



Carling Technologies™
Innovative Designs. Powerful Solutions.

HYDRAULIC-MAGNETIC

Circuit Protection



CATALOG

FOUNDED IN 1920

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

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

SWITCHES & CONTROLS

- Rocker
- Toggle
- Pushbutton
- Rotary

CIRCUIT PROTECTION

- Hydraulic Magnetic
- Thermal
- GFCI / ELCI

CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

GLOBAL LOCATIONS:

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

Maretron
Phoenix, AZ, USA

Carling Technologies
Brownsville, TX, USA
ISO14001:2004
ISO9001:2008
ISO/TS16949:2009

Carling Technologies
Matehuala, Mexico
ISO14001:2004
ISO9001:2008
ISO/TS16949:2009

Carling Technologies
Jupiter, FL, USA

Carling Technologies European Headquarters
Exeter, UK
ISO9001:2008
ISO/TS16949:2009

Carling Technologies
Kowloon, Hong Kong
ISO9001:2008

Carling Technologies
Zhongshan, China
ISO14001:2004
ISO9001:2008



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OTHER SERVED INDUSTRIES:

- Medical Equipment
- Industrial Control
- Audio/Visual Equip.
- Commercial Food Equipment
- HVAC Equipment
- Floor Care
- Generators
- Small Appliances
- Security Systems



2200+
EMPLOYEES
WORLDWIDE

Hydraulic-Magnetic Circuit Protection

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



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

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

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

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

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

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

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

	 L-Series	 N-Series	 CX-Series	 E-Series	 F-Series
Number of Poles	1-3	1-2	1-2, + auxiliary switch pole	1-6	1-3
Actuator Style	rocker, w/ or w/o guard	flush rocker, w/ or w/o push to reset guard	handle, 1 per pole	handle	handle
Available Delays	AC: ultrashort, short, medium, long, short-high inrush, medium-high inrush, long-high inrush	AC: ultrashort, short, medium, long, short-high inrush, medium-high inrush, long-high inrush	DC: instant, ultrashort, short, medium & long	AC, DC, AC/DC: instant, short, medium & long AC, DC, AC/DC: high inrush-short, medium & long	AC, DC: short, medium & long
Max Current & Voltage Ratings	.1-32A@120/240VAC .1-20A@415/240VAC, 3 pole	1-20A@240/277VAC 1-30A@120/240VAC	UL Recognized 0.2-115A@600VDC UL Listed 0.2-15A@250/500VDC 0.2-50A@205/410VDC	UL Listed 0.02-100A@240VAC, 80VDC, 125VDC UL Recognized 0.02-100A@277VAC, 160VDC, 1 pole 0.02-100A@600VAC, 2 Pole 1Ø, 3 pole 3Ø 0.02-120A@125VDC, 1 pole	UL489 Listed: 50-250A@125VDC 100-250A@120/240VAC 100-250A@277VAC 100-250A@208Y/120, 3ØVAC UL489A Listed 250-700A@125VDC
Max Interrupting Capacity	5000 amps	22,000 amps	UL Listed and UL Recognized up to 10,000 amps	UL Listed 50000A@80VDC 10000A@125VDC & 240VAC-5KA UL Recognized 5000A@125VDC 5000A@600VAC, w/o fuse backup 10000A@600VAC, w/ fuse backup	50000A@125VDC 10000A@120/240, 277, 208Y/120VAC
Auxiliary Switch Rating	n/a	n/a	20A@80VDC (GO circuit)	10.1A@250VAC 1.0A@65VDC 0.1A@80VDC	10.1A@250VAC 0.5A@65VDC 0.1A@80VDC
Available Circuits	series trip	series trip	series trip	series, shunt, relay, switch only, series w/ remote shutdown	series & switch only w/ or w/o metering shunt
Terminal Options	10-32, 8-32, M5 & M4 screw	screw terms	10-32 or M5 screw terminals 1/4-20 or M6 threaded stud	10-32 stud, 1/4-20 stud 0-32 screw, 1/4-20 screw, box wire connector	3/8-16 stud, 3/8-16 screw & box wire connector
Mounting Method	threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)	threaded insert: #6-32 x .195 inches ISO M3 x 5mm	threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)	rear or front panel	rear or front panel
Agency Approvals	UL 489, cUL, TUV (EN60934-2)	UL489, TUV (EN60947-2)	UL489, UL1077, TUV (EN60934-2)	UL, CSA, VDE, UL1500, UL489	cUL, TUV, UL489, UL489A

