Circuit Protection

Hydraulic/Magnetic Protection

Carling Technologies®
Innovative Designs. Powerful Solutions.

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • General Inquiries: (800) 670-4183 • www.stevenengineering.com

Transforming Customer Needs into Customer Solutions

At Carling Technologies, we do much more than manufacture electrical components. We engineer powerful solutions. Working closely with your product team, we can tailor switching and circuit protection solutions that meet your application needs — cost effectively.

Since our founding in 1920, there are few products we haven't turned on, fewer industries that haven't turned to us. With five ISO certified manufacturing locations and technical sales offices worldwide, Carling Technologies now ranks among the world's largest privately owned manufacturers of hydraulic/magnetic circuit breakers, thermal circuit protectors, electrical switches and assemblies, power distribution centers and electronic control systems. In regard to circuit protection, we lead the industry in delivering higher ratings in smaller packages. And what makes all our breakers especially attractive is their superior performance and reliability —— both hallmarks of Carling Technologies .

We have over 2000 employees working through offices and manufacturing sites across the globe, providing engineered solutions to leading electronic and industrial OEMs in a variety of industries, including:

- Electronics (telecom, medical, computers, office automation)
- Transportation (on/off road vehicles, trucks, buses, boats)
- Factory Automation
- Industrial Controls
- Appliances

We look forward to helping you create safe, reliable products that exceed the tough demands of today's applications. You'll find our commitment to excellence consistently delivers "Quality by Design," our company's mission.

Our commitment to quality products begins with our investment in research and development. Not only does Carling have a team of highly-qualified engineers on staff, we equip them with the industry's most advanced computer-aided design tools.

Our engineering team will work closely with yours to advance your project from initial product concepts to final design and manufacturing. Using industry-leading CAD/CAM software, Carling engineers can evaluate multiple design alternatives as well as develop products, tooling and manufacturing processes concurrently. The result? Functionally superior, aesthetically pleasing products — produced faster and at a lower cost.

We can even share electronic files that can be easily incorporated into the rest of your design. Just one more reason you'll think of Carling as much more than an approved vendor, but rather as a proven partner.

Our automated call center system ensures that your calls are routed to the right Customer Care person for prompt attention. Our customer care personnel are technically trained to discuss your requirements and provide the advice and services you expect from Carling Technologies. Each member of the Carling Customer Care team is technically trained on our standard products, and Application Engineers are also available to answer your more advanced technical questions. In addition, Carling is proud to offer a global network of fully trained representatives and distributors, who are always ready to service you.

Carling Technologies' Products

Within this catalog, you'll find a comprehensive line of hydraulic/magnetic and equipment leakage circuit breakers, from .1 to 700 amps, for most any circuit protection, power switching and circuit control need. We also offer thermal circuit protectors, electrical switches, electronic control systems and power distribution centers. For more information on our other products, please request one of the catalogs listed on the inside back cover of this catalog, or go to **www.carlingtech.com**.

How To Use This Catalog

Please refer to the Contents, located on this page, and the Product Selector Guide, located on pages 2 and 3, for the type of breaker required. Each breaker Series is located under an alphabetical code. Each code refers you to the specific pages covering an individual Series. Product features/specifications and dimensional drawings are provided to assist you with product selection.

Follow our easy step-by-step catalog number sequence to construct the circuit breaker, which meets your needs. An ordering format and an example for constructing a catalog number are provided for each Series.

www.carlingtech.com

Our website also offers a fast and easy way for you to configure part numbers and check stock on-line for your circuit breaker needs. Our on-line product selector will guide you to the right Series that fits your application, and the on-line product configurator will help you build a valid part number. A stock check feature is also included at **www.carlingtech.com**. Product Selector, Configurit, Product pages & PDF files make the Carling Technologies' web site your "one stop shop" for quick and thorough product information.

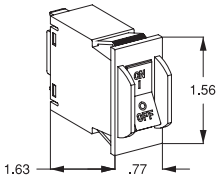
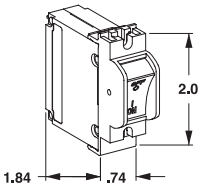
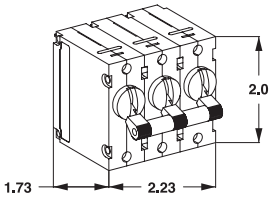
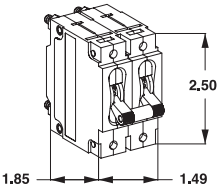
Customer Care Center

For additional application assistance, we urge you to consult with our experienced staff in our Customer Care Center. Our Technical and Engineering staff has extensive test, research and development capabilities, and have assisted many customers in solving unique design and application problems with standard or customized products. Please refer to our location listing on the back of this catalog, for contact information for your area.

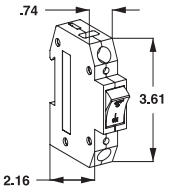
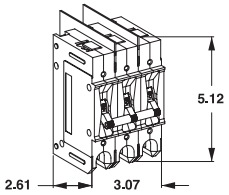
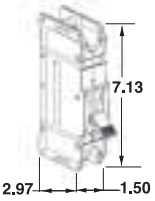
We look forward to working with you.

Contents

Hydraulic / Magnetic

	M-Series	A-Series	B-Series	C-Series
				
Number of Poles	1-2	1-6 (handle); 1-3 (rocker)	1-6	1-6 (handle); 1-3 (rocker)
Available Delays	Instant, Short Medium & High Inrush AC/DC	Instantaneous, Ultra-short, Short, Medium & Long, AC, DC, AC/DC High Inrush - Short, Medium & Long AC and DC	Instantaneous, Ultra-short, Short, Medium & Long, AC, DC, AC/DC High Inrush - Short, Medium & Long AC and DC	Instantaneous, Ultra-short, Short, Medium & Long, AC, DC, AC/DC High Inrush - Short, Medium & Long AC and DC
Maximum Current & Voltage Ratings	0.02 -15FLA, 32VDC, 125 VAC, 1-pole; 15.1-30GPA, 32VDC, 125VAC, 1-pole; 0.02-15FLA, 65VDC, 250VAC, 2-pole; 15.1-30GPA, 65VDC, 250VAC,2-pole; 0.02-12FLA, 250VAC, 1-pole; 0.02-7.5GPA, 50VDC, 1-pole 0.02-30A 80VDC Polarity Sensitive (1 pole)	0.02 -30A@277VAC, 80VDC 31.0-50A@125/250VAC, 65VDC	0.02 -30A@277VAC, 80VDC 31.0-50A@125/250VAC, 65VDC	***UL Listed*** 0.02-250A@80VDC 0.02-60A@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
Maximum Interrupting Capacity	1000A @ 65 VDC, 2-pole 1000A @ 32 VDC, 1-pole 1000A @ 250VAC, 2-pole 1000A @ 125VAC, 1-pole 1000A @ 65VDC, 1-pole (polarity sensitive) 600A@80VDC 1-pole (polarity sensitive)	3000A @ 65 VDC, UL only 3500A @ 65 VDC, w/fuse backup 3000A @ 125/250VAC, UL only 5000A @ 277VAC, w/fuse backup	3000A @ 65 VDC, UL only 3500A @ 65 VDC, w/fuse backup 3000A @ 125/250VAC, UL only 5000A @ 277VAC, w/fuse backup	***UL Listed*** 50000A@80VDC, 10,000A@120VAC, 5000A@125VDC, 240VAC ***UL Recognized*** 7500A@80VDC 3000A@125/250VAC, UL only 5000A @ 250VAC 5000A@480WYE/277VAC w/fuse backup
Auxilary Switch Ratings	7A@ 250VAC 0.1A@125VAC (gold contacts) 7A(res.)@28VDC 4A(Ind.)@28VDC	10.1A@125VAC 0.1A@125VAC (gold contacts) 0.5A@65VDC 0.1A@80VDC	10.1A@125VAC 0.1A@125VAC (gold contacts) 0.5A@65VDC 0.1A@80VDC	10.1A@250VAC 0.1A@125VAC (gold contacts) 0.5A@65VDC 0.1A@80VDC
Available Circuits	Series, Switch Only	Series, Shunt, Relay, Switch Only, Series w/Remote Shutdown, Relay & Shunt Trip Dual Coil	Series, Shunt, Relay, Switch Only, Series w/Remote Shutdown, Relay & Shunt Trip Dual Coil, Mid-Trip with Alarm Switch	Series, Shunt, Relay, Switch Only, Series w/Remote Shutdown, Relay & Shunt Trip Dual Coil, Mid-Trip with Alarm Switch
Terminal Options	.250" Tab w/ QC, 8-32 Screw	.250" Tab w/ QC, 8-32 & 10-32 Screw (& metric), PCB	.250" Tab w/ QC, 8-32 & 10-32 Screw (& metric), PCB	10-32 Stud, 1/4-20 Stud, 0-32 Screw w/ saddle clamp, Clip Terminal, 1/4 & 7/16 Push-In
Mounting Method	Rocker: Front Panel Snap-In Handle: Threaded Bushing, Push-Pull	Threaded inserts: Front Panel Snap-In	Threaded inserts: Front Panel Snap-In	Threaded inserts
Agency Approvals	UL, CSA, VDE(rocker), UL489A	UL, CSA, VDE, TUV(rocker), UL1500, UL489A	UL, CSA, VDE, TUV(rocker), UL1500, UL489, UL489A	UL, CSA, VDE, TUV, UL1500, UL489, UL489A
Dimensions				

Hydraulic / Magnetic

	D-Series	E-Series	F-Series
			
Number of Poles	1-4 (handle); 1-3 (rocker)	1-6	1-3
Available Delays	Instantaneous, Ultra-short, Short, Medium & Long, AC, DC, AC/DC High Inrush - Short, Medium & Long AC and DC	Instant, Short, Medium & Long - AC, DC, and AC/DC High Inrush - Short, Medium & Long- AC, DC, and AC/DC	Short, Medium & Long DC
Maximum Current & Voltage Ratings	0.02 -50A@277VAC, 65VDC 0.02-30A@480WYE /277VAC, 2 pole, 1Ø, 3 pole 3Ø	***UL Listed*** 0.02-100A@240VAC, 65VDC, 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 ***UL489A Listed*** 250-700A@125VDC
Maximum Interrupting Capacity	1500A without fuse, 5000A with fuse @ 65 VDC, 250VAC, VDE only 5000A @ 65 VDC 5000A @ 480WYE/277VAC, w/fuse backup,UL only 3000A @ 125/250VAC, UL only	***UL Listed*** 25000A@65VDC 5000A@125VDC & 240VAC ***UL Recognized*** 5000A @ 125VDC 5000A @ 600VAC, without fuse backup 10000A @ 600VAC, w/fuse backup	50000A@125VDC
Auxilary Switch Ratings	n/a	10.1A@ 250VAC 1.0A@65VDC 0.1A@80VDC	10.1A@ 250VAC 0.5A@65VDC 0.1A@80VDC
Available Circuits	Series, Switch Only, Series w/Remote Shutdown	Series, Shunt, Relay, Switch Only, Series w/Remote Shutdown	Series & Switch Only with or without Metering Shunt
Terminal Options	Recessed Wire-ready, Pressure Plate Type Screw Terminals	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	Rear Mounted on DIN Rail or Front Panel	Rear or Front Panel	Rear or Front Panel
Agency Approvals	UL, CSA, VDE	UL, CSA, VDE, UL1500, UL489	CUL,TUV, UL489, UL489A
Dimensions			

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.

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 ignition-protected, 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, A, B, C, D and E-Series breakers have been certified to meet EN 60934 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.

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 circuit protection product line, please see our thermal circuit protection catalog.

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 Circuit Breaker Trip

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

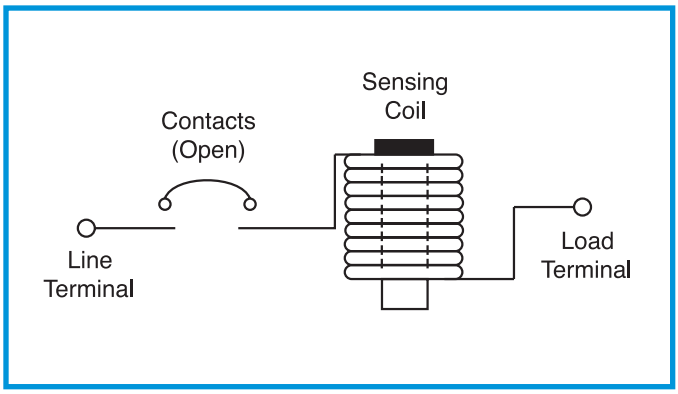


Figure 1

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

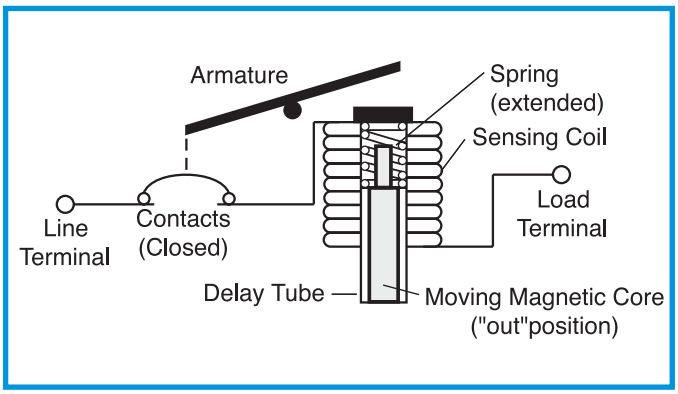


Figure 2 - Rated Current or Less

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

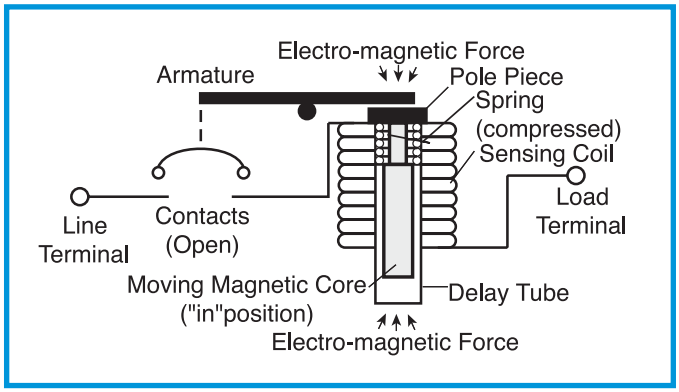


Figure 3 - Moderate Overload with Induced Delay

Under short circuit conditions, the resultant increase in electro-magnetic 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)

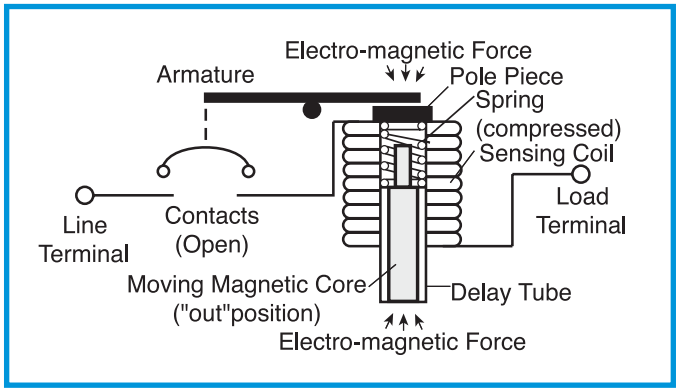


Figure 4 - Short Circuit Condition - No Induced Delay

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.

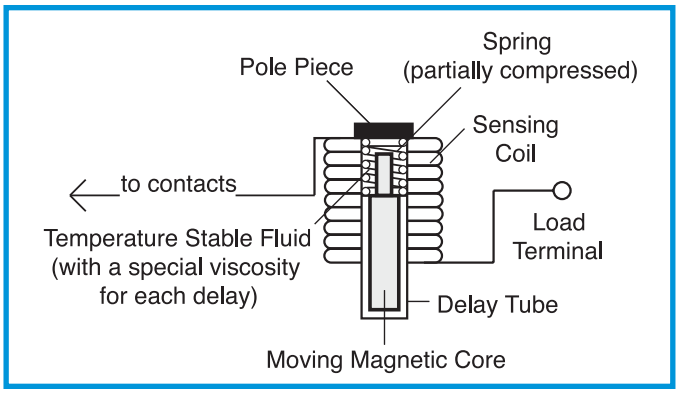


Figure 5 - Rated Current or Less

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.

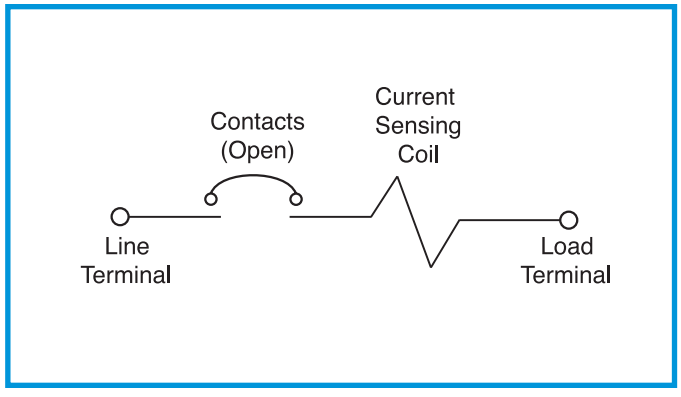
By use of magnetic “shunt” plates within the magnetic circuit, it is possible to divert magnetic flux resulting in higher “inrush withstanding capability” (or high inrush delays). These delays disregard short duration, high pulse surges (typically 8ms or less and up to 25x rated current), characteristic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

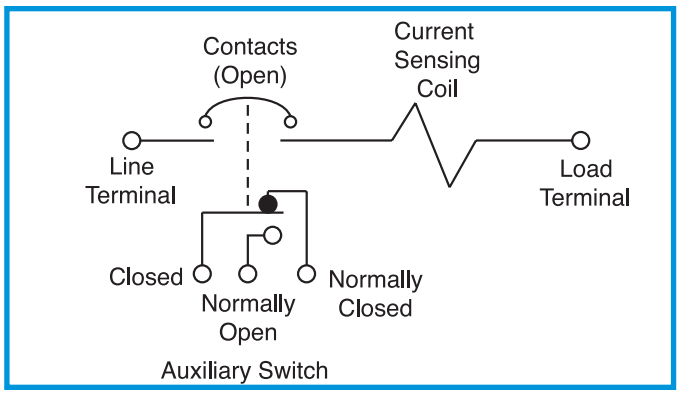
Series Trip

A basic two terminal device is usually used as a combination power switch and overload protector. The contacts and current sensing coil are connected in series with the line and load terminals.



Series Trip with Auxiliary Switch

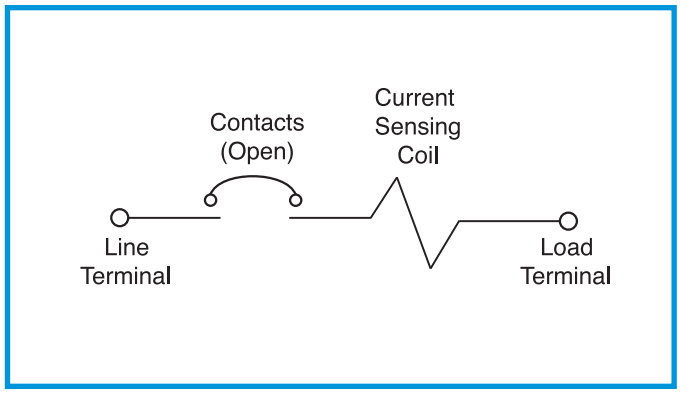
Same as a Series Trip except with the addition of a S.P.D.T. snap-action switch, which is electrically isolated, but mechanically linked to the movement of the main breaker contacts. This switch is commonly used to remotely signal the status of the breaker (ON or OFF/TRIPPED).



Series Mid-Trip with Auxiliary/Alarm Switch

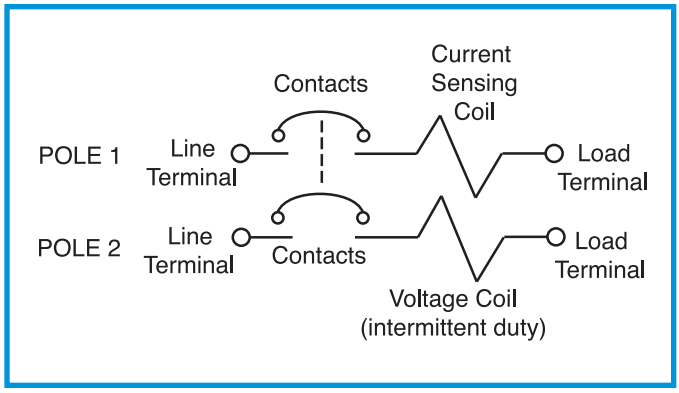
Similar to “Series Trip with Auxiliary Switch” except the S.P.D.T. auxiliary switch is actuated only upon electrical trip of the breaker. Upon electrical trip, the “N.O.” contact closes and the “N.C.” contact opens. This can be used to remotely signal the “TRIPPED” status of the breaker. Also, upon electrical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

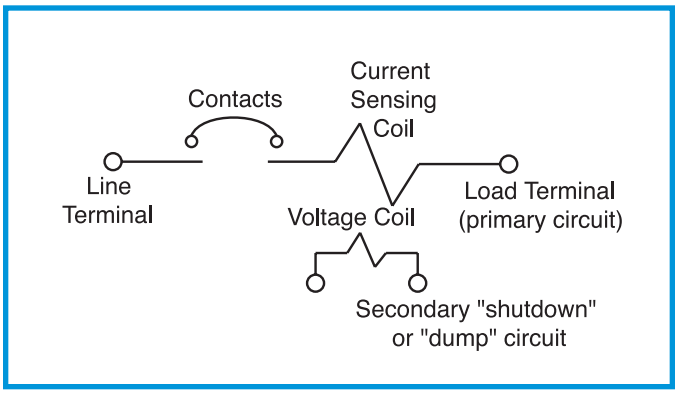
(For “dump” circuit or “panic” circuit applications). Same as a Series Trip but with an additional (self-interrupting) “voltage coil” pole (usually of opposite polarity) for remote shutdown. In the example, a momentary voltage pulse to Pole 2 will shut down both Pole 1 and Pole 2. Because the voltage 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.



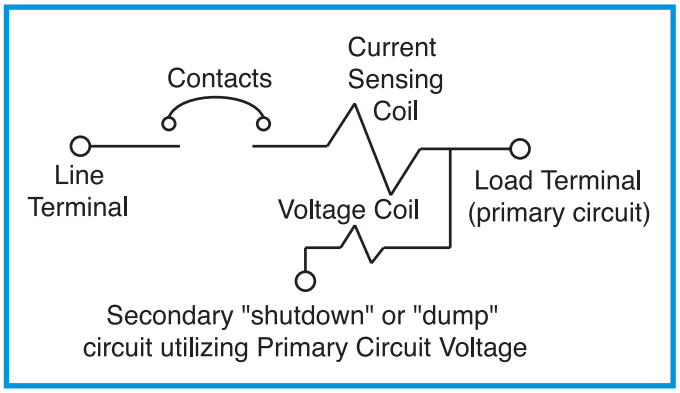
Dual Coil with Remote Shutdown

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.



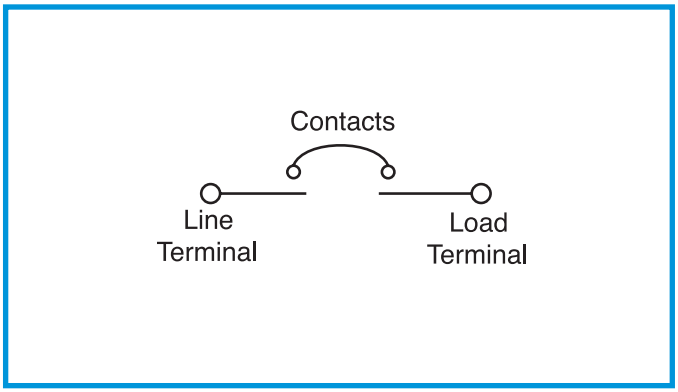
The other circuit option is the “**Shunt Trip Dual Coil**”, a three terminal device with one side of the voltage coil internally connected to the primary circuit. The other side of the voltage coil is connected to an external third terminal on the bottom of the breaker. This circuit option uses line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

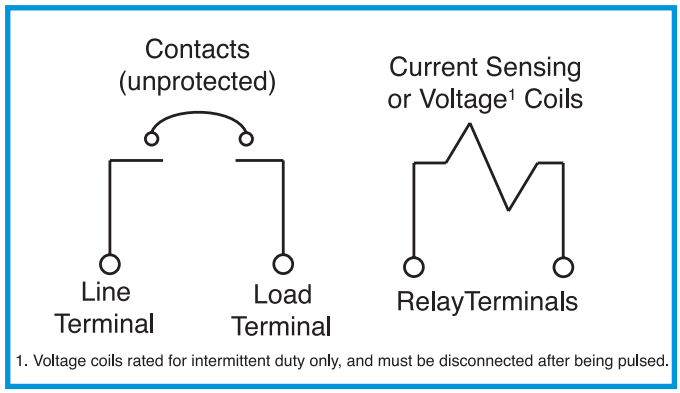
Switch Only

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

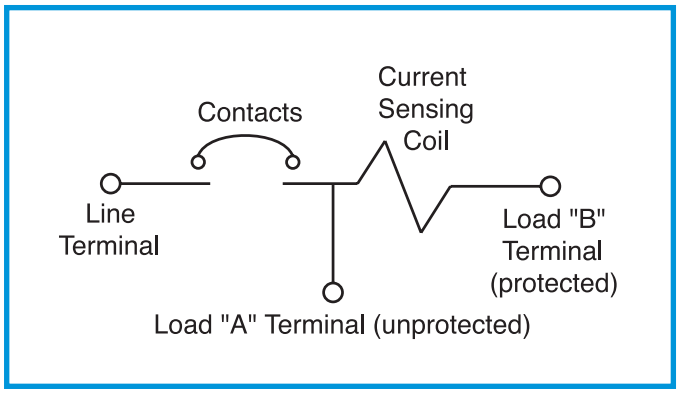
A four terminal device in which the contact and coil circuits are electrically isolated but mechanically linked. An overload in the coil circuit will cause the contact circuit to open. These circuits may be of opposite polarity. Commonly used in dump circuit, panic circuit, and remote shutdown applications.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



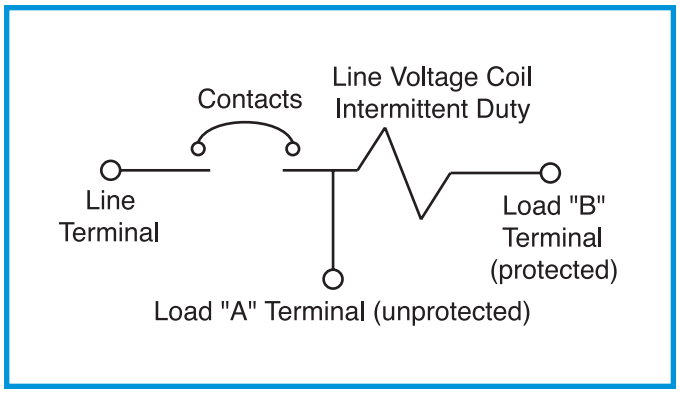
1. Voltage coils rated for intermittent duty only, and must be disconnected after being pulsed.

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. Because the voltage coil is self-interrupting, no additional components, such as auxiliary switches, etc., are needed in the load (B) circuit.

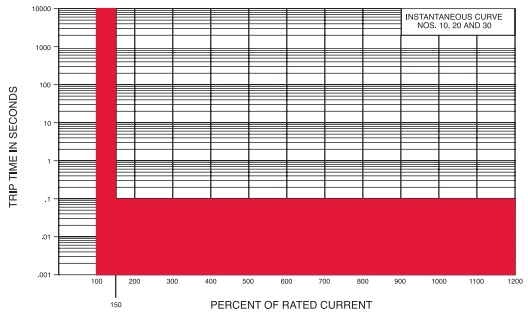


M-SERIES TIME DELAY VALUES										
	PERCENT OF RATED CURRENT									
	Delay	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP	10, 20, 30	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
TIME	12, 22, 32, 62, 72, 92	No Trip	.300 - 7.00	.200 - 5.00	.100 - 2.00	.030 - .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

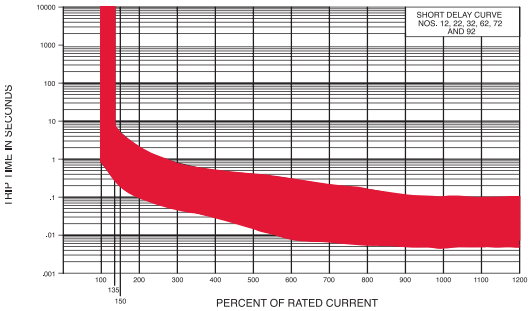
NOTES:
Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
The minimum inrush pulse tolerance handling capability is 12 times the rated current 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

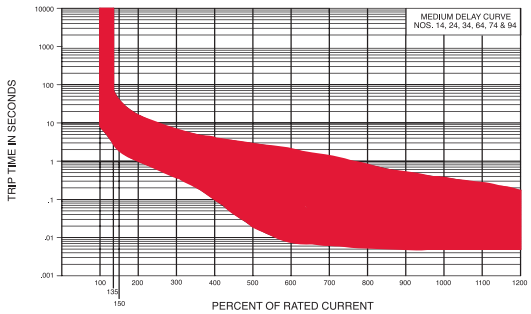
Instantaneous



Short



Medium



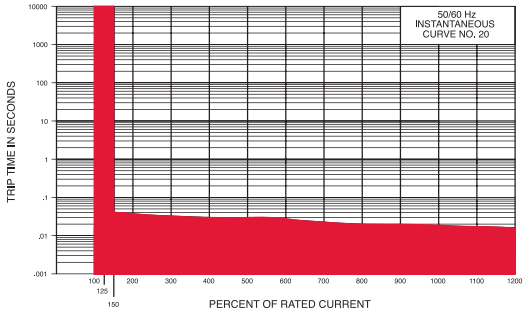
A, B, C & D-SERIES TIME DELAY VALUES											
	PERCENT OF RATED CURRENT										
	DELAY	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP TIME (SECONDS)	10	No Trip	May Trip	---	.032 MAX	.024 MAX	.020 MAX	.018 MAX	.016 MAX	.015 MAX	.013 MAX
	11	No Trip	.013 - .125	---	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020	.004 - .020
	12	No Trip	.500 - 6.50	---	.300 - 3.00	.130 - 1.20	.031 - .220	.011 - .120	.004 - .090	.004 - .060	.004 - .040
	14	No Trip	2.00 - 60.0	---	1.20 - 40.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .100	.004 - .100
	16	No Trip	45.0 - 345	---	20.0 - 150	9.00 - 60.0	1.40 - 11.4	.150 - 5.80	.009 - 3.70	.005 - 1.70	.005 - .500
	20	No Trip	May Trip	---	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
	21	No Trip	.014 - .150	---	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
	22	No Trip	.700 - 12.0	---	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
	24	No Trip	10.0 - 160	---	6.00 - 60.0	2.20 - 20.0	.300 - 3.00	.050 - 1.30	.007 - .500	.005 - .060	.005 - .040
	26	No Trip	50.0 - 700	---	32.0 - 350	10.0 - 90.0	1.50 - 15.0	.500 - 7.00	.020 - 3.00	.006 - 2.00	.005 - 1.00
	32	No Trip	May Trip	.400 - 8.00	.300 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .060	.004 - .040
	34	No Trip	May Trip	1.80 - 100	1.20 - 60.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .110	.004 - .100
	36	No Trip	May Trip	35.0 - 520	20.0 - 350	9.00 - 90.0	1.40 - 15.0	.150 - 7.00	.009 - 3.70	.005 - 2.00	.004 - 1.00
	42	No Trip	.700 - 12.0	---	.400 - 6.00	.180 - 2.30	.050 - .600	.026 - .300	.018 - .200	.014 - .150	.012 - .130
	44	No Trip	7.00 - 100	---	3.00 - 50.0	1.10 - 18.0	.220 - 3.00	.120 - 1.70	.075 - 1.20	.050 - .850	.042 - .720
	46	No Trip	50.0 - 700	---	31.0 - 350	12.0 - 150	1.50 - 20.0	.700 - 10.0	.404 - 7.90	.260 - 6.50	.198 - 5.80
	52	No Trip	.500 - 6.50	---	.340 - 4.50	.180 - 2.30	.051 - .600	.030 - .320	.018 - .220	.014 - .200	.012 - .130
	54	No Trip	1.50 - 50.0	---	.750 - 35.0	.350 - 18.0	.110 - 3.00	.070 - 1.70	.045 - 1.40	.039 - 1.30	.035 - 1.30
	56	No Trip	45.0 - 345	---	19.0 - 170	8.50 - 100	1.24 - 15.0	.410 - 9.00	.256 - 8.00	.210 - 5.50	.198 - 2.90

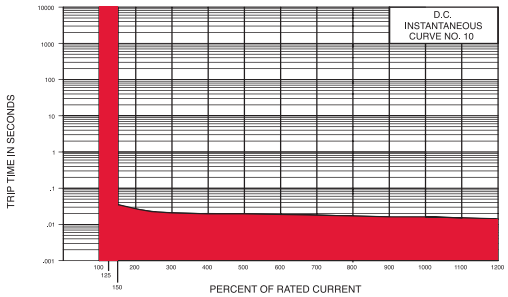
NOTES:
UL489 C-Series Breakers available with Delay Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46.
Delay Curves 11,12,14,16,21,22,24,26,42,44,46,52,54,56: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.
Delay Curves 32,34,36: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
Delay Curves 10,20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
On 50 amp and less current ratings, the minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 25 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration such as switching power supplies, highly capacitive loads and transformer loads.

AC

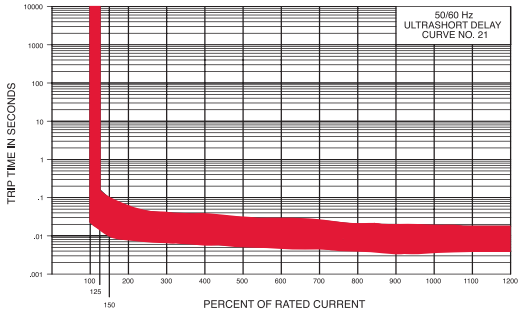
DC

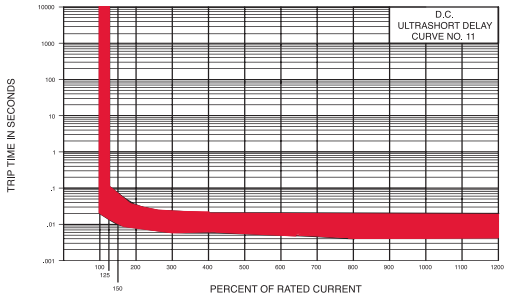
Instantaneous



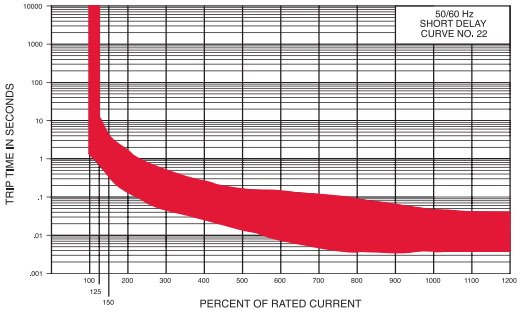


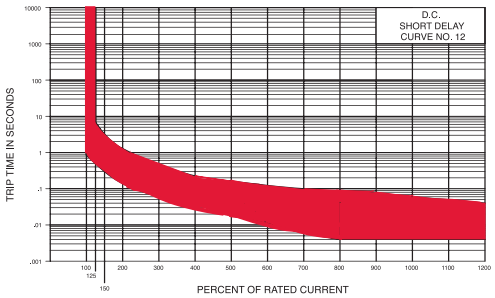
Ultrashort





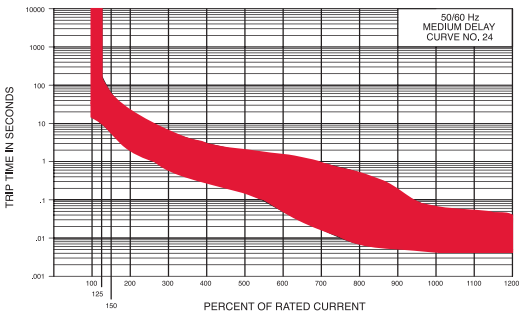
Short



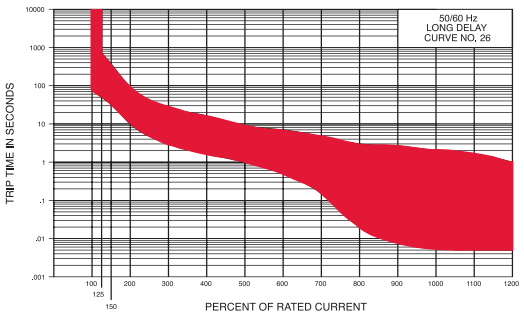


AC

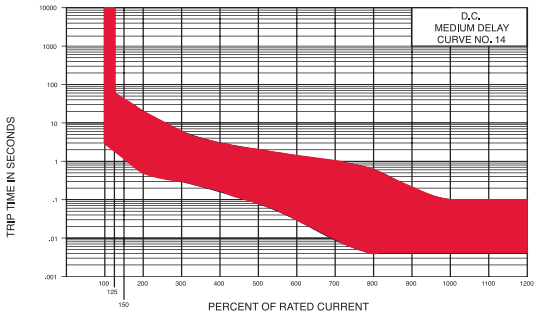
Medium

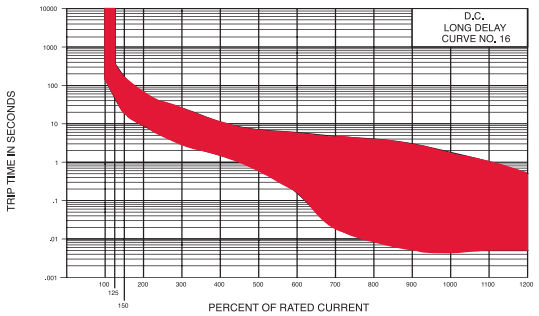


Long



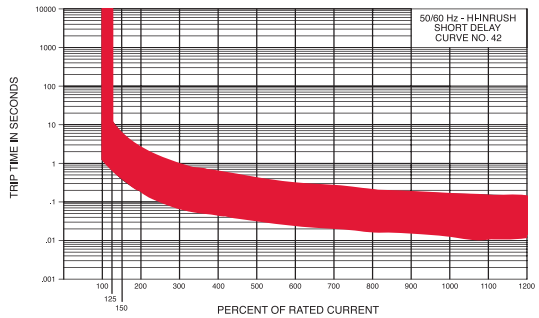
DC (A-D-Series Only)



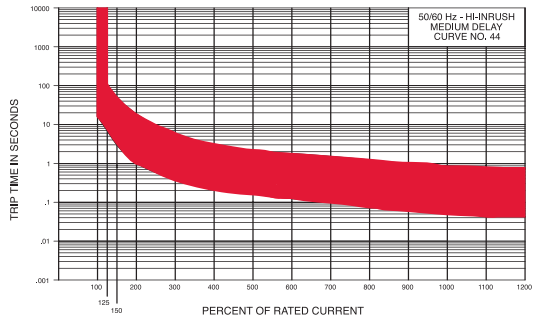


High Inrush AC

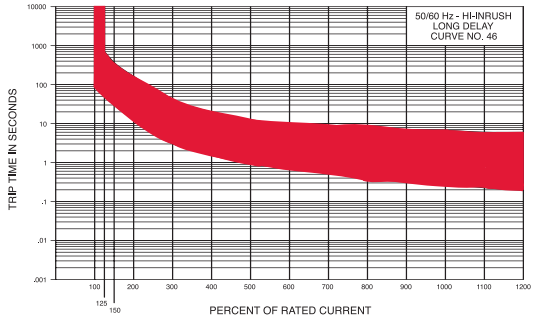
Short



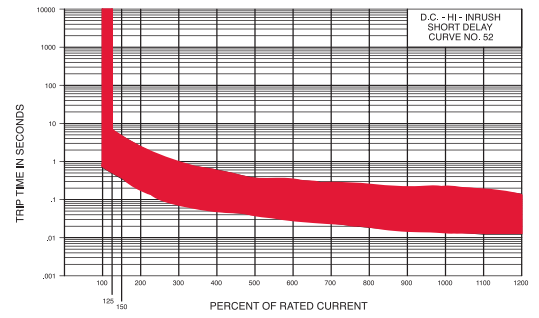
Medium

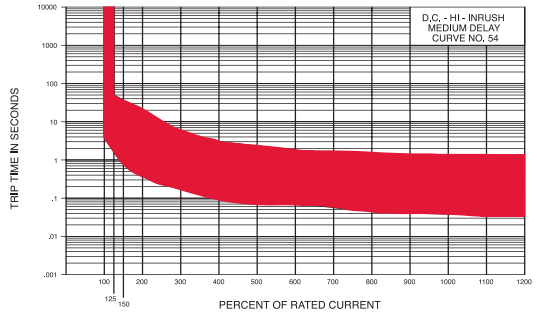


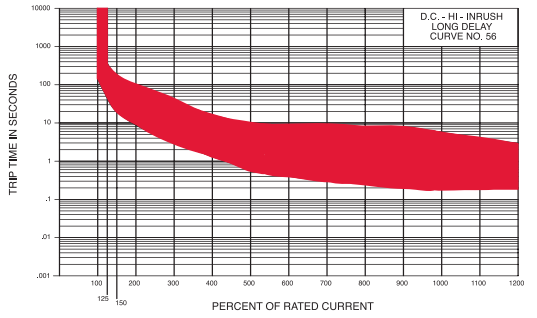
Long



High Inrush DC (A-D-Series Only)

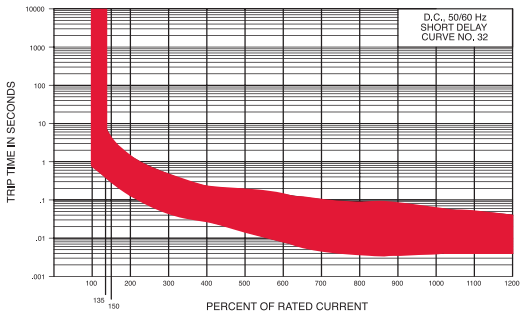




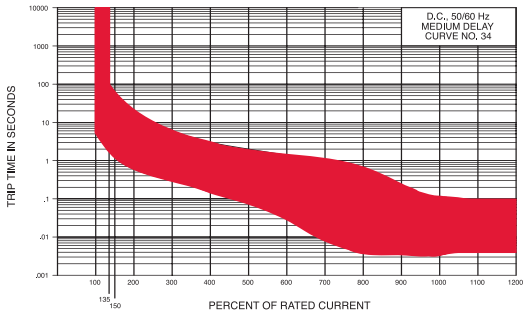


AC/DC

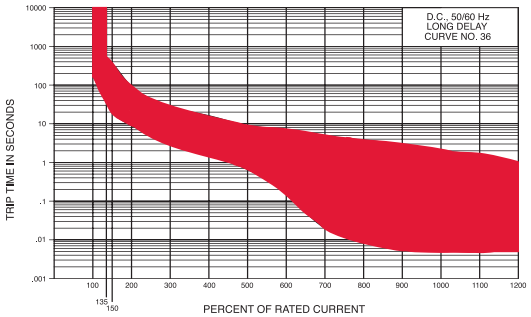
Short



Medium



Long



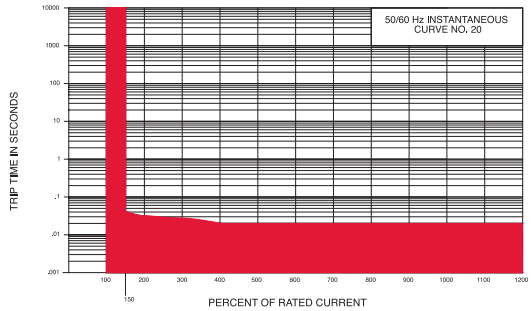
E-SERIES TIME DELAY VALUES											
	PERCENT OF RATED CURRENT										
	Delay	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP TIME (SECONDS)	10	No Trip	May Trip	---	.001 - .038	.001 - .032	.001 - .021	.001 - .019	.001 - .019	.001 - .019	.001 - .019
	12, 72	No Trip	.600 - 7.00	---	.330 - 2.00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

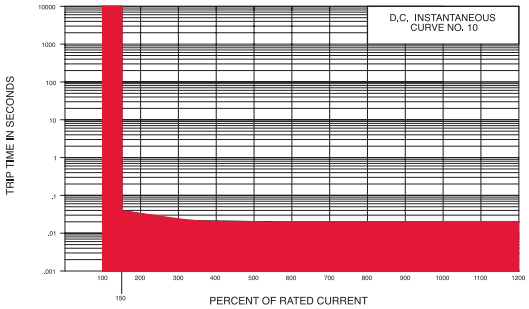
NOTES
Delay Curves 10,20,30: Breakers to hold 100% and must trip at 150% of rated current and greater wthin the time limit shown in these curves.
Delay Curves 12,14,16,22,24,26,62,64,66,72,74,76: Breakers to hold 100% and must trip at 125% of rated current and greater wthin the time limit shown in these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

AC

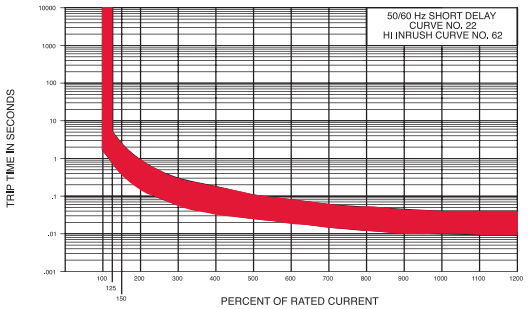
DC

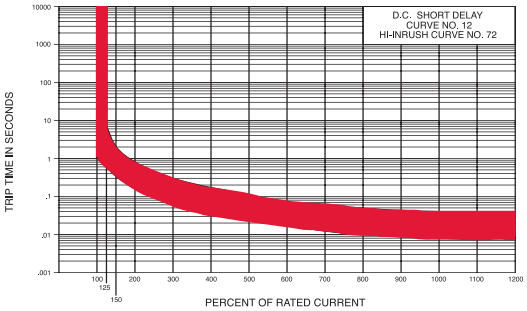
Instantaneous





Short





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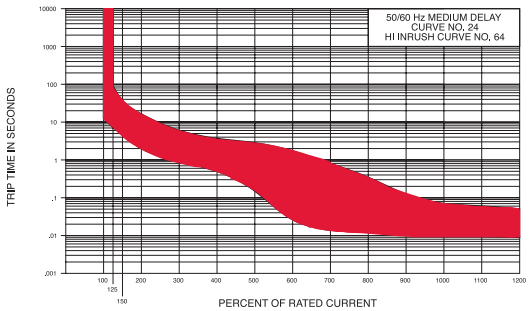

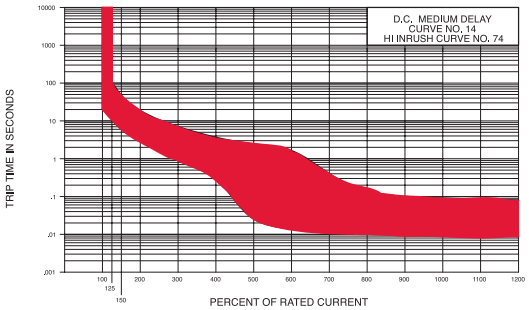

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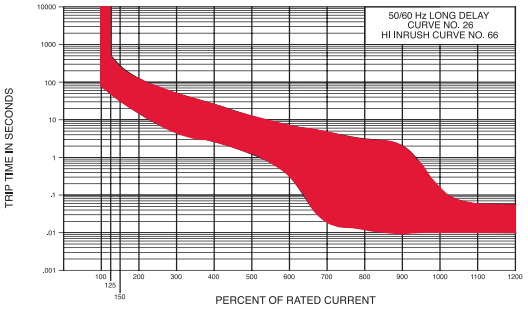
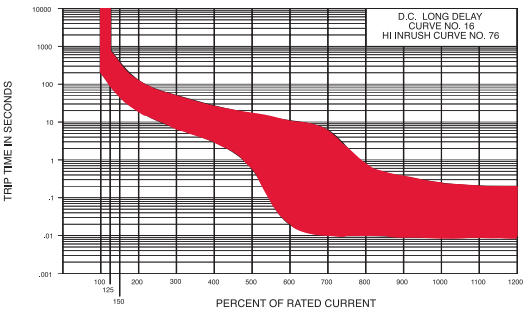
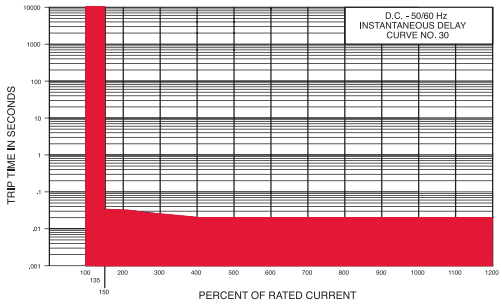




AC/DC

Instantaneous



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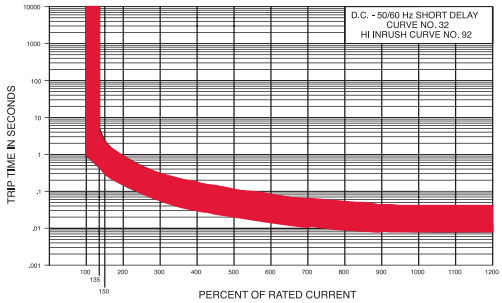

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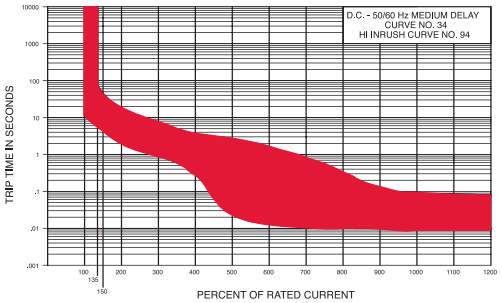

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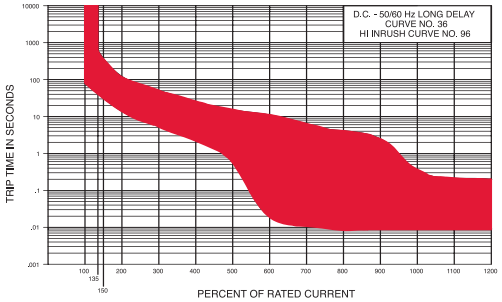
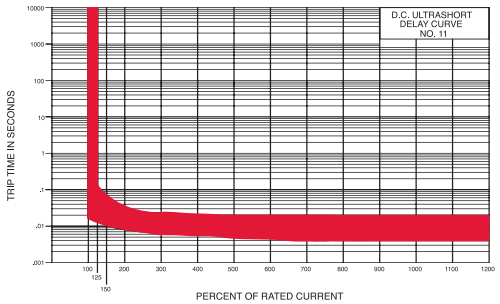


F-SERIES TIME DELAY VALUES									
	PERCENT OF RATED CURRENT								
	Delay	100%	125%	150%	200%	400%	600%	800%	1000%
TRIP TIME SECONDS	11	No Trip	.013 - .125	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020
	12	No Trip	.475 - 10.0	.275 - 2.80	.140 - .850	.030 - .190	.015 - .125	.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

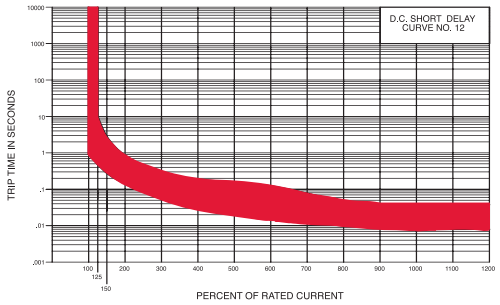
NOTES:
UL489 F-Series Breakers available with Delay Curves 11, 12, 14, 16.
Delay Curves 11,12,14,16: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
The minimum inrush pulse tolerance handling capabilities is 10 times rated current based on a 60 Hz 1/2 cycle, 8.33 ms pulse.

