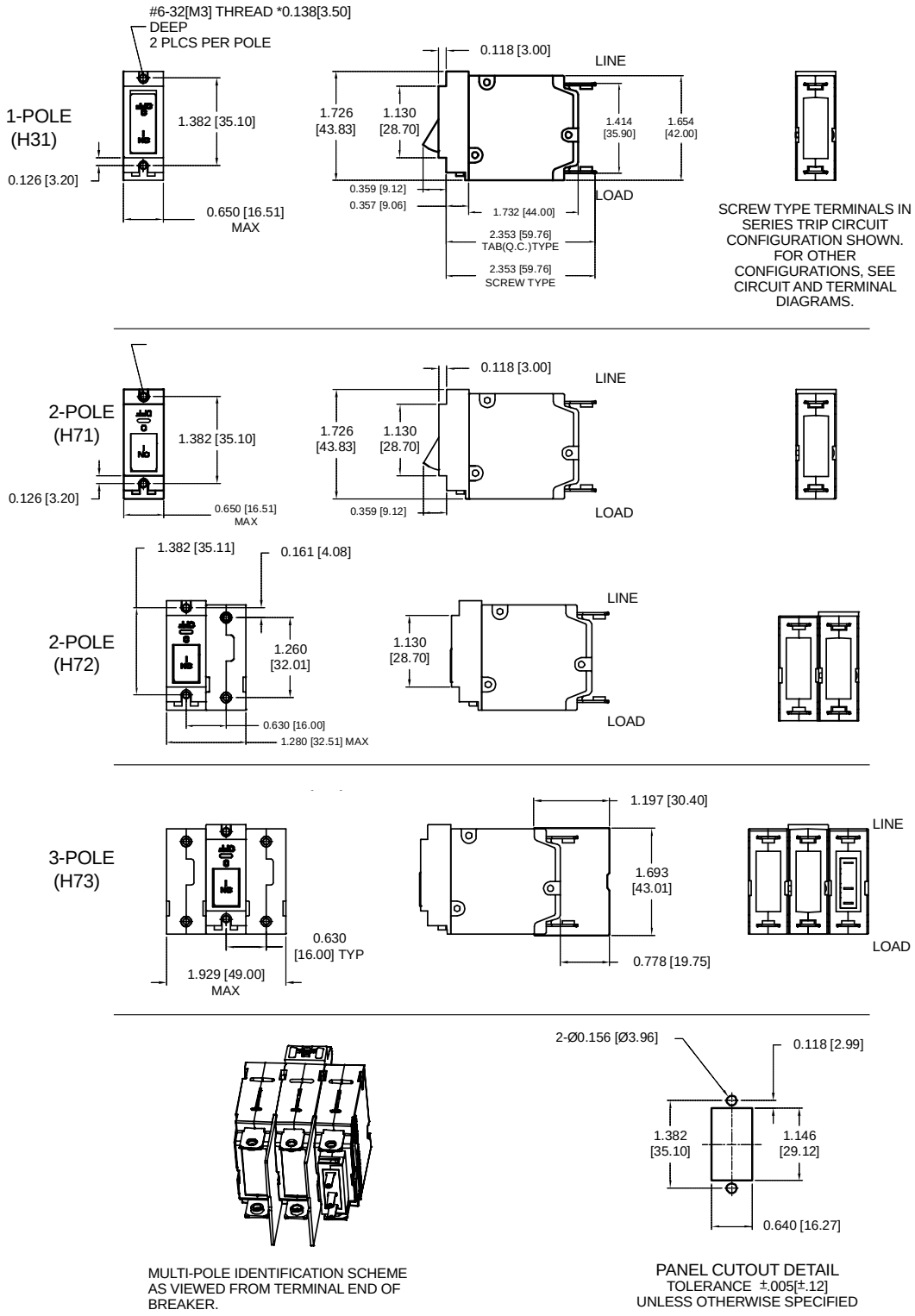


PANEL CUTOUT DETAIL
TOLERANCE ±.005[±.12]
UNLESS OTHERWISE SPECIFIED

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

Dimensional Specifications: in. [mm]

PUSH-TO-RESET ACTUATOR



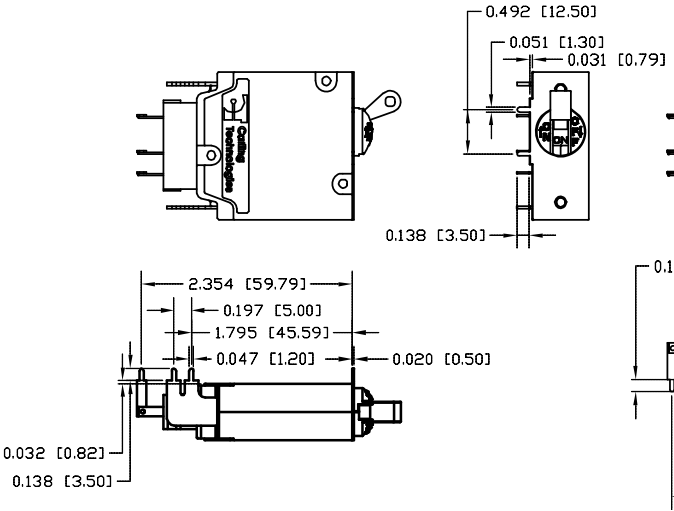
MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

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

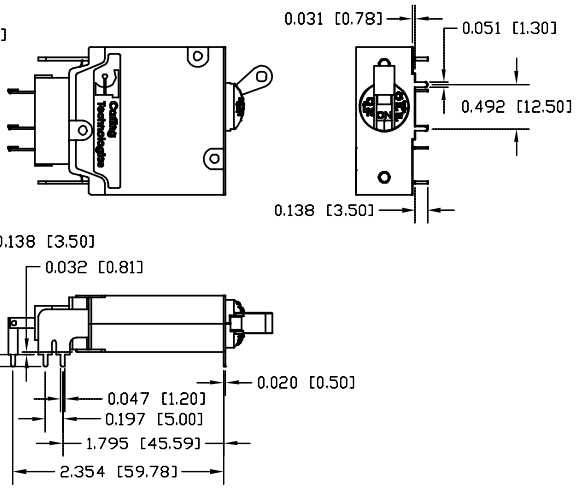
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

PC Terminal Diagrams: in. [mm]

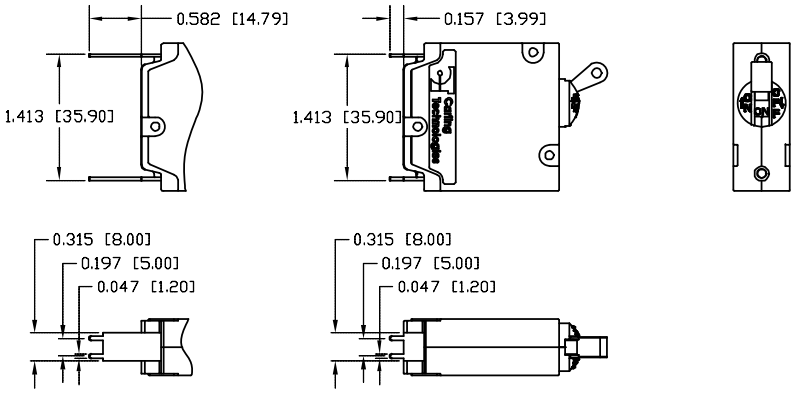
PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE R



PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE L



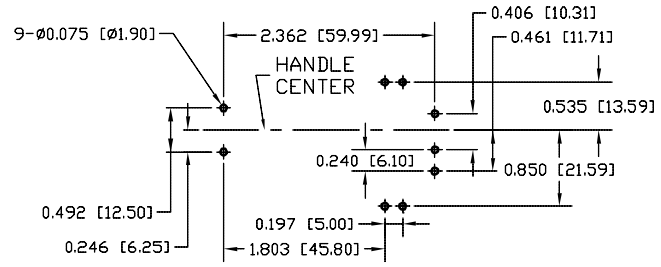
PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE S & T



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

PC Terminal Diagrams: in. [mm]

P.C. FOOT PRINT
FOR TERMINAL CODE R



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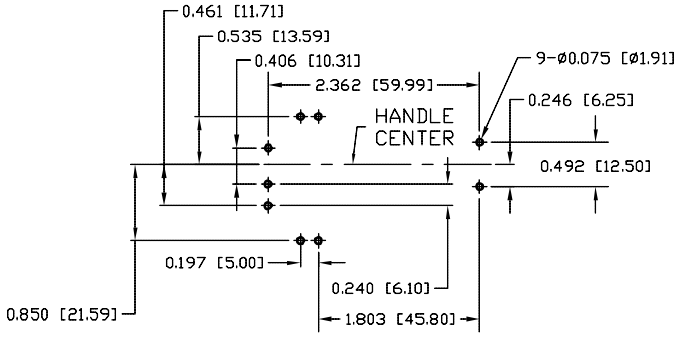
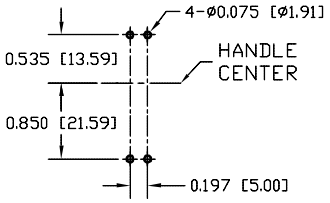
FOR TERMINAL CODE L



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

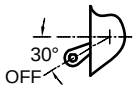
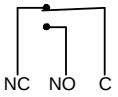
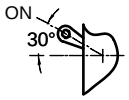
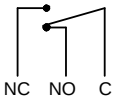
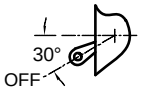
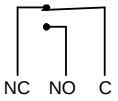


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

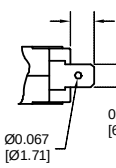
Circuit & Terminal Diagrams: in. [mm]

HANDLE POSITION VS. AUX SWITCH MODE

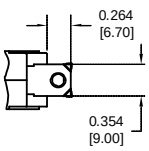
STANDARD C/B

CIRCUIT BREAKER MODE	HANDLE POSITION	AUX. SWITCH MODE
OFF		
ON		
ELECTRICAL TRIP		

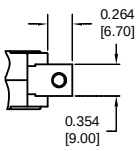
TERMINAL DIMENSIONAL DETAIL & RATING



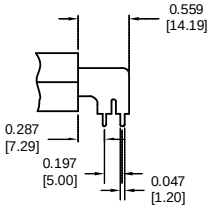
TAB (Q.C.)
≤ 32 AMP



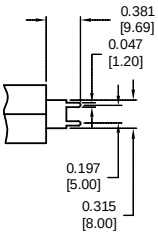
UPTURN LUG
#8-32 ≤ 32 AMP
M4 ≤ 32 AMP



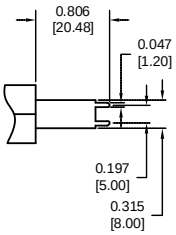
BUS
#8-32 ≤ 32 AMP
M4 ≤ 32 AMP



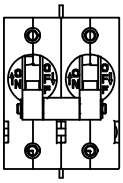
P.C. TERMINAL
90 FACING LEFT ≤ 32 AMP
90 FACING RIGHT ≤ 32 AMP

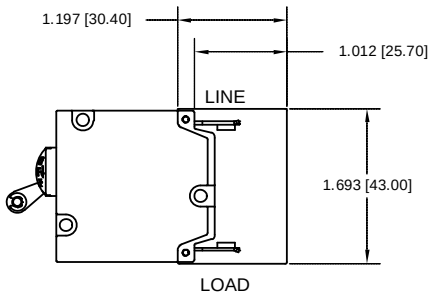


P.C. TERMINAL
STRAIGHT (SHORT)
≤ 32 AMP



P.C. TERMINAL
STRAIGHT (LONG)
≤ 32 AMP





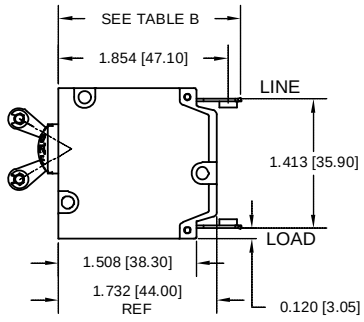
BARRIER FOR
UL-RECOGNIZED MULTI-POLE
BREAKERS

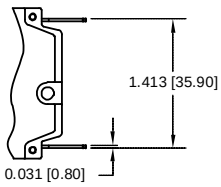
TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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]

TABLE B

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]

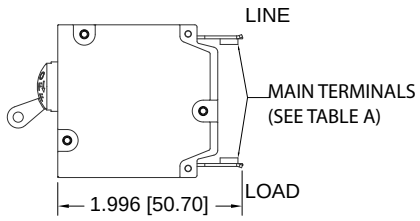
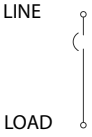
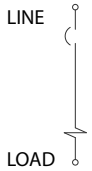
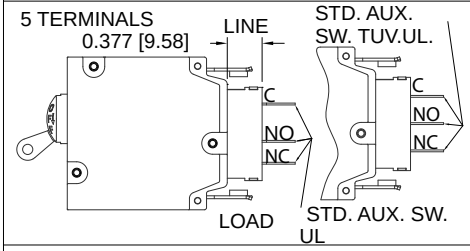
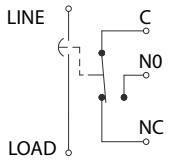
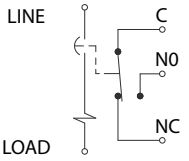
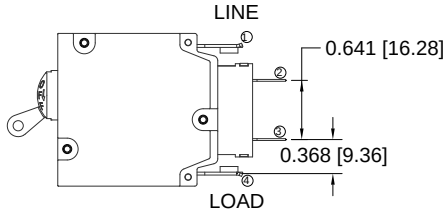
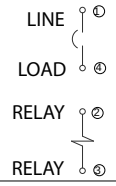




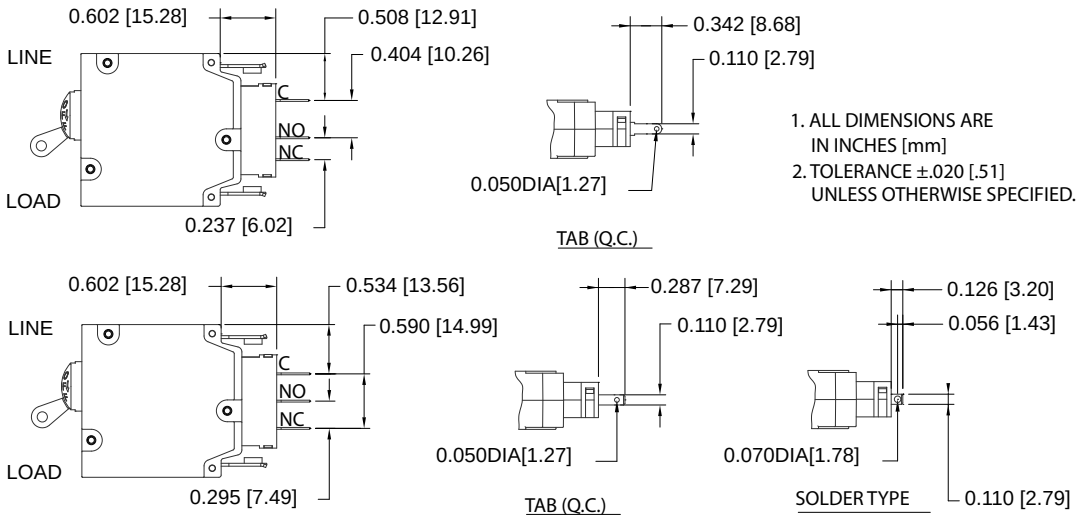
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS.
WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

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

Circuit & Terminal Diagrams: in. [mm]

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC ANSI SWITCH ONLY (NO COIL)	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC ANSI SERIES TRIP	CIRCUIT CODE	AUX SWITCH CODE
2 TERMINALS 		A	0		B	0
5 TERMINALS 0.377 [9.58] 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH 	A	1 2 3	SERIES TRIP WITH AUXILIARY 	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, the 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. The A-Series circuit breakers are offered with ratings from 0.02 to 50 amps, up to 277VAC or 80VDC and are available with several choices of pole configurations, time delays, terminals, with a wide range of standard colors, imprinting and actuator styles.

Actuator styles include handle for 1-6 poles and rocker for 1-3 pole construction. When front panel operation and aesthetics demand a clean, contemporary design, a two-color or solid color Visi-Rocker actuator, indicating either the ON mode or the TRIPPED/OFF mode, is ideally suitable. The new Rockerguard bezel and push-to-reset bezel, which help prevent inadvertent actuation, is also available.

Product Highlights:

- Specially constructed version available for applications requiring CE markings
- The metal toggle option was tested to MIL-PRF-55629C for ingress protection when mounted in a panel, and also meets IP68 requirement.

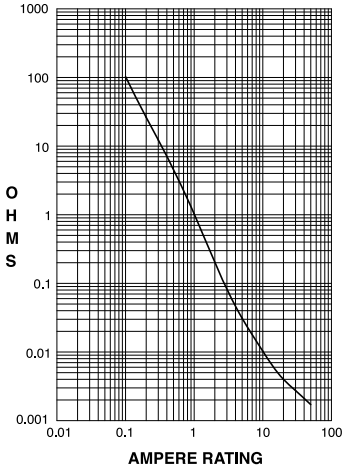
Typical Applications:

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

Electrical

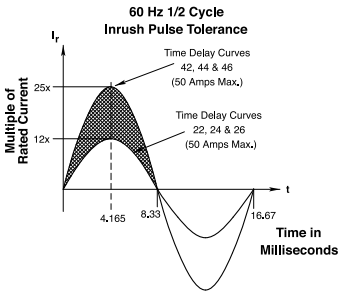
Maximum Voltage	277VAC 50/60 Hz, 80VDC
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 50.0. Other ratings available - consult ordering scheme.
Standard Voltage Coils	DC-6V, 12V; AC-120V, Other ratings available, consult 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.

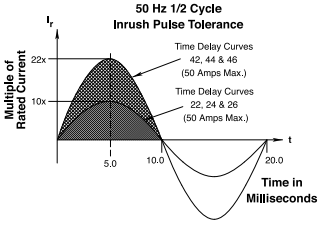
RESISTANCE PER POLE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Breaker)



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

Pulse Tolerance Curves





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

*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) UL / CSA		Application Codes		Construction Notes
	Max Rating	Frequency	Phase	Full Load Amps	General Purpose Amps	With Backup Fuse	Without Backup Fuse	UL	CSA	
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
			1	0.02 - 30	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Two Pole Break
			1	---	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
						UL/CSA		VDE		TUV				
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS[1]	WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP	UL	CSA	
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
DUAL COIL	80	DC	—	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
			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	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
			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	TC1,2, OL1,C1	TC1,2, OL1,C1	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. R72040875

VDE Certified

EN60934, VDE 0642 under File No. 10537

A	A	3	–	B	0	–	10	–	450	–	1	B	1	–	C
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 Agency Approval

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
2 Two
3 Three
4 Four
5 Five
6 Six

4 CIRCUIT
A [2] Switch Only (No Coil)
B Series Trip (Current)
C Series Trip (Voltage)
D [3] Shunt Trip (Current)
E [3] Shunt Trip (Voltage)
F [3] Relay Trip (Current)
G [3] Relay Trip (Voltage)
H [3,4] Dual Coil with Shunt Trip Voltage Coil
K [3,4] Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH [5]
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
10 DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20 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 [7] 50/60Hz Short, Hi-Inrush
44 [7] 50/60Hz Medium, Hi-Inrush
46 [7] 50/60Hz Long, Hi-Inrush
52 [7] DC, Short,Hi-Inrush
54 [7] DC, Medium, Hi-Inrush
56 [7] DC, Long, Hi-Inrush

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 auxilary 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.

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** [8]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [8]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [8]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [8]	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) [6]

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

A	A	1	–	B	0	–	14	–	450	–	1	B	1	–	M	T
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]
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** [3]	35.000
270	0.700	**440**	4.000	**711**	11.500	**640** [3]	40.000
275	0.750	**445**	4.500	**612**	12.000	**645** [3]	45.000
280	0.800	**450**	5.000	**712**	12.500	**650** [3]	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; 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 MAXIMUM APPLICATION RATING
M 80 DC

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

Notes:
1 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.
2 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
3 VDE Certified to 30 amps. UL489A Listed to 50 amps.
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 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 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.
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 Single pole only.

A	A	3	–	B	0	–	14	–	450	–	1	A	1	–	P
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 Agency Approval

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)	**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	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	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 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
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.

A	F	1	–	B	0	–	14	–	450	–	1	3	1	–	M	T
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

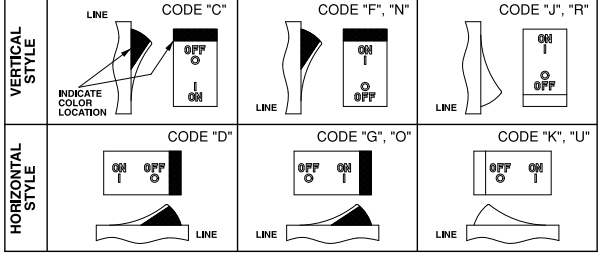
2 ACTUATOR [1]
Two Color Visi-Rocker
- **C** Indicate ON, vertical legend
- **D** Indicate ON, horizontal legend
- **F** Indicate OFF, vertical legend
- **G** Indicate OFF, horizontal legend

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



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. (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** DC, Short,Hi-Inrush
- **54** DC, Medium, Hi-Inrush
- **56** 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** [4]	35.000
270	0.700	**440**	4.000	**711**	11.500	**640** [4]	40.000
275	0.750	**445**	4.500	**612**	12.000	**645** [4]	45.000
280	0.800	**450**	5.000	**712**	12.500	**650** [4]	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 or Visi-Color [10]	Marking: ON-OFF	Marking: Dual [10]	Marking Color: Single Color	Marking 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]

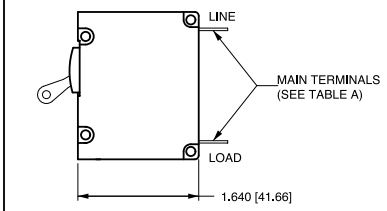
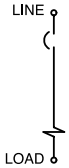
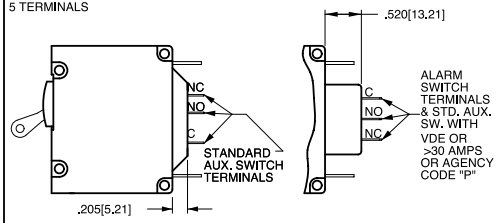
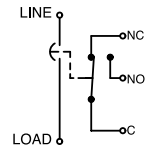
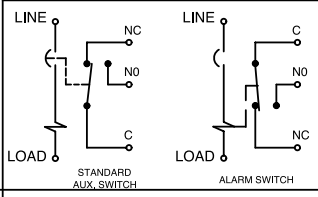
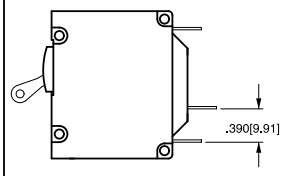
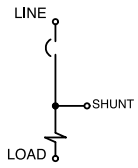
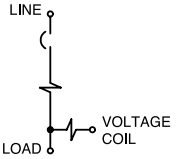
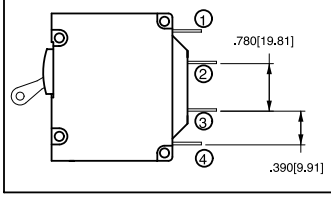
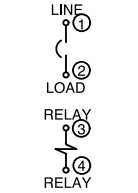
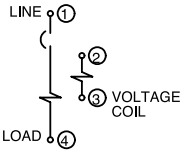
	STANDARD ROCKER BEZEL	BARRIERS
	Threaded Insert, 2 per pole	
1	6-32 x 0.195 inches	no
A	6-32 X 0.195 inches (multi-pole units only)	yes
2	ISO M3 x 5mm	no
B	ISO M3 x 5mm (multi-pole units only)	yes
	ROCKERGUARD & PUSH-TO-RESET BEZEL	
	Threaded Insert, 2 per pole	
3	6-32 x 0.195 inches	no
C	6-32 x 0.195 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 MAXIMUM APPLICATION RATING
- **M** 80 DC

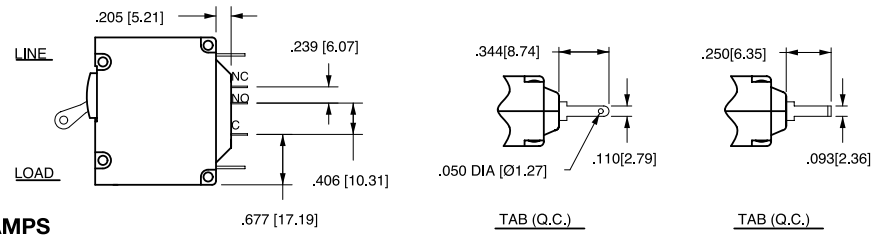
12 AGENCY APPROVAL
- **T** UL489A Listed
- **K** UL489A Listed, VDE Certified
- **J** UL489A Listed, TUV Certified

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

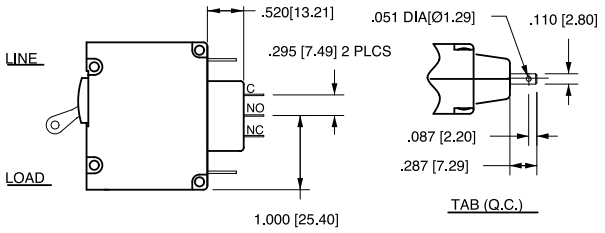
Circuit & Terminal Diagrams: in. [mm]

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC ANSI SWITCH ONLY (NO COIL)	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC ANSI SERIES TRIP	CIRCUIT CODE	AUX SWITCH CODE
2 TERMINALS 		A	0		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



≤ 30 AMPS

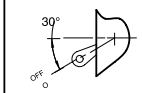
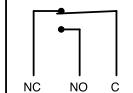
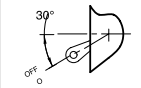
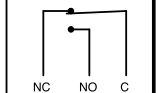
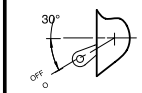
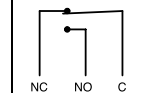
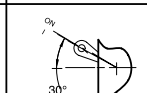
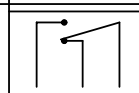
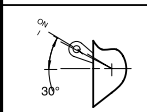
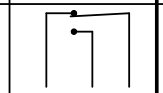
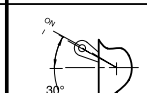
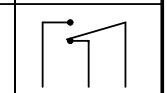
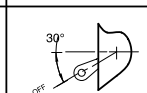
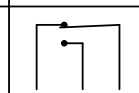
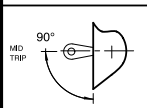
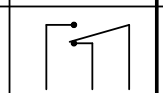
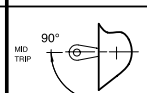
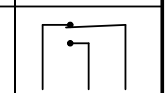


> 30 AMPS

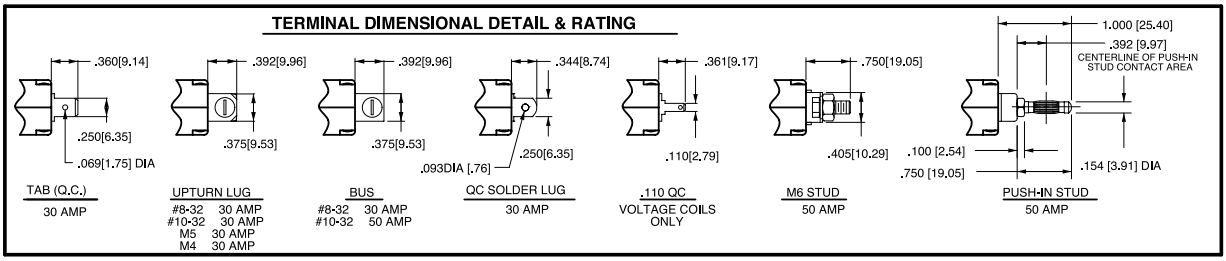
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Alarm Switch available with .110 x .020 Q.C. & Solder Lug Terminals Only.

Circuit & Terminal Diagrams: in. [mm]

HANDLE POSITION VS. AUX/ALARM SWITCH MODE

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

TERMINAL DIMENSIONAL DETAIL & RATING



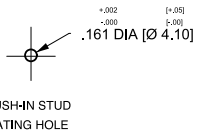
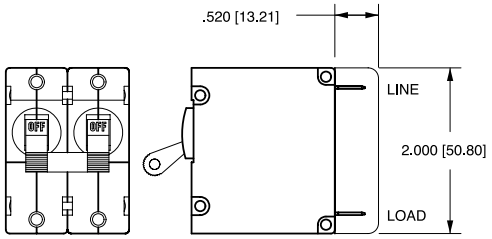


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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]

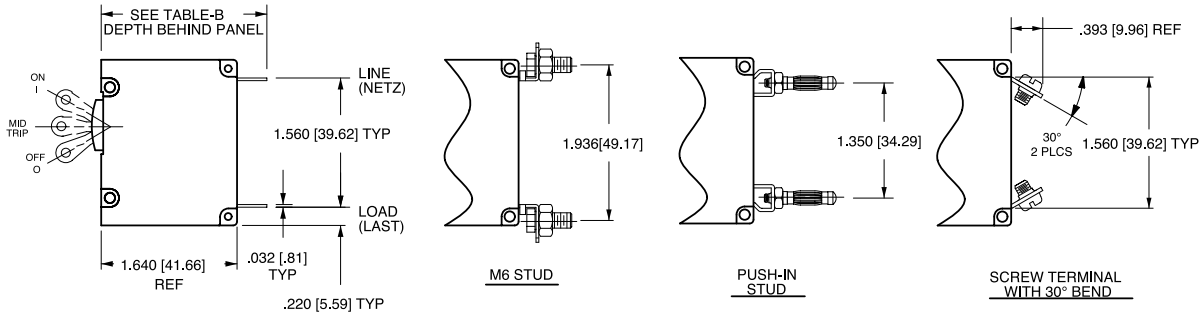


BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

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]

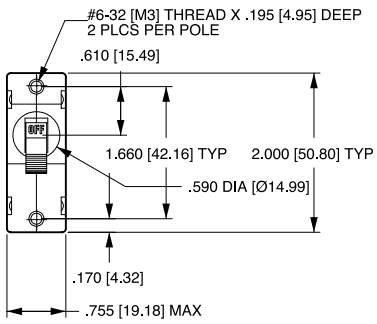
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

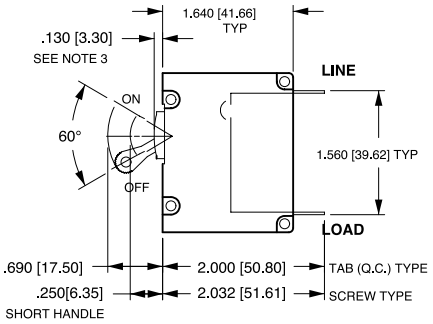


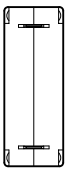
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Alarm Switch available with .110 x .020 QC & solder lug terminals only.

Dimensional Specifications: in. [mm]

1-POLE (AA1)

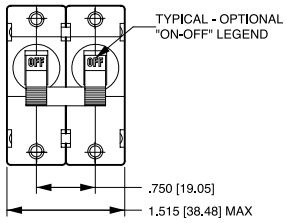




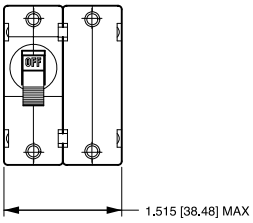


TAB (Q.C.) TYPE TERMINALS IN SERIES TRIP CIRCUIT CONFIGURATION SHOWN. FOR OTHER CONFIGURATIONS, SEE CIRCUIT AND TERMINAL DIAGRAMS.

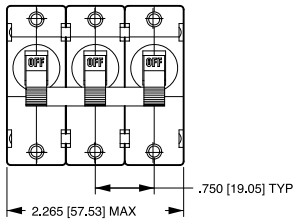
2-POLE (AA2)



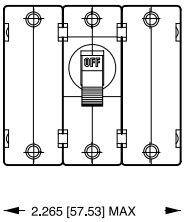
2-POLE (AB2)



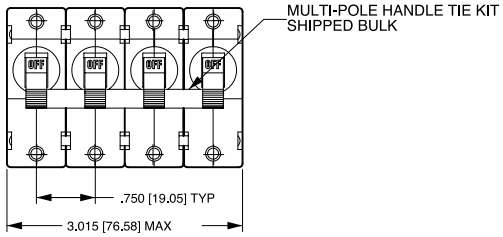
3-POLE (AA3)



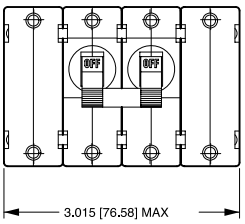
3-POLE (AB3)

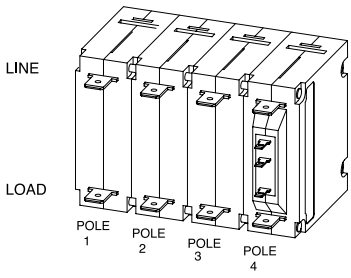


4-POLE (AA4)

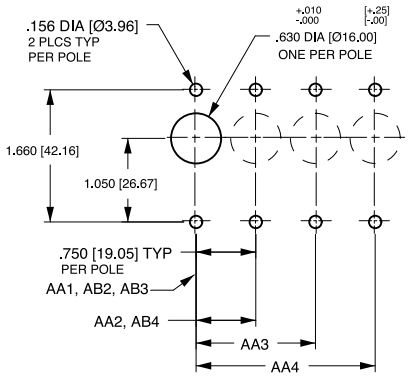


4-POLE (AB4)





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

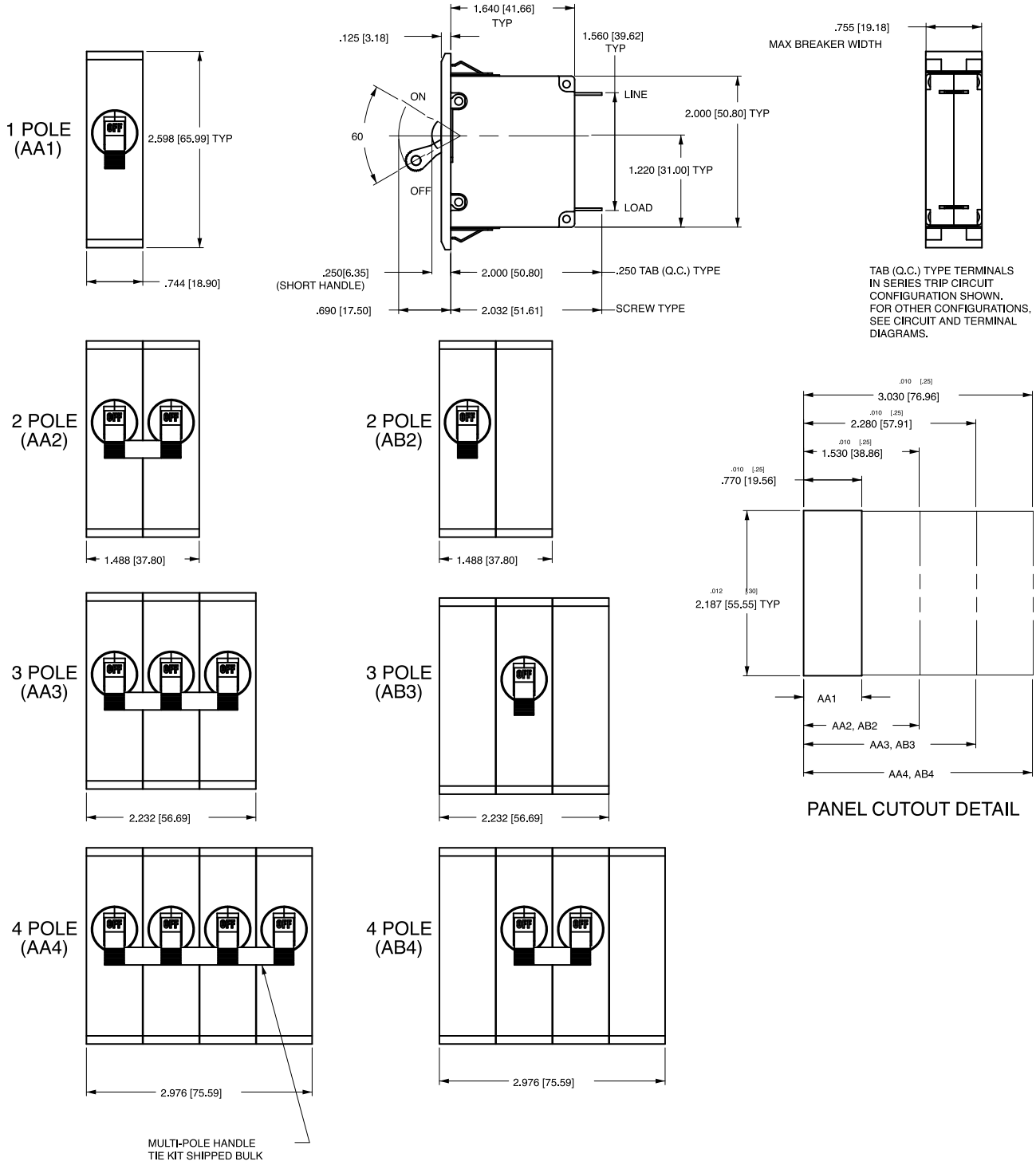


PANEL CUTOUT DETAIL

TOLERANCES ±.005 [±.12]
UNLESS OTHERWISE SPECIFIED

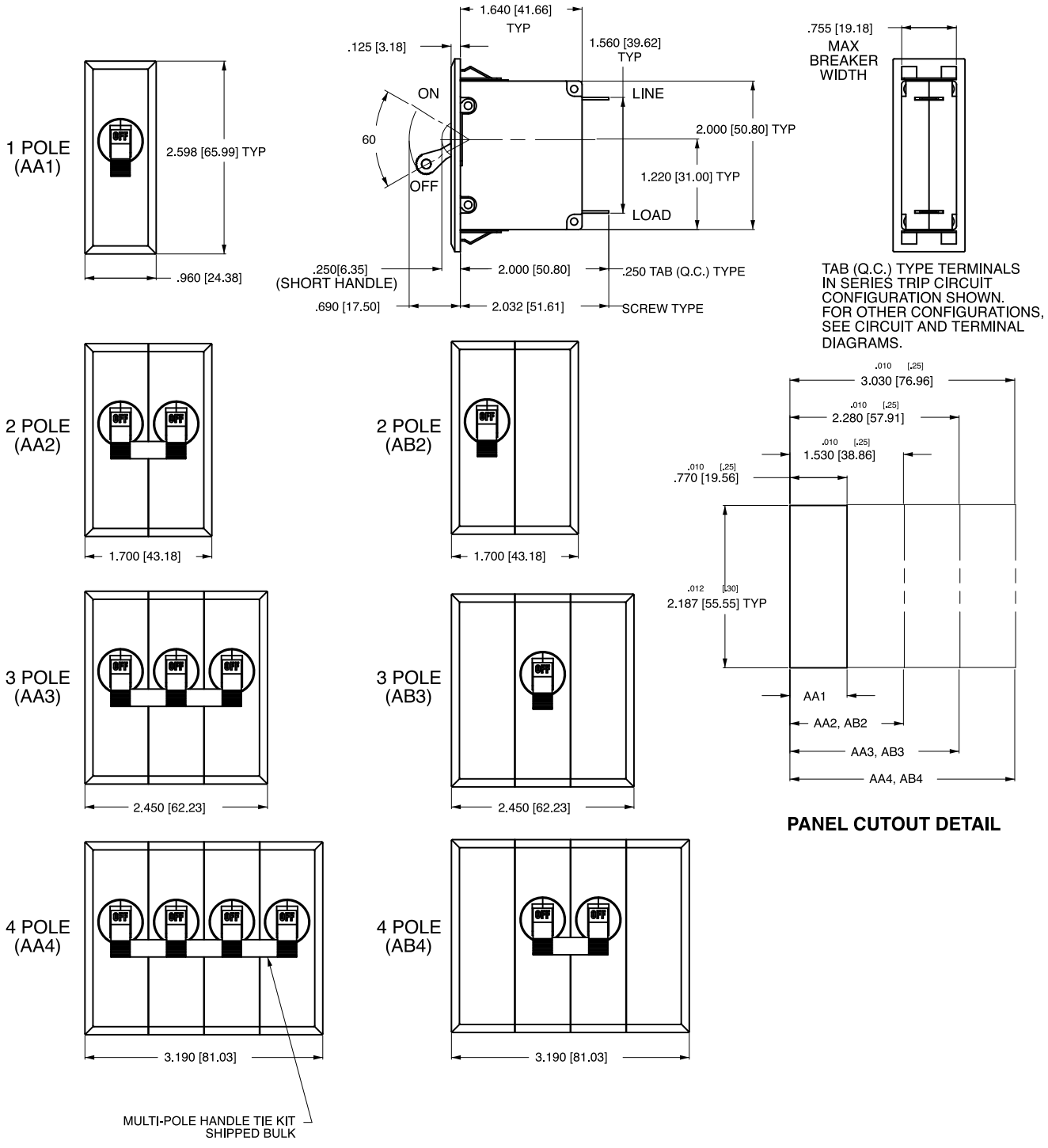
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ± 0.20 [.51] unless otherwise specified.
3 For agency code P = .150 [3.81].

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 ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



PANEL CUTOUT DETAIL

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.

A	M	1	–	B	0	–	10	–	450	–	1	0	1	–	C
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 Agency Approval

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)
B Series Trip (Current)
C Series Trip (Voltage)
D [3] Shunt Trip (Current)
E [3] Shunt Trip (Voltage)
F [3] Relay Trip (Current)
G [3] Relay Trip (Voltage)
H [3,4] Dual Coil with Shunt Trip Voltage Coil
K [3,4] Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH [5]
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
10 DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20 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 [7] 50/60Hz Short, Hi-Inrush
44 [7] 50/60Hz Medium, Hi-Inrush
46 [7] 50/60Hz Long, Hi-Inrush
52 [7] DC, Short,Hi-Inrush
54 [7] DC, Medium, Hi-Inrush
56 [7] DC, Long, Hi-Inrush

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** [8]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [8]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [8]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [8]	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) [6]

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

9 LEGEND PLATE
0 No legend plate

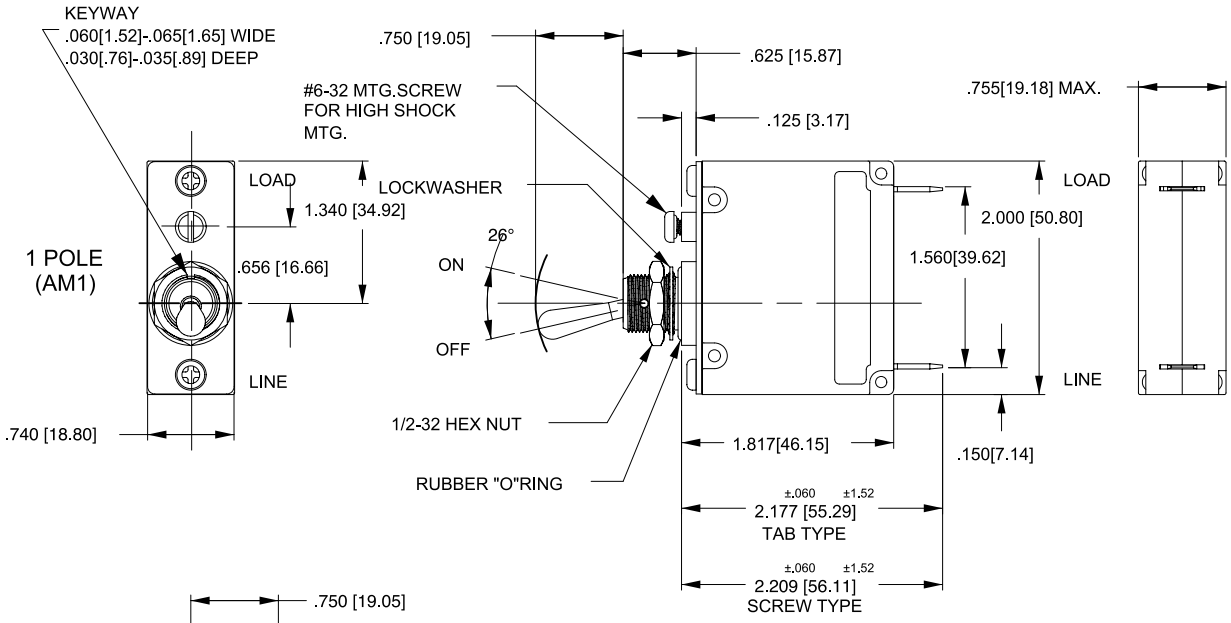
10 MOUNTING / BARRIERS

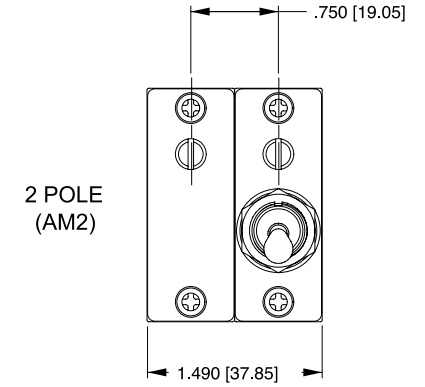
	MOUNTING STYLE	BARRIERS
1	Standard Hex Nut	no
A	Standard Hex Nut (multipole only)	yes

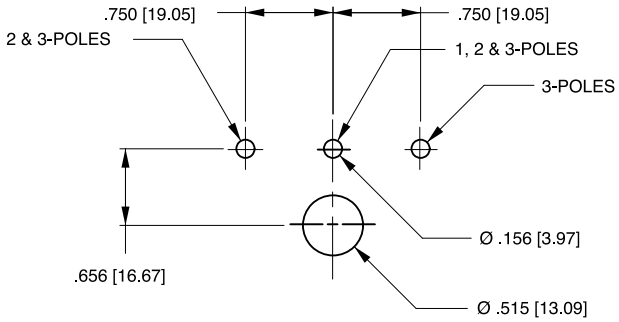
11 AGENCY APPROVAL
C UL Recognized & CSA Accepted
I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted

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.