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

Circuit Protection Introduction

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

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

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

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

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

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

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

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

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

Available Choices of Circuit Protection

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

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

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

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

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

Carling Technologies' Hydraulic-Magnetic Circuit Breakers

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

Features

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

Typical Applications

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

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

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

What Makes a Magnetic Breaker Trip

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

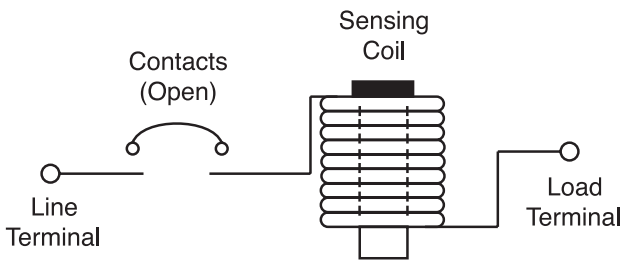


Figure 1

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

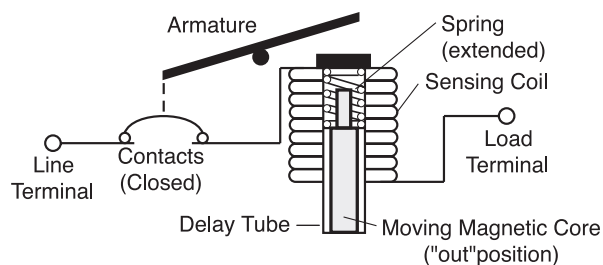


Figure 2 - Rated Current or Less

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

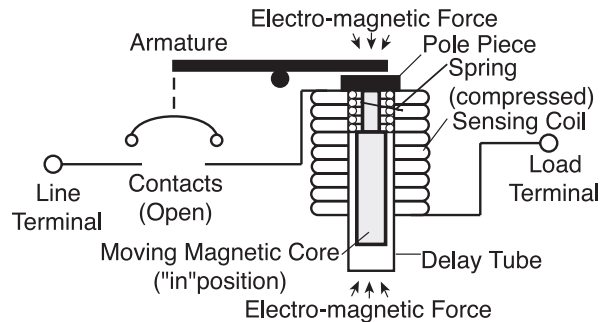


Figure 3 - Moderate Overload with Induced Delay

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

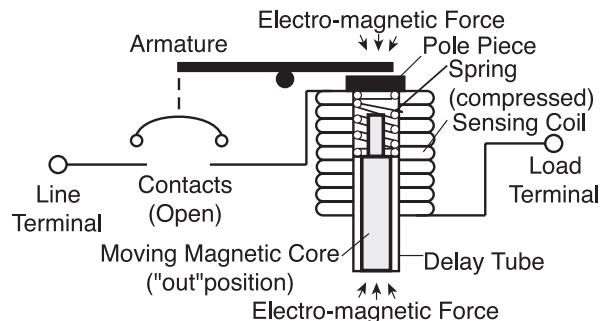


Figure 4 - Short Circuit Condition - No Induced Delay

How Various Time Delays are Obtained

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

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

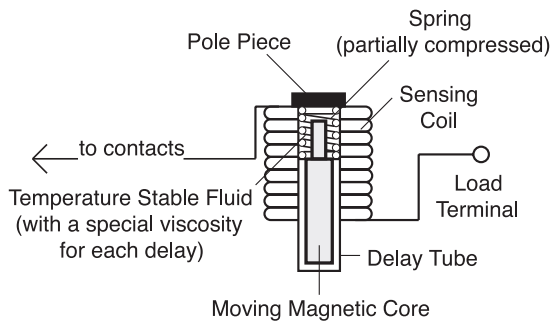


Figure 5 - Rated Current or Less

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

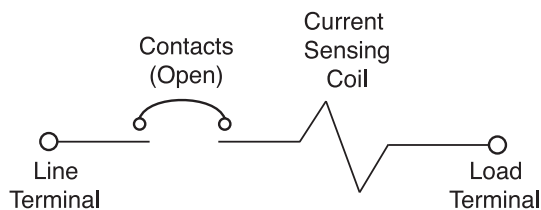
By use of magnetic “shunt” plates within the magnetic circuit, it is possible to divert magnetic flux resulting in higher “inrush withstanding capability” (or high inrush delays). These delays disregard short duration, high pulse surges (typically 8ms or less and up to 25x rated current), characteristic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

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

Available Circuit Options

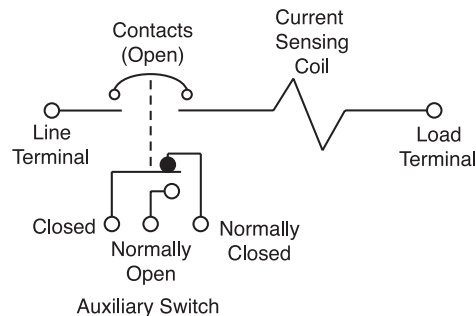
Series Trip

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



Series Trip with Auxiliary Switch

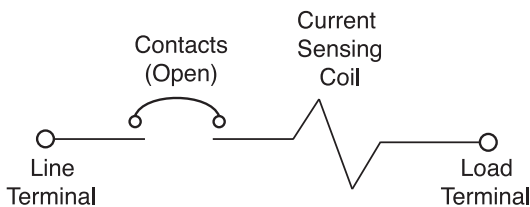
Inside the coil is a non-magnetic delay tube, housing a springbiased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is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



Series Mid-Trip with Auxiliary/Alarm Switch

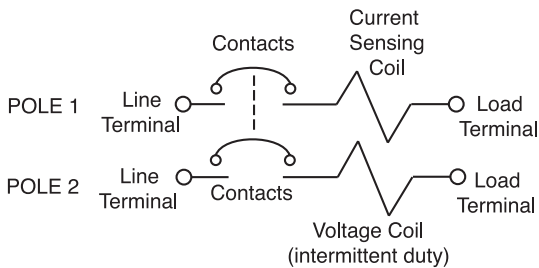
Similar to “Series Trip with Auxiliary Switch” except the S.P.D.T. auxiliary switch is actuated only upon electrical trip of the breaker. Upon electrical trip, the “N.O.” contact closes and the “N.C.” contact opens. This can be used to remotely signal the “TRIPPED” status of the breaker. Also, upon electrical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

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



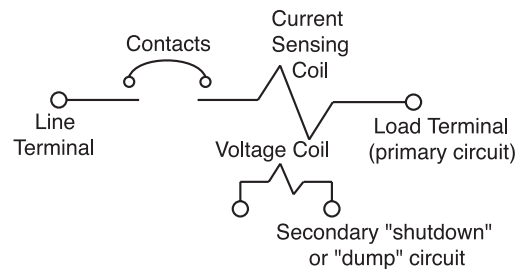
Series Trip with Remote Shutdown

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

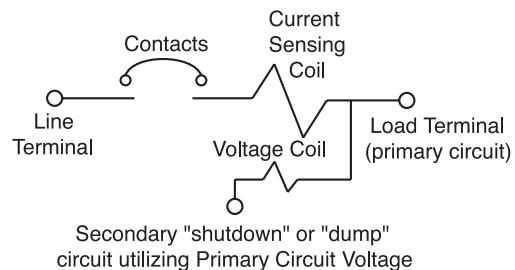


Dual Coil with Remote Shutdown

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



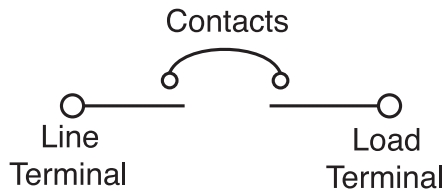
The other circuit option is the “Shunt Trip Dual Coil”, a three terminal device with one side of the voltage coil internally connected to the primary circuit. The other side of the voltage coil is connected to an external third terminal on the bottom of the breaker. This circuit option uses line voltage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



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

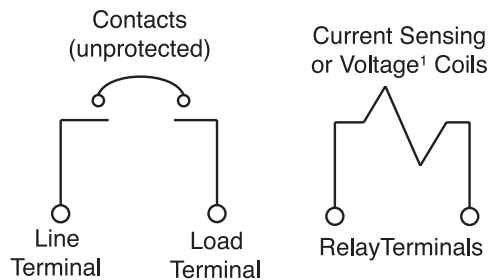
Switch Only

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



Relay Trip

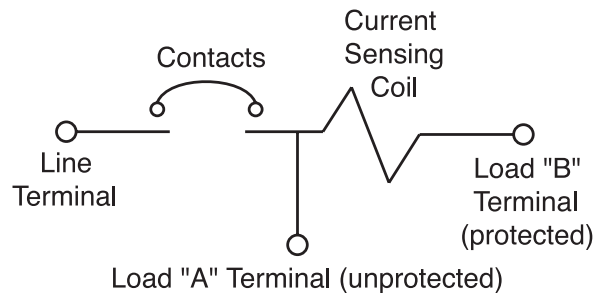
A four terminal device in which the contact and coil circuits are electrically isolated but mechanically linked. An overload in the coil circuit will cause the contact circuit to open. These circuits may be of opposite polarity. Commonly used in dump circuit, panic circuit, and remote shutdown applications.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



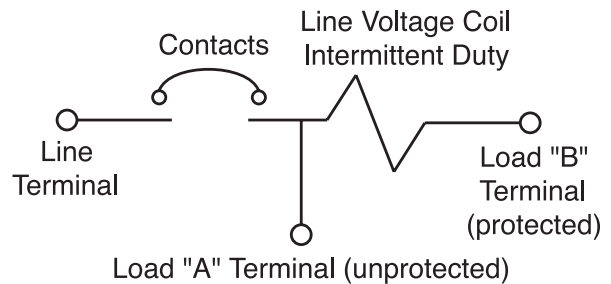
1. Voltage coils rated for intermittent duty only, and must be disconnected after being pulsed.