DC

Ultrashort



Short



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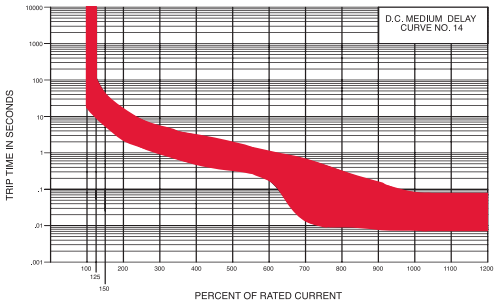
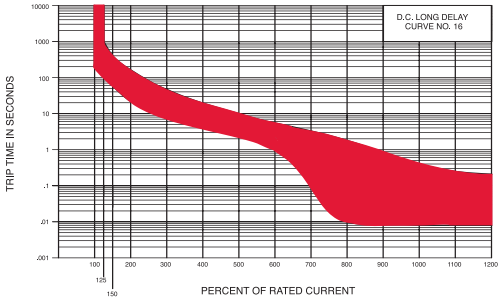


Long



The low cost M-Series utilizes the hydraulic magnetic principle which provides accurate and reliable circuit protection even when exposed to extremely hot and/or cold application environments.

Available in a choice of rocker actuator styles and colors, push button, push-pull, paddle, and baton style handle actuators, the Visi-Rocker® two-color actuators as well as non-illuminated or illuminated rocker versions with LED or neon bulbs. The exclusive Rockerguard® bezel helps prevent inadvertent actuation. "Wiping" contact design insures long term reliability. Various styling options allow design flexibility.

Typical applications include power supplies, medical equipment, and telecommunications equipment. In addition, these breakers meet CSA Standard 22.2 No. 100 for the Generator & Welder markets.

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 under 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

Electrical

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	
							U L/ 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	50 / 60	1	0.02 - 12	—	1	---	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	250 [2]	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	—	1	---	360	TC1,OL1,U2	TC3, OL1, U3

NOTES FOR TABLE A
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

Electrical

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	
							U L/ CSA		VDE / TUV			
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS		WITH BACKUP FUSE	WITHOUT BACKUP FUSE	WITH BACKUP FUSE [5]	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 - 20 [4]	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 [3]	DC	—	0.02 - 15	—	2	—	1000	3000	500	TC1,2, OL1, U1	TC1,2, OL1, U1
				—	15.1 - 20 [4]	2	—	1000	3000	500	TC1,2, OL0, U1	TC1,2, OL0, U1
	65	DC	—	0.02 - 15	—	2	5000	—	3000	500	TC1,2, OL1, C1	TC1,2, OL1,C1
					15.1 - 20 [4]	2	5000	—	3000	500	TC1,2, OL0, C1	TC1,2, OL0, C1
	80 [1]	DC	—	0.02 - 15	—	1	—	600 [4]	—	600	TC1,2, OL1, U1	TC1,2, OL1, U1
				—	15.1 - 25 [4]	1	—	600 [4]	—	600	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 [5]	—	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, OL1, U1	TC1,2, OL1, U1
				1 - 12	—	1 [5]	—	360	3000	500	TC1,OL1,U2	TC3, OL1, U3

NOTES FOR TABLE B
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 15 amps, 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.

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

M-SERIES TABLE C: UL489A (COMMUNICATIONS EQUIPMENT - POLARITY SENSITIVE)

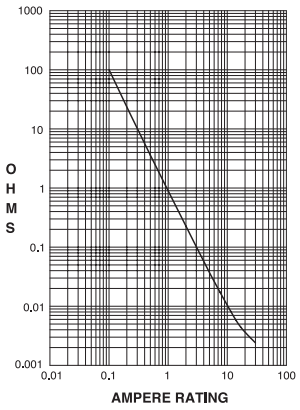
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING GENERAL PURPOSE AMPS	POLES BREAKING	INTERRUPTING CAPACITY (AMPS)	
					WITHOUT BACKUP FUSE	
	MAX. RATING	FREQUENCY			UL489A	TUV
SERIES	80	DC	0.02 - 30	1	600	--
	65 [1]	DC	0.02 - 30	1	1000	--
	80	DC	0.10 - 25	1	600	600

NOTES FOR TABLE C
1. Available only with Special Caralog Number

Electrical

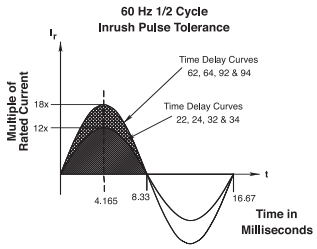
Maximum Voltage	125/250 VAC 50/60 Hz, 80 VDC (See Rating Tables.)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00 thru 15.0 in 1 amp increments, 18.0, 20.0, 25.0, 30.0. Other ratings available - see Ordering Scheme.
Auxiliary Switch Rating	SPDT; 7A 250VAC, 7A (Res) 28VDC, 4A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

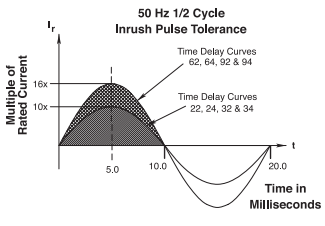
RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Breaker)



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 20.0	25%
20.1 - 30.0	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 Configurations	Series with or without Auxiliary Switch. Switch Only with or without Auxiliary Switch.
Weight	Approximately 30 grams/pole (Approximately 1.07 ounces/pole)
Standard Colors	See Ordering Scheme.

Environmental

Designed 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, 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.

M	M	1	–	B	–	34	–	260	–	1	–	1	B	B	–	B	–	C
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

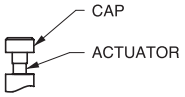
2 ACTUATOR [1]

Handle

M Paddle 

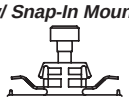
N Baton 

Push Button

T Push-Pull 

U Push To Reset 

Push Button w/ Snap-In Mounting

V Push-Pull 

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:***
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.

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

6 CURRENT RATING (AMPERES)[8]

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	**717**	17.500
075	0.075	**280**	0.800	**465**	6.500	**618**	18.000
080	0.080	**285**	0.850	**470**	7.000	**619**	19.000
085	0.085	**290**	0.900	**475**	7.500	**620**	20.000
090	0.090	**295**	0.950	**480**	8.000	**622**	22.000
095	0.095	**410**	1.000	**485**	8.500	**624**	24.000
210	0.100	**512**	1.250	**490**	9.000	**625**	25.000
215	0.150	**415**	1.500	**495**	9.500	**630**[9]	30.000
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 w/upturned lugs	**P**[12]	Printed Circuit Board
3[10]	Screw 8-32 (Bus Type)		

8 ACTUATOR COLOR[5]

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 w/ locking ring	**C**	
Black	**D**	
Black w/ locking ring	**E**	
Panel Dress Nut		
Bright nickel	**F**	
Bright nickel w/ locking ring	**G**	
Black	**H**	
Black w/ 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 [8]

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

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 following chart:

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

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 25 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.

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 

N Baton 

Push Button

T Push-Pull 

U Push To Reset 

Push Button w/ Snap-In Mounting

V Push-Pull 

W Push To Reset 

3 POLES
1 One

4 CIRCUIT
without Auxiliary Switch

B Series Trip (Current)

with Auxiliary Switch, Silver Contacts	***Terminal Type:***
S [2] Series Trip (Current)	.060 Dia, Round Solder Turret
T [2,3] Series Trip (Current)	.058 Dia, Round Q.C.
U[3, 12] 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.

5 FREQUENCY & DELAY

12	DC Short	**72**	DC, Short, Hi-Inrush
14	DC Medium	**74**	DC, Medium, Hi-Inrush

6 CURRENT RATING (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	**717**	17.500
075	0.075	**280**	0.800	**465**	6.500	**618**	18.000
080	0.080	**285**	0.850	**470**	7.000	**619**	19.000
085	0.085	**290**	0.900	**475**	7.500	**620**	20.000
090	0.090	**295**	0.950	**480**	8.000	**622**	22.000
095	0.095	**410**	1.000	**485**	8.500	**624**	24.000
210	0.100	**512**	1.250	**490**	9.000	**625**	25.000
215	0.150	**415**	1.500	**495**	9.500	**630**	30.000
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 w/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 w/ locking ring	**C**	
black	**D**	
black w/ locking ring	**E**	
Panel Dress Nut		
bright nickel	**F**	
bright nickel w/ locking ring	**G**	
black	**H**	
black w/ 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 Cap (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

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. 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.

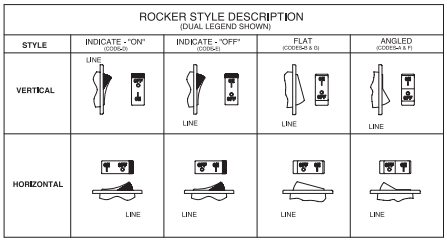
M	G	2	–	B	–	34	–	620	–	1	H	C	6	–	7	–	C
1 Series	2 Actuator	3 Poles		4 Circuit		5 Frequency & Delay		6 Current Rating		7 Terminal	8 Illumination	9 Actuator Color	10 Legend		11 Bezel Color		12 Agency Approval

1 SERIES
M

2 ACTUATOR [1]

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

ROCKER STYLE DESCRIPTION
(DUAL LEGEND SHOWN)



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:***
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.

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

6 CURRENT RATING (AMPERES)[10]

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	**717**	17.500
075	0.075	**280**	0.800	**465**	6.500	**618**	18.000
080	0.080	**285**	0.850	**470**	7.000	**619**	19.000
085	0.085	**290**	0.900	**475**	7.500	**620**	20.000
090	0.090	**295**	0.950	**480**	8.000	**622**	22.000
095	0.095	**410**	1.000	**485**	8.500	**624**	24.000
210	0.100	**512**	1.250	**490**	9.000	**625**	25.000
215	0.150	**415**	1.500	**495**	9.500	**630**[12]	30.000
220	0.200	**517**	1.750	**610**	10.000		

7 TERMINAL [10]

1	Push-On 0.250 Tab (Q.C.)	**A**[14]	Push-In Stud
2[13]	Screw 8-32 w/upturned lugs	**P**[15]	Printed Circuit Board
3[13]	Screw 8-32 (Bus Type)		

8 ROCKER ILLUMINATION

Non-illuminated	**A**		
Neon [5]	Neon	Green Glow[8]	
without resistor, 120VAC/250VAC	**B**	**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 [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	**5**	I - O Horizontal
2	ON - OFF Vertical	**6**	Dual Vertical
3	ON - OFF Horizontal	**7**	Dual Horizontal
4	I - O Vertical		

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

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 following chart:

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

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 and VDE Certified to 25 amps. 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.

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

A	Angled	**B**	Flat

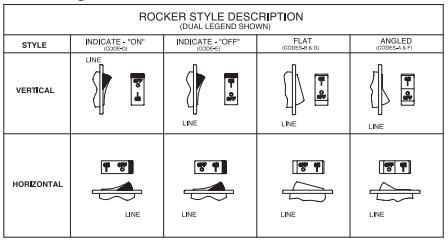
Two Color Visi-Rocker

D	Indicate ON	**E**	Indicate OFF

Illuminated single color

F	Angled	**G**	Flat

ROCKER STYLE DESCRIPTION
(DUAL LEGEND SHOWN)



3 POLES
1 One

4 CIRCUIT[2]
without Auxiliary Switch

B	Series Trip (Current)	

with Auxiliary Switch, Silver Contacts		***Terminal Type***
S	Series Trip (Current)	.060 Dia, Round Solder Turret
T[3]	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[3]	Series Trip (Current)	.058 Dia, Round Q.C.
5[3, 13]	Series Trip, Maintained Contacts	.080 Dia x .020 Flat Q.C.

5 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)

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	**717**	17.500
075	0.075	**280**	0.800	**465**	6.500	**618**	18.000
080	0.080	**285**	0.850	**470**	7.000	**619**	19.000
085	0.085	**290**	0.900	**475**	7.500	**620**	20.000
090	0.090	**295**	0.950	**480**	8.000	**622**	22.000
095	0.095	**410**	1.000	**485**	8.500	**624**	24.000
210	0.100	**512**	1.250	**490**	9.000	**625**	25.000
215	0.150	**415**	1.500	**495**	9.500	**630**	30.000
220	0.200	**517**	1.750	**610**	10.000		

7 TERMINAL [9]

1	Push-On 0.250 Tab (Q.C.)	**A**[11]	Push-In Stud
2	Screw 8-32 w/upturned lugs	**P**[12]	Printed Circuit Board
3	Screw 8-32 (Bus Type)		

8 ILLUMINATION

Non-illuminated	**A**		
Neon [4]	Neon	Green Glow [7]	
without resistor, 120VAC/250VAC	**B**	**C**	
LED	Red	Green	Amber
without resistor [5, 7]	**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]

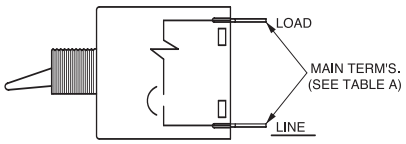
Color	without Rockerguard	with Rockerguard
White	**A**	**1**
Black	**B**	**2**
Gray	**G**	**7**

12 AGENCY APPROVAL[9]

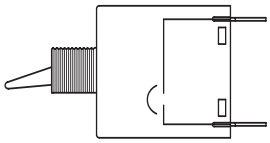
J	UL489A Listed & TUV Certified
M	UL Recognized & CSA Accepted
N	TUV Certified, UL Recognized & CSA Accepted
T	UL489A Listed

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.

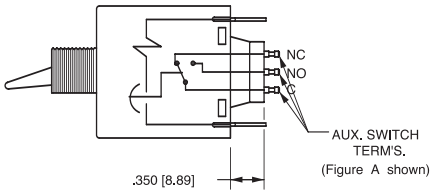
SERIES TRIP



SWITCH ONLY



SERIES TRIP W/ AUXILIARY SWITCH



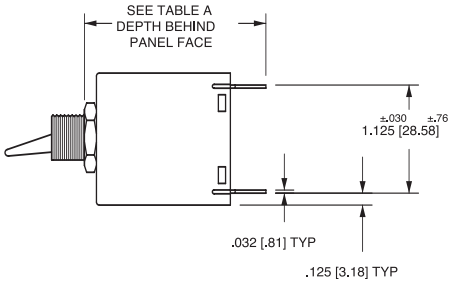


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C)	1.890 [48.00]
	SCREW (#8-32)	1.930 [49.03]
	PUSH-IN STUD	2.520 [64.00]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.035 [51.69]
	ROUND Q.C TYPE	2.025 [51.44]
	FLAT QUICK-CONNECT	2.129 [54.08]
	FLAT SOLDER LUG	2.012 [51.10]

*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

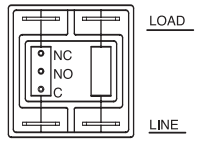


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCH TERMINALS

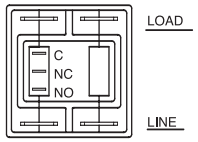
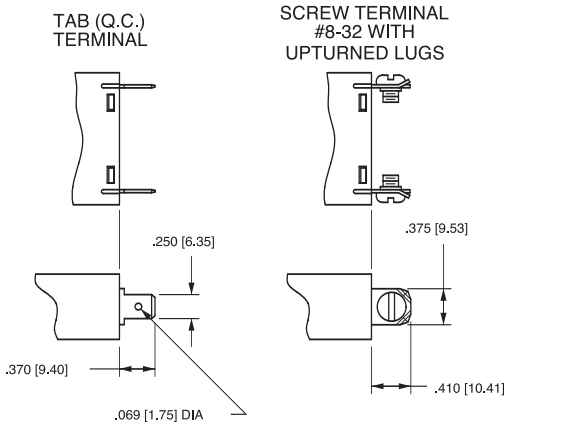
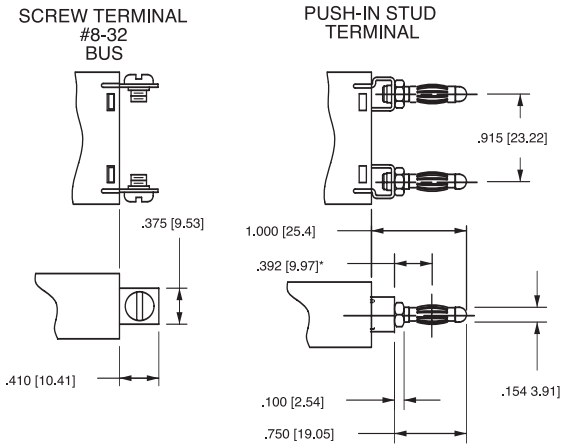
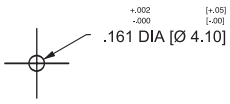


FIG. B

TERMINAL DIMENSIONAL DETAIL



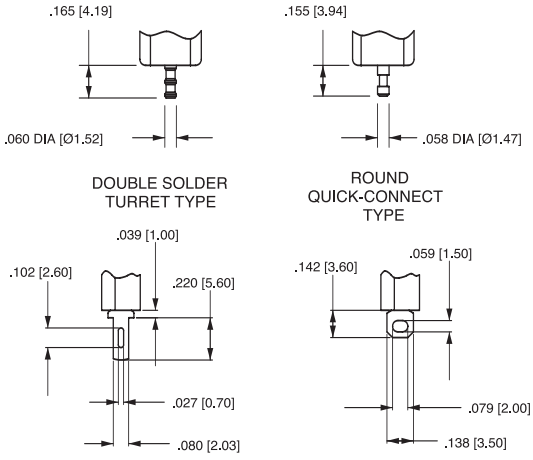




*CENTERLINE OF PUSH-IN STUD CONTACT AREA

PUSH-IN STUD MATING HOLE

AUXILIARY SWITCH TERMINALS



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

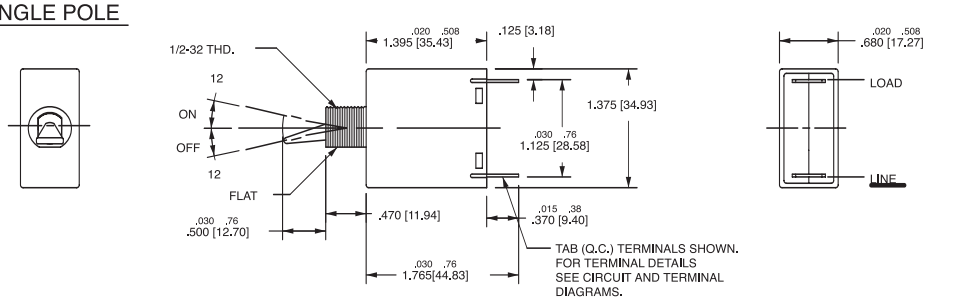
FLAT SOLDER LUG TYPE

*AVAILABLE THROUGH SPECAIL CATALOG PART NUMBER

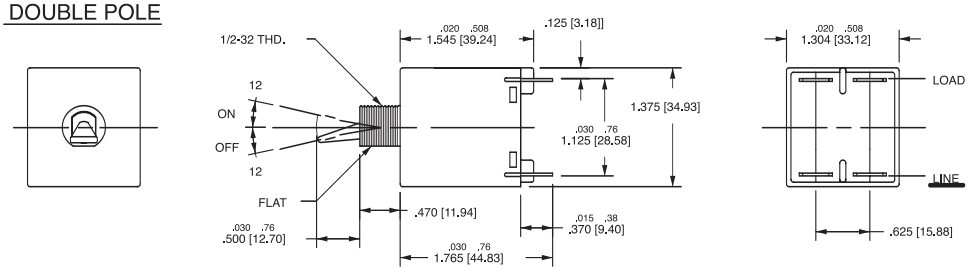
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

PADDLE ACTUATOR STYLE

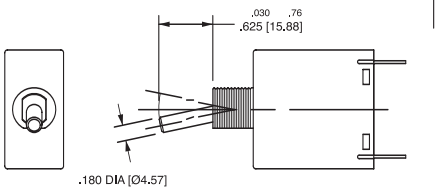
SINGLE POLE



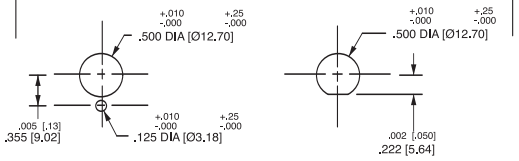
DOUBLE POLE



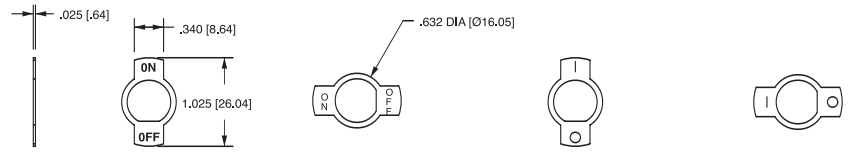
BATON ACTUATOR STYLE



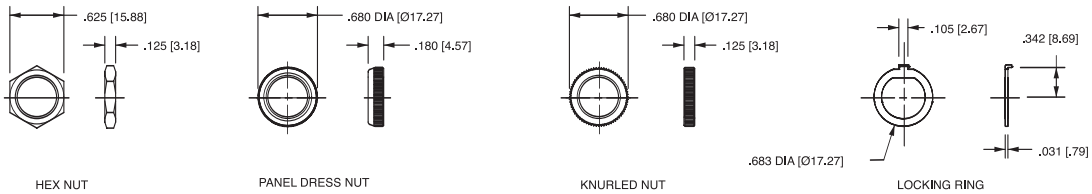
MOUNTING DETAILS



LEGEND PLATES

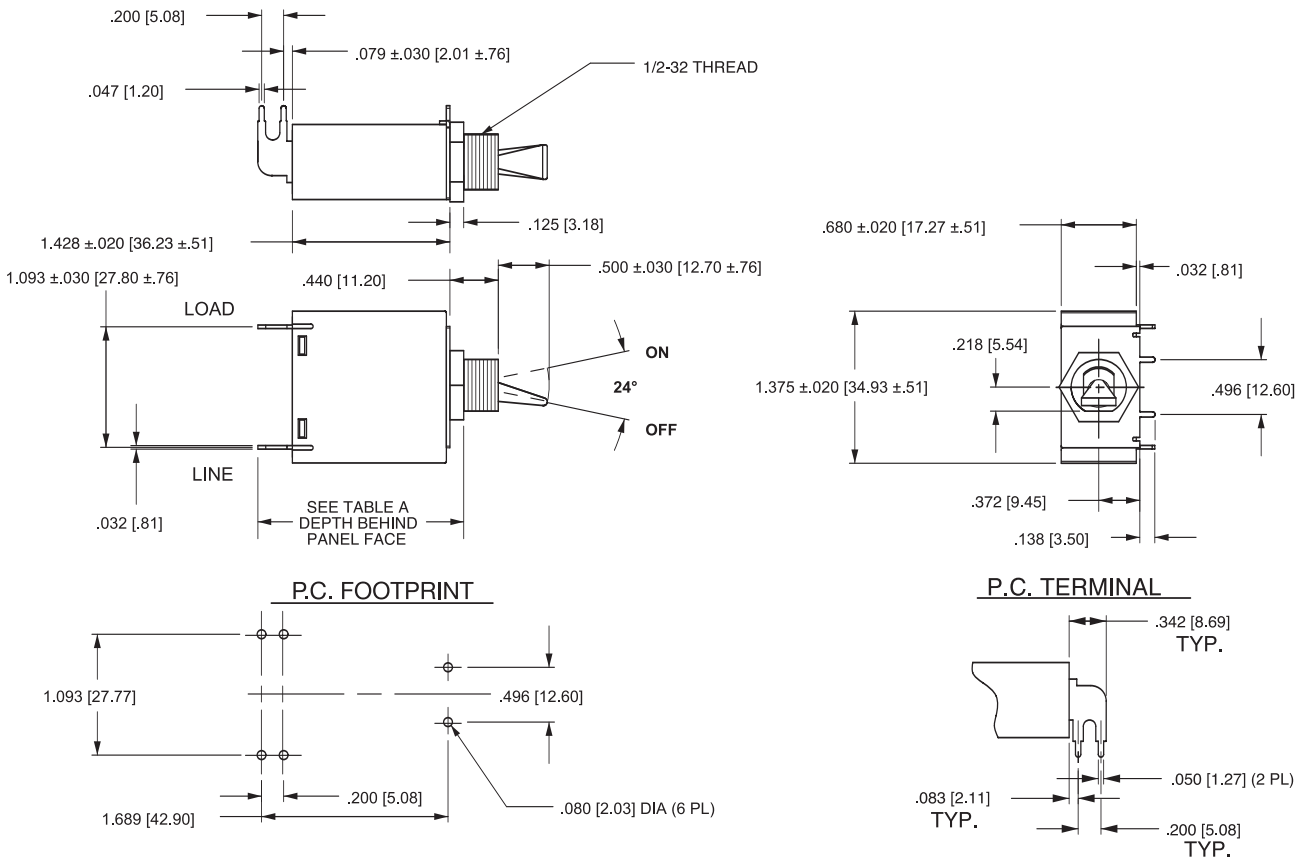


PANEL HARDWARE



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

HANDLE TYPE SHOWN WITHOUT AUX. SWITCH



HANDLE TYPE SHOWN WITH AUX. SWITCH

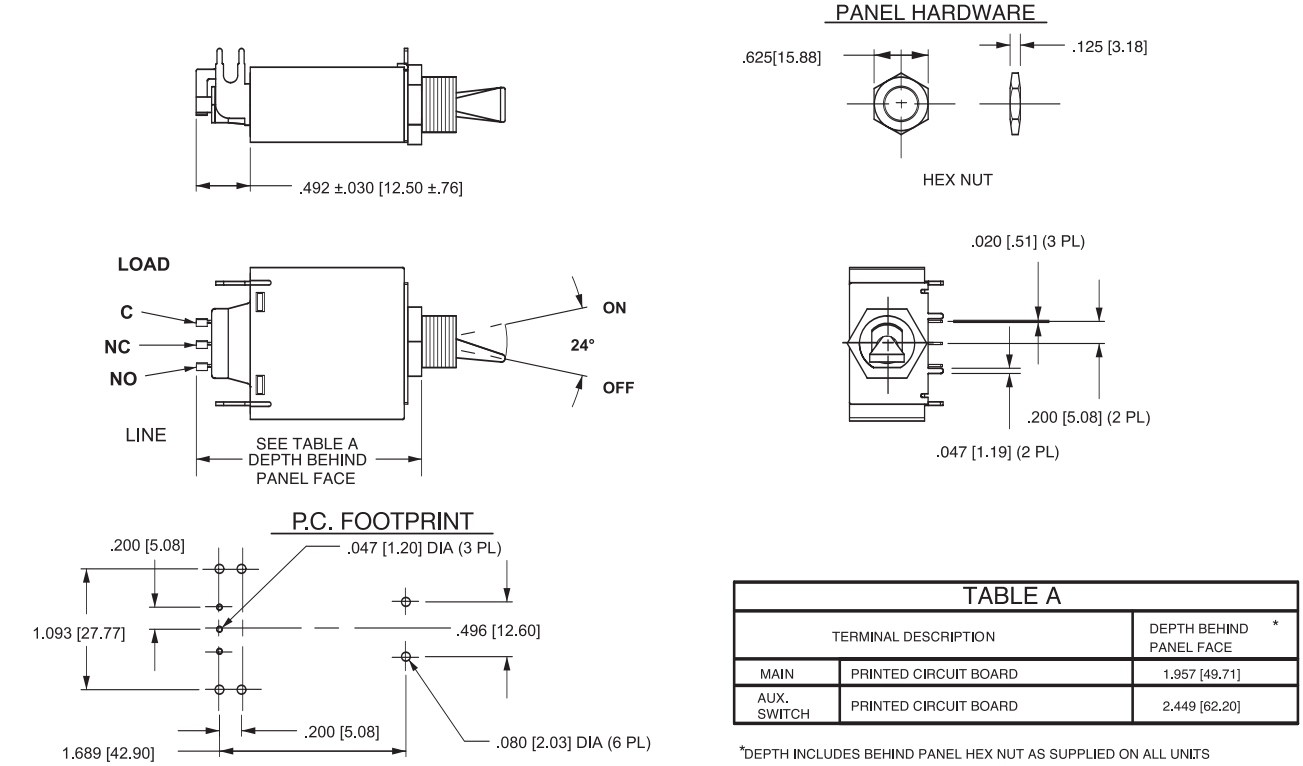
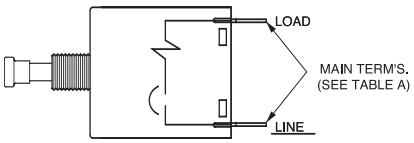


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	PRINTED CIRCUIT BOARD	1.957 [49.71]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.449 [62.20]

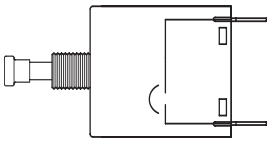
*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

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

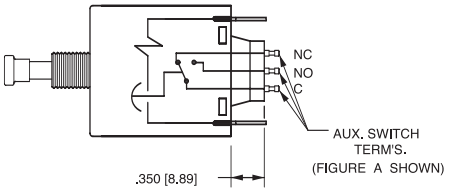
SERIES TRIP



SWITCH ONLY



SERIES TRIP W/ AUXILIARY SWITCH



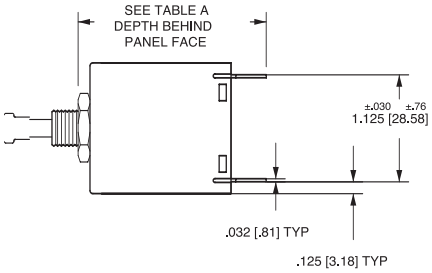


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C)	1.952 [49.57]
	SCREW (#8-32)	1.992 [50.60]
	PUSH-IN STUD	2.582 [65.58]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.097 [53.26]
	ROUND Q.C TYPE	2.087 [53.01]
	FLAT QUICK-CONNECT	2.191 [55.65]
	FLAT SOLDER LUG	2.074 [52.68]

*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

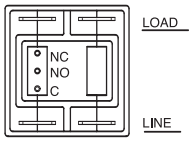


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCH TERMINALS

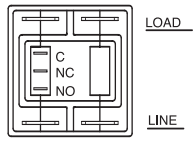
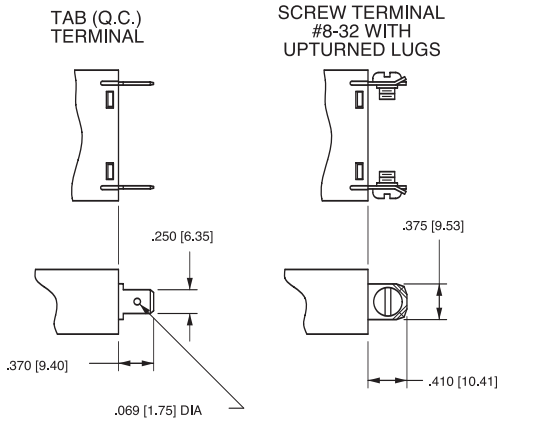
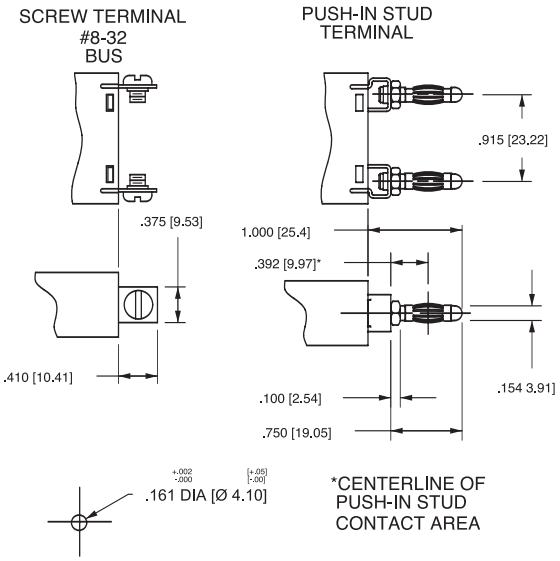


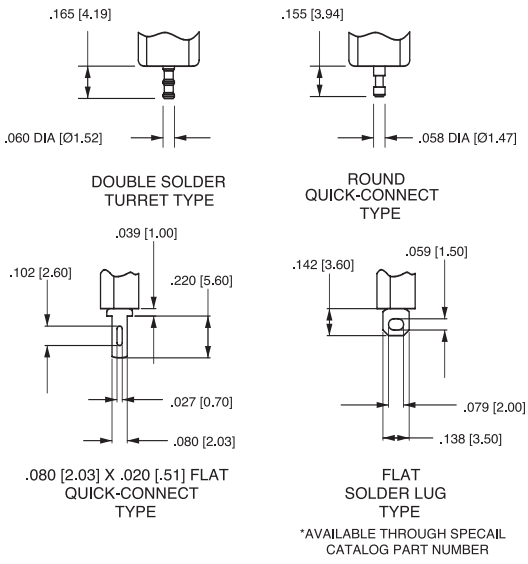
FIG. B

TERMINAL DIMENSIONAL DETAIL





AUXILIARY SWITCH TERMINALS

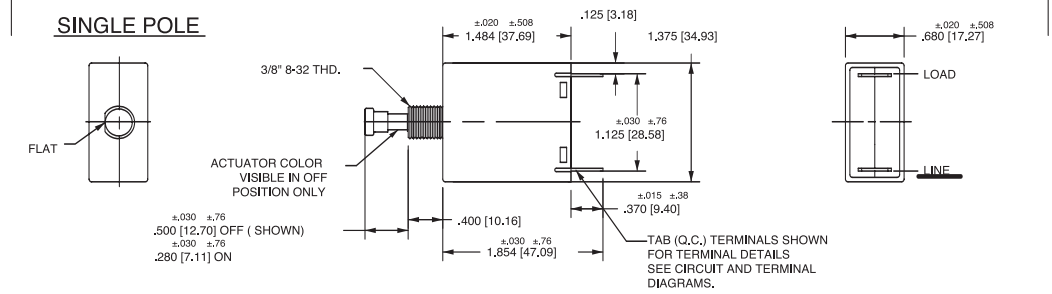


*AVAILABLE THROUGH SPECAIL CATALOG PART NUMBER

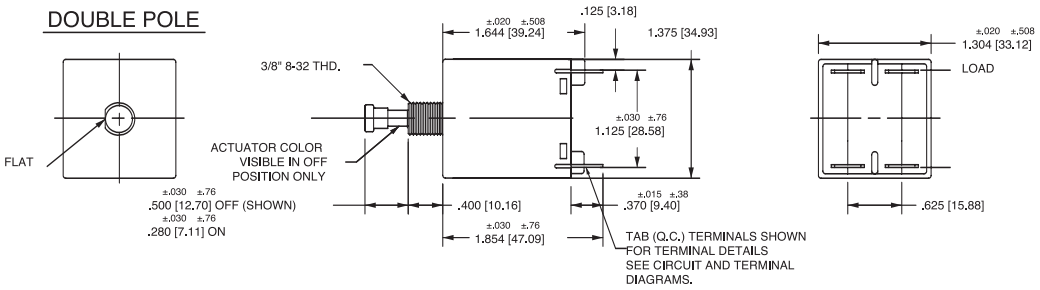
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

PUSH-PULL ACTUATOR STYLE

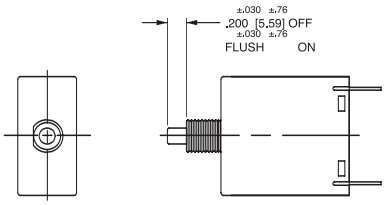
SINGLE POLE



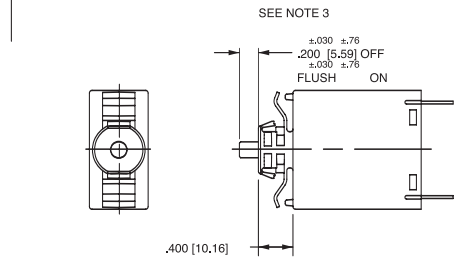
DOUBLE POLE



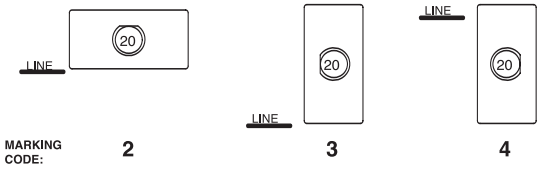
PUSH-TO-RESET ACTUATOR STYLE



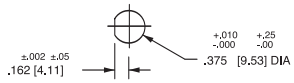
SNAP-IN BUSHING ACTUATOR STYLE



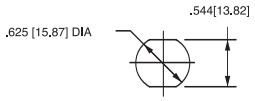
BUTTON MARKING ORIENTATION (PUSH-PULL ONLY)



MOUNTING DETAILS

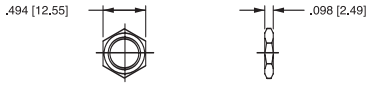


PUSH-PULL,
PUSH TO RESET

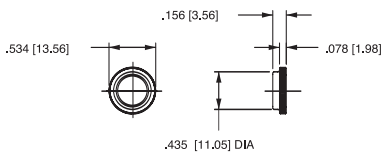


SNAP-IN BUSHING

PANEL HARDWARE



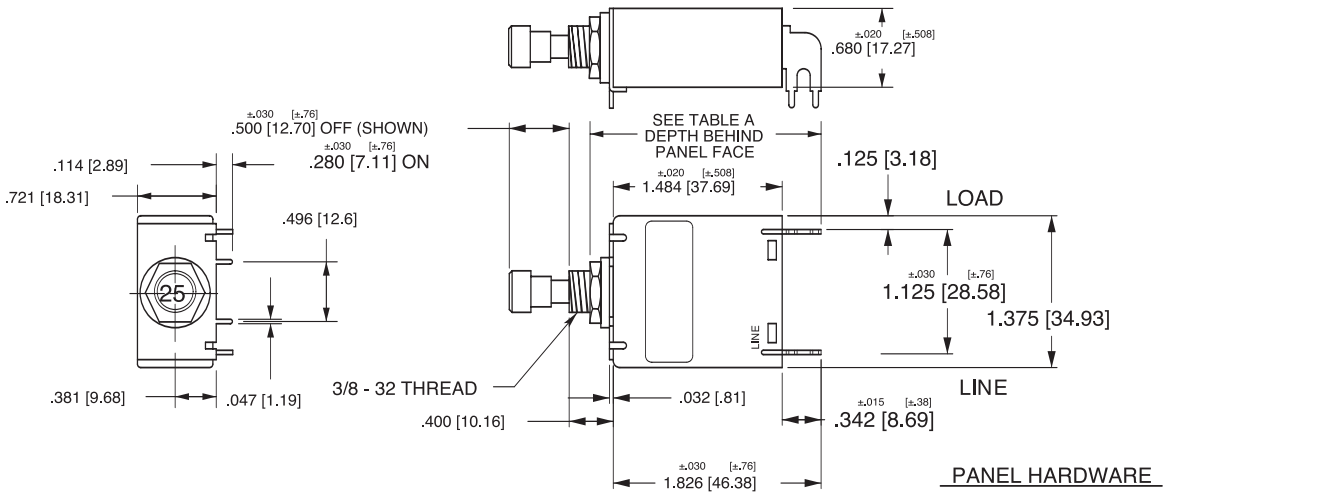
HEX NUT



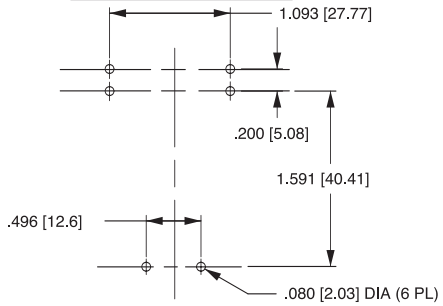
PANEL DRESS NUT

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.