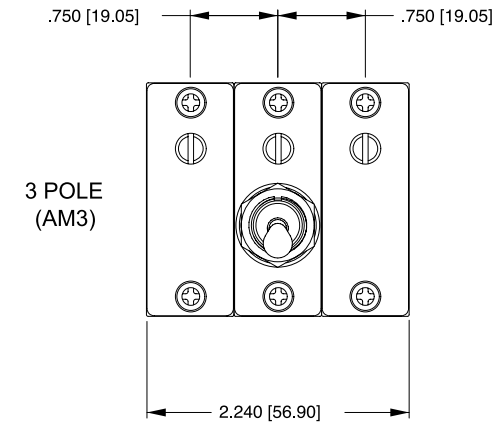
Dimensional Specifications: in. [mm]







PANEL CUTOUT DETAIL
TOLERANCES ±.005[.13]



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

A	F	1	–	B	0	–	24	–	630	–	2	3	1	–	D
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 Agency Approval

1 SERIES
A

2 ACTUATOR [1]

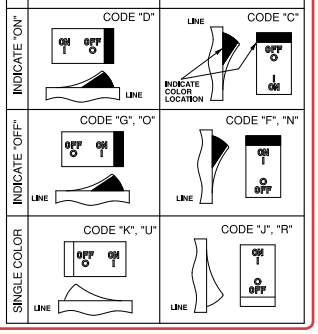
Two Color Visi-Rocker
- **C** Indicate ON, vertical legend
- **D** Indicate ON, horizontal legend
- **F** Indicate OFF, vertical legend
- **G** Indicate OFF, horizontal legend
- **H** Indicate OFF, no legend

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



3 POLES
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 [6,7]
- **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
- **10** DC Instantaneous
- **11** DC Ultra Short
- **12** DC Short
- **14** DC Medium
- **16** DC Long
- **20** 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** [9] 50/60Hz Short, Hi-Inrush
- **44** [9] 50/60Hz Medium, Hi-Inrush
- **46** [9] 50/60Hz Long, Hi-Inrush
- **52** [9] DC, Short,Hi-Inrush
- **54** [9] DC, Medium, Hi-Inrush
- **56** [9] DC, Long, Hi-Inrush

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** [8]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [8]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [8]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [8]	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.)
- **2** Screw 8-32 with upturned lugs
- **3** [13] Screw 8-32 (Bus Type)
- **4** Screw 10-32 with upturned lugs
- **5** [13] 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
- **E** [13] Screw M4 (Bus Type)
- **F** Screw M5 with upturned lugs & 30° bend
- **G** Screw M5 (Bus Type) & 30° bend
- **H** [13] Screw M5 (Bus Type)
- **L** [14] 0.250 Q.C./ Solder Lug
- **M** [13] M6 Threaded Stud
- **P** [15] Printed Circuit Board Terminals
- **Q** [16] Push-In Stud
- **R** Screw M4 with upturned lugs & 30° bend
- **S** [17] Push-On 0.110 Tab (Q.C.) & 30° bend
- **T** Screw M4 (Bus Type) & 30° bend

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color [12]	Marking: ON-OFF	Marking: Dual [12]	Marking Color: Single Color	Marking 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

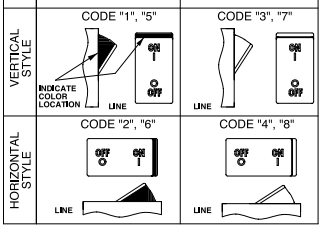
Notes:
1. Push-To-Reset actuators have OFF portion of rocker shrouded.
2. Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
3. Switch Only circuits, rated up to 50 amps & 3 poles, are available only when tied to 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.
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. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
10. 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.
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: VDE Certification up to 25 amps and UL Recognition and CSA Accepted up to 30 amps, but not recommended over 20 amps.
13. 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.
14. VDE 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 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.
16. Terminal Code Q not available with VDE.
17. Terminal Code S used on voltage coil circuit constructions only.
18. Color shown is visi and legend with remainder of rocker black.
19. Dual = ON-OFF/I-O legend with actuator. None = no legend on actuator
20. 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.

A	1	1	–	B	0	–	24	–	630	–	2	3	1	–	E
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 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

ROCKER STYLE DESCRIPTIONS



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 [6,7]
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
10 [6] DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20 [6] 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 [9] 50/60Hz Short, Hi-Inrush
44 [9] 50/60Hz Medium, Hi-Inrush
46 [9] 50/60Hz Long, Hi-Inrush
52 [9] DC, Short,Hi-Inrush
54 [9] DC, Medium, Hi-Inrush
56 DC, Long, Hi-Inrush

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** [8]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [8]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [8]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [8]	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.)
2 Screw 8-32 with upturned lugs
3 [13] Screw 8-32 (Bus Type)
4 Screw 10-32 with upturned lugs
5 [13] 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
E [13] Screw M4 (Bus Type)
F Screw M5 with upturned lugs & 30° bend
G Screw M5 (Bus Type) & 30° bend
H [13] Screw M5 (Bus Type)
L [14] 0.250 Q.C./ Solder Lug
M [13] M6 Threaded Stud
P [15] Printed Circuit Board Terminals
Q Push-In Stud
R Screw M4 with upturned lugs & 30° bend
S [16] Push-On 0.110 Tab (Q.C.) & 30° bend
T Screw M4 (Bus Type) & 30° bend

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color [17]	Marking: ON-OFF	Marking: Dual [17]	Marking Color: Single Color	Marking 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	BARRIERS
	Threaded Insert, 2 per pole	
	FLAT ROCKER ACTUATOR	
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

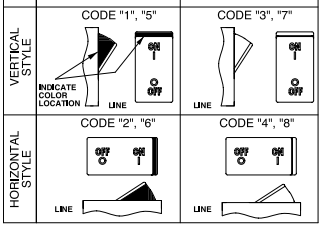
Notes:
1 Push-To-Reset actuators have OFF portion of rocker shrouded.
2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
3 Switch Only circuits, rated up to 50 amps & 3 poles. Only available when tied to a protected 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.

A	1	1	–	B	0	–	14	–	630	–	2	3	1	–	M	T
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

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

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** [4]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [4]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [4]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [4]	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 or Visi-Color [11]	Marking: ON-OFF	Marking: Dual [11]	Marking Color: Single Color	Marking 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]

		BARRIERS
	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole FLAT ROCKER ACTUATOR	
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

A	Y	1	–	B	0	–	24	–	620	–	4	2	1	–	C	C
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 Max. Appl. Rating	12 Agency Approval

1 SERIES
A

2 ACTUATOR [1]
Y Single Color Recessed Paddle Actuator with Vertical Legends

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

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

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

7 CURRENT RATING (AMPERES) [4]

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
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
285	0.850	**455**	5.500	**613**	13.000		
290	0.900	**460**	6.000	**614**	14.000		

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)

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 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
E Screw, M4 (Bus Type)
F Screw M5 with upturned lugs & 30° bend
G Screw M5 (Bus Type) & 30° bend
H Screw M5 (Bus Type)
L 0.250 Q.C./Solder Lug
M M6 Threaded Stud
P Printed Circuit Board Terminals
Q Push-In Stud
R Screw, M4 with upturned lugs & 30° Bend
S Screw, M5 with upturned lugs
T Screw, M4 with upturned lugs

9 ACTUATOR COLOR & LEGEND [5]

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 RATING [6]
A 65 VDC
C 120/240 VAC (Available only on 2 or 3-Pole units)
K 120 VAC
M 80 DC

12 AGENCY APPROVAL [7]
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]

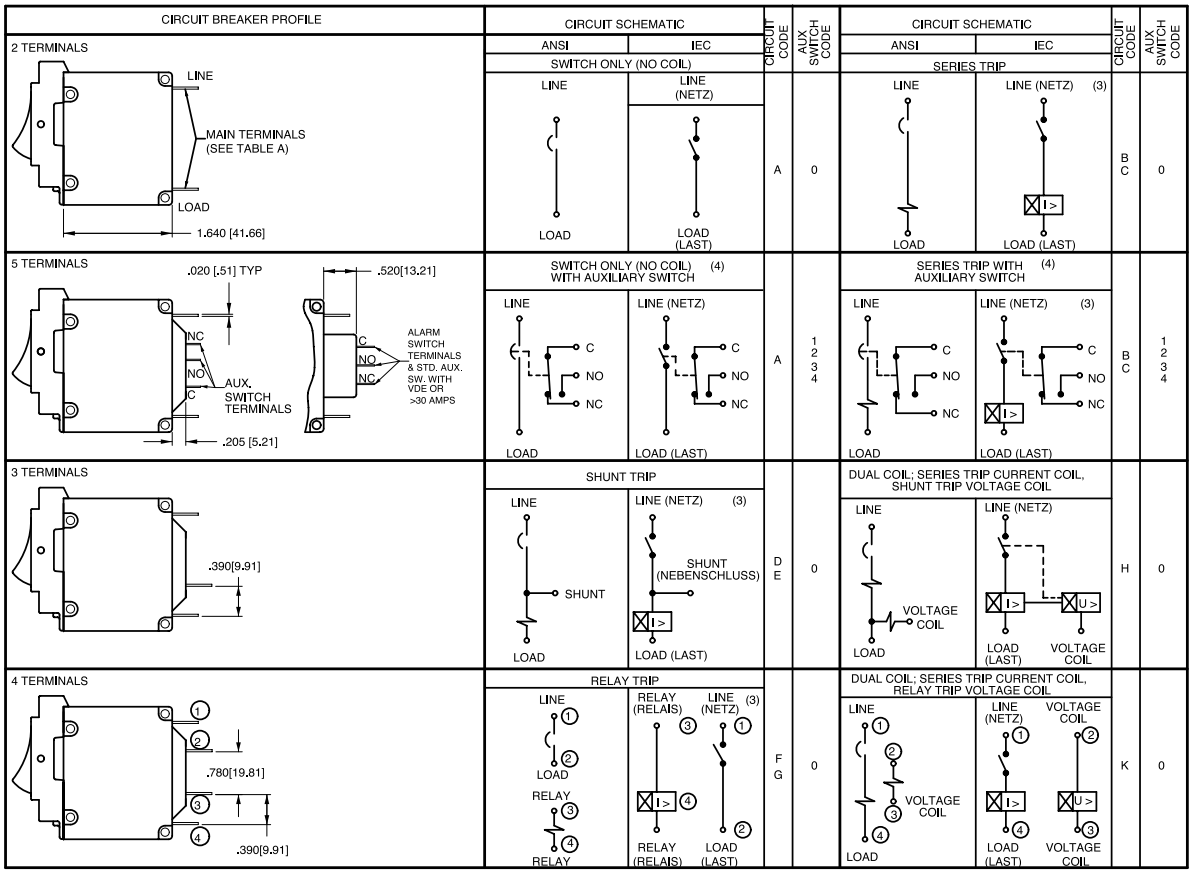
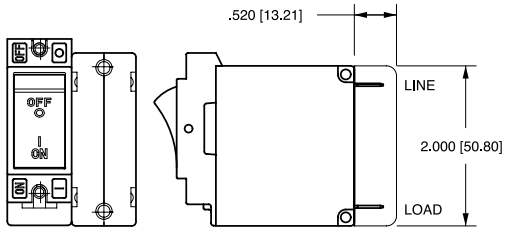
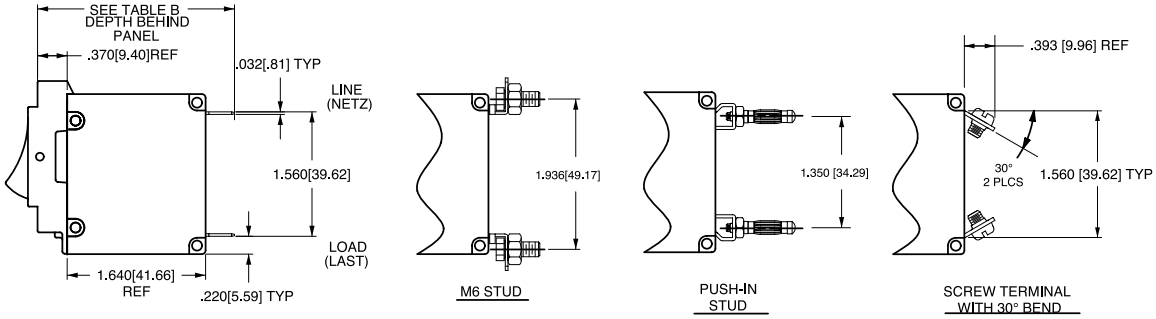


TABLE B		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.370 [60.20]
	SCREW TYPE	2.402 [61.01]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.577 [65.46]
	SCREW #8-32 W/UPTURNED LUGS	2.734 [69.44]
AUX. SWITCH*	.093 TAB (Q.C.)	2.465 [62.61]
	.110 TAB (Q.C.)	2.559 [65.00]
	SOLDER TYPE	2.340 [59.44]

* 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.

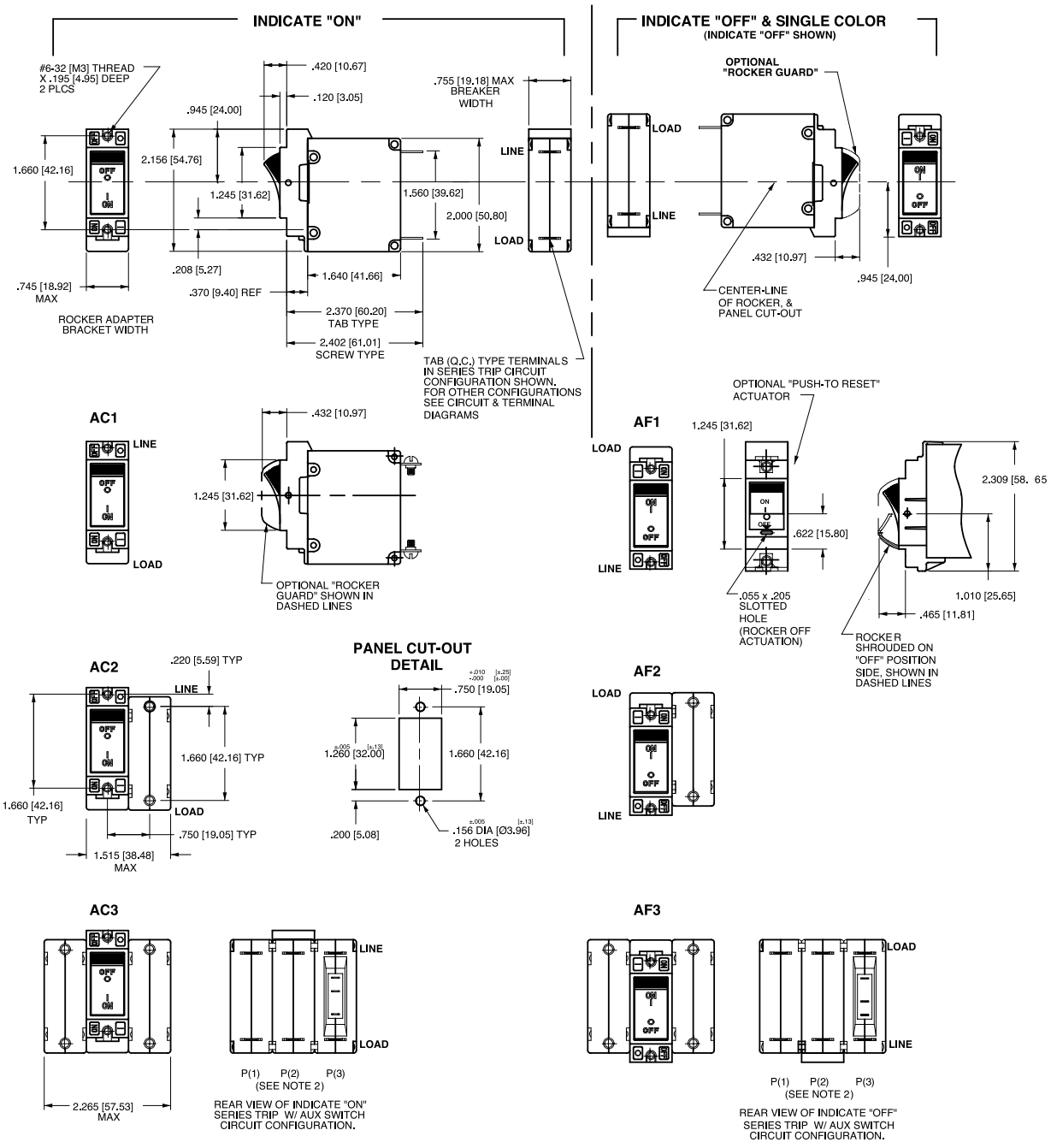


BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS



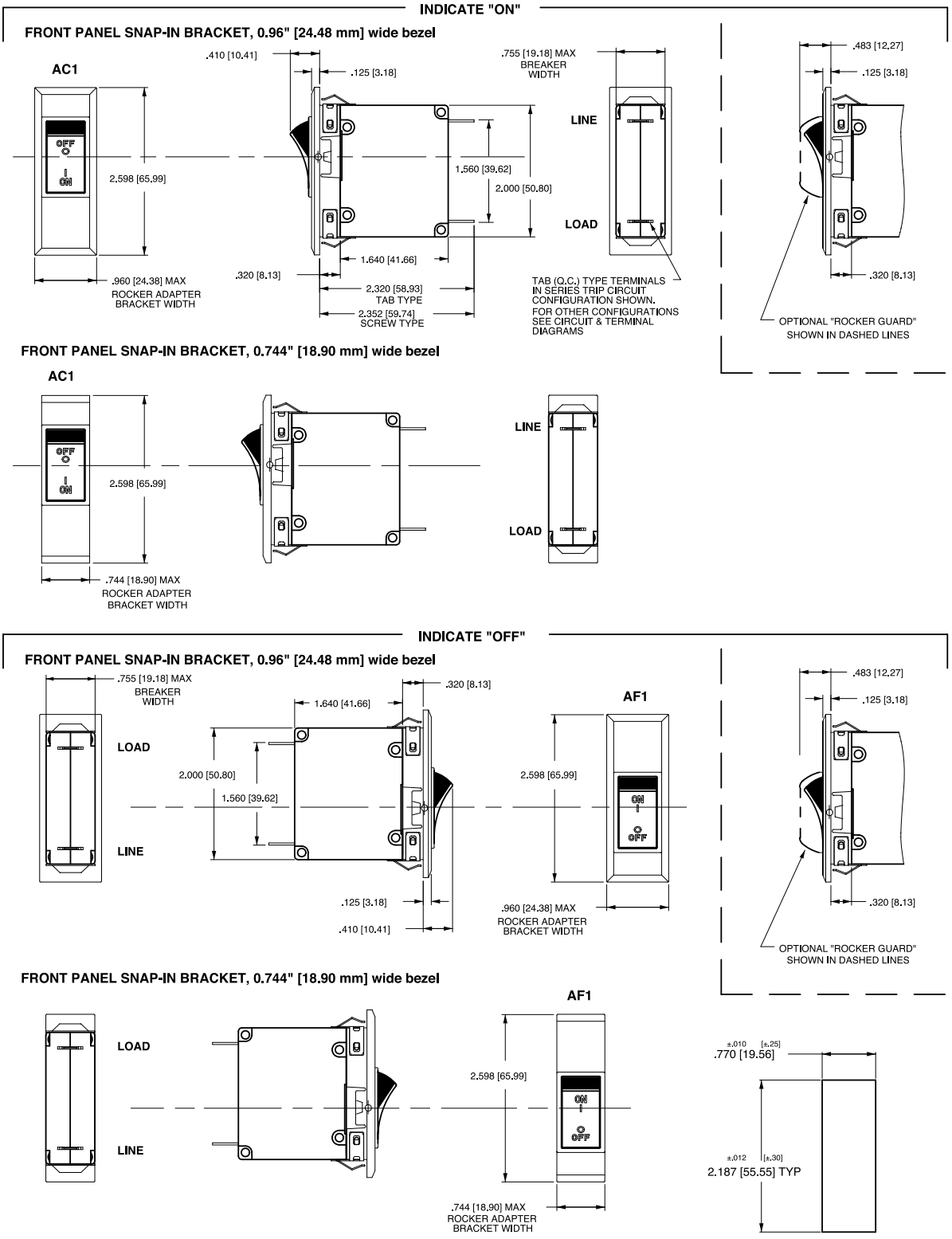
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuit.
4 Circuits shown for >30 amps / VDE.

Dimensional Specifications: in. [mm]



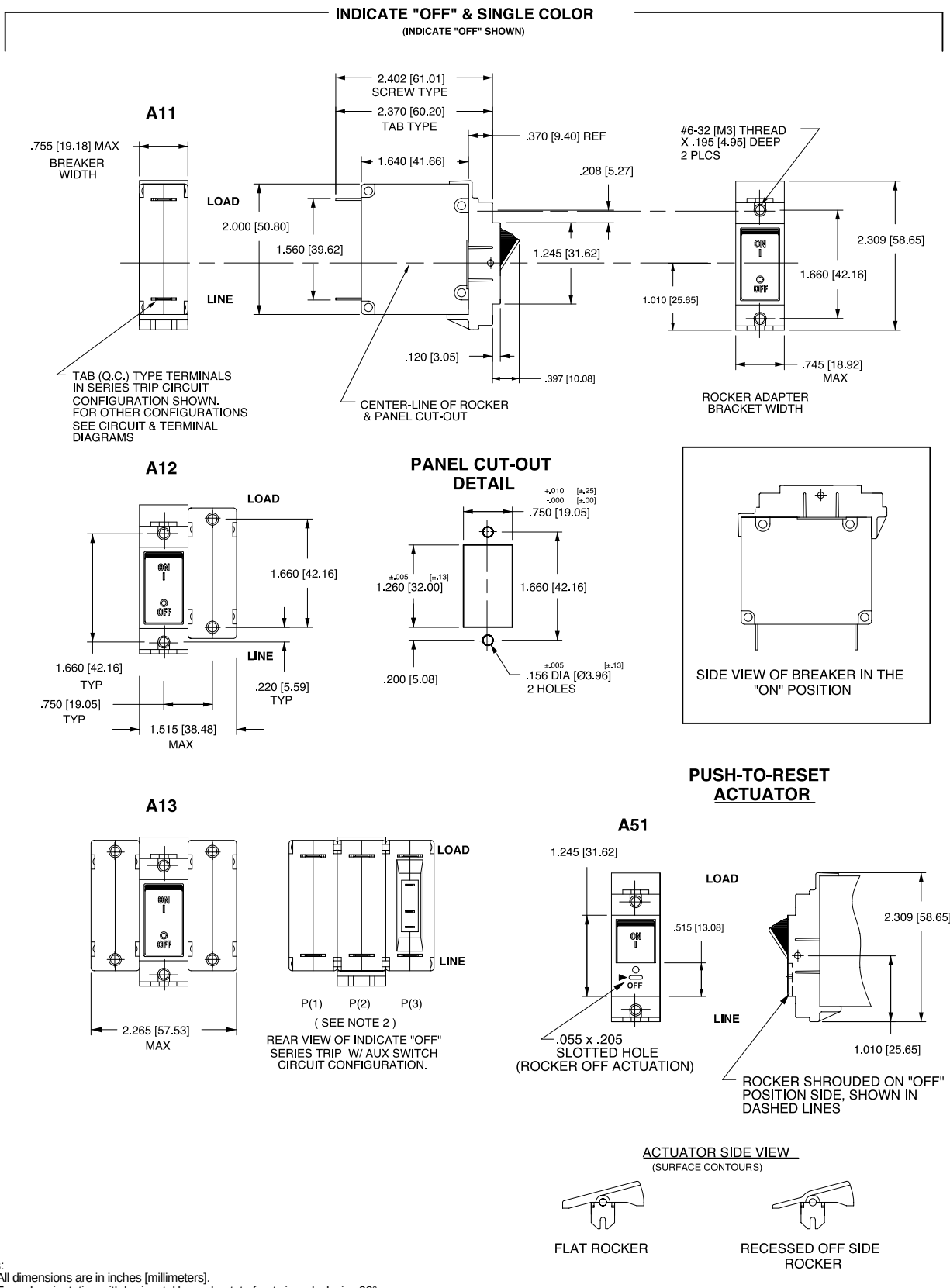
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 All dimensions are in inches [millimeters].
4 Tolerance ± 0.20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

Dimensional Specifications: in. [mm]



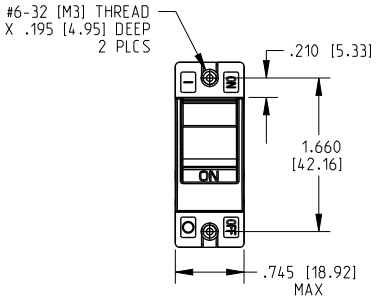
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal
2 For pole orientation with horizontal legend, rotate front view clockwise 90°. Orientation on indicate "OFF" is opposite of indicate "ON"
3 Recommended panel thickness: .04 0 [1.02] to .100 [2.54]
4 All dimensions are in Inches [millimeters].
5 Tolerance ±.020 [.51] unless otherwise specified.

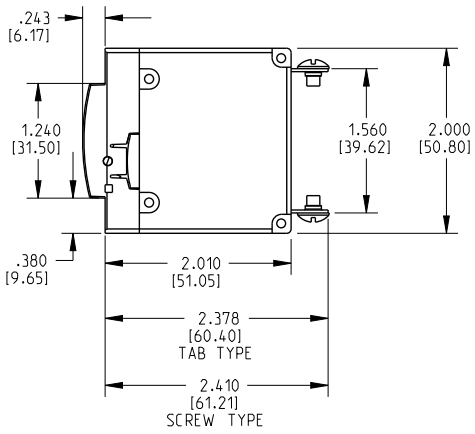
Dimensional Specifications: in. [mm]

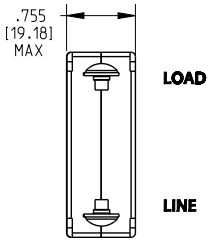


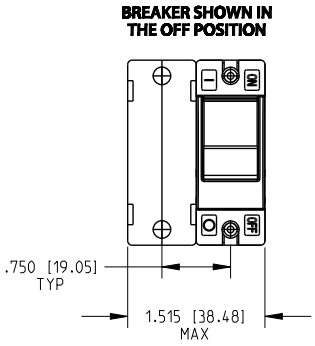
Notes:
1 All dimensions are in inches [millimeters].
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 Tolerance ± 0.20 [.51] unless otherwise specified.

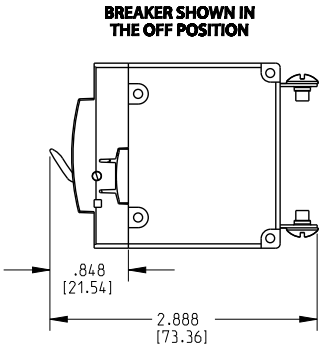
Dimensional Specifications: in. [mm]

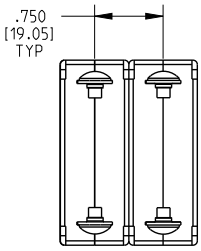


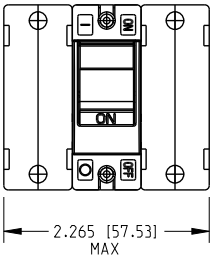


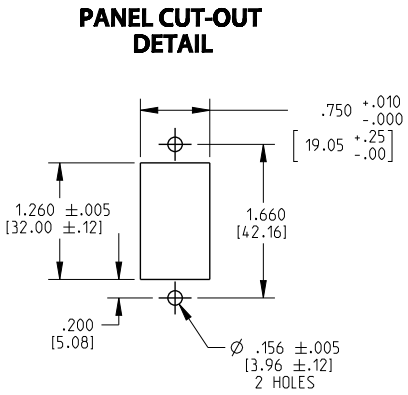








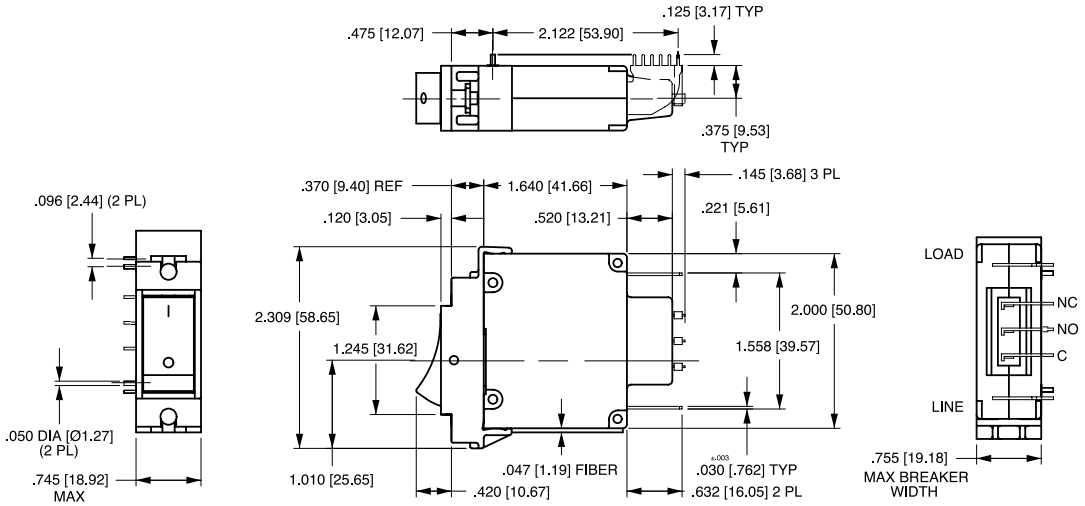




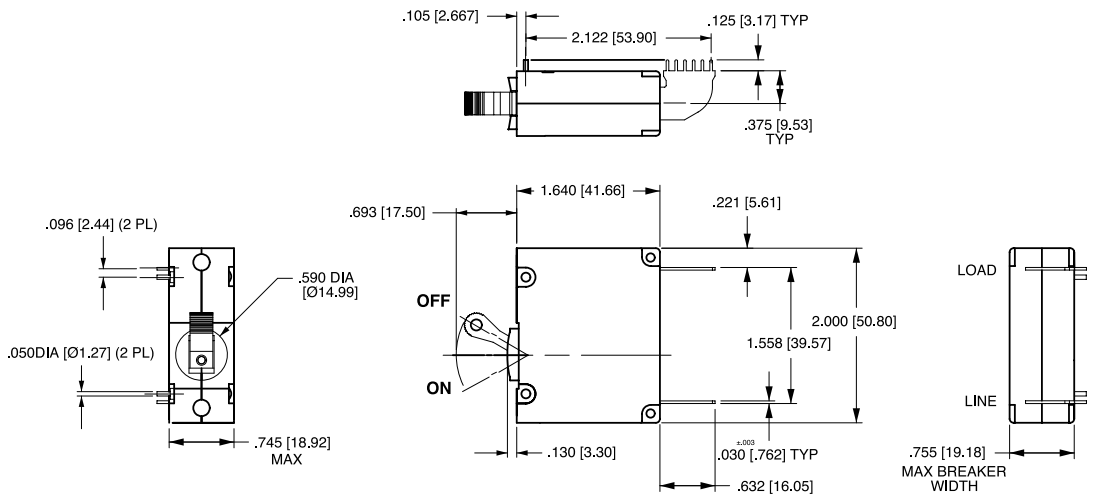
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ± 0.20 [.51] unless otherwise specified

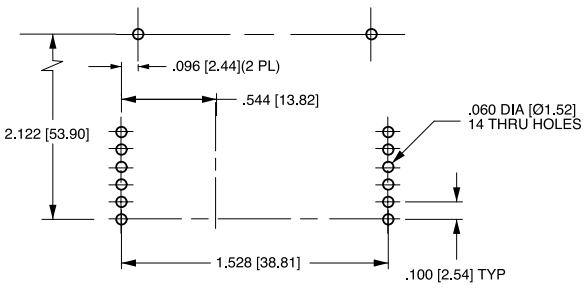
PC Terminal Diagrams: in. [mm]

A-SERIES ROCKER

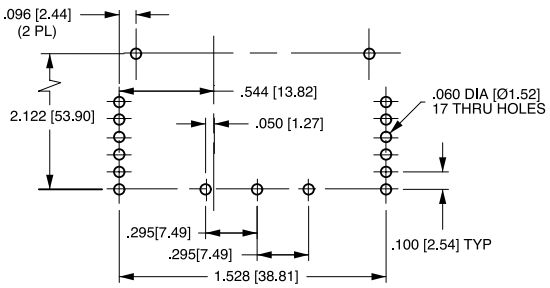


A-SERIES HANDLE





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

The B-Series hydraulic-magnetic circuit breakers are compact and temperature stable designed for precision operation in OEM markets requiring general purpose as well as full load amp applications. These circuit breakers are designed specifically for world market applications requiring extra insulation and tongue & groove half-shell constructions. Actuators available include handle for 1-6 poles, rocker for 1-3 poles, and Visi-Rocker for 1-3 poles construction. They are also offered with ratings from 0.02 to 50 amps and up to 277VAC or 80VDC, with choices of time delays, terminals, wide range of standard colors, imprinting.

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

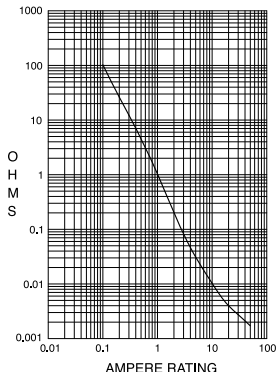
Typical Applications:

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

Electrical

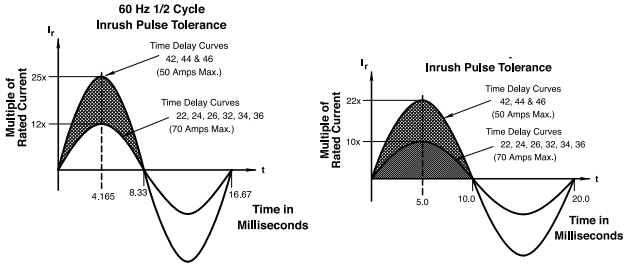
Maximum Voltage	277VAC 50/60 Hz, 80VDC
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 and 50.0 amps. Other ratings available, see ordering scheme.
Standard Voltage Coils	DC - 6V, 12V; AC - 120V, other ratings available, 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.

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



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.

Physical

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.

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

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

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	
	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,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	
	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 [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	
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	---	---	---	---	---	
	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 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.

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
						UL/CSA		VDE		TUV				
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS [1]	WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP	UL	CSA	
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	
	250	50 / 60	1	0.10 - 30	---	—	3000	3000	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				31 - 50	31 - 50	—	3000	—	—	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	TC1,2, OL1,C1	
DUAL COIL	80	DC	—	0.10 - 30	---	—	7500	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	1	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	
			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	
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	
	250	50 / 60	1	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	
			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	UL	CSA
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)

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

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. R72040875

VDE Certified

EN60934, VDE 0642 under File No. 10537

B	A	3	–	B	0	–	10	–	450	–	1	B	1	–	C
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 Agency Approval

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
2 Two
3 Three
4 Four
5 Five
6 Six

4 CIRCUIT
A [2] Switch Only (No Coil)
B Series Trip (Current)
C Series Trip (Voltage)
D [3] Shunt Trip (Current)
E [3] Shunt Trip (Voltage)
F [3] Relay Trip (Current)
G [3] Relay Trip (Voltage)
H [3,4] Dual Coil with Shunt Trip Voltage Coil
K [3,4] Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH [5]
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 [2] DC 50/60Hz, Switch Only
10 [6] DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20 [6] 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 [7] 50/60Hz Short, Hi-Inrush
44 [7] 50/60Hz Medium, Hi-Inrush
46 [7] 50/60Hz Long, Hi-Inrush
52 [7] DC, Short,Hi-Inrush
54 [7] DC, Medium, Hi-Inrush
56 [7] DC, Long, Hi-Inrush

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** [8]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [8]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [8]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [8]	50.000

OR VOLTAGE COIL (NORMAL RATED VOLTAGE) [6]

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 [9]
1 [10] Push-On 0.250 Tab (Q.C.)
2 Screw 8-32 with upturned lugs
3 [11] Screw 8-32 (Bus Type)
4 Screw 10-32 with upturned lugs
5 [11] 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
E [11] Screw M4 (Bus Type)
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
L [12] 0.250 Q.C./ Solder Lug
M [11] M6 Threaded Stud
N Screw M4 Back Connect
P [13] Printed Circuit Board Terminals
Q [16] Push-In Stud
R Screw M4 with upturned lugs & 30° bend
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 *(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 [14]	6-32 x 0.225 inches	no
C [14]	6-32 X 0.225 inches *(multi-pole units only)*	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; 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 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.

B	A	1	–	B	0	–	14	–	450	–	1	B	1	–	M	T
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 [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.		
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., 0.110 Solder Lug	**9**	S.P.D.T., 0.187 Q.C. Term.

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	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** [3]	35.000
270	0.700	**440**	4.000	**711**	11.500	**640** [3]	40.000
275	0.750	**445**	4.500	**612**	12.000	**645** [3]	45.000
280	0.800	**450**	5.000	**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 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 MAXIMUM APPLICATION RATING
M	80 DC

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

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.
   T: Handle moves to mid-position and alarm switch activates only upon electrical trip of the breaker.
2. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
3. VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
4. 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.
5. 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.
6. 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.
7. 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.
8. Terminal Code Q not available with VDE approvals.

B	A	1	–	B	0	–	24	–	450	–	1	B	A	–	K	G
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 [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	**3** [3]	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	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	**280**	0.800	**445**	4.500	**711**	11.500
215	0.150	**285**	0.850	**450**	5.000	**612**	12.000
220	0.200	**290**	0.900	**455**	5.500	**712**	12.500
225	0.250	**295**	0.950	**460**	6.000	**613**	13.000
230	0.300	**410**	1.000	**465**	6.500	**614**	14.000
235	0.350	**512**	1.250	**470**	7.000	**615**	15.000
240	0.400	**415**	1.500	**475**	7.500	**616**	16.000
245	0.450	**517**	1.750	**480**	8.000	**617**	17.000
250	0.500	**420**	2.000	**485**	8.500	**618**	18.000
255	0.550	**522**	2.250	**490**	9.000	**620**	20.000
260	0.600	**527**	2.750	**495**	9.500	**622**	22.000
265	0.650	**430**	3.000	**610**	10.000	**624**	24.000
270	0.700	**435**	3.500	**710**	10.500	**625**	25.000
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
7	Screw 8-32 (Bus Type) & 30° bend	**K**	Screw 10-32 Back Connect
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
	Front panel Snap-In, 0.75" [19.05mm] wide bezel	
6	without Handleguard (multipole only)	yes
	Front panel Snap-In, 0.96" wide bezel	
8	without Handleguard, 1-pole 0.96" wide; (multipole only) .105" bezel overhang on all sides	yes

11 MAXIMUM APPLICATION RATING
C [8]	120/240VAC
K	120VAC

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

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
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 All poles must be same polarity.
3 3 pole units available only when 1 of 3 poles is neutral.
4 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.
5 Screw Terminals are recommended on ratings greater than 20 amps.
6 Standard actuator colors are black and white.
7 Adapter plate with mounting centers of 2.082 inches. Available with Actuator Codes A, S and T.
8 Voltage Rating available with 2 and 3-pole breakers only.
9 Barriers supplied on multi-pole units only.

Circuit & Terminal Diagrams: in. [mm]

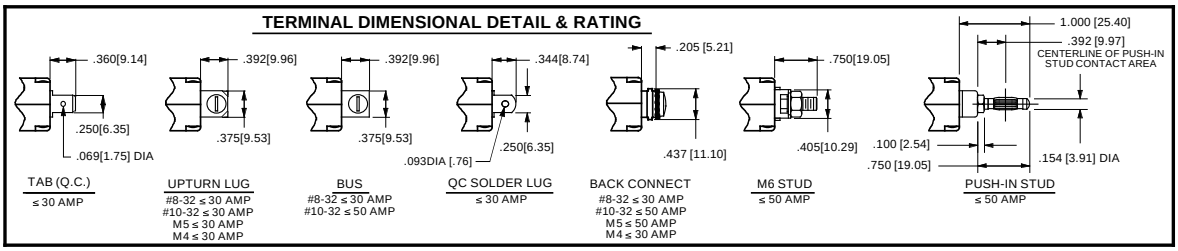
	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
	SWITCH ONLY (NO COIL)				SERIES TRIP			
SERIES TRIP (2 TERM'S.) MAIN TERM'S. (SEE TABLE A) 1.730 [43.94]	LINE / LOAD	LINE (NETZ) / LOAD (LAST)	A	O	LINE / LOAD	LINE (3) (NETZ) / I > / LOAD (LAST)	B C	O
SERIES TRIP W AUX SWITCH (5 TERM'S.) .520 [13.21] C NO NC AUX. SWITCH TERM'S.	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH LINE / C / NO / NC / LOAD	LINE (NETZ) / C / NO / NC / LOAD (LAST)	A	2 3 4	SERIES TRIP WITH AUXILIARY / ALARM SWITCH LINE / STD. AUX. SWITCH / C / NO / NC / ALARM SWITCH / LOAD	LINE (NETZ) (3) / STD. AUX. SWITCH / C / NO / I > / NC / ALARM SWITCH / LOAD (LAST)	B C	2 3 4
SHUNT TRIP (3 TERM'S.) .390 [9.91]	SHUNT TRIP LINE / SHUNT / LOAD	LINE (NETZ) (3) / SHUNT (NEBENSCHLUSS) / I > / LOAD (LAST)	D E	0	DUAL COIL; SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL LINE / VOLTAGE COIL / LOAD	LINE (NETZ) / I > / U > / LOAD (LAST) / VOLTAGE COIL	H	0
RELAY TRIP (4 TERM'S.) .780 [19.81] .390 [9.91]	RELAY TRIP LINE ① / ② LOAD / RELAY ③ / ④ RELAY	RELAY (RELAIS) ③ / I > / ④ RELAY (RELAIS) / LINE (NETZ) (3) ① / ② LOAD (LAST)	F G	0	DUAL COIL; SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL LINE ① / ② / VOLTAGE COIL ③ / ④ LOAD	LINE (NETZ) ① / I > / ④ LOAD (LAST) / VOLTAGE COIL ② / U > / ③ VOLTAGE COIL	K	0

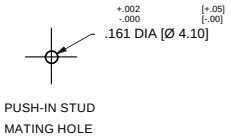
HANDLE POSITION VS. AUX/ALARM SWITCH MODE

	STANDARD C/B		MID TRIP C/B		MID TRIP C/B	
CIRCUIT BREAKER MODE	HANDLE POSITION	AUX. SWITCH MODE	HANDLE POSITION	ALARM SWITCH MODE	HANDLE POSITION	AUX. SWITCH MODE (w/o ALARM SWITCH)
OFF	30° OFF O	NC NO C	30° OFF O	NC NO C	30° OFF O	NC NO C
ON	ON I 30°	NC NO C	ON I 30°	NC NO C	ON I 30°	NC NO C
ELECTRICAL TRIP	30° OFF O	NC NO C	90° MID TRIP	NC NO C	90° MID TRIP	NC NO C

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

Circuit & Terminal Diagrams: in. [mm]





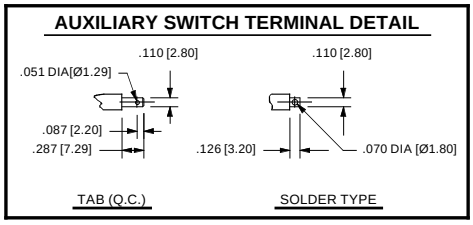
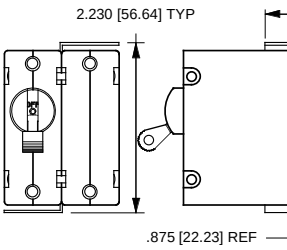
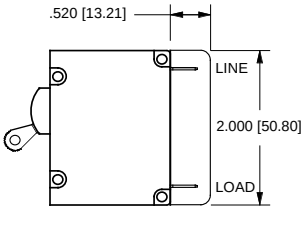


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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

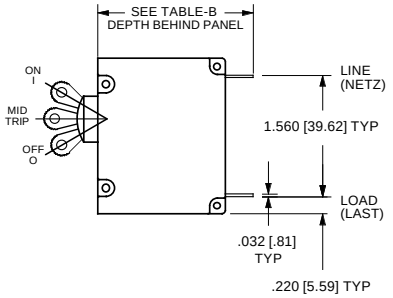


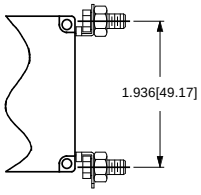
BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

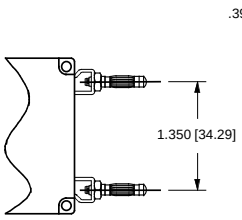
TABLE B

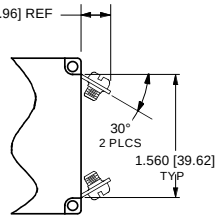
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.090 [53.09]
	SCREW TYPE	2.122 [53.90]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.612 [66.35]
	SCREW #8-32 W/UPTURNED LUGS	2.644 [67.16]
AUX. SWITCH*	TAB (Q.C.) .110 x .020	2.537 [64.44]
	SOLDER TYPE	2.348 [59.64]

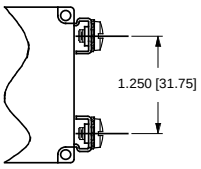
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

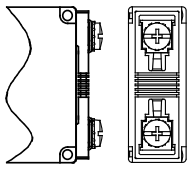






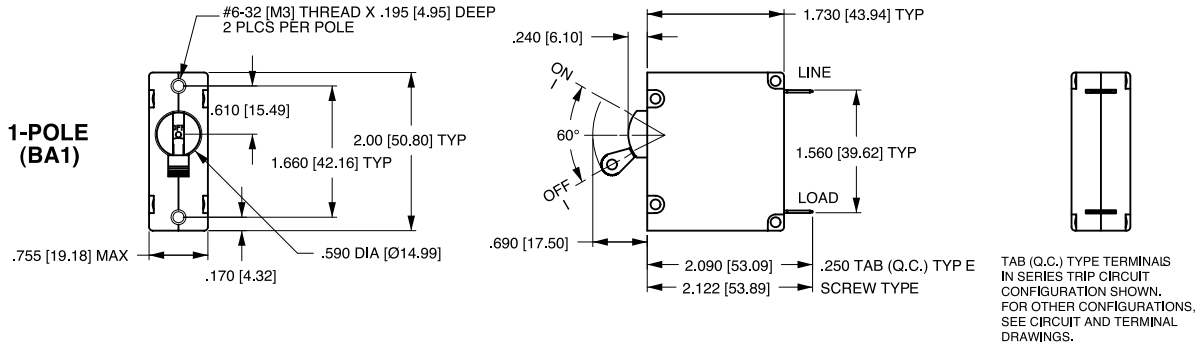


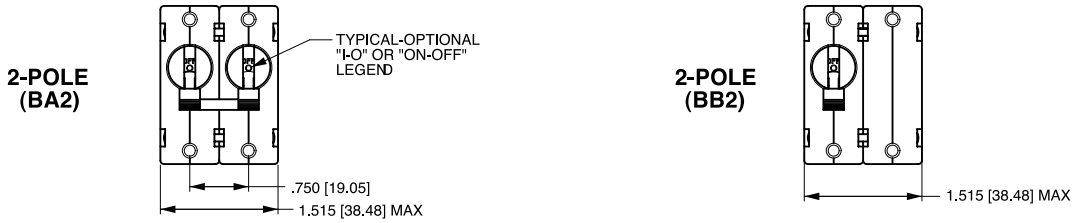


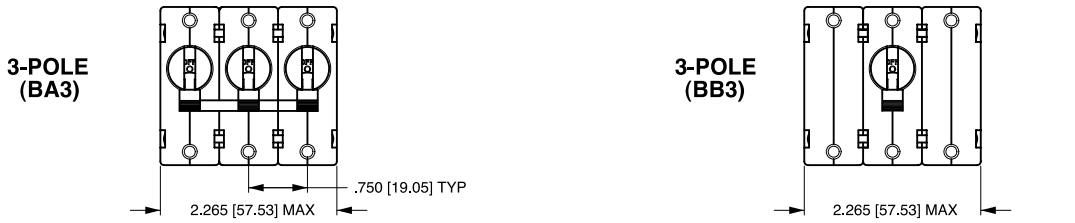


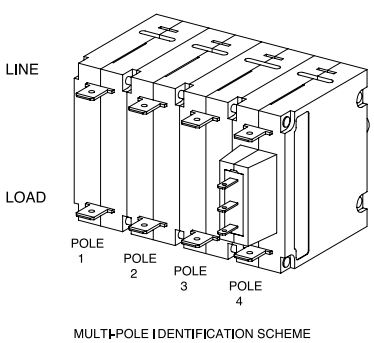
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

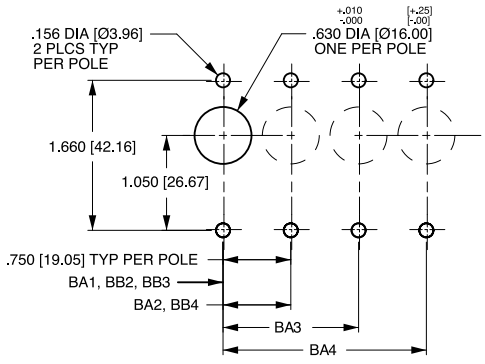








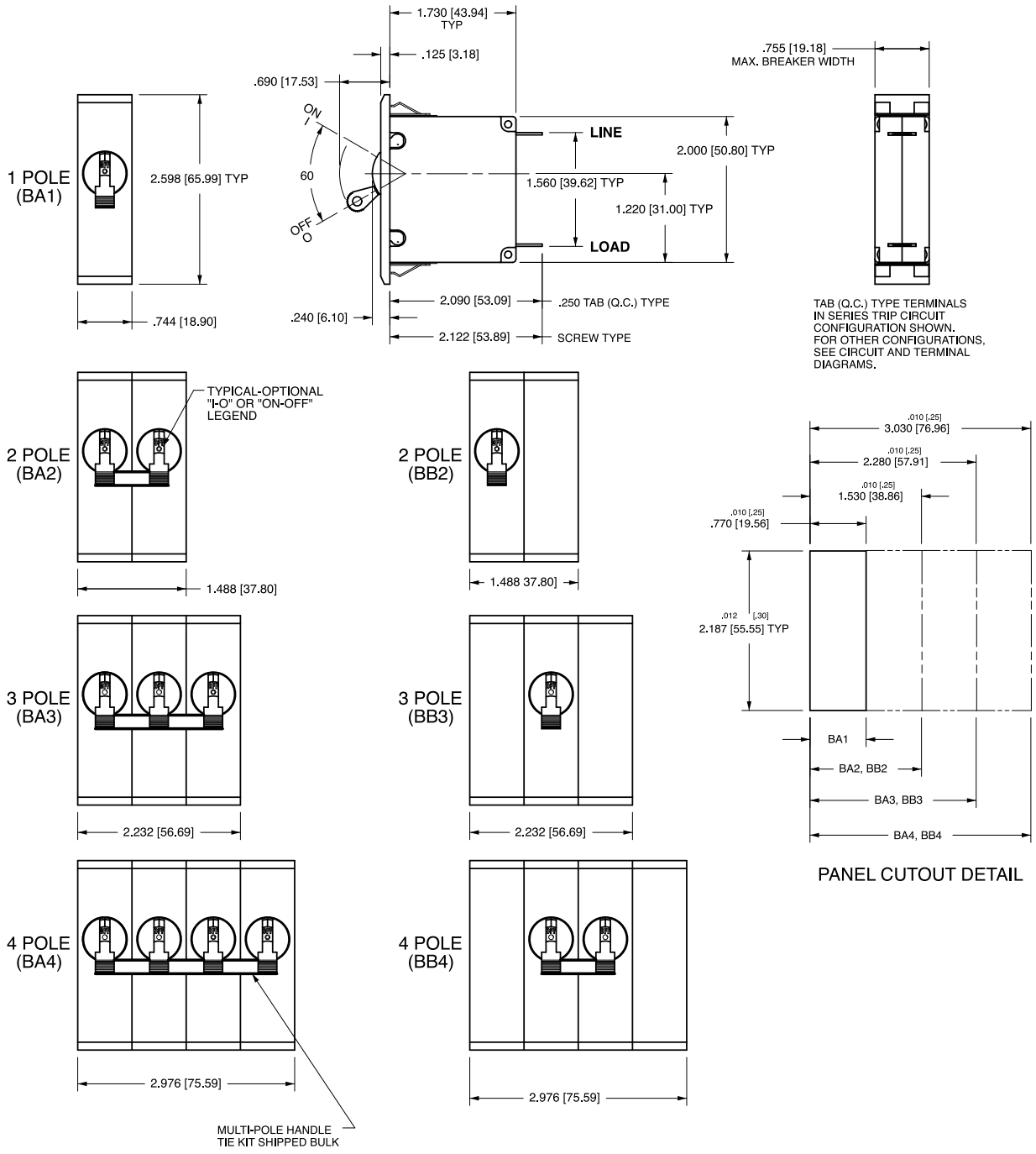
MULTI-POLE IDENTIFICATION SCHEME
AS VIEWED FROM TERMINAL END OF BREAKER.