Shunt Trip

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



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



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

UL Recognized/UL1077 Recognized

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

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

UL Listed/UL 489 Listed

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

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

UL1500 (MARINE)

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

CSA

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

CUL

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

VDE and TUV

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

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

CE MARKING

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

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

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

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

Warranty Policy

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

M-Series

M-Series CIRCUIT BREAKER

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

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



Product Highlights:

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

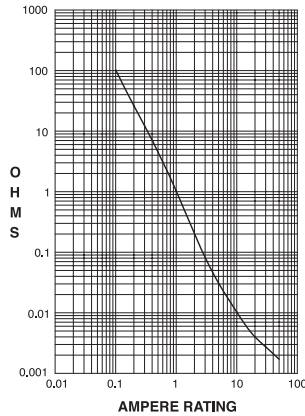
Typical Applications:

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

Electrical

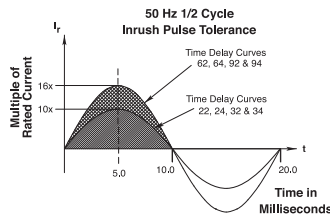
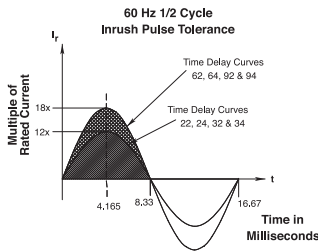
Maximum Voltage	125/250 VAC 50/60 Hz, 80 VDC (See Rating Tables.)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00 thru 15.0 in 1 amp increments, 18.0, 20.0, 25.0, 30.0. Other ratings available - see Ordering Scheme.
Auxiliary Switch Rating	SPDT; 7A 250VAC, 7A (Res) 28VDC, 4A (Ind.) 28VDC, 0.25A 80VDC (Res) (silver contacts), 0.1A 125VAC (gold contacts).
Insulation Resistance	Minimum of 100 Megohms at 500 VDC.
Dielectric Strength	UL, CSA 1500V, 50/60 Hz for one minute between all electrically isolated terminals. M-Series Circuit Breakers comply with the 8mm spacing and 3750 V 50/60Hz dielectric requirements from hazardous voltage to operator accessible surfaces, per Publications IEC 380, 435, 950, EN 60950 and VDE 0805.
Resistance, Impedance	Values from Line to Load Terminal - based on Series Trip Circuit Breaker.

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



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

Pulse Tolerance Curves



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

Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute with rated Current and Voltage.
Trip Free	All M-Series Circuit Breakers will trip on overload, even when actuator is forcibly held in the ON position.
Trip Indication	The actuator moves positively to the OFF position when an overload causes the circuit breaker to trip.

Physical

Number of Poles	1 or 2
Internal Circuit Configs.	Series with or without Auxiliary Switch. Switch Only with or without Auxiliary Switch.
Weight	Approximately 30 grams/pole (Approximately 1.07 ounces/pole)
Standard Colors	See Ordering Scheme.a

Environmental

Designed in accordance with requirements of specification MIL PRF-55629 & MIL-STD-202G as follows:	
Shock	Withstands 100 Gs, 6ms, sawtooth while carrying rated current per Method 213, Cond. I. Instantaneous curves tested at 80% of rated current.
Vibration	Withstands 0.060" excursion from 10-55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous curves tested at 80% of rated current.
Moisture Resistance	Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.
Salt Spray	Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).
Thermal Shock	Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C).
Operating Temperature	-40° C to +85° C
Chemical Resistance	Only the outside surfaces of the case and the handles may be cleaned with detergents or alcohol. Organic (hydrocarbon based) solvents are not recommended because they attack plastics. Caution should be taken when solvents are used to clean and remove flux from terminals. Lubricants should not be introduced into the handle/bushing openings

Electrical Tables

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

M-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		POLES BREAKING	SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS		UL/ CSA		UL	CSA
							WITH BACKUP FUSE	WITHOUT BACKUP FUSE		
SERIES	32	DC	--	0.02 - 15	--	1	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
				--	15.1 - 25	1	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
	50 ²	DC	--	0.02 - 7.5	--	1	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	2	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	65	DC	--	--	15.1 - 25	2	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	1	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	65 ^{1,2}	DC	--	--	15.1 - 30	1	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	2	5000 ³	--	TC1,2, OL1, C1	TC1,2, OL1, C1
	65	DC	--	--	15.1 - 25	2	5000 ³	--	TC1,2, OL0, C1	TC1,2, OL0, C1
				0.02 - 15	--	1	--	600	TC1,2, OL1, U1	TC1,2, OL1, U1
	80 ¹	DC	--	--	15.1 - 30	1	--	600	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	1	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	125	50 / 60	1	--	15.1 - 30	1	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				1 - 30	--	1	--	360	TC1,OL1,U2	TC3, OL1, U3
				0.02 - 12	--	1	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	250 ²	50 / 60	1	0.02 - 12	--	1	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
250	50 / 60	1	--	12.1 - 18	1	1000 ⁴	--	TC1,2, OL0, C1	TC1,2, OL0, C1	
			0.02 - 15	--	2	--	1000	TC1,2, OL1, U1	TC1,2, OL1, U1	
			--	15.1 - 30	2	--	1000	TC1,2, OL0, U1	TC1,2, OL0, U1	
			1 - 30	--	2	--	360	TC1,OL1,U2	TC3, OL1, U3	

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

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

M-SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS												
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		POLES BREAKING	SHORT CIRCUIT CAPACITY (AMPS)				APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS		U / CSA		VDE / TUV		UL	CSA
							WITH BACKUP FUSE	WITHOUT BACKUP FUSE	WITH BACKUP FUSE ⁵	WITHOUT BACKUP FUSE		
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
				0.02 - 15	--	2	--	1000	3000	500	TC1,2, OL1, U1	TC1,2, OL1, U1
	65	DC	--	--	15.1 - 20 ⁴	2	--	1000	3000	500	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	2	5000	--	3000	500	TC1,2, OL1, C1	TC1,2, OL1, C1
	65 ³	DC	--	--	15.1 - 20 ⁴	2	5000	--	3000	500	TC1,2, OL0, C1	TC1,2, OL0, C1
				0.02 - 15	--	1	--	600 ⁴	--	600	TC1,2, OL1, U1	TC1,2, OL1, U1
	80 ¹	DC	--	--	15.1 - 20 ⁴	1	--	600 ⁴	--	600	TC1,2, OL0, U1	TC1,2, OL0, U1
				0.02 - 15	--	1	--	1000	3000	500	TC1,2, OL1, U1	TC1,2, OL1, U1
	125	50 / 60	1	1 - 15	--	1	--	360	3000	500	TC1,OL1,U2	TC3, OL1, U3
				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
	250	50 / 60	1	1 - 12	--	1	--	360	3000	500	TC1,OL1,U2	TC3, OL1, U3

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

Electrical Tables

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

M-SERIES TABLE C: UL489A Listed (COMMUNICATIONS EQUIPMENT - POLARITY SENSITIVE)						
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING GENERAL PURPOSE AMPS	POLES BREAKING	INTERRUPTING CAPACITY (AMPS)	
	MAX. RATING	FREQUENCY			WITHOUT BACKUP FUSE	
					UL489A	TUV
SERIES	80	DC	0.02 - 30	1	600	---
	65 ¹	DC	0.02 - 30	1	1000	---
	80	DC	0.10 - 25	1	600	600

Table C Notes:
 1 Available only with Special Caralog Number

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

M-SERIES TABLE D: Parallel Pole Construction UL489A Listed (COMMUNICATIONS EQUIPMENT - POLARITY SENSITIVE)					
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING GENERAL PURPOSE AMPS	POLES BREAKING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY			WITHOUT BACKUP FUSE
					UL489A
SERIES	80	DC	31-50	2	600
	65 ¹	DC	31-50	2	1000