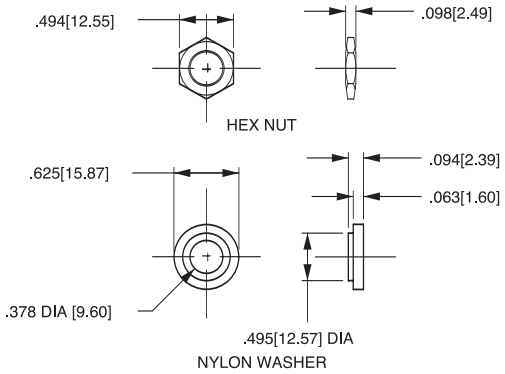
PUSH-PULLTYPE SHOWN WITHOUT AUX. SWITCH



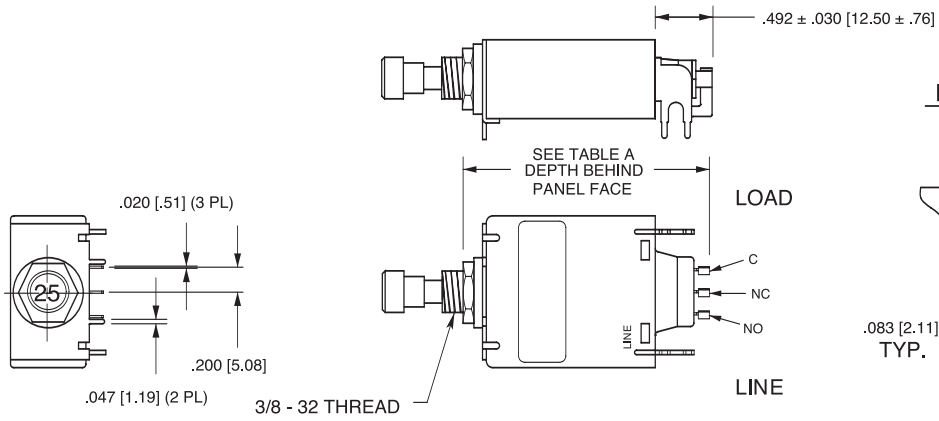
P.C. FOOTPRINT



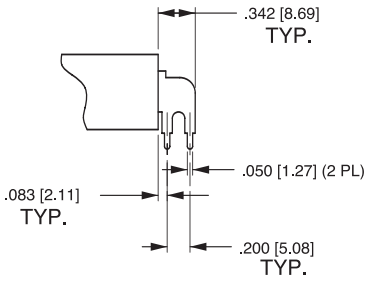
PANEL HARDWARE



PUSH-PULL TYPE SHOWN WITH AUX. SWITCH



P.C. TERMINAL



P.C. FOOTPRINT

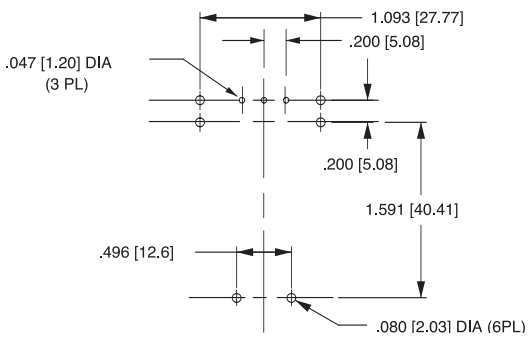
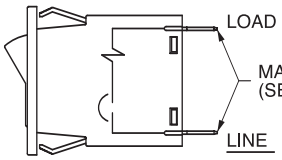


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND * PANEL FACE
MAIN	PRINTED CIRCUIT BOARD	2.019 [51.28]
AUX. SWITCH	PRINTED CIRCUIT BOARD	2.511 [63.78]

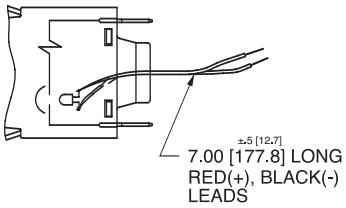
*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

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

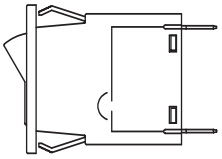
SERIES TRIP



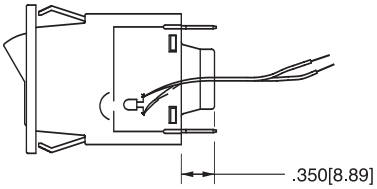
SERIES TRIP W/ ILLUMINATED ROCKER



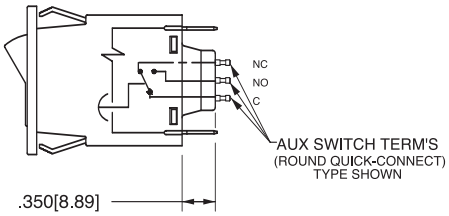
SWITCH ONLY

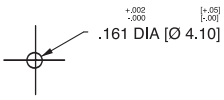


SWITCH ONLY W/ ILLUMINATED ROCKER



SERIES TRIP W/ AUXILIARY SWITCH





PUSH-IN STUD
MATING HOLE

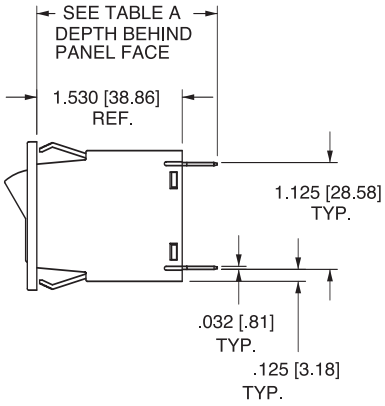


TABLE - A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE
MAIN	TAB (Q.C.)	1.900 [48.26]
	SCREW (#8-32)**	1.940 [49.28]
	PUSH-IN STUD	2.530 [64.26]
*AUX. SWITCH	DOUBLE SOLDER TURRET TYPE	2.045 [51.94]
	ROUND Q.C. TYPE	2.035 [51.69]
	FLAT QUICK CONNECT	2.139 [54.33]
	FLAT SOLDER LUG	2.022 [51.36]

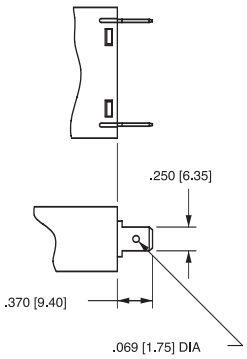
* AUX. SWITCH IS NOT AVAILABLE ON SINGLE POLE ILLUMINATED UNITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN ON CLA-8003.

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

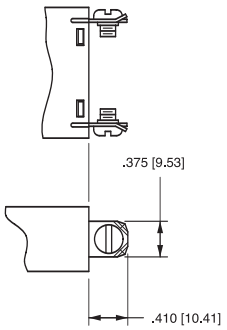
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuit.

TERMINAL DIMENSIONAL DETAIL

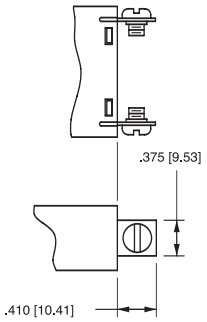
TAB (Q.C.) TERMINAL



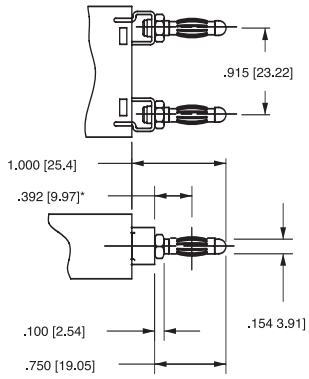
SCREW TERMINAL #8-32 WITH UPTURNED LUGS



SCREW TERMINAL #8-32 BUS

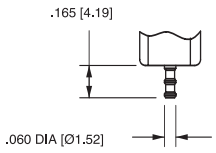


PUSH-IN STUD TERMINAL

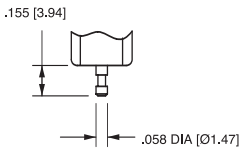


*CENTERLINE OF PUSH-IN STUD CONTACT AREA

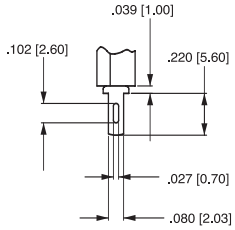
AUXILIARY SWITCH TERMINALS



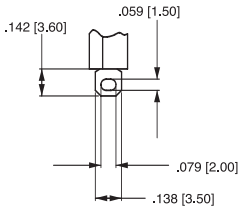
DOUBLE SOLDER TURRET TYPE



ROUND QUICK-CONNECT TYPE



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

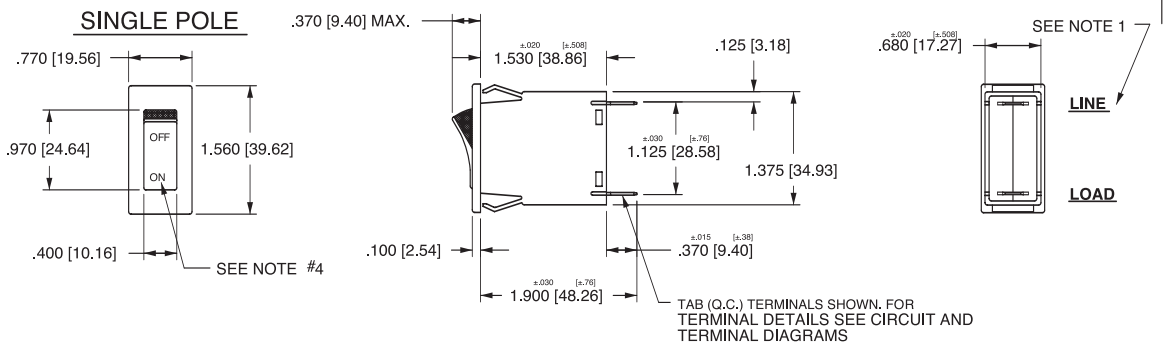


FLAT SOLDER LUG TYPE

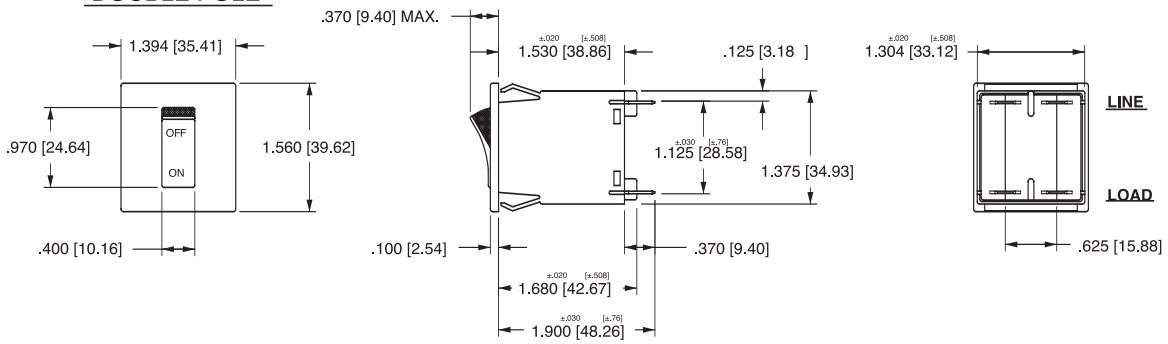
*AVAILABLE THROUGH SPECAIL CATALOG PART NUMBER

INDICATE "ON" (VISI-ON)

SINGLE POLE

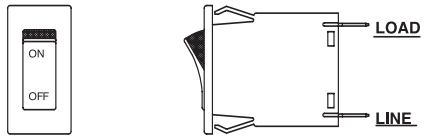


DOUBLE POLE

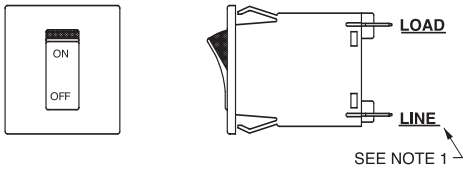


INDICATE "OFF" (VISI-OFF) AND SINGLE COLOR

SINGLE POLE

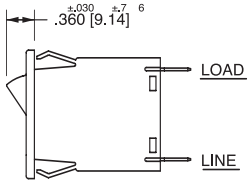


DOUBLE POLE

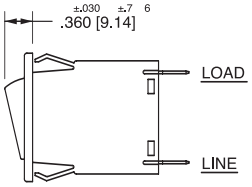


SINGLE COLOR

ANGLED ROCKER STYE

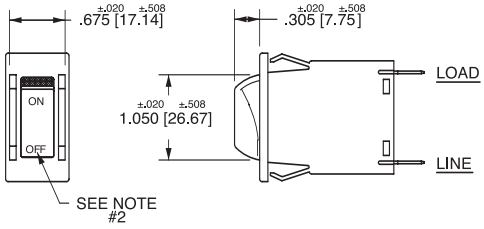


FLAT ROCKER STYE



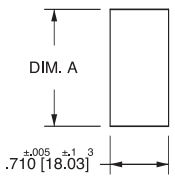
ROCKERGUARD CONFIGURATION

DIMENSIONS ALSO APPLY TO DOUBLE POLE

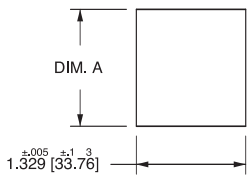


PANEL CUT - OUT DETAIL

SINGLE POLE



DOUBLE POLE



PANEL THICKNESS	DIM. A +.005 -.000 / ±.1 3 -.0 0
.062 [1.57]	1.385 [35.18]
.093 [2.36]	1.420 [36.07]
.125 [3.18]	1.460 [37.08]

Notes:

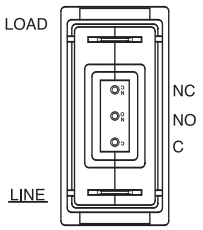
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
2 I-O, ON-OFF or dual legends available for vertical or horizontal mounting. For pole orientation with horizontal legend, rotate front view clockwise 90°.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

ONE POLE

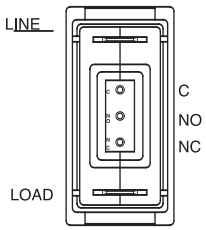
SINGLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX.SWITCH TERMINALS

ROCKER AND AUXILIARY SWITCH OPTIONS

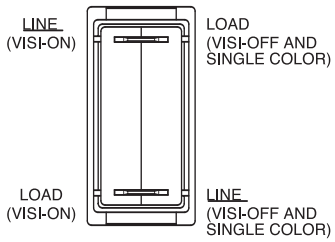
VISI-OFF AND SINGLE COLOR (NON-ILLUMINATED) ROCKER OPTIONS WITH AUXILIARY SWITCH



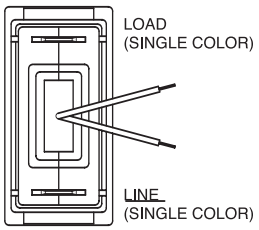
VISI-ON ROCKER WITH AUXILIARY SWITCH



ALL-ROCKER OPTIONS WITHOUT AUXILIARY SWITCH



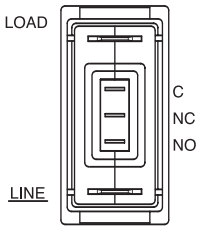
ILLUMINATED ROCKERS WITHOUT AUXILIARY SWITCH



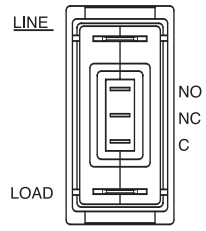
SINGLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX.SWITCH TERMINALS

ROCKER AND AUXILIARY SWITCH OPTIONS

VISI-OFF AND SINGLE COLOR (NON-ILLUMINATED) ROCKER OPTIONS WITH AUXILIARY SWITCH



VISI-ON ROCKER WITH AUXILIARY SWITCH

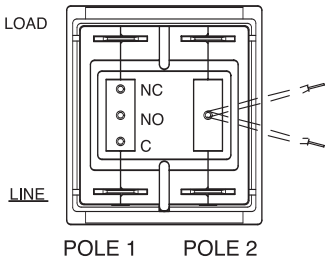


TWO POLE

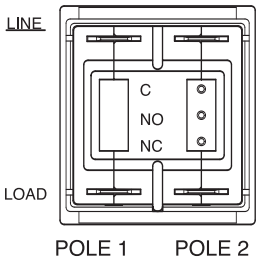
DOUBLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX.SWITCH TERMINALS

ROCKER AND AUXILIARY SWITCH OPTIONS

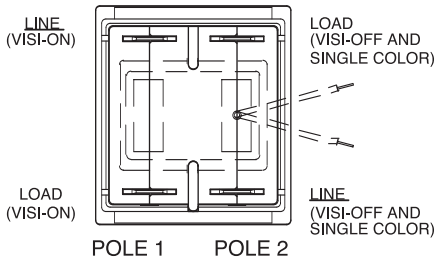
SINGLE COLOR AND VISI-OFF (ILLUMINATED AND NON-ILLUMINATED) ROCKER OPTIONS WITH AUXILIARY SWITCH



VISI-ON ROCKER WITH AUXILIARY SWITCH



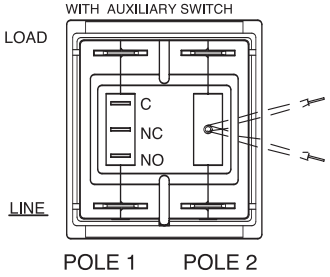
ALL-ROCKER OPTIONS WITHOUT AUXILIARY SWITCH



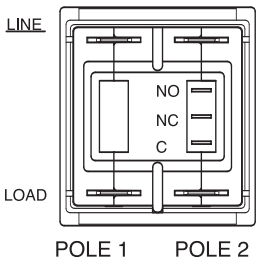
DOUBLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX.SWITCH TERMINALS

ROCKER AND AUXILIARY SWITCH OPTIONS

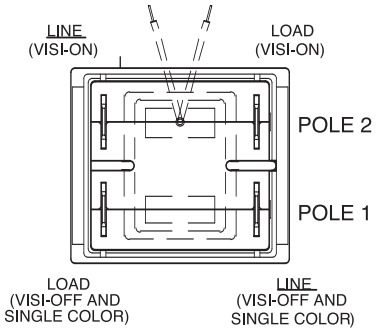
SINGLE COLOR AND VISI-OFF (ILLUMINATED AND NON-ILLUMINATED) ROCKER OPTIONS WITH AUXILIARY SWITCH



VISI-ON ROCKER WITH AUXILIARY SWITCH



POLE DESIGNATIONS FOR HORIZONTAL MOUNTING/LEGEND- ALL ROCKER STYLES



Compact size and well known for its proven reliability, the A-Series utilizes the hydraulic magnetic principle which provides precise operation and performance even when exposed to extremely hot and/or cold application environments. When aesthetics demand a clean contemporary and functional design, the visi-rocker two-color actuator can be specified. A rockerguard and push-to-reset bezel help prevent inadvertent actuation. A specially constructed version is now available for applications requiring CE markings. The A-Series is used in many telecommunications and marine applications. In addition, these breakers meet CSA Standard 22.2 No. 100 for the Generator & Welder markets.

1-6 poles (handle), 1-3 poles (rocker). 0.02 - 50 amps, up to 277 VAC or 80 VDC, with a choice of time delays, terminals and actuator colors.

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

Electrical

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

A -SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS

CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA	
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE			
SERIES	32	DC	---	0.02 - 50	---	---	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	
	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, OL1,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]	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	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	---					
	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 for Table A:

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: 250/125 VAC, 125/250 VAC and 208Y/120 VAC Power Systems. 1 pole protector required for : 125 VAC, 1Ø Power System.

4 Meets the requirements of CSA 22.2 No. 100-04 - Motors and Generators.

Electrical

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	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 [2]	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles
				31 - 50	---	2000 [1]	---	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 [2]	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles
				31 - 50	---	2000 [1]	---	---	---	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 [2]	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles
				31 - 50	---	2000 [1]	---	---	---	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker Version 1 - 3 Poles

Notes for Table B:
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 Meets the requirements of CSA 22.2 No. 100-04 - Motors and Generators.

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	TC1,2,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 for Table C:
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 (Guide DITT, File E189195), under UL489A.

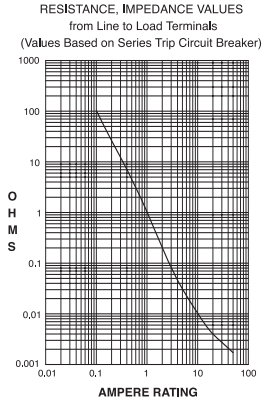
A-SERIES TABLE D: UL489A (COMMUNICATIONS EQUIPMENT)

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 for Table C:
1 Parallel Pole Construction

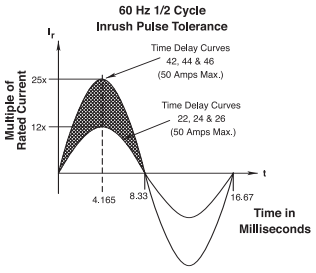
Electrical

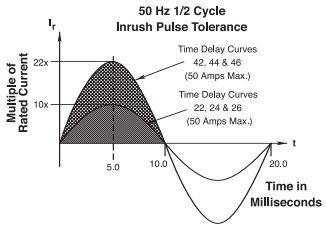
Maximum Voltage	277VAC 50/60 Hz, 80VDC
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 50.0. Other ratings available - consult ordering scheme.
Standard Voltage Coils	DC-6V, 12V; AC-120V, Other ratings available, consult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



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 Configurations	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

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

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

5 AUXILIARY/ALARM SWITCH[5]
0	w/o Aux Switch	**5**	S.P.S.T., 0.093 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**6**	S.P.S.T., 0.139 Solder Lug
2	S.P.D.T., 0.110 Q.C. Term.	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
3	S.P.D.T., 0.139 Solder Lug	**8**	S.P.S.T., 0.187 Q.C. Term.
4	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	**9**	S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
03	DC 50/60Hz, Switch Only	**30**	DC, 50/60Hz Instantaneous
10[6]	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[6]	50/60Hz Instantaneous	**44**[7]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46**[7]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short0	**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)
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 (NOMINAL RATED VOLTAGE)[6]
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.)	**E**[11]	Screw M4 (Bus Type)
2	Screw 8-32 w/upturned lugs	**F**	Screw M5 w/upturned lugs and 30° bend
3[11]	Screw 8-32 (Bus Type)	**G**	Screw M5 (Bus Type) and 30° bend
4	Screw 10-32 w/upturned lugs	**H**[11]	Screw M5 (Bus Type)
5[11]	Screw 10-32 (Bus Type)	**L**[12]	0.250 Q.C./ Solder Lug
6	Screw 8-32 w/upturned lugs and 30° bend	**M**[11]	M6 Threaded Stud
7	Screw 8-32 (Bus Type) and 30° bend	**Q**[14]	Push-In Stud
8	Screw 10-32 w/upturned lugs and 30° bend	**R**	Screw M4 w/upturned lugs and 30° bend
9	Screw 10-32 (Bus Type) and 30° bend	**T**[11]	Screw M4 (Bus Type) and 30° bend
B	Screw M5 w/upturned lugs	**P**[13]	Printed Circuit Board Terminals
C	Screw M4 w/upturned lugs	**S**[13]	Push-On 0.110 Tab (Q.C.)

9 ACTUATOR COLOR & LEGEND
Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	**A**	**B**	**1**	Black
Black	**C**	**D**	**2**	White
Red	**F**	**G**	**3**	White
Green	**H**	**J**	**4**	White
Blue	**K**	**L**	**5**	White
Yellow	**M**	**N**	**6**	Black
Gray	**P**	**Q**	**7**	Black
Orange	**R**	**S**	**8**	Black
Black (short handle)[15]	**T**	**U**	**9**	White

10 MOUNTING/BARRIERS
	MOUNTING STYLE	BARRIERS
	Threaded Inserts, 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 Rec. STD 1077, UL Rec. 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 & 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.

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	w/o Aux Switch	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**8**	S.P.S.T., 0.187 Q.C. Term.
2	S.P.D.T., 0.110 Q.C. Term.	**9**	S.P.D.T., 0.187 Q.C. Term.
3	S.P.D.T., 0.139 Solder Lug		

6 FREQUENCY & DELAY
11	DC Ultra Short	**52**[3]	DC, Short,Hi-Inrush
12	DC Short	**54**[3]	DC, Medium, Hi-Inrush
14	DC Medium	**56**[3]	DC, Long, Hi-Inrush
16	DC Long		

7 CURRENT RATING (AMPERES)
210	0.100	**415**	1.500	**710**	10.500
215	0.150	**517**	1.750	**611**	11.000
220	0.200	**420**	2.000	**711**	11.500
225	0.250	**522**	2.250	**612**	12.000
230	0.300	**527**	2.750	**712**	12.500
235	0.350	**430**	3.000	**613**	13.000
240	0.400	**435**	3.500	**614**	14.000
245	0.450	**440**	4.000	**615**	15.000
250	0.500	**445**	4.500	**616**	16.000
255	0.550	**450**	5.000	**617**	17.000
260	0.600	**455**	5.500	**618**	18.000
265	0.650	**460**	6.000	**620**	20.000
270	0.700	**465**	6.500	**622**	22.000
275	0.750	**470**	7.000	**624**	24.000
280	0.800	**475**	7.500	**625**	25.000
285	0.850	**480**	8.000	**630**	30.000
290	0.900	**485**	8.500	**635**[4]	35.000
295	0.950	**490**	9.000	**640**[4]	40.000
410	1.000	**495**	9.500	**645**[4]	45.000
512	1.250	**610**	10.000	**650**[4]	50.000

8 TERMINAL[5]
1[6]	Push-On 0.250 Tab (Q.C.)	**9**	Screw 10-32 (Bus Type) and 30° bend
2	Screw 8-32 w/upturned lugs	**B**	Screw M5 w/upturned lugs
3[7]	Screw 8-32 (Bus Type)	**F**	Screw M5 w/upturned lugs and 30° bend
4	Screw 10-32 w/upturned lugs	**G**	Screw M5 (Bus Type) and 30° bend
5[7]	Screw 10-32 (Bus Type)	**H**	Screw M5 (Bus Type)
6	Screw 8-32 w/upturned lugs and 30° bend	**M**[7]	M6 Threaded Stud
7	Screw 8-32 (Bus Type) and 30° bend	**P**[8]	Printed Circuit Board Terminals
8	Screw 10-32 w/upturned lugs and 30° bend	**Q**[9]	Push-In Stud

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
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 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 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
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	w/o Aux Switch	**4**	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
2	S.P.D.T., 0.110 Q.C. Term.		
3	S.P.D.T., 0.139 Solder Lug		

6 FREQUENCY & DELAY
03	DC 50/60Hz, Switch Only	**30**	DC, 50/60Hz Instantaneous
10[6]	DC Instantaneous	**31**	DC, 50/60Hz Ultra Short
11	DC Ultra Short	**32**	DC, 50/60Hz Short
12	DC Short	**34**	DC, 50/60Hz Medium
14	DC Medium	**36**	DC, 50/60Hz Long
16	DC Long	**42**[7]	50/60Hz Short, Hi-Inrush
20[6]	50/60Hz Instantaneous	**44**[7]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46**[7]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short0	**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)
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 (NOMINAL RATED VOLTAGE)[6]
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 w/upturned lugs
2	Screw 8-32 w/upturned lugs	**C**	Screw M4 w/upturned lugs
3[11]	Screw 8-32 (Bus Type)	**E**[11]	Screw M4 (Bus Type)
4	Screw 10-32 w/upturned lugs	**F**	Screw M5 w/upturned lugs and 30° bend
5[11]	Screw 10-32 (Bus Type)	**G**	Screw M5 (Bus Type) and 30° bend
6	Screw 8-32 w/upturned lugs and 30° bend	**H**[11]	Screw M5 (Bus Type)
7	Screw 8-32 (Bus Type) and 30° bend	**R**	Screw M4 w/upturned lugs and 30° bend
8	Screw 10-32 w/upturned lugs and 30° bend	**T**[11]	Screw M4 (Bus Type) and 30° bend
9	Screw 10-32 (Bus Type) and 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

10 MOUNTING/BARRIERS
	MOUNTING STYLE	BARRIERS
	Threaded Inserts, 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 Rec. STD 1077, UL Rec. 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 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, 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.

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 Legend Plate	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 w/o 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., 0.139 Solder Lug
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
5 S.P.S.T., 0.093 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
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 Short0
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)

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 (NOMINAL RATED VOLTAGE)[6]

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 w/upturned lugs
3 Screw 8-32 (Bus Type)
4 Screw 10-32 w/upturned lugs
5 Screw 10-32 (Bus Type)
6 Screw 8-32 w/upturned lugs and 30° bend
7 Screw 8-32 (Bus Type) and 30° bend
8 Screw 10-32 w/upturned lugs and 30° bend
9 Screw 10-32 (Bus Type) and 30° bend
B Screw M5 w/upturned lugs
C Screw M4 w/upturned lugs
E Screw M4 (Bus Type)
F Screw M5 w/upturned lugs and 30° bend
G Screw M5 (Bus Type) and 30° bend
H Screw M5 (Bus Type)
L[11] 0.250 Q.C./ Solder Lug
M M6 Threaded Stud
Q Push-In Stud
R Screw M4 w/upturned lugs and 30° bend
T Screw M4 (Bus Type) and 30° bend
P[12] Printed Circuit Board Terminals
S[12] 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

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. 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 auxilary 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, 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.

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
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

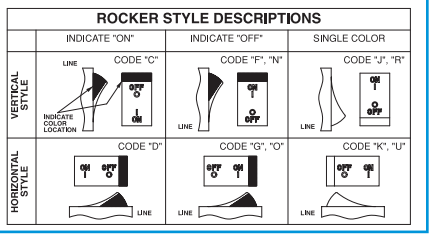
Single color

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)	**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 [6, 7]

0	w/o Aux Switch	**5**	S.P.S.T., 0.093 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**6**	S.P.S.T., 0.139 Solder Lug
2	S.P.D.T., 0.110 Q.C. Term.	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
3	S.P.D.T., 0.139 Solder Lug	**8**	S.P.S.T., 0.187 Q.C. Term.
4	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	**9**	S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

03	DC 50/60Hz, Switch Only	**30**	DC, 50/60Hz Instantaneous
10 [8]	DC Instantaneous	**31**	DC, 50/60Hz Ultra Short
11	DC Ultra Short	**32**	DC, 50/60Hz Short
12	DC Short	**34**	DC, 50/60Hz Medium
14	DC Medium	**36**	DC, 50/60Hz Long
16	DC Long	**42** [9]	50/60Hz Short, Hi-Inrush
20 [8]	50/60Hz Instantaneous	**44** [9]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46** [9]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short	**52** [9]	DC, Short,Hi-Inrush
24	50/60Hz Medium	**54** [9]	DC,Medium, Hi-Inrush
26	50/60Hz Long	**56**	DC, Long, Hi-Inrush

7 CURRENT RATING (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** [10]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [10]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [10]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [10]	50.000

***OR* VOLTAGE COIL (NOMINAL RATED VOLTAGE)**

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

8 TERMINAL [11]

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

9 ACTUATOR COLOR & LEGEND

Actuator or	*Marking:*			*Marking Color:*	
Visi-Color [12]	I-O	ON-OFF	Dual [12]	Single Color	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 [20]

		BARRIERS
	STANDARD ROCKER BEZEL, ***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" 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" 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 Rec. STD 1077, UL Rec. 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 Aux. switch and/or mixed poles, and have one rocker per breaker.
3. Switch Only circuits, rated up to 50 amps & 3 poles, are 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.
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 aux. 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 and 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 and 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	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

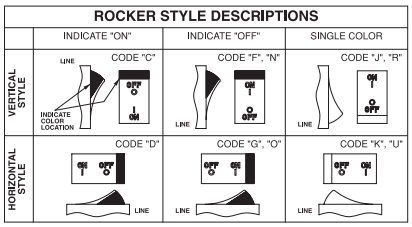
2 ACTUATOR [1]

Two Color Visi-Rocker
- **C** Indicate ON, vertical legend
- **D** Indicate ON, horizontal legend
- **F** Indicate OFF, vertical legend
- **G** Indicate OFF, horizontal legend

Push-To-Reset, Visi-Rocker
- **N** Indicate OFF, vertical legend
- **O** Indicate OFF, horizontal legend

Single color
- **J** Vertical legend
- **K** Horizontal legend

Push-To-Reset , Single color
- **R** Vertical legend
- **U** Horizontal legend



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

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH [3]

0	w/o 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., 0.139 Solder Lug	**9**	S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)

210	0.100	**415**	1.500	**710**	10.500
215	0.150	**517**	1.750	**611**	11.000
220	0.200	**420**	2.000	**711**	11.500
225	0.250	**522**	2.250	**612**	12.000
230	0.300	**527**	2.750	**712**	12.500
235	0.350	**430**	3.000	**613**	13.000
240	0.400	**435**	3.500	**614**	14.000
245	0.450	**440**	4.000	**615**	15.000
250	0.500	**445**	4.500	**616**	16.000
255	0.550	**450**	5.000	**617**	17.000
260	0.600	**455**	5.500	**618**	18.000
265	0.650	**460**	6.000	**620**	20.000
270	0.700	**465**	6.500	**622**	22.000
275	0.750	**470**	7.000	**624**	24.000
280	0.800	**475**	7.500	**625**	25.000
285	0.850	**480**	8.000	**630**	30.000
290	0.900	**485**	8.500	**635**[5]	35.000
295	0.950	**490**	9.000	**640**[5]	40.000
410	1.000	**495**	9.500	**645**[5]	45.000
512	1.250	**610**	10.000	**650**[5]	50.000

8 TERMINAL [5]
- **1** [6] Push-On 0.250 Tab (Q.C.)
- **2** Screw 8-32 w/upturned lugs
- **3** [7] Screw 8-32 (Bus Type)
- **4** Screw 10-32 w/upturned lugs
- **5** [7] Screw 10-32 (Bus Type)
- **6** Screw 8-32 w/upturned lugs and 30° bend
- **7** Screw 8-32 (Bus Type) and 30° bend
- **8** Screw 10-32 w/upturned lugs and 30° bend
- **9** Screw 10-32 (Bus Type) and 30° bend
- **B** Screw M5 w/upturned lugs
- **F** Screw M5 w/upturned lugs and 30° bend
- **G** Screw M5 (Bus Type) and 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***		***Marking Color:***	
	ON-OFF	**Dual** [10]	**Single Color**	**Visi-Rocker**
White	**B**	**1**	Black	White
Black	**D**	**2**	White	n/a
Red	**G**	**3**	White	Red
Green	**J**	**4**	White	Green
Blue	**L**	**5**	White	Blue
Yellow	**N**	**6**	Black	Yellow
Gray	**Q**	**7**	Black	Gray
Orange	**S**	**8**	Black	Orange

10 MOUNTING/BARRIERS [11]

	STANDARD ROCKER BEZEL	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 Aux. 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.

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]

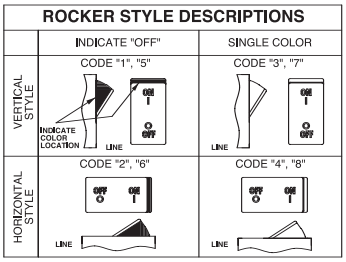
Two Color Visi-Rocker
- **1** Indicate OFF, vertical legend
- **2** Indicate OFF, horizontal legend

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)	**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 [6,7]

0	w/o Aux Switch	**5**	S.P.S.T., 0.093 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**6**	S.P.S.T., 0.139 Solder Lug
2	S.P.D.T., 0.110 Q.C. Term.	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
3	S.P.D.T., 0.139 Solder Lug	**8**	S.P.S.T., 0.187 Q.C. Term.
4	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	**9**	S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

03	DC 50/60Hz, Switch Only	**30**	DC, 50/60Hz Instantaneous
10 [8]	DC Instantaneous	**31**	DC, 50/60Hz Ultra Short
11	DC Ultra Short	**32**	DC, 50/60Hz Short
12	DC Short	**34**	DC, 50/60Hz Medium
14	DC Medium	**36**	DC, 50/60Hz Long
16	DC Long	**42** [9]	50/60Hz Short, Hi-Inrush
20 [8]	50/60Hz Instantaneous	**44** [9]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46** [9]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short	**52** [9]	DC, Short,Hi-Inrush
24	50/60Hz Medium	**54** [9]	DC,Medium, Hi-Inrush
26	50/60Hz Long	**56**	DC, Long, Hi-Inrush

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

7 CURRENT RATING (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** [10]	35.000
210	0.100	**512**	1.250	**495**	9.500	**640** [10]	40.000
215	0.150	**415**	1.500	**610**	10.000	**645** [10]	45.000
220	0.200	**517**	1.750	**710**	10.500	**650** [10]	50.000

OR VOLTAGE COIL (NOMINAL RATED VOLTAGE)

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

8 TERMINAL [11]

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

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color [17]	*Marking:* I-O	ON-OFF	Dual [17]	*Marking Color:* Single Color	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 [18]

		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 [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 Rec. STD 1077, UL Rec. 1500 (ignition protected), & CSA Accepted

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

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

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

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH [3,4]

0	w/o Aux Switch	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**8**	S.P.S.T., 0.187 Q.C. Term.
2	S.P.D.T., 0.110 Q.C. Term.	**9**	S.P.D.T., 0.187 Q.C. Term.
3	S.P.D.T., 0.139 Solder Lug		

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)

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** [5]	35.000
270	0.700	**440**	4.000	**711**	11.500	**640** [5]	40.000
275	0.750	**445**	4.500	**612**	12.000	**645** [5]	45.000
280	0.800	**450**	5.000	**712**	12.500	**650** [5]	50.000

8 TERMINAL [6]

1 [7]	Push-On 0.250 Tab (Q.C.)	**B**	Screw M5 w/upturned lugs
2	Screw 8-32 w/upturned lugs	**C**	Screw M4 w/upturned lugs
3 [8]	Screw 8-32 (Bus Type)	**F**	Screw M5 w/upturned lugs and 30° bend
4	Screw 10-32 w/upturned lugs	**G**	Screw M5 (Bus Type) and 30° bend
5 [8]	Screw 10-32 (Bus Type)	**H** [8]	Screw M5 (Bus Type)
6	Screw 8-32 w/upturned lugs and 30° bend	**M** [8]	M6 Threaded Studs
7	Screw 8-32 (Bus Type) and 30° bend	**P** [9]	Printed Circuit Board Terminals
8	Screw 10-32 w/upturned lugs and 30° bend	**Q** [10]	Push-In Stud
9	Screw 10-32 (Bus Type) and 30° bend		

9 ACTUATOR COLOR & LEGEND

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

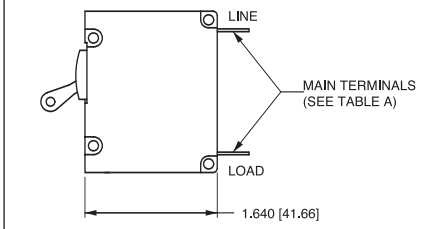
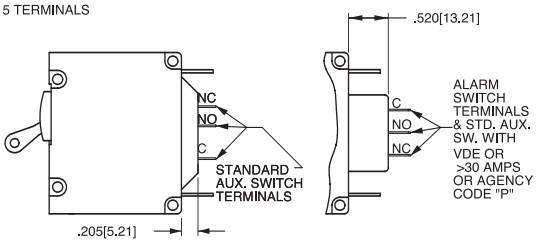
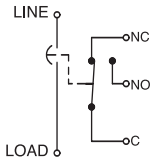
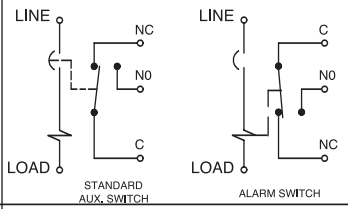
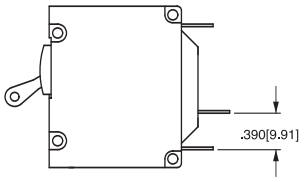
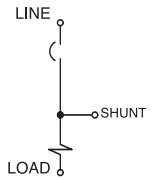
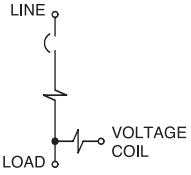
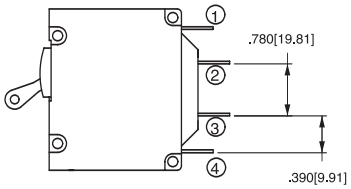
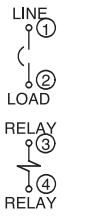
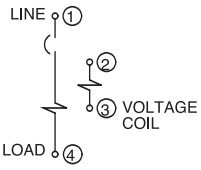
10 MOUNTING/BARRIERS [12]

		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 [13]	
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

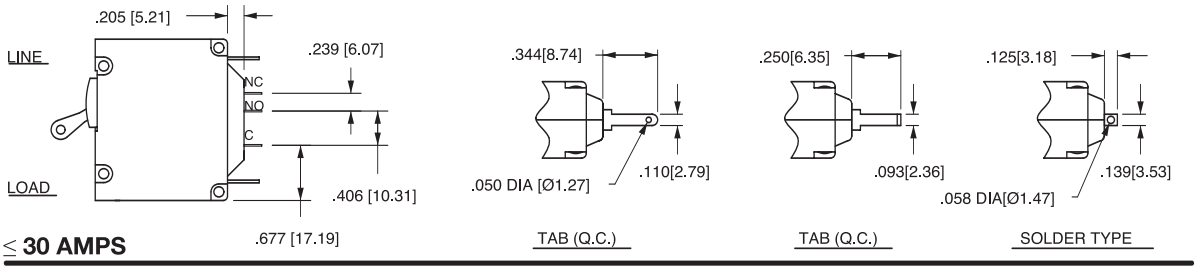
11 MAXIMUM APPLICATION RATING
M 80 DC

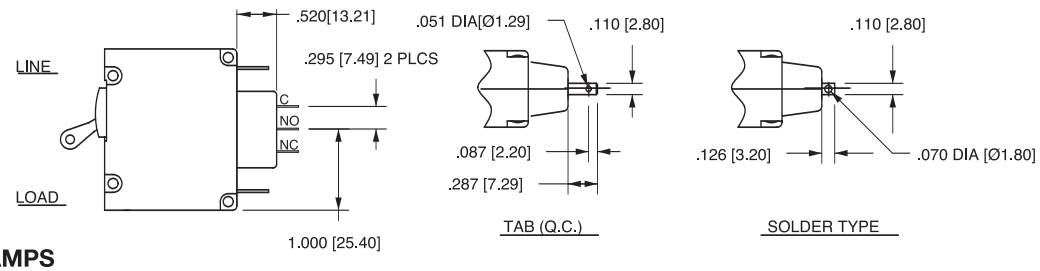
12 AGENCY APPROVAL
T UL489A Listed
J UL489A Listed, TUV Certified

Notes:
1. Push-To-Reset actuators have OFF portion of rocker shrouded.
2. Multi-pole breakers have all breakers identical except when specifying Aux. 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. 30-50 amps are supplied with extended boat (B-Style) half shells.
4. On multi-pole breakers, one aux. switch is supplied, mounted in the extreme right pole.
5. VDE Certification available with single pole breakers only. UL489A Listing available with one and two pole breakers.
6. 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.
7. 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.
8. 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.
9. 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.
10. Terminal Code Q not available with VDE certification.
11. Color shown is visi and legend with remainder of rocker black, Dual = ON-OFF/I-O legend.
12. 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.
13. Recessed "off-side" available with actuator codes 1, 2, 3 & 4. Legends on rocker are available in ink stamping only.

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

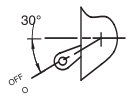
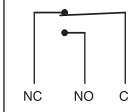
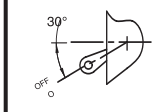
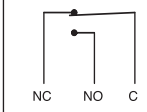
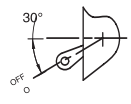
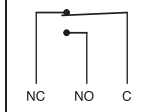
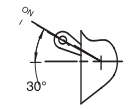
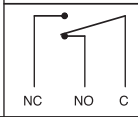
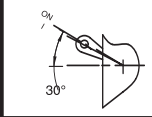
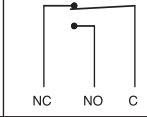
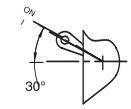
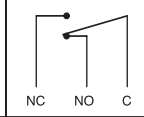
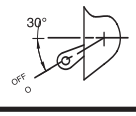
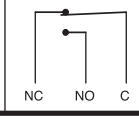
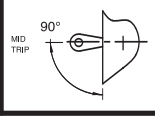
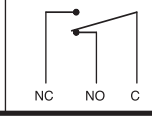
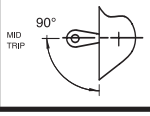
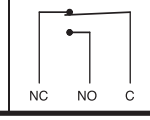
AUXILIARY/ALARM SWITCH TERMINAL DETAIL



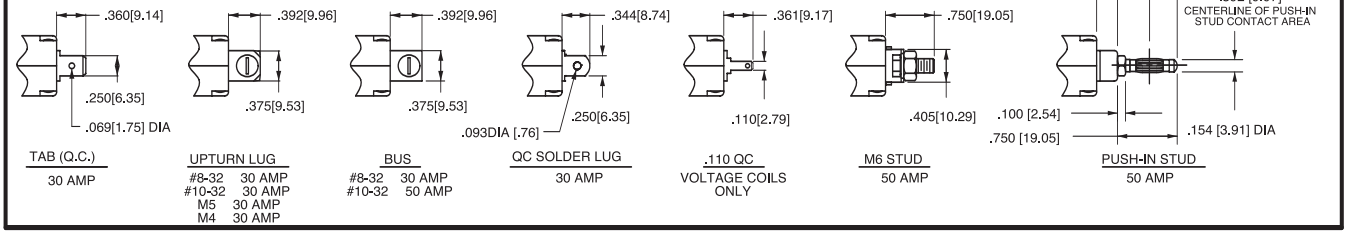


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Alarm Switch available with .110 x .020 Q.C. & Solder Lug Terminals Only.