PANEL CUTOUT DETAIL
TOLERANCES ±.005 [±.12]

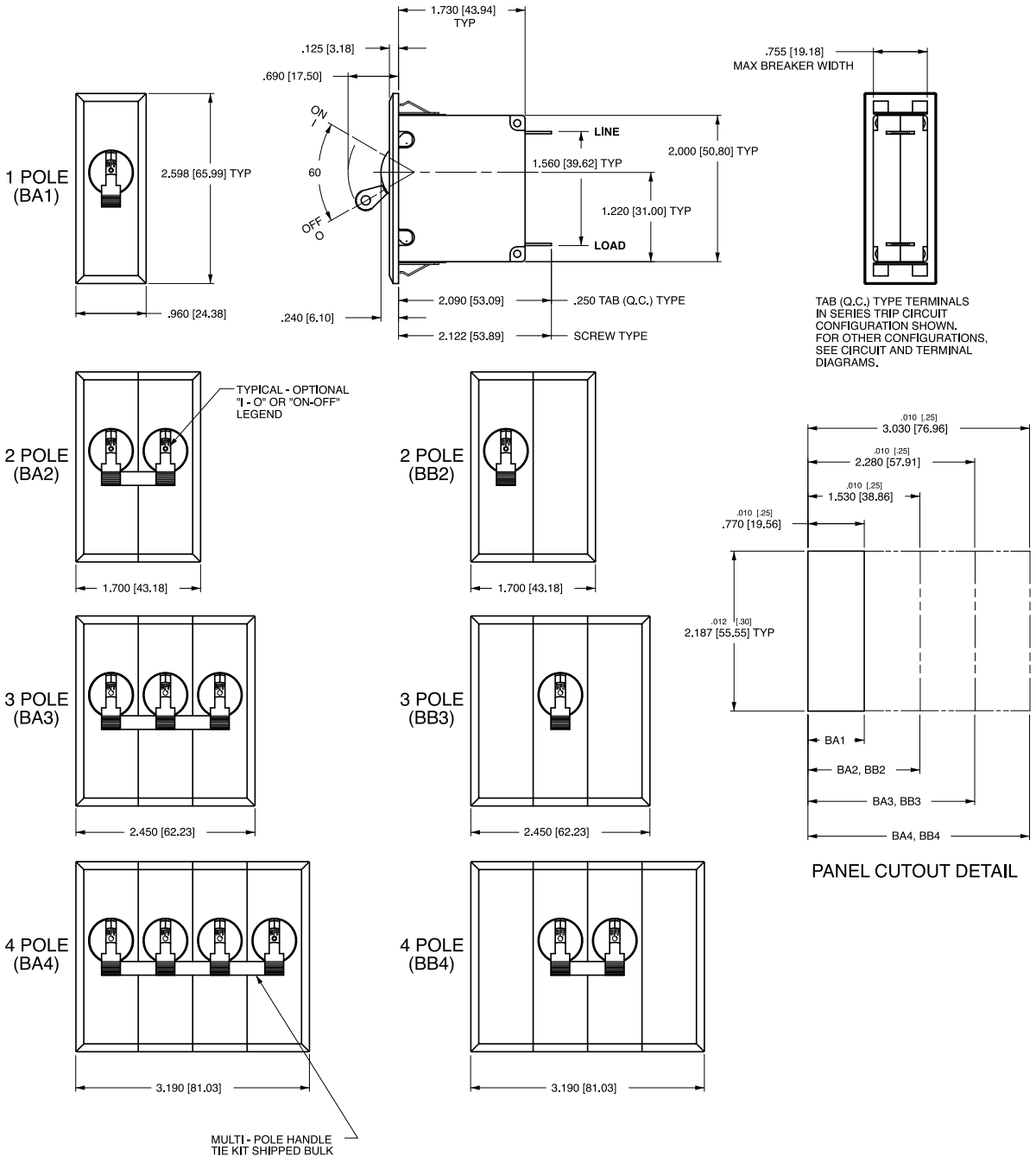
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ± 0.20 [.51] unless otherwise specified.

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 ±.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.

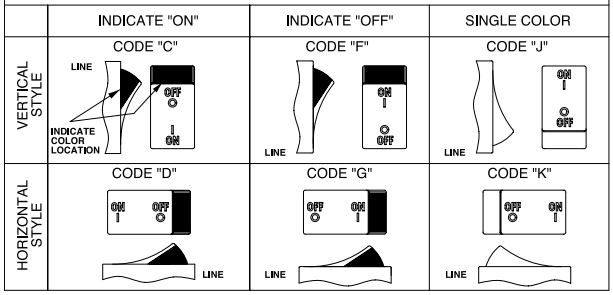
B	F	1	–	B	0	–	24	–	630	–	2	3	A	–	K	G
1 Series	2 Actuator	3 Poles		4 Circuit	5 Aux/Alarm Switch		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color	10 Mounting/ Barriers		11 Max. Appl. Rating	12 Agency Approval

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
- **3** [3] 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
- **22** AC Short
- **24** AC Medium
- **26** AC Long
- **42** AC, Short,Hi-Inrush
- **44** AC, Medium, Hi-Inrush
- **46** AC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

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

8 TERMINAL [5]
- **1** [6] 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 [7]	Marking: ON-OFF	Marking: Dual [7]	Marking Color: Single Color	Marking 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	BARRIERS [9]
	Threaded Insert, 2 per pole	
A	6-32 x 0.195 inches *(multi-pole units only)*	yes
B	ISO M3 x 5mm	yes
	ROCKERGUARD BEZEL	
	Threaded Insert, 2 per pole	
C	6-32 X 0.225 inches *(multi-pole units only)*	yes
D	ISO M3 x 6.5mm	yes

11 MAXIMUM APPLICATION RATING
- **C** [8] 120/240 VAC
- **K** 120 VAC

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

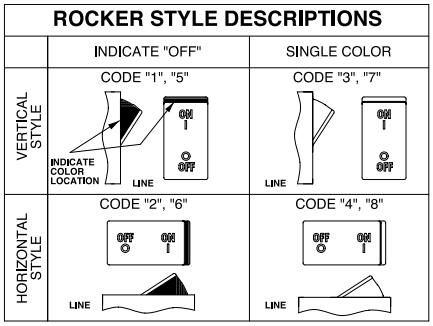
Notes:
1. Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
2. All poles must be same polarity.
3. 3 pole units available only when 1 of 3 poles is neutral.
4. On multi-pole breakers, one auxiliary switch is supplied, 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.

B	1	1	–	B	0	–	24	–	630	–	2	3	A	–	K	G
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 [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 [2,3]
1 One **2** Two **3** [4] 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
22 AC Short
24 AC Medium
26 AC Long
42 AC, Short,Hi-Inrush
44 AC, Medium, Hi-Inrush
46 AC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

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

8 TERMINAL [6]
1 [7] 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: ON-OFF	Marking: Dual [8]	Marking Color: Single Color	Marking 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]

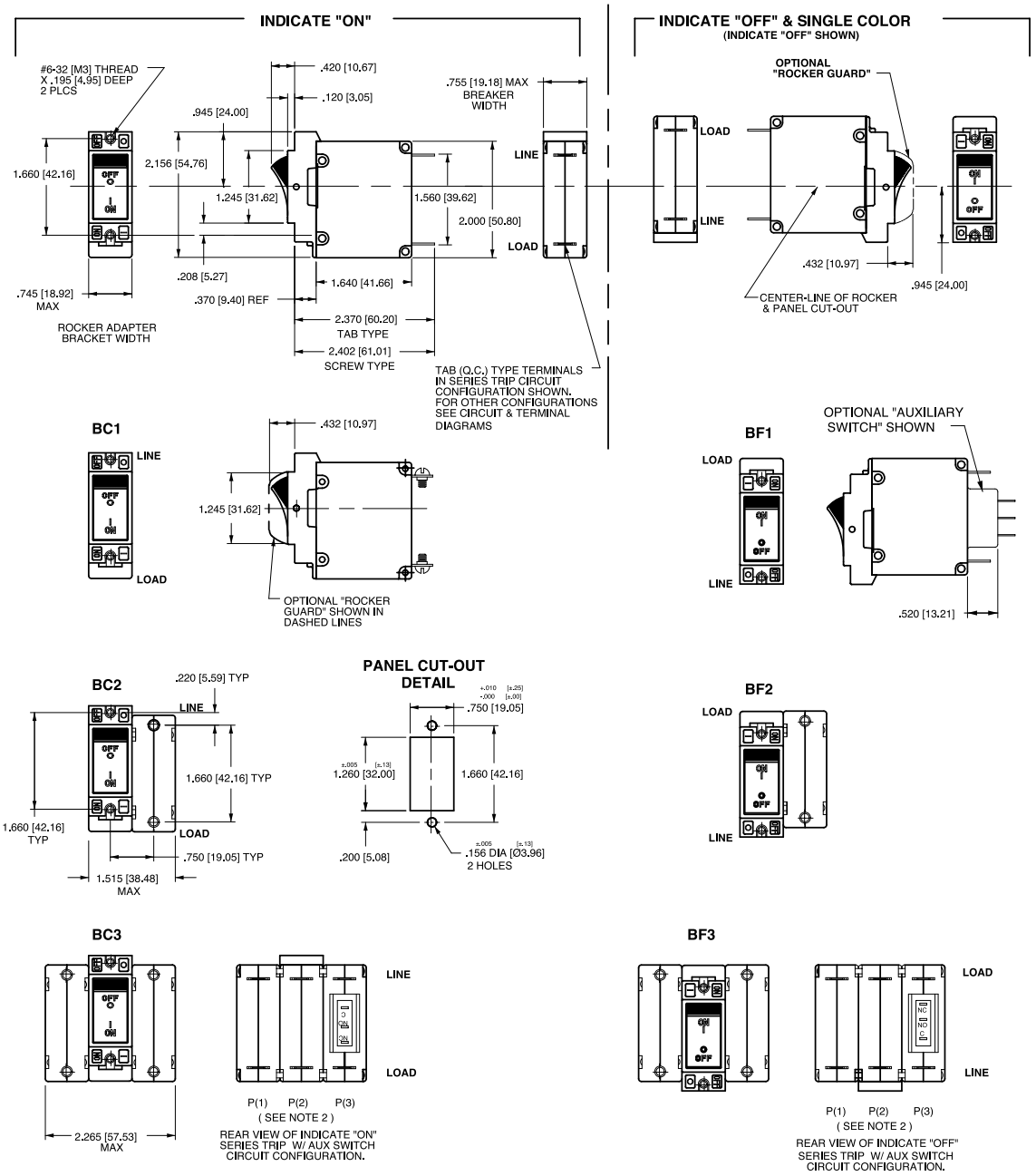
		BARRIERS [12]
	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole FLAT ROCKER ACTUATOR	
A	6-32 x 0.195 inches *(multi-pole units only)*	yes
B	ISO M3 x 5mm	yes
	RECESSED OFF SIDE ROCKER ACTUATOR [10]	
E	6-32 X 0.225 inches *(multi-pole units only)*	yes
F	ISO M3 x 6.5mm	yes
	PUSH-TO-RESET BEZEL,Threaded Insert, 2 per pole	
C	6-32 x 0.195 inches	yes
D	ISO M3 x 5mm	yes

11 MAXIMUM APPLICATION RATING
C [11] 120/240 VAC
K 120 VAC

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

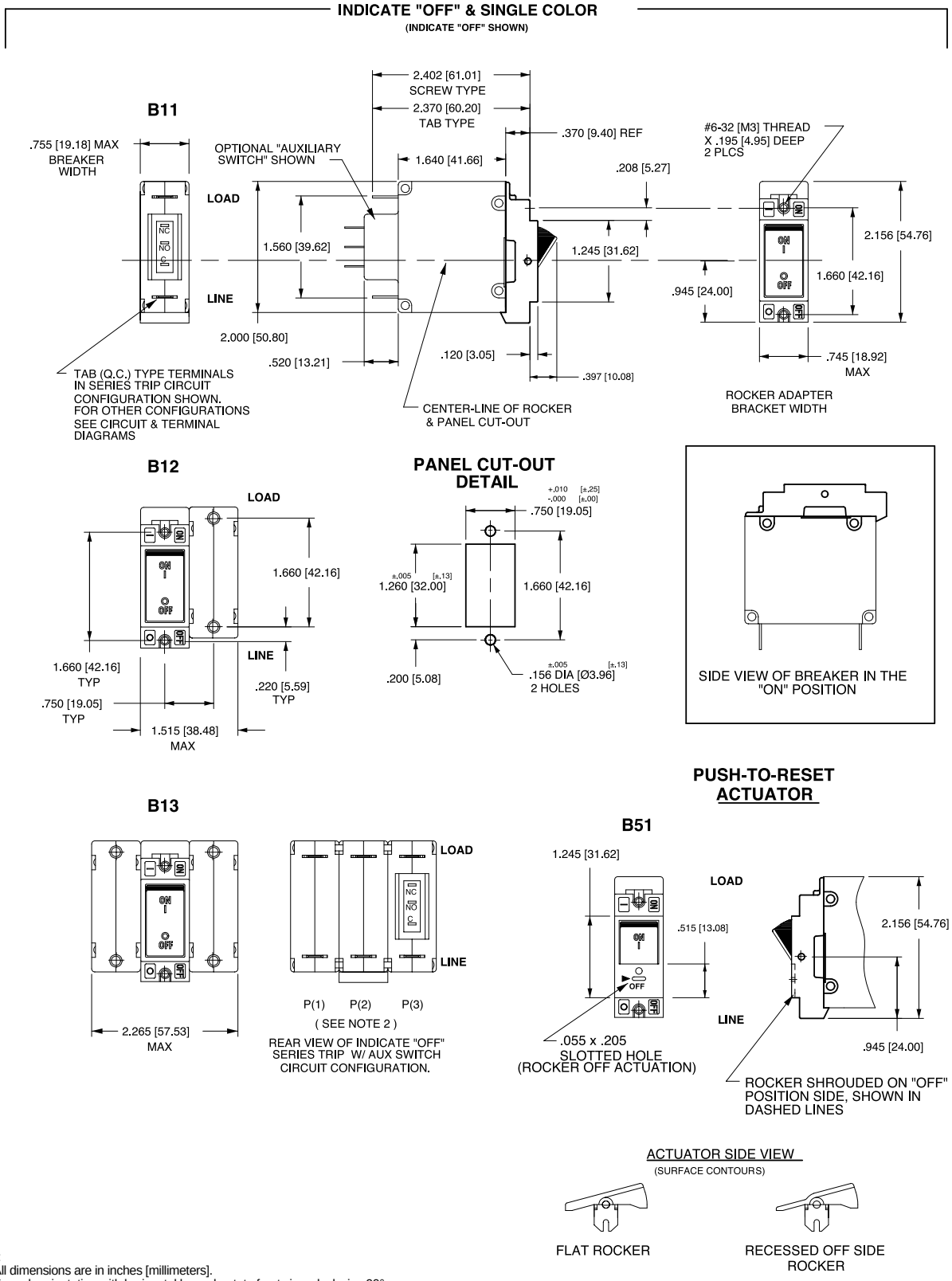
Notes:
1 Push-To-Reset actuators have OFF portion of rocker shrouded.
2 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
3 All poles must be same polarity.
4 3 pole units available only when1 of 3 poles is neutral.
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]



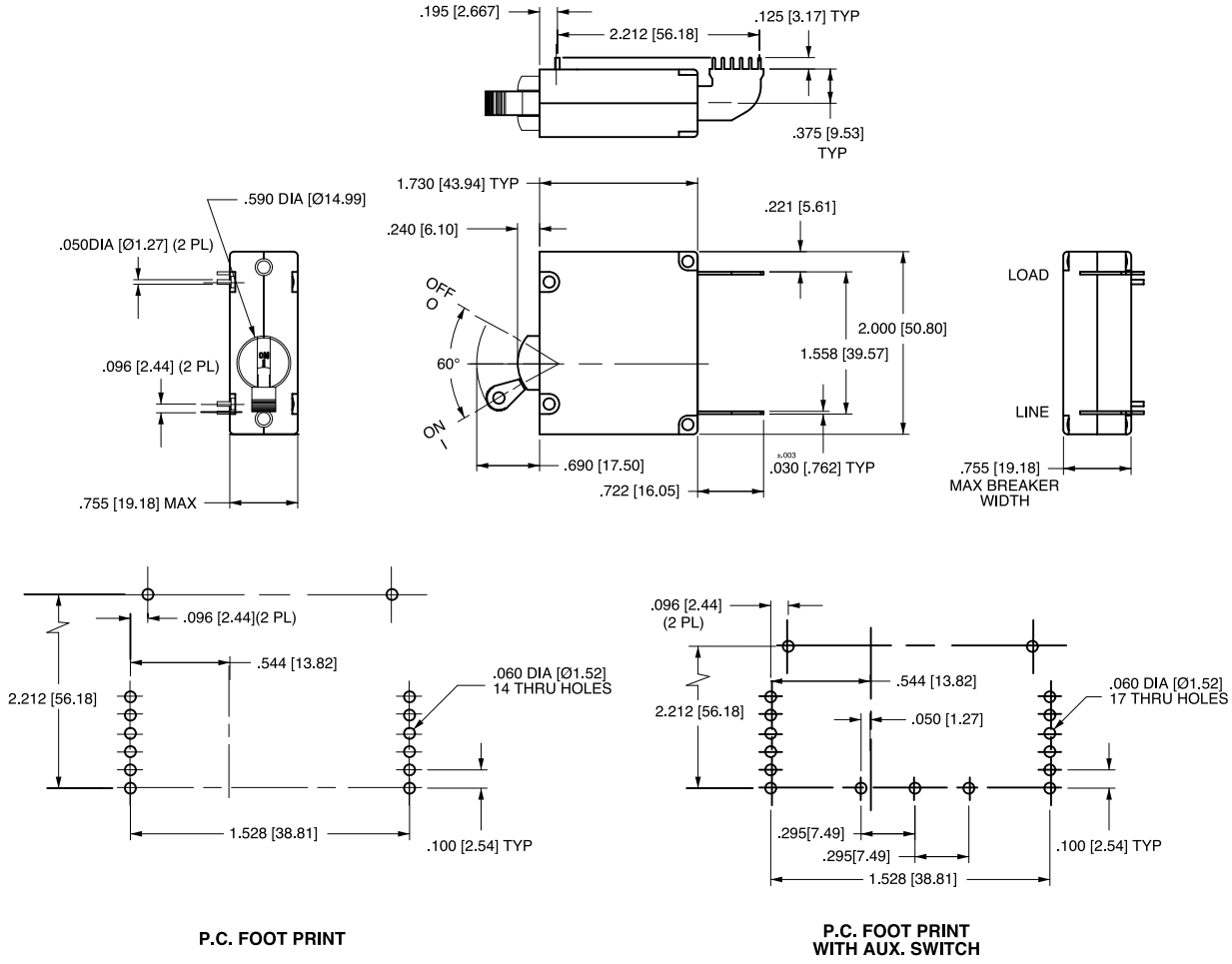
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate “OFF” is opposite of indicate “ON”.
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 All dimensions are in inches [millimeters].
4 Tolerance ±.020 [.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 ±.010 [.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 ±.010 [.25] unless otherwise specified.

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. New thermoset glass filled polyester half shell construction provides for increased mechanical and electrical strength. The wiping contacts, mechanical linkage with two step actuation, clean 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:

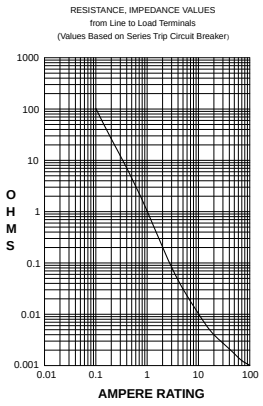
- Extensive list of Agency Approvals
- Available with Standard or Metric Stud terminals, or Saddle Clamp screw terminals
- Optional mid-trip handle style actuator
- Unique arc chute design which allows for higher interrupting capacities of up to 10,000 amps
- Exclusive Rockerguard and Push-To-Reset bezel
- 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

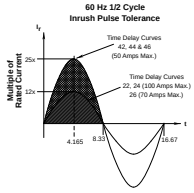
Electrical

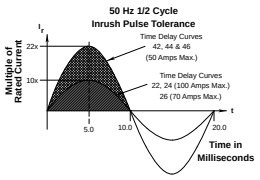
Maximum Voltage	AC, 480 WYE/277 VAC, 50/60 Hz (see Table A.) UL489: AC,240 VAC. (See Table D), 50/60 Hz, 125 VDC
Current Rating	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 25.0, 30.0, 35.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0 and 100 amps. Other ratings available, 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.



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) UL/CSA		APPLICATION CODES		NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	WITH BACKUP FUSE [1]	WITHOUT BACKUP FUSE	UL	CSA	
SERIES	32	DC	---	0.02 - 100	---	---	5000	TC1, OL1, U2	TC1, OL1, U2	
	48	DC	---	110 - 150	---	---	5000	TC1, OL1, U2	TC1, OL1, U2	
	65	DC	---	0.02 - 70	---	---	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	71 -100	---	5000	TC1,2, OL0,U1	TC1,2, OL0,U1	
	80	DC	---	0.02 - 70	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				---	71 -100	---	7500	TC1,2, OL0,U1	TC1,2, OL0,U1	
	80	DC	---	0.02 - 70	---	---	10,000	TC1,2, OL1,U1	TC1,2, OL1,U1	Must Have Agency Code "L"
				---	71 -100	---	10,000	TC1,2, OL0,U1	TC1,2, OL0,U1	Must Have Agency Code "L"
	125	DC	---	0.02 - 50	---		5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"
	125 / 250	DC	---	0.02 - 50	---		5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"
	250	DC	---	0.02 - 50	---		5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L". 2 Pole Break Required for 250 Volts
	125	50 / 60	1	0.02 - 100	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				0.02 - 100	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"
	150	DC	---	---	80 - 100	---	5000	TC1, OL0, U3	---	Must Have Agency Code "L"
	150	DC	---	---	101 - 175	---	5000	TC1, OL0, U3	---	Must Have Agency Code "L" Parallel Pole
	125 / 250	50 / 60	1	0.02 - 100	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	
				0.02 - 50	---	---	3000	TC1,2,OL1,U1	TC1,2,OL1,U1	2 or 3 poles breaking single phase
				51 - 100	---	---	1000	TC1,2,OL1,U1	TC1,2,OL1,U1	2 or 3 poles breaking single phase
				0.02 - 100	---	---	5000	TC1,2,OL1,U2	TC1,2,OL1,U2	2 or 3 poles breaking single phase, "L" Agency Code
	250	50 / 60	1	0.02 - 50	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				0.02 - 100	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"
				51 - 70	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	
			3	---	0.02 - 100	---	3000	TC1, OL0, U2	TC1, OL0, U2	
				0.02 - 70	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
				---	0.02 - 90	---	5000	TC1,2,OL0,U1	TC1,2,OL0,U1	Must Have Agency Code "L"
	277	50 / 60	1	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	
	480 / 277	50 / 60	3	0.02 - 30	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
				---	31 - 50	5000	---	TC1,2,OL0,C1	TC1,2,OL0,C1	
	480	50 / 60	1	0.02 - 30	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	2 poles breaking 1 phase
				---	31 - 50	5000	---	TC1,2,OL0,C1	TC1,2,OL0,C1	
DUAL COIL	80	DC	---	0.02 - 50	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	125	50 / 60	1	0.02 - 50	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
	125 / 250	50 / 60	1	0.02 - 50	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	2 or 3 poles breaking single phase
				0.02 - 50	---	---	3000	TC1,2,OL1,U1	TC1,2,OL1,U1	2 or 3 poles breaking single phase
	250	50 / 60	1	0.02 - 50	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	
			3	0.02 - 50	---	---	3000	TC1, OL0, U2	TC1, OL0, U2	Per Pole Rating
				0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	
	277	50 / 60	1	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
SHUNT	80	DC	---	0.02 - 50	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	277	50 / 60	1	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	
	250	50 / 60	3	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
	480 / 277	50 / 60	3	0.02 - 30	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
				---	31 - 50	5000	---	TC1,2,OL0,C1	TC1,2,OL0,C1	
	480	50 / 60	1	0.02 - 30	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	2 poles breaking 1 phase
				---	31 - 50	5000	---	TC1,2,OL0,C1	TC1,2,OL0,C1	
RELAY	80	DC	---	0.02 - 50	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	277	50 / 60	1	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	
	250	50 / 60	3	0.02 - 50	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
SWITCH ONLY	65	DC	---	0.02 - 70	---	---	---	---	---	
				---	71 -100	---	---	---	---	
	80	DC	---	0.02 - 70	---	---	---	---	---	
				---	71 -100	---	---	---	---	
	125	50 / 60	1	0.02 - 100	---	---	---	---	---	
	125 / 250	50 / 60	1	0.02 - 100	---	---	---	---	---	2 or 3 poles breaking single phase
	250	50 / 60	1	0.02 - 100	---	---	---	---	---	
			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 1/2
	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:
1 UL recognized and CSA Accepted at 480V refers to 3 & 4 pole versions used in a 3Ø, wye connected circuit or 2-pole version connected with 2 poles breaking. 1Ø and backed up with series fusing as stated above in note 1.
* Series, 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		CONSTRUCTION NOTES
						UL/CSA		VDE		TUV				
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS [1]	WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP FUSE	UL	CSA	
SERIES	80	DC	---	0.10 - 70	---	---	7500	---	5000	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
			---	71 - 100	71 -100	---	10,000	---	5000	---	5000	TC1,2, OL0,U1	TC1,2, OL0,U1	Agency Code F, H, J or R Only
	125	DC	---	1 - 50	---	---	5000	---	--	---	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
	250	DC	---	0.10 - 50	---	---	5000	---	--	---	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only, 2P
		50 / 60	1	0.10 - 70	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				0.10 -100	---	---	5000	---	--	5000	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
			3	0.10 - 90	---	---	5000	---	--	5000	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
	415	50 / 60	3	0.10 - 30	---	5000	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker
						5000	---	5000	2500	3000	1500	TC1,2 ,OL1,C1	TC1,2, OL1,C1	Handle/ Agency F, H, J, or R
DUAL COIL	80	DC	---	0.10 - 30	---	---	7500	---	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	1 & 3	0.10 - 30	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
SHUNT	80	DC	---	0.10 - 70	---	---	7500	---	5000	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	1 & 3	0.10 - 70	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	415	50 / 60	3	0.10 - 30	---	5000	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker
						5000	---	5000	2500	3000	1500	TC1,2 ,OL1,C1	TC1,2, OL1,C1	Handle/ Agency F, H, J, or R

Notes:
1. General Purpose ratings for UL/CSA only.
2. 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	Limited to 2 Poles Max from 71 - 100 Amps.
	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)
	120	50 / 60	1	0.10 - 50	10,000	1 - 3 Poles
				51 - 70	5,000	1 - 3 Poles
	120 / 240	50 / 60	1	0.10 - 50	5,000	2 or 3 Poles. 1 Pole of a 3 Pole Unit is Neutral
				0.10 - 50	10000 [1]	2 or 3 Poles. 1 Pole of a 3 Pole Unit is Neutral
	240	50 / 60	1	0.10 - 30	5,000	1Pole
	240	50 / 60	1	0.10 - 20	5,000	2 Pole
	277	50 / 60	1	0.10 - 20	10,000	1Pole
DUAL COIL	120	50 / 60	1	0.10 - 30	10,000	---

Notes from Table D:
1. 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 Protected)								
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	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	—
				101 - 150	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	—
	65	DC	—	0.02 - 100	1500	TC1,2,OL0,U1	TC1,2,OL0,U1	—
	80	DC	—	0.02 - 70	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	—
	125	50 / 60	1	0.02 - 70	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	—
				71 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	—
	250	50 / 60	1	0.02 - 70	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	—
				71 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	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	110 - 250	10,000

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

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

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

TUV Certified — EN60934, under License No. R72040875

VDE Certified — EN60934, VDE 0642 under File No. 10537

C	A	3	–	B	0	–	10	–	450	–	1	2	1	–	C
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 Bezel/Barrier		11 Agency Approval

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]

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
D [4]	Shunt Trip (Current)	**K** [4,5]	Dual Coil with Relay Trip Voltage Coil
E [4]	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

03 [3]	DC 50/60Hz, Switch Only	**30**	DC 50/60Hz Instantaneous
10 [7]	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** [8]	50/60Hz Short, Hi-Inrush
20 [7]	50/60Hz Instantaneous	**44** [8]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46** [8]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short	**52** [8]	DC Short, Hi-Inrush
24	50/60Hz Medium	**54** [8]	DC Medium, Hi-Inrush
26	50/60Hz Long	**56**	DC Long, Hi-Inrush

Notes:

1 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.

2 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.

3 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.

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.

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 and 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 No marking available. Consult factory. VDE/TUV Approval requires dual (I-O, ON-OFF) or I-O markings on all handles.

17 Single pole only.

18 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** [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]	100.00
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 [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 Handleguard	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

C	A	2	–	P	0	–	D4	–	820	–	3	2	1	–	M	T
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		11 Max. App. Rating	12 Agency Approval

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
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)
5 S.P.S.T., N.O., 0.110 Q.C Term. (Gold Contacts)
6 S.P.S.T., 0.139 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
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	**820**	200.00
811	110.00	**814**	140.00	**917**	175.00	**922**	225.00
812	120.00	**815**	150.00	**818**	180.00	**825**	250.00
912	125.00	**816**	160.00	**819**	190.00		

Notes:
1 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.
2 Standard Handle colors are White, Black, Red & Yellow.
3 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 not available on the single pole unit.
4 Ratings for 101 to 125 amps are available in 1-pole size.
Ratings from 110 to 200 amps are available in 2-pole size.
For ratings from 225-250 amps, specify 3-pole size.
For ratings from 350-400 amps, specify 4-pole size.
5 1 pole only available with terminal codes 3 and 6.
6 Agency code K and 7 not available with 1 pole.
Agency code J only available with 1 pole.

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

9 ACTUATOR COLOR

	LEGEND ON-OFF	Dual	Legend Color
White	**B**	**1** [2]	Black
Black	**D**	**2** [2]	White
Red	**G**	**3** [2]	White
Green	**J**	**4** [2]	White
Blue	**L**	**5** [2]	White
Yellow	**N**	**6** [2]	Black
Gray	**Q**	**7** [2]	Black
Orange	**S**	**8** [2]	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
J UL489A Listed, TUV Certified
K UL489A Listed, VDE Certified
T UL489A Listed
7 UL489A Listed, TUV Certified

C	1	2	–	P	0	–	D4	–	820	–	3	2	A	–	M	T
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		11 Max. App. Rating	12 Agency Approval

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
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)
5 S.P.S.T., N.O., 0.110 Q.C Term. (Gold Contacts)
6 S.P.S.T., 0.139 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
D1 DC Ultra Short
D2 DC Short
D4 DC Medium
D6 DC Long

7 CURRENT RATING (AMPERES) [2]

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
810	100.00	**813**	130.00	**817**	170.00	**820**	200.00
811	110.00	**814**	140.00	**917**	175.00	**922**	225.00
812	120.00	**815**	150.00	**818**	180.00	**825**	250.00
912	125.00	**816**	160.00	**819**	190.00		

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
J UL489A Listed, TUV Certified
T UL489A Listed
7 UL489A Listed, TUV Certified

Notes:
1 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 not available on the single pole unit.
2 Ratings for 101 to 125 amps are available in 1-pole size.
Ratings from 110 to 200 amps are available in 2-pole size.
For ratings from 225-250 amps, specify 3-pole size.
For ratings from 350-400 amps, specify 4-pole size.
3 1 pole only available with terminal codes 3 and 6.
4 Agency code K and 7 not available with 1 pole.
Agency code J only available with 1 pole.

C	A	3	–	B	0	–	14	–	450	–	1	2	1	–	K	G
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. App. Rating	12 Agency Approval

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

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 ***Threaded Insert***	BARRIERS [12]
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:

1 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.

2 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.

3 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.

4 Available up to 50 amps maximum.

5 Current ratings 71 - 100 with VDE approvals are available up to two poles maximum.

6 Terminal Codes 9 & C are not VDE approved.

7 Terminal Code 1 available to 60 amps maximum.

8 Terminal Codes 2, 4, 5 & C available to 50 amps maximum.

9 Terminal Codes 3, 6 & 9 available to 100 amps maximum.

10 Terminal Code A available to 100 amps maximum.

11 VDE and TUV approvals require Dual (I-O, ON-OFF) markings on all handles.

12 Barriers supplied on multi-pole units only.

C	M	3	–	B	0	–	10	–	450	–	1	0	1	–	C
1 Series	2 Actuator	3 Poles		4 Circuit	5 Aux/Alarm Switch		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Legend Plate	10 Mounting Bezel/Barrier		11 Agency Approval

1 SERIES
C

2 ACTUATOR [1]
M Sealed Toggle, one per pole

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

4 CIRCUIT
A [2] Switch Only (no coil)
B Series Trip (current)
C Series Trip (voltage)
D [3] Shunt Trip (current)
E [3] Shunt Trip (voltage)
F [3] Relay Trip (current)
G [3] Relay Trip (voltage)
H [3,4] Dual Coil with Shunt Trip Voltage Coil
K [3,4] Dual Coil with Relay Trip Voltage Coil

5 AUXILIARY / ALARM SWITCH
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
03 [2] DC 50/60Hz, Switch Only
10 [6] DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20 [6] 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 [7] 50/60Hz Short, Hi-Inrush
44 [7] 50/60Hz Medium, Hi-Inrush
46 [7] 50/60Hz Long, Hi-Inrush
52 [7] DC Short, Hi-Inrush
54 [7] DC Medium, Hi-Inrush
56 DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES) [9]

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** [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]	100.00
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 [9] Stud 10-32
2 [10] Screw 10-32
3 [11] Stud 1/4-20
4 [10] Stud M5 x 0.8
5 [10] Screw M5 x 0.8
6 [11] Stud M6
7 [12] 0.250 Double Click Connect
9 [11] 7/16" Clip Terminal
A [13] Plug-In Stud
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:
1 Actuator Code M: Handle location as viewed from front of breaker:
2 pole - right pole 3 pole - center pole
2 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.
3 Circuit Codes D,E,F,G,H & K available with Terminal Codes 1,2,4 & 5 only.
4 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.
5 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.
6 Voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
7 Available with Circuit Codes B & D only, and up to 50 amps maximum.
8 Consult factory for current ratings 71-100, in three pole units, available as special catalog number only.
9 Terminal Code 1 available to 60 amps maximum.
10 Terminal Codes 2, 4, 5 and C available to 50 amps maximum.
11 Terminal Codes 3, 6 & 9 available to 100 amps maximum.
12 Terminal Code 7 available to 25 amps maximum.
13 Terminal Code A available to 100 amps maximum.

C	C	3	–	B	0	–	14	–	450	–	1	2	1	–	D
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 Agency Approval

1 SERIES
C

2 ACTUATOR [1]

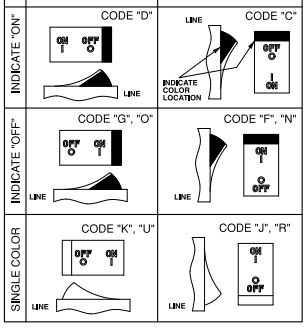
Two Color Visi-Rocker
- **C** Indicate ON, vertical legend
- **D** Indicate ON, horizontal legend
- **E** Indicate ON, no legend
- **F** Indicate OFF, vertical legend
- **G** Indicate OFF, horizontal legend
- **H** Indicate OFF, no legend

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



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
- **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
- **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

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** [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]	100.00
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:***	
				Single 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 [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
	ROCKERGUARD BEZEL		
A	6-32 x 0.195 inches	no	<300
C	6-32 x 0.195 inches	yes	<300
E [19]	6-32 x 0.195 inches	yes	≥300
G	ISO M3 x 5mm	no	<300
J	ISO M3 x 5mm	yes	<300
L [19]	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
- **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:
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.

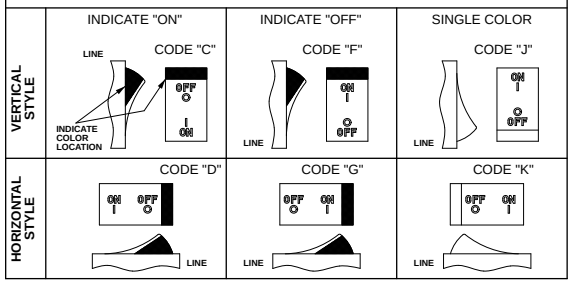
C	C	3	–	B	0	–	14	–	450	–	1	2	A	–	K	G
1 Series	2 Actuator	3 Poles		4 Circuit	5 Aux/Alarm Switch		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color	10 Mounting/ Barriers		11 Max. App. Rating	12 Agency Approval

1 SERIES
C

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

ROCKER STYLE DESCRIPTIONS



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
- **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** DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES) [4]

CODE	AMPERES							
210	0.100	**295**	0.950	**470**	7.000	**618**	18.000
215	0.150	**410**	1.000	**475**	7.500	**620**	20.000
220	0.200	**512**	1.250	**480**	8.000	**622**	22.000
225	0.250	**415**	1.500	**485**	8.500	**624**	24.000
230	0.300	**517**	1.750	**490**	9.000	**625**	25.000
235	0.350	**420**	2.000	**495**	9.500	**630**	30.000
240	0.400	**522**	2.250	**610**	10.000	**635**	35.000
245	0.450	**425**	2.500	**710**	10.500	**640**	40.000
250	0.500	**527**	2.750	**611**	11.000	**650**	50.000
255	0.550	**430**	3.000	**711**	11.500	**660**	60.000
260	0.600	**435**	3.500	**612**	12.000	**670**	70.000
265	0.650	**440**	4.000	**712**	12.500	**680**	80.000
270	0.700	**445**	4.500	**613**	13.000	**685**	85.000
275	0.750	**450**	5.000	**614**	14.000	**690**	90.000
280	0.800	**455**	5.500	**615**	15.000	**695**	95.000
285	0.850	**460**	6.000	**616**	16.000	**810**	100.00
290	0.900	**465**	6.500	**617**	17.000		

8 TERMINAL
- **1** [5] Stud 10-32
- **2** [6] Screw 10-32 with saddle & washer clamps
- **3** [7] Stud 1/4-20
- **4** [6] Stud M5 x 0.8
- **5** [6] Screw M5 x 0.8 with saddle & washer clamps
- **6** [7] Stud M6
- **9** [7,8] 7/16" Clip Terminal
- **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:***	
Color:	**ON-OFF**	**Dual** [10]	**Single Color Rocker/Handle**	**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]

		BARRIERS [13]
	Standard Rocker Bezel Threaded Insert, 2 per pole	
A	6-32 X 0.195 inches	yes
C	ISO M3 x 5mm	yes
	Rockerguard Bezel 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 [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

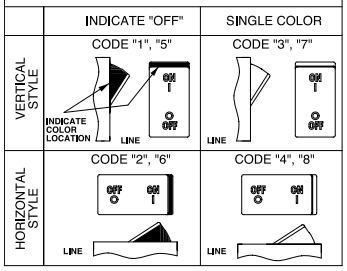
Notes:
1. Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
2. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
3. Available up to 50 amps maximum.
4. Current ratings 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.

C	1	2	–	B	0	–	10	–	450	–	1	2	1	–	E
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 Agency Approval

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
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
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
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. Auxilary 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	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** [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]	100.00
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 [15] 7/16" Clip Terminal
A [14] Plug-In Stud
C [15] 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND [16,17,18]

Actuator or Visi-Color	*Marking:*			*Marking Color:*	
				Single 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 [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

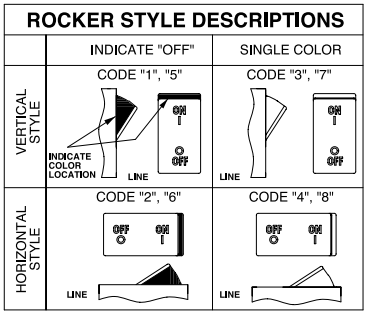
11 AGENCY APPROVAL
C UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
I UL Recognized STD 1077, UL Recognized 1500 (ignition protected), & CSA Accepted
L UL489 Construction: UL Recognized & CSA Accepted
R UL489 Construction: TUV Certified, UL Recognized & CSA Accepted

C	1	2	–	B	0	–	14	–	450	–	1	2	A	–	K	G
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. App. Rating	12 Agency Approval

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 [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
42 [4] 50/60Hz Short, Hi-Inrush
44 [4] 50/60Hz Medium, Hi-Inrush
46 [4] 50/60Hz Long, Hi-Inrush
52 [4] DC Short, Hi-Inrush
54 [4] DC Medium, Hi-Inrush
56 [4] DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES) [5]

CODE	AMPERES							
210	0.100	**295**	0.950	**470**	7.000	**618**	18.000
215	0.150	**410**	1.000	**475**	7.500	**620**	20.000
220	0.200	**512**	1.250	**480**	8.000	**622**	22.000
225	0.250	**415**	1.500	**485**	8.500	**624**	24.000
230	0.300	**517**	1.750	**490**	9.000	**625**	25.000
235	0.350	**420**	2.000	**495**	9.500	**630**	30.000
240	0.400	**522**	2.250	**610**	10.000	**635**	35.000
245	0.450	**425**	2.500	**710**	10.500	**640**	40.000
250	0.500	**527**	2.750	**611**	11.000	**650**	50.000
255	0.550	**430**	3.000	**711**	11.500	**660**	60.000
260	0.600	**435**	3.500	**612**	12.000	**670**	70.000
265	0.650	**440**	4.000	**712**	12.500	**680**	80.000
270	0.700	**445**	4.500	**613**	13.000	**685**	85.000
275	0.750	**450**	5.000	**614**	14.000	**690**	90.000
280	0.800	**455**	5.500	**615**	15.000	**695**	95.000
285	0.850	**460**	6.000	**616**	16.000	**810**	100.00
290	0.900	**465**	6.500	**617**	17.000		

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

9 ACTUATOR COLOR & LEGEND [12]

Actuator or Visi-Color	*Marking:*		*Marking Color:*	
			Single Color	
Color:	**ON-OFF**	**Dual** [11]	**Rocker/Handle**	**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]

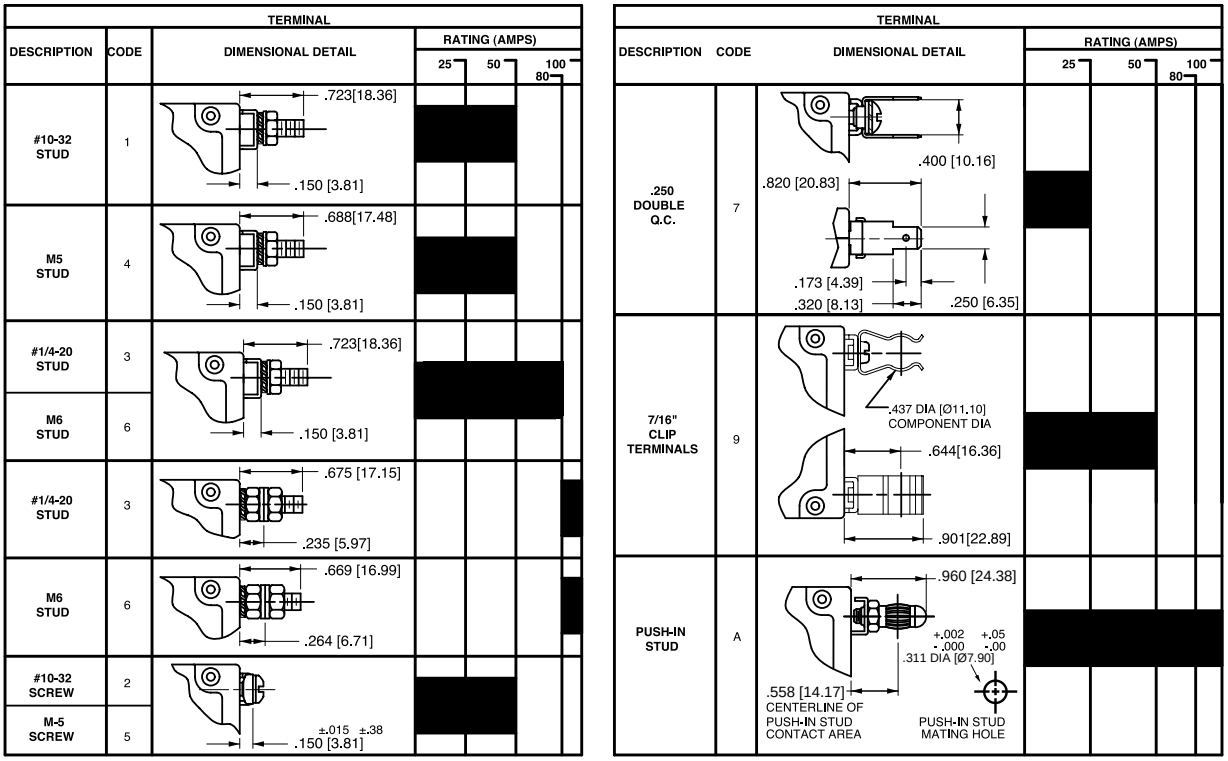
	STANDARD ROCKER BEZEL	BARRIERS [15]
	Threaded Insert, 2 per pole	
A	6-32 X 0.195 inches	yes
C	ISO M3 x 5mm	yes
	RECESSED OFF ROCKER [14]	
	Threaded Insert, 2 per pole	
E	6-32 x 0.195 inches	yes
F	ISO M3 x 5mm	yes
	PUSH-TO-RESET BEZEL [13]	
	Threaded Insert, 2 per pole	
B	6-32 x 0.195 inches	yes
D	ISO 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
A without approvals
G UL 489 Listed & CSA Certified
J UL489 Listed, CSA Certified & TUV Certified

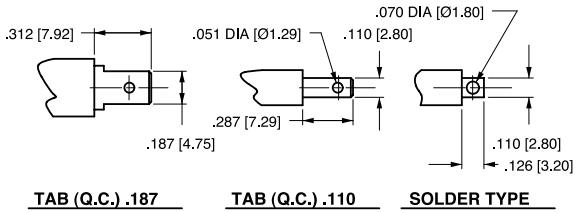
1 Notes:
2 Push-to-reset actuators have OFF portion of rocker shrouded.
3 Multi-pole breakers have all breakers identical except when specifying Auxiliary switch and/or mixed poles, and have one rocker per breaker.
4 On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
5 Available up to 50 amps maximum.
6 Current ratings 71 - 100 with VDE approvals are available up to two poles maximum.
7 Terminal Code 1 available to 60 amps maximum.
8 Terminal Codes 2, 4, 5 & C available to 50 amps maximum.
9 Terminal Codes 3, 6, 9 & A available to 100 amps maximum.
10 Terminal Codes 9 & C are not VDE approved.
11 Color shown is visi and legend with remainder of rocker black
12 Dual = ON-OFF/I-O legend on actuator.
13 VDE and TUV approval requires Dual (I-O, ON-OFF) markings on rocker.
14 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
15 5 & 6.
16 Recessed "OFF-SIDE" available with actuator codes 1, 2, 3, & 4. Legends on rocker are available in ink stamping only.
17 Barriers supplied on multi-pole units only.
18 2 & 3 pole circuit breakers required for 120/240 AC rating.