Table D Notes:
 1 Available only with Special Caralog Number

Agency Certifications

UL Recognized

UL Standard 1077



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

CSA Accepted



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

UL Listed

UL Standard 489A



Communications Equipment (Guide CCN/DITT, File E189195)

VDE Certified



EN60934, VDE 0642 under File 10537

TUV Certified



EN60934, under License No. R9671109



1 SERIES
M

2 ACTUATOR
Single Color Rocker **Two Color Visi-Rocker** **Single Color Translucent Rocker**
A Angled **D** Indicate ON **F** Angled
B Flat **E** Indicate OFF **G** Flat

3 POLES
2 Two

4 CIRCUIT/AUXILIARY SWITCH²
P Series Trip Current (Parallel Pole)
with Auxiliary Switch, Silver Contacts
Q Series Trip Current (Parallel Pole) .110 x 0.20 Q.C
with Auxiliary Switch, Gold Contacts
R Series Trip Current (Parallel Pole) .110 x 0.20 Q.C

5 FREQUENCY & TIME DELAY
D2 DC Short
D4 DC Medium

6 CURRENT RATING (AMPERES)

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

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

8 ILLUMINATION
Non-Illuminated
A Non-Illuminated

9 ACTUATOR COLOR & LEGEND

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

10 LEGEND
2 ON - OFF Vertical
3 ON - OFF Horizontal
6 Dual Vertical
7 Dual Horizontal

11 BEZEL COLOR
A White without Rockerguard
B Black without Rockerguard
G Gray without Rockerguard
1 White with Rockerguard
2 Black with Rockerguard
7 Gray with Rockerguard

12 AGENCY APPROVAL
T UL 489A Listed

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



1 SERIES
M

2 ACTUATOR
M Paddle
T Push-Pull

3 POLES
2 Two

4 CIRCUIT/AUXILIARY SWITCH¹
P Series Trip Current (Parallel Pole) with Auxiliary Switch, Silver Contacts
Q Series Trip Current (Parallel Pole) with Auxiliary Switch, Gold Contacts
R Series Trip Current (Parallel Pole) .110 x 0.20 Q.C

5 FREQUENCY & TIME DELAY
D2 DC Short
D4 DC Medium

6 CURRENT RATING (AMPERES)

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

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

8 ACTUATOR COLOR & LEGEND

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

9 FRONT PANEL HARDWARE

Handle
A No outer Panel Hardware
B Knurled Nut, Bright Nickel
C Knurled Nut, Bright Nickel w/Locking Ring
D Knurled Nut, Black
E Knurled Nut, Black w/Locking Ring
F Panel Dress, Bright Nickel
G Panel Dress, Bright Nickel w/Locking Ring
H Panel Dress, Black
J Panel Dress, Black w/Locking Ring

Push Button
1 No outer Panel Hardware
2 Knurled Nut, Bright Nickel

10 LEGEND PLATE / BUTTON MARKING

Handle Actuator Legend Plate
B ON - OFF Vertical
C ON - OFF Horizontal

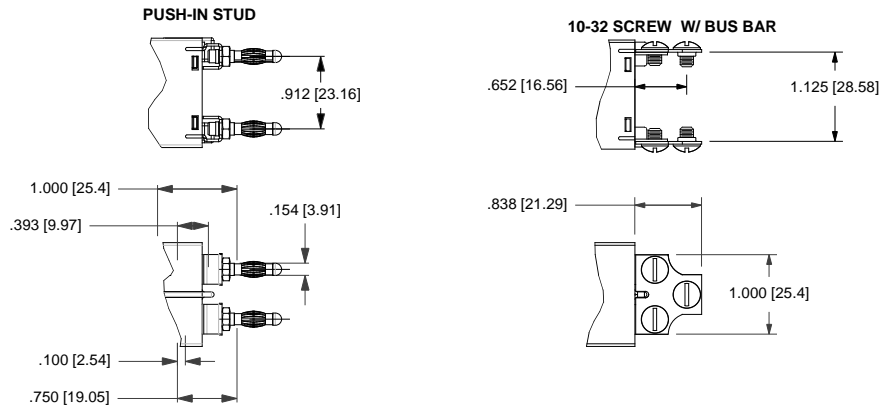
Push-Pull Actuator Legend Plate
2 Rated Amps Horizontal
3 Rated Amps Line Side Down
4 Rated Amps Line Side Up

11 BUSHING COLOR
B Black

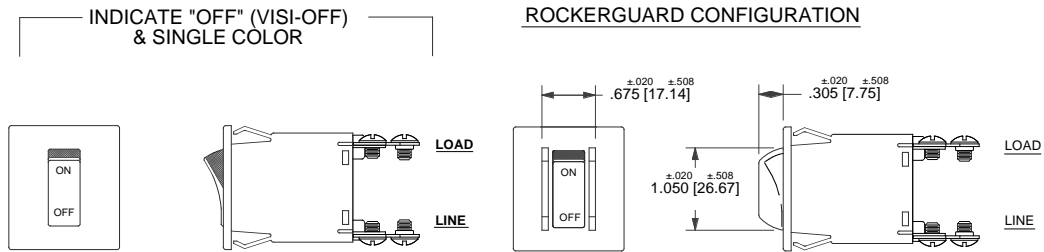
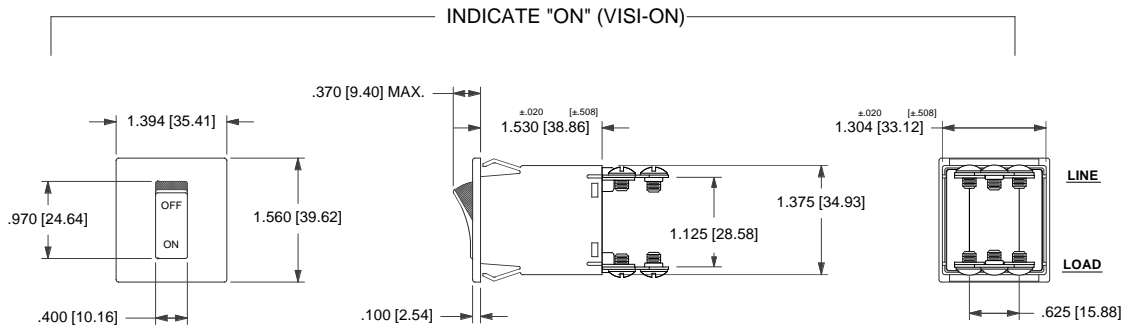
12 AGENCY APPROVAL
T UL 489A Listed

Notes:
1 Aux Switch only available with screw terminals

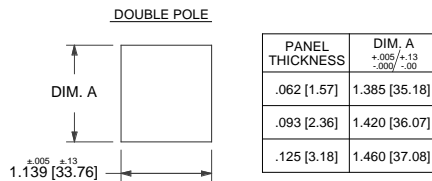
PARALLEL POLE TERMINAL OPTIONS



ROCKER ACTUATOR DETAIL



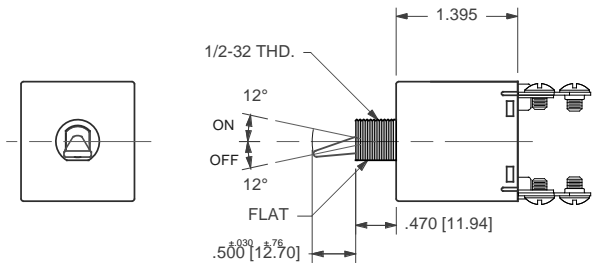
PANEL CUT - OUT DETAIL (ROCKER)