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



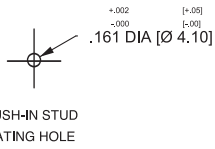
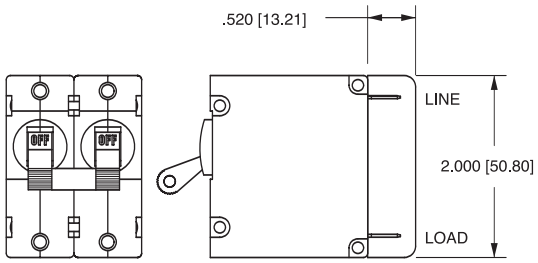


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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]

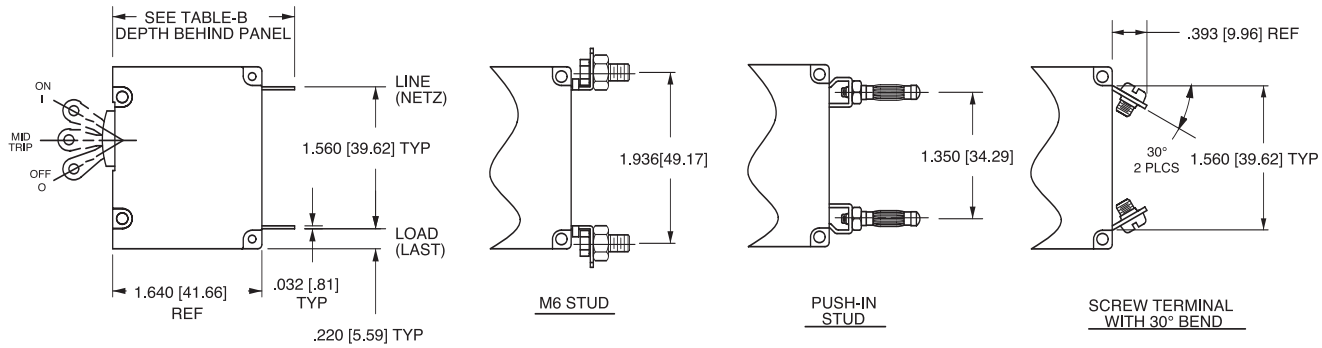


BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

TABLE B

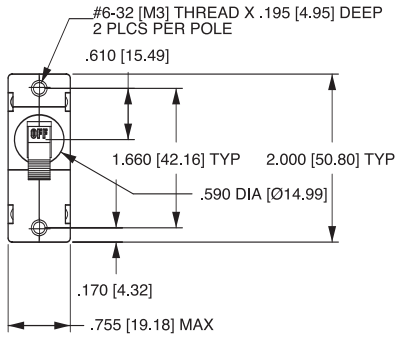
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.000 [50.80]
	SCREW TYPE	2.032 [51.60]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.207 [56.10]
	SCREW #8-32 W/UPTURNED LUGS	2.364 [60.05]
AUX. SWITCH*	.093 TAB (Q.C.)	2.095 [53.20]
	.110 TAB (Q.C.)	2.189 [55.60]
	SOLDER TYPE	1.970 [50.00]

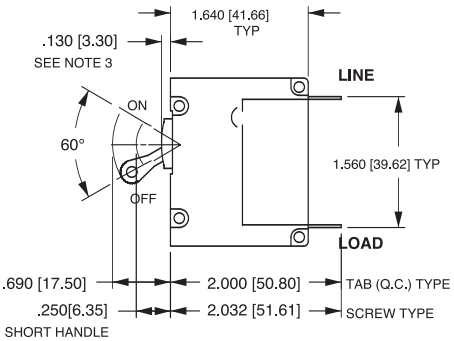
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

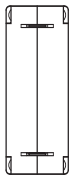


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Alarm Switch available with .110 x .020 QC & solder lug terminals only.

1-POLE (AA1)

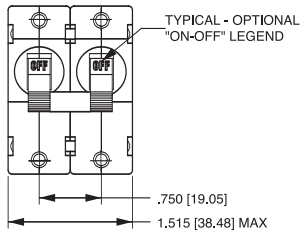




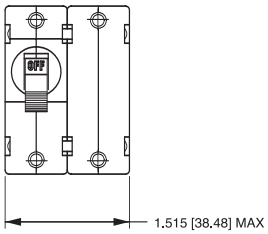


TAB (Q.C.) TYPE TERMINALS IN SERIES TRIP CIRCUIT CONFIGURATION SHOWN. FOR OTHER CONFIGURATIONS, SEE CIRCUIT AND TERMINAL DIAGRAMS.

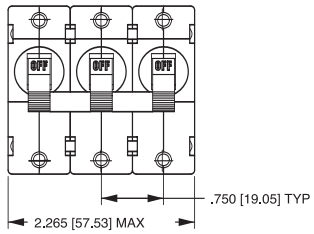
2-POLE (AA2)



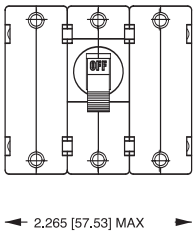
2-POLE (AB2)



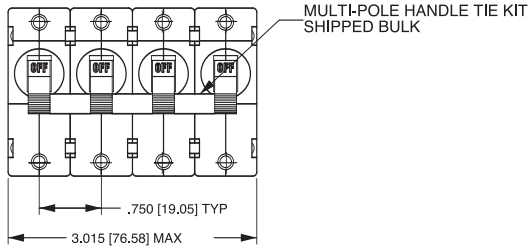
3-POLE (AA3)



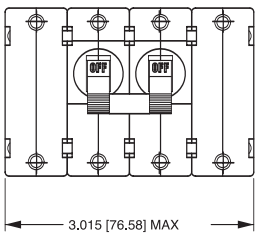
3-POLE (AB3)

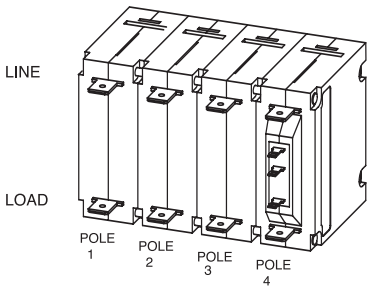


4-POLE (AA4)

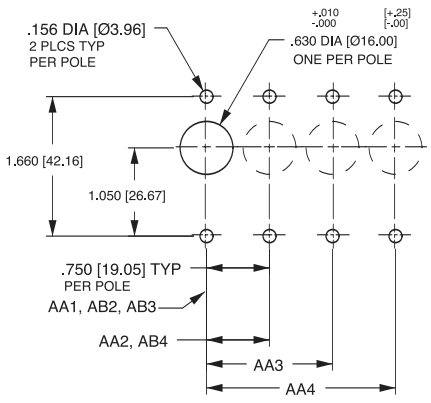


4-POLE (AB4)





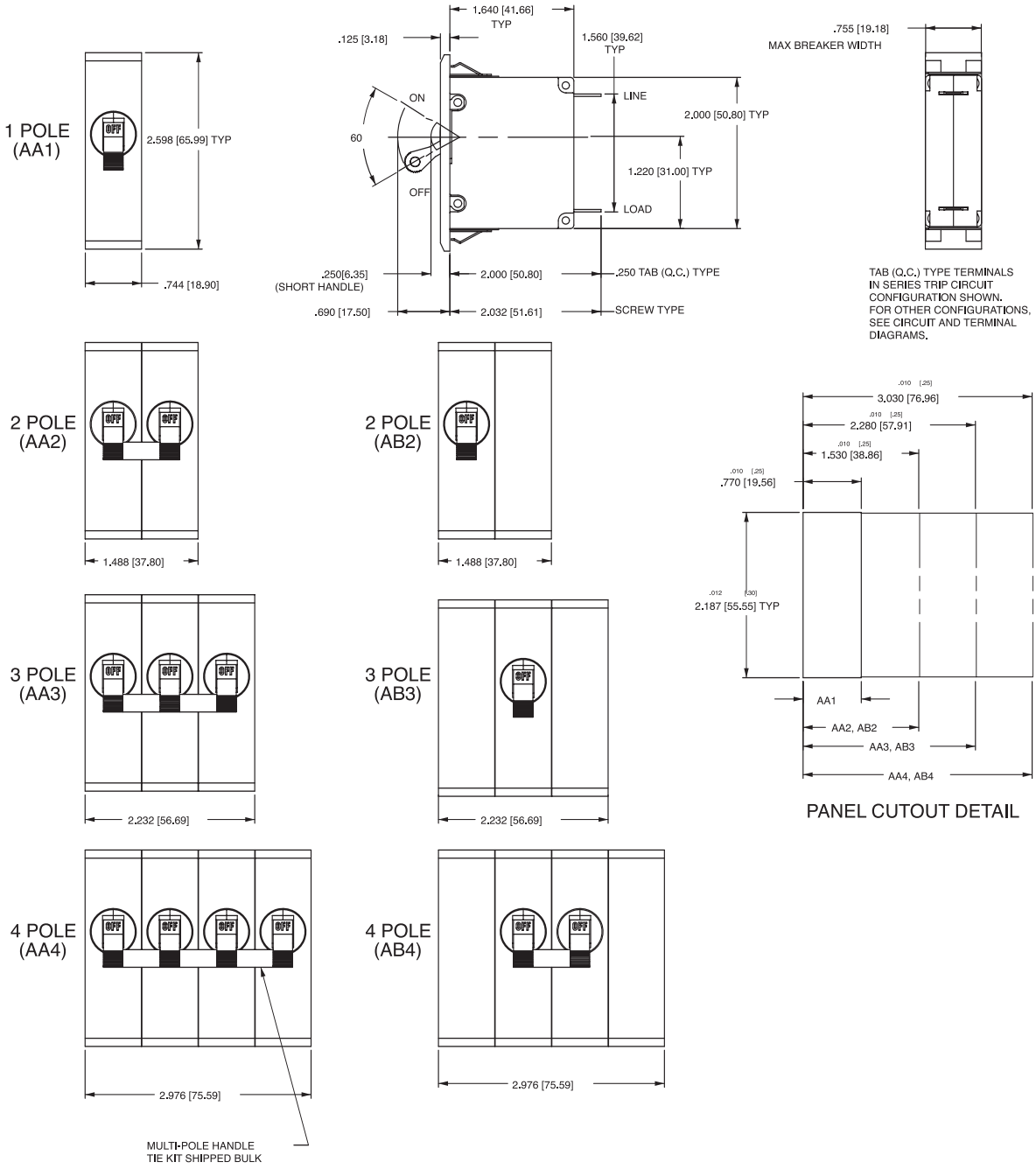
MULTI-POLE IDENTIFICATION SCHEME
AS VIEWED FROM TERMINAL END OF BREAKER.



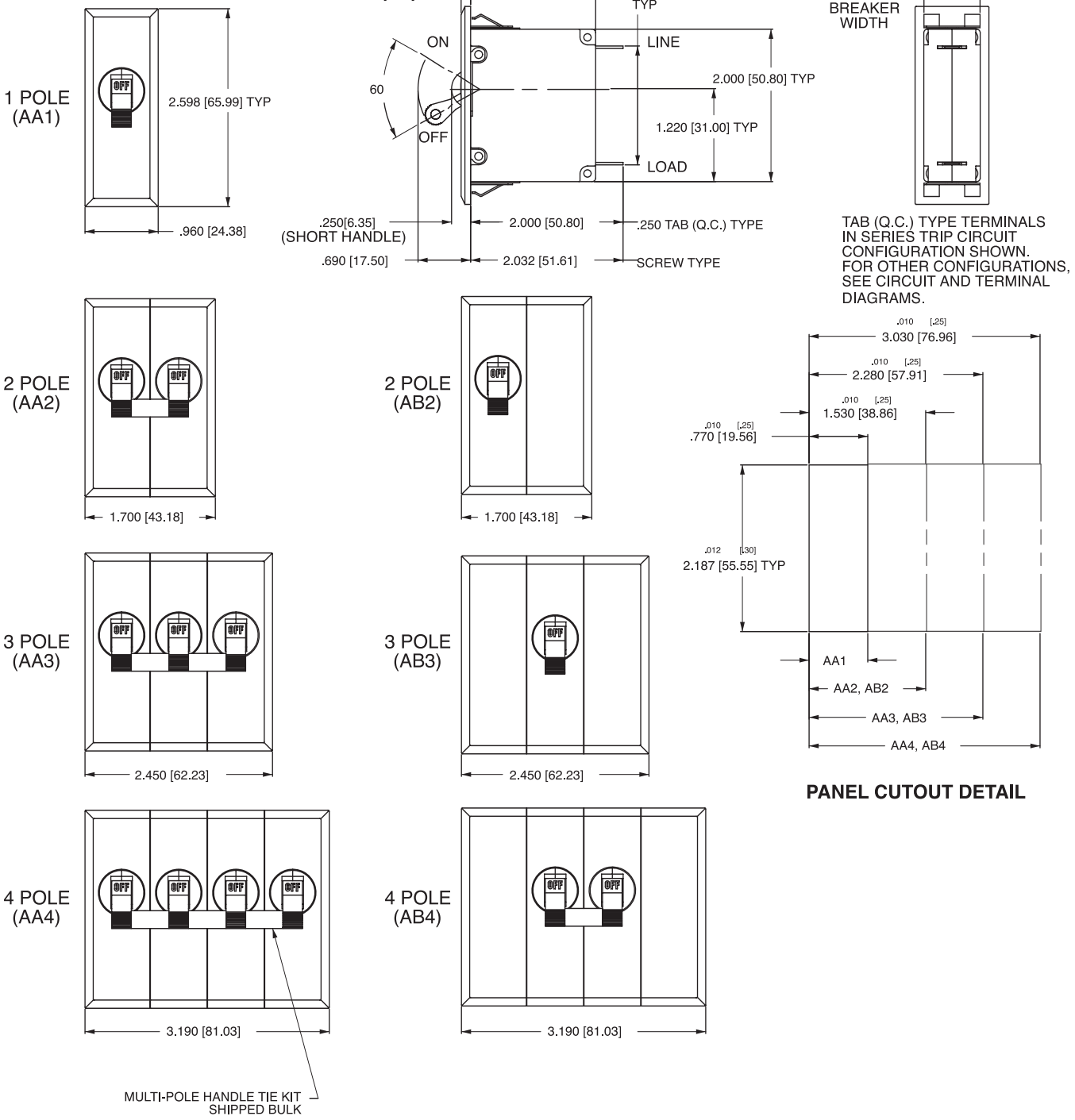
PANEL CUTOUT DETAIL

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].

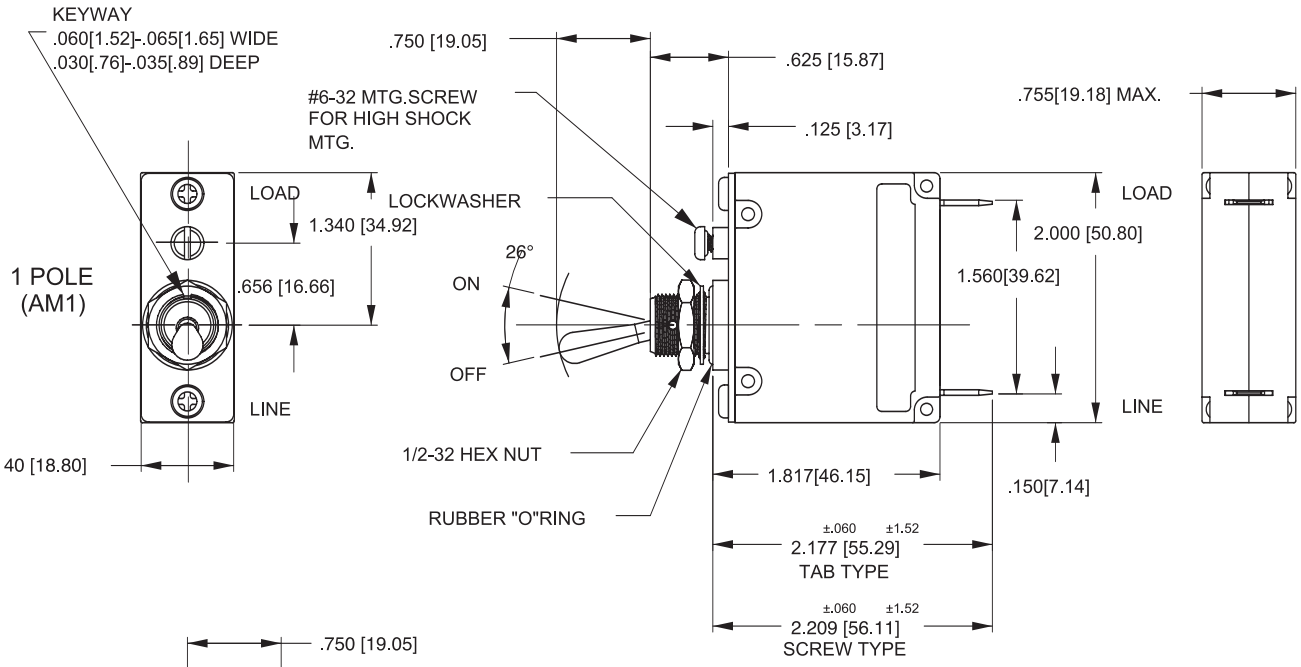


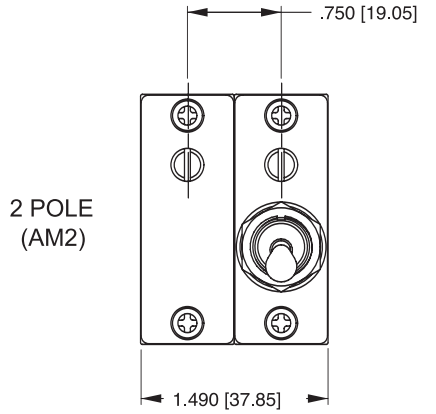
Notes:
1 All dimensions are in inches [millimeters].
2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
3 Tolerance ±.020 [.51] unless otherwise specified.

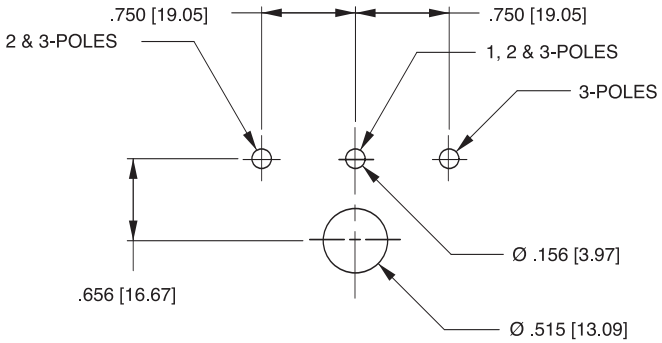


PANEL CUTOUT DETAIL

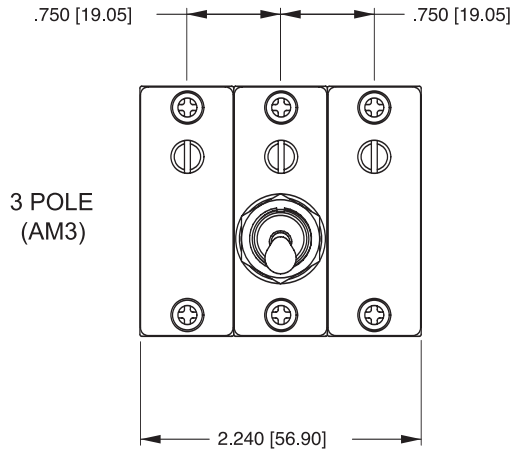
Notes:
1 All dimensions are in inches [millimeters].
2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
3 Tolerance ±.020 [.51] unless otherwise specified.







PANEL CUTOUT DETAIL
TOLERANCES ±.005[.13]



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

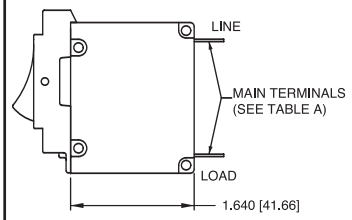
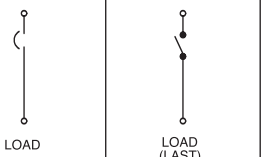
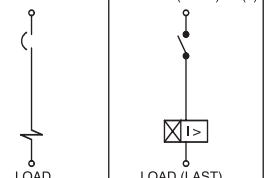
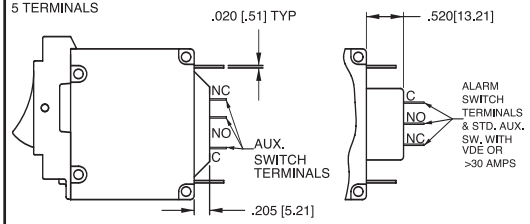
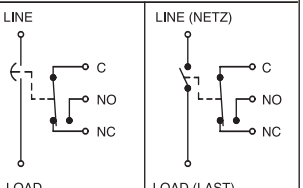
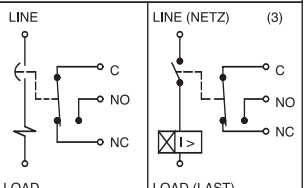
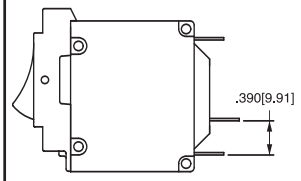
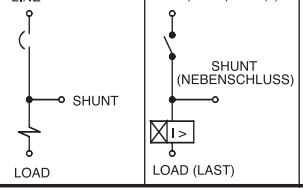
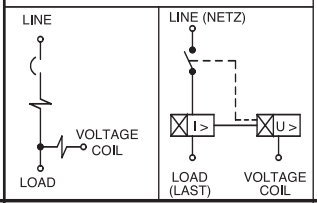
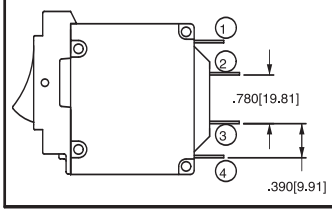
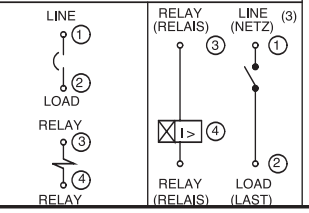
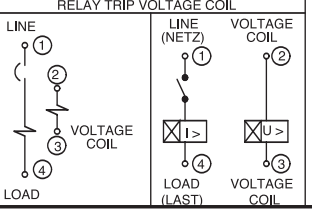
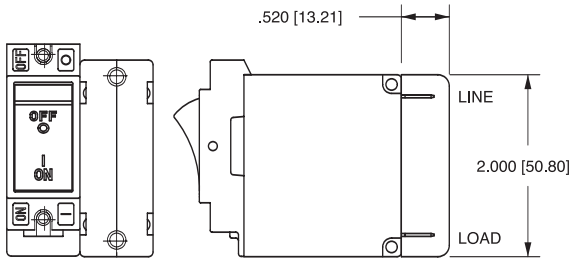
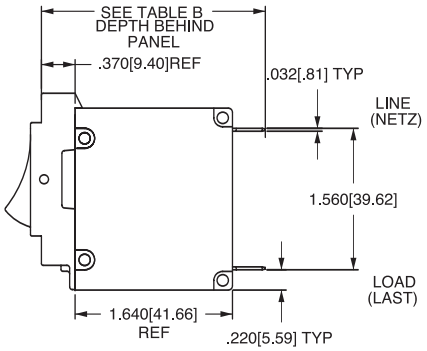
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE
2 TERMINALS 	ANSI / IEC SWITCH ONLY (NO COIL) LINE / LINE (NETZ) 	A	0	ANSI / IEC SERIES TRIP LINE / LINE (NETZ) (3) 	B C	0
5 TERMINALS 	SWITCH ONLY (NO COIL) (4) WITH AUXILIARY SWITCH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

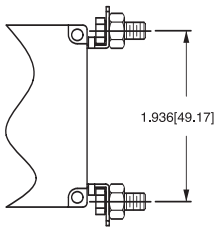
TABLE B		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.370 [60.20]
	SCREW TYPE	2.402 [61.01]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.577 [65.46]
	SCREW #8-32 W/UPTURNED LUGS	2.734 [69.44]
AUX. SWITCH*	.093 TAB (Q.C.)	2.465 [62.61]
	.110 TAB (Q.C.)	2.559 [65.00]
	SOLDER TYPE	2.340 [59.44]

* 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.

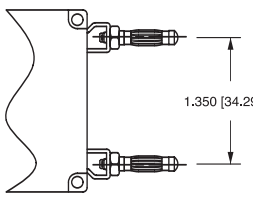


BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

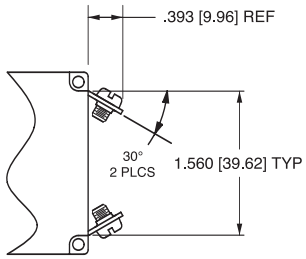




M6 STUD

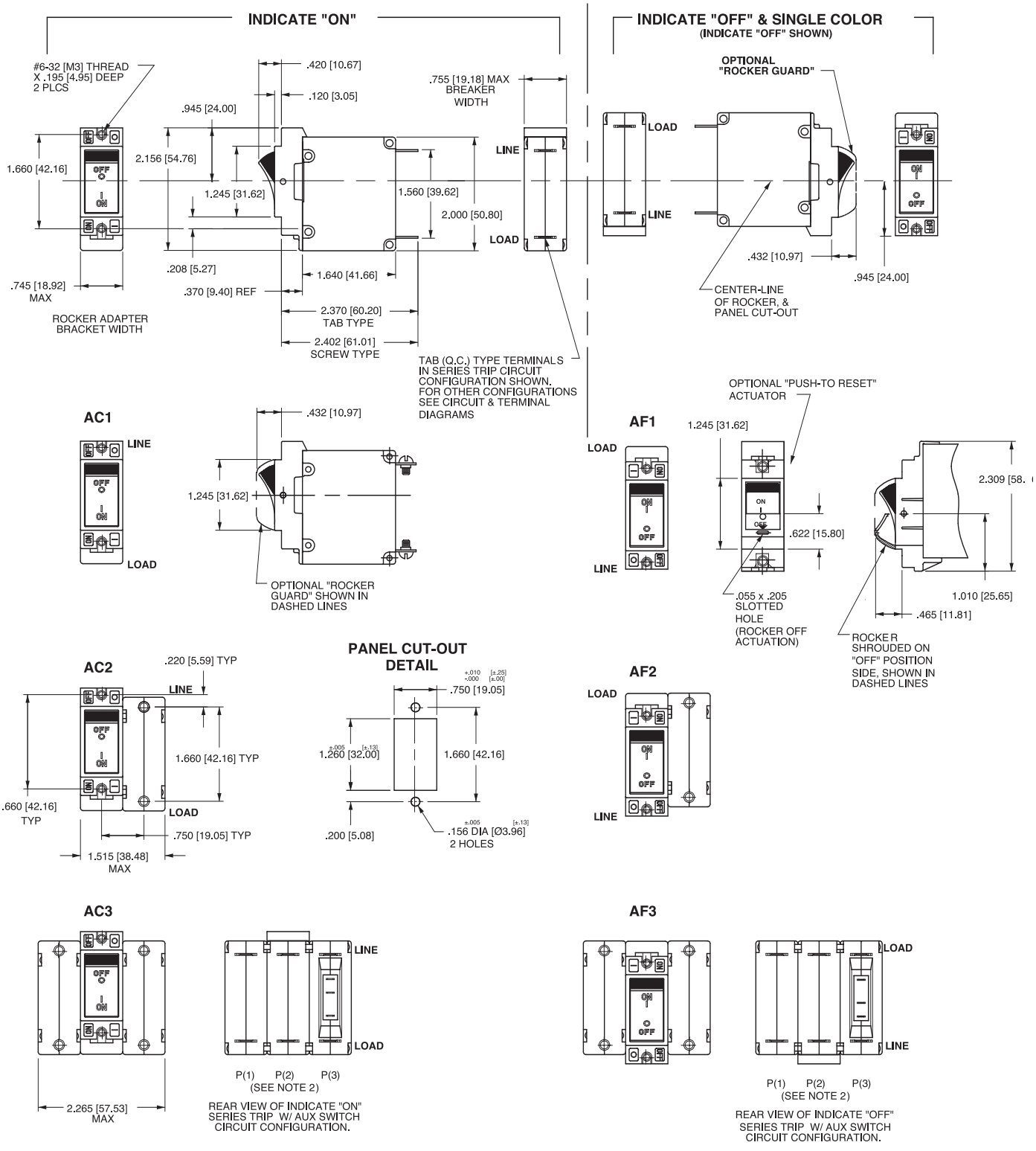


PUSH-IN STUD



SCREW TERMINAL WITH 30° BEND

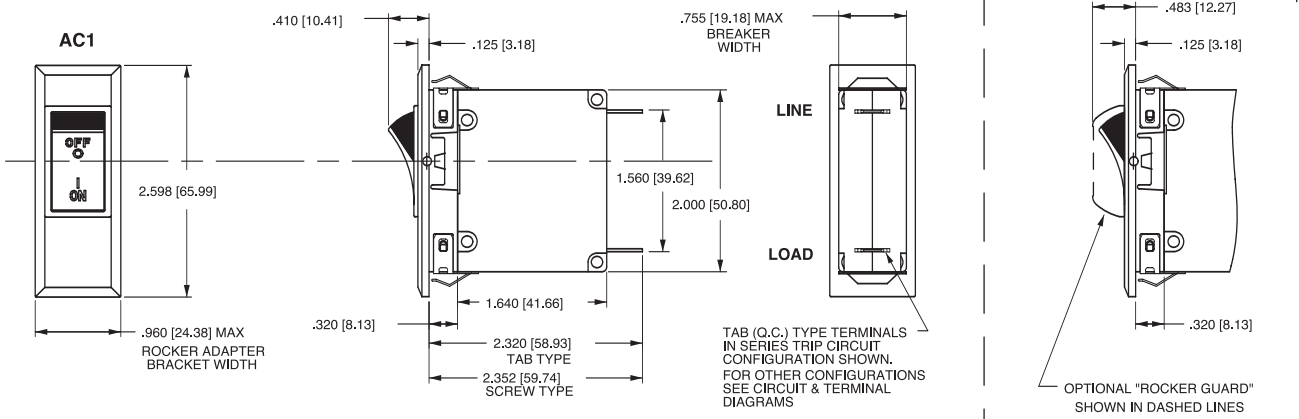
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Schematic shown represents current trip circuit.
4. Circuits shown for >30 amps / VDE.



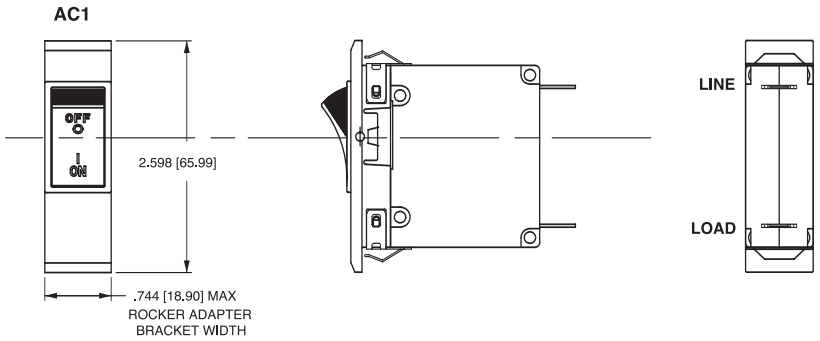
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 All dimensions are in inches [millimeters].
4 Tolerance ± 0.20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

INDICATE "ON"

FRONT PANEL SNAP-IN BRACKET, 0.96" [24.48 mm] wide bezel

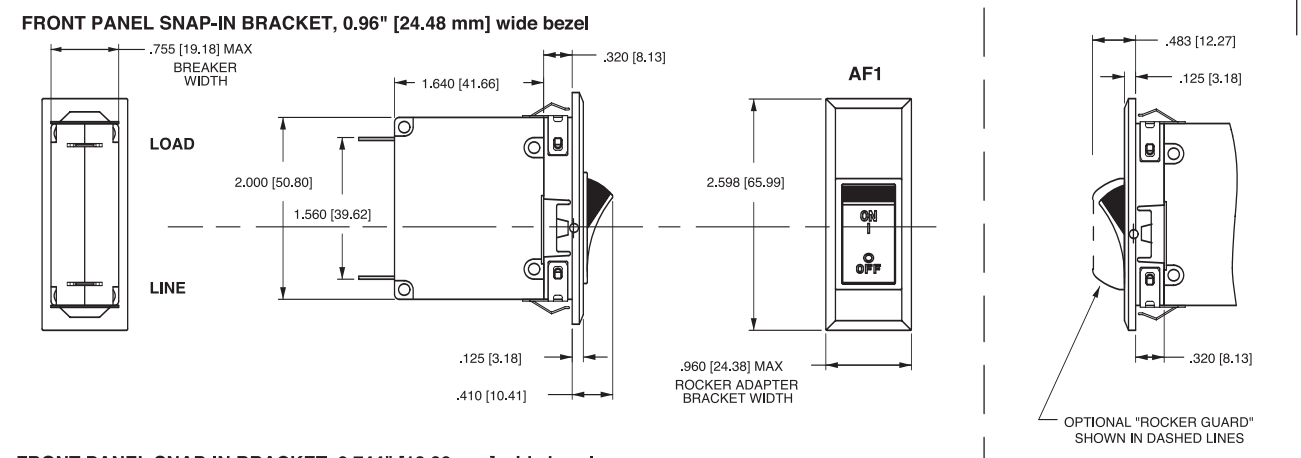


FRONT PANEL SNAP-IN BRACKET, 0.744" [18.90 mm] wide bezel

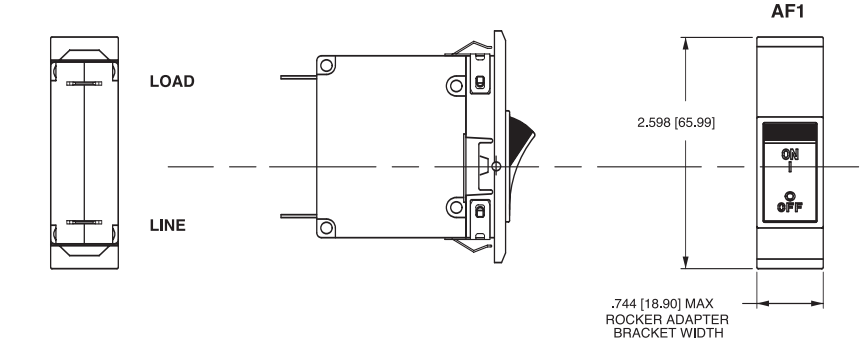


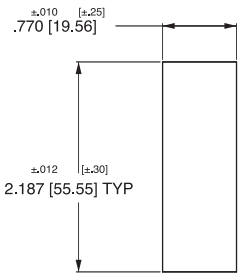
INDICATE "OFF"

FRONT PANEL SNAP-IN BRACKET, 0.96" [24.48 mm] wide bezel



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





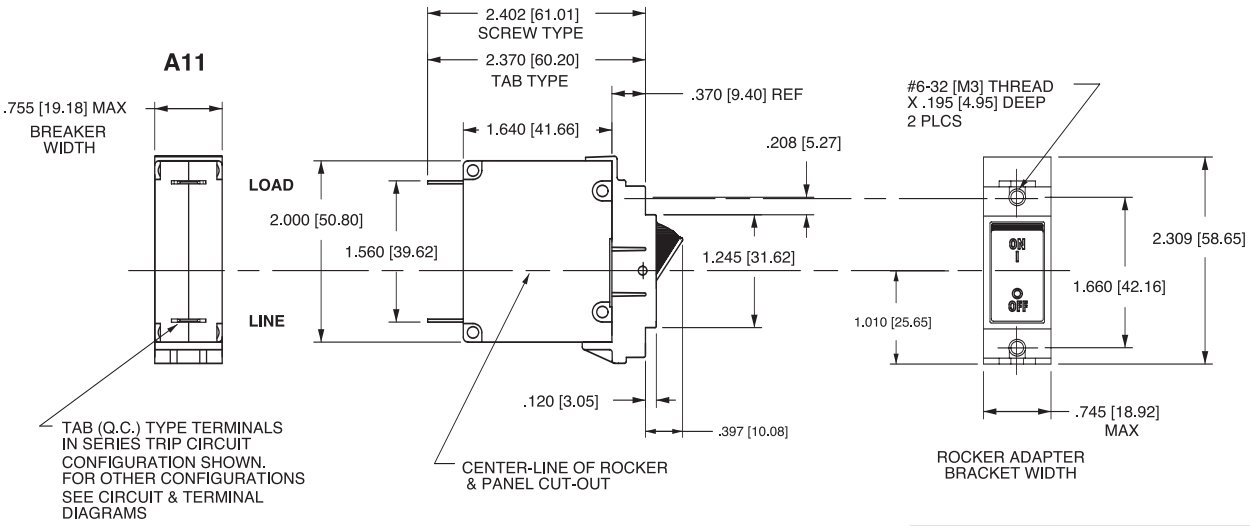
PANEL CUTOUT DETAIL

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.

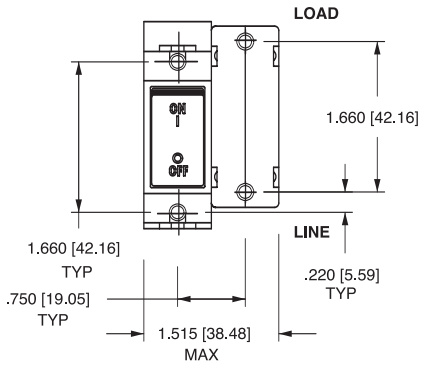
INDICATE "OFF" & SINGLE COLOR

(INDICATE "OFF" SHOWN)

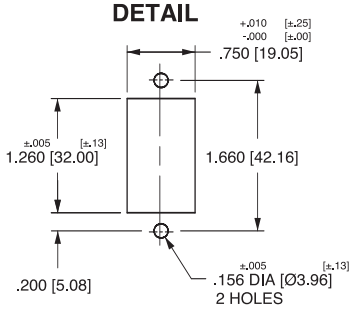
A11

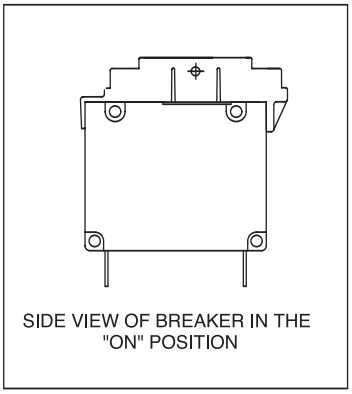


A12

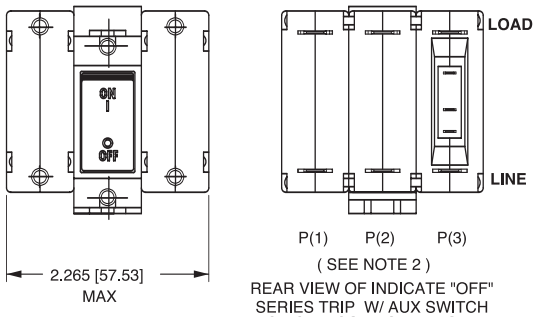


PANEL CUT-OUT DETAIL



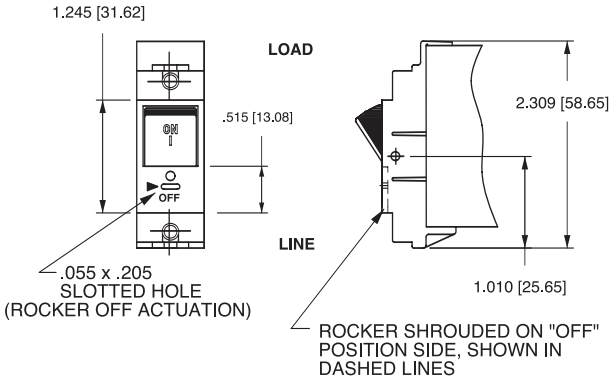


A13



PUSH-TO-RESET ACTUATOR

A51



ACTUATOR SIDE VIEW

(SURFACE CONTOURS)

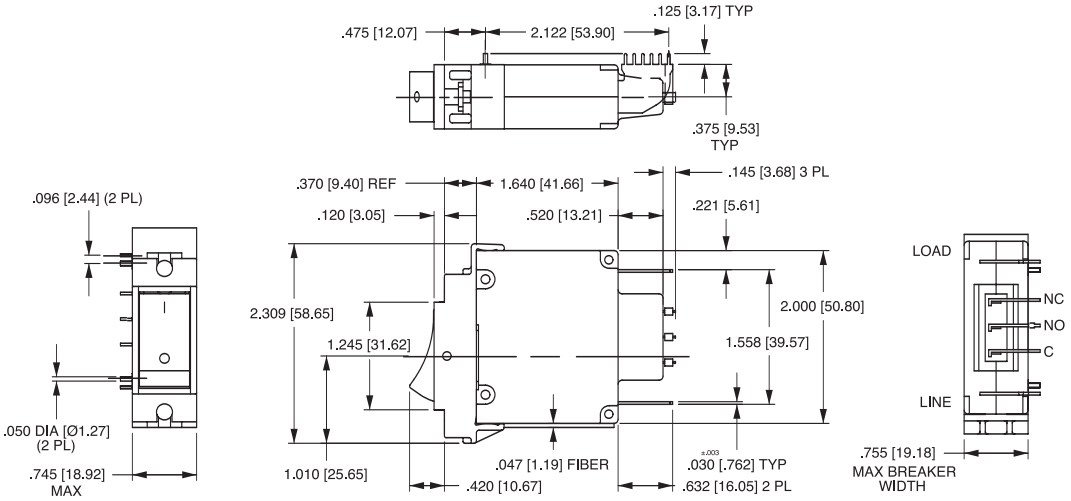
FLAT ROCKER

RECESSED OFF SIDE
ROCKER

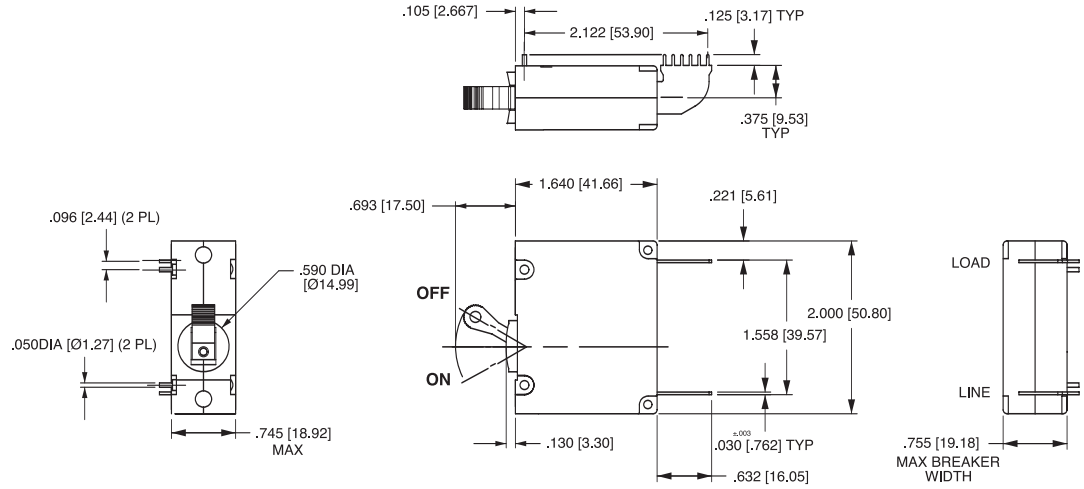
Notes:

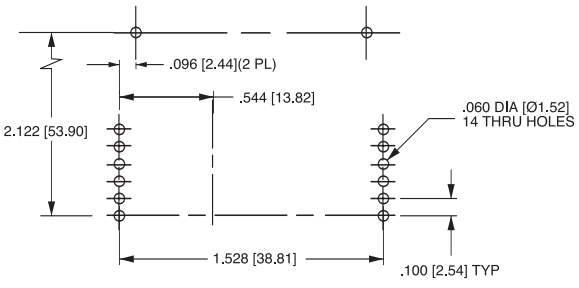
1 All dimensions are in inches [millimeters].
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 Tolerance ± 0.20 [.51] unless otherwise specified.

A-SERIES ROCKER

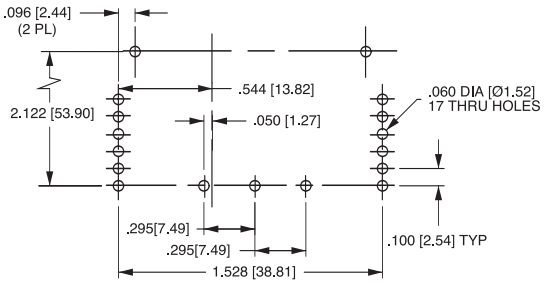


A-SERIES HANDLE





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.

Designed specifically for world market applications, the B-series utilizes the hydraulic magnetic principle which provides precise operation and performance even when exposed to extremely hot and/or cold application environments.

Typical applications include power supplies, medical equipment, office equipment, control panels and marine equipment. In addition, these breakes meet CSA Standard 22.2 No. 100 for the Generator & Welder markets.

1-6 poles, 0.02 - 50 amps, up to 277 VAC or 80 VDC, with choice of time delays, terminals and actuator colors.