Circuit & Terminal Diagrams: in. [mm]



NOTES: TOLERANCE ON STUD LENGTHS IS ±.031 [±.79] UNLESS OTHERWISE SPECIFIED.

AUXILIARY / ALARM SWITCH TERMINAL DETAIL[3]



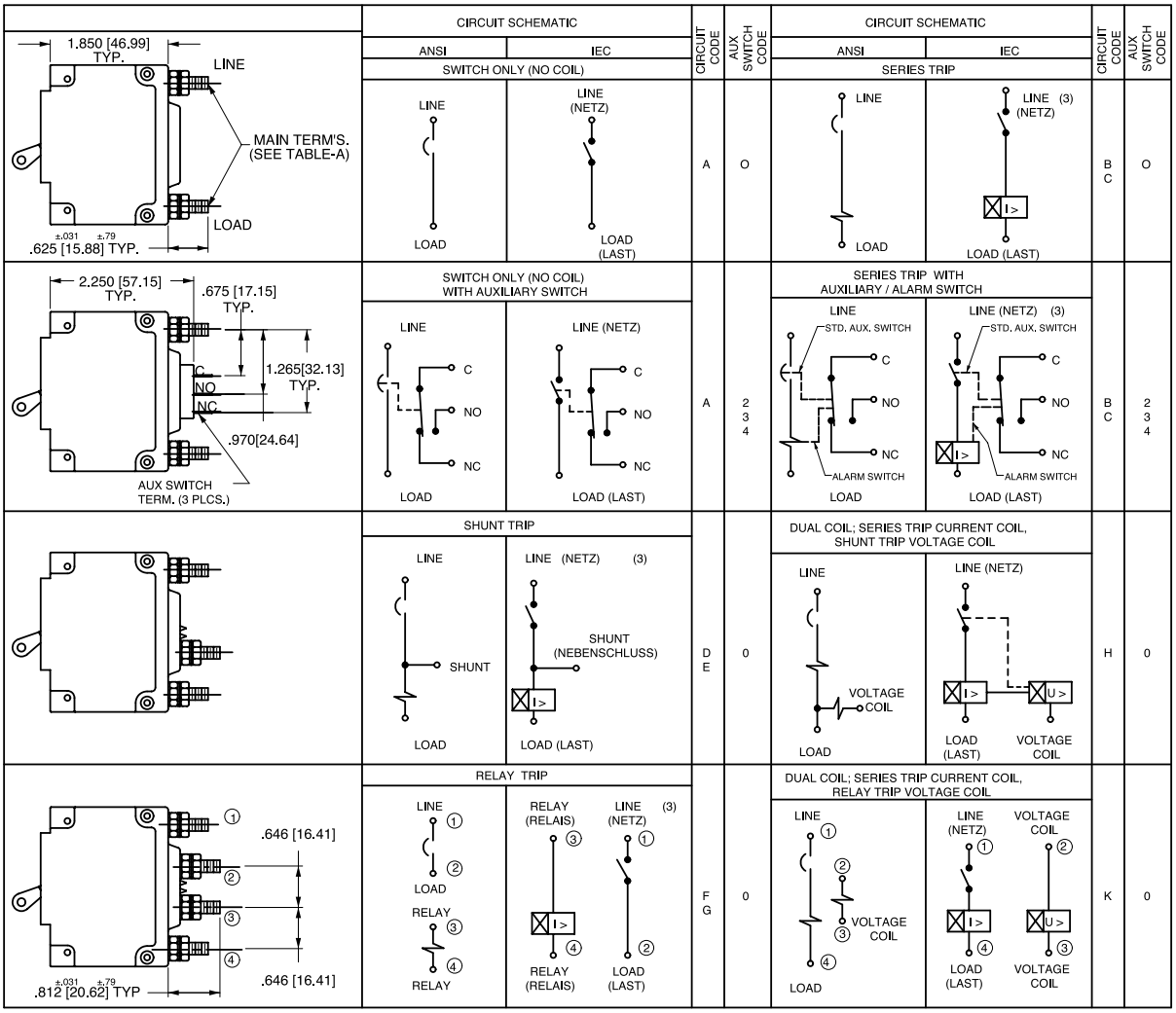
TIGHTENING TORQUE SPECIFICATIONS	
THREAD SIZE	TORQUE
#6-32 [M3] MOUNTING INSERTS	7-9 IN-LBS [0.8-1.0 NM]
#10-32 & M5 THD STUDS	15-20 IN-LBS [1.7-2.3 NM]
#10-32 THD SCREW	15-20 IN-LBS [1.7-2.3 NM]
#1/4-20 & M6 THD STUDS	30-35 IN-LBS [3.4-4.0 NM]

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 ±.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 mulit-pole identification scheme.

Circuit & Terminal Diagrams: in. [mm]

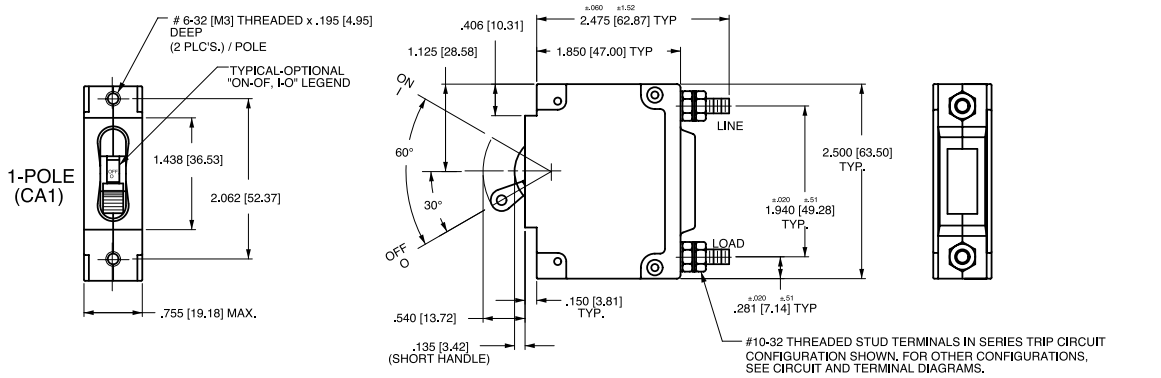


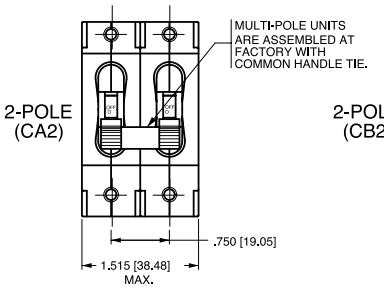
HANDLE POSITION VS. AUX/ALARM SWITCH MODE

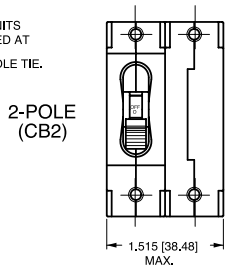
CIRCUIT BREAKER MODE	STANDARD C/B HANDLE POSITION	STANDARD C/B AUX. SWITCH MODE	MID TRIP C/B HANDLE POSITION	MID TRIP C/B STANDARD ALARM SWITCH MODE	MID TRIP C/B REVERSE ALARM SWITCH MODE[4]
OFF	30° OFF O	NC NO C	30° OFF O	NC NO C	NC NO C
ON	ON 30°	NC NO C	ON 30°	NC NO C	NC NO C
ELECTRICAL TRIP	30° OFF O	NC NO C	90°	NC NO C	NC NO C

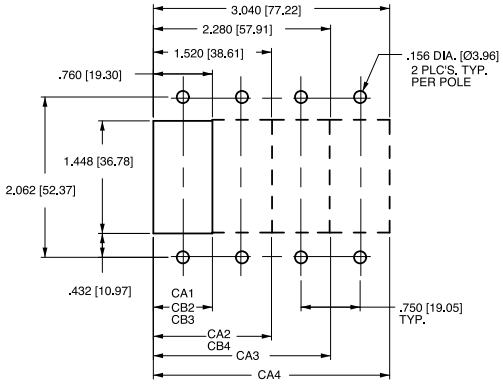
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuits.
4 Available only as special catalog number.

Dimensional Specifications: in. [mm]

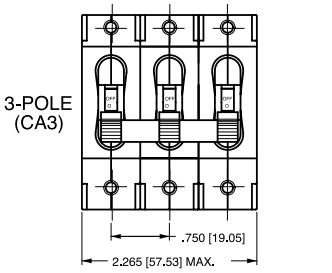


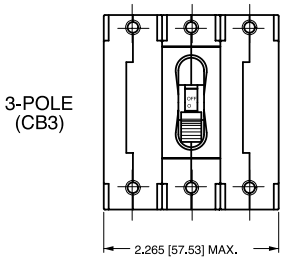


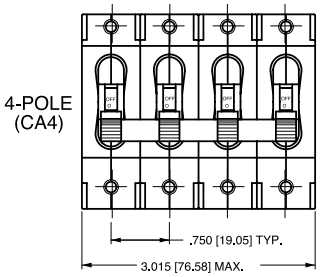


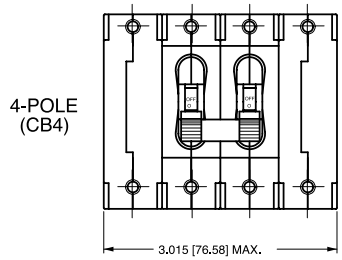


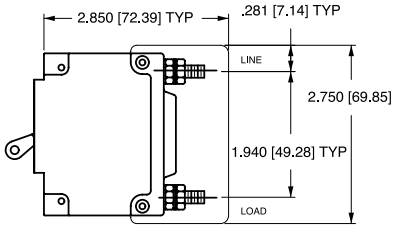
PANEL CUTOUT DETAIL
TOLERANCES ±.005 [.12]



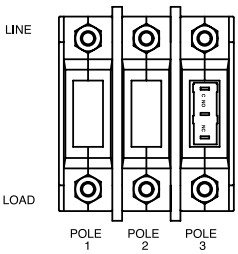




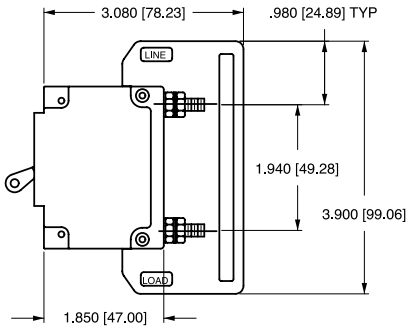




BARRIER FOR
UL-RECOGNIZED MULTI-POLE
BREAKERS



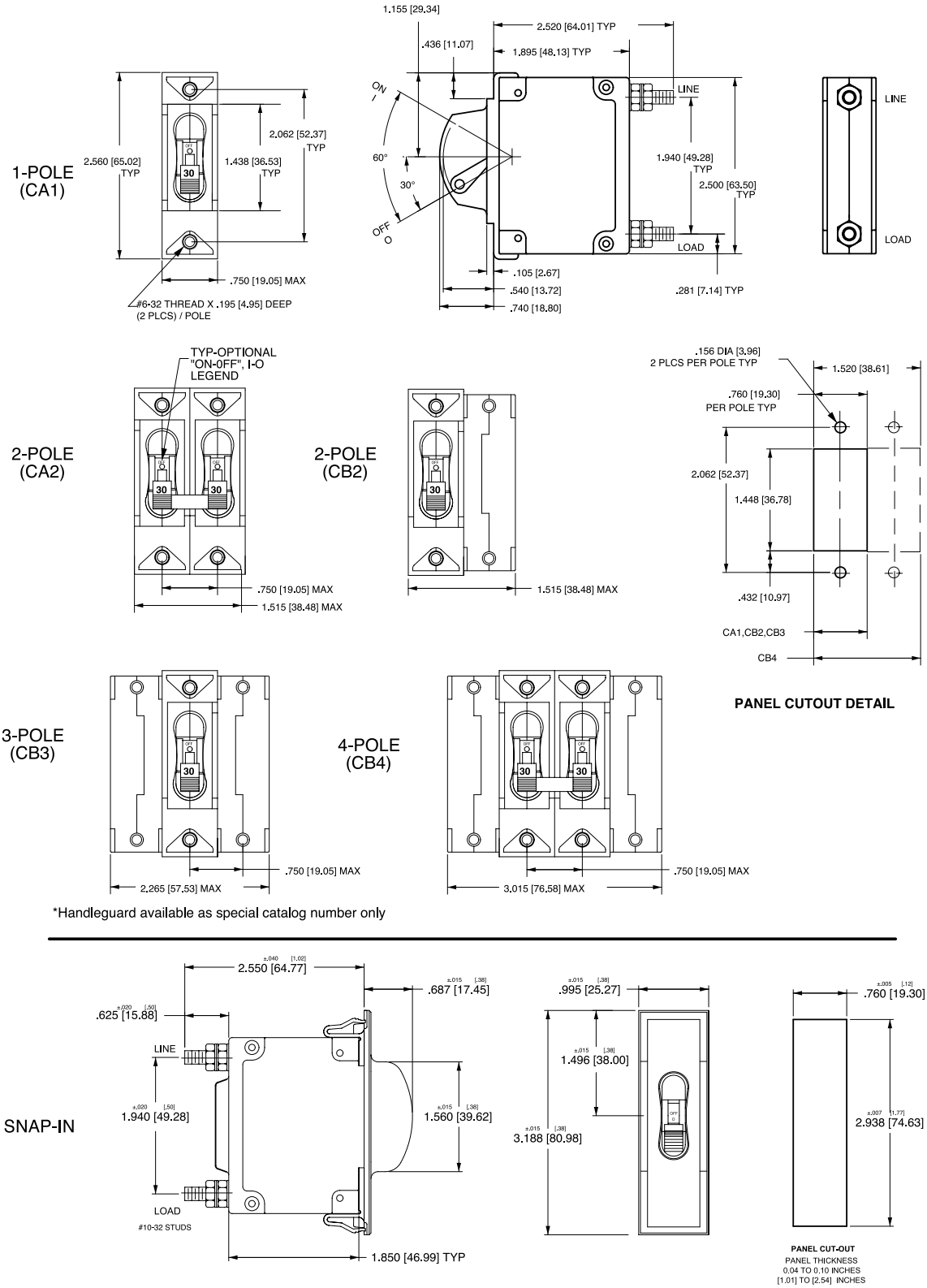
MULTI-POLE IDENTFICATION SCHEME
AS VIEWED FROM TERMINAL END OF BREAKER.



BARRIER FOR
UL-489 LISTED MULTI-POLE
BREAKERS

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

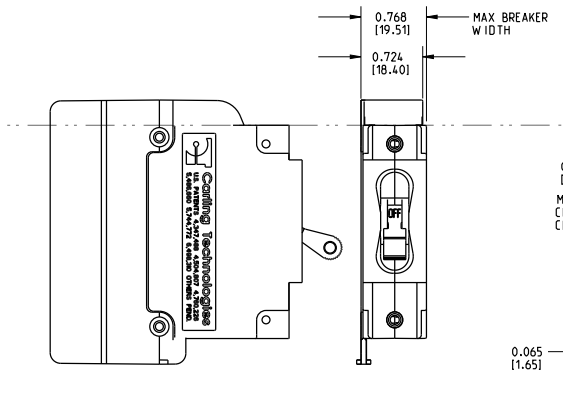
Dimensional Specifications: in. [mm]



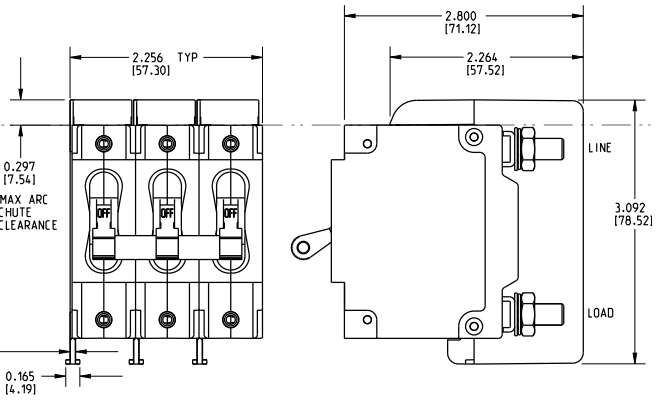
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

1-POLE (CA1)
w/ ARC CHUTE BARRIER

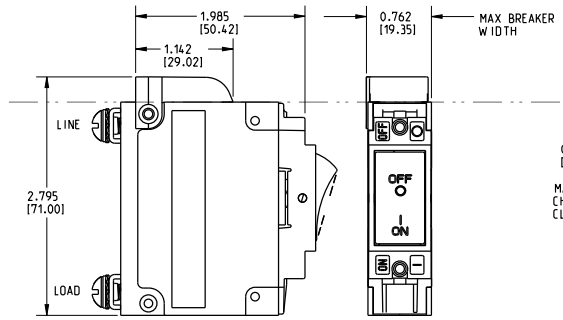


3-POLE (CA3)
w/ ARC CHUTE BARRIER

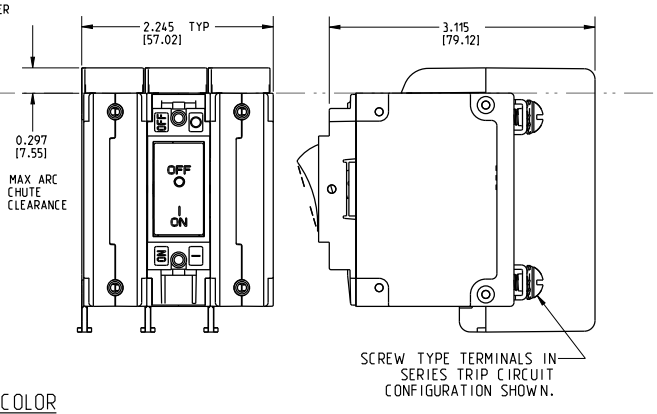


INDICATE "ON"

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

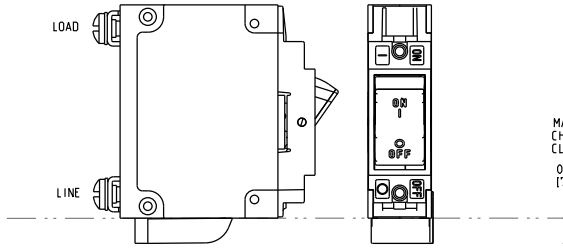


3-POLE (CC3,CD3)
w/ ARC CHUTE BARRIER

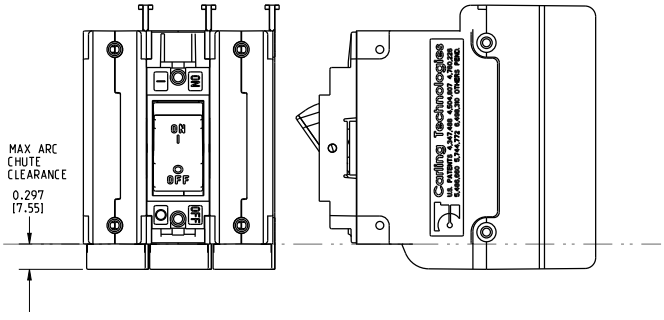


INDICATE "OFF" / SINGLE COLOR

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



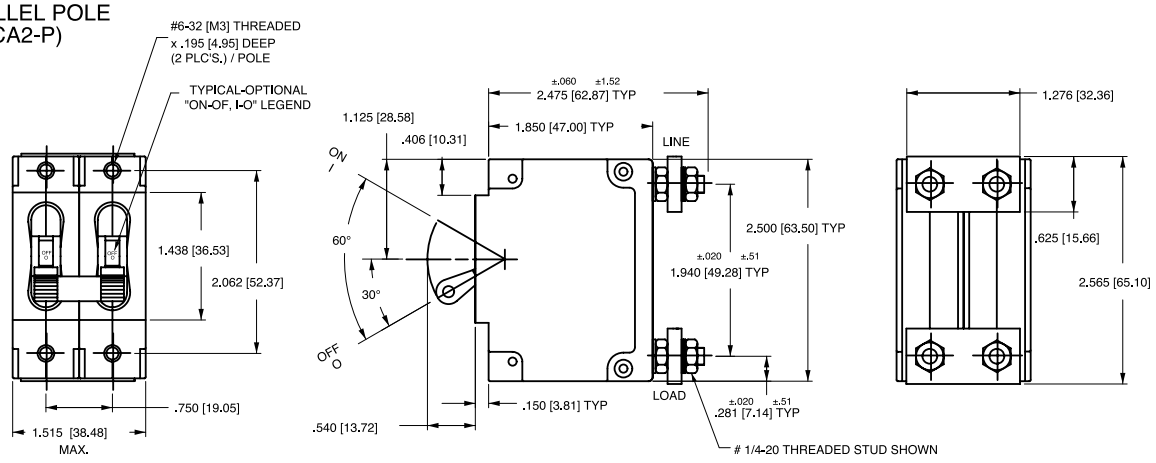
3-POLE (CF3,CG3,C13,C23)
w/ ARC CHUTE BARRIER



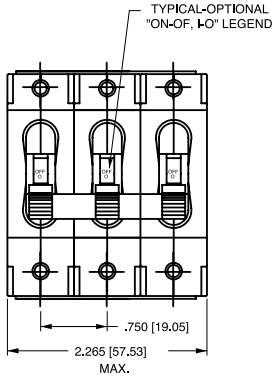
Notes:
1 Only 1-pole and 3-pole configurations shown. Arc chute (without barrier) and arc chute barrier also available for 2-pole construction.
2 Dimensions apply to all variations shown.
3 Notice that line and load terminal orientation for indicate on and indicate off rocker circuit breakers are opposite.
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 ± .020 unless otherwise specified.
7 Must be ordered under a special catalog number.

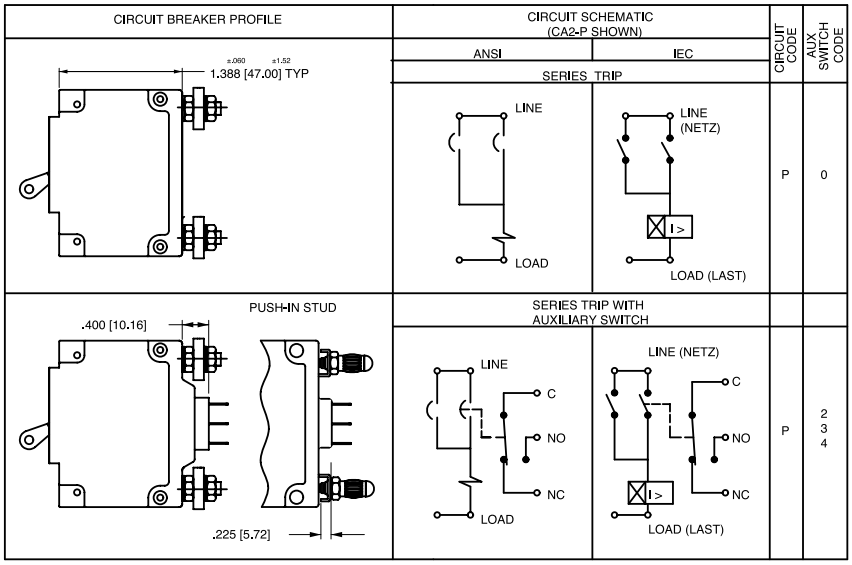
Dimensional Specifications: in. [mm]

PARALLEL POLE
(CA2-P)

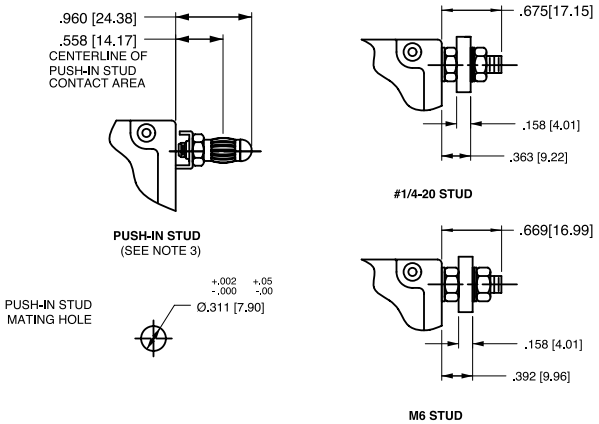


PARALLEL POLE
(CA3-P)

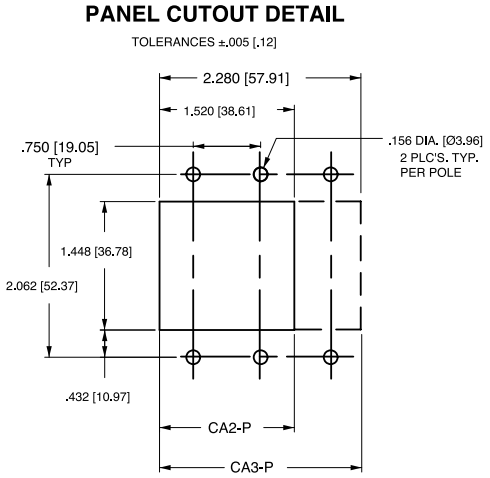




TERMINAL DETAILS

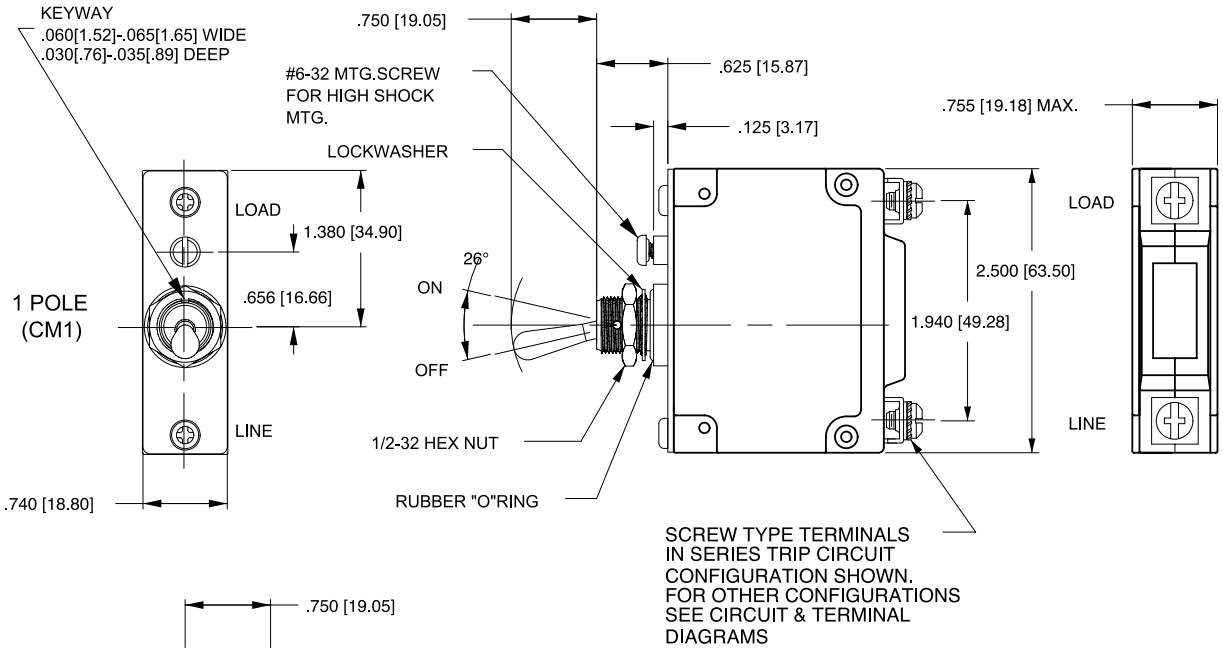


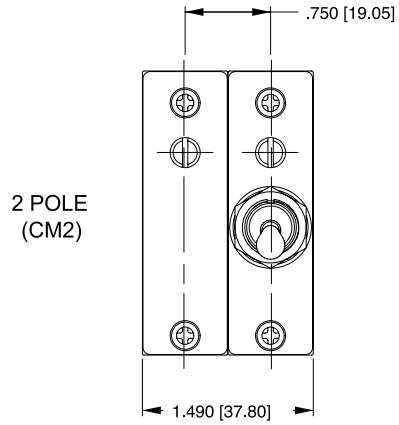
PANEL CUTOUT DETAIL

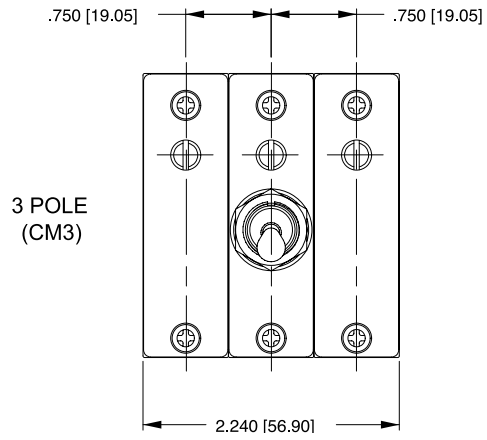


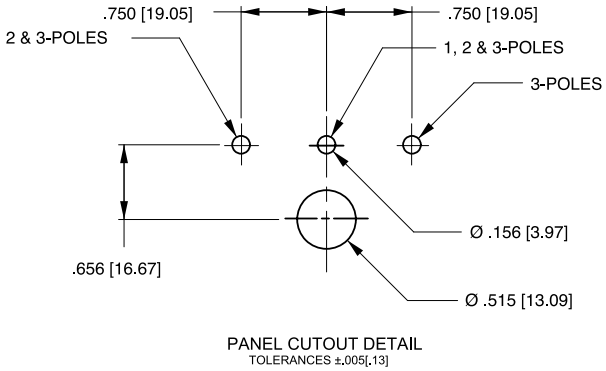
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



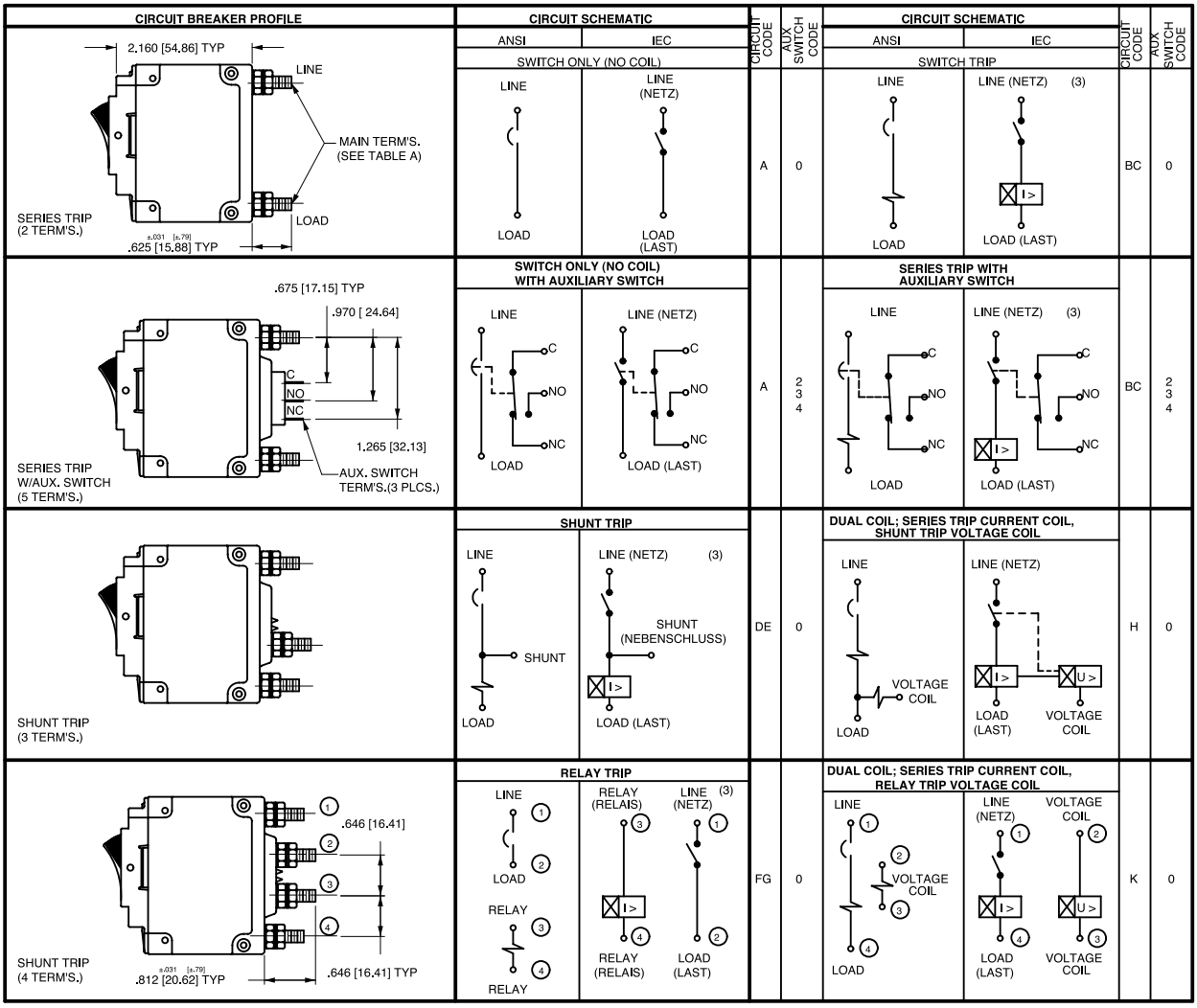


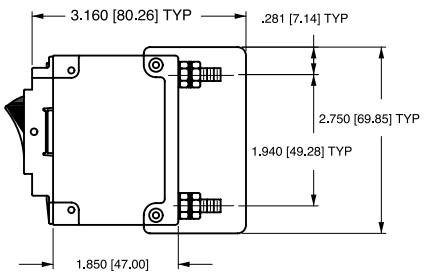




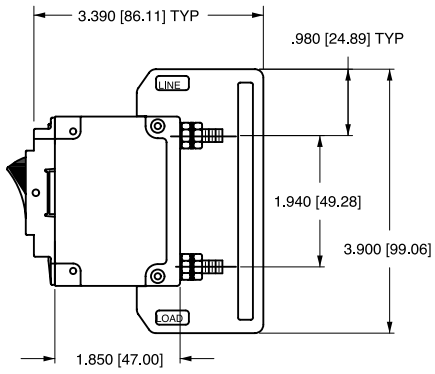
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Circuit & Terminal Diagrams: in. [mm]





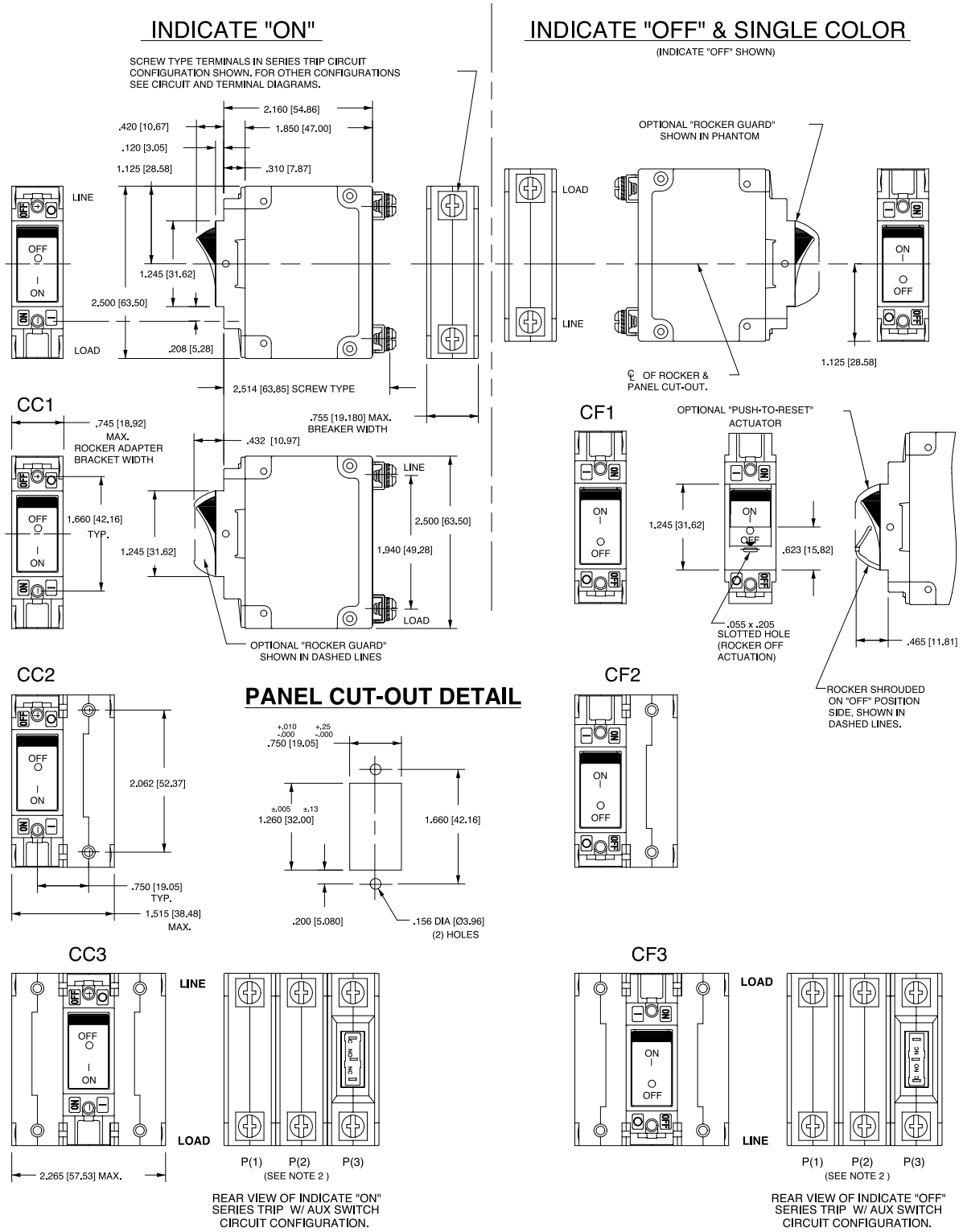
BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS



BARRIER FOR UL-489 LISTED MULTI-POLE BREAKERS

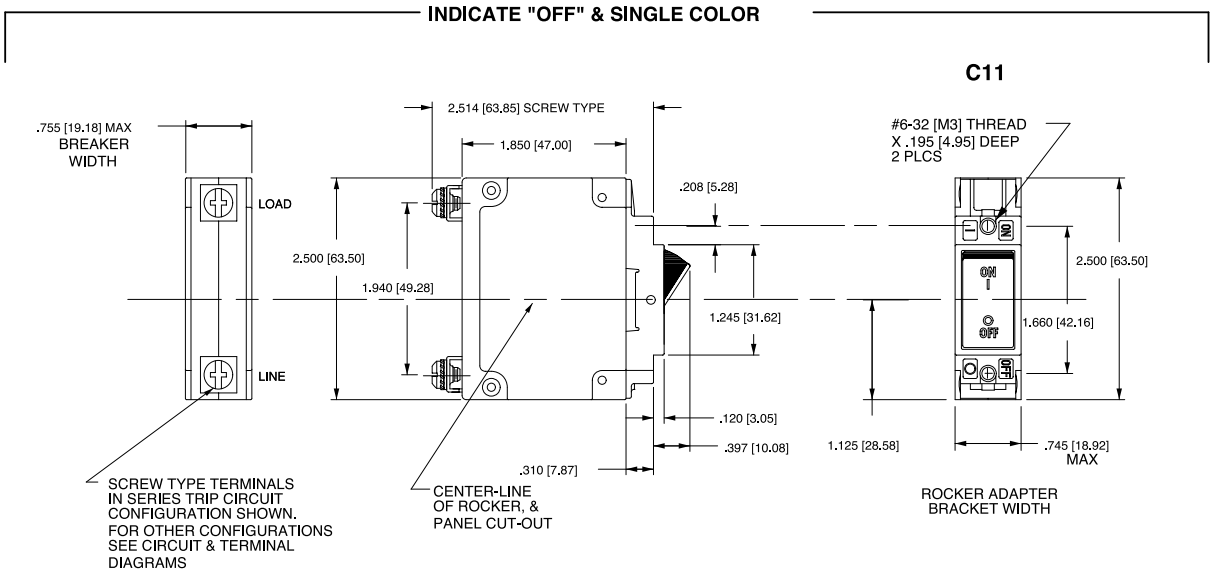
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuit.

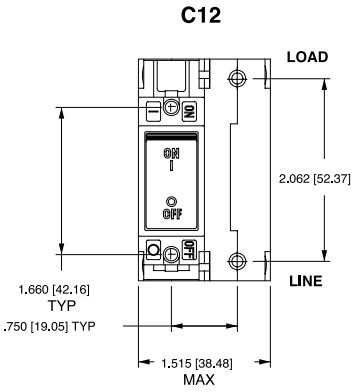
Dimensional Specifications: in. [mm]

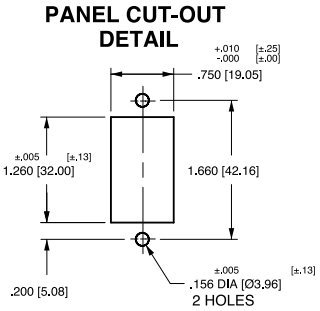


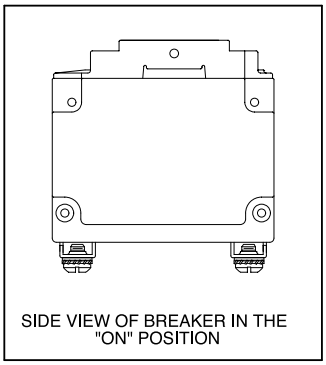
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line and load terminal orientation on indicate OFF is opposite of indicate ON.
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 All dimensions are in inches [millimeters].
4 Tolerance ±.020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

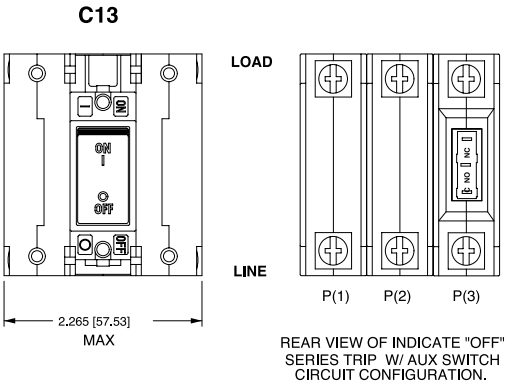
Dimensional Specifications: in. [mm]

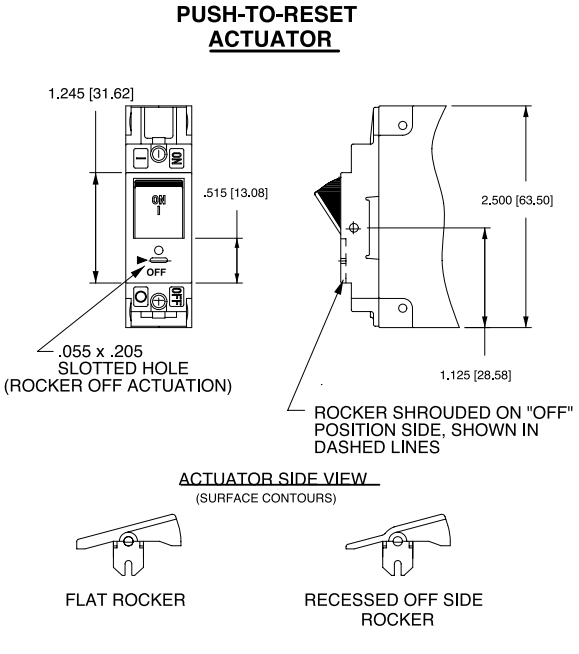












Notes:
1 For pole orientation with horizontal legend, rotate front view clockwise 90°.
2 All dimensions are in inches [millimeters].
3 Tolerance ±.020 [.51] unless otherwise specified.