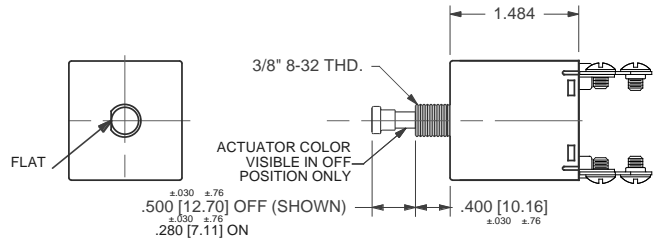
Notes:

- 1 ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
- 2 TOLERANCE ± 0.10 [.25] UNLESS OTHERWISE SPECIFIED.
- 3 DIMENSIONS APPLY TO BOTH ROCKER STYLES.
- 4 I-O, ON-OFF OR DUAL LEGENDS AVAILABLE FOR VERTICAL OR HORIZONTAL MOUNTING.
- 5 NOTICE THAT CIRCUIT BREAKER LINE AND LOAD TERMINAL ORIENTATION ON INDICATE "OFF" IS OPPOSITE THAT OF INDICATE "ON".

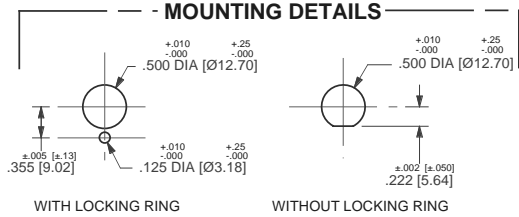
PADDLE ACTUATOR STYLE



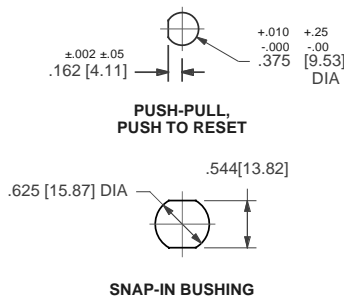
PUSH-PULL ACTUATOR STYLE



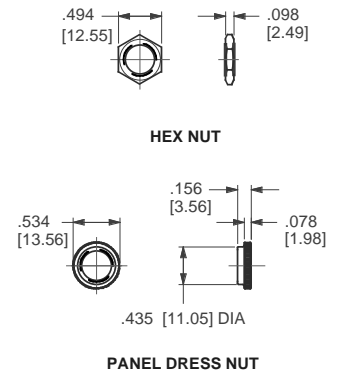
MOUNTING DETAILS



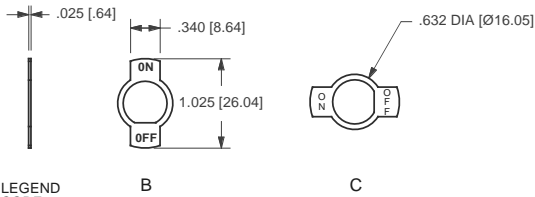
MOUNTING DETAILS



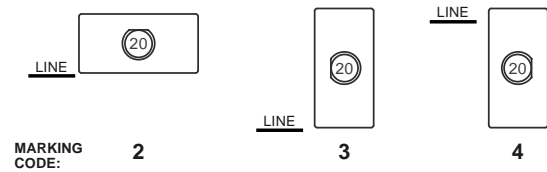
PANEL HARDWARE



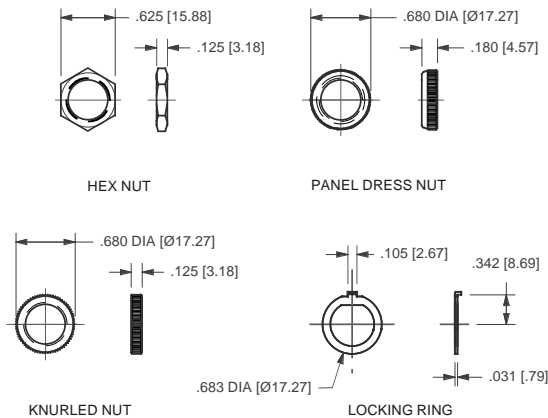
LEGEND PLATES



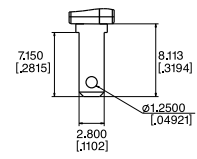
BUTTON MARKING ORIENTATION



PANEL HARDWARE



.110QC AUXILIARY SWITCH TERMINALS



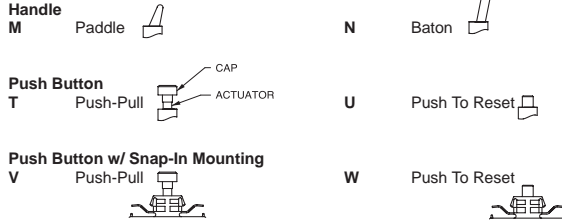
- Notes:
- 1 ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
 - 2 TOLERANCE ± 0.10 [.25] UNLESS OTHERWISE SPECIFIED.
 - 3 DIMENSIONS APPLY TO BOTH ROCKER STYLES.
 - 4 I-O, ON-OFF OR DUAL LEGENDS AVAILABLE FOR VERTICAL OR HORIZONTAL MOUNTING.
 - 5 NOTICE THAT CIRCUIT BREAKER LINE AND LOAD TERMINAL ORIENTATION ON INDICATE "OFF" IS OPPOSITE THAT OF INDICATE "ON".



1 SERIES

M

2 ACTUATOR¹



3 POLES

1 One **2** Two

4 CIRCUIT²

- without Auxiliary Switch**
A Switch Only (no coil) , Maintained Contacts
B Series Trip (Current)
- with Auxiliary Switch, Silver Contacts**
M Series Trip (Current) Aux Switch .110 QC x .020 QC
P³ 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.
S³ Series Trip (Current) .060 Dia, Round Solder Turret
T^{3,4} Series Trip (Current) .058 Dia, Round Q.C.
U^{3,13} Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.
- with Auxiliary Switch, Gold Contacts**
2^{3,4} Switch Only, Maintained Contacts .058 Dia, Round Q.C.
3^{3,13} Switch Only, Maintained Contacts .080 Dia x .020 Flat Q.C.
4^{3,4} Series Trip (Current) .058 Dia, Round Q.C.
5^{3,13} Series Trip, Maintained Contacts .080 Dia x .020 Flat Q.C.
9 Series Trip (Current) Aux Switch .110 QC x .020 QC

5 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)⁶

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

7 TERMINAL⁸

- 1** Push-On 0.250 Tab (Q.C.) **A¹¹** Push-In Stud
2¹⁰ Screw 8-32 w/upturned lugs **P¹²** Printed Circuit Board
3¹⁰ Screw 8-32 (Bus Type)

8 ACTUATOR COLOR & LEGEND⁵

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 HARDWARE⁶

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

10 LEGEND PLATE / BUTTON MARKING

- Handle Actuator Legend Plate (Actuator Styles M & N)**
A No Legend Plate
B ON - OFF Vertical
C ON - OFF Horizontal
D I - O Vertical
E I - O Horizontal
- Push-Pull Actuator Button Cap (Actuator Styles T & V)**
1 No Marking
2 Rated Amps Horizontal
3 Rated Amps Line Side Down
4 Rated Amps Line Side Up
- Push-to-Reset Actuator Button (Actuator Styles U & W)**
1 No Marking