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 E189195)
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

Electrical

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 for Table A:
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

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 for Table B:
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 for Table C:
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)

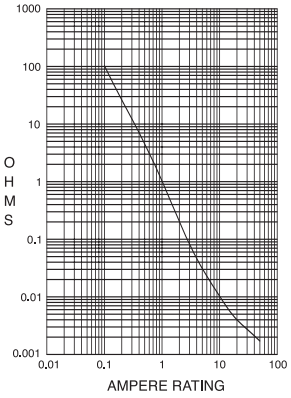
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	GENERAL PURPOSE AMPS	WITHOUT BACKUP FUSE
SERIES	80	DC	0.10 - 50	5000
	80	DC	60 - 90 [1]	5000

Notes for Table D:
1 60 -90 amp ratings require parallel pole construction

Electrical

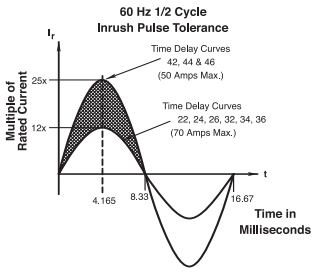
Maximum Voltage	277VAC 50/60 Hz, 80VDC
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 and 50.0 amps. Other ratings available, see ordering scheme.
Standard Voltage Coils	DC - 6V, 12V; AC - 120V, other ratings available,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

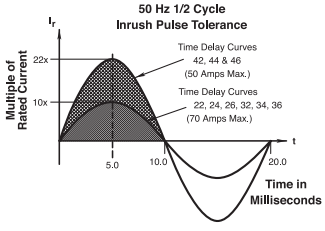
RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Breaker)



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

Pulse Tolerance Curves





Mechanical

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

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

5 AUXILIARY/ALARM SWITCH[5]
0	w/o Aux Switch	**5**	S.P.S.T., 0.093 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**6**	S.P.S.T., 0.139 Solder Lug
2	S.P.D.T., 0.110 Q.C. Term.	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
3	S.P.D.T., 0.139 Solder Lug	**8**	S.P.S.T., 0.187 Q.C. Term.
4	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	**9**	S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY
03[2]	DC 50/60Hz, Switch Only	**30**	DC, 50/60Hz Instantaneous
10[6]	DC Instantaneous	**31**	DC, 50/60Hz Ultra Short
11	DC Ultra Short	**32**	DC, 50/60Hz Short
12	DC Short	**34**	DC, 50/60Hz Medium
14	DC Medium	**36**	DC, 50/60Hz Long
16	DC Long	**42**[7]	50/60Hz Short, Hi-Inrush
20[6]	50/60Hz Instantaneous	**44**[7]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46**[7]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short	**52**[7]	DC, Short,Hi-Inrush
24	50/60Hz Medium	**54**[7]	DC, Medium, Hi-Inrush
26	50/60Hz Long	**56**[7]	DC, Long, Hi-Inrush

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 aux. 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, 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.

7 CURRENT RATING (AMPERES)
020	0.020	**230**	0.300	**425**	2.500	**612**	12.000
025	0.025	**235**	0.350	**527**	2.750	**712**	12.500
030	0.030	**240**	0.400	**430**	3.000	**613**	13.000
035	0.035	**245**	0.450	**435**	3.500	**614**	14.000
040	0.040	**250**	0.500	**440**	4.000	**615**	15.000
045	0.045	**255**	0.550	**445**	4.500	**616**	16.000
050	0.050	**260**	0.600	**450**	5.000	**617**	17.000
055	0.055	**265**	0.650	**455**	5.500	**618**	18.000
060	0.060	**270**	0.700	**460**	6.000	**620**	20.000
065	0.065	**275**	0.750	**465**	6.500	**622**	22.000
070	0.070	**280**	0.800	**470**	7.000	**624**	24.000
075	0.075	**285**	0.850	**475**	7.500	**625**	25.000
080	0.080	**290**	0.900	**480**	8.000	**630**	30.000
085	0.085	**295**	0.950	**485**	8.500	**635**[8]	35.000
090	0.090	**410**	1.000	**490**	9.000	**640**[8]	40.000
095	0.095	**512**	1.250	**495**	9.500	**645**[8]	45.000
210	0.100	**415**	1.500	**610**	10.000	**650**[8]	50.000
215	0.150	**517**	1.750	**710**	10.500		
220	0.200	**420**	2.000	**611**	11.000		
225	0.250	**522**	2.250	**711**	11.500		

OR VOLTAGE COIL (NOMINAL RATED VOLTAGE)[6]
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.)	**E**[11]	Screw M4 (Bus Type)
2	Screw 8-32 w/upturned lugs	**F**	Screw M5 w/upturned lugs and 30° bend
3[11]	Screw 8-32 (Bus Type)	**G**	Screw M5 (Bus Type) and 30° bend
4	Screw 10-32 w/upturned lugs	**H**	Screw M5 (Bus Type)
5[11]	Screw 10-32 (Bus Type)	**L**[12]	0.250 Q.C./ Solder Lug
6	Screw 8-32 w/upturned lugs and 30° bend	**M**[11]	M6 Threaded Studs
7	Screw 8-32 (Bus Type) and 30° bend	**P**[13]	Printed Circuit Board Terminals
8	Screw 10-32 w/upturned lugs and 30° bend	**Q**[16]	Push-In Stud
9	Screw 10-32 (Bus Type) and 30° bend	**R**	Screw M4 w/upturned lugs and 30° bend
B	Screw M5 w/upturned lugs	**S**[15]	Push-On 0.110 Tab (Q.C.)
C	Screw M4 w/upturned lugs	**T**	Screw M4 (Bus Type) and 30° bend

9 ACTUATOR COLOR & LEGEND
	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" [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 *(multi-pole units only)*	yes
	Front panel Snap-In, 0.96" [24.48mm] wide bezel	
7	without Handleguard, 1-pole units 0.96" wide; multipole units have .105" bezel overhang on all sides	no
8	without Handleguard, 1-pole units 0.96" wide; *(multi-pole units 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 Rec. STD 1077, UL Rec. 1500 (ignition protected), & CSA Accepted

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

4 CIRCUIT
B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH[2]
0	w/o Aux Switch	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
1	S.P.D.T., 0.093 Q.C. Term.	**8**	S.P.S.T., 0.187 Q.C. Term.
2	S.P.D.T., 0.110 Q.C. Term.	**9**	S.P.D.T., 0.187 Q.C. Term.
3	S.P.D.T., 0.139 Solder Lug		

6 FREQUENCY & DELAY[4]
11	DC Ultra Short	**52**	DC, Short,Hi-Inrush
12	DC Short	**54**	DC, Medium, Hi-Inrush
14	DC Medium	**56**	DC, Long, Hi-Inrush
16	DC Long		

7 CURRENT RATING (AMPERES)
210	0.100	**415**	1.500	**710**	10.500
215	0.150	**517**	1.750	**611**	11.000
220	0.200	**420**	2.000	**711**	11.500
225	0.250	**522**	2.250	**612**	12.000
230	0.300	**527**	2.750	**712**	12.500
235	0.350	**430**	3.000	**613**	13.000
240	0.400	**435**	3.500	**614**	14.000
245	0.450	**440**	4.000	**615**	15.000
250	0.500	**445**	4.500	**616**	16.000
255	0.550	**450**	5.000	**617**	17.000
260	0.600	**455**	5.500	**618**	18.000
265	0.650	**460**	6.000	**620**	20.000
270	0.700	**465**	6.500	**622**	22.000
275	0.750	**470**	7.000	**624**	24.000
280	0.800	**475**	7.500	**625**	25.000
285	0.850	**480**	8.000	**630**	30.000
290	0.900	**485**	8.500	**635**[3]	35.000
295	0.950	**490**	9.000	**640**[3]	40.000
410	1.000	**495**	9.500	**645**[3]	45.000
512	1.250	**610**	10.000	**650**[3]	50.000

8 TERMINAL[4]
1[5]	Push-On 0.250 Tab (Q.C.)	**9**	Screw 10-32 (Bus Type) and 30° bend
2	Screw 8-32 w/upturned lugs	**B**	Screw M5 w/upturned lugs
3[6]	Screw 8-32 (Bus Type)	**F**	Screw M5 w/upturned lugs and 30° bend
4	Screw 10-32 w/upturned lugs	**G**	Screw M5 (Bus Type) and 30° bend
5[6]	Screw 10-32 (Bus Type)	**H**	Screw M5 (Bus Type)
6	Screw 8-32 w/upturned lugs and 30° bend	**M**[6]	M6 Threaded Stud
7	Screw 8-32 (Bus Type) and 30° bend	**P**[7]	Printed Circuit Board Terminals
8	Screw 10-32 w/upturned lugs and 30° bend	**Q**[8]	Push-In Stud

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/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 *(multi-pole units only)*	yes
	Rectangular Adapter Plate with mounting centers of 2.062 inches 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 *(multi-pole units only)*	yes
	Front panel Snap-In, 0.75" wide bezel	
5	without Handleguard	no
6	without Handleguard *(multi-pole units only)*	yes
	Front panel Snap-In, 0.96" wide bezel	
7	without Handleguard, 1-pole units 0.96" wide; multipole units have .105" bezel overhang on all sides	no
8	without Handleguard, 1-pole units 0.96" wide; *(multi-pole units 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, 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 mulit-pole 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	w/o Aux Switch	**3**	S.P.D.T., 0.139 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)
210	0.100	**512**	1.250	**495**	9.500
215	0.150	**415**	1.500	**610**	10.000
220	0.200	**517**	1.750	**710**	10.500
225	0.250	**420**	2.000	**611**	11.000
230	0.300	**522**	2.250	**711**	11.500
235	0.350	**527**	2.750	**612**	12.000
240	0.400	**430**	3.000	**712**	12.500
245	0.450	**435**	3.500	**613**	13.000
250	0.500	**440**	4.000	**614**	14.000
255	0.550	**445**	4.500	**615**	15.000
260	0.600	**450**	5.000	**616**	16.000
265	0.650	**455**	5.500	**617**	17.000
270	0.700	**460**	6.000	**618**	18.000
275	0.750	**465**	6.500	**620**	20.000
280	0.800	**470**	7.000	**622**	22.000
285	0.850	**475**	7.500	**624**	24.000
290	0.900	**480**	8.000	**625**	25.000
295	0.950	**485**	8.500	**630**	30.000
410	1.000	**490**	9.000		

8 TERMINAL[5]
1	Push-On 0.250 Tab (Q.C.)	**9**	Screw 10-32 (Bus Type) and 30° bend
2	Screw 8-32 w/upturned lugs	**A**	Load Terminal: #8 Screw/QC Combination. (Special Cat.#)
3	Screw 8-32 (Bus Type)	**B**	Screw M5 w/upturned lugs
4	Screw 10-32 w/upturned lugs	**F**	Screw M5 w/upturned lugs and 30° bend
5	Screw 10-32 (Bus Type)	**G**	Screw M5 (Bus Type) and 30° bend
6	Screw 8-32 w/upturned lugs and 30° bend	**H**	Screw M5 (Bus Type)
7	Screw 8-32 (Bus Type) and 30° bend	**M**	M6 Threaded Stud
8	Screw 10-32 w/upturned lugs and 30° bend	**Q**	Push-In Stud

9 ACTUATOR COLOR[6]
	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/BARRIERS
	MOUNTING STYLE	BARRIERS[9]
	Threaded Insert, 2 per pole	
A	6-32 X 0.195 inches	yes
B	ISO M3 x 5mm	yes
	Rectangular Adapter Plate with mounting centers of 2.062 inches and Threaded insert, 2 per pole[7]	
C	6-32 X 0.225 inches	yes
D	ISO M3 x 6.5mm	yes
	Front panel Snap-In, 0.75" wide bezel	
6	without Handleguard	yes
	Front panel Snap-In, 0.96" wide bezel	
8	without Handleguard, 1-pole units 0.96" wide; .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 unassembled 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 aux. 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.

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

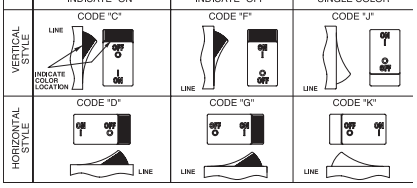
Two Color Visi-Rocker
- **C** Indicate ON, vertical legend
- **D** Indicate ON, horizontal legend
- **F** Indicate OFF, vertical legend
- **G** Indicate OFF, horizontal legend

Single color
- **J** Vertical legend
- **K** Horizontal legend

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[1,2]
- **1** One
- **2** Two
- **3**[3] Three

4 CIRCUIT
- **B** Series Trip (Current)

5 AUXILIARY/ALARM SWITCH[4]
- **0** w/o 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., 0.139 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
- **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)

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[5]
- **1**[6] Push-On 0.250 Tab (Q.C.)
- **2** Screw 8-32 w/upturned lugs
- **3** Screw 8-32 (Bus Type)
- **4** Screw 10-32 w/upturned lugs
- **5** Screw 10-32 (Bus Type)
- **6** Screw 8-32 w/upturned lugs and 30° bend
- **7** Screw 8-32 (Bus Type) and 30° bend
- **8** Screw 10-32 w/upturned lugs and 30° bend
- **9** Screw 10-32 (Bus Type) and 30° bend
- **B** Screw M5 w/upturned lugs
- **C** Screw M4 w/upturned lugs
- **F** Screw M5 w/upturned lugs and 30° bend
- **G** Screw M5 (Bus Type) and 30° bend
- **H** Screw M5 (Bus Type)

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS

		BARRIERS[9]
	STANDARD ROCKER BEZEL	
	Threaded Insert, 2 per pole	
A	6-32 X 0.195 inches	yes
B	ISO M3 x 5mm	yes
	ROCKERGUARD 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**[8] 120/240 VAC
- **K** 120 VAC

11 AGENCY APPROVAL
- **G** UL489 Listed

Notes:
1. Multi-pole breakers have all breakers identical except when specifying Aux. switch and/or mixed poles, and have one rocker per breaker.
2. All poles must be same polarity.
3. 3 pole units available only when1 of 3 poles is neutral.
4. On multi-pole breakers, one aux. 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]

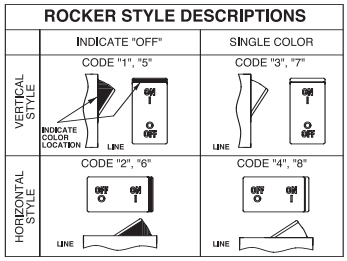
Two Color Visi-Rocker
- **1** Indicate OFF, vertical legend
- **2** Indicate OFF, horizontal legend

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 [5]
- **0** w/o 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., 0.139 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
- **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)

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 [6]
- **1** [7] Push-On 0.250 Tab (Q.C.)
- **2** Screw 8-32 w/upturned lugs
- **3** Screw 8-32 (Bus Type)
- **4** Screw 10-32 w/upturned lugs
- **5** Screw 10-32 (Bus Type)
- **6** Screw 8-32 w/upturned lugs and 30° bend
- **7** Screw 8-32 (Bus Type) and 30° bend
- **8** Screw 10-32 w/upturned lugs and 30° bend
- **9** Screw 10-32 (Bus Type) and 30° bend
- **B** Screw M5 w/upturned lugs
- **C** Screw M4 w/upturned lugs
- **F** Screw M5 w/upturned lugs and 30° bend
- **G** Screw M5 (Bus Type) and 30° bend
- **H** Screw M5 (Bus Type)

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color [8]	***Marking***		***Marking Color:***	
	ON-OFF	**Dual** [9]	**Single Color**	**Visi-Rocker**
White	**B**	**1**	Black	White
Black	**D**	**2**	White	n/a
Red	**G**	**3**	White	Red
Green	**J**	**4**	White	Green
Blue	**L**	**5**	White	Blue
Yellow	**N**	**6**	Black	Yellow
Gray	**Q**	**7**	Black	Gray
Orange	**S**	**8**	Black	Orange

10 MOUNTING/BARRIERS [9]

		BARRIERS [12]
	STANDARD ROCKER BEZEL, ***Threaded Insert, 2 per pole***	
	FLAT ROCKER ACTUATOR	
A	6-32 X 0.195 inches	yes
B	ISO M3 x 5mm	yes
	RECESSED OFF SIDE ROCKER ACTUATOR [10]	
E	6-32 x 0.195 inches	yes
F	ISO M3 x 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

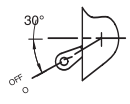
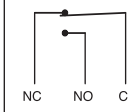
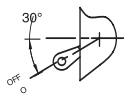
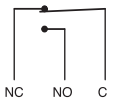
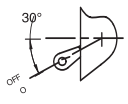
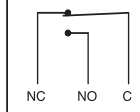
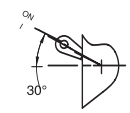
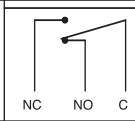
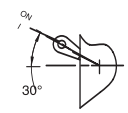
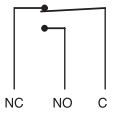
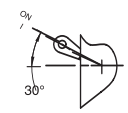
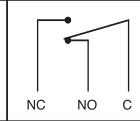
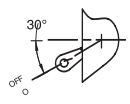
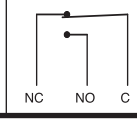
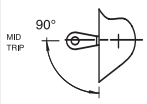
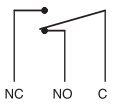
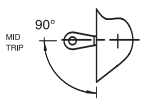
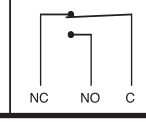
12 AGENCY APPROVAL
- **G** UL489 Listed

Notes:
1. Push-To-Reset actuators have OFF portion of rocker shrouded.
2. Multi-pole breakers have all breakers identical except when specifying Aux. 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 aux. 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.

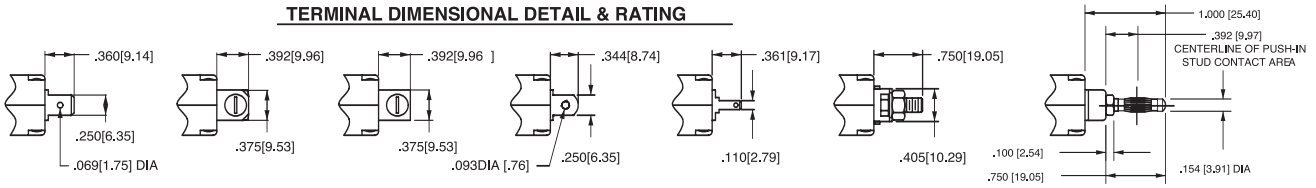
	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
	SWITCH ONLY (NO COIL)				SERIES TRIP			
SERIES TRIP (2 TERM'S.) MAIN TERM'S. (SEE TABLE A) 1.730 [43.94]	LINE / LOAD	LINE (NETZ) / LOAD (LAST)	A	O	LINE / LOAD	LINE (3) (NETZ) / LOAD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

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.

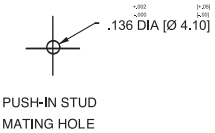
HANDLE POSITION VS. AUX/ALARM SWITCH MODE

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



TAB (Q.C.)	UPTURN LUG	BUS	QC SOLDER LUG	.110 QC	M6 STUD	PUSH-IN STUD
30 AMP	#8-32 30 AMP #10-32 30 AMP M5 30 AMP M4 30 AMP	#8-32 30 AMP #10-32 50 AMP	30 AMP	VOLTAGE COILS ONLY	50 AMP	50 AMP



AUXILIARY SWITCH TERMINAL DETAIL

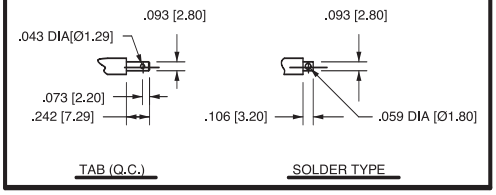
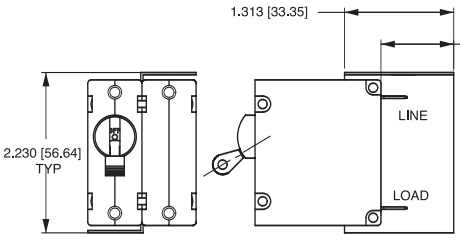
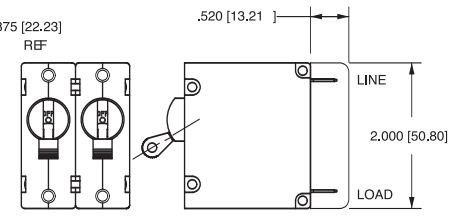


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

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

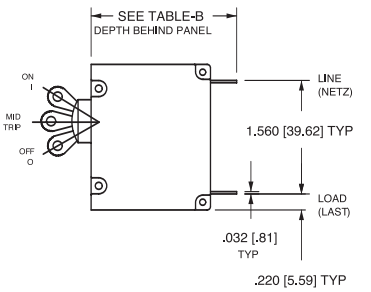


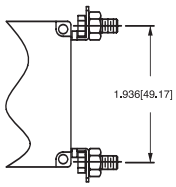
BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

TABLE B

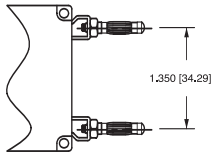
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL
MAIN	TAB (Q.C.)	2.090 [53.09]
	SCREW TYPE	2.122 [53.90]
SHUNT, RELAY & DUAL COIL	TAB (Q.C.)	2.612 [66.35]
	SCREW #8-32 W/UPTURNED LUGS	2.644 [67.16]
AUX. SWITCH*	TAB (Q.C.) .110 x .020	2.537 [64.44]
	SOLDER TYPE	2.348 [59.64]

* 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

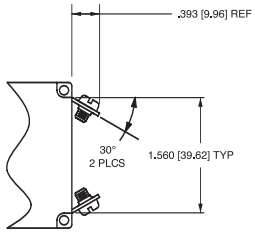




M6 STUD



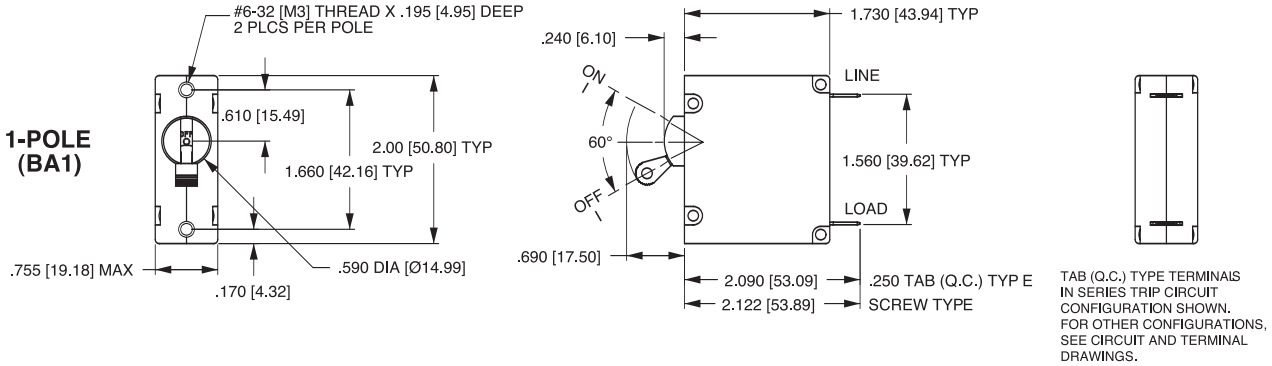
PUSH-IN STUD



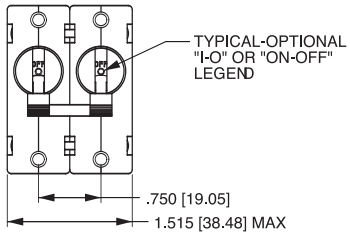
SCREW TERMINAL WITH 30° BEND

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

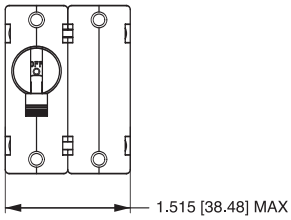
1-POLE (BA1)



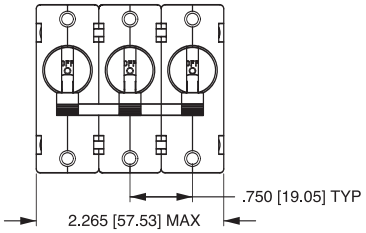
2-POLE (BA2)



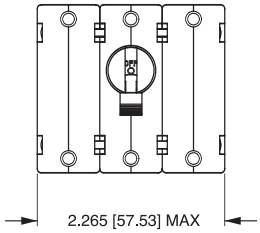
2-POLE (BB2)



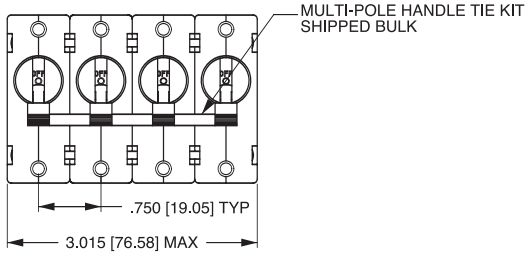
3-POLE (BA3)



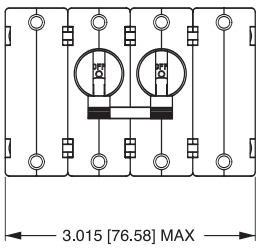
3-POLE (BB3)

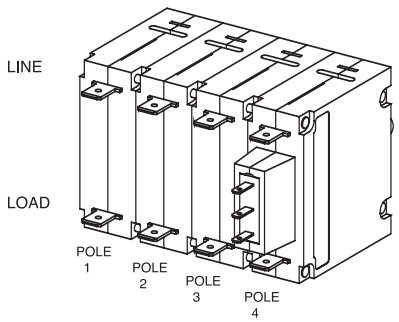


4-POLE (BA4)

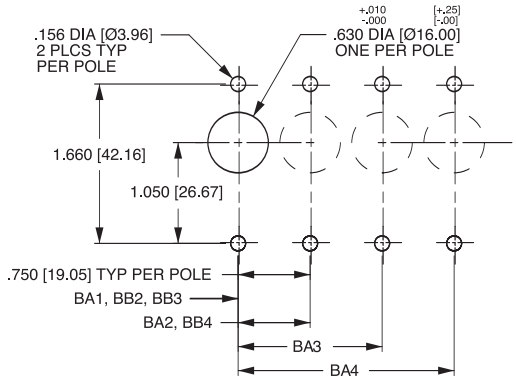


4-POLE (BB4)



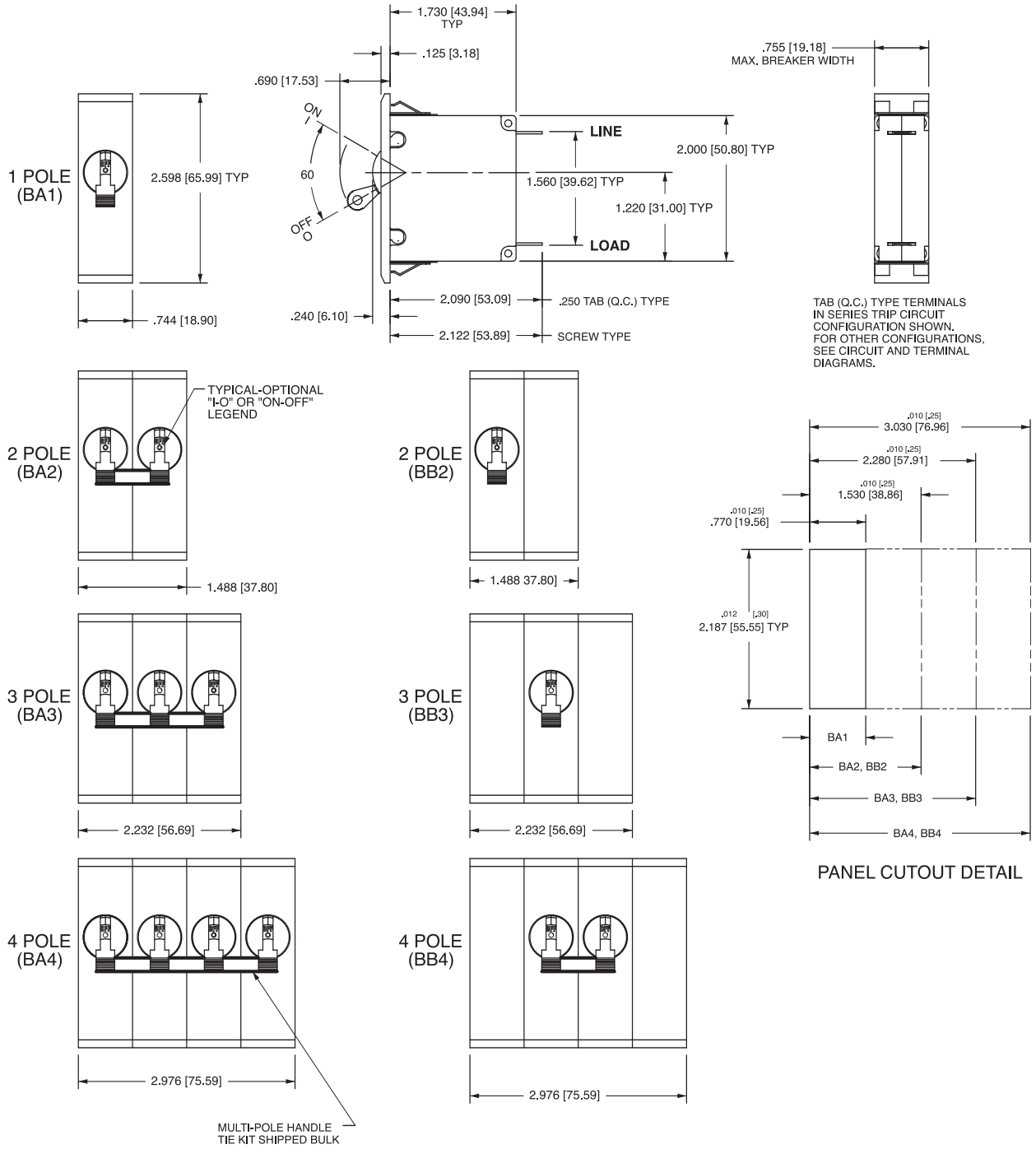


MULTI-POLE IDENTIFICATION SCHEME
AS VIEWED FROM TERMINAL END OF BREAKER.

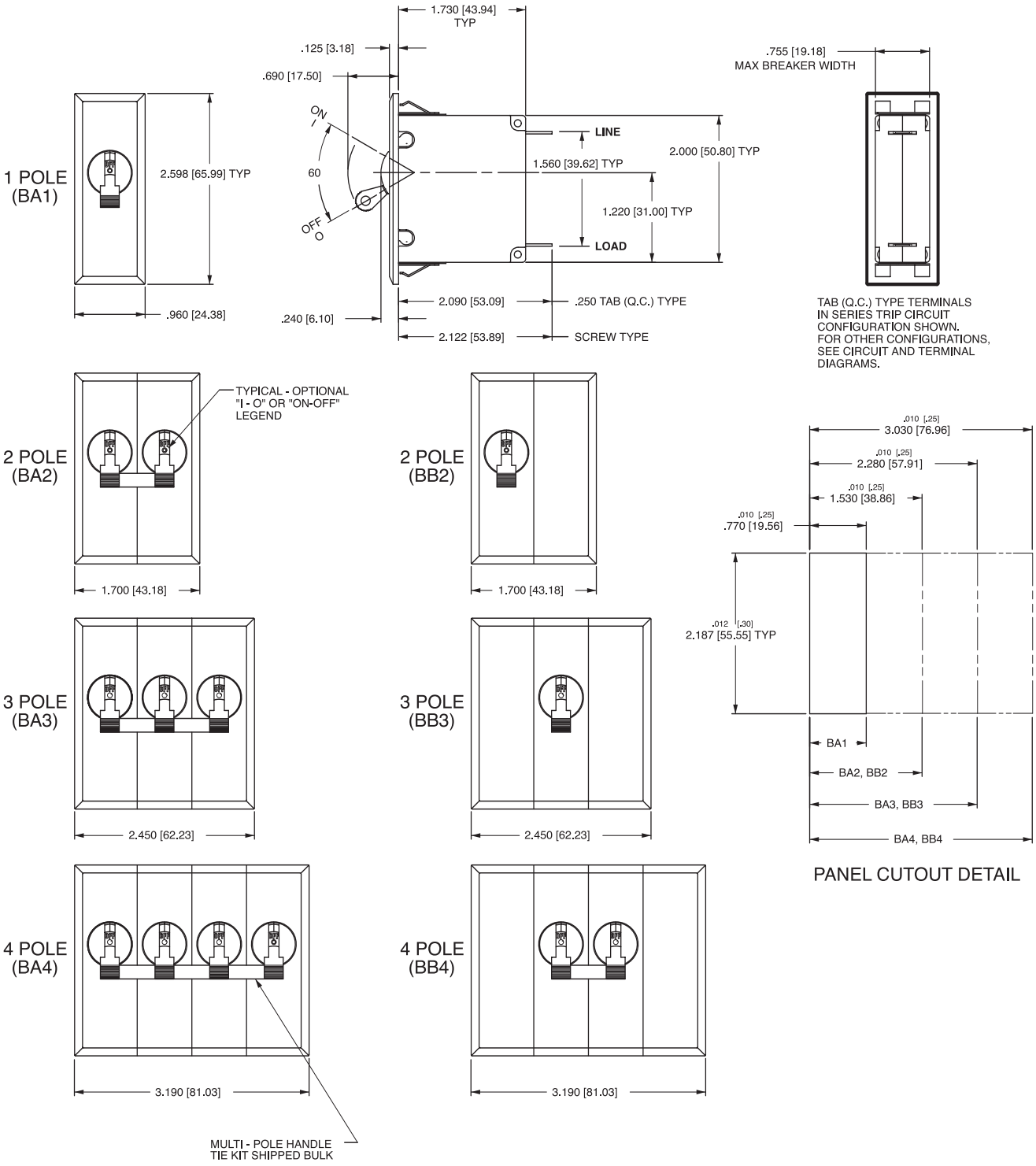


PANEL CUTOUT DETAIL
TOLERANCES ±.005 [±.12]

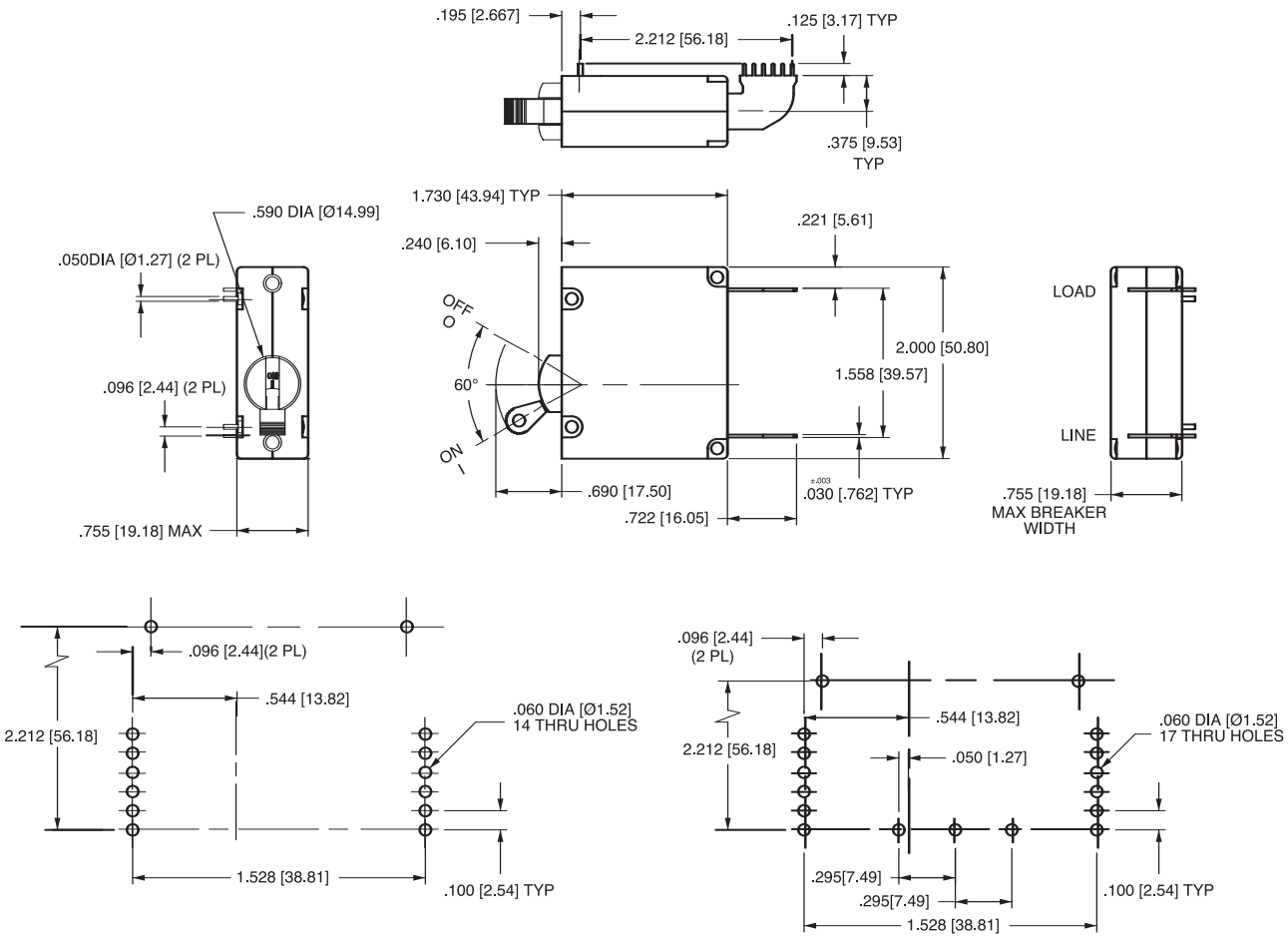
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.



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.



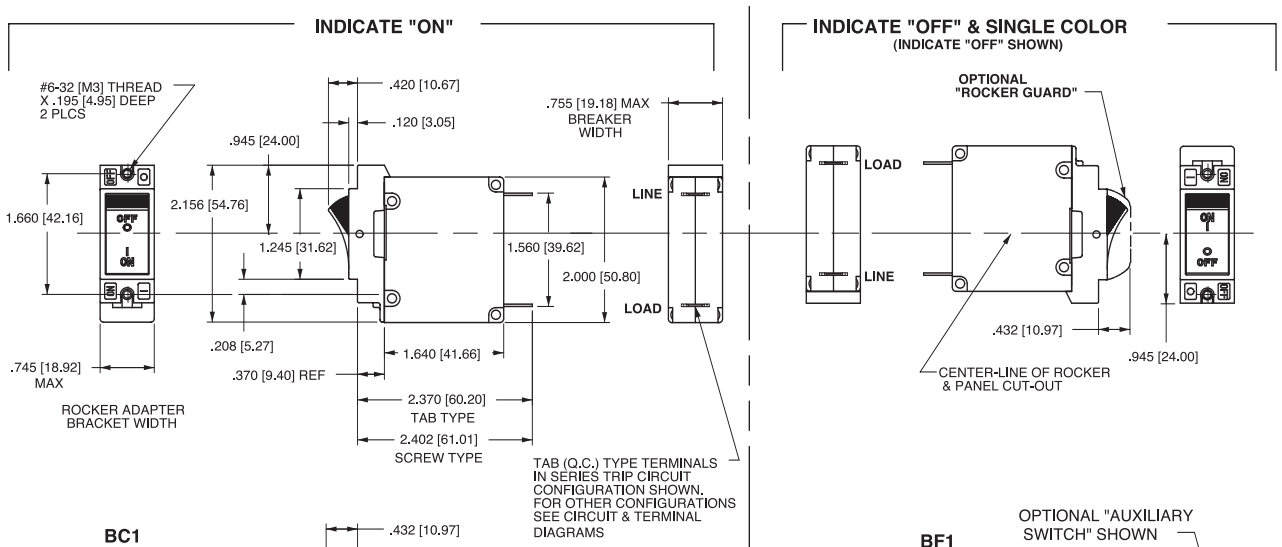
Notes:
1 All dimensions are in inches [millimeters].
2 Recommended panel thickness .040 [1.02] to .100 [2.54].
3 Tolerance ±.020 [.51] unless otherwise specified.

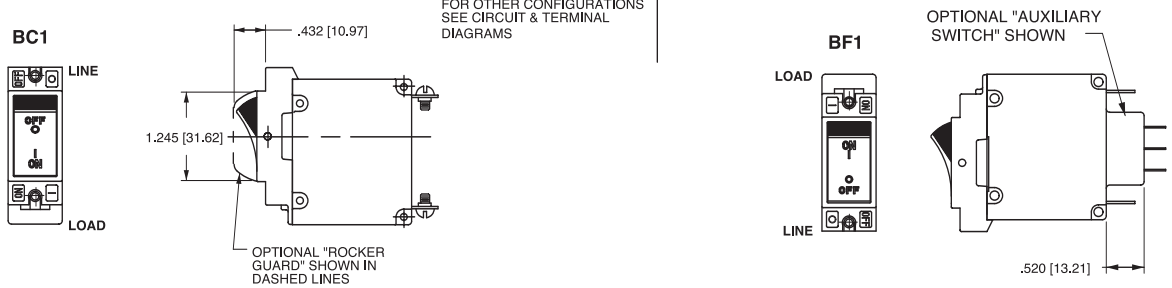


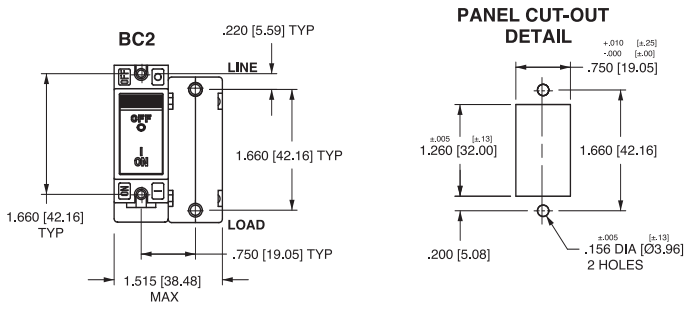
P.C. FOOT PRINT

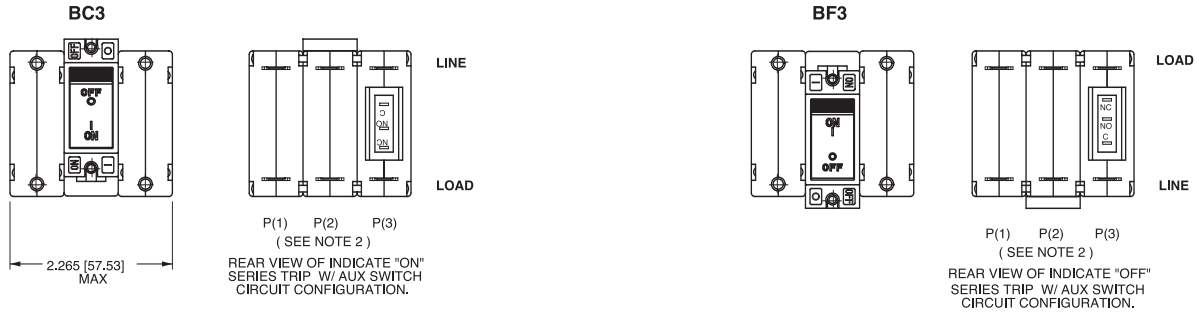
P.C. FOOT PRINT WITH AUX. SWITCH

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.









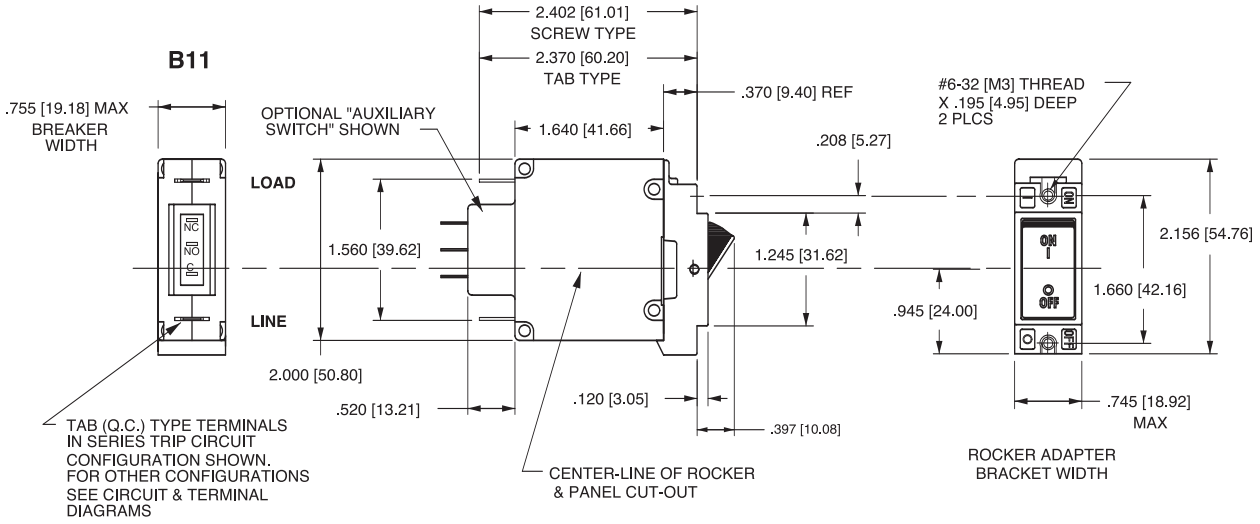
Notes:

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.