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:

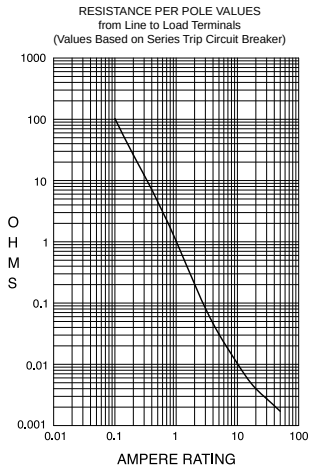
- 0.02 - 50 Amps
- 480 VAC or 65 VDC
- 1-4 poles (Handle)
- 1-3 poles (Rocker)
- Choice of Time Delays
- DIN rail mounting
- Precise temperature independent operation
- Wiping contacts – mechanical linkage with two-step
- Finger safe terminals
- Common trip linkage between poles ensures that an overload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

Typical Applications:

- Industrial Controls
- Renewable Energy

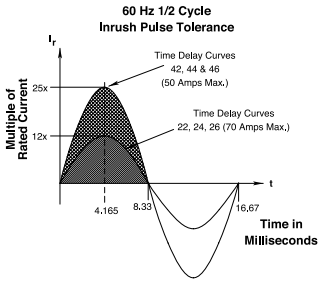
Electrical

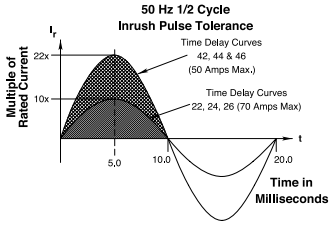
Maximum Voltage	AC, 480 wye/277 VAC (See Table A), 50/60 Hz, 65VDC
Standard Current Coils	0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 & 50.0. Other ratings available - consult factory.
Standard Voltage Coils	DC - 6V, 12V; AC - 120V, other ratings available, 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



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 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

*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	SHORT CIRCUIT CAPACITY (AMPS)				APPLICATION CODES	
					UL/CSA		VDE			
	MAX. RATING	FREQUENCY	PHASE [1]	FULL LOAD AMPS	WITH BACKUP FUSE	WITH BACKUP FUSE	(Inc) WITH BACKUP FUSE	(Icn) WITHOUT BACKUP FUSE	UL	CSA
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:
1 DC and 1 Phase 277 V ratings are 1 or 2 poles breaking. Three phase ratings are 3 poles breaking.
2 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.
3 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)

UL Listed
UL Standard 508
Switches, Industrial Control (Guide NRNT2, File E148683)

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

VDE Certified
EN60934, VDE 0642 under File No. 10537

D	A	3	–	B0	–	10	–	450	–	1	2	1	–	C
1 Series	2 Actuator	3 Poles		4 Circuit		5 Frequency & Delay		6 Current Rating		7 Terminal	8 Actuator Color	9 Mounting/ Voltage		10 Agency Approval

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	CODE "C"	CODE "F", "N"	CODE "J", "R"
HORIZONTAL STYLE	CODE "D"	CODE "G", "O"	CODE "K", "U"

3 POLES
1	One	3	Three
2	Two	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	**26**	50/60Hz Long
10 [5]	DC Instantaneous	**32**	DC, 50/60Hz Short
11	DC Ultra Short	**34**	DC, 50/60Hz Medium
12	DC Short	**36**	DC, 50/60Hz Long
14	DC Medium	**42** [6]	50/60Hz Short, Hi-Inrush
16	DC Long	**44** [6]	50/60Hz Medium, Hi-Inrush
20 [5]	50/60Hz Instantaneous	**46** [6]	50/60Hz Long, Hi-Inrush
21	50/60Hz Ultra Short	**52** [6]	DC, Short, Hi-Inrush
22	50/60Hz Short	**54** [6]	DC, Medium, Hi-Inrush
24	50/60Hz Medium	**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 BO 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	CODE	AMPERES	CODE	AMPERES	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	CODE	AMPERES	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		

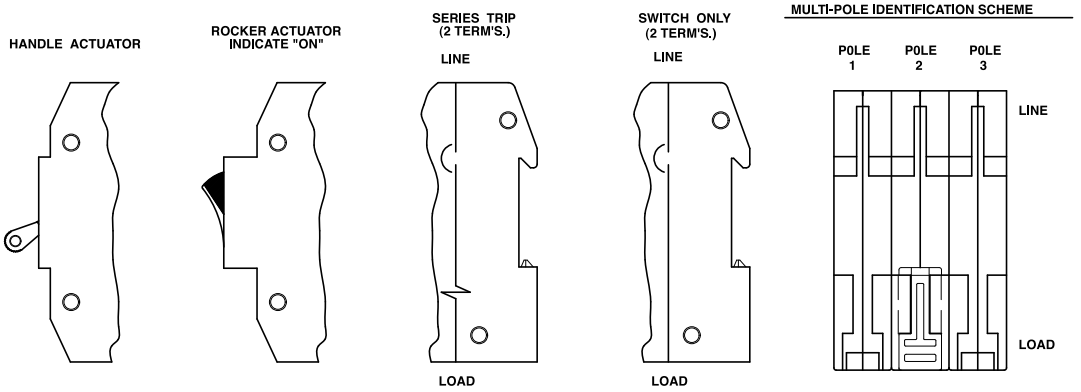
7 TERMINAL
- **1** #10 Screw & Pressure Plate for Direct Wire Connection
- **2** #10 Screw without Pressure Plate

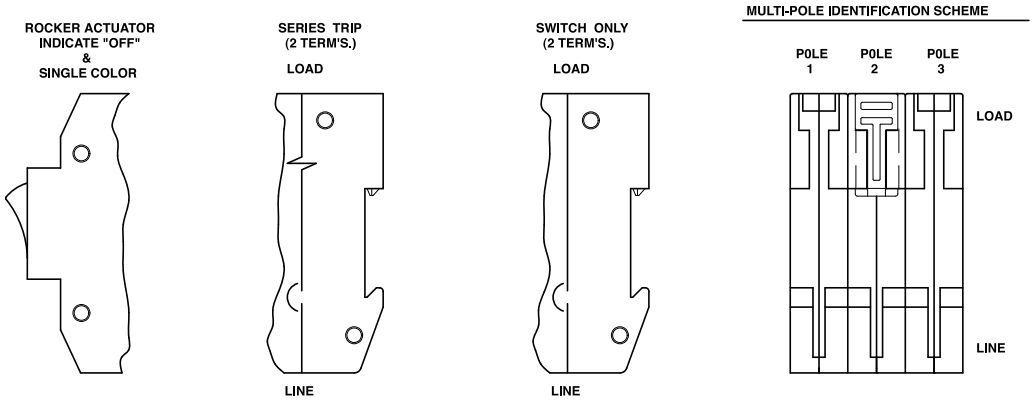
8 ACTUATOR COLOR & LEGEND
Actuator or Visi-Color	Marking:			Marking Color:	
Color	**I-O**	**ON-OFF**	**Dual**	**Single Color Rocker/Handle**	**Visi-Rocker (Actuator Black)** [7]
White	**A**	**B**	**1**	Black	White
Black	**C**	**D**	**2**	White	N/A
Red	**F**	**G**	**3**	White	Red
Green	**H**	**J**	**4**	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
	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]





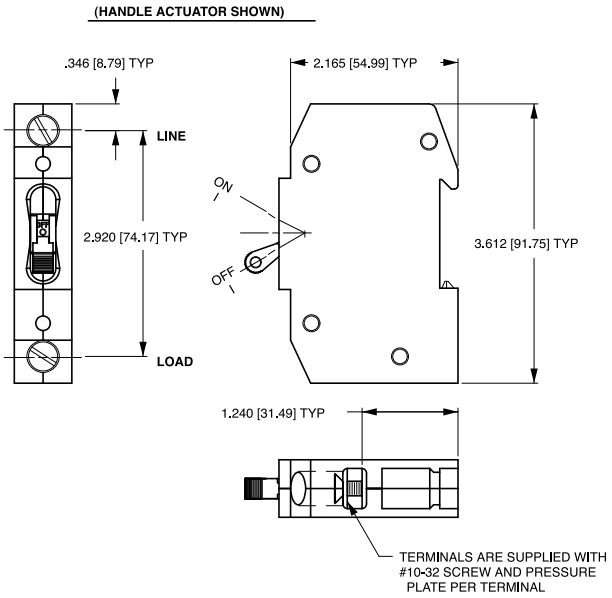
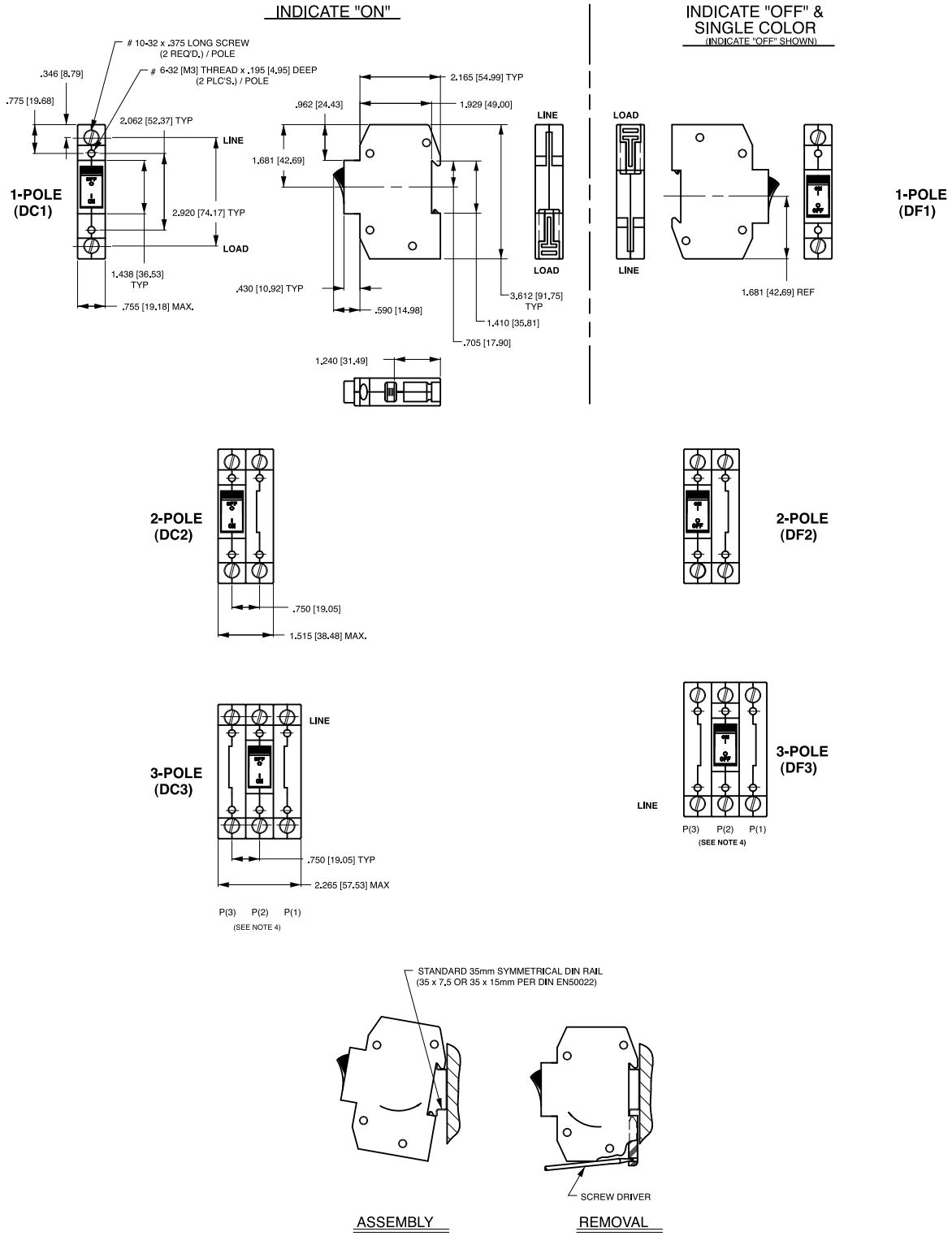


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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]

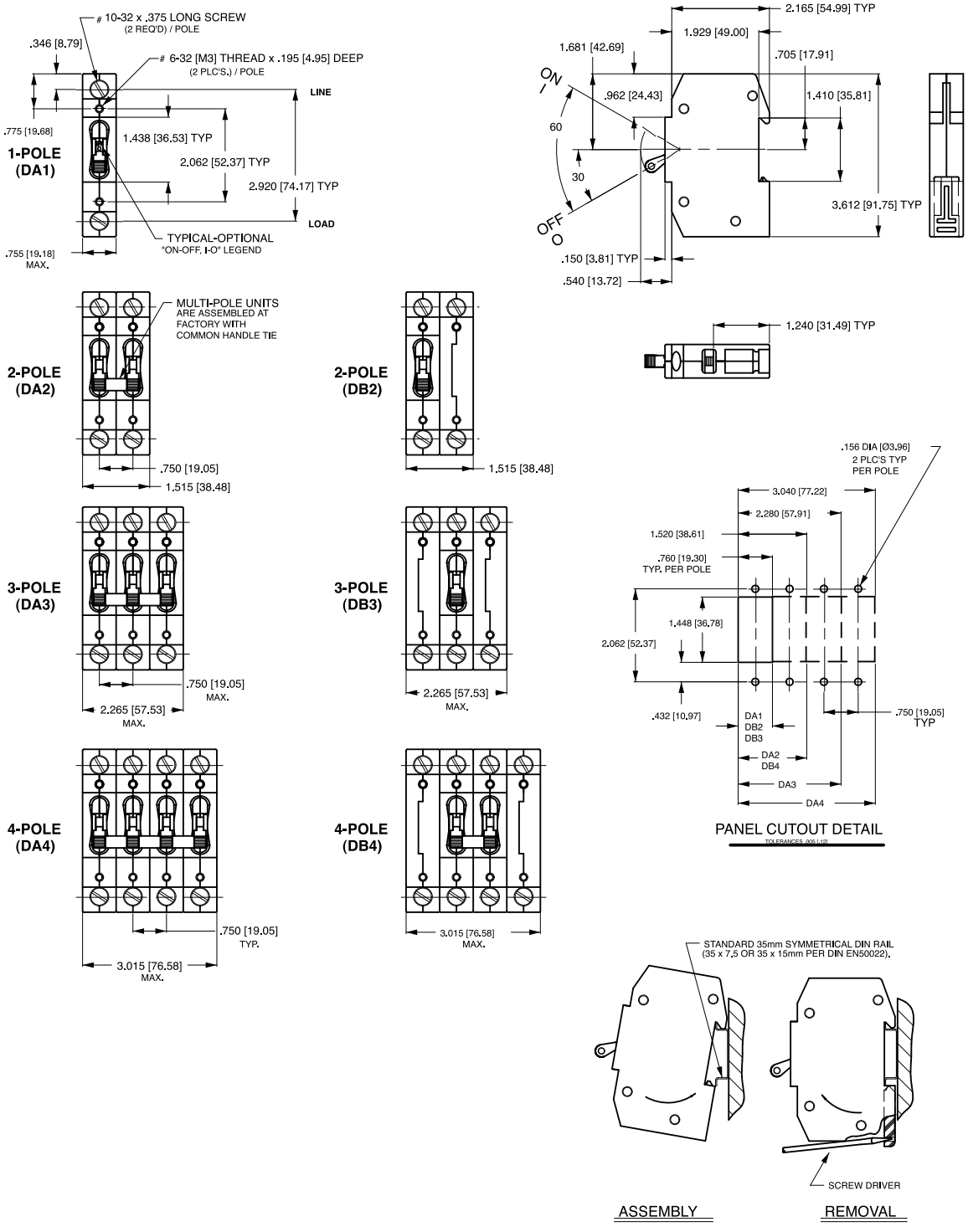
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.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 ±.010 [.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 contacts. 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 Recognized: 1 to 4 poles; 0.1-63 Amps; 80 VDC, 240 VAC/480VAC; cUL, TUV & CCC.

Resources:

Download 3D CAD Files

IGS > STP >

Product Highlights:

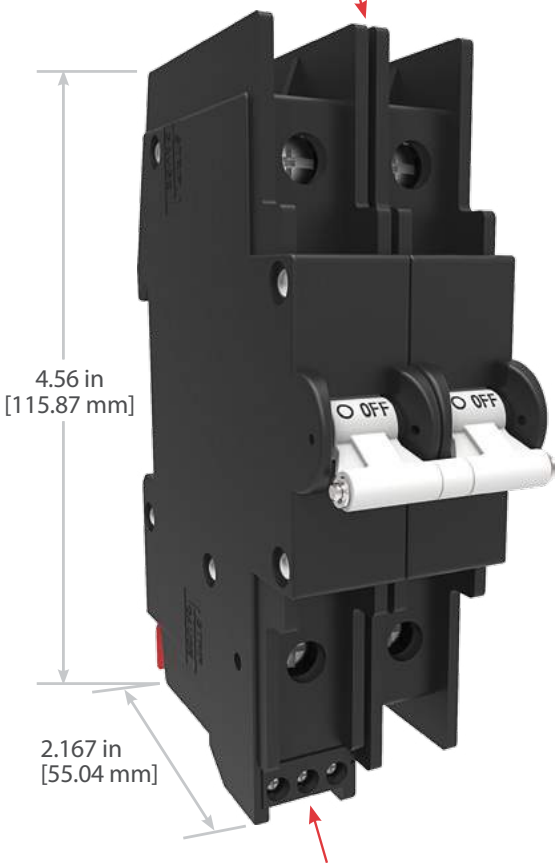
- DIN Rail Mounting
- UL 489 Listed
- UL Recognized, cUL, TUV & CCC
- Wiping Contacts
- Common Trip Linkage Between Poles

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

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	Short Circuit Capacity (Amps)			
	Max Rating	Frequency	Phase	Minimum Poles	Full Load Amps	Without Backup Fuse		Application Codes	
						UL/CSA	TUV	UL	CSA
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

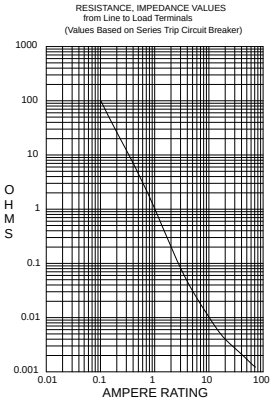
Table B: Lists UL Listed (489) configuration and performance capabilities.

G-SERIES TABLE B: UL 489 LISTED BRANCH CIRCUIT BREAKERS						
Circuit Configuration	Voltage				Current Rating	Interrupting Capacity (Amps RMS)
	Max Rating	Frequency	Phase	Poles	Full Load Amps	
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	Minimum of 100 Megohms at 500 VDC
Dielectric Strength	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.

G	A	1	–	B	0	–	24	–	620	–	1	1	–	D	C
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 Rating	11 Agency Approval

1 SERIES
G

2 ACTUATOR
A Handle, one per pole
S Mid-Trip Handle, one per pole

3 POLES
1 One
2 Two
3 Three
4 Four

4 CIRCUIT
A[1] 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
10 DC, Instantaneous
11 DC, Ultra Short
12 DC, Short
14 DC, Medium
16 DC, Long
20 50/60 Hz Instantaneous
21 50/60 Ultra Short
22 50/60 Hz Short
24 50/60 Hz Medium
26 50/60 Hz Long
42 50/60 Hz Hi-Inrush Short [2]
44 50/60 Hz Hi-Inrush Medium
46 50/60 Hz Hi-Inrush Long
52 DC Hi-Inrush Short
54 DC Hi-Inrush Medium
56 DC Hi-Inrush Long

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

G	A	1	–	B	0	–	24	–	620	–	1	1	–	D	G
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 Rating*	*11 Agency Approval*

1 SERIES
G

2 ACTUATOR
A Handle, one per pole
S [1] Mid-Trip Handle, one per pole

3 POLES
1 One
2 Two
3 Three

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

6 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
410	1.000	**445**	4.500	**610**	10.000	**618**	18.000
512	1.250	**450**	5.000	**710**	10.500	**620**	20.000
415	1.500	**455**	5.500	**611**	11.000	**622**	22.000
517	1.750	**460**	6.000	**711**	11.500	**624**	24.000
420	2.000	**465**	6.500	**612**	12.000	**625**	25.000
522	2.250	**470**	7.000	**712**	12.500	**630**	30.000
425	2.500	**475**	7.500	**613**	13.000	**635**	35.000
527	2.750	**480**	8.000	**614**	14.000	**640**	40.000
430	3.000	**485**	8.500	**615**	15.000	**650**	50.000
435	3.500	**490**	9.000	**616**	16.000		
440	4.000	**495**	9.500	**617**	17.000		

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

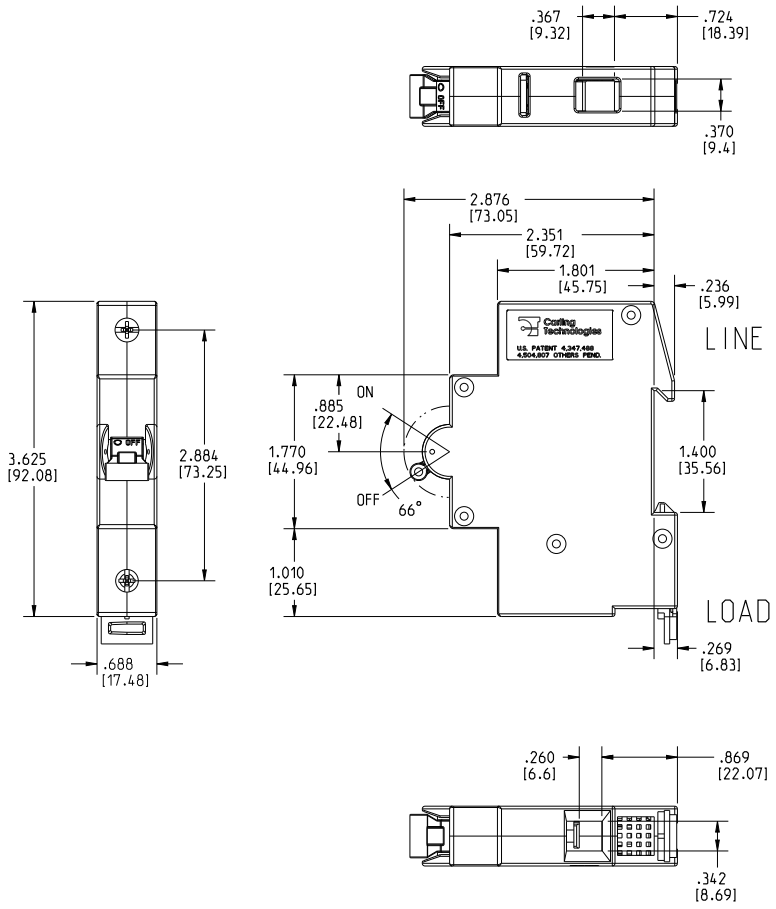
10 APPLICATION RATING
B 125 VDC [5]
C 120/240 VAC [6]
D 240 VAC [7]
K 120 VAC [8]
M 80 VDC [9]

11 AGENCY APPROVAL
A Without Approvals
G UL489 Listed

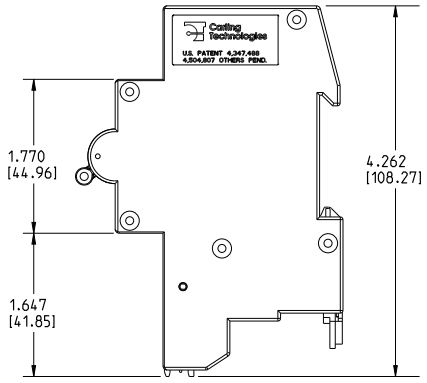
Notes:
1 Mid-trip Handle(s) available at 1 pole unit and 2 pole unit only.
2 Third pole of a 3 pole unit is switch only pole.
3 On multi-pole breakers one auxiliary switch is supplied, mounted in the extreme left pole when viewed from front of panel.
4 Hi Inrush Delays limited to 50A maximum.
5 125VDC 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]

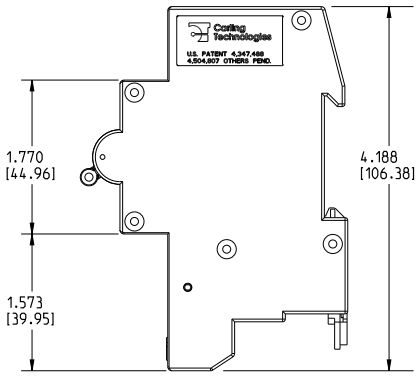
1 POLE WITHOUT AUXILIARY SWITCH



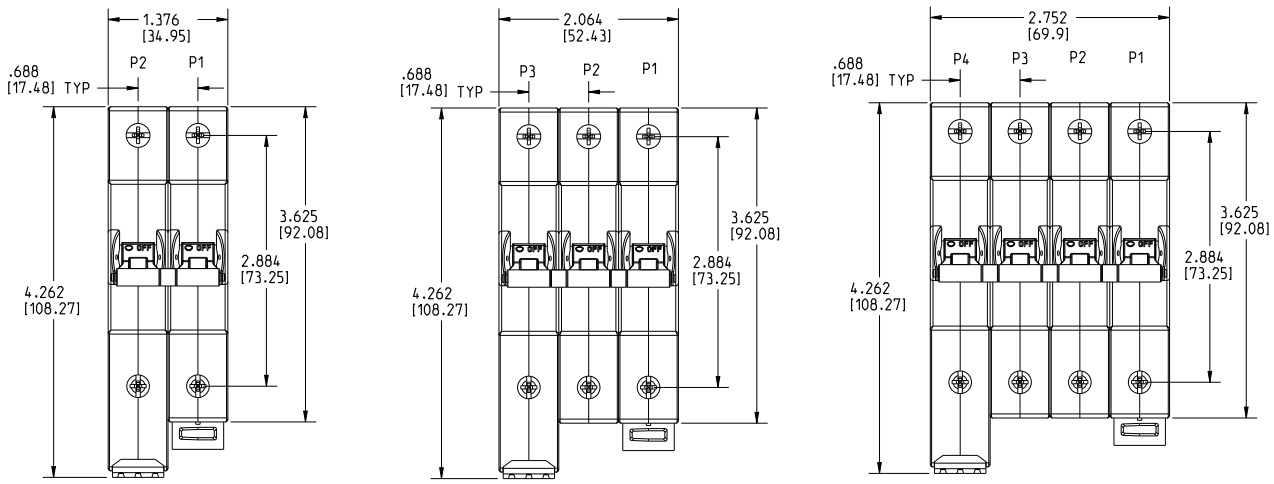
1 POLE WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



1 POLE WITH AUXILIARY SWITCH (SCREW TERMINAL BLOCK)



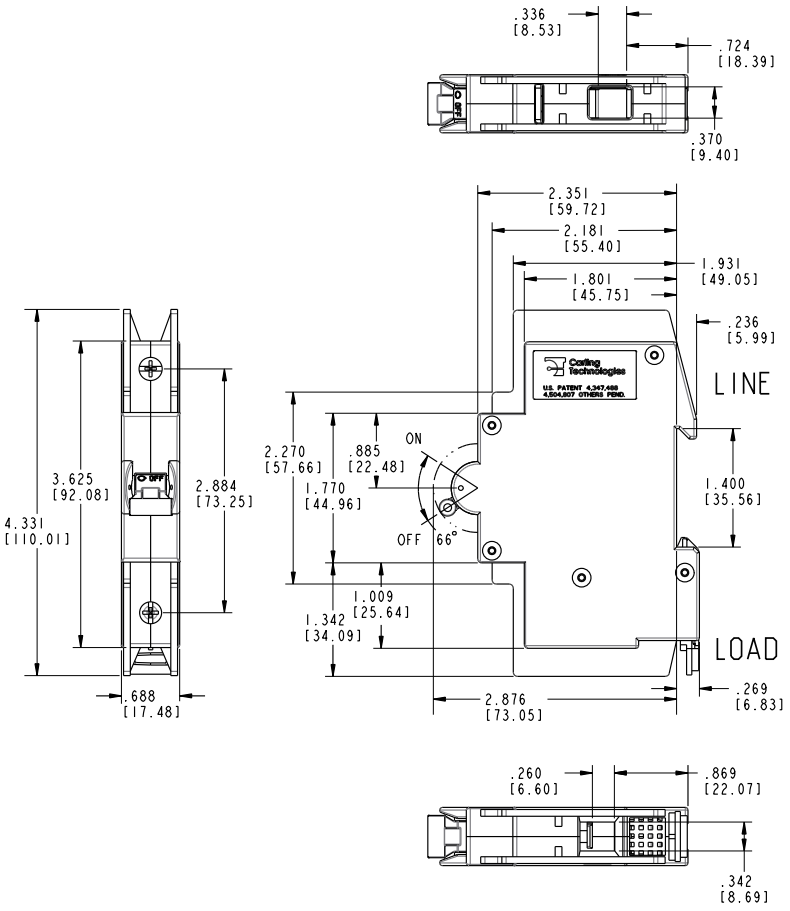
MULTIPLE POLES WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



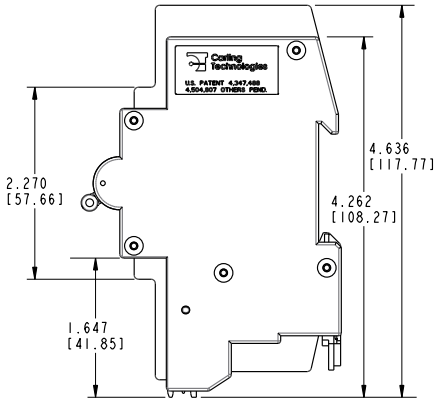
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]

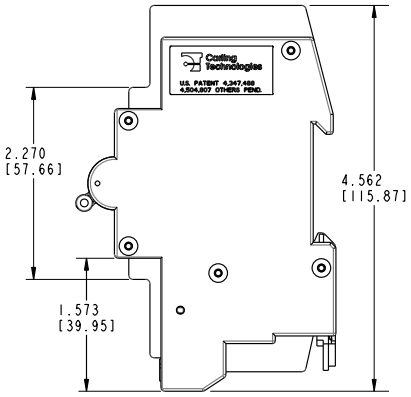
1 POLE WITHOUT AUXILIARY SWITCH



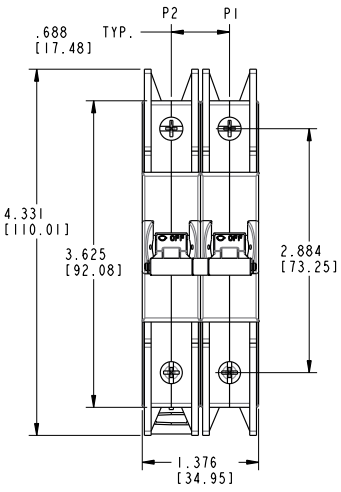
1 POLE WITH AUXILIARY SWITCH *(PENDING)* (PLUG-IN TERMINAL BLOCK)

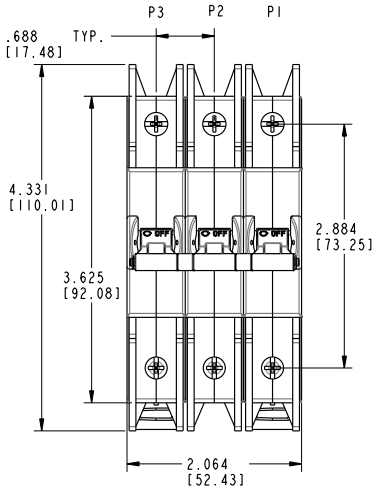


1 POLE WITH AUXILIARY SWITCH *(PENDING)* (SCREW TERMINAL BLOCK)



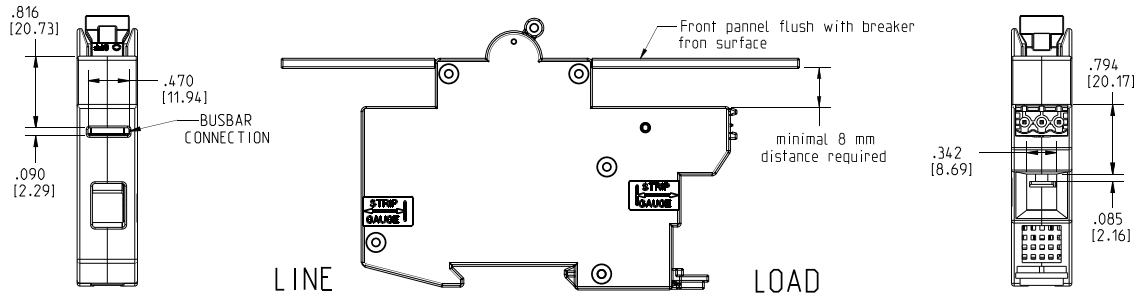
MULTIPLE POLES WITH AUXILIARY SWITCH *(PENDING)* (PLUG-IN TERMINAL BLOCK)



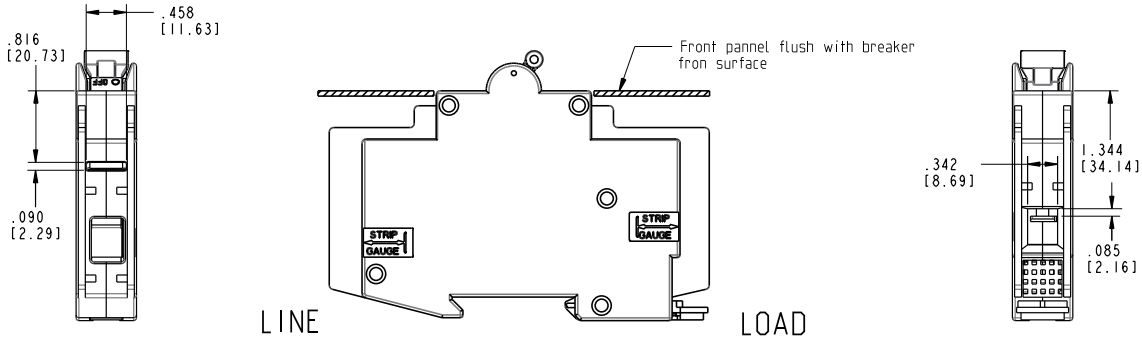


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

UL RECOGNIZED



UL489



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

Auxiliary contact with internal connector


Internal connector

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

Example plugs:

Spring clamp terminals

Dimensions in mm

Screw terminals

Screw terminals 45° angle

Wire size solid wire	0.2 - 1.5 mm
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

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.

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.

The optional current transformer allows outlet metering and monitoring of power usage thus facilitating load adjustments and maximizing 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. Maximum current and voltage ratings: .2-32A, 120/240-240VAC. Maximum interrupting capacity: 5000 Amps.

Resources:

Download 3D CAD Files

IGS > STP >

Watch Product Video

Product Highlights:

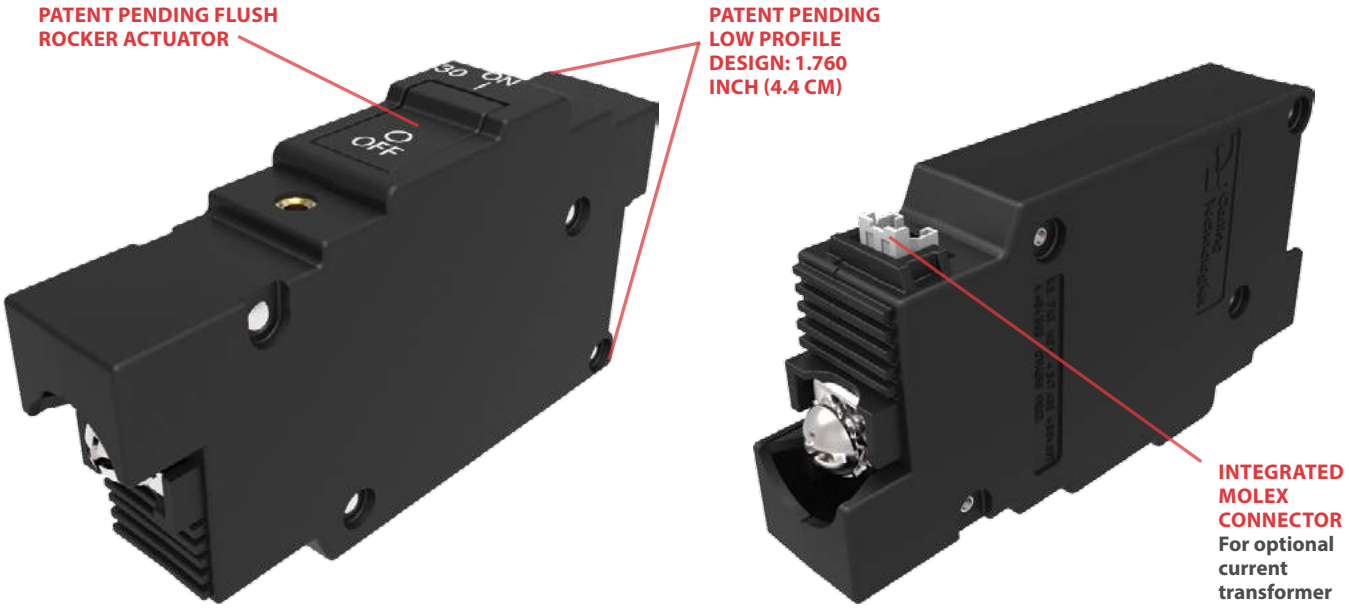
- Optional current transformer
- Ultra low profile design saves valuable space
- Optional handle guard actuator
- UL 489 LISTED Branch Circuit breaker
- Designed for worldwide datacenter compatibility with up to 240VAC ratings

Typical Applications:

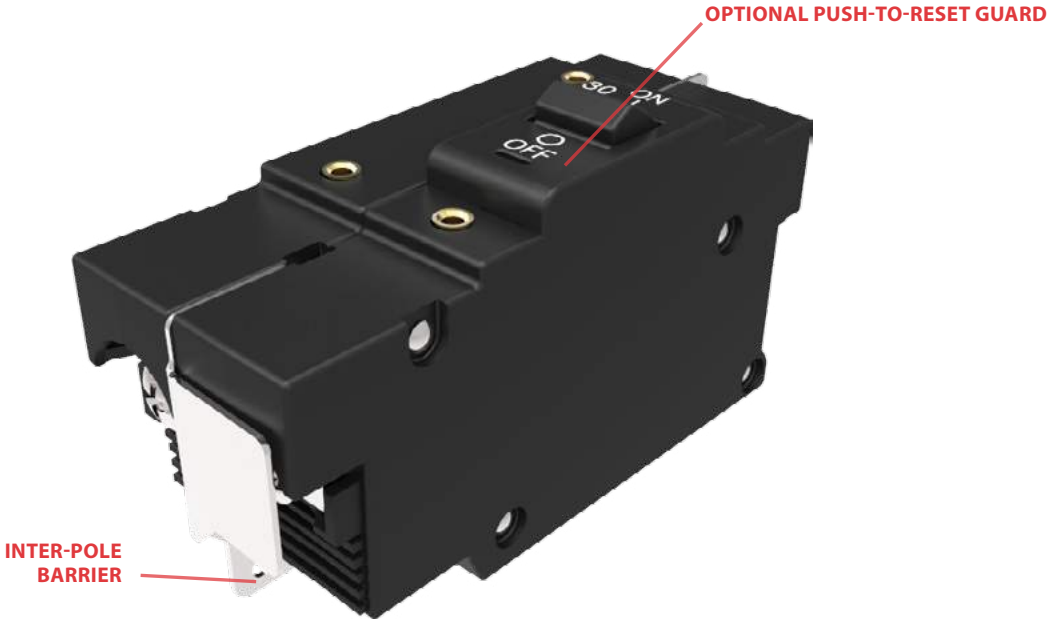
- Telecom/Datacom

L-Series
DESIGN FEATURES

1–Pole Configuration with Low Profile Rocker Actuator



2–Pole Configuration with Push-To-Reset Guard



Electrical Tables

Voltage, Current and IC Ratings

Voltage (VAC)	Current (Amps)	Number of Poles	Phase	Current Metering	Interrupt Capacity		
					UL489 (Amps)	EN60934	
						Icn	Inc
240	0.1 - 32	1	1	Yes	5000	3000	10000
240	0.1 - 32	2*	1	Yes	5000	3000	10000
240	0.1 - 20	3	3	Yes	5000	3000	5000
415/240	0.1 - 20	3	3	Yes	---	3000	5000
120/240	0.1 - 32	2	1	Yes	5000	3000	10000
120/240	0.1 - 32	3**	1	Yes	5000	3000	10000

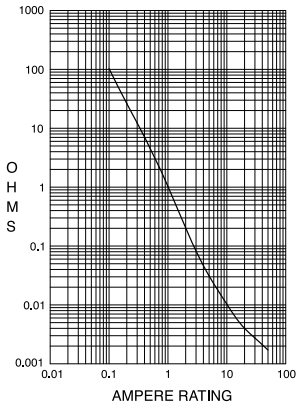
Notes:
* Breaking both sides of the line
** 3rd pole to be neutral break

Time Delay

Delay Curve Number	Voltage	Description
21	50/60 Hz	Ultrashort
22	50/60 Hz	Short
24	50/60 Hz	Medium
26	50/60 Hz	Long
42	50/60 Hz	Hi-inrush, Short
44	50/60 Hz	Hi-inrush, Medium
46	50/60 Hz	Hi-inrush, Long

Impedance

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

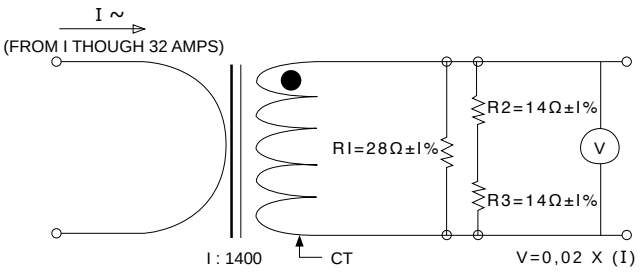


CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15
5.1 - 32.0	± 25

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

Electrical

Current Metering	Integrated current transformer. Measurement range: 1-32 Amps Voltage output: 10mV per Amp according to the formula below: 2(Amp) ≤ I ≤ 32(Amp) V = 0.01× I ± 2% $\left\lvert \frac{\left[\frac{V}{I}-\frac{V_{10}}{I_{10}}\right]}{\frac{V_{10}}{I_{10}}} \right\rvert \le 0.85\%$ 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. 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



Insulation Resistance	Minimum of 100 Megohms@500VDC
Overload	50 operations @ 600% of rated
Interrupt Capacity	See Table 1

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
Termination Barrier	Standard for 2 & 3 poles
Mounting	Threaded Insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per Pole)
Actuator	Rocker, with or without guard
Internal Circuit Config.	Series Trip
Materials	Housing - Glass Filled Polyester Rocker – Nylon 6/6 Line/Load Terminals – Copper Alloy; Bright Acid Tin Plated
Weight	~107 Grams (~3.76 Ounces) per pole
Standard Color	Housing - Black, Rocker - Black

Mechanical

Endurance	10,000 "On-Off" Operations @ 6 per minute; 6000 cycles with rated Current and Voltage; 4000 cycles without electrical load.
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

L	1	1	–	B	0	–	24	–	620	–	4	2	1	–	D	G
1 Series	2 Actuator	3 Poles		4 Circuit	5 Current Metering		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color & Legend	10 Mounting		11 Rating	12 Agency Approval

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
1 [2] Integrated Current Transformer, 1 per unit
2 Integrated Current Transformer, 1 per pole

6 FREQUENCY & 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	CODE	AMPERES	CODE	AMPERES
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
230	0.300	**425**	2.500	**612**	12.000
235	0.350	**527**	2.750	**712**	12.500
240	0.400	**430**	3.000	**613**	13.000
245	0.450	**435**	3.500	**614**	14.000
250	0.500	**440**	4.000	**615**	15.000
255	0.550	**445**	4.500	**616**	16.000
260	0.600	**450**	5.000	**617**	17.000
265	0.650	**455**	5.500	**618**	18.000
270	0.700	**460**	6.000	**620**	20.000
275	0.750	**465**	6.500	**622**	22.000
280	0.800	**470**	7.000	**624**	24.000
285	0.850	**475**	7.500	**625**	25.000
290	0.900	**480**	8.000	**630**	30.000
295	0.950	**485**	8.500	**632**	32.000
410	1.000	**490**	9.000		
512	1.250	**495**	9.500		

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

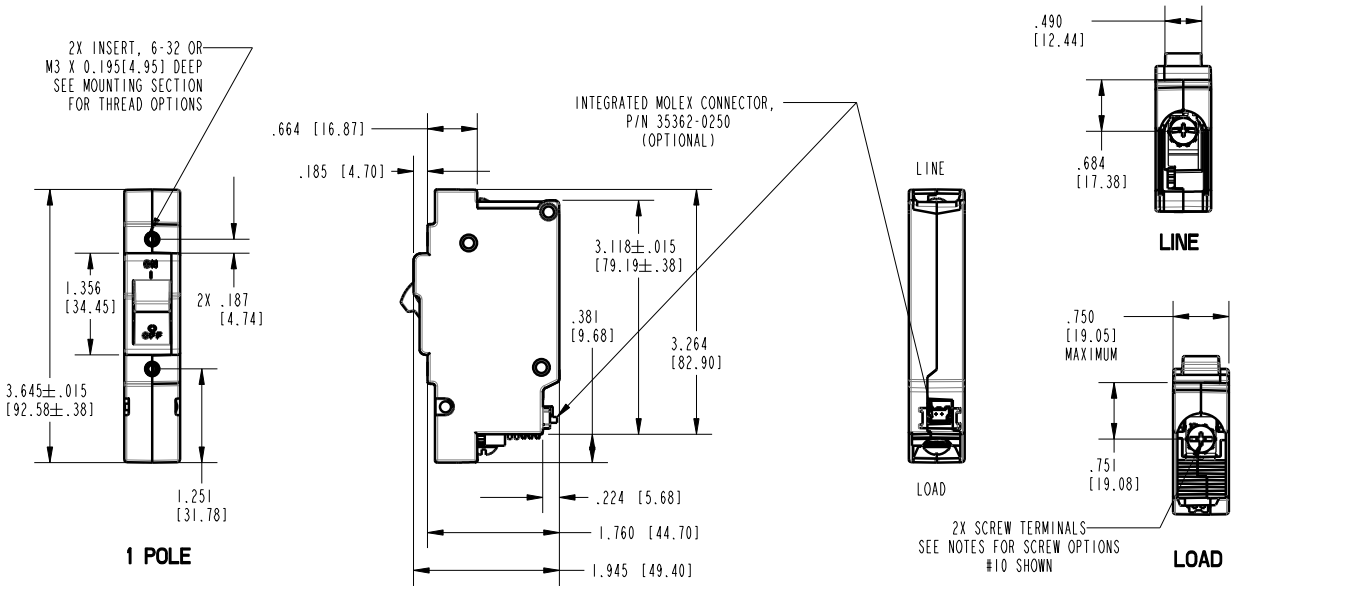
10 MOUNTING INSERTS [3]
1 6-32 X .195 Threaded Inserts
A 6-32 X .195 Threaded Inserts with Terminal Barrier
2 **ISO** M3 X 5 mm Threaded Inserts
B **ISO** M3 X 5 mm Threaded Inserts with Terminal Barrier

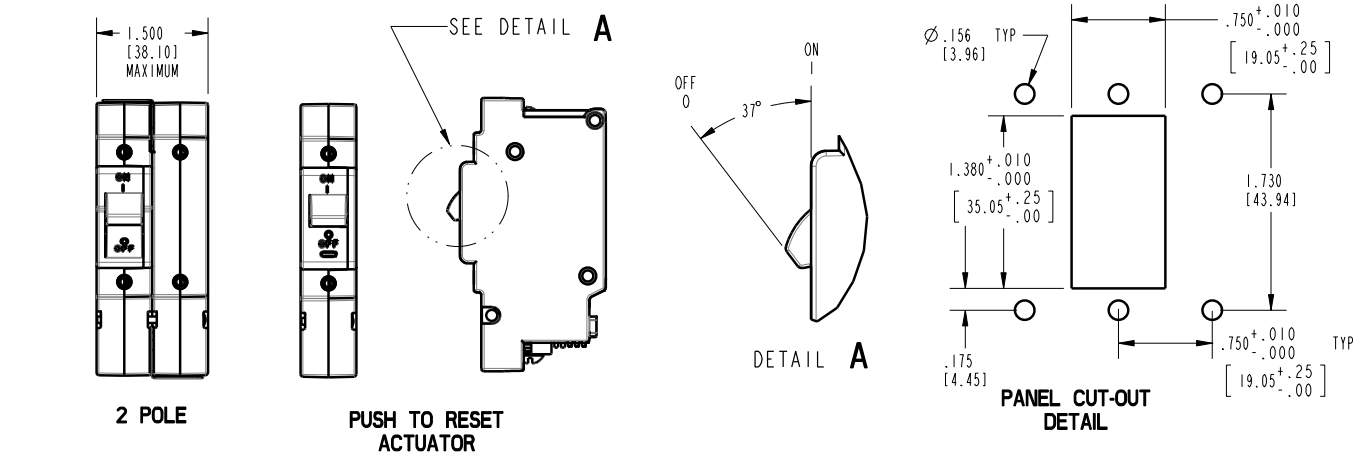
11 MAX. APPLICATION RATING
C [1] 120/240 VAC (2 or 3 Pole only)
D 240 VAC
P [4] 415Y/240 VAC (TUV only) 240 VAC 3 phase Delta

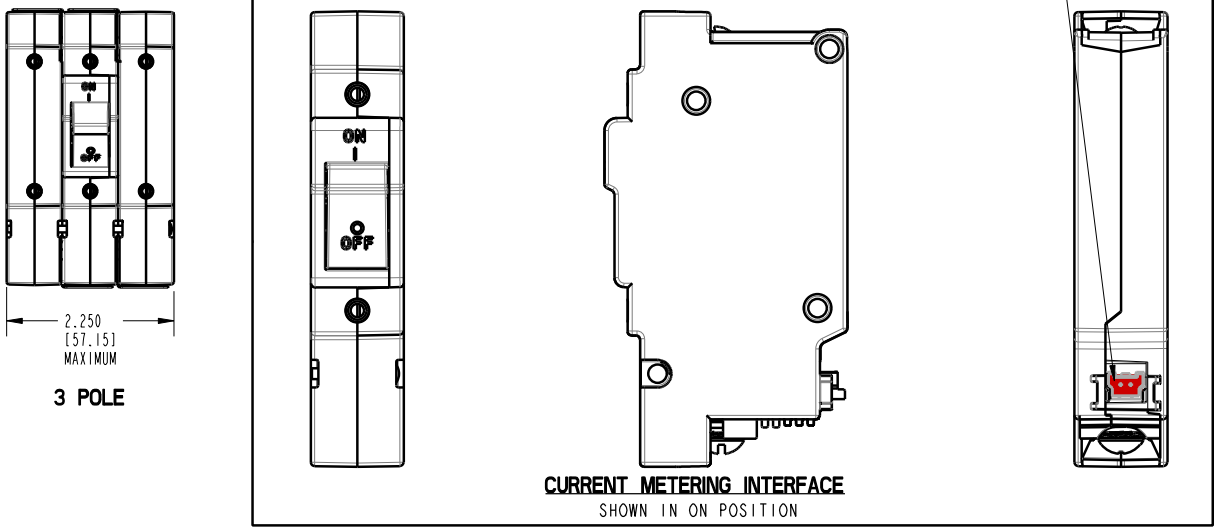
12 AGENCY APPROVAL
A Without approvals
G UL 489 Listed
3 UL 489 Listed, TUV Certified

Notes:
1 3 Pole units available only when one of three poles is neutral
2 On Multi Pole units one current transformer is supplied on the actuator pole
3 Terminal barriers are required on multi poles breaker
4 Voltage rating P only available as a 3 pole device 20A max

Dimensional Specifications: in. [mm]







Notes:
1 All dimensions are in inches [millimeters].
2 Screws have combination head
3 Screw thread options: #8-32, #10-32, M4X.7, M5X.8

N-Series
CIRCUIT BREAKER

The 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. The optional current transformer allows for remote outlet metering and monitoring of power usage thus facilitating load adjustments and maximizing efficiency. A patent pending, flush-rocker actuator and push-to-reset guard offer additional protection against accidental switching.