11 BUSHING COLOR⁷

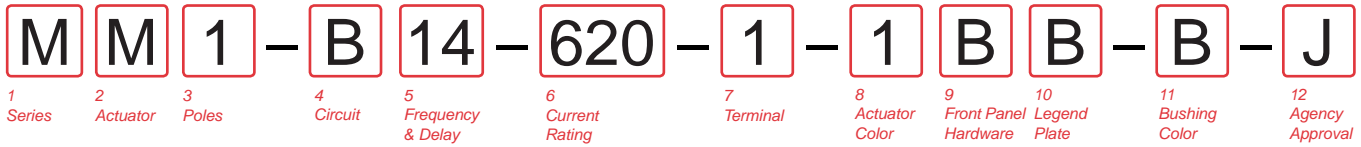
- B** Black

12 AGENCY APPROVAL⁹

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

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

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



1 SERIES
M

2 ACTUATOR¹

Handle
M Paddle N Baton

Push Button
T Push-Pull U⁸ Push To Reset

Push Button w/ Snap-In Mounting
V Push-Pull W⁸ Push To Reset

3 POLES
1 One

4 CIRCUIT

without Auxiliary Switch
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts
M Series Trip (Current) Aux Switch
S² Series Trip (Current)
T^{2,3} Series Trip (Current)
U^{3,12} Series Trip, Maintained Contacts

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

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

5 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)

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

7 TERMINAL⁴

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 & LEGENDS⁵

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 HARDWARE⁶

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

10 LEGEND PLATE / BUTTON MARKING

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

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

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

11 BUSHING COLOR⁷
B Black

12 AGENCY APPROVAL⁹

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

- Notes:
- One actuator is located in the center of each multi-pole breaker. Actuator codes V & W limited to single pole breakers only.
 - 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.
 - Mates with AMP .058" diameter pin receptacles including 60983-1 (gold plated) and 60983-3 (tin plated).
 - Screw terminals or Push-in Stud recommended above 20 amps.
 - Actuator color is only visible in the OFF position on Push-Pull actuators.
 - All units have one hex nut installed on bushing for use behind the panel.
 - Other colors available. Consult factory.
 - Not available with UL489A Listed breakers.
 - TUV certified to 25 amps. UL Recognized, CSA Accepted and UL Listed to 30 amps.
 - Terminal code A available with circuit codes A & B only.
 - Printed circuit board available with UL recognized approval only.
 - Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

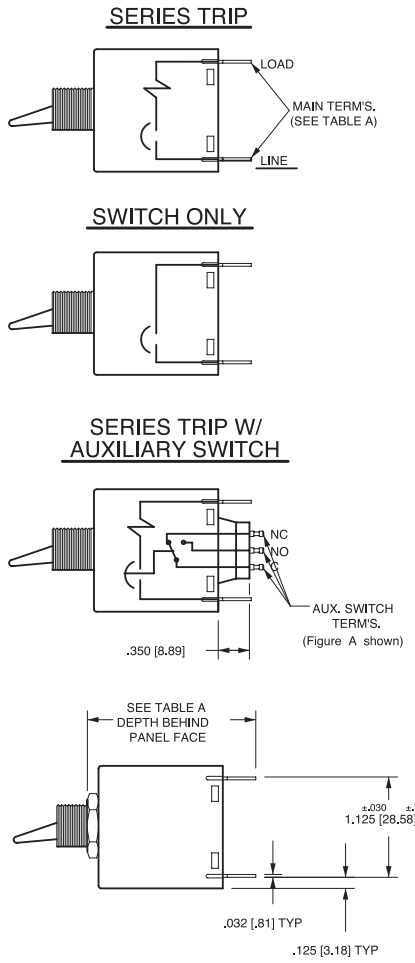


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C.)	1.890 [48.00]
	SCREW (#8-32)	1.930 [49.03]
	PUSH-IN STUD	2.520 [64.00]
AUX. **	DOUBLE SOLDER TURRET TYPE	2.035 [51.69]
	ROUND Q.C TYPE	2.025 [51.44]
	FLAT QUICK-CONNECT	2.129 [54.08]
	FLAT SOLDER LUG	2.012 [51.10]

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

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

MULTI-POLE IDENTIFICATION SCHEME

SOLDER TURRET AND ROUND QC AUX SWITCH TERMINALS

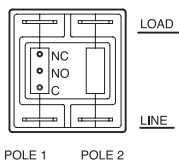


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCHTERMINALS

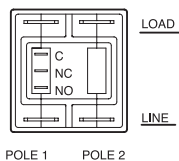
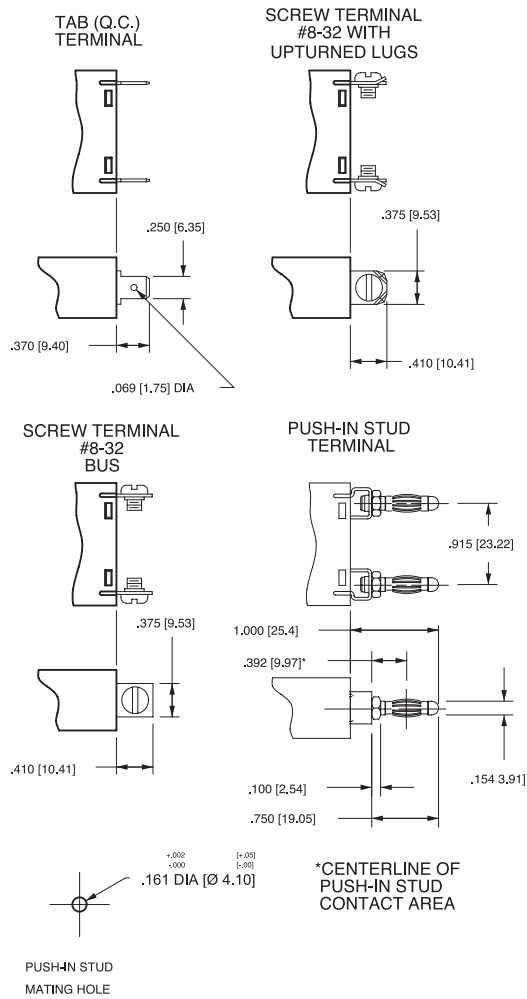


FIG. B

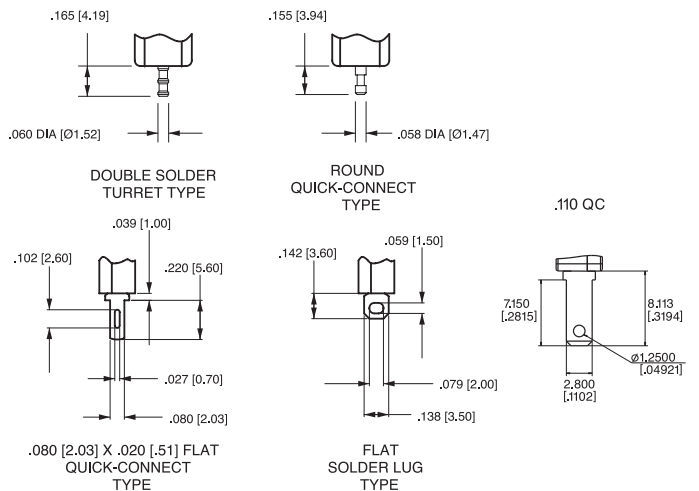
Notes:

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

TERMINAL DIMENSIONAL DETAIL

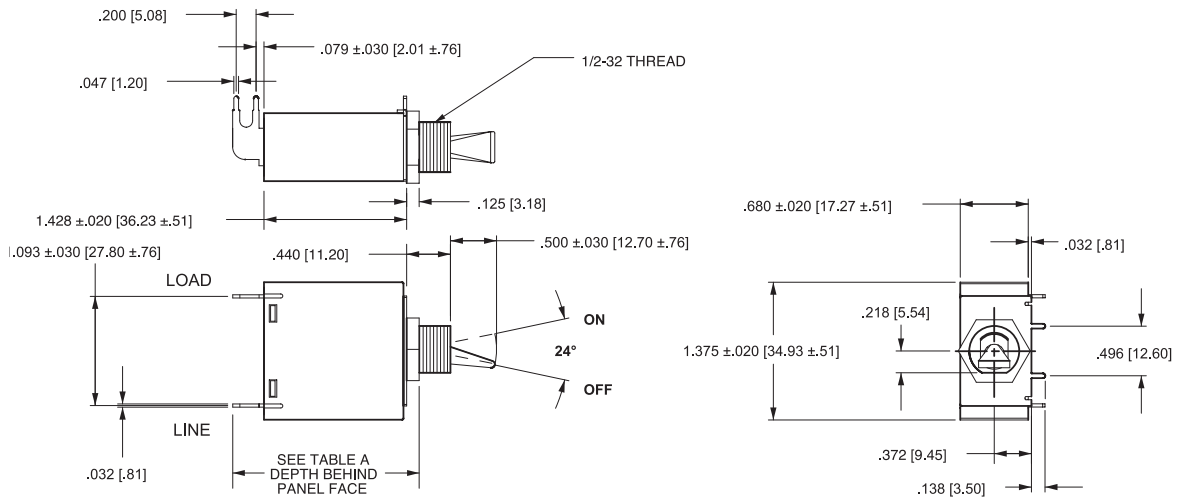


AUXILIARY SWITCH TERMINALS

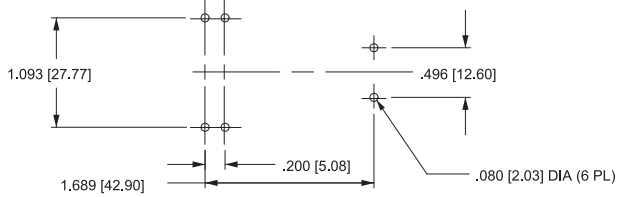


*AVAILABLE THROUGH SPECIAL CATALOG PART NUMBER

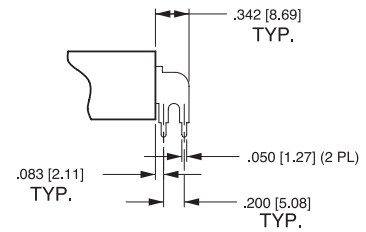
HANDLE TYPE SHOWN WITHOUT AUX. SWITCH



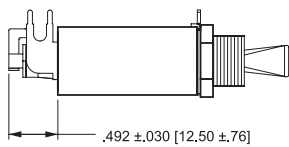
P.C. FOOTPRINT



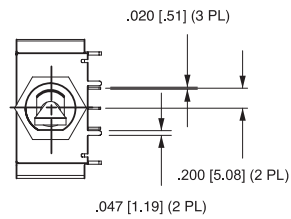
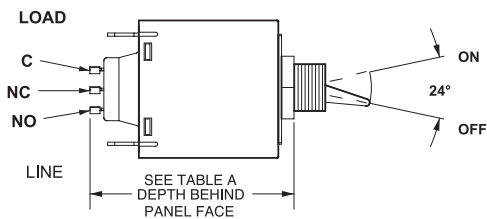
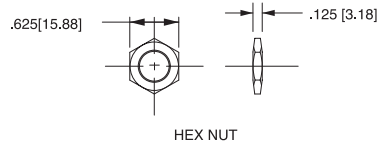
P.C. TERMINAL



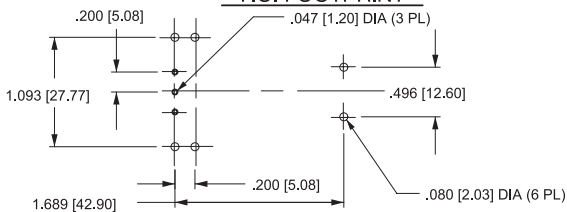
HANDLE TYPE SHOWN WITH AUX. SWITCH



PANEL HARDWARE



P.C. FOOTPRINT



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

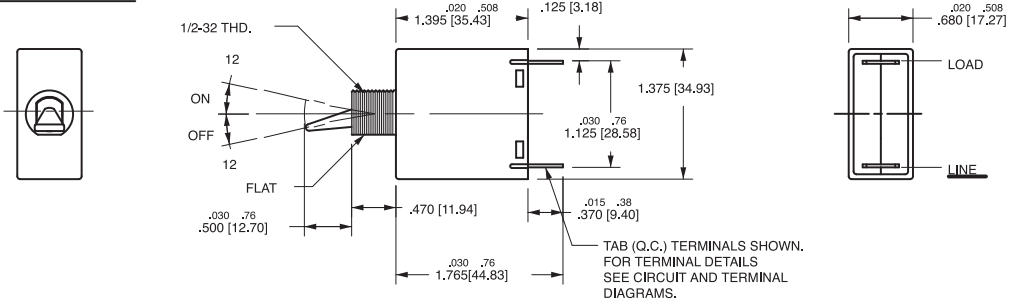
*DEPTH INCLUDES BEHIND PANEL HEX NUT AS SUPPLIED ON ALL UNITS

Notes:

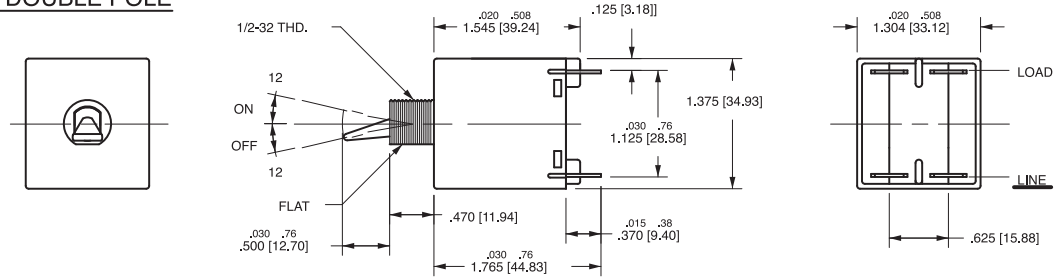
- All dimensions are in inches [millimeters].
- Tolerance ±.020 [.51] unless otherwise specified.