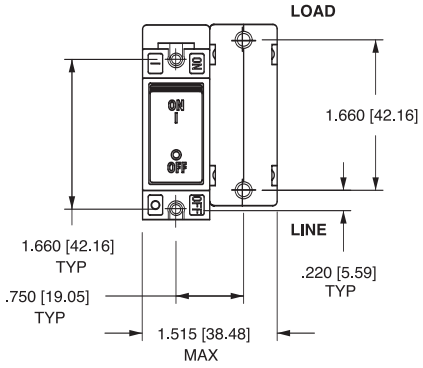
INDICATE "OFF" & SINGLE COLOR

(INDICATE "OFF" SHOWN)

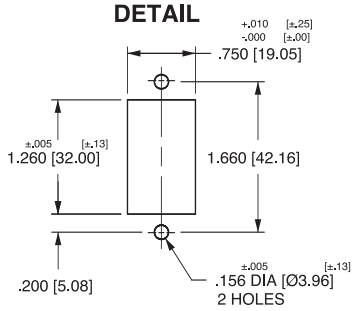
B11

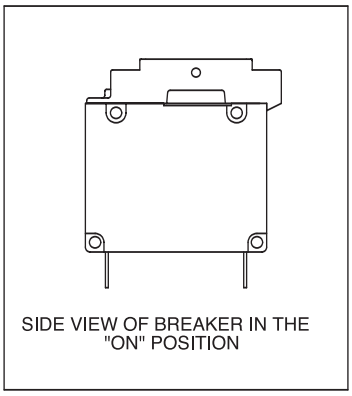


B12



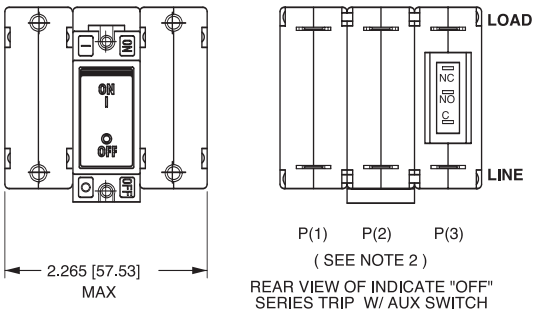
PANEL CUT-OUT DETAIL





SIDE VIEW OF BREAKER IN THE "ON" POSITION

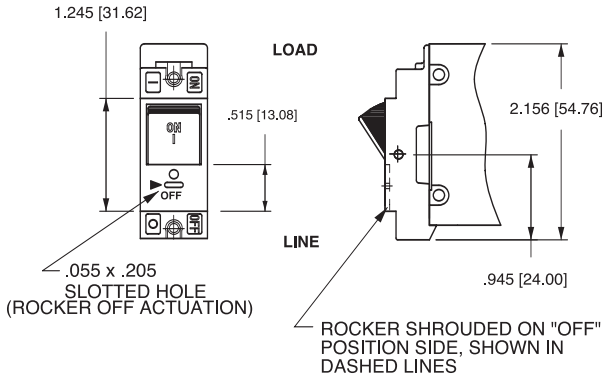
B13



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

PUSH-TO-RESET ACTUATOR

B51



ACTUATOR SIDE VIEW

(SURFACE CONTOURS)

FLAT ROCKER

RECESSED OFF SIDE ROCKER

Notes:

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

Designed for those applications requiring higher amperage and voltage handling capability in a compact design. Available with American Standard or Metric Threaded Stud terminals, or Saddle Clamp screw terminals. Available with optional mid-trip handle style actuator, solid color rocker actuators and Visi-rocker two color actuators. Visi-rocker can be specified to indicate either the ON or TRIPPED/OFF mode. Rockerguard and Push-To-Reset bezel help prevent inadvertent actuation.
The C-Series UL489 breakers employ a unique arc chute design which results in obtaining higher interrupting capacities, up to 50,000 amps. Thermoset glass filled polyester half shell construction for increased mechanical & electrical strength; Wiping Contacts - Mechanical linkage with two-step actuation – cleans contacts, provides high, positive contact pressure & longer contact life;
1-6 poles, 0.02 - 100 amps, up to 480 VAC or 80 VDC, UL489 up to 240 VAC or 125 VDC, with choice of time delays and actuator colors.

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 E189195)
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. R72041016

VDE Certified

EN60934, VDE 0642 under File No. 10537

Electrical

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"
				71 - 100	—	—	1000	TC1,2,OL1,U1	TC1,2,OL1,U1	
	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,U1	TC1,2,OL1,U1	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,OL1,U1	TC1,2,OL1,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 for Table A:

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

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 & 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 for Table B:
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.
2 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.

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
	250	50 / 60	1	0.10 - 50	---	---	3500	3000	1500	3000	1500	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				0.10 - 70	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
				71 - 100	---	---	5000	---	---	5000	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
			3	0.10 - 90	---	---	3000	---	---	5000	5000	TC1, OL0, U2	TC1, OL0, U2	
				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 [2]	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker
						5000 [2]	---	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 [2]	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker
						5000 [2]	---	5000	2500	3000	1500	TC1,2 ,OL1,C1	TC1,2, OL1,C1	Handle/ Agency F, H, J, or R

Notes for Table C:
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.

Electrical

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	50000 [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
	240	50 / 60	1	0.10 - 30	5,000	1 or 2 Poles
DUAL COIL	120	50 / 60	1	0.10 - 30	10,000	--

Notes from Table D:
1 Special catalog number required. Consult factory.

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	32	DC	---	0.02 - 100	5000	TC1,2,OL1,U2	TC1,2,OL1,U2	—
	48	DC	---	0.02 - 100	5000	TC1,2,OL1,U2	TC1,2,OL1,U2	—
				101 - 150	5000	TC1,2,OL1,U2	TC1,2,OL1,U2	—
	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	—
				0. 02 - 100	3000	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
	125 / 250	50 / 60	1	0.02 - 100	3500	TC1, OL1, U2	TC1, OL1, U2	2 or 3 Poles Breaking Single Phase
	250	50 / 60	1	0.02 - 50	3500	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				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

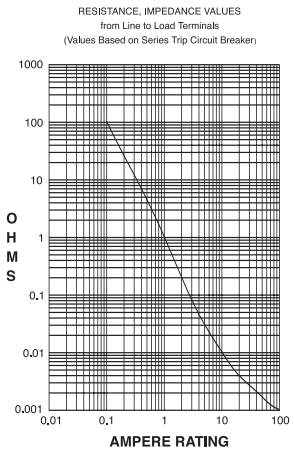
Table F: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (Guide DITT, File E189195), under UL489A.

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

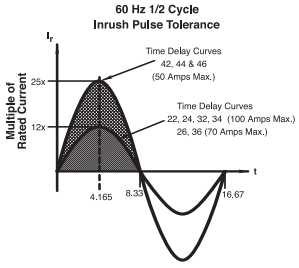
Electrical

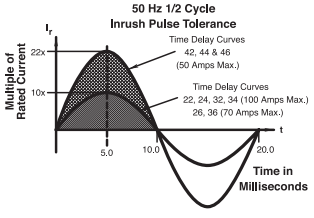
Maximum Voltage	AC, 480 WYE/277 VAC, 50/60 Hz (see Table A.) UL489: AC,240 VAC. (See Table D), 50/60 Hz, 125 VDC
Current Rating	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 25.0, 30.0, 35.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0 and 100 amps. Other ratings available, 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 - 100.0	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 Configurations	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 & mid-trip 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

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/ Barriers		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[6]
0	w/o Aux Switch	**5**	S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
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	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
4	S.P.D.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[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

7 CURRENT RATING (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]	100.000
230	0.300	**527**	2.750	**613**	13.000		

OR VOLTAGE COIL (NOMINAL RATED VOLTAGE)[7]
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, threaded	**6**[12]	Stud M6 threaded
2[11]	Screw 10-32	**7**[13,15]	0.250 Double Quick Connect
3[12]	Stud 1/4-20, threaded	**8**[15]	1/4" Clip Terminal
4[11]	Stud M5 x 0.8, threaded	**9**[12,15]	7/16" Clip Terminal
5[11]	Screw M5 x 0.8	**A**[14]	Plug-In Stud
		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 Rec. STD 1077, UL Rec. 1500 (ignition protected), & CSA Accepted
L	UL489 Construction: UL Recognized & CSA Accepted
R	UL489 Construction: TUV Certified, UL Recognized & CSA Accepted

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 auxilary switch and/or mixed poles. 4 pole max w/VDE. 5th pole available as Series Trip w/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 aux. switch is supplied, mounted in the extreme right pole.
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. 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 7,8,9 & 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.

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[1]
A Handle, one per pole
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

3 POLES[3]
2 Two
3 Three

4 CIRCUIT
P Series Trip (Parallel Pole)

5 AUXILIARY/ALARM SWITCH
0 w/o 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., 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)

811	110.000	**814**	140.000	**917**	175.000	**922**[3]	225.000
812	120.000	**815**	150.000	**818**	180.000	**825**[3]	250.000
912	125.000	**816**	160.000	**819**	190.000		
813	130.000	**817**	170.000	**820**	200.000		

8 TERMINAL[2]
3 1/4 - 20 Threaded Stud
6 M6 Threaded Stud
A Plug-In Stud

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

11 MAXIMUM APPLICATION RATING
M 80 DC

12 AGENCY APPROVAL
T UL489A Listed (up to 250 amps)
K UL489A Listed, VDE Certified (up to 200 amps)

Notes:
1 Actuator Code:
A: Handle tie pin spacer(s) and retainers provided 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 Terminal Code:
3 & 6: Supplied with bus bars connecting the Line and Load Terminals.
A: Line and Load Terminals must be connected to a copper bus bar having a minimum cross section of 0.078 square inches.
3 Above 200 amps, 3 poles are required.

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	w/o Aux Switch	**5**	S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
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	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
4	S.P.D.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	**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)[5]
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**	100.000
290	0.900	**465**	6.500	**617**	17.000		

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

9 ACTUATOR COLOR & LEGEND[11]
Actuator Color	ON-OFF	Dual	Legend Color
White	**B**	**1**	Black
Black	**D**	**2**	White
Red	**G**	**3**	White
Green	**J**	**4**	White
Blue	**L**	**5**	White
Yellow	**N**	**6**	Black
Gray	**Q**	**7**	Black
Orange	**S**	**8**	Black

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

11 MAXIMUM APPLICATION RATING
A	65 DC
B	125 DC
C	120/240 AC[2]
D	240 AC
K	120 AC
M	80 DC

12 AGENCY APPROVAL[11]
A	w/o 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 8, 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/ Barriers		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)	**F**[3]	Relay Trip (Current)
B	Series Trip (Current)	**G**[3]	Relay Trip (Voltage)
C	Series Trip (Voltage)	**H**[3,4]	Dual Coil with Shunt Trip Voltage Coil
D[3]	Shunt Trip (Current)	**K**[3,4]	Dual Coil with Relay Trip Voltage Coil
E[3]	Shunt Trip (Voltage)		

5 AUXILIARY/ALARM SWITCH[5]

0	w/o Aux Switch	**5**	S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
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	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
4	S.P.D.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	**30**	DC, 50/60Hz Instantaneous
10[6]	DC Instantaneous	**31**	DC, 50/60Hz Ultra Short
11	DC Ultra Short	**32**	DC, 50/60Hz Short
12	DC Short	**34**	DC, 50/60Hz Medium
14	DC Medium	**36**	DC, 50/60Hz Long
16	DC Long	**42**[7]	50/60Hz Short, Hi-Inrush
20[6]	50/60Hz Instantaneous	**44**[7]	50/60Hz Medium, Hi-Inrush
21	50/60Hz Ultra Short	**46**[7]	50/60Hz Long, Hi-Inrush
22	50/60Hz Short	**52**[7]	DC, Short,Hi-Inrush
24	50/60Hz Medium	**54**[7]	DC,Medium, Hi-Inrush
26	50/60Hz Long	**56**	DC, Long, Hi-Inrush

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 aux. 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, 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.

7 CURRENT RATING (AMPERES)[9]

020	0.020	**235**	0.350	**430**	3.000	**614**	14.000
025	0.025	**240**	0.400	**435**	3.500	**615**	15.000
030	0.030	**245**	0.450	**440**	4.000	**616**	16.000
035	0.035	**250**	0.500	**445**	4.500	**617**	17.000
040	0.040	**255**	0.550	**450**	5.000	**618**	18.000
045	0.045	**260**	0.600	**455**	5.500	**620**	20.000
050	0.050	**265**	0.650	**460**	6.000	**622**	22.000
055	0.055	**270**	0.700	**465**	6.500	**624**	24.000
060	0.060	**275**	0.750	**470**	7.000	**625**	25.000
065	0.065	**280**	0.800	**475**	7.500	**630**	30.000
070	0.070	**285**	0.850	**480**	8.000	**635**	35.000
075	0.075	**290**	0.900	**485**	8.500	**640**	40.000
080	0.080	**295**	0.950	**490**	9.000	**650**	50.000
085	0.085	**410**	1.000	**495**	9.500	**660**	60.000
090	0.090	**512**	1.250	**610**	10.000	**670**	70.000
095	0.095	**415**	1.500	**710**	10.500	**680**[8]	80.000
210	0.100	**517**	1.750	**611**	11.000	**685**[8]	85.000
215	0.150	**420**	2.000	**711**	11.500	**690**[8]	90.000
220	0.200	**522**	2.250	**612**	12.000	**695**[8]	95.000
225	0.250	**425**	2.500	**712**	12.500	**810**[8]	100.000
230	0.300	**527**	2.750	**613**	13.000		

OR VOLTAGE COIL (NOMINAL RATED VOLTAGE)[7]

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, threaded	**7**[12]	0.250 Double Quick Connect
2[10]	Screw 10-32	**8**	1/4" Clip Terminal
3[11]	Stud 1/4-20	**9**[11]	7/16" Clip Terminal
4[10]	Stud M5 x 0.8	**A**[13]	Plug-In Stud
5[10]	Screw M5 x 0.8	**C**[10]	5/16" Clip Terminal
6[11]	Stud M6 threaded		

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
L UL Recognized & CSA Accepted with listed construction

C	C	3	–	B	0	–	10	–	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

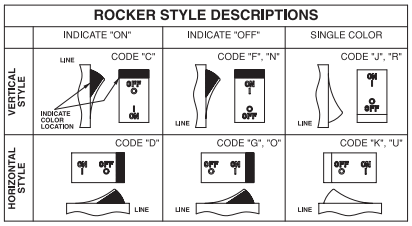
2 ACTUATOR [1]

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



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** w/o 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., 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
- **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 Aux. 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 aux. 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. 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 7,8,9 & 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 witha ctuator codes N, O, P, R, U, V.
18. VDE/TUV approval requires Dual (I-O, ON-OFF) or I-O markings on rocker.
19. VDE/TUV: 30 amps max.; UL/CSA: 50 amps max.; Available in 2 - 4 poles only and limited to AC Delays. "General Purpose amps" not rated for "full load amps" or to be used in applications with a motor.

7 CURRENT RATING (AMPERES)

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]	100.000
230	0.300	**527**	2.750	**613**	13.000		

OR VOLTAGE COIL (NOMINAL RATED VOLTAGE) [7]

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, threaded
- **2** [11] Screw 10-32
- **3** [12] Stud 1/4-20, threaded
- **4** [11] Stud M5 x 0.8, threaded
- **5** [11] Screw M5 x 0.8
- **6** [12] Stud M6 threaded
- **7** [13] 0.250 Double Quick Connect
- **8** 1/4" Clip Terminal
- **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

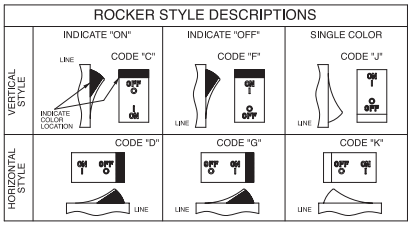
11 AGENCY APPROVAL
- **C** UL Recognized & CSA Accepted
- **D** VDE Certified, UL Recognized & CSA Accepted
- **E** TUV Certified, UL Recognized & CSA Accepted
- **H** UL489 Construction: VDE Certified, UL Recognized & CSA Accepted
- **I** UL Rec. STD 1077, UL Rec. 1500 (ignition protected), & CSA Accepted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

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		*Single color*	
C	Indicate ON, vertical legend	**J**	Vertical legend
D	Indicate ON, horizontal legend	**K**	Horizontal legend
F	Indicate OFF, vertical legend		
G	Indicate OFF, horizontal legend		



3 POLES[1]

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

4 CIRCUIT

B	Series Trip (Current)

5 AUXILIARY/ALARM SWITCH[2]

0	w/o Aux Switch	**5**	S.P.S.T., 0.093 Q.C. Term. (Gold Contacts)
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	**7**	S.P.S.T., 0.110 Q.C. Term.(Gold Contacts)
4	S.P.D.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	**26**	50/60Hz Long
12	DC Short	**42**[3]	50/60Hz Short, Hi-Inrush
14	DC Medium	**44**[3]	50/60Hz Medium, Hi-Inrush
16	DC Long	**46**[3]	50/60Hz Long, Hi-Inrush
21	50/60Hz Ultra Short	**52**[3]	DC, Short,Hi-Inrush
22	50/60Hz Short	**54**[3]	DC,Medium, Hi-Inrush
24	50/60Hz Medium	**56**[3]	DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)[4]

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	**100**	100.000
290	0.900	**465**	6.500	**617**	17.000		

8 TERMINAL

1[5]	Stud 10-32, threaded	**6**[7]	Stud M6 threaded
2[6]	Screw 8-32 w/saddle & washer clamps	**8**[8]	1/4" Clip Terminal
		9[7,8]	7/16" Clip Terminal
3[7]	Stud 1/4-20, threaded	**A**[7,8]	Push-In Stud
4[6]	Stud M5 x 0.8, threaded	**C**[6,8]	5/16" Clip Terminal
5[6]	Screw M5 x 0.8 w/saddle & washer clamp		

9 ACTUATOR COLOR & LEGEND[11]

Actuator or Visi-Color[9]	*Marking:*		*Marking Color:*	
			Single Color	
Color:	**ON-OFF**	**Dual**[10]	**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[13]
	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
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 Aux. switch and/or mixed poles, and have one rocker per breaker.
2 On multi-pole breakers, one aux. 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 8, 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]

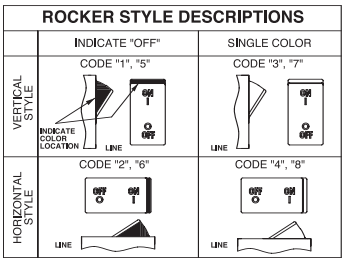
Two Color Visi-Rocker
- **1** Indicate OFF, vertical legend
- **2** Indicate OFF, horizontal legend

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** w/o 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., 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
- **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) [9]

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	**100** [9]	100.000
230	0.300	**527**	2.750	**613**	13.000		

***OR* VOLTAGE COIL (NOMINAL RATED VOLTAGE)** [7]

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, threaded
- **2** [11] Screw 10-32
- **3** [12] Stud 1/4-20, threaded
- **4** [11] Stud M5 x 0.8, threaded
- **5** [11] Screw M5 x 0.8
- **6** [12] Stud M6 threaded
- **7** [13] 0.250 Double Quick Connect
- **8** 1/4" Clip Terminal
- **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
	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 Rec. STD 1077, UL Rec. 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 Aux. 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 aux. 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 7,8,9 & 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.

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]

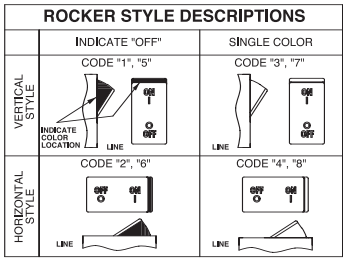
Two Color Visi-Rocker
- **1** Indicate OFF, vertical legend
- **2** Indicate OFF, horizontal legend

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 [3]
- **0** w/o 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., 0.093 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

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) [5]

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	**100**	100.000
290	0.900	**465**	6.500	**617**	17.000		

8 TERMINAL
- **1** [6] Stud 10-32, threaded .625 long
- **2** [7] Screw 8-32 w/saddle & washer clamps
- **3** [8] Stud 1/4-20, threaded .625 long
- **4** [7] Stud M5 x 0.8, threaded 16mm long
- **5** [7] Screw M5 x 0.8 w/saddle & washer clamp
- **6** [8] Stud M6 threaded, 17mm long
- **8** [9] 1/4" Clip Terminal
- **9** [8,9] 7/16" Clip Terminal
- **A** [8,9] Push-In Stud
- **C** [7,9] 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND [12]

Actuator or Visi-Color [10]	***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
- **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

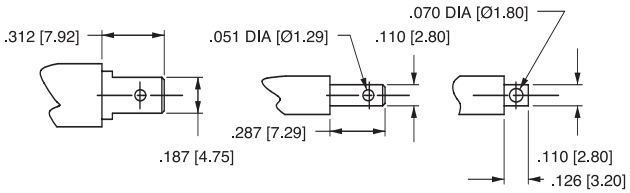
Notes:
1. Push-to-reset actuators have OFF portion of rocker shrouded.
2. Multi-pole breakers have all breakers identical except when specifying Aux. switch and/or mixed poles, and have one rocker per breaker.
3. On multi-pole breakers, one aux. switch is supplied, mounted in the extreme right pole.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

TERMINAL						
DESCRIPTION	CODE	DIMENSIONAL DETAIL	RATING (AMPS) 25	50	100 80	
#10-32 STUD	1	.723[18.36] .150 [3.81]	■	■		
M5 STUD	4	.688[17.48] .150 [3.81]	■	■		
#1/4-20 STUD	3	.723[18.36] .150 [3.81]	■	■	■	
M6 STUD	6					
#1/4-20 STUD	3	.675 [17.15] .235 [5.97]				■
M6 STUD	6	.669 [16.99] .264 [6.71]				■
#10-32 SCREW	2	±.015 ±.38 .150 [3.81]	■	■		
M-5 SCREW	5					

TERMINAL						
DESCRIPTION	CODE	DIMENSIONAL DETAIL	RATING (AMPS) 25	50	100 80	
.250 DOUBLE Q.C.	7	.400 [10.16] .820 [20.83] .173 [4.39] .320 [8.13] .250 [6.35]			■	
7/16" CLIP TERMINALS	9	.437 DIA [Ø11.10] COMPONENT DIA .644[16.36] .901[22.89]			■	
PUSH-IN STUD	A	.845[21.46] +.002 -.000 +.05 -.00 Ø.311[7.90] .482[12.24] CENTERLINE OF PUSH-IN STUD CONTACT AREA PUSH-IN STUD MATING HOLE			■	

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

AUXILIARY / ALARM SWITCH TERMINAL DETAIL[3]



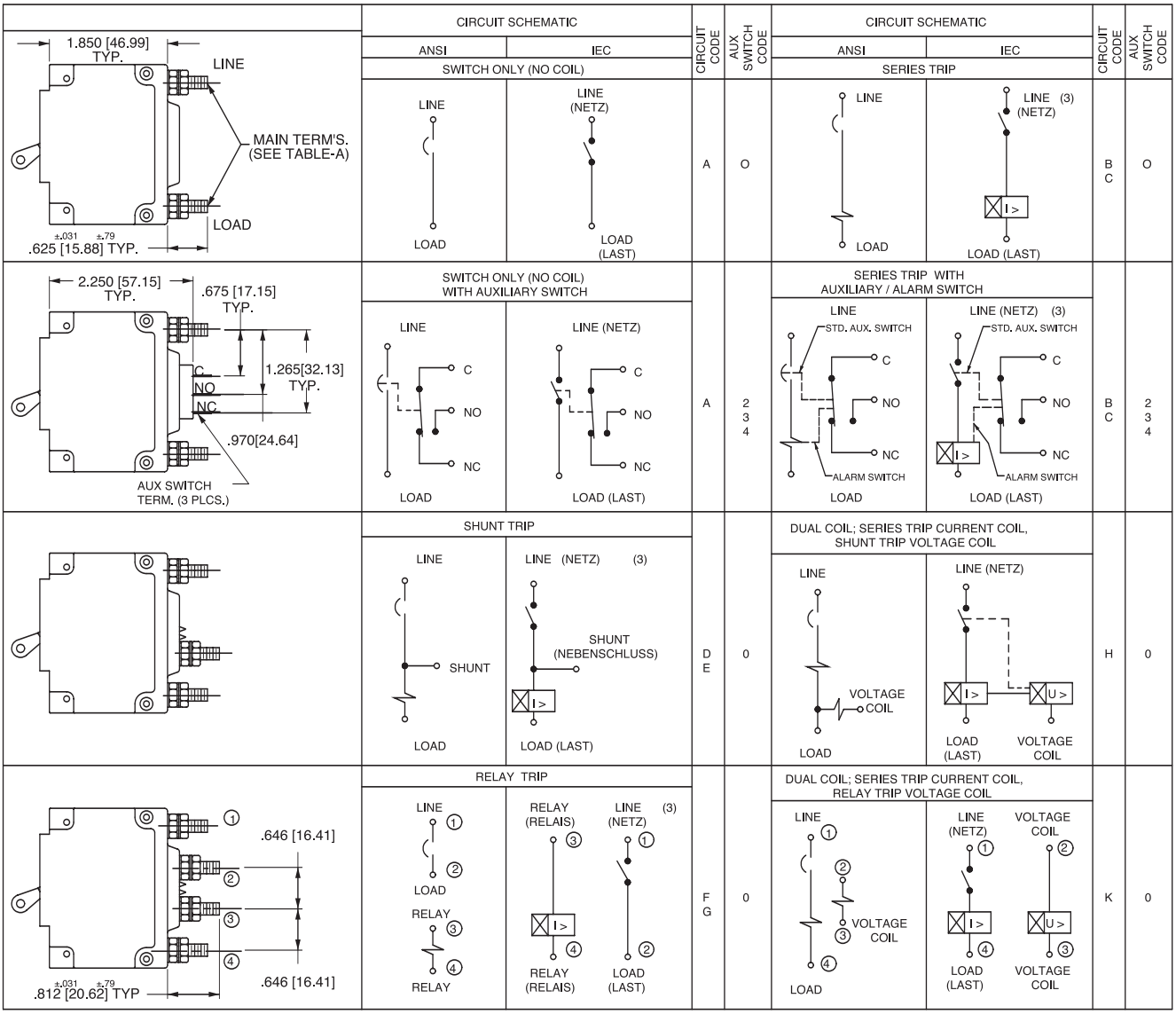
TAB (Q.C.) .187 **TAB (Q.C.) .110** **SOLDER TYPE**

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

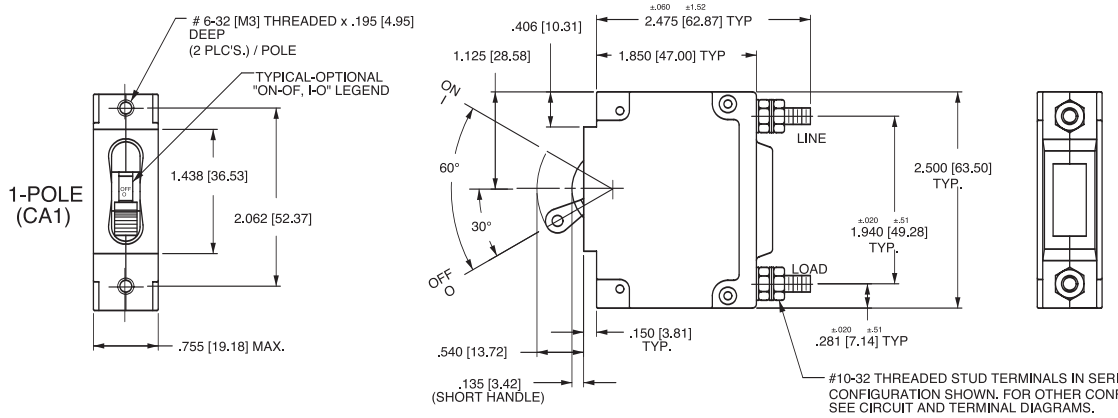
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Available on Series Trip and Switch Only Circuits when called for on multi-pole units. Only one aux. switch is normally supplied, as viewed in mulit-pole identification scheme.

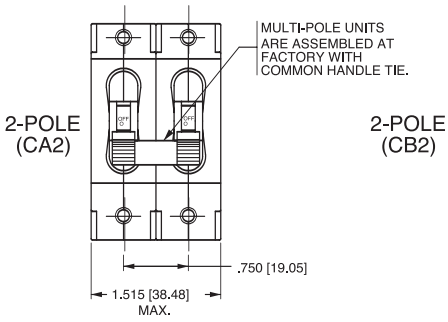


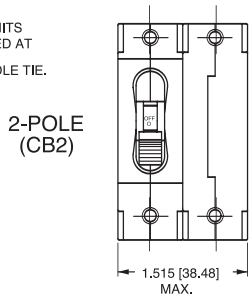
HANDLE POSITION VS. AUX/ALARM SWITCH MODE

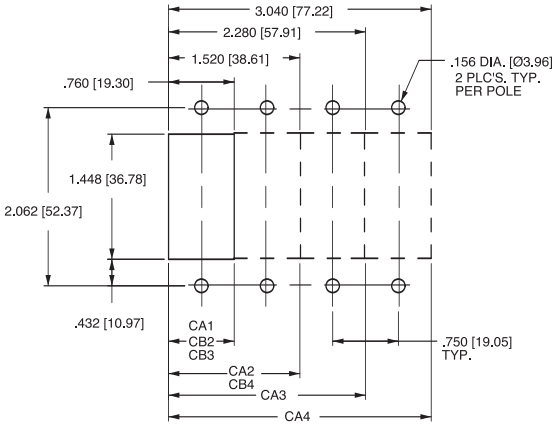
CIRCUIT BREAKER MODE	STANDARD C/B HANDLE POSITION	STANDARD C/B AUX. SWITCH MODE	MID TRIP C/B HANDLE POSITION	MID TRIP C/B STANDARD ALARM SWITCH MODE	MID TRIP C/B REVERSE ALARM SWITCH MODE[4]
OFF	30° OFF	NC NO C	30° OFF	NC NO C	NC NO C
ON	ON 30°	NC NO C	ON 30°	NC NO C	NC NO C
ELECTRICAL TRIP	30° OFF	NC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



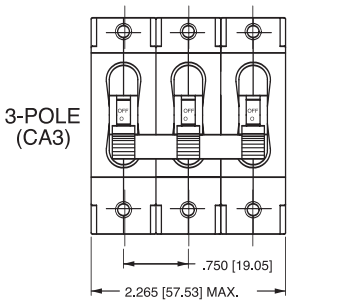


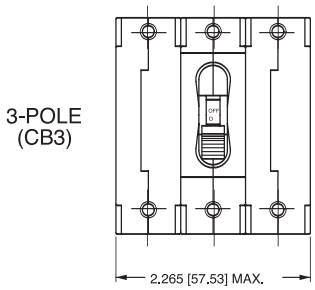


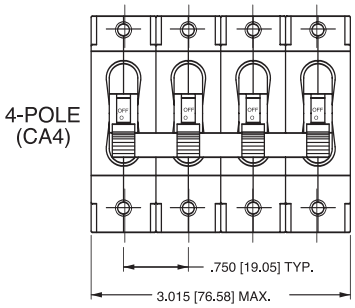


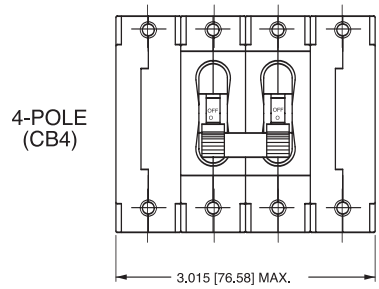
PANEL CUTOUT DETAIL

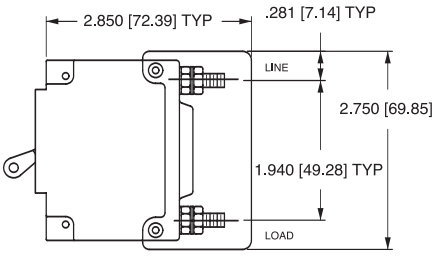
TOLERANCES ±.005 [.12]



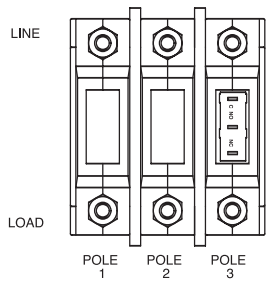




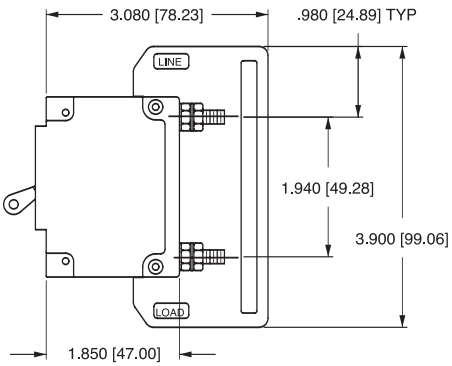




BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS



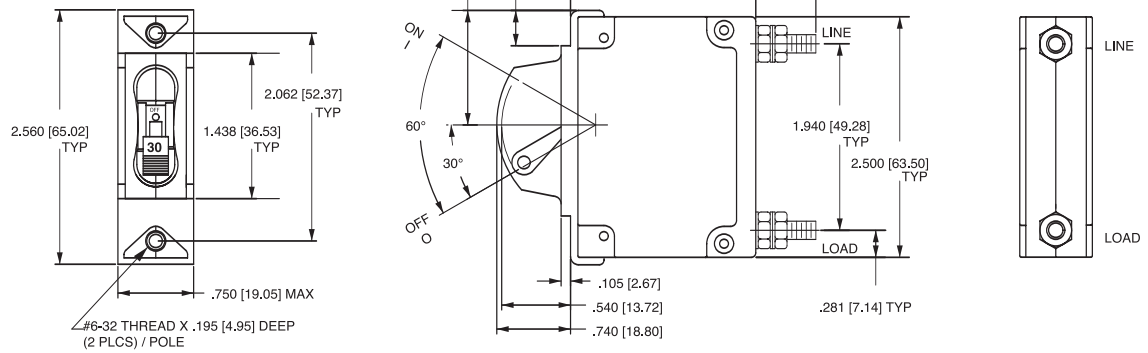
MULTI-POLE IDENTFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.



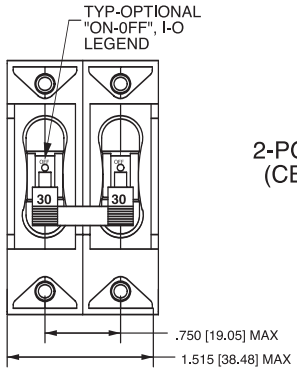
BARRIER FOR UL-489 LISTED MULTI-POLE BREAKERS

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

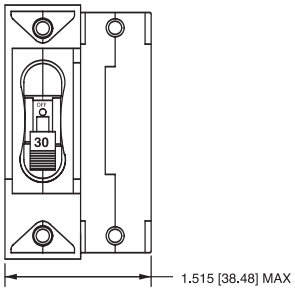
1-POLE
(CA1)

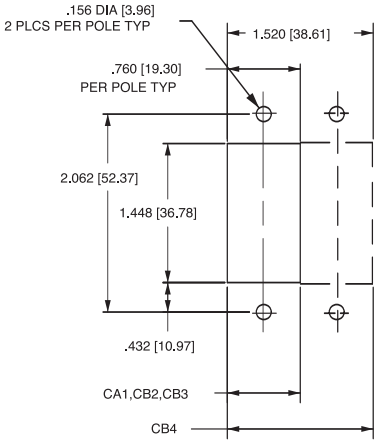


2-POLE
(CA2)



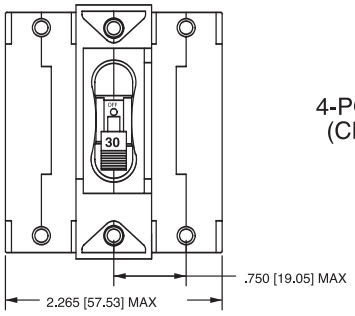
2-POLE
(CB2)



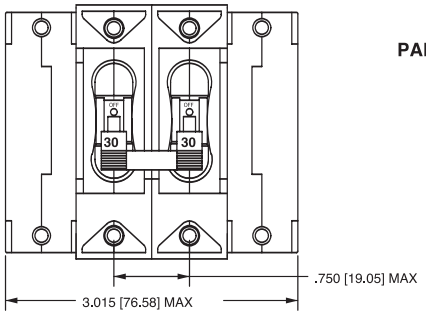


PANEL CUTOUT DETAIL

3-POLE
(CB3)

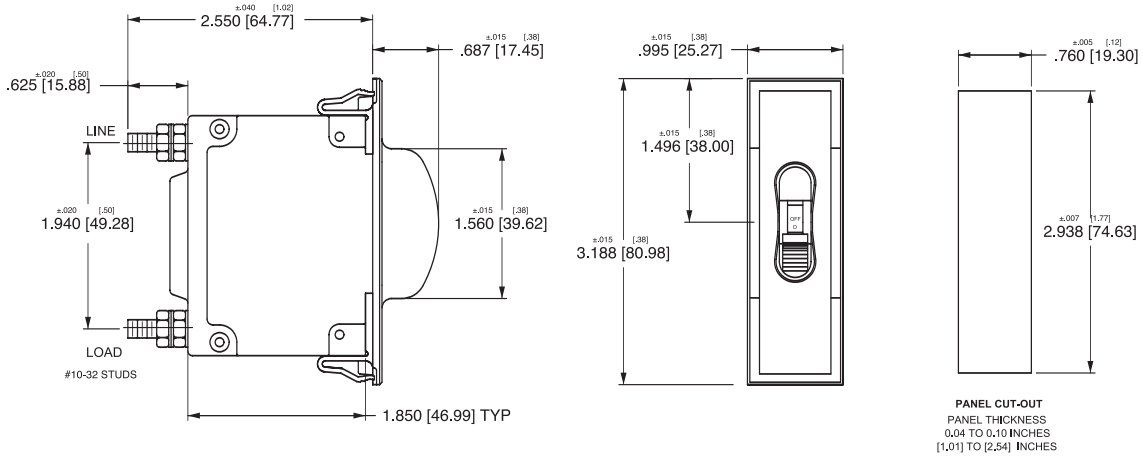


4-POLE
(CB4)



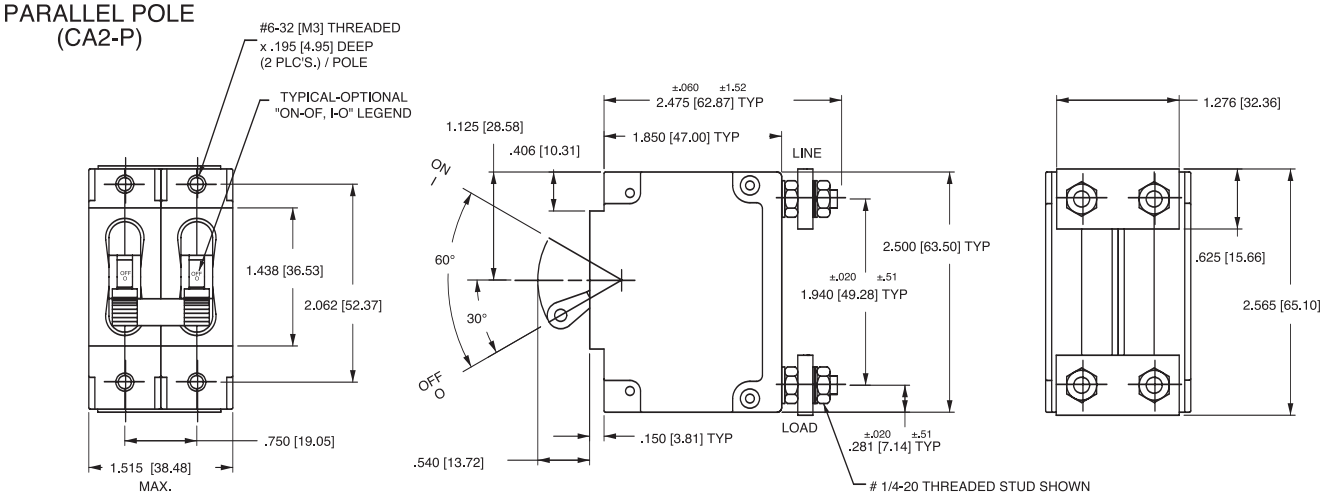
*Handleguard available as special catalog number only

SNAP-IN

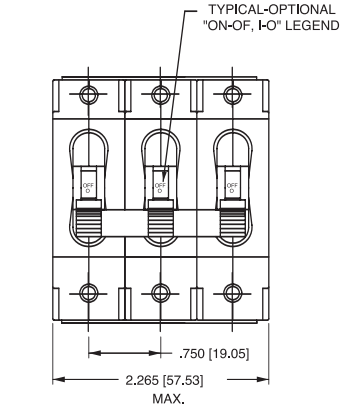


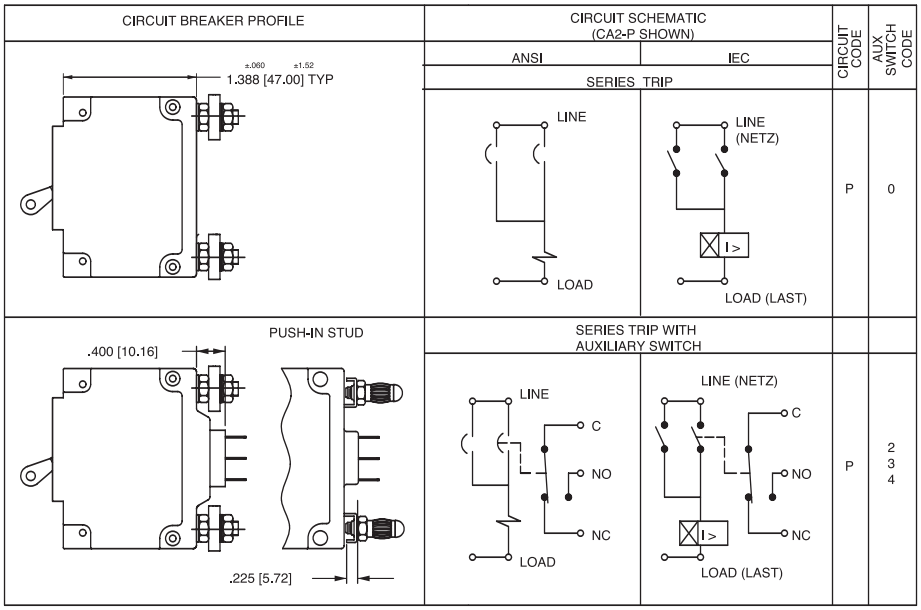
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

PARALLEL POLE (CA2-P)

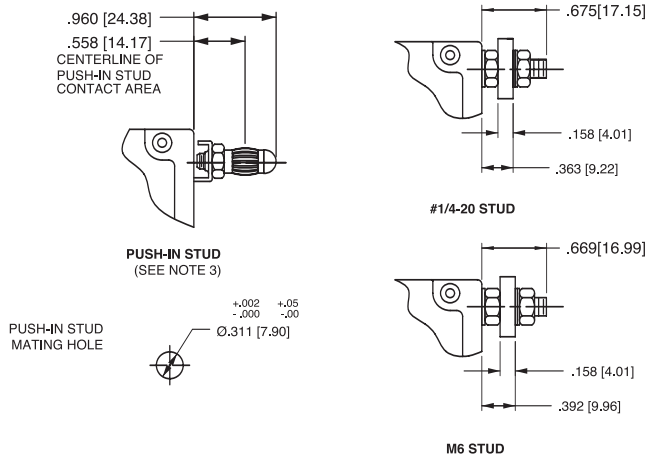


PARALLEL POLE (CA3-P)



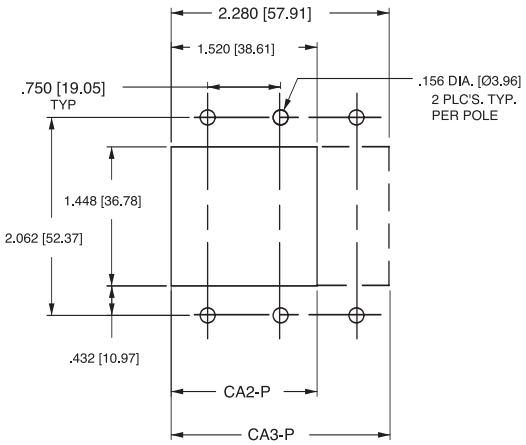


TERMINAL DETAILS

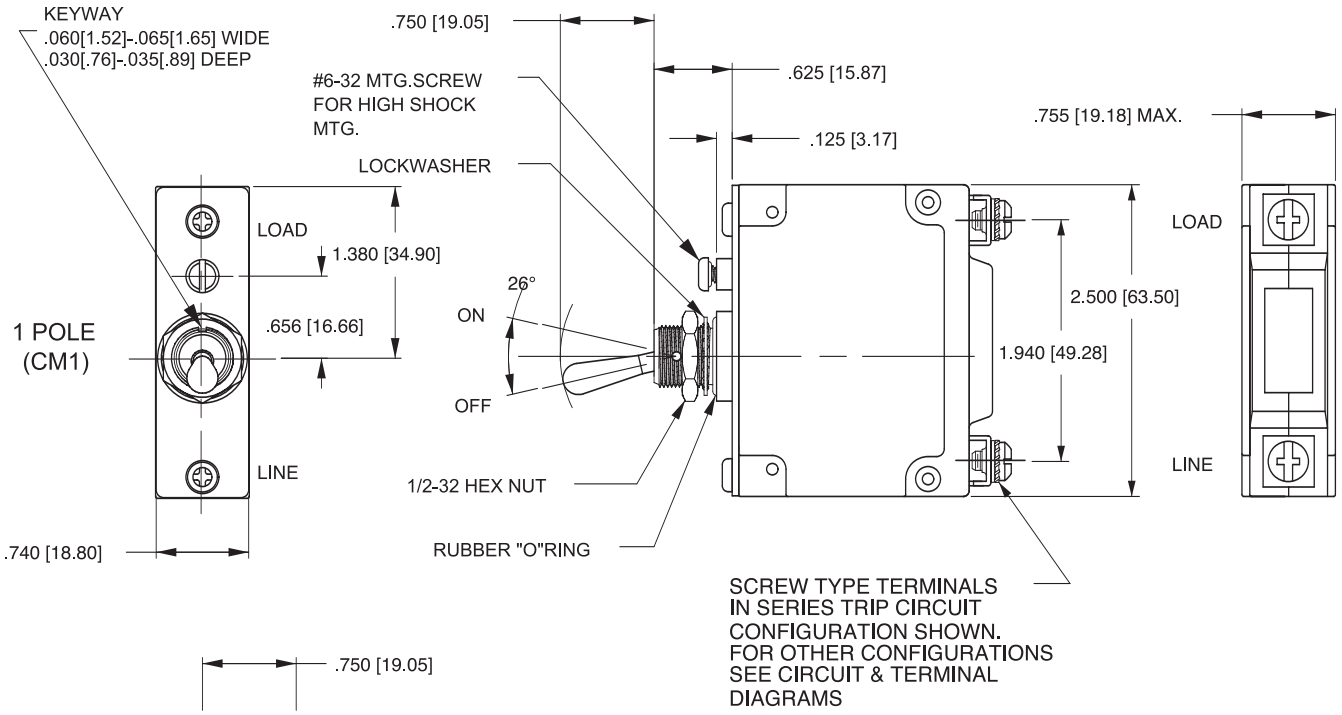


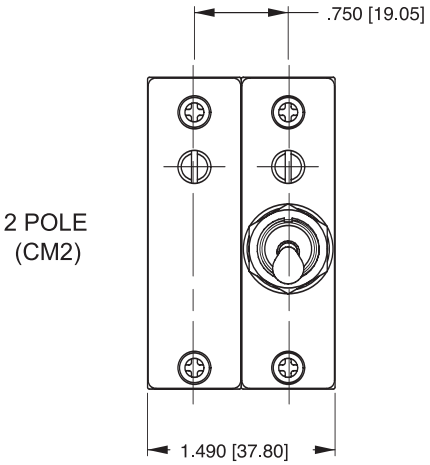
PANEL CUTOUT DETAIL

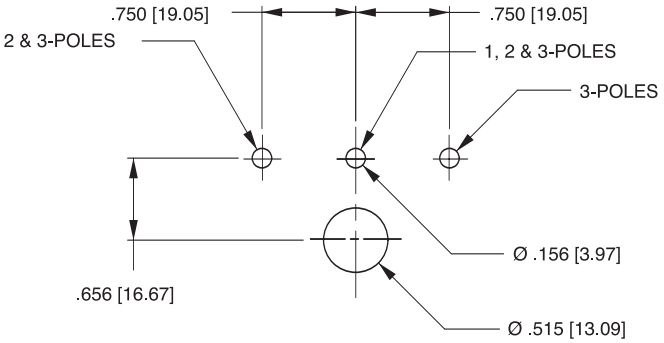
TOLERANCES ±.005 [.12]



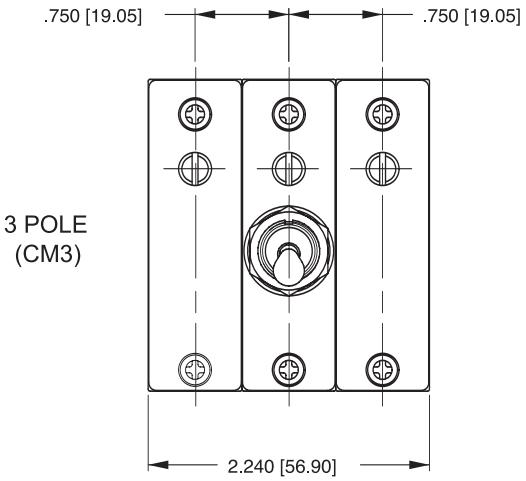
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Line and Load terminals must be paralleled with copper bus with a minimum cross section of .078 square inches [50.32 sq. mm.].