Resources:

Download 3D CAD Files

IGS › STP ›

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:

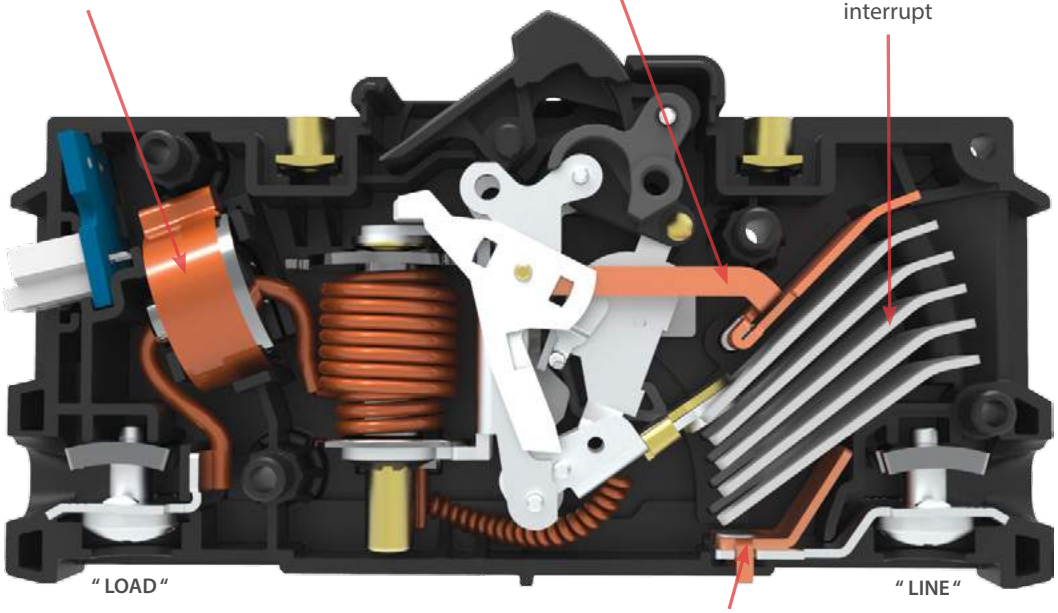
- Telecom/Datacom
  - PDU's
  - Data Servers
  - Data Storage

N-Series
DESIGN FEATURES

CURRENT TRANSFORMER
Remote current sensing via molex connector

UPPER ARC RUNNER
Optional, for 277 VAC rated breakers

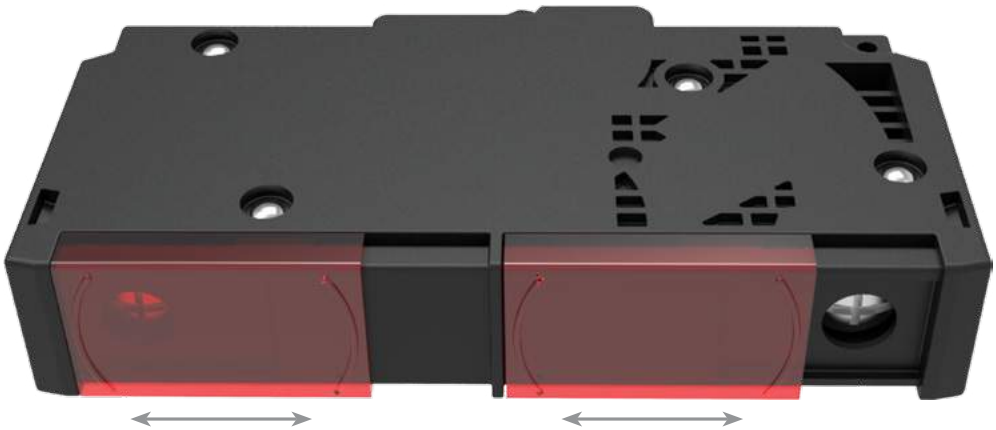
GRIDS (5x)
Arc deionizing splitter plates that increase arc voltage for quick interrupt



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 Tables

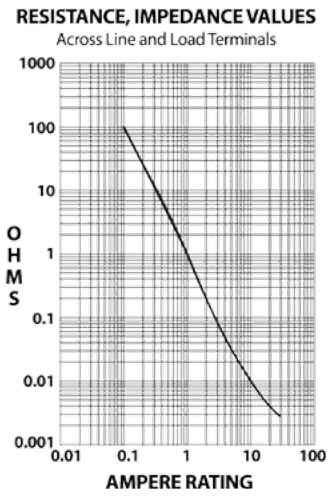
Table 1: Voltage and Current Ratings

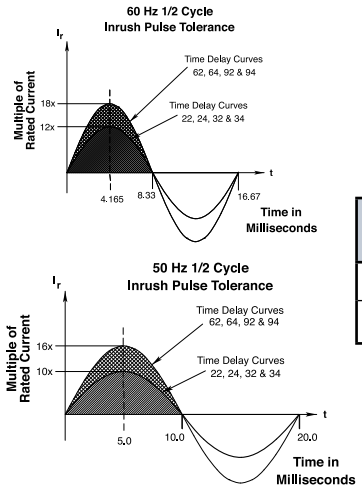
N-SERIES TABLE 1: ELECTRICAL RATINGS						
VOLTAGE	CURRENT (AMPS)	NUMBER OF POLES	INTERRUPT CAPACITY (AMPS)			
			UL 489		EN60947-2 (Ics & Icu)	
			1-20 A	21-30 A	1-20 A	21-30 A
120/240 VAC	1 - 30	2	10000	5000	5000	5000
240 VAC	1 - 20	1	22000	N/A	5000	5000
277 VAC	1 - 20	1	10000	N/A	N/A	N/A

Table 2: Time Delay

N-SERIES TABLE 2: TIME DELAY OPTIONS		
DELAY CURVE NUMBER	VOLTAGE	DESCRIPTION
21	50/60 Hz	Ultrashort
22	50/60 Hz	Short
24	50/60 Hz	Medium
26	50/60 Hz	Long
42	50/60 Hz	Hi-inrush, Short
44	50/60 Hz	Hi-inrush, Medium
46	50/60 Hz	Hi-inrush, Long

Electrical: Impedance / Resistance



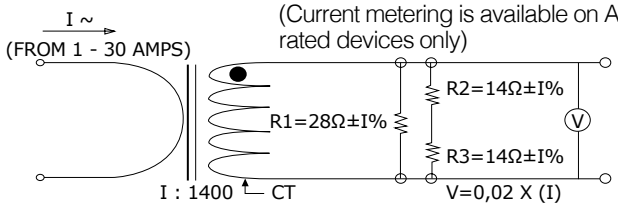


CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15
5.1 - 30.0	± 25

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

Electrical

Current Metering	Integrated current transformer. Measurement range: 1-30 Amps. Voltage output: 10mV per Amp according to the formula below: 2 (Amp) ≤ I ≤ 30 (Amp) V = 0.01´ I ± 2% $\left\lvert \frac{\left[\frac{V}{I}-\frac{V_{10}}{I_{10}}\right]}{\frac{V_{10}}{I_{10}}} \right\rvert \le 0.85\%$ 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±0.25°. Maximum crest factor of primary current is1.73. 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)



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
Insulation Resistance	Minimum of 100 Megohms @ 500VDC
Overload	50 operations @ 600% of rated current for AC rated devices
Interrupt Capacity	See table 1

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	MIL-PRF-55629 and MIL-STD-202G
Operating Temperature	-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 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
Salt Spray	Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96hrs)

Physical

Number of Poles	1 - 2 poles
Termination	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	15-20 in-lbs (Line & Load terminals)
Termination Barrier	Integral sliding barrier to comply with spacing requirements (See figure 1)
Mounting	Threaded Insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per Pole)
Insert Termination Torque	7-9 in-lbs
Actuator	Rocker, with or without guard (See figures 1, 2, and 4)
Internal Circuit Config.	Series Trip
Materials	Housing - Glass Filled Polyester Rocker – Nylon Line/Load Terminals - Copper Alloy; Bright Acid Tin Plated
Weight	~107 grams (~3.76 ounces) per pole
Standard Color	Housing – Black. Rocker - Several (See ordering scheme for colors)

Agency Approvals

UL 489, cUL, TUV EN60947-2

N	1	1	–	B	0	–	24	–	620	–	1	2	1	–	D	G
1 Series	2 Actuator	3 Poles		4 Circuit	5 Current Metering		6 Frequency & Delay		7 Current Rating		8 Terminal	9 Actuator Color & Legend	10 Mounting		11 Rating	12 Agency Approval

1 SERIES
N N-Series Circuit Breaker

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

4 CIRCUIT
B Series Trip (current)

5 CURRENT METERING
0 Without Current Transformer
1 Integrated Current Transformer, 1 per unit [1]
2 Integrated Current Transformer, 1 per pole

6 FREQUENCY & DELAY
21 50/60 Hz Ultra Short
22 50/60 Hz Short
24 50/60 Hz Medium
26 50/60 Hz Long
42 50/60 Hz Short, HI-Inrush
44 50/60 Hz Medium, Hi-Inrush
46 50/60 Hz Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

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

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 MOUNTING
1 6-32 x .195 inches Threaded Inserts
2 ISO M3 x 5 mm Threaded Inserts

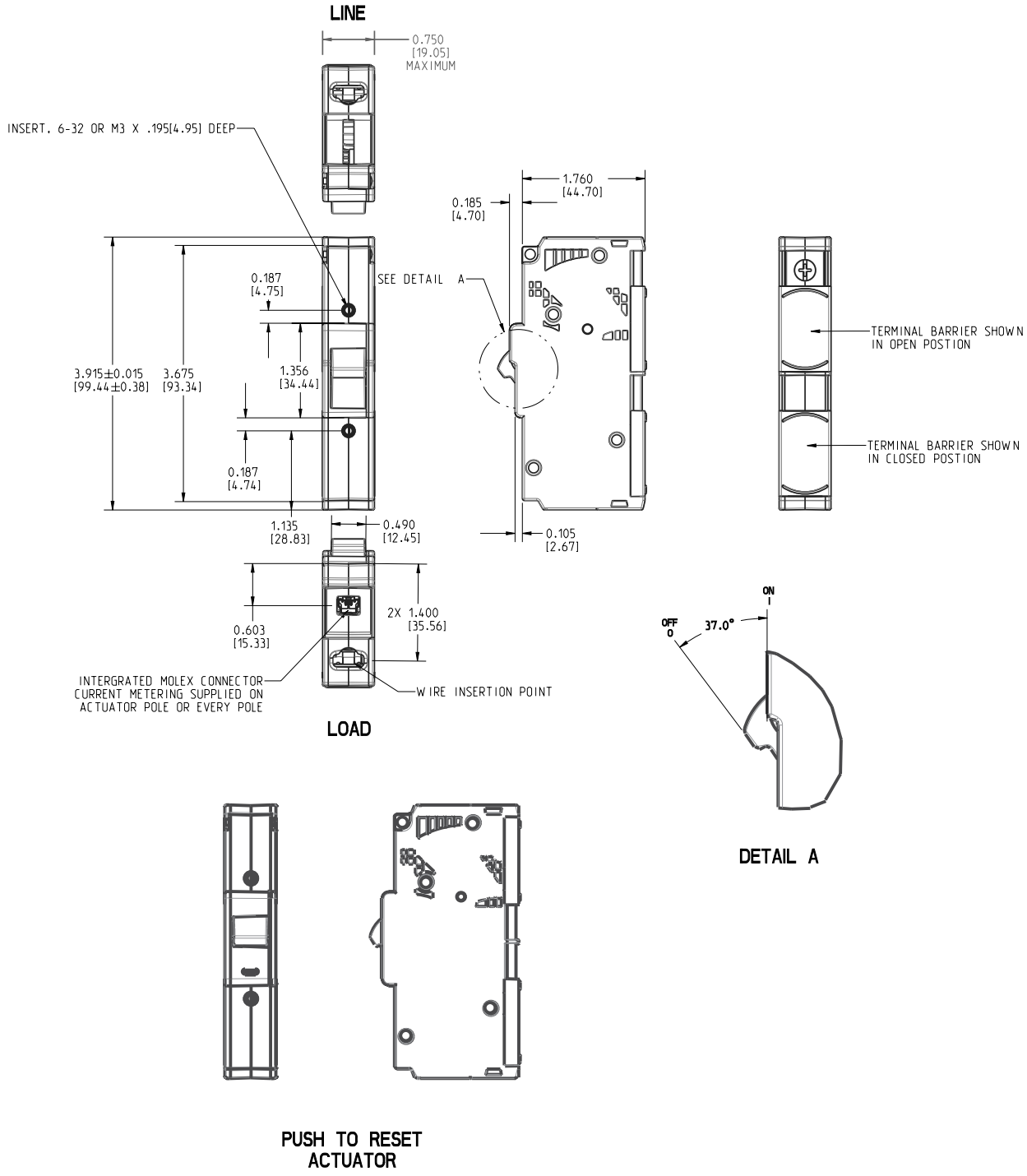
11 APPLICATION RATING
C 120/240 VAC (2 Pole only)
D 240 VAC [2]
F 277 VAC [3]

12 AGENCY APPROVAL
A Without Approvals
G UL 489 Listed
3 UL 489 Listed, TUV Certified [4]

Notes:
1 On multi pole units one current transformer is supplied on the actuator pole
2 Available up to 20 amps
3 Voltage rating F only available as a 1 pole device at 20 amps maximum
4 TUV approval requires dual (I-O, ON-OFF) markings

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

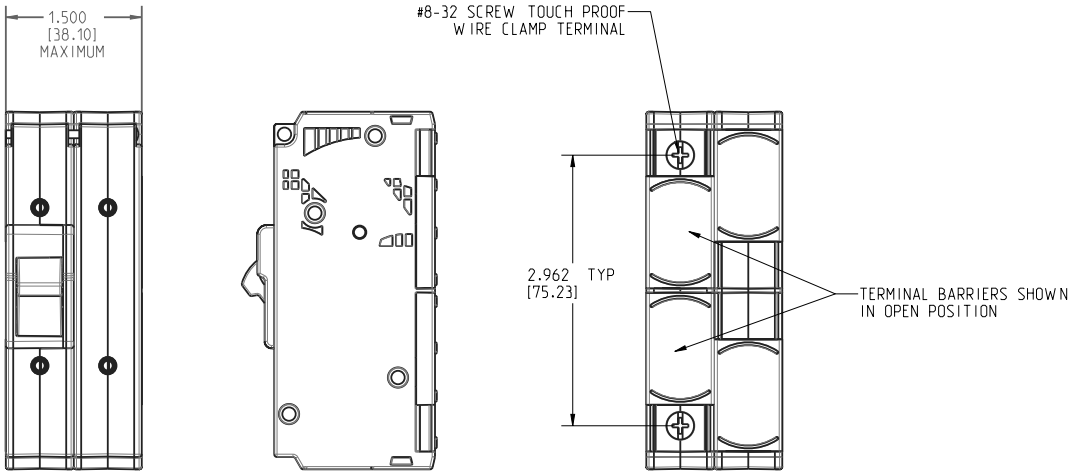
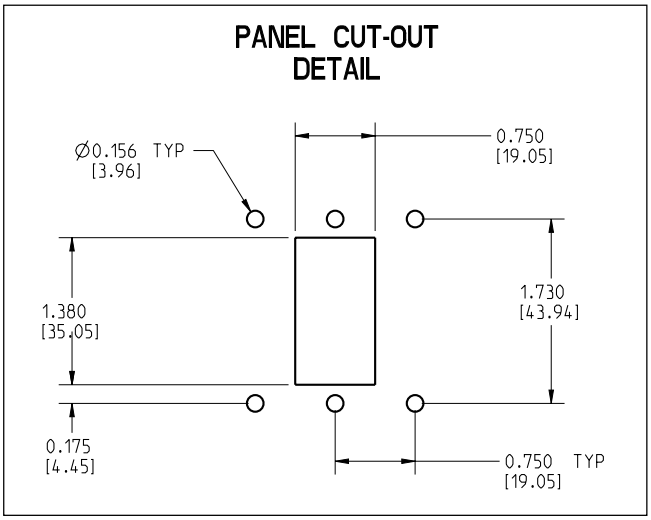


Figure 3. N-Series Panel Cut-Out



Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.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

IGS › STP ›

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

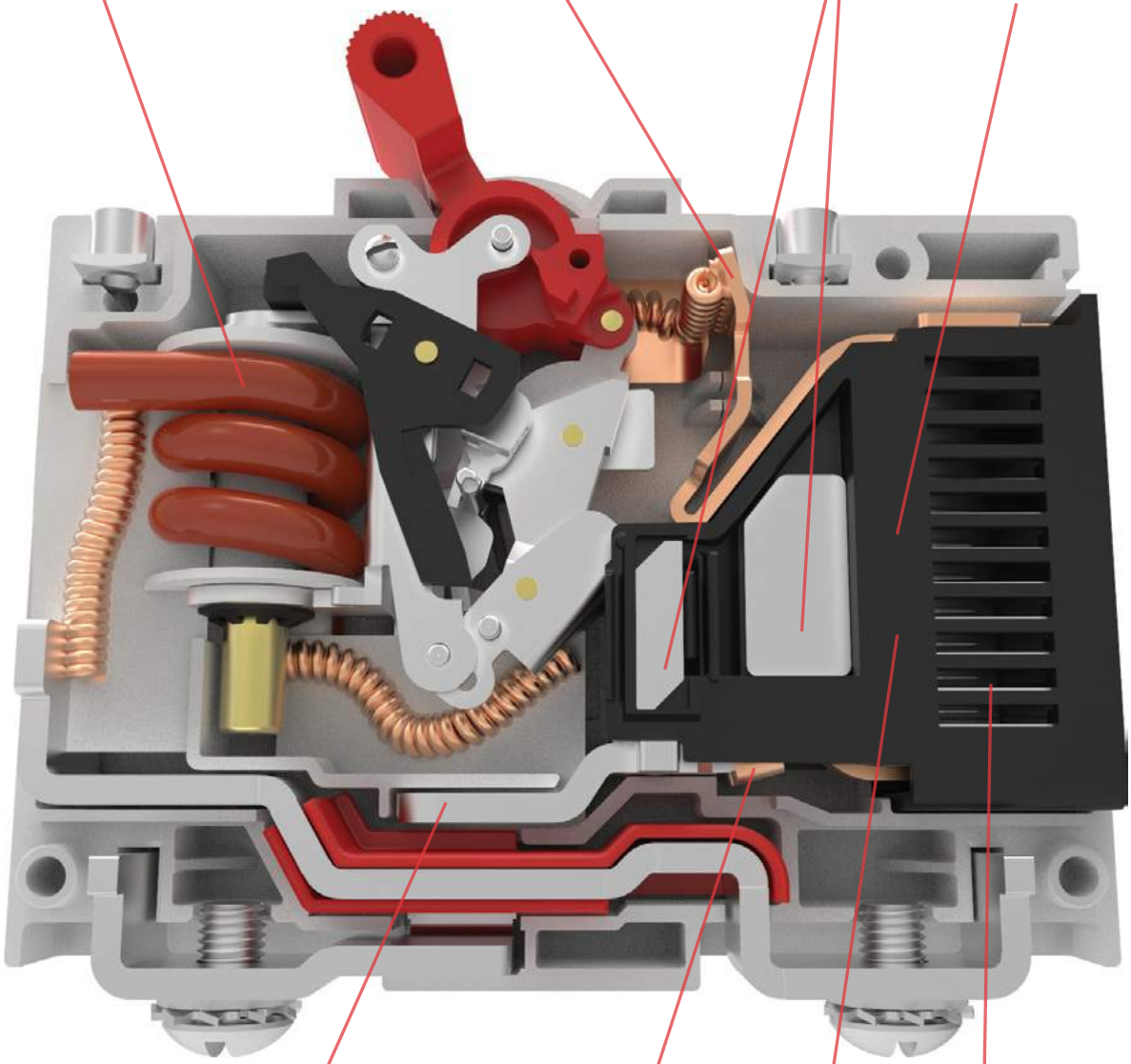
CX-Series
DESIGN FEATURES

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 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.

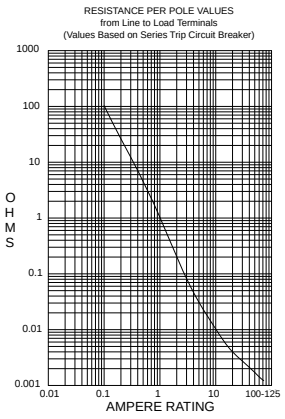
Table D: TUV Certified Configuration to IEC / EN 60947-2. Low Voltage Switch gear and Control gear - Circuit Breakers

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.

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.

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

1 SERIES
C

2 ACTUATOR
X Handle, one per pole

3 POLES
1 One
2 Two

4 CIRCUIT
B Series Trip (current)

5 AUXILIARY/ALARM SWITCH
0 Without Aux Switch

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

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	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.

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

1 SERIES
C

2 ACTUATOR
X Handle, one per pole

3 POLES [1,2]
2 Two
3 Three
4 Four
5 Five

4 CIRCUIT
S Switch Only

5 RELAY TRIP VOLTAGE COIL RATING [1,2]
0 Without Relay Trip Voltage Coil
A 12 VDC
B 24 VDC
C 32 VDC
D 48 VDC

6 FREQUENCY & DELAY
03 DC Switch Only

7 CURRENT RATING (AMPERES) [1,3]

2-Pole Section
810 50A - 100A

4-Pole Section
917 110A - 175A

8 TERMINAL [4,5]
3 Stud, 1/4-20
6 Stud, M6
A Stud, 1/4-20, with 10-32 Screw Terminals on Voltage Pole
B Stud, M6, with M5 Screw Terminals on Voltage Pole

9 HANDLE COLOR & LEGEND

Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	**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
06 600VDC

12 AGENCY APPROVAL
A Without Approvals
14 UL489B Listed

Notes:
1 2 Pole Unit is required for ratings between 50A - 100A.
4 Pole Unit is required for ratings between 110A - 175A.
2 A Relay Trip Voltage Coil Pole may be added to either the 2 or 4 Pole construction. The addition of this extra pole dictates a change in the designation for the number of poles in selection 3.
3 For Current Ratings between 50A - 100A select current code 810 (100A).
For Current Ratings between 101A - 175A select current code 917 (175A).
4 Voltage Pole must have screw terminals.
Switch Pole must have stud terminals.
5 On 3 Pole Unit, Voltage Pole to be located at P1 as standard.
On 5 Pole Unit, Voltage Pole to be located at P3 as standard.

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

1 SERIES
C

2 ACTUATOR
X Handle, one per pole

3 POLES [7]
1 One
2 Two
3 Three
4 Four [10]

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	CODE	AMPERES	CODE	AMPERES	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

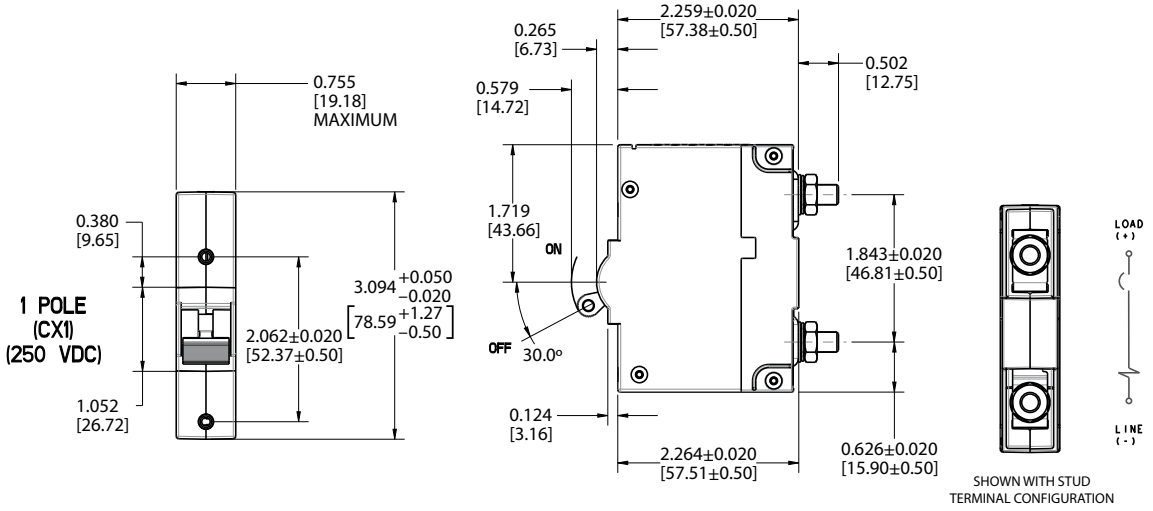
10 MOUNTING INSERTS
A 6-32 Thread
B M3 Thread

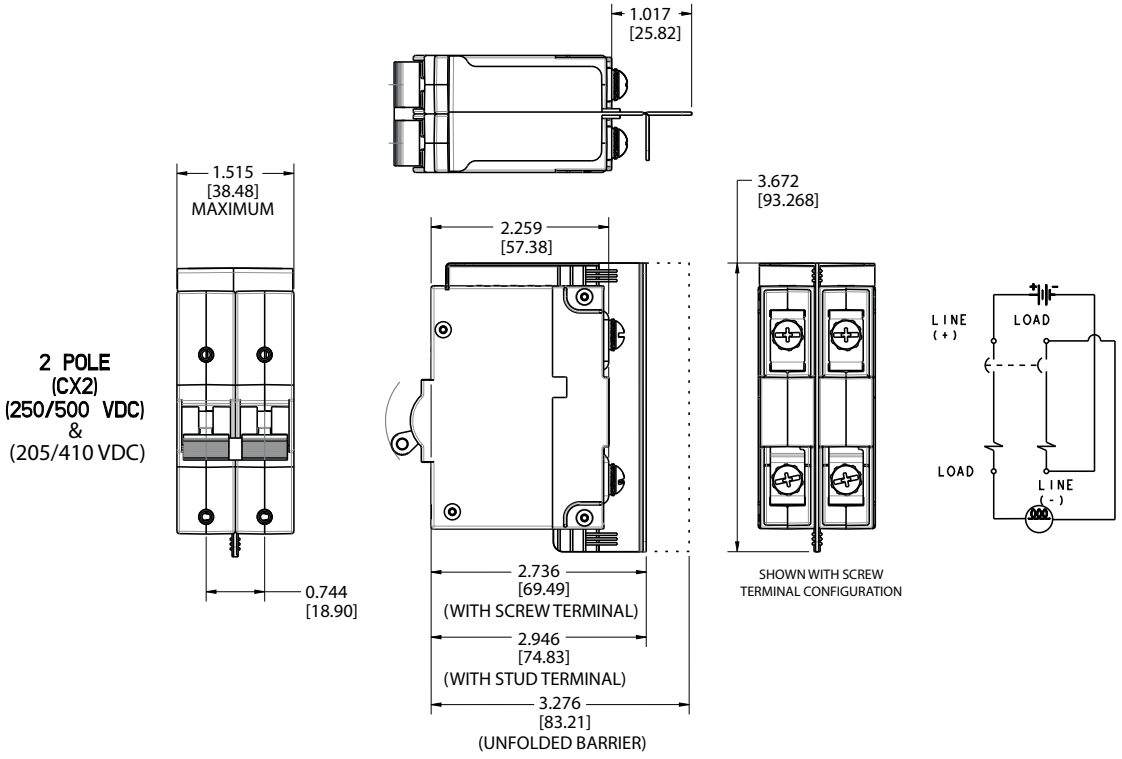
11 MAX. APPLICATION RATING
10 300VDC
11 440 VDC without factory installed terminal bus [4]
14 440VDC with factory installed terminal bus [4]
06 600VDC [5]

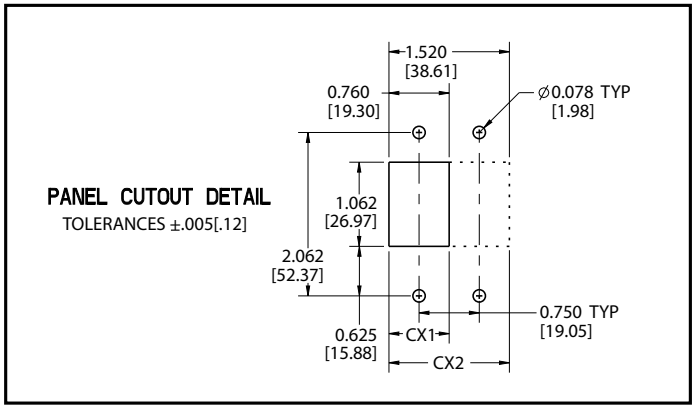
12 AGENCY APPROVAL
A Without Approvals
C UL 1077 Recognized
W UL 1077 Recognized & TUV Certified IEC/ EN 60947-2 [9]

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]

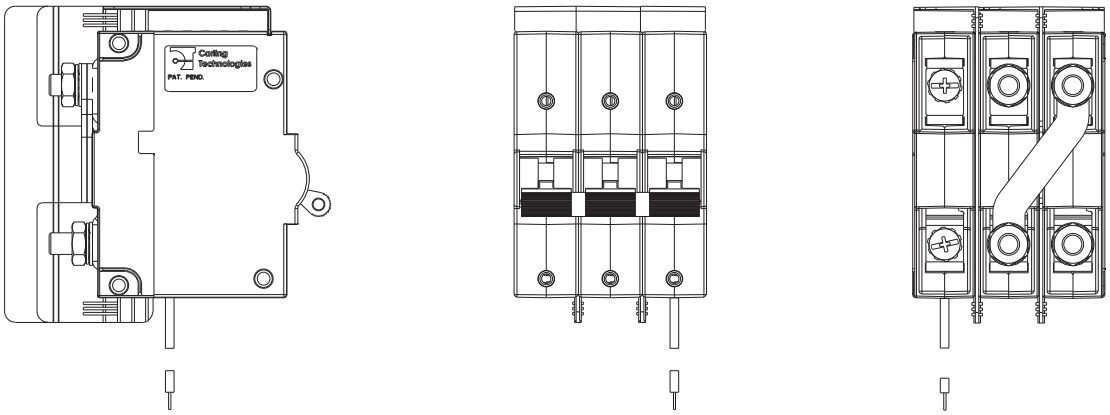


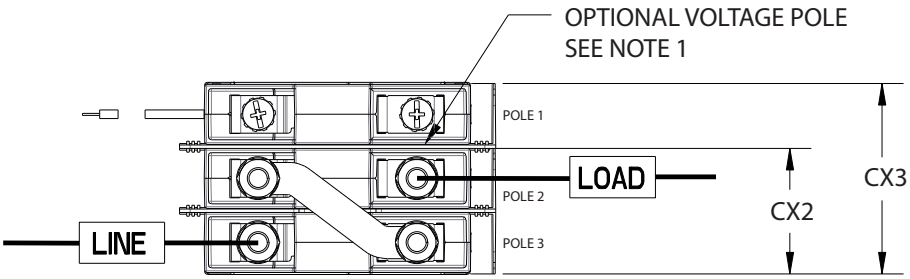




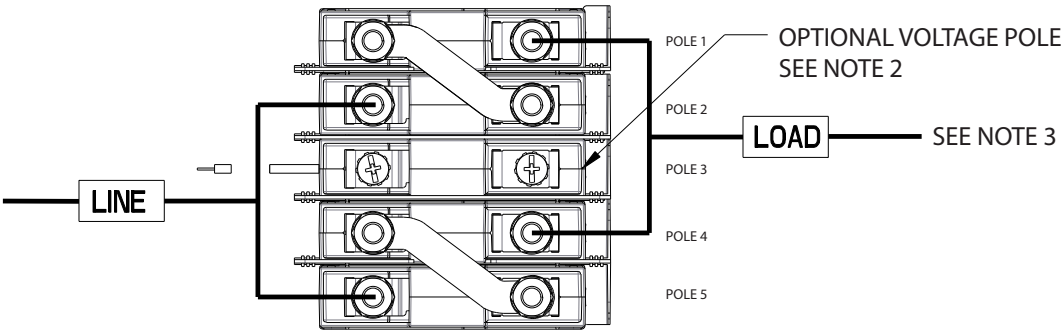
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]





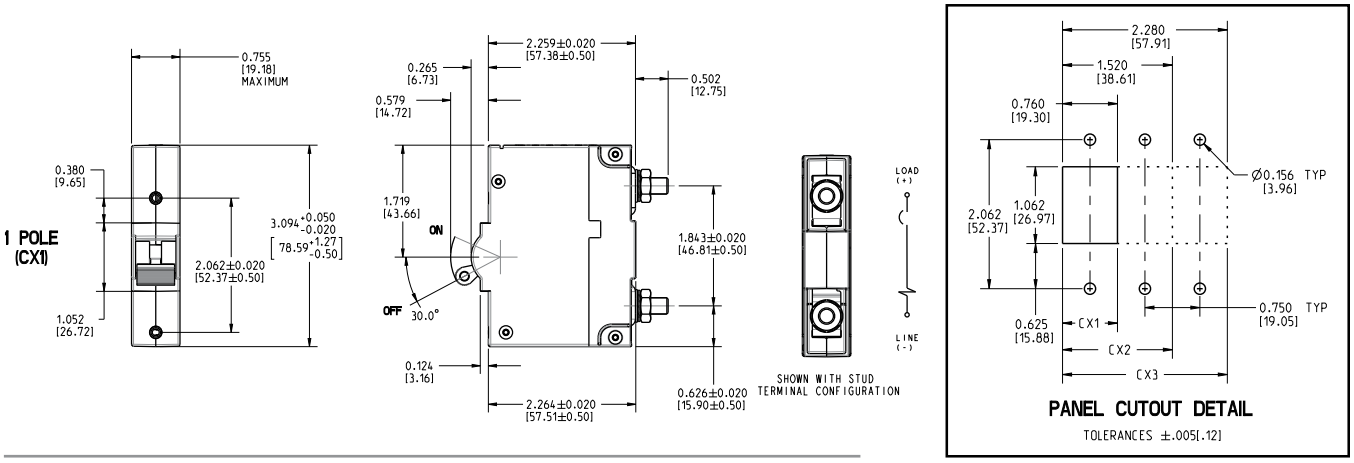
CX3 - 2 POLE SWITCH (CX2)SHOWN
WITH OPTIONAL VOLTAGE POLE
50A-100A DEVICE, 600VDC

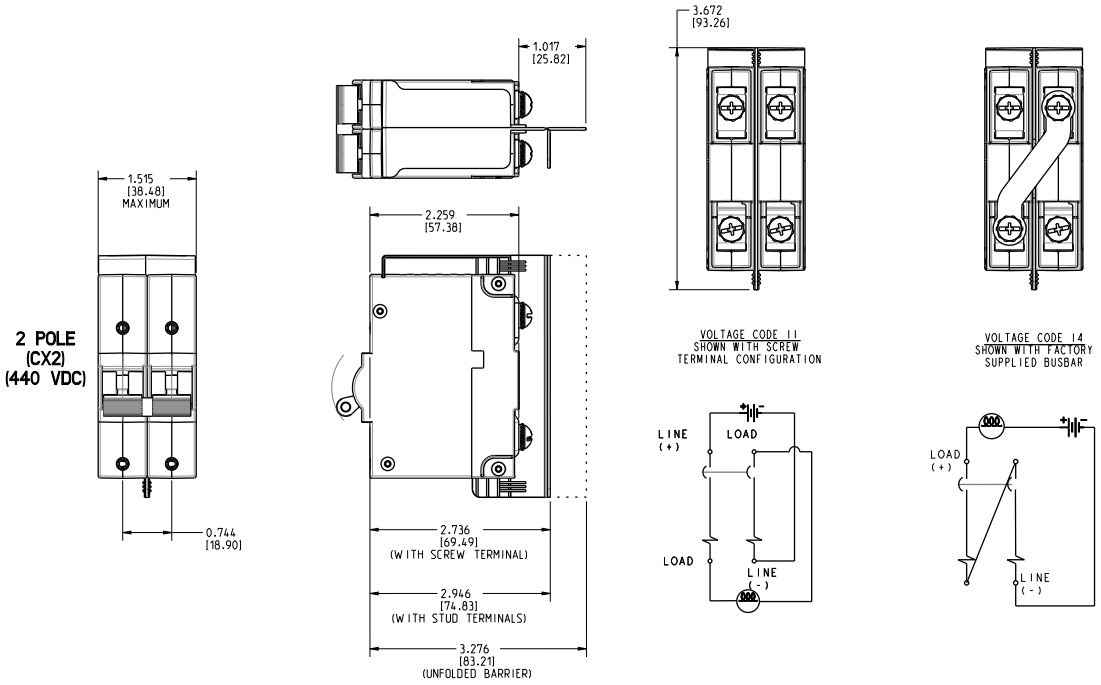


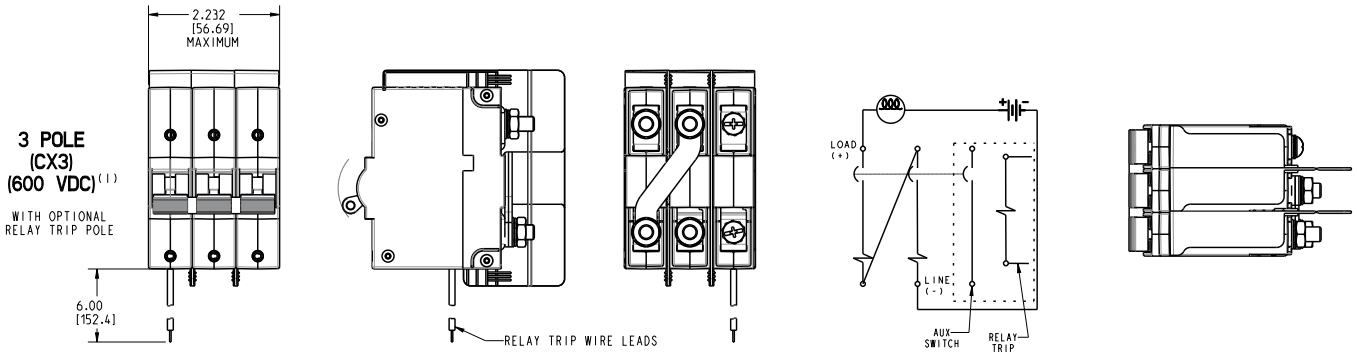
CX5 - 4 POLE SWITCH (CX4)SHOWN
WITH OPTIONAL VOLTAGE POLE
101A-175A DEVICE, 600VDC

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 selection .127 in^2 (81.94 mm^2)

Dimensional Specifications: in. [mm]







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

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.

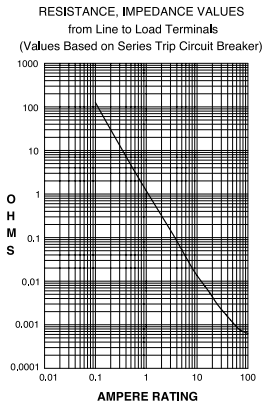
Its physical features include front and back mounting, screw and stud terminals and heavy duty box wire connectors for solid wire or a pressure plate connector for standard wire. The E-series is available with handle actuators and can be configured as .1-125 amps, up to 600VAC or 125VDC, with choice 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

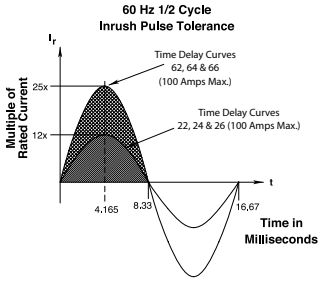
Electrical

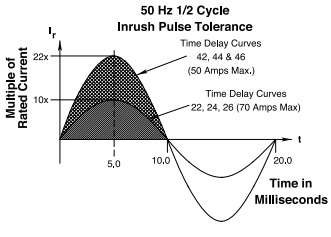
Maximum Voltage	600VAC 50/60 Hz, 125VDC (See Table A)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 50.0, 60.0, 70.0 & 100 Amp.
Auxiliary Switch Rating	SPDT; 10.1A 250VAC, 1.0A 65VDC; 0.5A 80VDC, 0.1A 125VAC (with gold contacts).
Insulation 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	1 - 6
Mounting	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	
						UL/CSA			
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	WITH BACKUP FUSE[3]	WITHOUT BACKUP FUSE	UL	CSA
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
						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	SHORT CIRCUIT CAPACITY (AMPS)			APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	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
	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	SHORT CIRCUIT CAPACITY (AMPS)	APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE	UL	CSA
SERIES	65	DC	---	0.02 - 100	5,000	TC1,2,OL1,U1	TC1,2,OL1,U1
	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)

Component Recognition Program as Manual Motor Controls (Guide NLRV2, File E135367)

UL Standard 1500

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

UL Listed

UL Standard 489

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

CSA Accepted

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

CSA Certified

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

TUV Certified

EN60934 under License No. R72031056

VDE Certified

EN60934, VDE 0642 under File No. 10537

E	A	2	–	B	0	–	24	–	450	–	1	2	A	–	C	B
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 POLES [1]
1	One	3	Three	5	Five
2	Two	4	Four	6	Six

4 CIRCUIT [2]
A [3]	Switch Only (no coil)	**E**	Shunt Trip (voltage)
B	Series Trip (current)	**F**	Relay Trip (current)
C	Series Trip (voltage)	**G**	Relay Trip (voltage)
D	Shunt Trip (current)		

5 AUXILIARY SWITCH [4]
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
03 [3]	DC 50/60Hz, Switch Only	**34**	DC, 50/60Hz Medium
10 [5]	DC Instantaneous	**36**	DC, 50/60Hz Long
12	DC Short	**62**	50/60Hz Short, Hi-Inrush
14	DC Medium	**64**	50/60Hz Medium, Hi-Inrush
16	DC Long	**66**	50/60Hz Long, Hi-Inrush
20 [5]	50/60Hz Instantaneous	**72**	DC, Short,Hi-Inrush
22	50/60Hz Short	**74**	DC,Medium, Hi-Inrush
24	50/60Hz Medium	**76**	DC, Long, Hi-Inrush
26	50/60Hz Long	**92** [6]	DC, 50/60Hz Short, Hi-Inrush
30	DC, 50/60Hz Instantaneous	**94** [6]	DC, 50/60Hz Medium, Hi-Inrush
32	DC, 50/60Hz Short	**96** [6]	DC, 50/60Hz Long, Hi-Inrush

7 CURRENT RATING (AMPERES) [7]
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
090	0.095	**415**	1.500	**710**	10.500	**680**	80.000
210	0.100	**517**	1.750	**611**	11.000	**690**	90.000
215	0.150	**420**	2.000	**711**	11.500	**810**	100.000
220	0.200	**522**	2.250	**612**	12.000	**811**	110.000
225	0.250	**425**	2.500	**712**	12.500	**812**	120.000
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 TERMINAL [12]
BACK CONNECTED (FRONT MOUNTED ONLY)		MAX. RATING
1 [9]	10-32 Stud (All Terminals)	50 A
2 [9]	1/4-20 Stud (All Terminals)	120 A
A [9]	M5 Stud (Line & Load)	50 A
B [9]	M6 Stud (Line & Load)	100 A

FRONT CONNECTED (BACK MOUNTED ONLY)		MAX. RATING
3 [10]	Box Wire Connector (Line & Load)	100 A
C [11]	Box Wire Connector with Pressure Plate (Line & Load)	100 A
4	10-32 Screw (Line & Load)	50 A
D	M5 Screw (Line & Load)	50 A
5	10-32 “Bus-Type” Screw (Line), 10-32 Screw (Load)	50 A
E	M5 “Bus-Type” Screw (Line), 10-32 Screw (Load)	50 A
6 [10]	10-32 “Bus-Type” Screw (Line), Box Wire Connector (Load)	100 A
F [11]	10-32 “Bus-Type” Screw (Line), Box Wire Connector with Pressure Plate (Load)	100 A
7	1/4-20 Screw (Line & Load)	100 A
G	M6 Screw (Line & Load)	100 A
8	1/4-20 “Bus-Type” Screw (Line), 1/4-20 Screw (Load)	100 A
H	M6 “Bus-Type” Screw (Line), M6 Screw (Load)	100 A
9 [10]	1/4-20 “Bus-Type” Screw (Line), Box Wire Connector (Load)	100 A
J [11]	1/4-20 “Bus-Type” Screw (Line), Box Wire Connector with Pressure Plate (Load)	100 A

9 ACTUATOR COLOR & LEGEND [13]
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
BACK CONNECTED (FRONT MOUNTED ONLY)

	Mounting Inserts
A	6-32
B	ISO M3

FRONT CONNECTED (BACK MOUNTED ONLY) [14]

	Back Mounting Foot Type	Front Mounting Inserts (Optional Use)
C	Short	6-32
D	Short	ISO M3
E	Long	6-32
F	Long	ISO M3

11 MAXIMUM APPLICATION RATING [15]
A	65 VDC, 120 A	**G** [16]	600 VAC, 100 A
B	125 VDC, 120 A	**H** [16]	480 VAC, 100 A
C	120/240 VAC, 100 A	**J** [16]	415 VAC, 100 A
D	240 VAC, 100 A	**L** [16]	160 VDC, 100 A
E [16]	277/480 VAC, 100 A	**T**	125 VDC/240 VAC, 100 A
F	277 VAC, 100 A	**W** [16]	125 VDC/415 VAC, 100 A

12 AGENCY APPROVAL
B	UL 1077 / UL508 Recognized & CSA Accepted
D	UL 1077 Recognized, CSA Accepted, & VDE Certified

Notes:
1. VDE approval on 1-5 poles only. Standard multi-pole units identical poles except when specifying auxiliary switch - (see Note 4). For mixed ratings, consult factory.
2. Switch Only & Series Trip construction available with either front or back connected terminals.
   Shunt construction available with back connected terminals, (Terminal Codes 1 & 2) only. Circuit Codes B,C & D are VDE approved.
3. Switch Only construction: 30 amps or less select Current Rating Code 630; 31-70 amps, select Current Rating code 670; 71-100 amps, select Current Rating Code 810; 101-125 amps Select Current Rating Code 912. Switch Only is VDE approved only if tied to a protected pole.
4. Auxiliary Switch available on Switch Only and Series Trip units. On multi-pole units, only one auxiliary switch is normally supplied mounted in the extreme right pole. Back mounted units require special mounting provisions when auxiliary switch is specified. VDE approval on Auxilary 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. Series Trip construction with a voltage coil s VDE approved only if tied to a protected pole.
6. Frequency & Delay Codes 92,94 & 96 are not VDE Certified.
7. Current Coil Ratings 0.100 - 100 ams are VDE Certified.
8. 125 A rating (Code 912) available as a Switch Only (Circuit Code A), rated 125 VDC (Code B).
9. An Anti-Flash Over Barrier is supplied between poles on multi-pole units with 10-32 (Terminal Code 1). 1/4-20 (Code 2), M5 (Code A), and M6 (Code B) terminals per UL requirement.
10. Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
11. Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
12. Terminal Codes A,B,D,E,G & H are not VDE Certified.
13. VDE approvals require Dual (I-O, ON-OFF) or I-O markings on all handles.
14. 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.
15. Application ratings B,D,J,T & W are available with VDE.
16. 415, 480 & 600 VAC ratings require 3 or 4 pole break 3Ø and 2 pole break 1Ø.