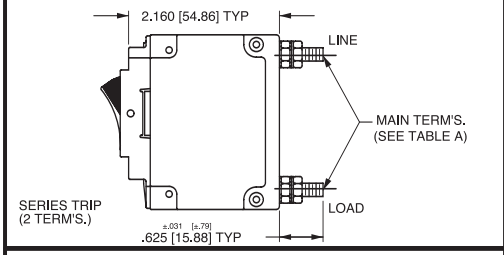
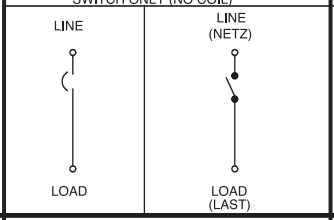
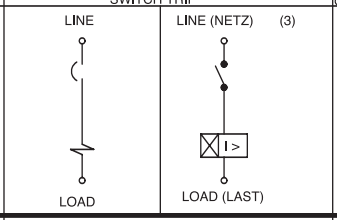
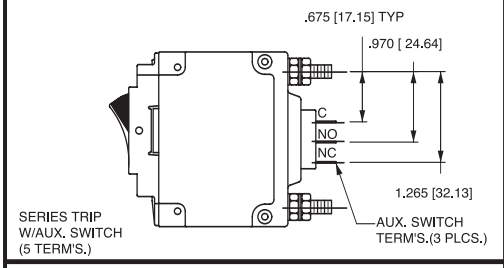
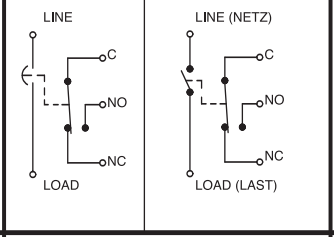
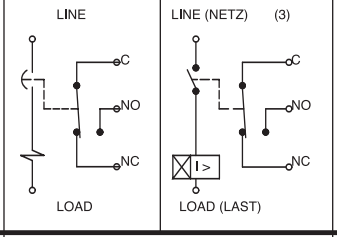
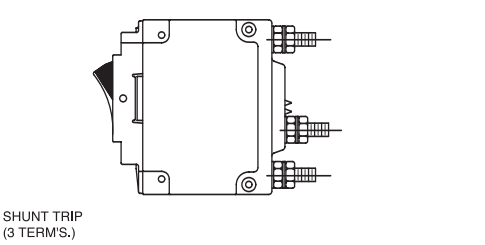
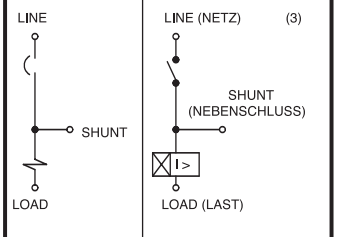
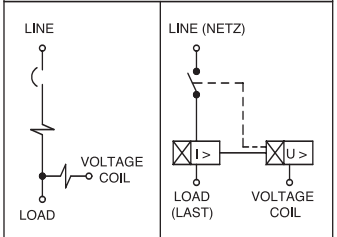
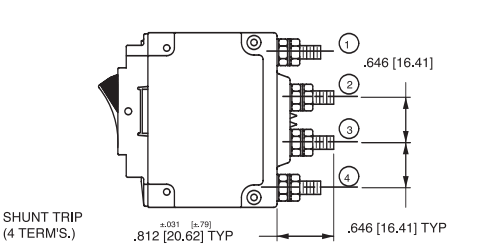
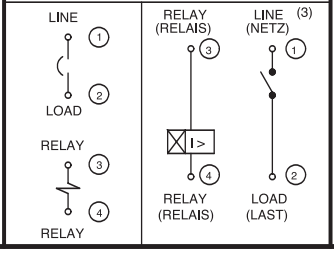
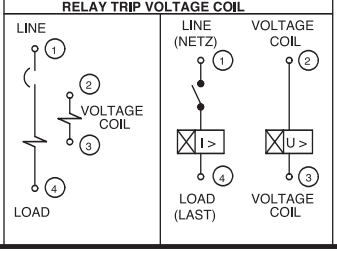


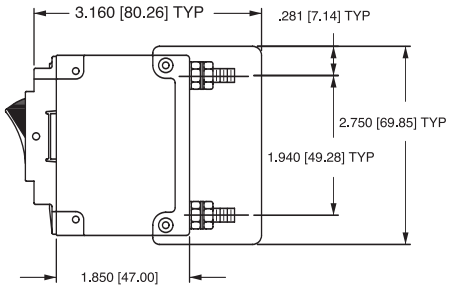


PANEL CUTOUT DETAIL
TOLERANCES ±.005[.13]

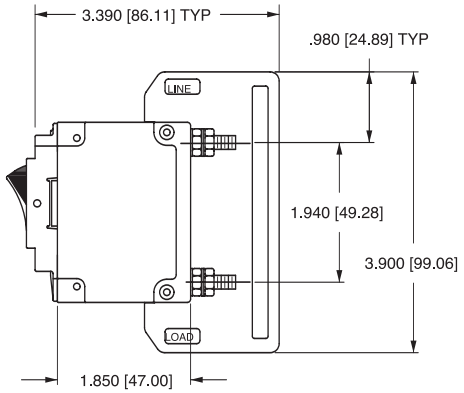


Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

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



BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

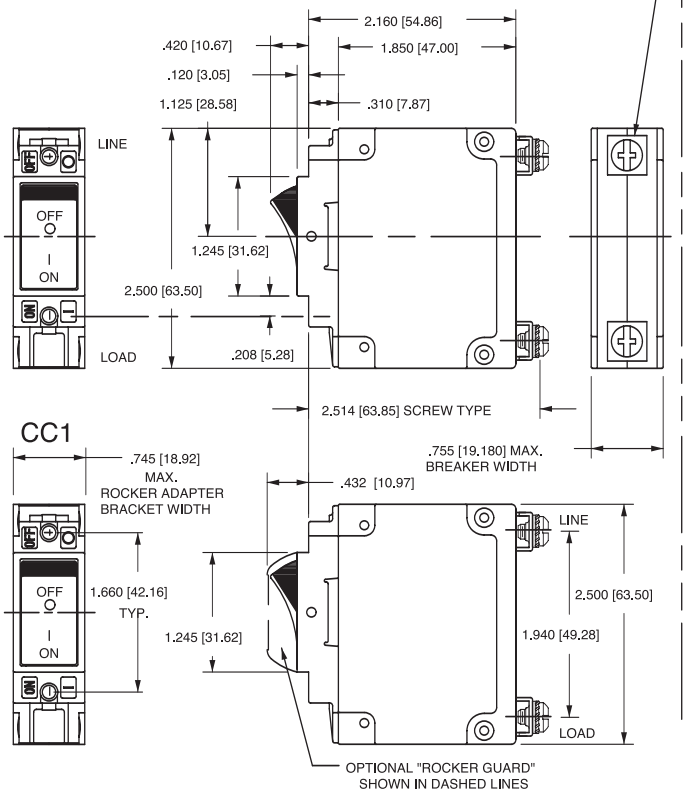


BARRIER FOR UL-489 LISTED MULTI-POLE BREAKERS

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

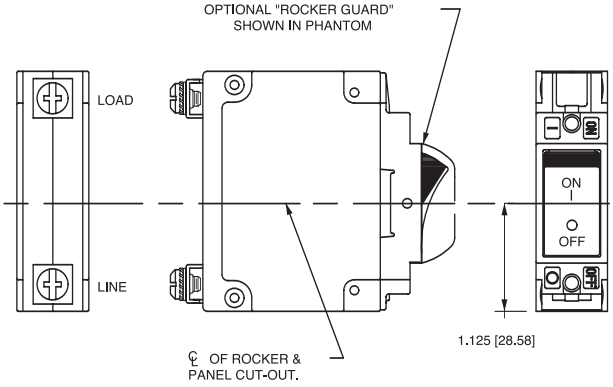
INDICATE "ON"

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



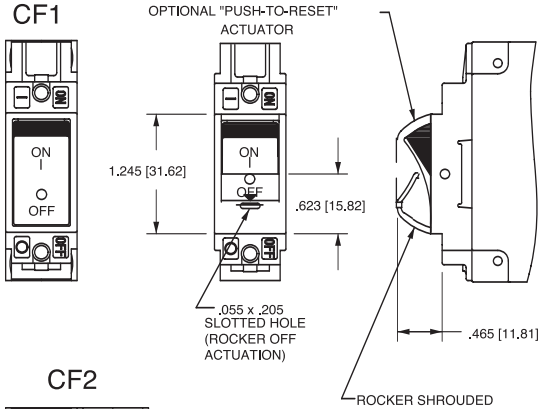
INDICATE "OFF" & SINGLE COLOR

(INDICATE "OFF" SHOWN)

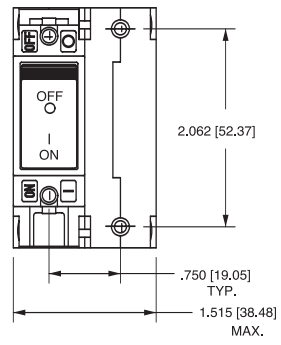


CC1

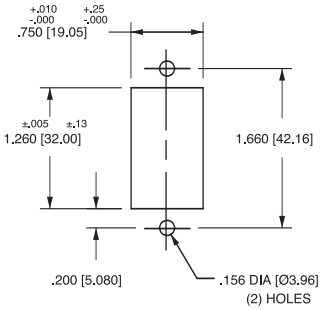
CF1



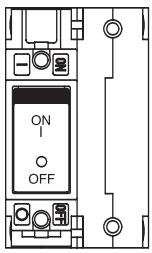
CC2



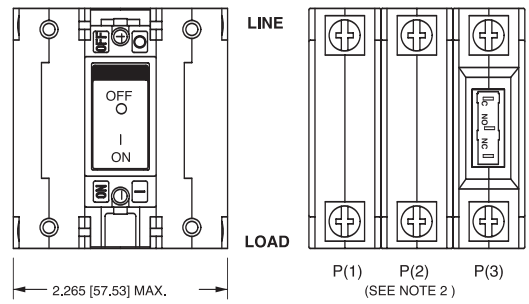
PANEL CUT-OUT DETAIL



CF2

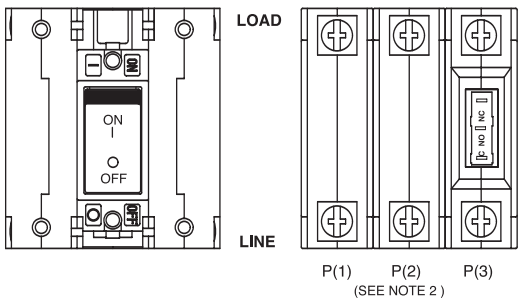


CC3



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

CF3

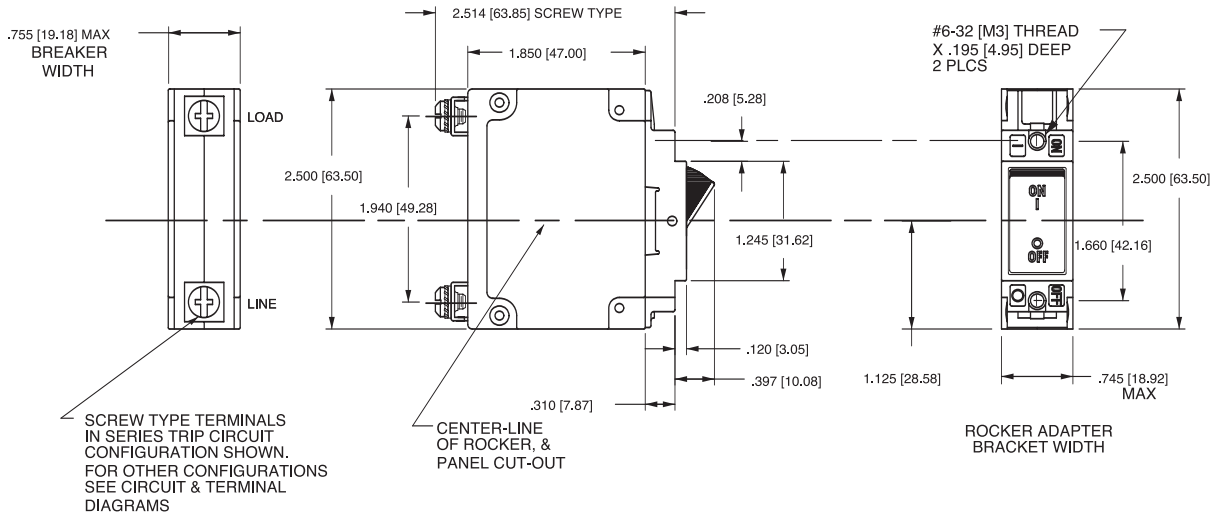


REAR VIEW OF INDICATE "OFF" SERIES TRIP W/ AUX SWITCH CIRCUIT CONFIGURATION.

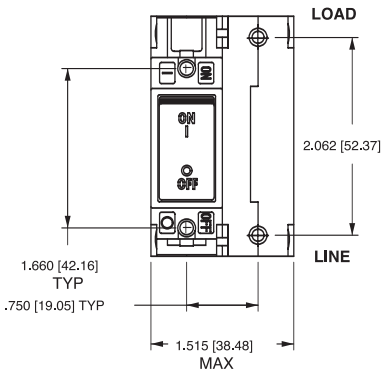
Notes:
1 Dimensions apply to all variations shown. Notice that circuit breaker line and load terminal orientation on indicate OFF is opposite of indicate ON.
2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
3 All dimensions are in inches [millimeters].
4 Tolerance ±.020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

INDICATE "OFF" & SINGLE COLOR

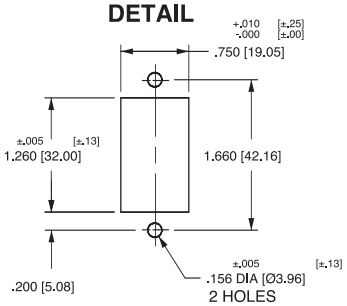
C11

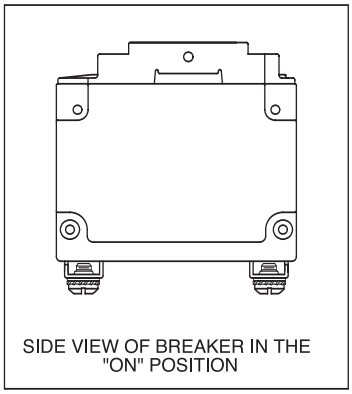


C12



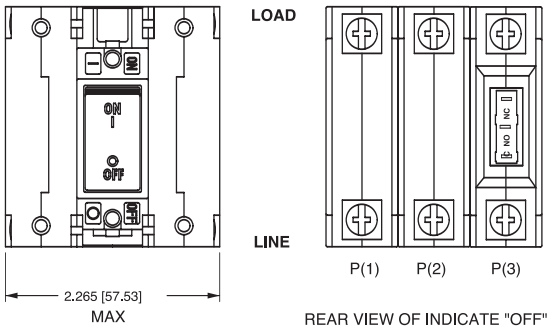
PANEL CUT-OUT DETAIL





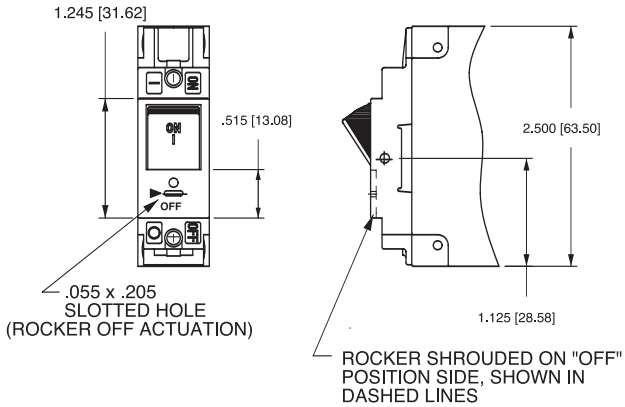
SIDE VIEW OF BREAKER IN THE "ON" POSITION

C13



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

PUSH-TO-RESET ACTUATOR



ACTUATOR SIDE VIEW
(SURFACE CONTOURS)

FLAT ROCKER

RECESSED OFF SIDE ROCKER

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.

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.

0.02 - 50 amps, up to 480 VAC or 65 VDC, 1 - 4 poles (Handle), 1 - 3 poles (Rocker), with a choice of time delays.

Agency Certifications

UL Recognized

UL Standard 1077 — Component Recognition Program as Protectors, Supplementary (Guide QVNU2, File E75596)

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

Electrical

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

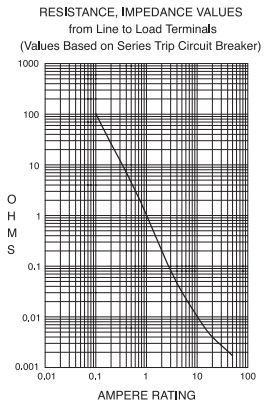
D-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS

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 for Table A:
1 DC and 1Phase 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.

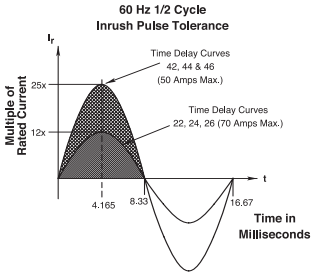
Electrical

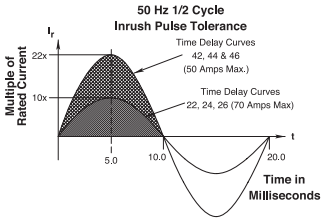
Maximum Voltage	AC, 480 wye/277 VAC (See Table A), 50/60 Hz, 65VDC
Standard Current Coils	0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 & 50.0. Other ratings available - consult factory.
Standard Voltage Coils	DC - 6V, 12V; AC - 120V, other ratings available,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

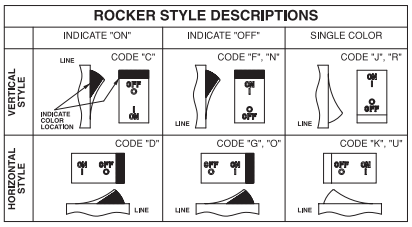
Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:

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

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)



3 POLES
1 One **2** Two **3** Three **4** Four

4 CIRCUIT
A0 Switch Only (No Coil) [4]
B0 Series Trip (Current)
C0 Series Trip (Voltage)

5 FREQUENCY & DELAY

03	DC 50/60Hz, Switch Only	**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

6 CURRENT RATING (AMPERES)

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

OR **VOLTAGE COIL (VOLTS, MIN. TRIP RATING)**[5]

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

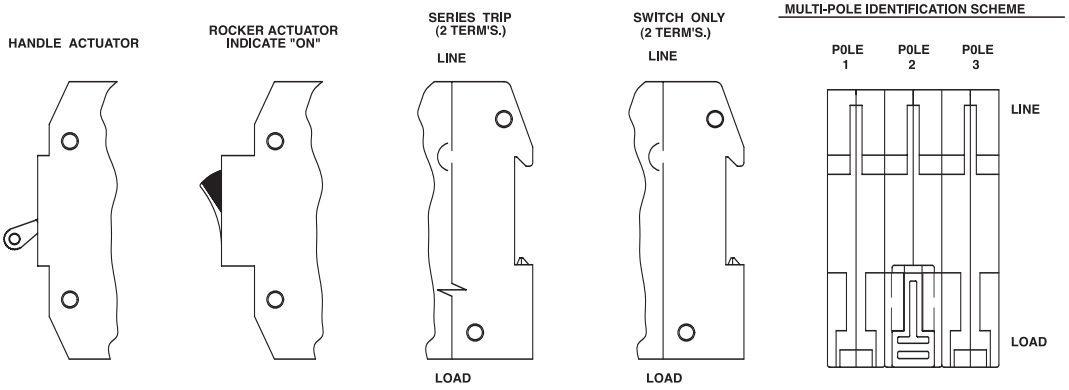
Actuator or Visi-Color	***Marking:***			***Marking Color:***	
Color:	**I-O**	**ON-OFF**	**Dual**	**Single Color Rocker/Handle**	**Visi-Rocker (Actuator Black)**[7]
White	**A**	**B**	**1**	Black	White
Black	**C**	**D**	**2**	White	n/a
Red	**F**	**G**	**3**	White	Red
Green	**H**	**J**	**4**	White	Green
Blue	**K**	**L**	**5**	White	Blue
Yellow	**M**	**N**	**6**	Black	Yellow
Gray	**P**	**Q**	**7**	Black	Gray
Orange	**R**	**S**	**8**	Black	Orange

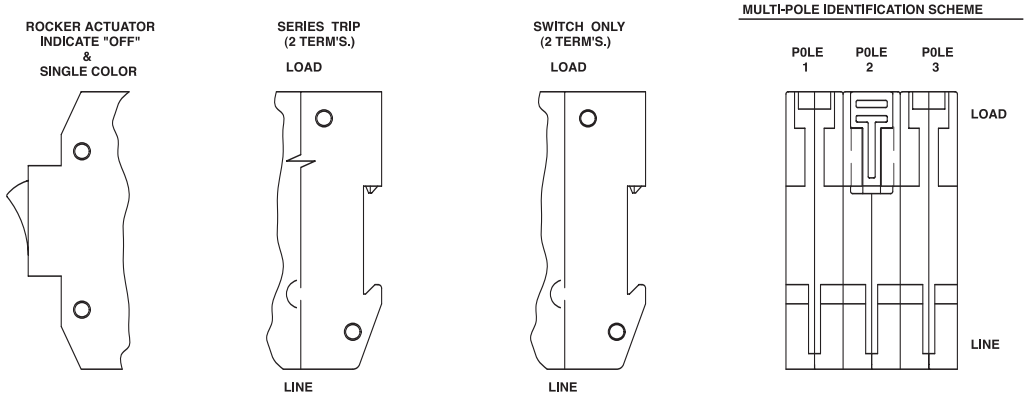
9 MOUNTING/VOLTAGE

	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

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





(HANDLE ACTUATOR SHOWN)

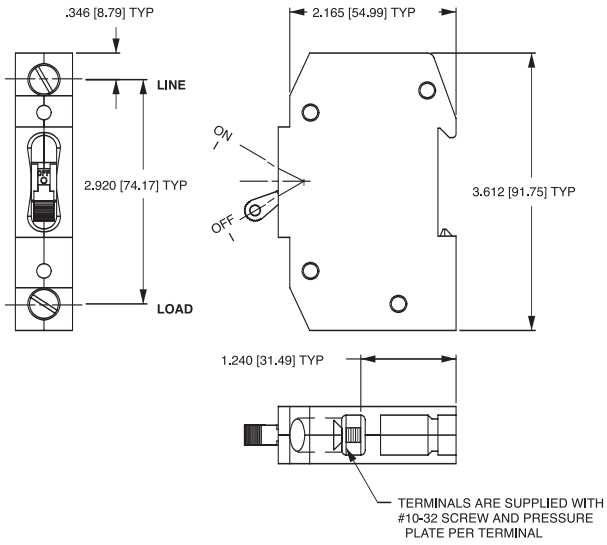
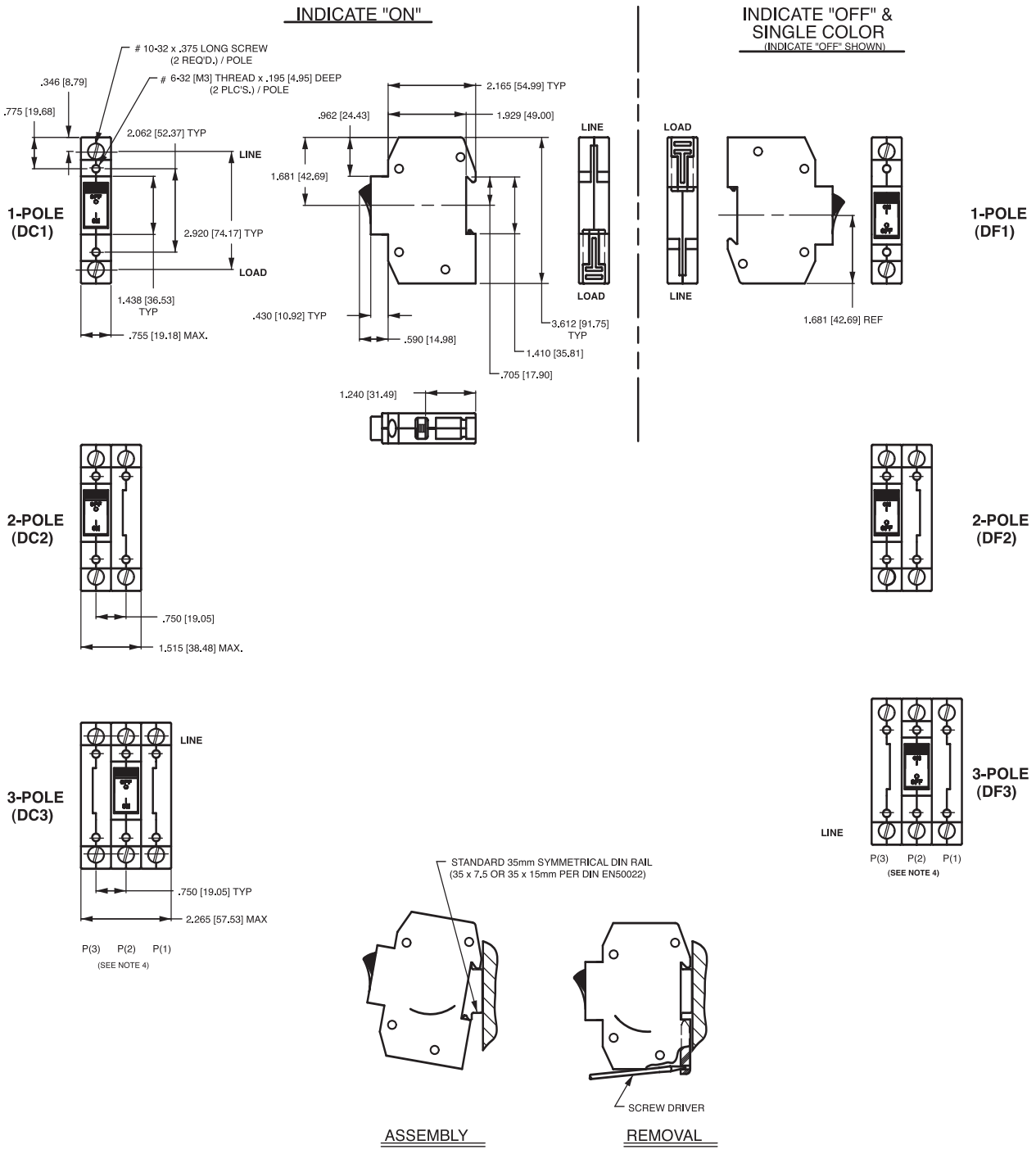


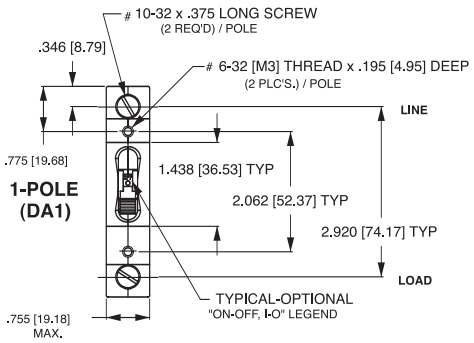
TABLE A
TIGHTENING TORQUE SPECIFICATIONS

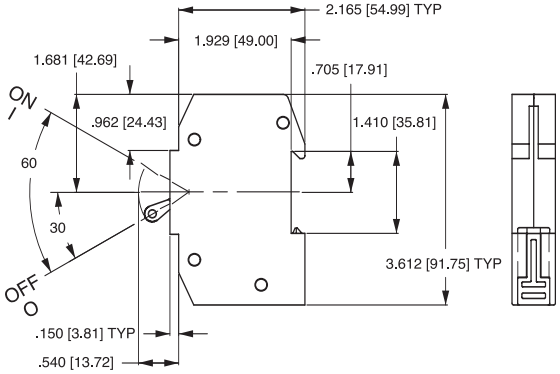
THREAD SIZE	TORQUE
#6-32 [M3] HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#10-32 THD TERMINAL SCREW	15-20 IN-LBS [1.7-2.3 NM]

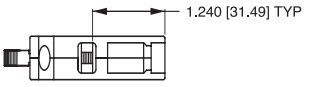
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

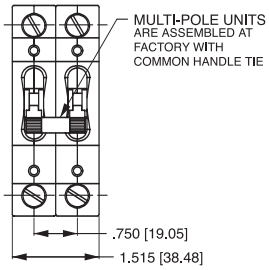


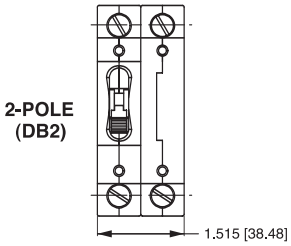
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.
3 Dimensions apply to all variations shown. Notice that circuit breaker line and load terminal orientation on indicate OFF is opposite of indicate ON.
4 For pole orientation with horizontal legend,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

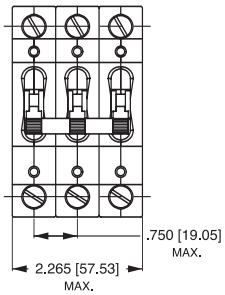


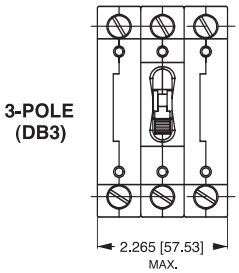


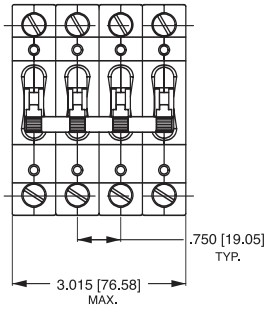


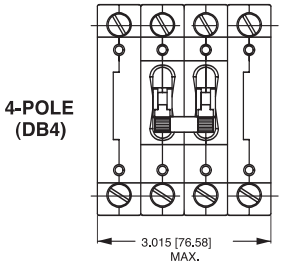


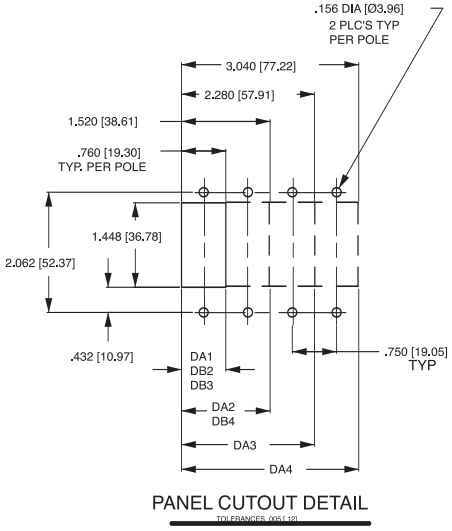


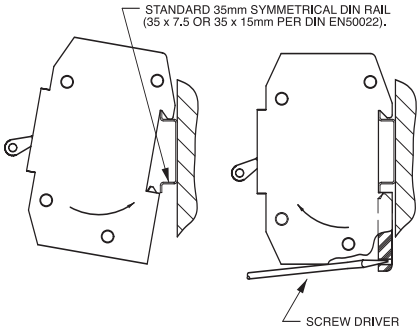












Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

Ideally suited for higher amperage applications. Available with front and back mounting, screw terminals, stud terminals and heavy duty box wire connectors for solid wire or a pressure plate connector for stranded wire. Power selector device available, consult factory.

The E-Series is UL Listed and CSA Certified for Branch Circuit protection which does not require a fuse backup. It is also UL Recognized and CSA Certified as a Supplementary Protector and as a Manual Motor Controller.

1-6 poles, .1 - 100 amps, up to 600 VAC or 125 VDC, with choice of time delays and actuator colors.

Agency Certifications

UL Recognized

UL Standard 1077	Component Recognition Program as Protectors, Supplementary (Guide QVNU2, File E75596)
UL Standard 508	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

Electrical

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)
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE
SERIES	80	DC	---	0.10 - 125	50,000
	125	DC	---	0.10 - 125	10,000
	120	50 / 60	1	0.10 - 125	10,000
	120 / 240	50 / 60	1	0.10 - 125	10,000
	240	50 / 60	1 & 3	0.10 - 100	5,000

Electrical

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		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA WITH BACKUP FUSE 1	UL/CSA WITHOUT BACKUP FUSE	UL	CSA	
SERIES & SHUNT	125	DC	---	0.02 - 120	---	---	5,000	TC1,2, OL1,U1	TC1,2, OL1,U1	---
				---	101 - 120	---	5,000	TC1,2, OL0,U1	TC1,2, OL0,U1	---
	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, OL1,U1	TC1,2, OL1,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	---
				0.02 - 100	---	10,000	---	TC1,2, OL1,C1	TC1,2, OL1,C1	---
	480	50 / 60	1 & 3	0.02 - 100	---	10,000	---	TC1,2, OL1,C1	TC1,2, OL1,C1	2 Poles Breaking Single Phase, 3 or 4 Poles Breaking Three Phase
	600	50 / 60	1 & 3	0.02 - 100	---	10,000	---	TC1,2, OL1,C1	TC1,2, OL1,C1	
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 for Table B:
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 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

CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY (AMPS)			APPLICATION CODES		CONSTRUCTION NOTES
					UL/CSA		VDE (Icn) WITHOUT BACKUP FUSE			
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITH BACKUP FUSE 1	WITHOUT BACKUP FUSE		UL	CSA	
SERIES & SHUNT	125	DC	---	0.02 - 120	---	5,000	5,000	TC1,2, OL1,U1	TC1,2, OL1,U1	1 - 2 Pole
	240	50 / 60	1 & 3	0.02 - 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	0.02 - 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	---	0.02 - 120						
	240	50 / 60	1 & 3	0.02 - 100						
	415	50 / 60	1 & 3	0.02 - 100						

Notes for Table C:
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.

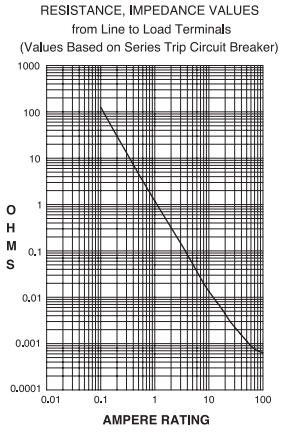
Table D: Lists UL Recognized, CSA Accepted configurations and performance capabilities as Protectors, Supplementary for Marine Electrical and Fuel Systems (Guide PEQZ2, File E75596). Ignition Protected per UL 1500. UL Classified Small Craft Electrical Devices, Marine in accordance with ISO 8846 (Guide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

E-SERIES TABLE D: UL1500 (Marine Ignition 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	65	DC	---	0.02 - 100	5000	TC1,2,OL1,U1	TC1,2,OL1,U1
	125	50 / 60	1	0.02 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1
	250	50 / 60	1	0.02 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1

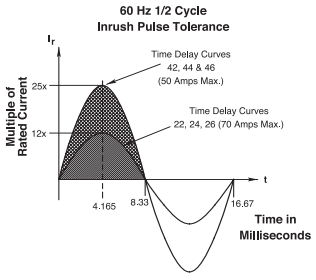
Electrical

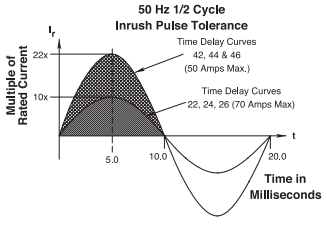
Maximum Voltage	600VAC 50/60 Hz, 125VDC (See Table A)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 50.0, 60.0, 70.0 & 100 Amp.
Auxiliary Switch Rating	SPDT; 10.1A 250VAC, 1.0A 65VDC; 0.5A 80VDC, 0.1A 125VAC (with gold contacts).
Insulation 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 - 125.0	± 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 and tested in accordance with requirements of specification MIL-PRF- 55629 and MIL-STD-202 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

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
Handle

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.D.T. 0.110 Q.C. Terminals
2	S.P.D.T. 0.110 Q.C. Terminals	**7**	S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)
3	S.P.D.T. 0.139 Solder Lug	**8**	S.P.D.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]

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)	100 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 w/ 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 w/ 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 w/ Pressure Plate (Load)	100 A

9 ACTUATOR COLOR & LEGEND [13]

Actuator Color	***Marking:***			***Marking Color:***
Color:	I-O	ON-OFF	Dual	
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 w/either front or back connected terminals. Shunt construction available w/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
Handle

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.D.T. 0.110 Q.C. Terminals
2	S.P.D.T. 0.110 Q.C. Terminals	**7**	S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)
3	S.P.D.T. 0.139 Solder Lug		
4	S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)	**8**	S.P.D.T. 0.187 Q.C. Terminals
		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	**92**[6]	DC, 50/60Hz Short, Hi-Inrush
26	50/60Hz Long	**94**[6]	DC, 50/60Hz Medium, Hi-Inrush
32	DC, 50/60Hz Short		
34	DC, 50/60Hz Medium	**96**[6]	DC, 50/60Hz Long, Hi-Inrush
36	DC, 50/60Hz Long		

7 CURRENT RATING (AMPERES)[7]

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	**912**	125.000
225	0.250	**425**	2.500	**712**	12.500		
230	0.300	**527**	2.750	**613**	13.000		

***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)	100 A
FRONT CONNECTED (BACK MOUNTED ONLY)		**MAX. RATING**
3[9]	Box Wire Connector (Line & Load)	100 A
C[10]	Box Wire Connector w/ 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 w/ Pressure Plate (Load)	100 A
7	1/4-20 Screw (Line & Load)	100 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 w/ Pressure Plate (Load)	100 A

9 ACTUATOR COLOR & LEGEND[12]

Actuator Color :	***Marking:***		***Marking Color:***
Color:	ON-OFF	Dual	
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

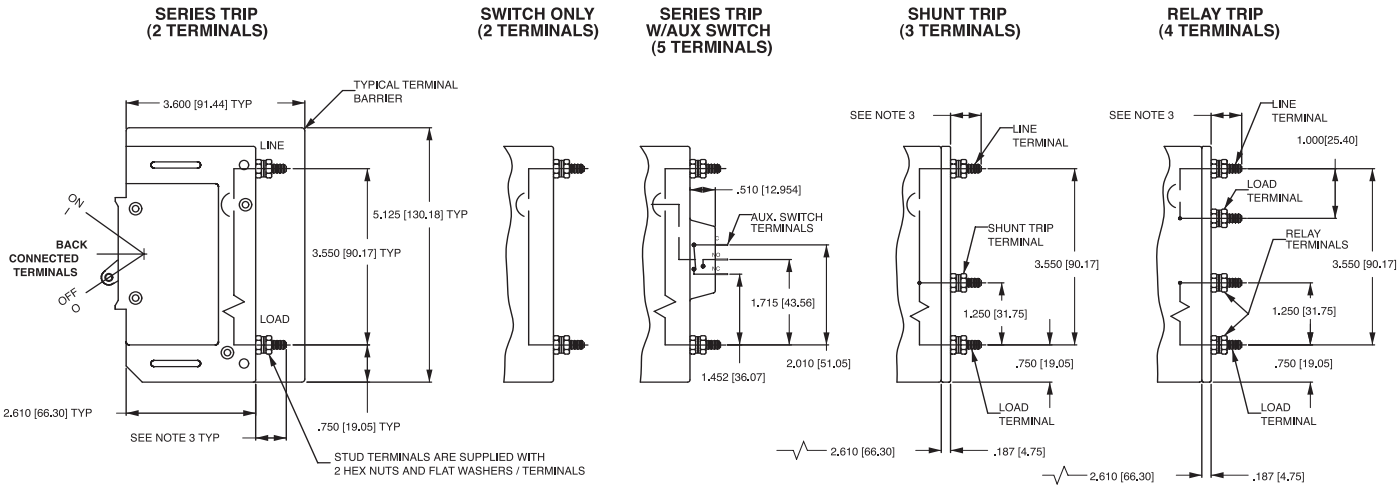
B	125 VDC, 100A
C[13]	120/240 VAC, 100A
D	240 VAC, 100A

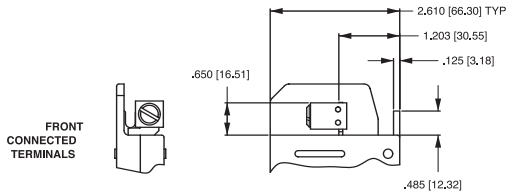
12 AGENCY APPROVAL

C	UL 489 Listed & CSA Certified
F	UL 489 Listed, CSA Certified, & VDE Certified

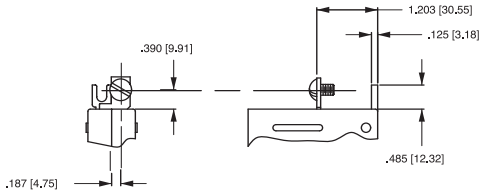
NOTES

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 w/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.

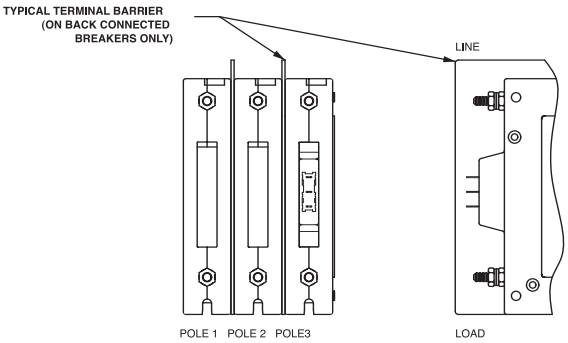




BOX TYPE WIRE CONNECTORS



BUS TYPE SCREW TERMINALS



MULTI-POLE IDENTIFICATION SCHEME

AUXILIARY SWITCH TERMINALS

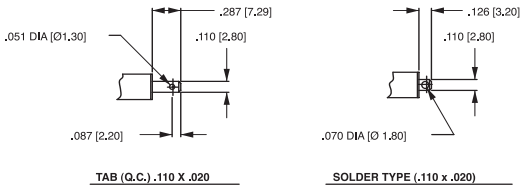
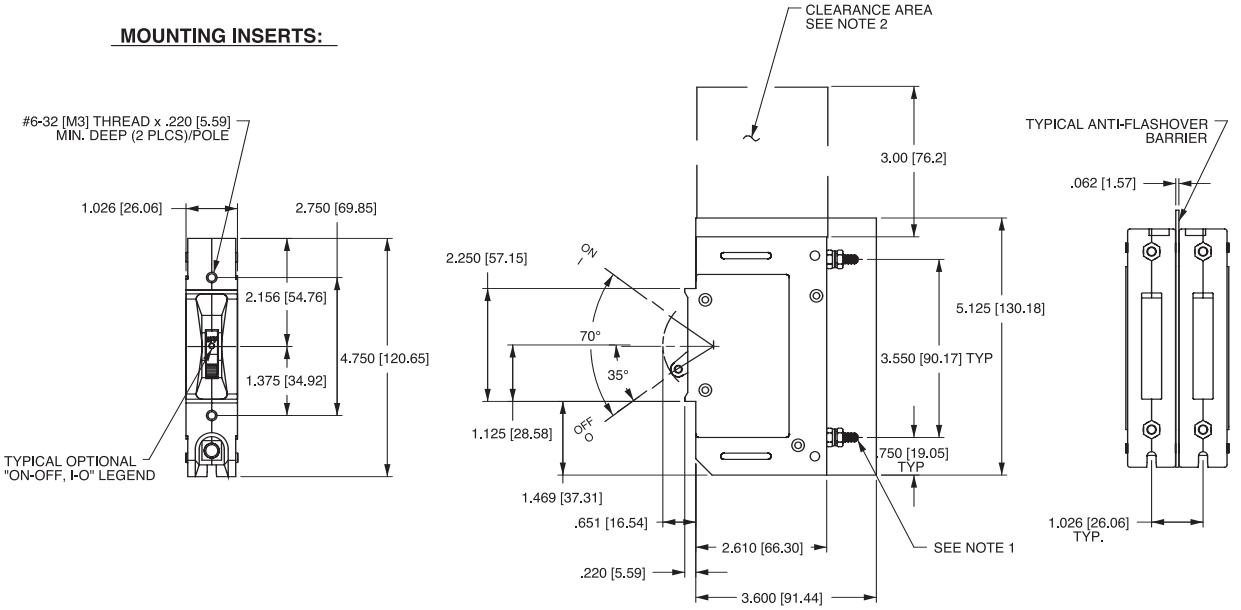


TABLE A
TIGHTENING TORQUE SPECIFICATIONS

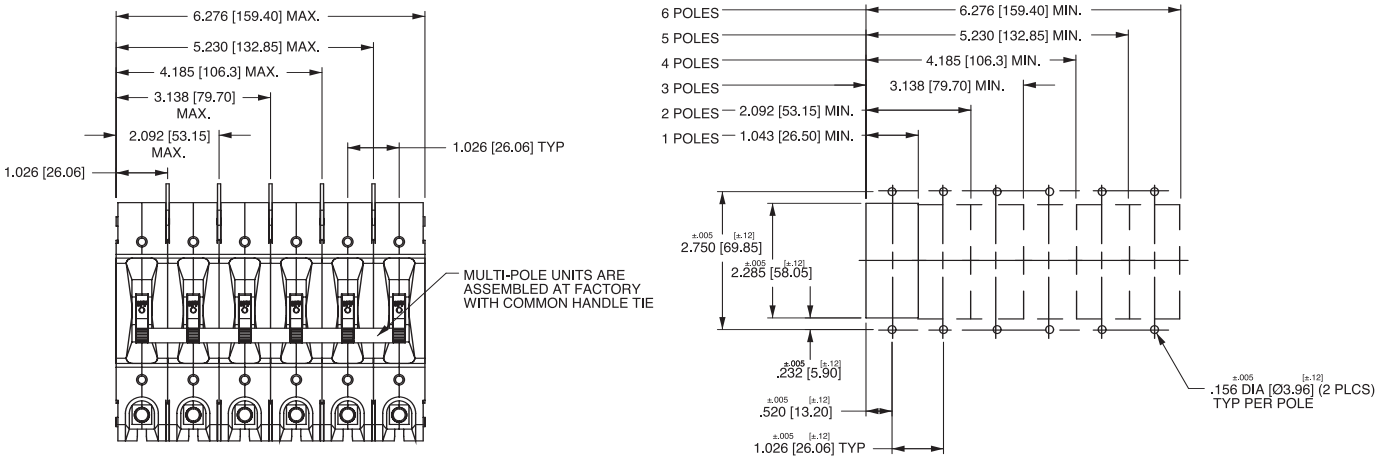
THREAD SIZE TERMINAL TYPE	WIRE SIZE	TORQUE
#6-32 [M3] HARDWARE	—	7-9 IN-LBS [0,8-1,0 NM]
#10-32 THD TERMINAL SCREW	ALL	15-20 IN-LBS [1,7-2,3 NM]
1/4-20 THD TERMINAL SCREW	ALL	30-35 IN-LBS [3,4-4,0 NM]
#10-32 STUDS	ALL	15-20 IN-LBS [1,7-2,3 NM]
1/4-20 STUDS	ALL	30-35 IN-LBS [3,4-4,0 NM]
BOX WIRE CONNECTOR	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$^{\pm.062}$/15.88$^{\pm1.574}$ long.
51-120 amps: 1/4-20 & M6 Studs .750$^{\pm.062}$/19.05$^{\pm1.574}$ long.

MOUNTING INSERTS:

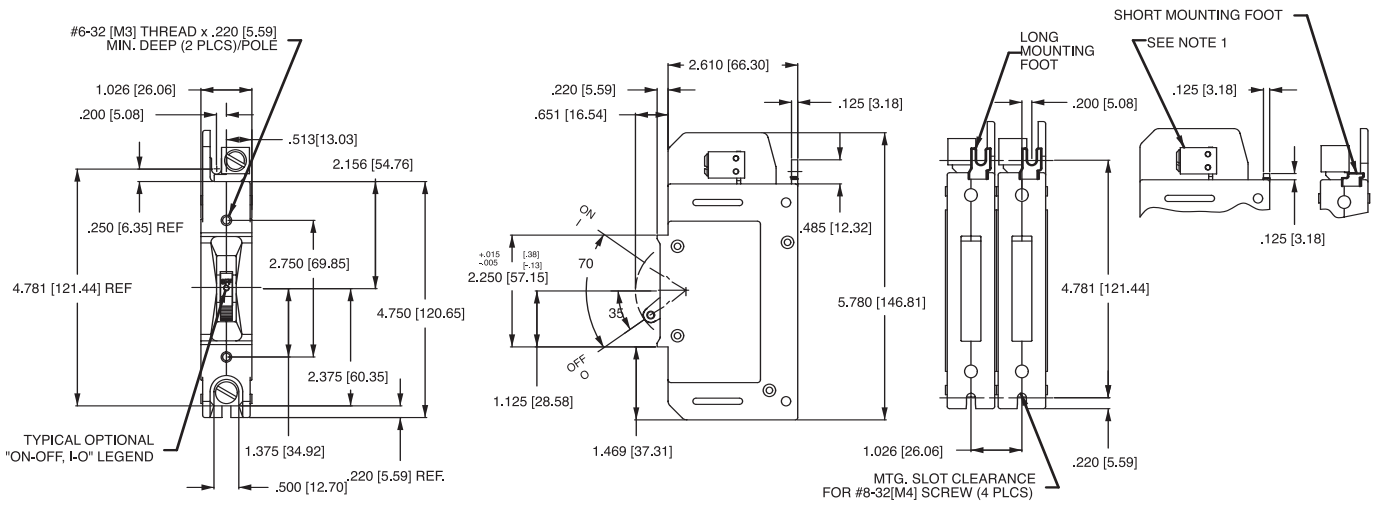


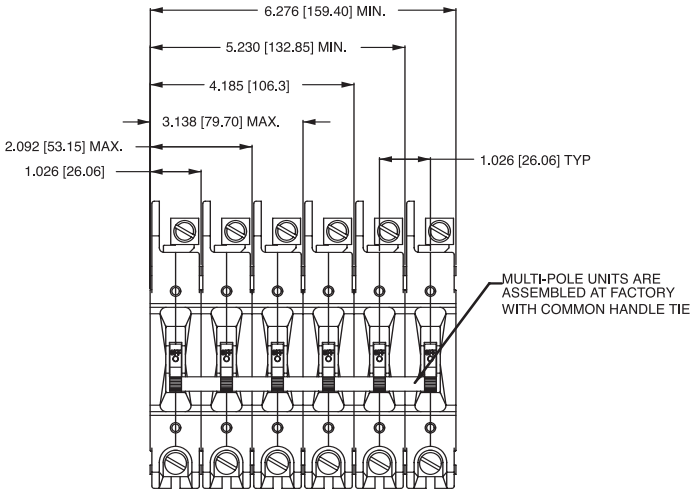
PANEL CUTOUT DETAIL



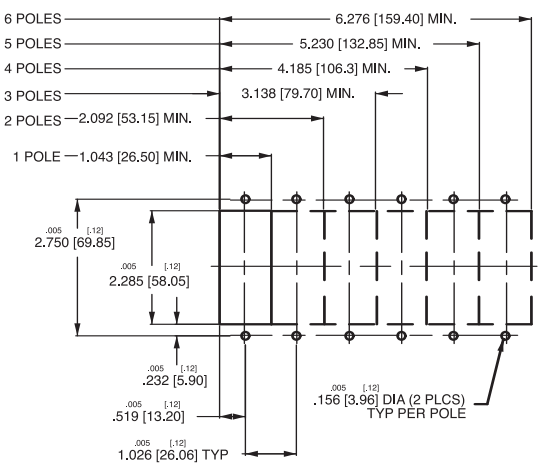
Notes:
1 1/4 -20 stud terminal in Series Trip circuit configuration shown.
2 A 3" min spacing must be provided between the circuit breaker arc venting area of back connected E-Series circuit breaker and grounded obstructions.
3 All dimensions are in inches [millimeters].
4 Tolerance ±.020 [.51] unless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

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 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.

Agency Certifications

UL Listed

UL Standard 489A

Circuit Breakers, Molded Case, (Guide DIVQ7, File E129899), UL Standard 489;
Complies with the requirements of CSA Standard for Molded Case Circuit Breakers, CAN/CSA - C22.2 No. 5.1 - M

TUV Certified

EN60947-2
Low Voltage Switchgear and Control Gear under License No. R72031058

Electrical

Table A: 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

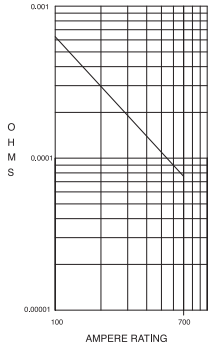
F-SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS					
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)	
	MAX. RATING	FREQUENCY	FULL LOAD AMPS	UL / CSA 1 - 3 POLES	TUV 1 or 2 POLES
SERIES	125	DC	50 - 250	50,000	25,000

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

Electrical

Maximum Voltage	125VDC
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

F	A	2	–	B	0	–	14	–	820	–	1	2	A	–	B	G
1 Series	2 Actuator	3 Poles		4 Circuit	5 Auxiliary/ 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/ALARM SWITCH[5]
0	w/o 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., 0.093 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. 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 Q.C. 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

7 CURRENT RATING (AMPERES)
810	100.00	**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 (VOLTS, MIN. TRIP RATING)[7]**

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:	***Marking:***			***Marking Color:***
	I-O	ON-OFF	Dual	
White	**A**	**B**	**1**	Black
Black	**C**	**D**	**2**	White

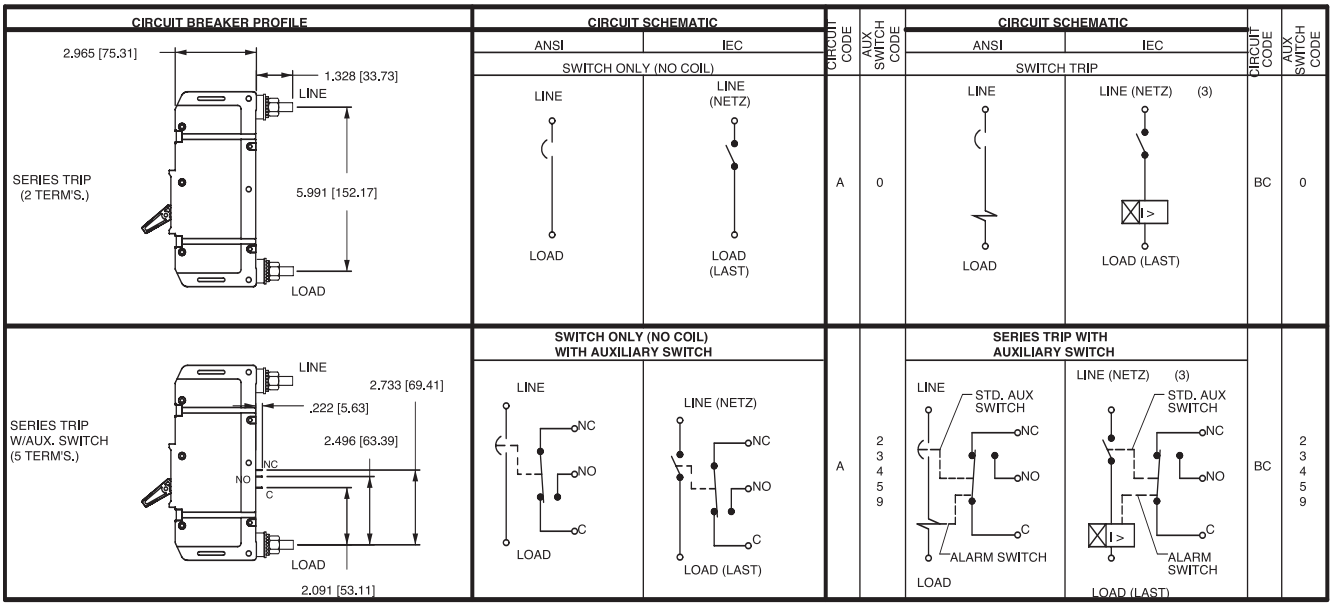
10 MOUNTING
	Front Mounting Inserts	***Back Mounting Inserts***
A	10-32	10-32 screw clearance holes
B	ISO M5	10-32 screw clearance holes

11 MAXIMUM APPLICATION RATING
	Voltage	***Current***
B	125 VDC	700A

12 AGENCY APPROVAL
A	No approvals
G	UL 489 Listed & CUL Certified
J	UL 489 Listed, CUL Certified & TUV Certified
T	UL489A (Telecom) Listed

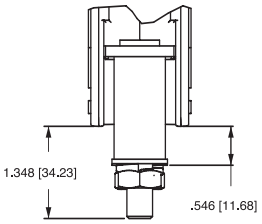
Notes:
1. For 100 to 250 amps, select Current Code 825. For 300-400 amps, select Current Code 840. For 450-700 amps, select Current Code 870.
2. Available with Frequency and Delay code 10 only, and are not rated for continuous duty. Delay 10 is only available with voltage coils.
3. Codes M, N, P & Q (Parallel Poles) are supplied with factory installed Bus Bar on Line and Load.
4. 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 multi-pole breakers with 3/8 - 16 stud terminals (Terminal Code 1)
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.

F SERIES NON-PARALLEL POLE CONSTRUCTION:

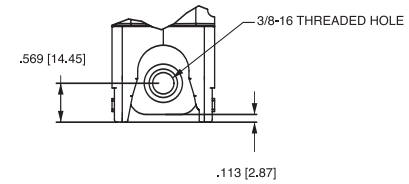


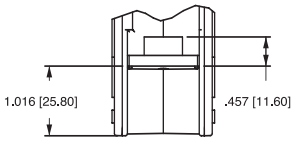
TERMINAL DETAILS

BACK CONNECT

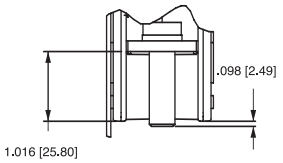


3/8-16 THREADED STUD
CODE 1



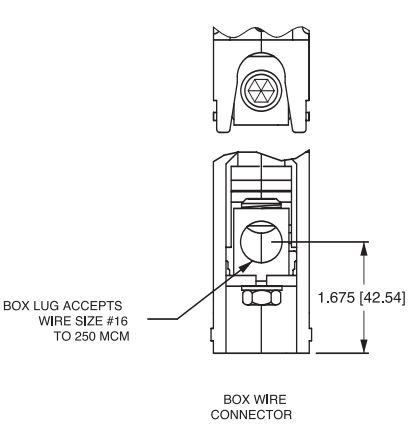


3/8-16 THREADED HOLE
CODE 2

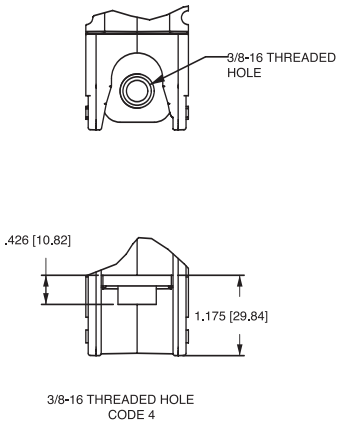


SHORT STUD
CODE 5

FRONT CONNECT



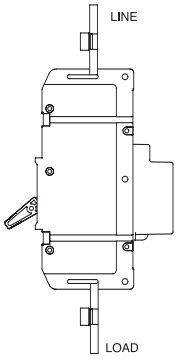
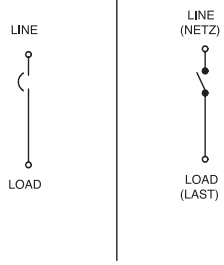
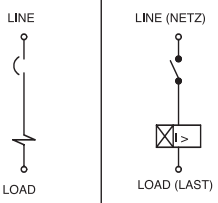
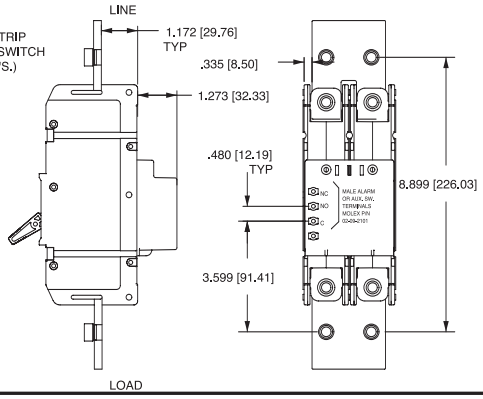
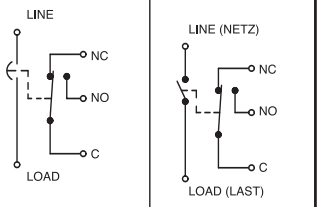
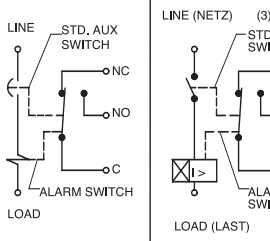
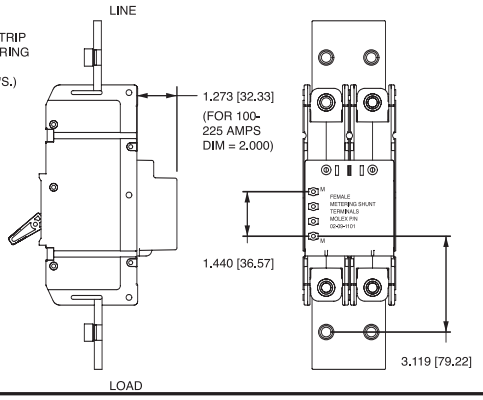
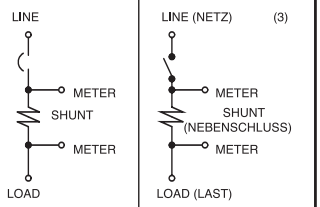
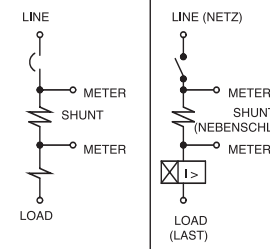
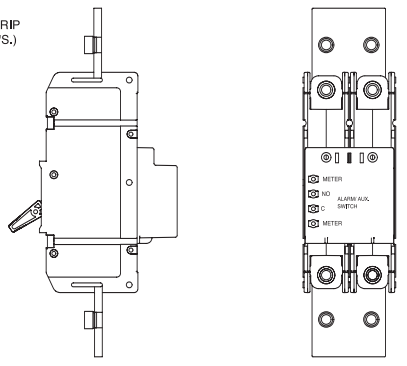
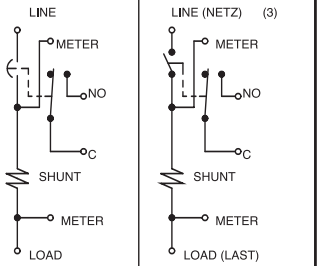
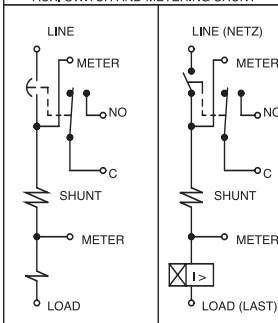
BOX WIRE
CONNECTOR



3/8-16 THREADED HOLE
CODE 4

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

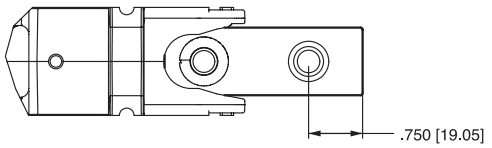
F-SERIES PARALLEL POLE CONSTRUCTION:

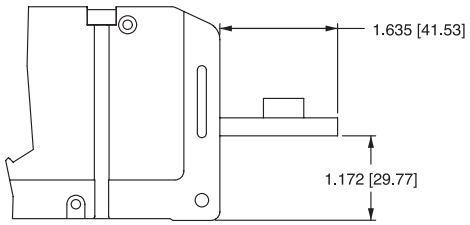
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC	CIRCUIT CODE	AUX SWITCH CODE
	ANSI / IEC			ANSI / IEC		
	SWITCH ONLY (NO COIL)			SERIES TRIP		
SERIES TRIP (2 TERM'S.) 		A	0		BC	0
SERIES TRIP W/AUX. SWITCH (5 TERM'S.) 	SWITCH ONLY (NO COIL) WITH ALARM OR AUX. SWITCH 	A	B	SERIES TRIP WITH ALARM OR AUX. SWITCH 	BC	B
SERIES TRIP W/METERING SHUNT (4 TERM'S.) 	SWITCH ONLY (NO COIL) WITH METERING SHUNT 	N	0	SERIES TRIP CURRENT COIL, WITH METERING SHUNT 	M	0
RELAY TRIP (4 TERM'S.) 	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.

TERMINAL DETAILS

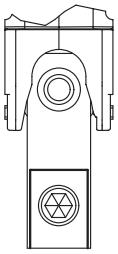
BACK CONNECT

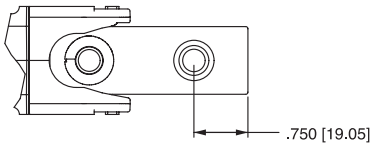


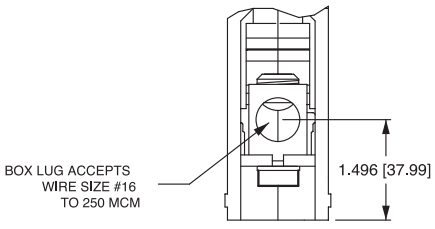


3/8-16 THREADED HOLE
CODE 2

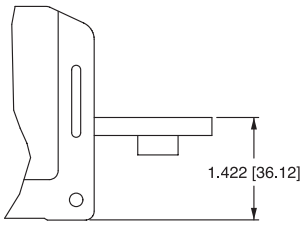
FRONT CONNECT







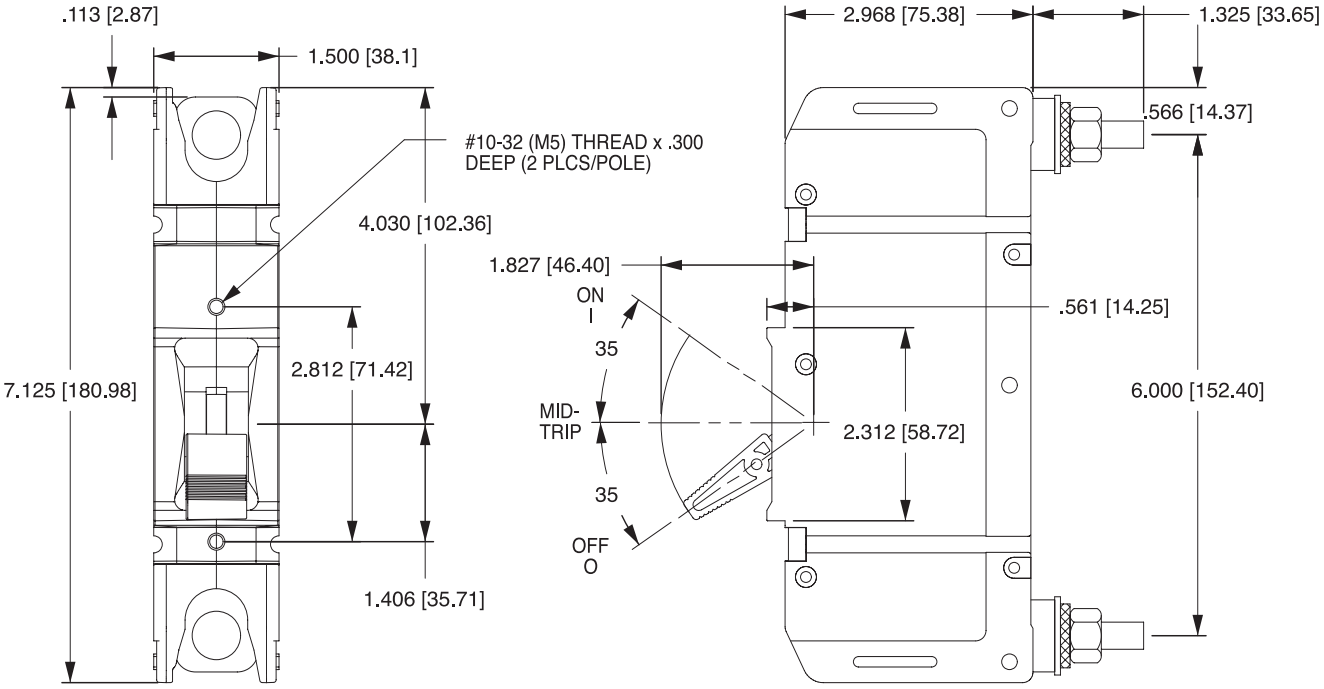
BOX WIRE
CONNECTOR

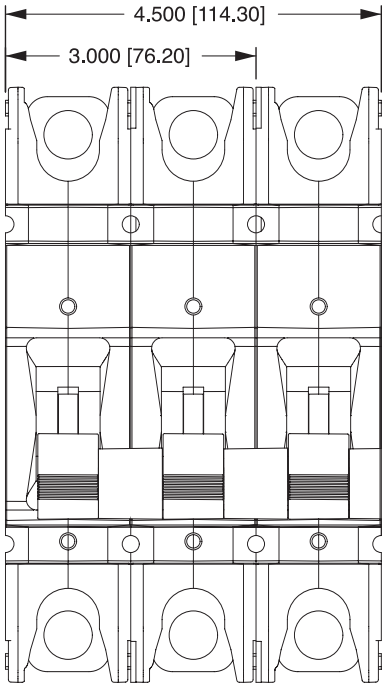


3/8-16 THREADED HOLE
CODE 4

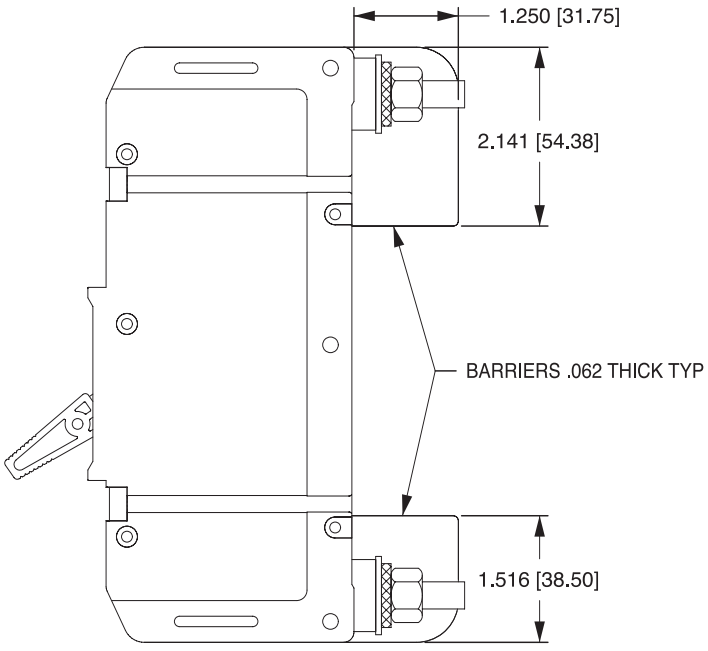
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

SERIES TRIP BACK CONNECT (STUD TERMINALS SHOWN)



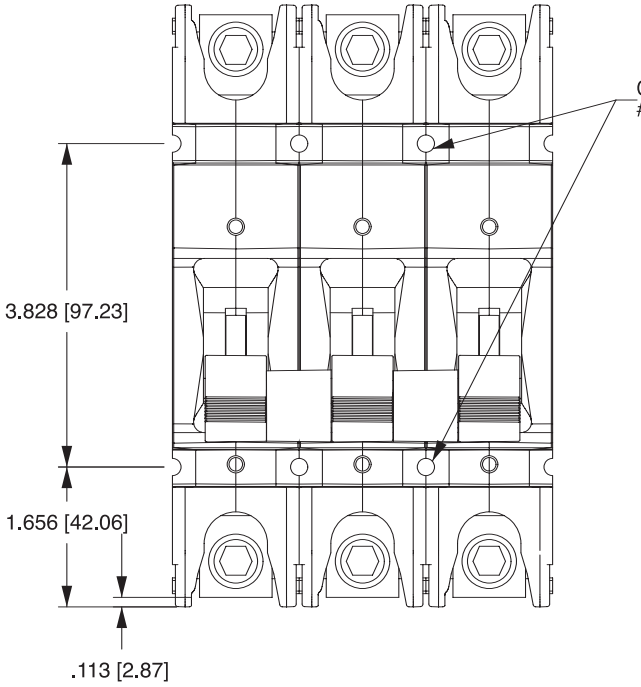


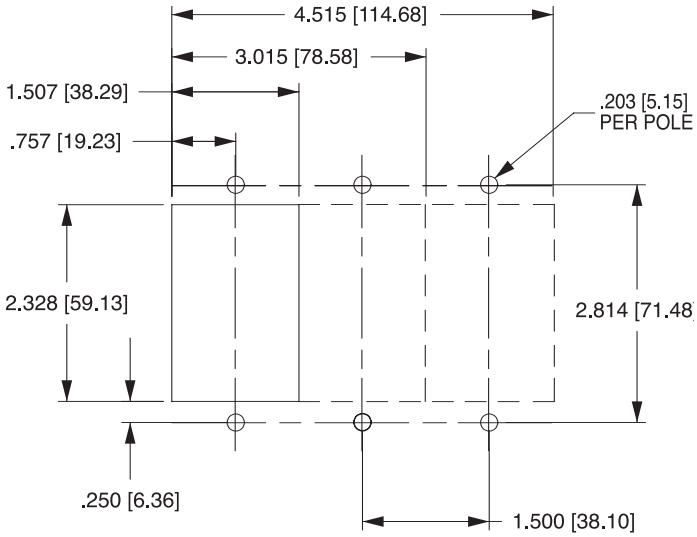
MULTIPOLE SERIES TRIP, SHOWING TERMINAL BARRIER



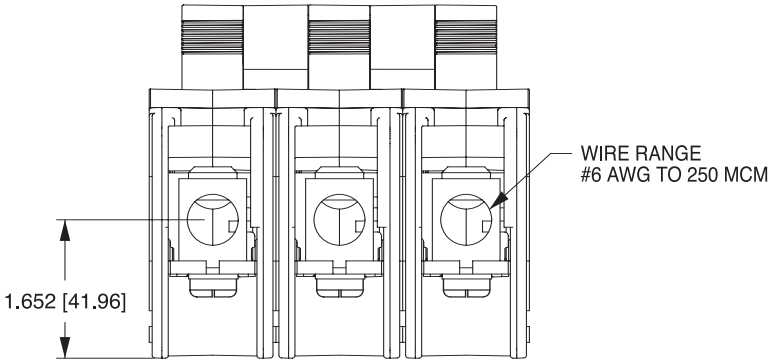
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

SERIES TRIP FRONT CONNECT
(BOX LUG TERMINALS SHOWN)

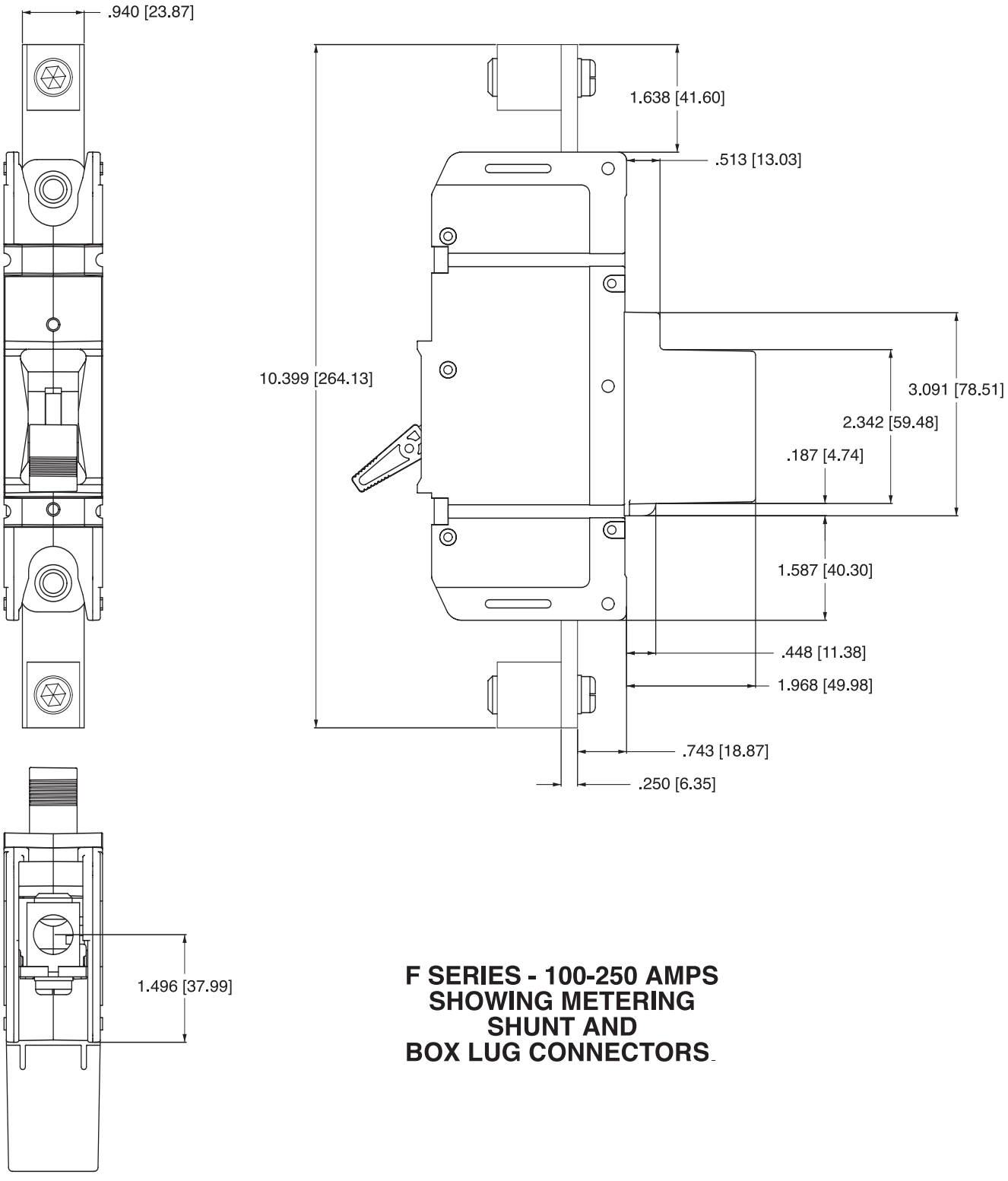




PANEL CUTOUT DETAIL



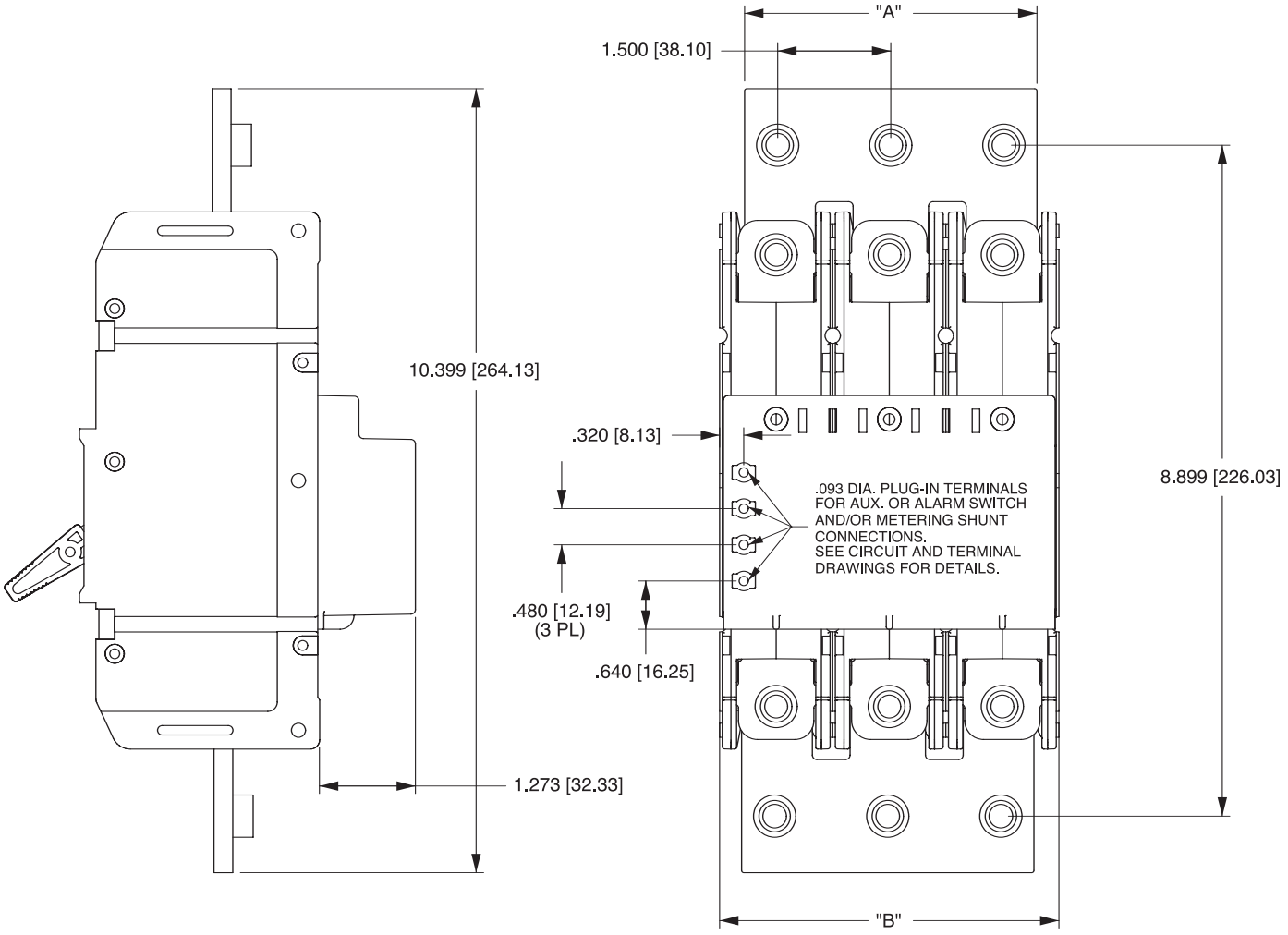
Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.



F SERIES - 100-250 AMPS SHOWING METERING SHUNT AND BOX LUG CONNECTORS

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.



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 Module

The Carling Technologies Remote Operated Circuit Breaker (ROCB) combines the convenience of remote ON, OFF and Reset capabilities, with the safety and accuracy of a standard magnetic current sensing device, thus allowing operation of the breaker from various locations in a system, facility or site (while not sacrificing the ability to manually operate the breaker if required). With the ROCB, service, diagnostics, load shedding and power distribution control functions can now be performed in areas that were previously unattended, inaccessible or unsafe.

The ROCB module allows remote operation of the C-Series panel mount breaker, or the D-Series DIN rail mount breaker (up to 3 poles) through hard wiring with a single pole, double throw switch connected to a standard power source, or more sophisticated relay and modem networks.

The ROCB module can be mounted to either side of the host breaker, while occupying only the width of a standard C-Series pole. Several interface methods are available. Remote physical actuation of the host circuit breaker is achieved by connecting the ROCB module's handle with the breakers.
Being based on the C-Series breaker, the ROCB allows easy adaptation into existing panel designs. In addition, its compact size allows efficient use of space for new design applications. With the ROCB, Carling has designed a versatile, compact and reliable solution -- in a hydraulic/magnetic circuit breaker or switch only device that can be operated both manually and remotely.

Design Features include:
- ON-OFF and trip indication
- Load shedding
- Energy management
- Compact size
- Automatic reset capable
- Choice of interface styles
- Panel or DIN rail 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

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.

0	n/a - ordered separate from breaker
1	Left Side
2	Right Side

3 INTERFACE

1	Flying Leads
2	Integral Connector
3	Flying Leads w/ 4 pin dual row connector (female)
4	Flying Leads w/ 4 pin dual row connector (male)

4 LEAD LENGTH

00	No Lead	**11**	11"	**22**	22"
01	1"	**12**	12"	**23**	23"
02	2"	**13**	13"	**24**	24"
03	3"	**14**	14"	**25**	25"
04	4"	**15**	15"	**26**	26"
05	5"	**16**	16"	**27**	27"
06	6"	**17**	17"	**28**	28"
07	7"	**18**	18"	**29**	29"
08	8"	**19**	19"	**30**	30"
09	9"	**20**	20"		
10	10"	**21**	21"		

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:
Available with integral connector only.
Integral and 4-pin dual row connectors not available with agency approval G: UL 489.

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 1 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	1	B
1 Accessory Code	*2 Series*	*3 Poles*		*4 Interface*	*5 Terminal*	*6 Color*

1 ACCESSORY CODE
8

2 SERIES
A A & B-Series

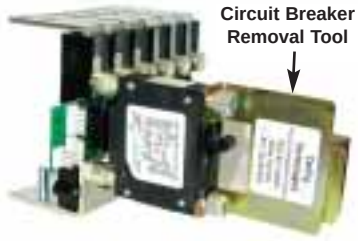
3 POLES
1 1 pole

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**	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
2	Textured Surface
3	Glossy Surface

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 multi-stage 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-through current
The actual fault current passing through a protective device as compared to the current available to the device.
line *see load*
The conductors that are at the supply of energy to a circuit. Line normally refers to the current carrying non-grounded conductor.
line loss *see voltage drop*
The power loss that occurs due to amperage flowing through the resistance of conductors over their length.
listed (UL Listed)
Indicates that a device or component has met certain specifications as set forth by Underwriters Laboratory. Further, it means that the device or component has been tested for conformance and 'listed' with UL so it can use the UL logo and claim conformance to the specification.
load *see line*
A device that consumes power and does work.

M

make (rating)
The current that a breaker, switch, or relay can connect without damaging the device.
make before break
Describes a switch action that connects the new circuit before disconnecting the old. This type of switch action is required for battery switches in order to avoid an open circuit for the engine alternator, which can cause extreme voltages that can damage the alternator and accessory electronics.

N

NEC *see National Electrical Code*
NEMA
National Electrical Manufacturers Association
National Electrical Code (NEC)
The NEC is developed and maintained by the National Fire Protection Association which describes how residential, commercial, and RV electrical systems must be installed. The NEC is adopted, sometimes with revision, by states that also adopt the Uniform Building Code. Electrical inspections required by most building permits follow the NEC. While not required aboard boats, the NEC is a valuable guide to safe electrical systems. The goal of the NEC is personal safety and fire prevention.
neutral (ground) *see single phase*
The grounded current carrying conductor in a single phase, four wire, 120/240V AC system.
neutral-to-ground bonding
Connecting the ground and the neutral together via an electrical conductor.
nuisance trip
A circuit breaker or fuse, which trips or blows without the circuit actually being overloaded. This may be due to a surge current which requires a slow tripping breaker or a slow blow fuse.

O

ohm
The unit for resistance equals V/I = 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: $P = I^2 R$ When a potential difference of V volts appears across a component having a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = V^2 / R$
power factor
In an AC circuit loads other than resistance shift the phase angle between the voltage and the current. This shift is the result of energy being stored and released in an inductor for example. To calculate the power consumed one must consider this phase shift. We do so by using the following formula P=VI 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.

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