E	A	2	–	B	0	–	24	–	450	–	1	2	A	–	C	C
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 POLES [1]

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

4 CIRCUIT [2]
B Series Trip (current)
C [3] Series Trip (voltage)

5 AUXILIARY SWITCH [4]

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

10 [5]	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
20 [5]	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	**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
090	0.095	**415**	1.500	**710**	10.500	**680**	80.000
210	0.100	**517**	1.750	**611**	11.000	**690**	90.000
215	0.150	**420**	2.000	**711**	11.500	**810**	100.000
220	0.200	**522**	2.250	**612**	12.000	**811**	110.000
225	0.250	**425**	2.500	**712**	12.500	**812**	120.000
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 TERMINAL [7]

BACK CONNECTED (FRONT MOUNTED ONLY)		MAX. RATING
1 [8]	10-32 Stud (All Terminals)	50 A
2 [8]	1/4-20 Stud (All Terminals)	125 A

FRONT CONNECTED (BACK MOUNTED ONLY)		MAX. RATING
3 [9]	Box Wire Connector (Line & Load)	100 A
C [10]	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
6 [9]	10-32 “Bus-Type” Screw (Line), Box Wire Connector (Load)	100 A
F [10]	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
9 [9]	1/4-20 “Bus-Type” Screw (Line), Box Wire Connector (Load)	100 A
J [10]	1/4-20 “Bus-Type” Screw (Line), Box Wire Connector with Pressure Plate (Load)	100 A

9 ACTUATOR COLOR & LEGEND [12]

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]

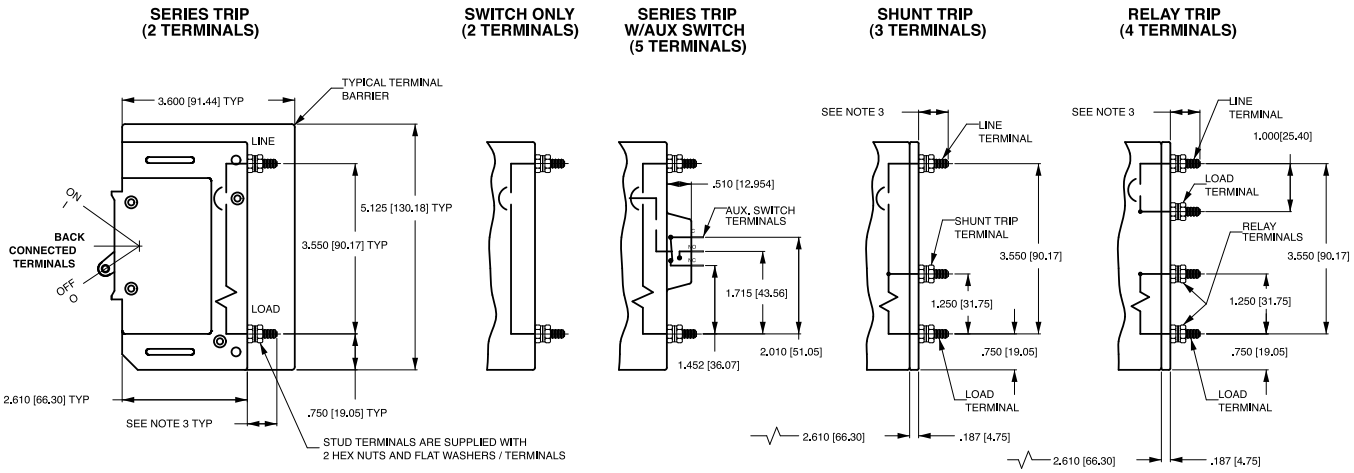
	Back Mounting Foot Type	Front Mounting Inserts (Optional Use)
C	Short	6-32
D	Short	ISO M3
E	Long	6-32
F	Long	ISO M3

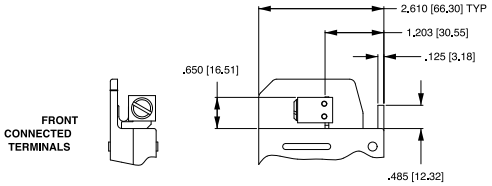
11 MAXIMUM APPLICATION RATING [15]
1 120 VAC
B 125 VDC, 120 A
C [13] 120/240 VAC, 100 A
D 240 VAC, 100 A

12 AGENCY APPROVAL
C UL 489 Listed & CSA Certified
F UL 489 Listed, CSA Certified, & VDE Certified

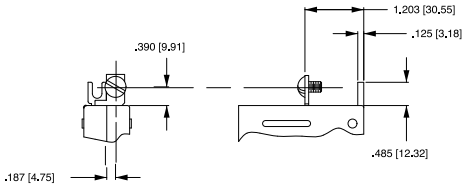
Notes:
1 Standard multi-pole units identical poles except when specifying auxiliary switch - (see Note 4). For mixed ratings, consult factory. VDE Certification on 1-5 poles only.
2 Series Trip construction available with either front or back connected terminals.
3 Series Trip construction with a voltage 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 auxilary 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]

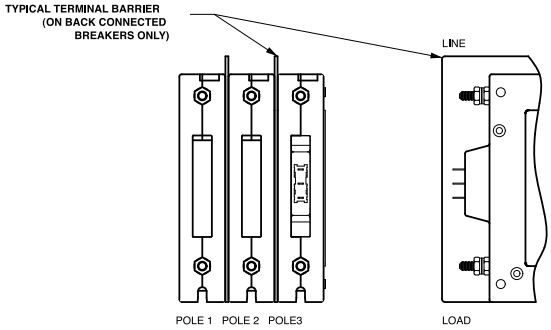




BOX TYPE WIRE CONNECTORS

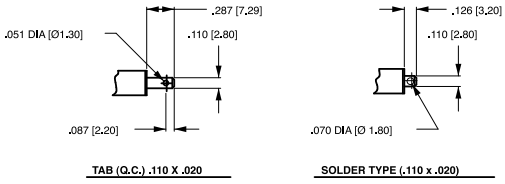


BUS TYPE SCREW TERMINALS



MULTI-POLE IDENTIFICATION SCHEME

AUXILIARY SWITCH TERMINALS



TAB (Q.C.) .110 X .020

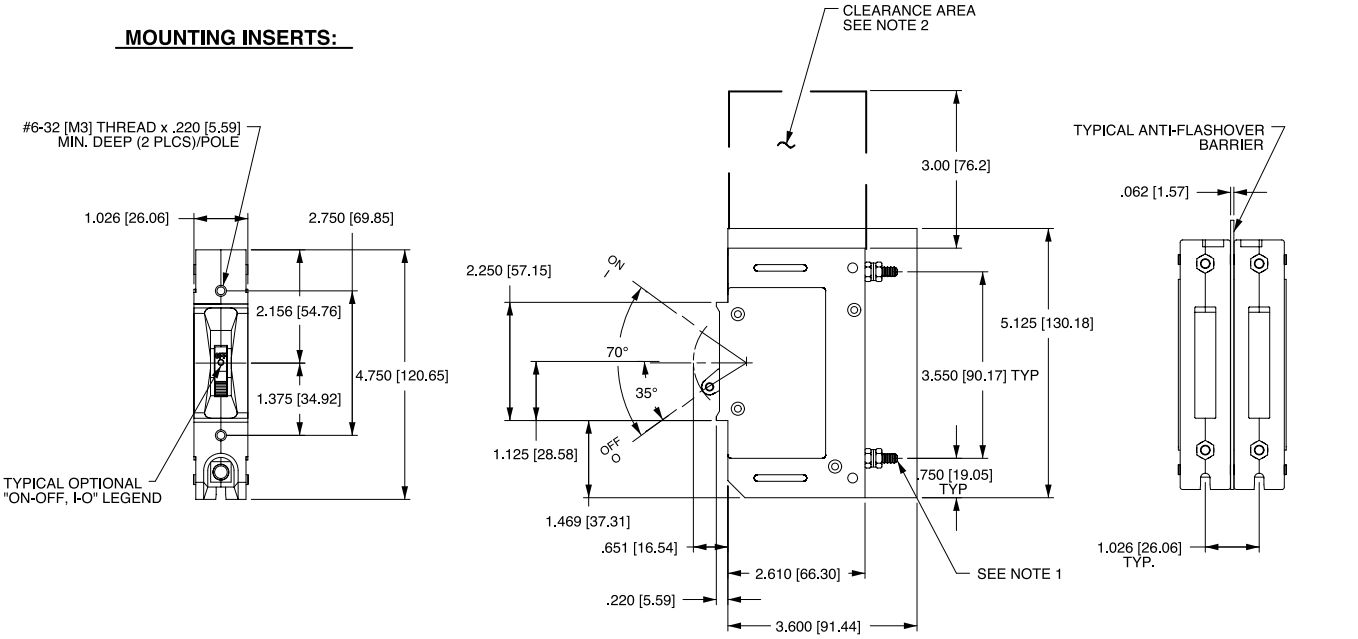
SOLDER TYPE (.110 x .020)

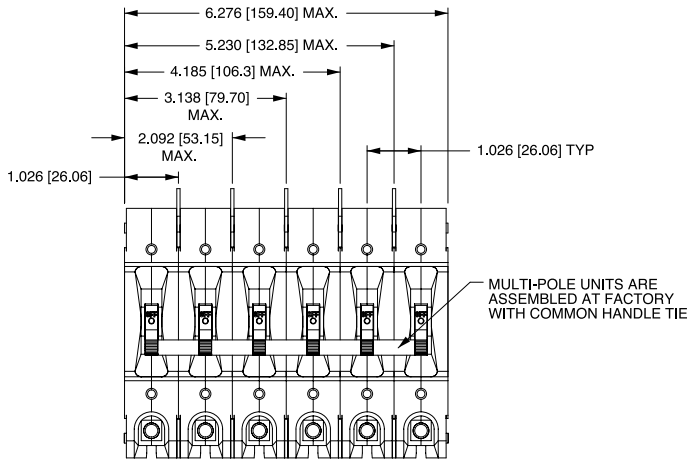
TABLE A
TIGHTENING TORQUE SPECIFICATIONS

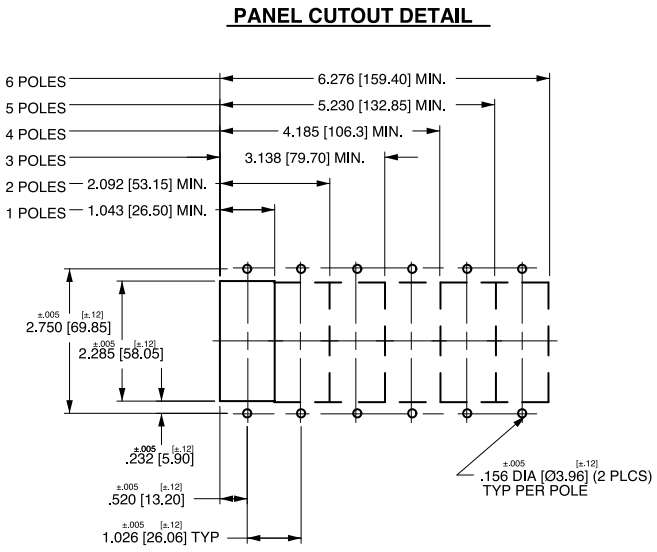
THREAD SIZE TERMINAL TYPE	WIRE SIZE	TORQUE
#6-32 [M3] HARDWARE	—	7-9 IN-LBS [0.8-1.0 NM]
#10-32 THD. TERMINAL SCREW	ALL	15-20 IN-LBS [1.7-2.3 NM]
1/4-20 THD. TERMINAL SCREW	ALL	30-35 IN-LBS [3.4-4.0 NM]
#10-32 STUDS	ALL	15-20 IN-LBS [1.7-2.3 NM]
1/4-20 STUDS	ALL	30-35 IN-LBS [3.4-4.0 NM]
BOX WIRE CONNECTOR	14-10 AWG	35 IN-LBS [4.0 NM]
	8 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 ±.020 [.51] unless otherwise specified.
3 0-50 amps: 10-32 & M5 Studs .625±.062/15.88±1.574 long.
4 51-120 amps: 1/4-20 & M6 Studs .750±.062/19.05±1.574 long.

Dimensional Specifications: in. [mm]



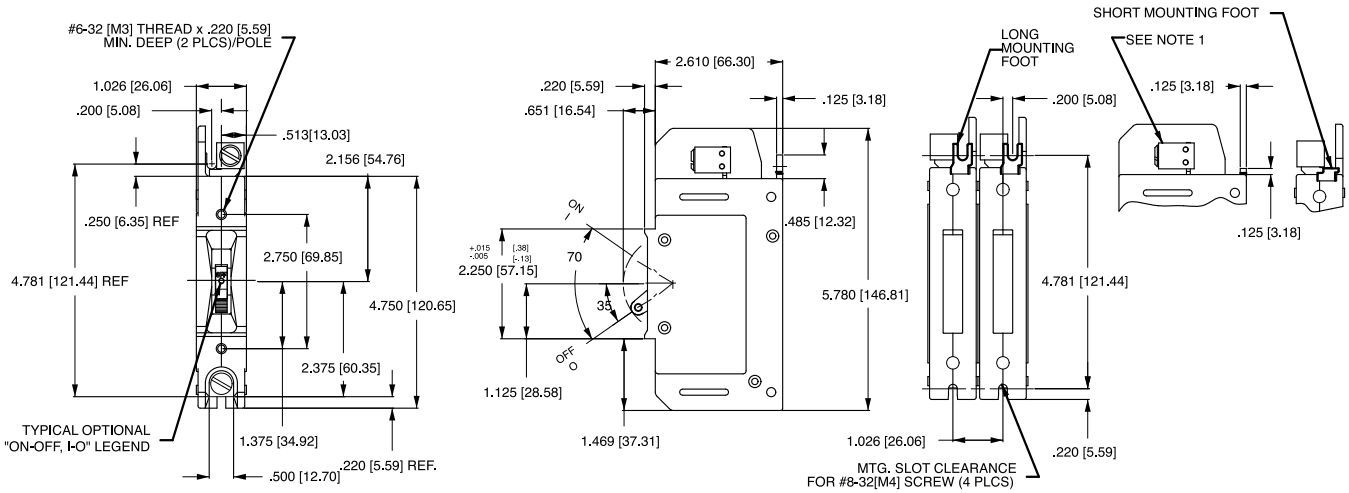


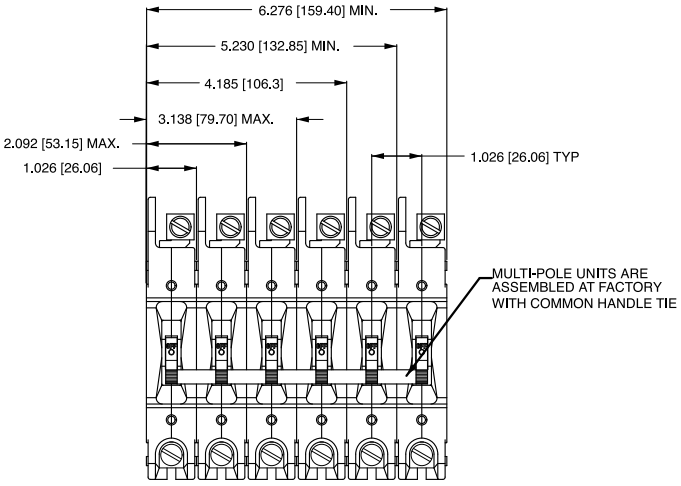


Notes:
1 1/4 -20 stud terminal in Series Trip circuit configuration shown.
2 A 3" min spacing must be provided between the circuit breaker arc venting area of back connected E-Series circuit breaker and grounded obstructions.
3 All dimensions are in inches [millimeters].
4 Tolerance ±.020 [.51] unless otherwise specified.
5 Circuit breakers must be mounted on vertical surface.

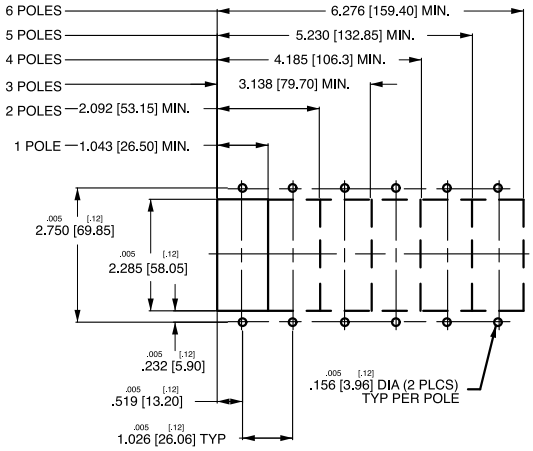
Dimensional Specifications: in. [mm]

MOUNTING INSERTS:





PANEL CUTOUT DETAIL

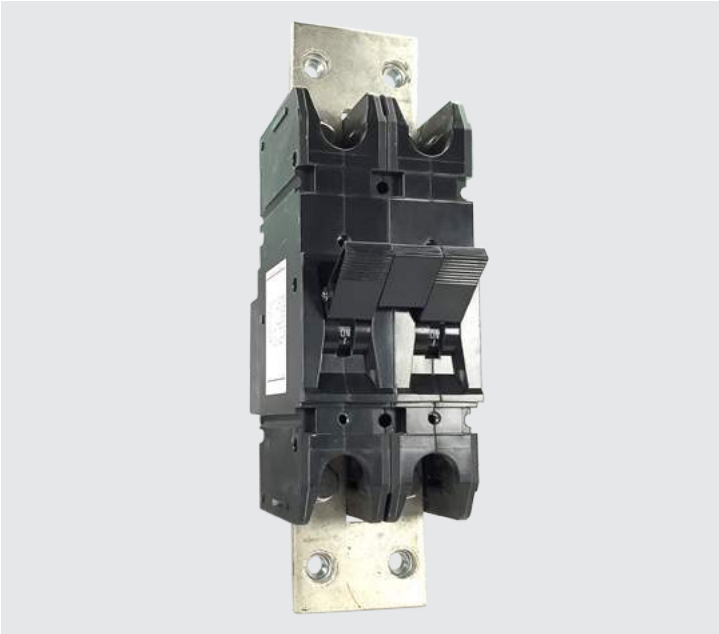


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Box wire connector terminal in Series Trip circuit configuration shown.
4 Circuit breakers must be mounted on vertical surface.

F-Series
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:

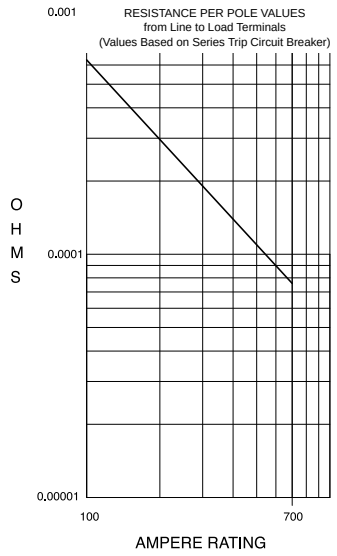
- AC ratings to UL 489
- DC voltage ratings up to 700A with metering shunt section
- Consistent trip point over temperatures ranging from -40°C to +85°C
- Optional 25 millivolt metering shunt construction

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 auxilary 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	INTERRUPTING CAPACITY (AMPS)	
	MAX RATING	FREQUENCY	PHASE	FULL LOAD AMPS	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	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	FULL LOAD AMPS	WITHOUT BACKUP FUSE
SERIES	125	DC	251 - 700	50,000

Agency Certifications

UL Listed

UL 489

c UL us LISTED

Circuit Breakers , Molded Case (Guide DIVQ, File E129899) Complies with the requirements of the CSA Standard for Molded Case Circuit Breakers, CANCSA- C22.2 No. 5.1 –M

UL 489A

UL LISTED

Circuit Breakers for Use in Communications Equipment (Guide DITT, File E189195)

TUV Certified

IEC 60947-2
Low Voltage Switchgear and Control Gear under TUV License No. R72031058

F	A	2	–	B	0	–	14	–	820	–	1	2	A	–	B	G
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		11 Max. App. Rating	12 Agency Approval

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
A [1] Switch Only (no coil)
B Series Trip (current)
C [2] Series Trip (voltage)

Parallel Pole Construction:
M [3,4] Series Trip (Current) with Metering Shunt
N [3,4] Switch Only with Metering Shunt
P [3] Series Trip (Current)
Q [3] Switch Only

5 AUXILIARY SWITCH [5]
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
A [6] S.P.S.T., 0.093 Round QC Terminals
B [6] S.P.D.T., 0.093 Round QC Terminals

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
22 AC Short
24 AC Medium
26 AC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES						
810	100.000	**820**	200.00	**835** [8]	350.00	**860** [8]	600.00
912	125.00	**922**	225.00	**840** [8]	400.00	**870** [8]	700.00
815	150.00	**825**	250.00	**845** [8]	450.00		
917	175.00	**830** [8]	300.00	**850** [8]	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)		Max Rating
1 [9]	3/8-16 Stud	250A
2 [14]	3/8-16 Screw, Line & Load	700A
5 [14]	3/8-16 Short Stud	250A
Front Connected (Back Mounted Only) [11]		**Max Rating**
3	Box Wire Connector, Line & Load	700A
4 [14]	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

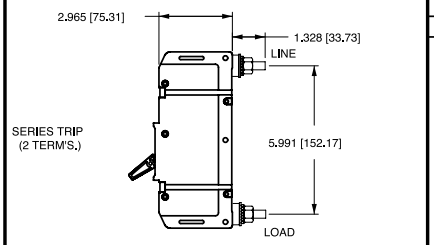
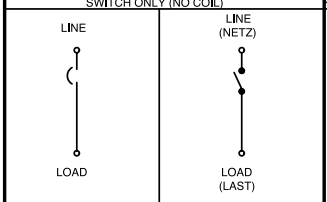
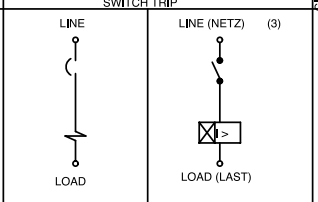
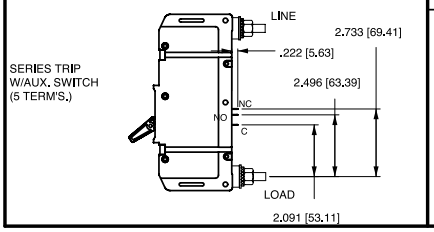
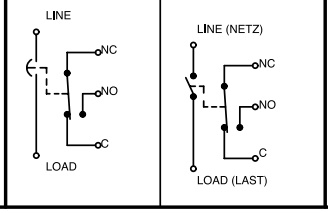
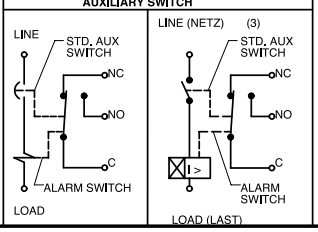
	VOLTAGE	CURRENT
B	125 VDC	700A
C [15]	120/240	250A
F	277 VAC	250A
7 [16]	120/208 VAC	250A

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 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.

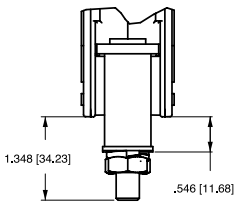
Circuit & Terminal Diagrams: in. [mm]

F SERIES NON-PARALLEL POLE CONSTRUCTION:

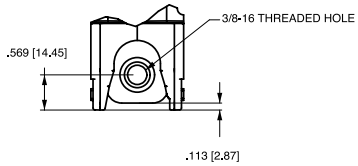
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE
	ANSI / IEC — SWITCH ONLY (NO COIL)			ANSI / IEC — SWITCH TRIP		
		A	0		BC	0
	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH 	A	2 3 4 5 9	SERIES TRIP WITH AUXILIARY SWITCH 	BC	2 3 4 5 9

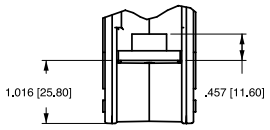
TERMINAL DETAILS

BACK CONNECT

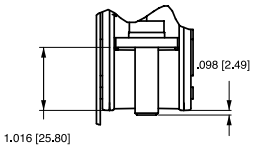


3/8-16 THREADED STUD
CODE 1



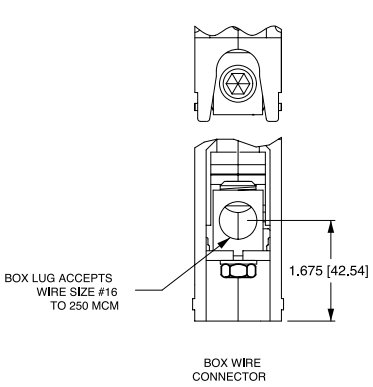


3/8-16 THREADED HOLE
CODE 2

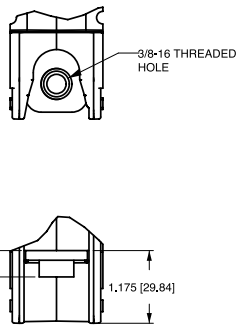


SHORT STUD
CODE 5

FRONT CONNECT



BOX WIRE
CONNECTOR

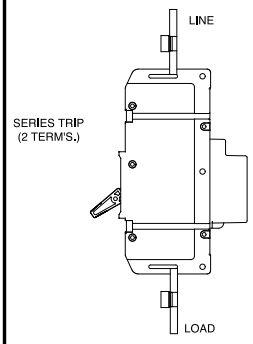
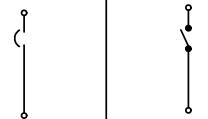
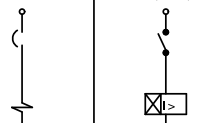
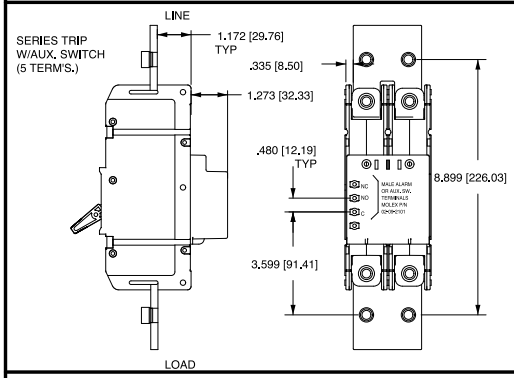
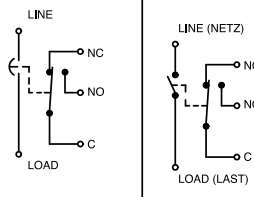
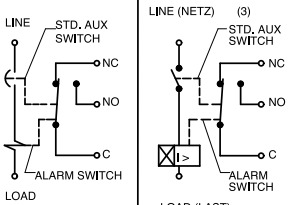
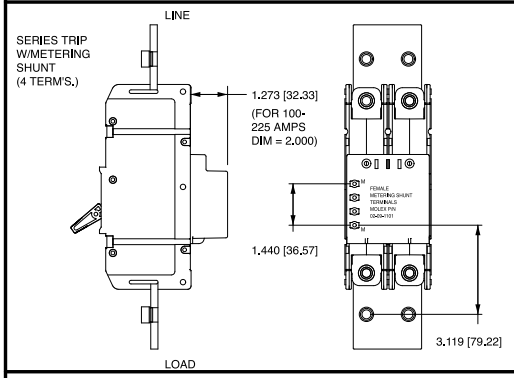
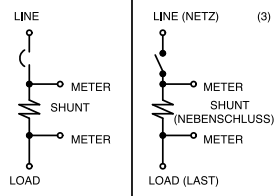
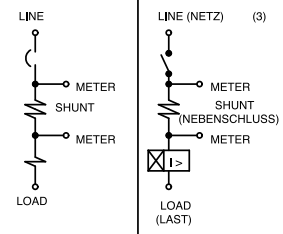
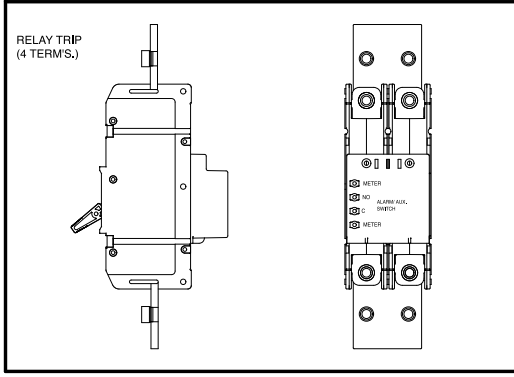
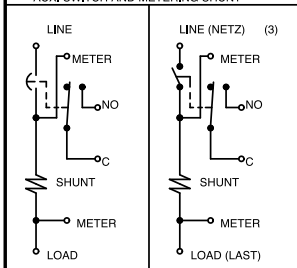
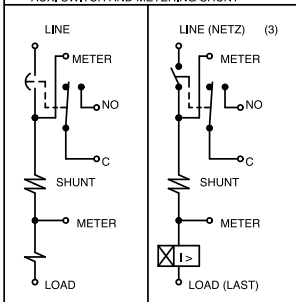


3/8-16 THREADED HOLE
CODE 4

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

Circuit & Terminal Diagrams: in. [mm]

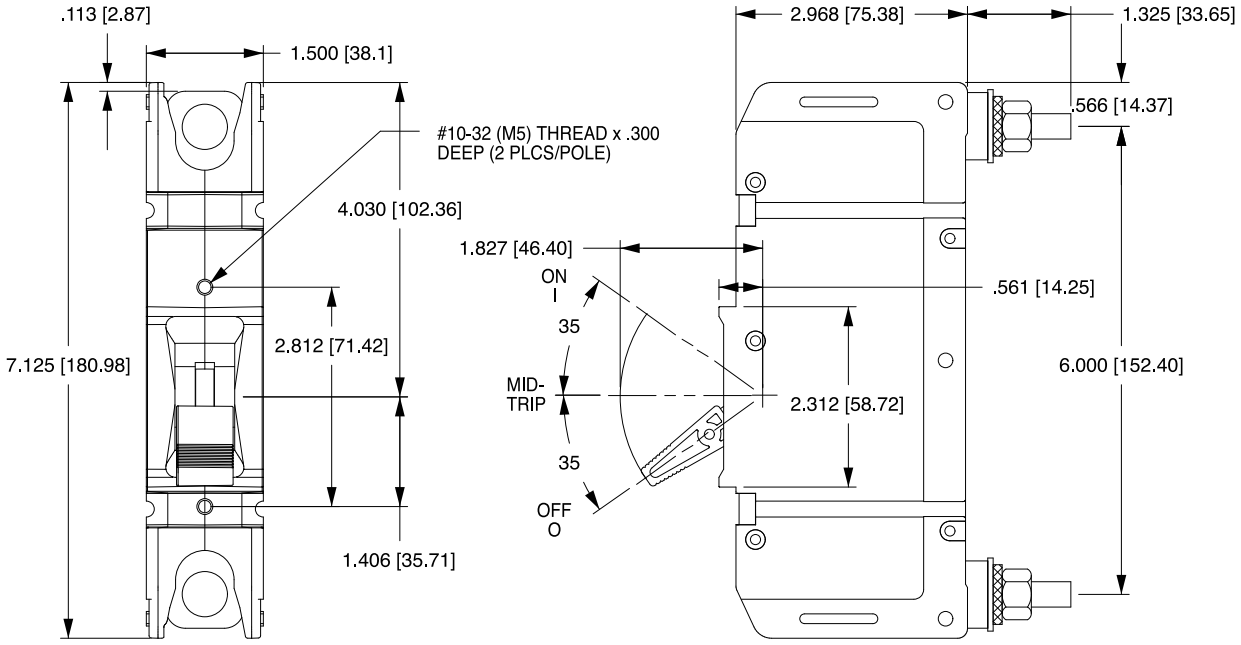
F-SERIES PARALLEL POLE CONSTRUCTION:

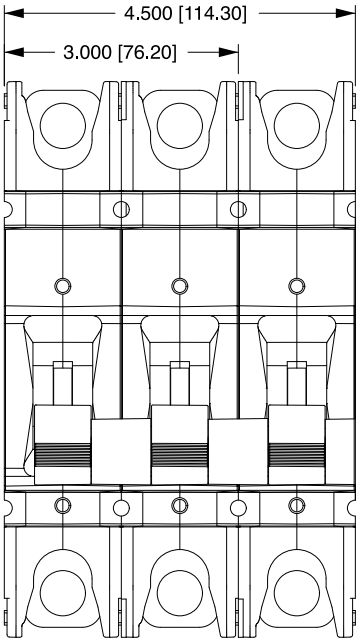
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC ANSI	CIRCUIT SCHEMATIC IEC	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC ANSI	CIRCUIT SCHEMATIC IEC	CIRCUIT CODE	AUX SWITCH CODE
	SWITCH ONLY (NO COIL) 		A	0	SERIES TRIP 		BC	0
	SWITCH ONLY (NO COIL) WITH ALARM OR AUX. SWITCH 		A	B	SERIES TRIP WITH ALARM OR AUX. SWITCH 		BC	B
	SWITCH ONLY (NO COIL) WITH METERING SHUNT 		N	0	SERIES TRIP CURRENT COIL, WITH METERING SHUNT 		M	0
	SWITCH ONLY WITH ALARM OR AUX. SWITCH AND METERING SHUNT 		N	A	SERIES TRIP WITH ALARM OR AUX. SWITCH AND METERING SHUNT 		M	A

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

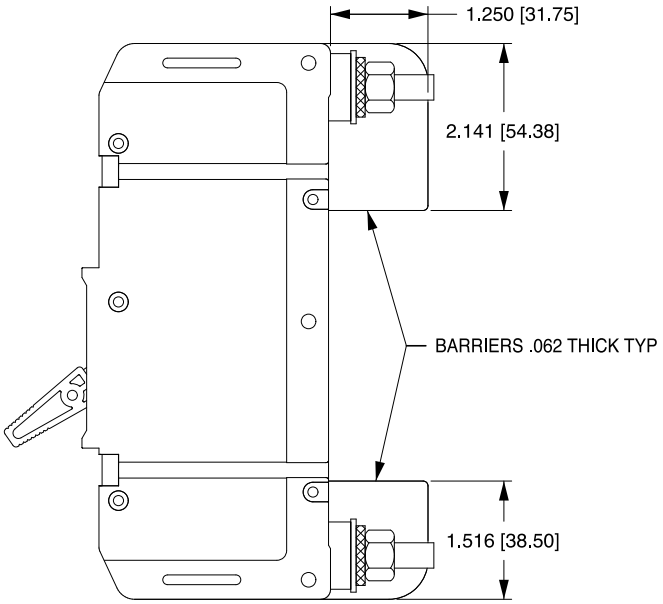
Dimensional Specifications: in. [mm]

SERIES TRIP BACK CONNECT (STUD TERMINALS SHOWN)



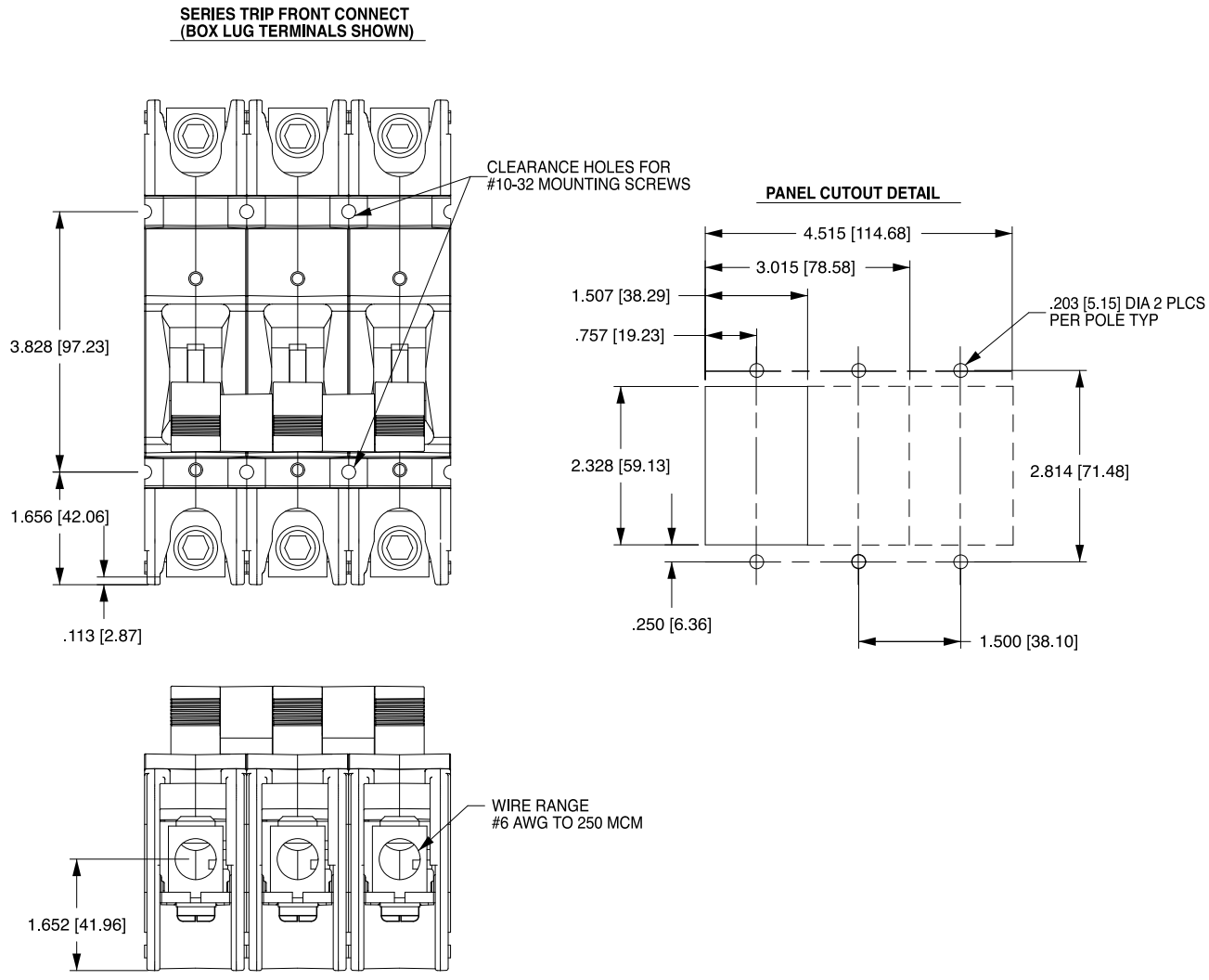


MULTIPOLE SERIES TRIP, SHOWING TERMINAL BARRIER



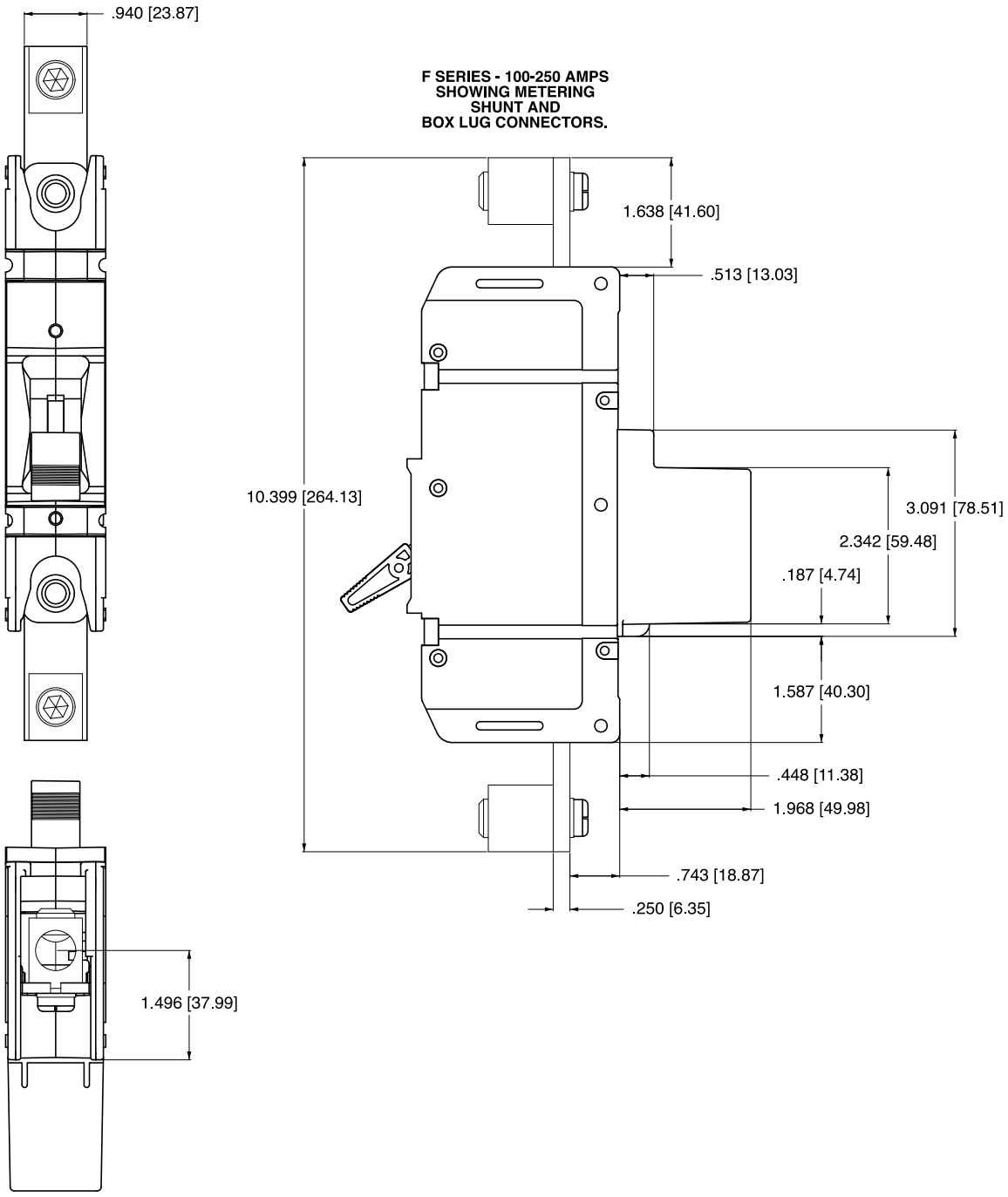
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Dimensional Specifications: in. [mm]



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

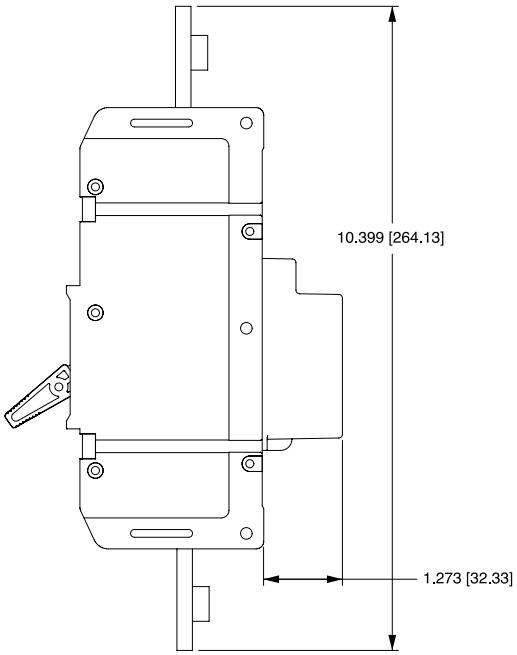
Dimensional Specifications: in. [mm]

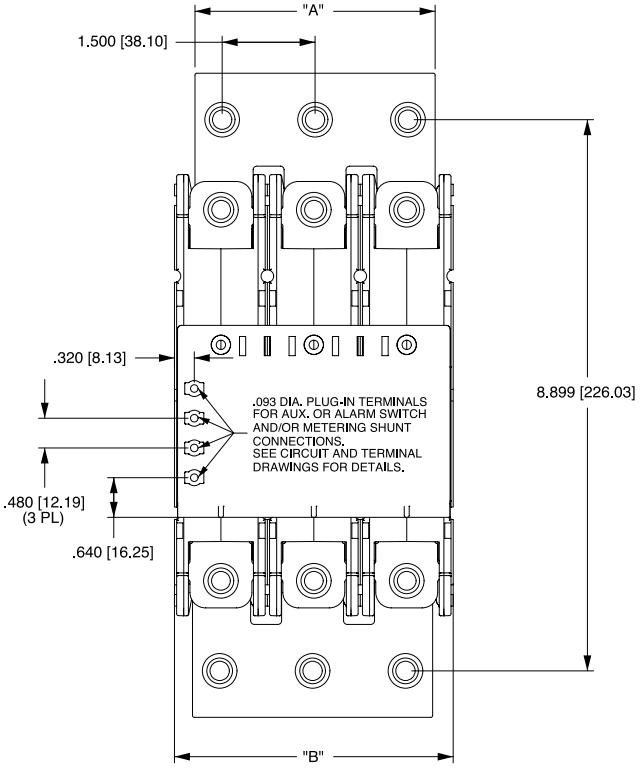


F-Series breakers are available up to 700A, and are also available with a 25 millivolt metering shunt construction. This optional construction provides a safe method for monitoring current flowing through the breaker by simply connecting a meter with light gauge wire to the appropriate terminals located 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 ±.020 [.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 ±.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.

/ RB | 1 | 1 | 10 | B | U | 1 | C

1 Series	2 Mounting Position	3 Interface	4 Lead Length	5 Voltage Rating	6 Actuator Color	7 Mounting Insert	8 Agency Approval

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	**10**	10”	**21**	21”
01	1”	**11**	11”	**22**	22”
02	2”	**12**	12”	**23**	23”
03	3”	**13**	13”	**24**	24”
04	4”	**14**	14”	**25**	25”
05	5”	**15**	15”	**26**	26”
06	6”	**16**	16”	**27**	27”
07	7”	**17**	17”	**28**	28”
08	8”	**18**	18”	**29**	29”
09	9”	**19**	19”	**30**	30”
		20	20”		

5 VOLTAGE RATING
A 12 VDC
B 20-40 VDC
C 41-80 VDC

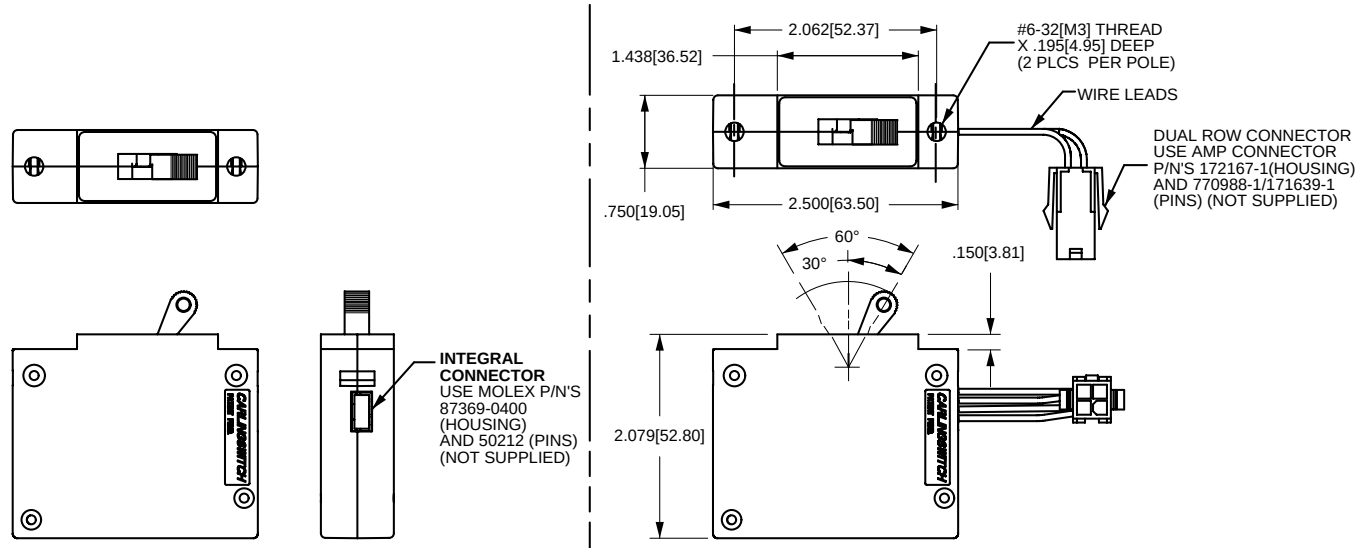
6 ACTUATOR COLOR
T White
U Black
V Red
W Yellow

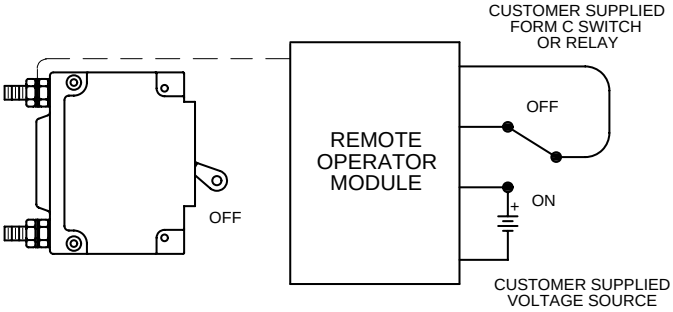
7 MOUNTING INSERT
1 6-32 x 0.195”
2 ISO M3 x 5mm

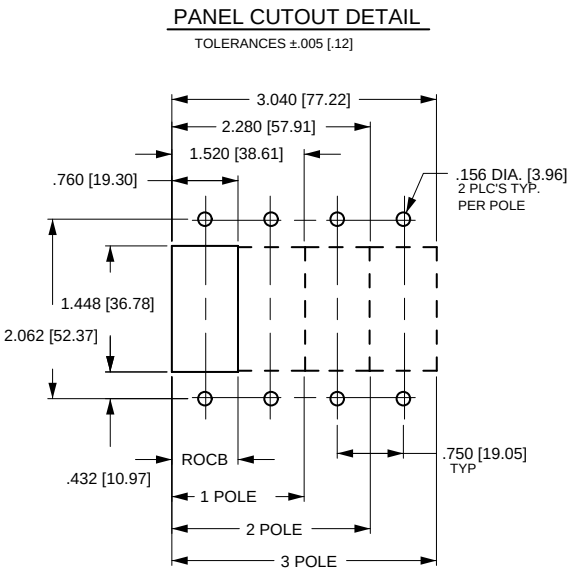
8 AGENCY APPROVAL
C UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
G UL 489 Listed & CSA Certified
I UL 1500 Ignition Protected,UL Recognized & CSA Accepted
J UL 489 Listed, CSA Certified & TUV Certified

Notes:
Integral and 4-pin dual row connectors not available with agency approval J or G: UL 489.

Dimensional Specifications: in. [mm]



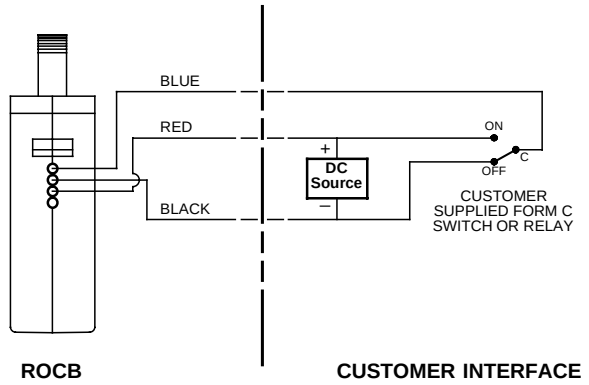




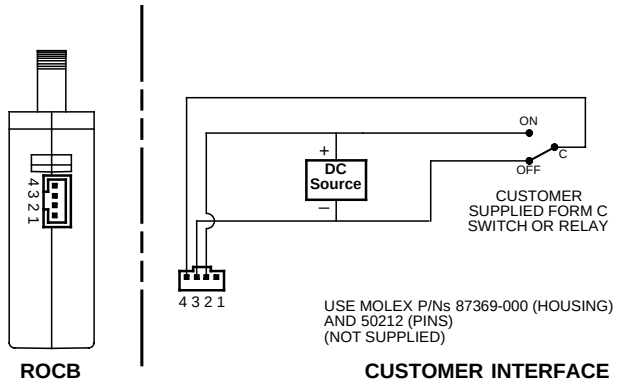
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Wire Instructions

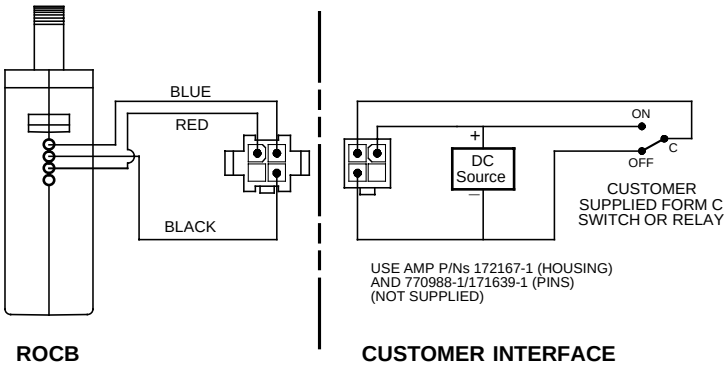
CATALOG INTERFACE OPTION 1 (FLYING LEADS)
WIRING INSTRUCTIONS



CATALOG INTERFACE OPTION 2 (INTEGRAL CONNECTOR)
WIRING INSTRUCTIONS

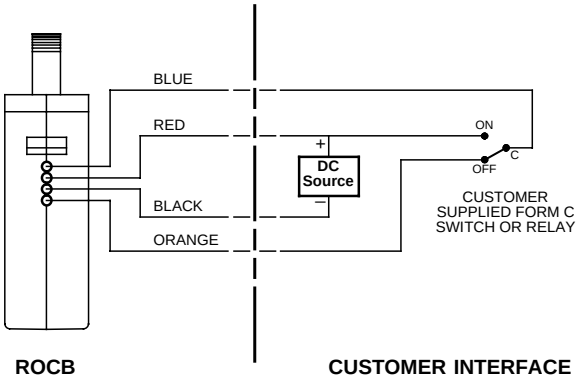


CATALOG INTERFACE OPTION 3
(FLYING LEADS WITH 4 PIN DUAL ROW CONNECTOR)
WIRING INSTRUCTIONS

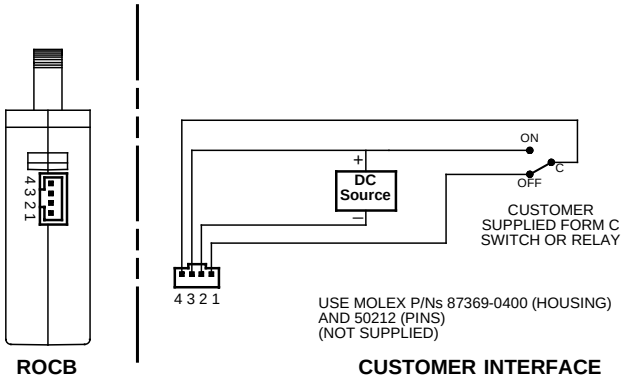


Wire Instructions

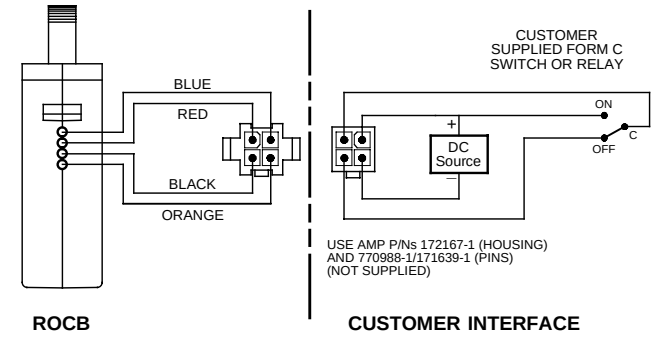
CATALOG INTERFACE OPTION 1 (FLYING LEADS)
WIRING INSTRUCTIONS



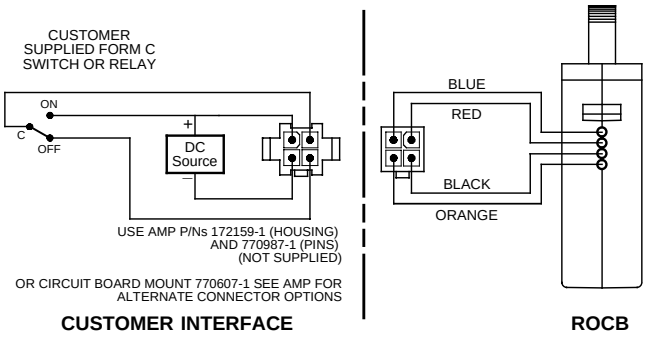
CATALOG INTERFACE OPTION 2 (INTEGRAL CONNECTOR)
WIRING INSTRUCTIONS



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.

8	M	1	–	C	–	1	2	1
1 Accessory Code	*2 Series*	*3 Poles*		*4 Accessory Type*		*5 Actuator Type*	*6 Color*	*7 Finish*

1 ACCESSORY CODE
8

2 SERIES
A A & B-Series
C C & D-Series
M M-Series

3 POLES
1 One Pole
A, B, C & D-Series Front Panel Snap-In Only
2 Multi-Pole Inner
3 Multi-Pole Outer

4 ACCESSORY TYPE
C Panel Hole Plug

5 ACTUATOR TYPE & MOUNTING STYLE

	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

6 COLOR
1 White (M-Series only)
2 Black
7 Gray (M-Series only)

7 FINISH
1 Matte
2 Gloss (A & B-Series only)

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.

8	A	1	–	1	2	1
1 Accessory Code	*2 Series*	*3 Poles*		*5 Interface*	*5 Terminal*	*6 Color*

1 ACCESSORY CODE
8

2 SERIES
A A & B-Series

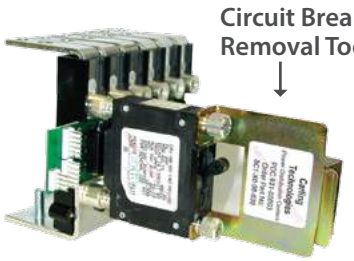
3 POLES
1 One Pole

4 INTERFACE WITH AUXILIARY SWITCH
1 Yes
2 No

5 AUXILIARY SWITCH TERMINAL TYPE
1 TAB, 0.110 Inches (Symmetrical terminal spacings)
3 None

6 COLOR
B Black

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.

8 E 6 – B – C 3 1

1	*2*	*3*	*4*	*5*	*6*	*7*
Accessory Code	*Series*	*Poles*	*Accessory Type*	*Sections*	*Color*	*Style*

1 ACCESSORY CODE
8

2 SERIES

C	C & D-Series
E	E-Series

3 POLES

4	4 Poles
6	6 Poles
9[1]	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

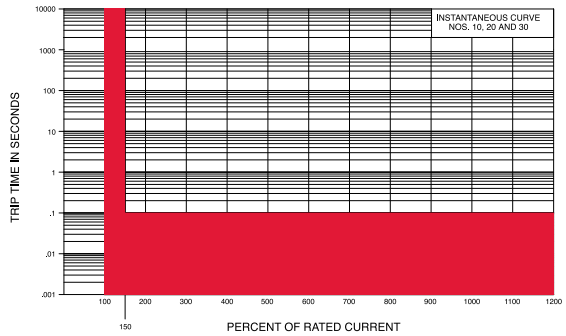
Notes:
1 9 Pole option only available on E-Series

M, MS-SERIES TIME DELAY VALUES										
	PERCENT OF RATED CURRENT									
	Delay	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP	10, 20, 30	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
TIME	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
SECONDS	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

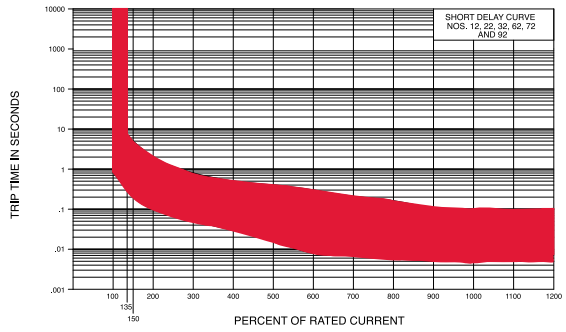
Notes:
1 Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
2 Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time 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

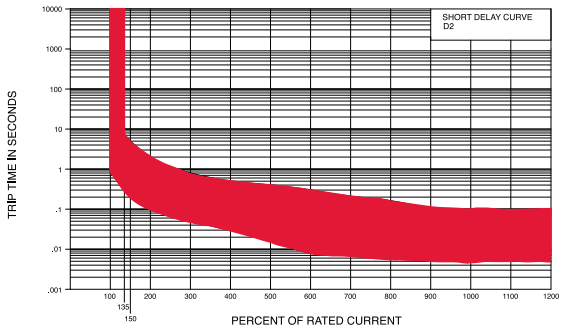
Instantaneous



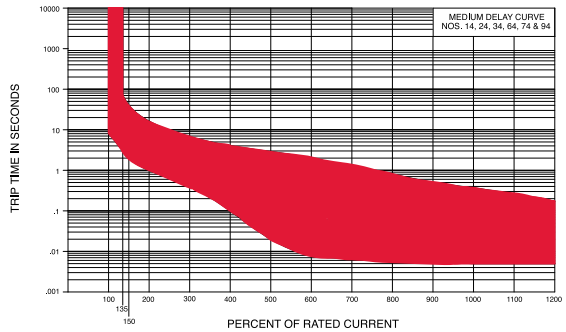
Short



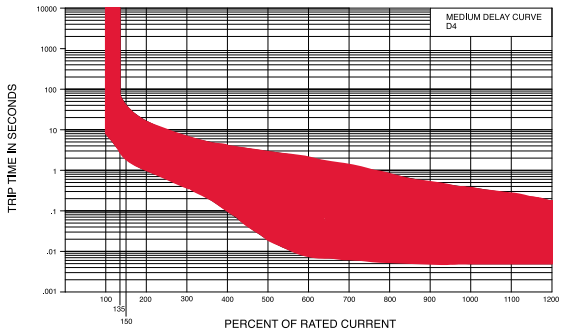
Short D2



Medium



Medium D4



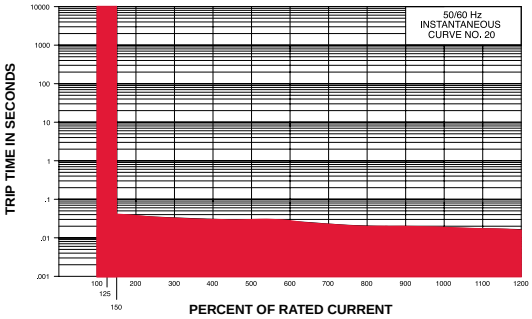
H, A, B, C, D, G, L, CX-SERIES TIME VALUES											
	PERCENT OF RATED CURRENT										
	DELAY	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
	10	No Trip	May Trip	---	.032 MAX	.024 MAX	.020 MAX	.018 MAX	.016 MAX	.015 MAX	.013 MAX
	11	No Trip	.013 - .125	---	.010 - .070	.008 - .032	.006 - .020	.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
TRIP	22	No Trip	.700 - 12.0	---	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
TIME	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
(SECONDS)	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

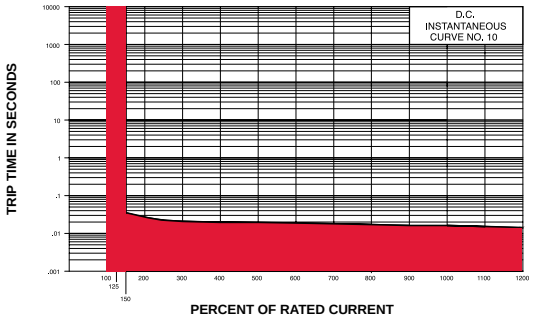
Notes:
UL489 C-Series Breakers available with Delay Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46.
Delay Curves 11,12,14,16,21,22,24,26,42,44,46,52,54,56: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.
Delay Curves 32,34,36: Breakers 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 of short duration such as switching power supplies, highly capacitive loads and transformer loads.

AC

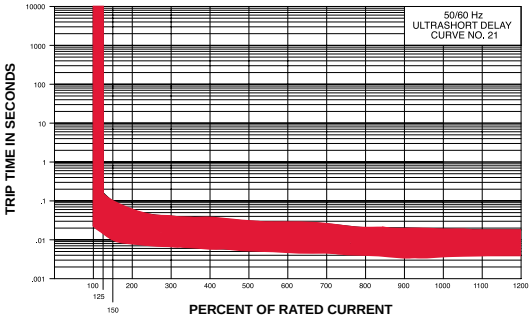
DC

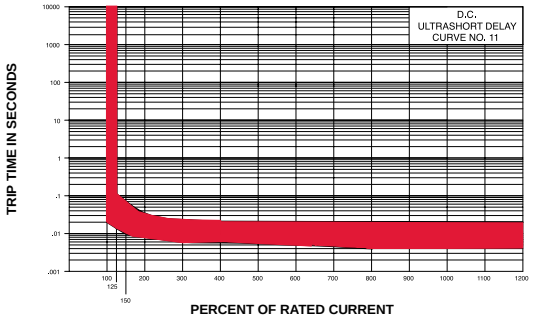
Instantaneous



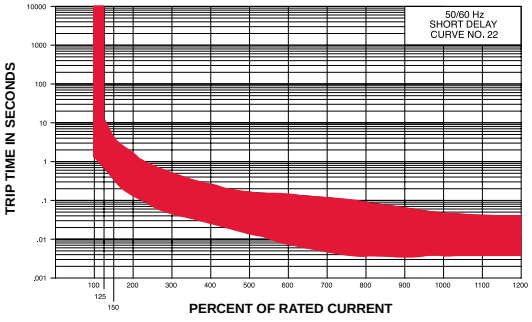


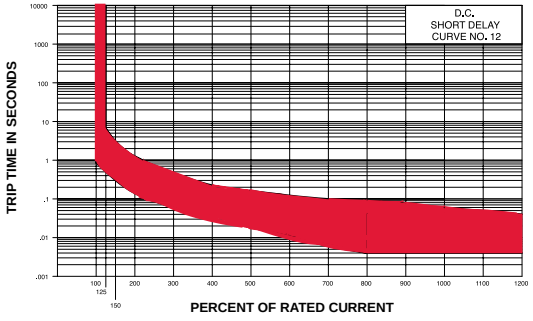
Ultrashort





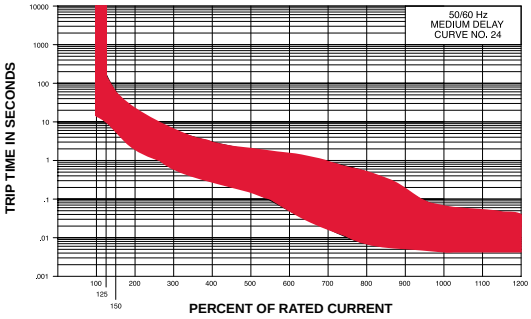
Short



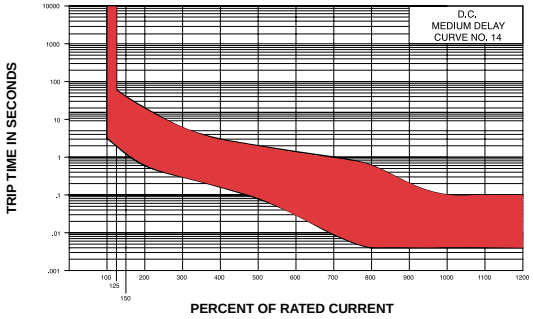


Medium

AC



DC



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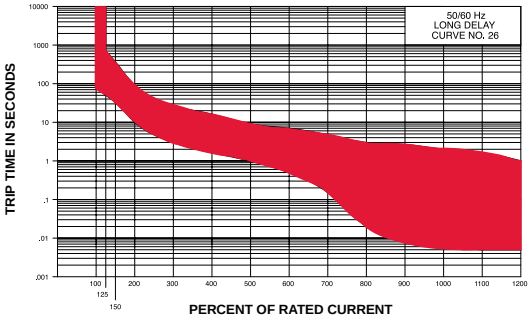
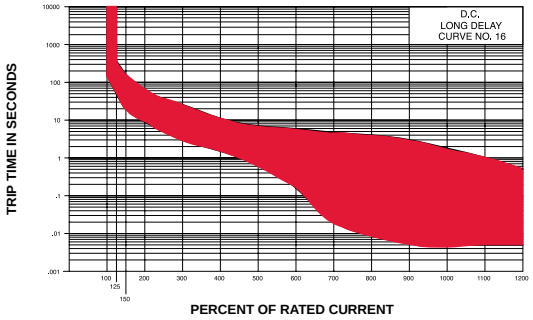
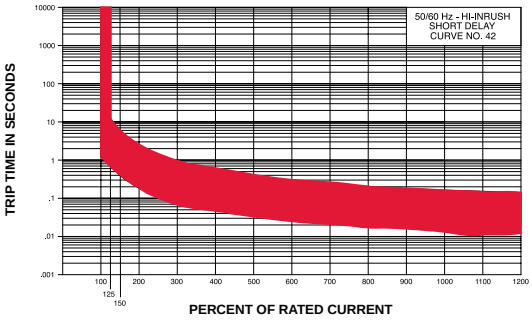


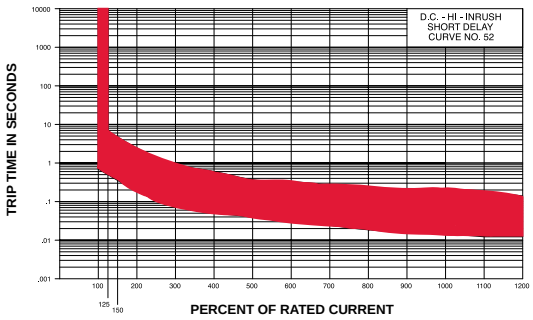


Short

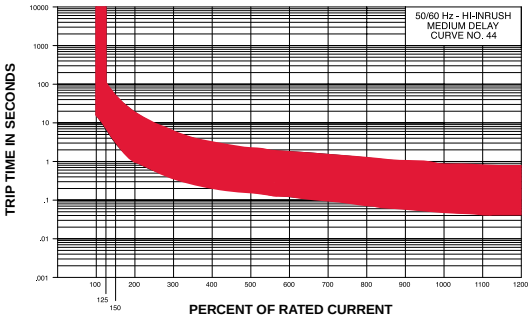
High Inrush AC

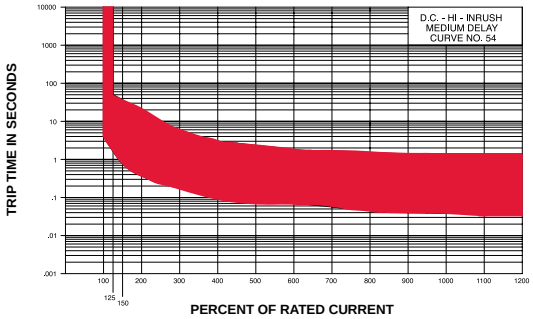


High Inrush DC

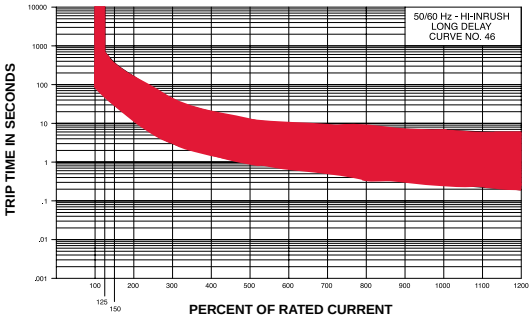


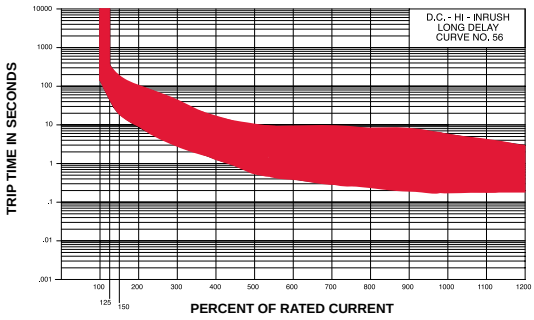
Medium





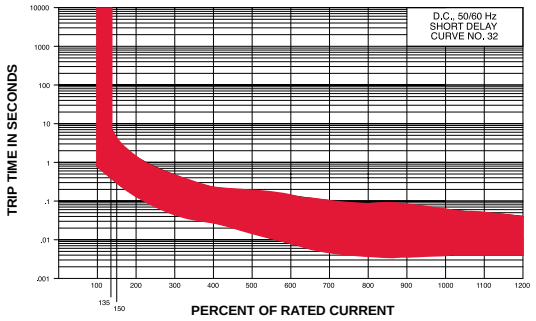
Long



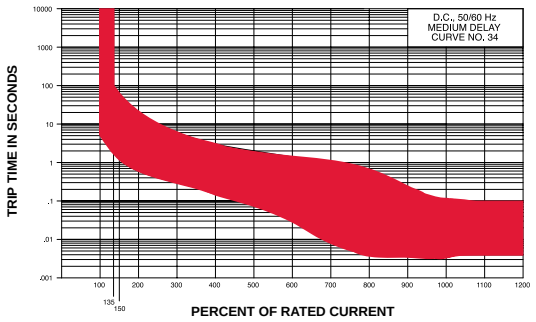


AC/DC

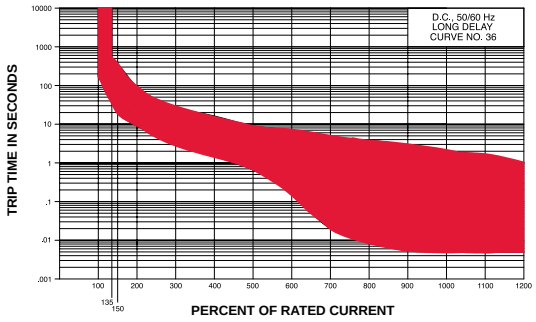
Short



Medium



Long

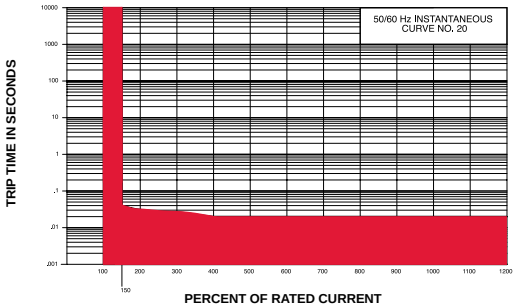


E-SERIES TIME DELAY VALUES											
	PERCENT OF RATED CURRENT										
	Delay	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP TIME (SECONDS)	10	No Trip	May Trip	---	.001 - .038	.001 - .032	.001 - .021	.001 - .019	.001 - .019	.001 - .019	.001 - .019
	12, 72	No Trip	.600 - 7.00	---	.330 - 2.00	.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

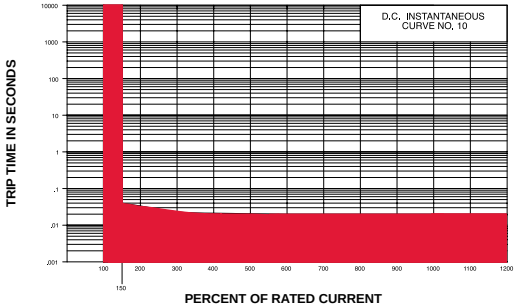
NOTES
Delay Curves 10,20,30: Breakers to hold 100% and must trip at 150% of rated current and greater wthin the time limit shown in these curves.
Delay Curves 12,14,16,22,24,26,62,64,66,72,74,76: Breakers to hold 100% and must trip at 125% of rated current and greater wthin the time limit shown in these curves.
Delay Curves 32,34,36,92,94,96: Breakers to hold 100% and must trip at 135% of rated current and greater wthin 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

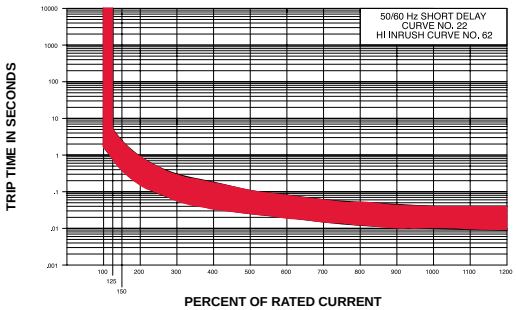
AC

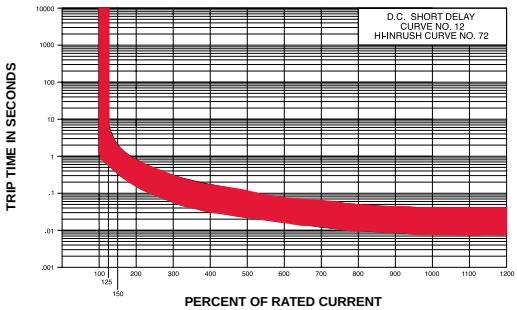


DC

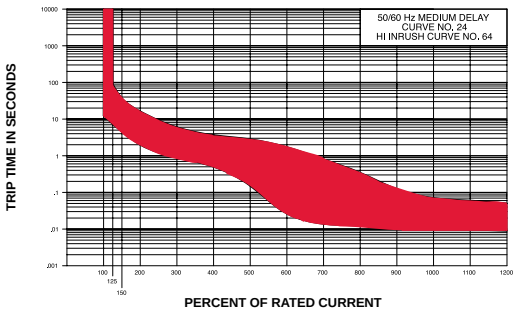


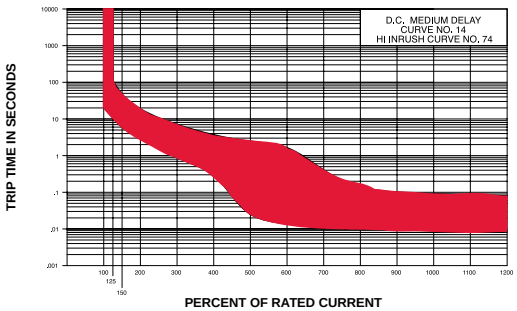
Short



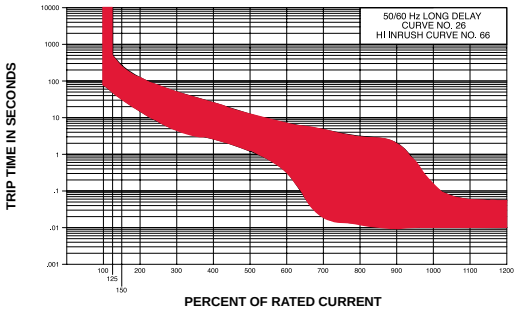


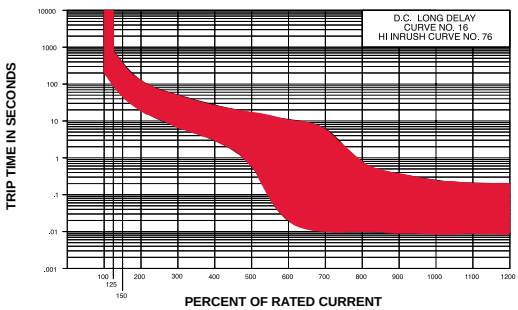
Medium





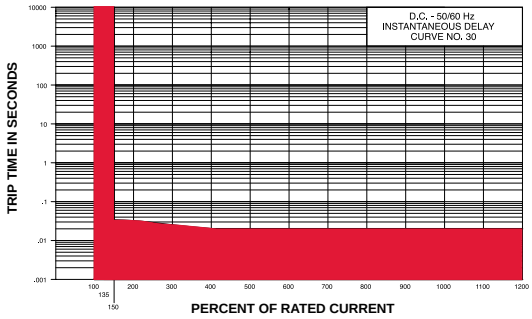
Long



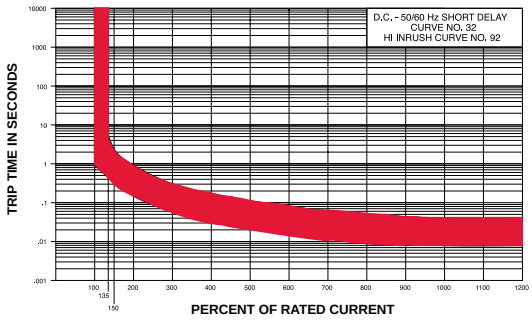


AC/DC

Instantaneous



Short



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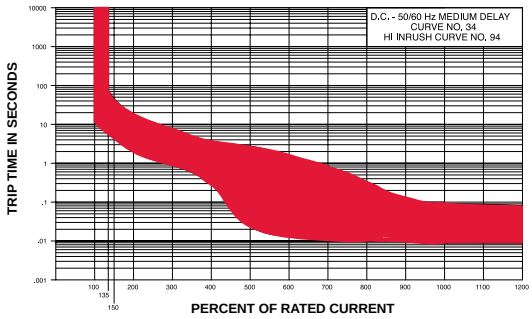

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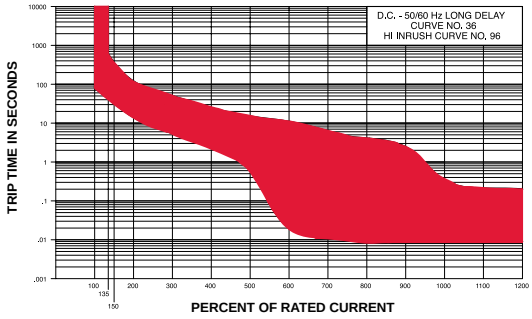
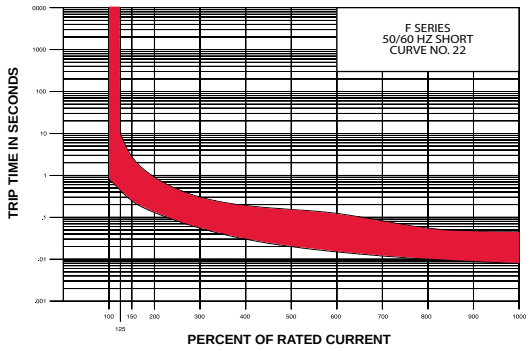


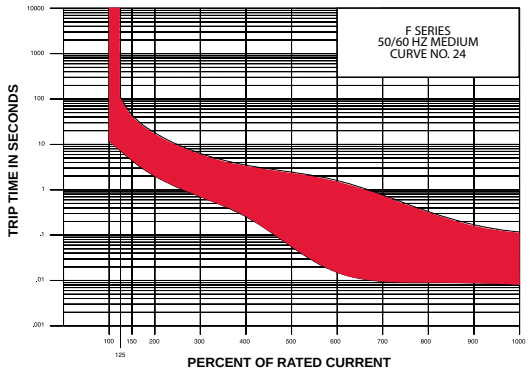
F-SERIES TIME DELAY VALUES									
	PERCENT OF RATED CURRENT								
	Delay	100%	125%	150%	200%	400%	600%	800%	1000%
TRIP TIME SECONDS	11	No Trip	.013 - .125	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020
	12	No Trip	.475 - 10.0	.275 - 2.80	.140 - .850	.030 - .190	.015 - .125	.010 - .050	.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
	16	No Trip	110 - 1000	60.0 - 400	22.0 - 150	4.00 - 25.0	1.00 - 5.50	.010 - 1.80	.008 - .390
	22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.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
	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

AC

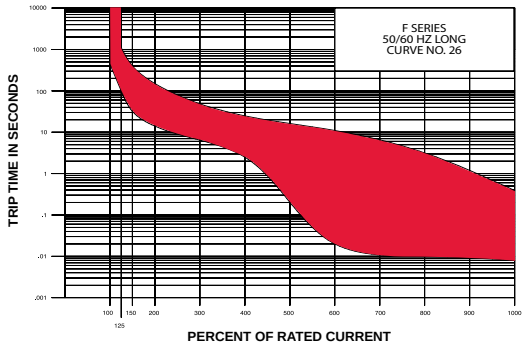
Short - AC 22



Medium - AC 24

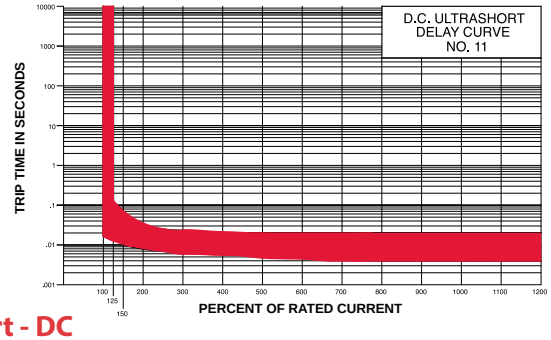


Long - AC 26

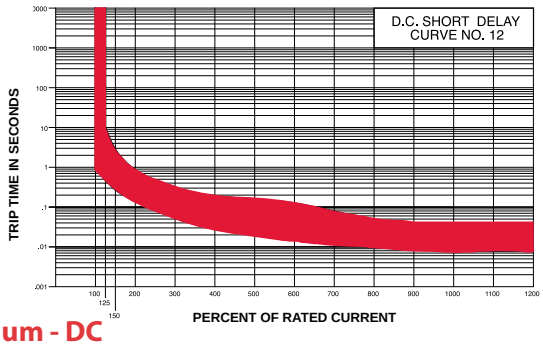


DC

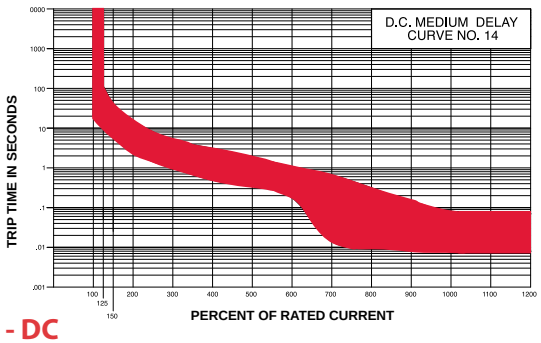
Ultrashort - DC



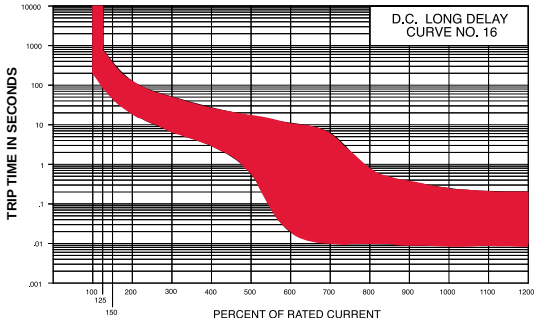
Short - DC



Medium - DC



Long - DC



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 X10 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 x 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 Mils
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 = <eth> r 2
A = 3.1428 x (.0005) 2 inches
A = .0000007857 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 X 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 x 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 electo-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 GFCI and GFP
GFCI (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-ThroughCurrent
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 = 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 sac 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 = I2 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 =V2 /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 cosine ø, where ø is the difference in phase angle between the voltage and current. Cosine ø 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 annunciate 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

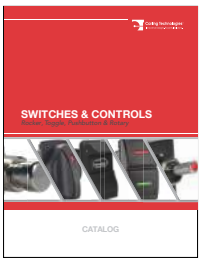
Watt
The measurement of electrical power. One watt is equal to one ampere of current flowing at one volt. Watts are typically rated as amps x volts; however, amps x volts, or volts-amps (v-a) ratings and watts are only equivalent when powering devices that absorb all the energy such as electric heating 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.

There are several catalogs available featuring complete details on all Carling Technologies products. Below is a list of useful information such as catalogs, brochures and videos. Please visit our website at **carlingtech.com** or scan the QR codes below for complete details.

www.carlingtech.com

Watch Company Profile Video

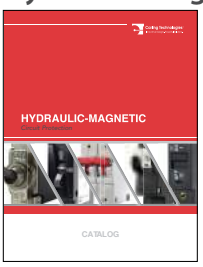
Switches & Controls



catalog

Complete line and ordering details for Switches & Control products including Rocker, Toggle, Pushbutton, and Rotary style switches.

Hydraulic-Magnetic



catalog

Complete line and ordering details for all hydraulic-magnetic circuit breakers.

Thermal

catalog

Complete line and ordering details for all thermal circuit breakers.

GFCI / ELCI

catalog

Complete line and ordering details for all GFCIs/ELCIs.

Marine

catalog *brochure*

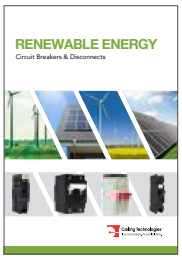
Complete line of ELCIs, thermal and hydraulic-magnetic circuit breakers specific for marine applications.

On-Off Highway

catalog *brochure*

Complete line of switches, controls and custom solutions specific for on-off highway applications.

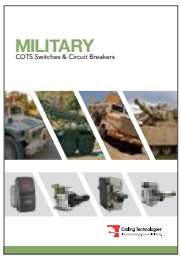
Renewable Energy



catalog *brochure*

Complete line of circuit breakers and disconnect products specific for renewable energy applications.

Military



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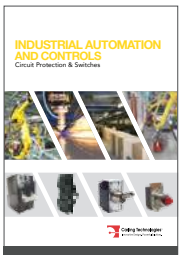
Complete line of COTS *(Commercial-Off-The-Shelf)* switches and circuit breakers specific for military applications.

Telecom/Datacom

catalog *brochure*

Complete line of hydraulic-magnetic circuit breakers specific for telecom/datacom applications.

Industrial Automation

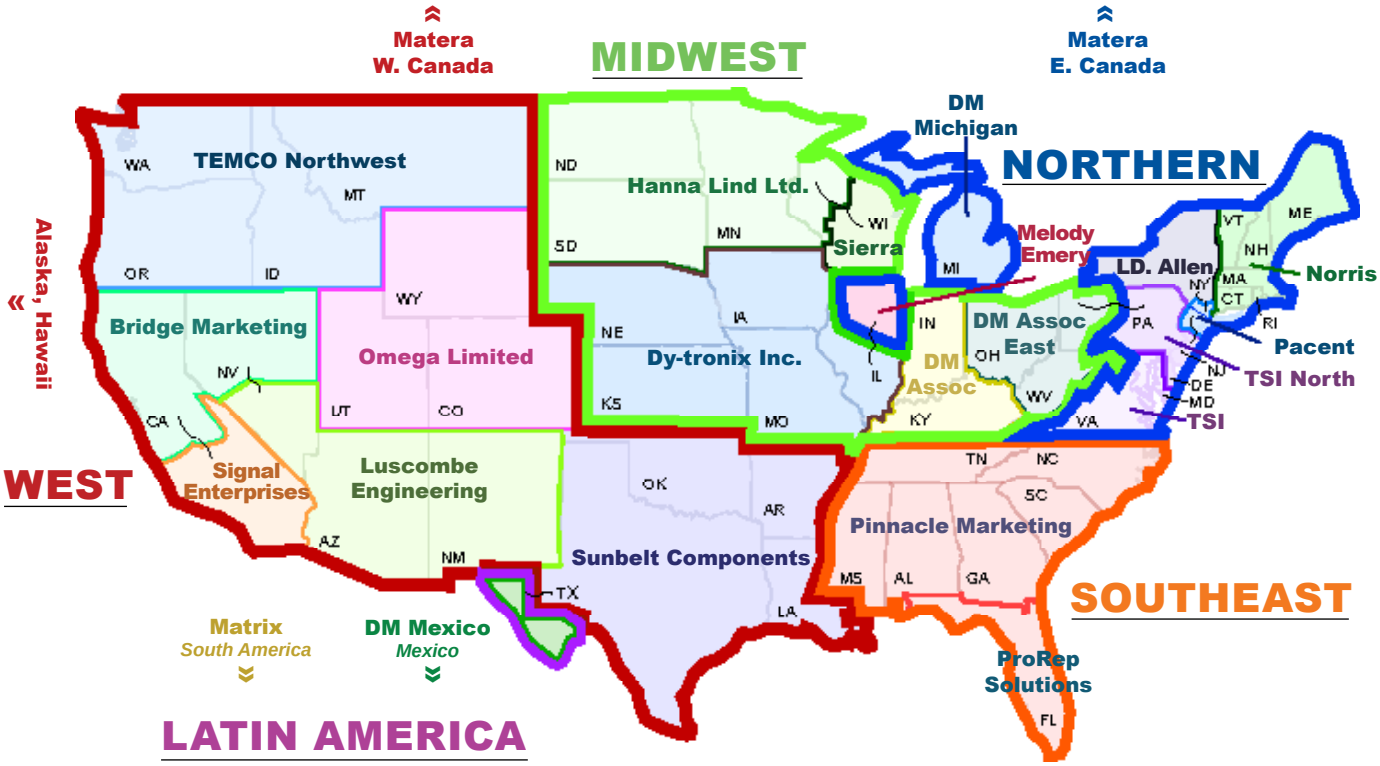


brochure

Complete line of switches and circuit breakers specific for industrial automation & controls applications.

Authorized Sales Representatives

Click on the group name on the map below to find your local representative or visit *www.carlingtech.com/findarep*.



Americas

Europe
Middle East
Africa

Asia-Pacific
Oceania

About Carling

Founded in 1920, Carling Technologies is a leading manufacturer of electrical and electronic switches and assemblies, circuit breakers, electronic controls, power distribution units, and multiplexed power distribution systems. With four ISO registered manufacturing facilities and technical sales offices worldwide, Carling Technologies Sales, Service and Engineering teams do much more than manufacture electrical components, they engineer powerful solutions! To learn more about Carling please visit **www.carlingtech.com/company-profile.**

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