PADDLE ACTUATOR STYLE

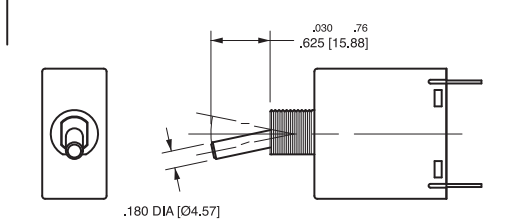
SINGLE POLE



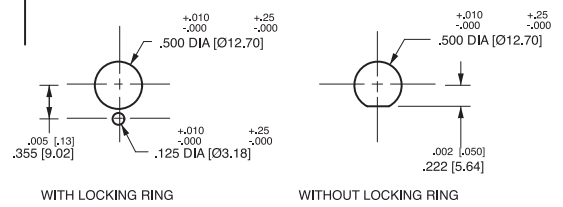
DOUBLE POLE



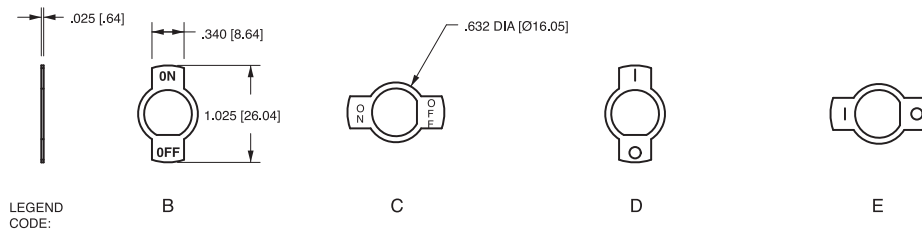
BATON ACTUATOR STYLE



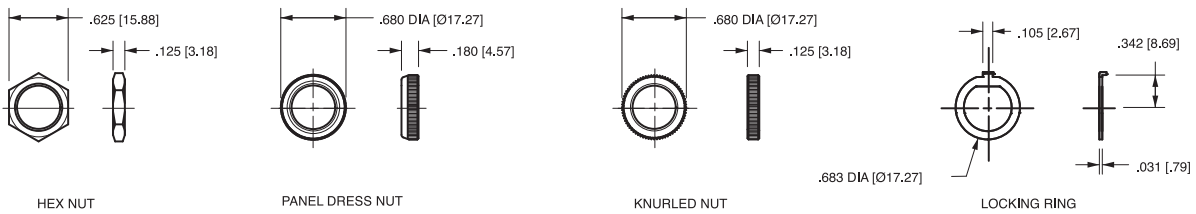
MOUNTING DETAILS



LEGEND PLATES



PANEL HARDWARE



Notes:

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

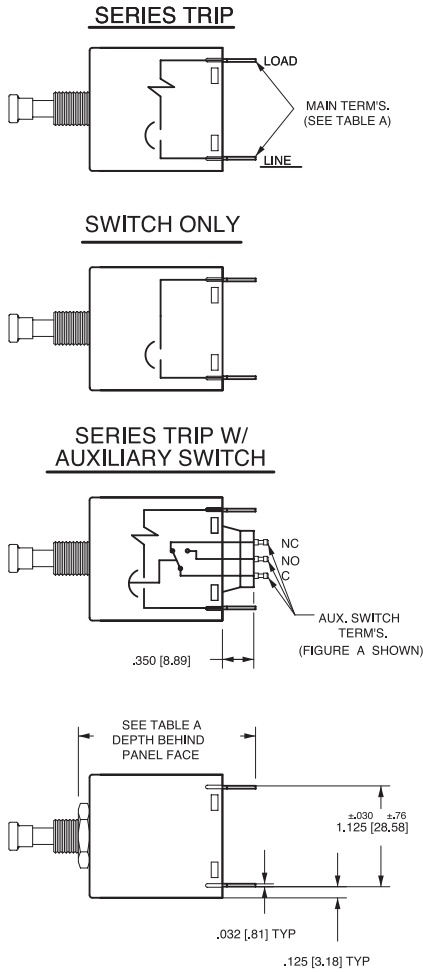


TABLE A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE *
MAIN	TAB (Q.C.)	1.952 [49.57]
	SCREW (#8-32)	1.992 [50.60]
	PUSH-IN STUD	2.582 [65.58]
AUX. ** SWITCH	DOUBLE SOLDER TURRET TYPE	2.097 [53.26]
	ROUND Q.C TYPE	2.087 [53.01]
	FLAT QUICK-CONNECT	2.191 [55.65]
	FLAT SOLDER LUG	2.074 [52.68]

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

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

MULTI-POLE IDENTIFICATION SCHEME

SOLDER TURRET AND ROUND QC AUX SWITCH TERMINALS

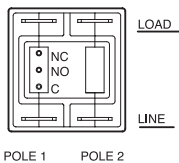


FIG. A

FLAT QC AND SOLDER LUG AUX SWITCH TERMINALS

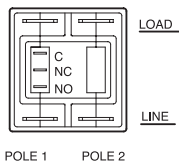
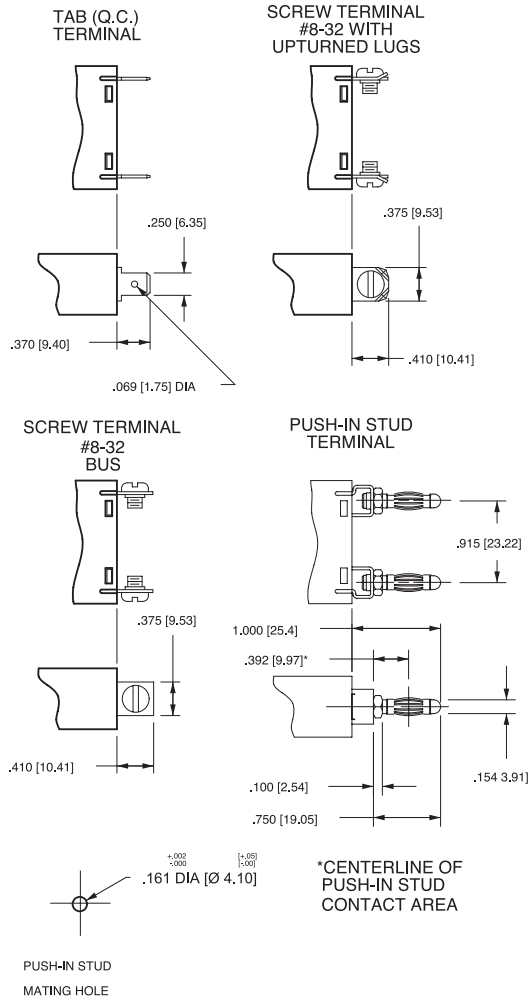


FIG. B

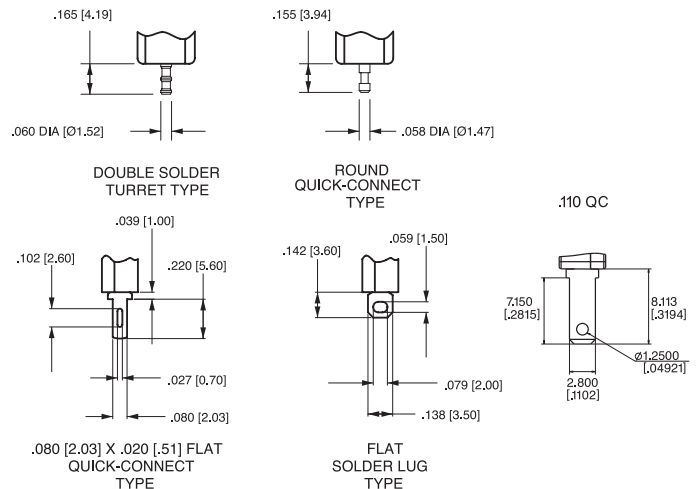
Notes:

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

TERMINAL DIMENSIONAL DETAIL

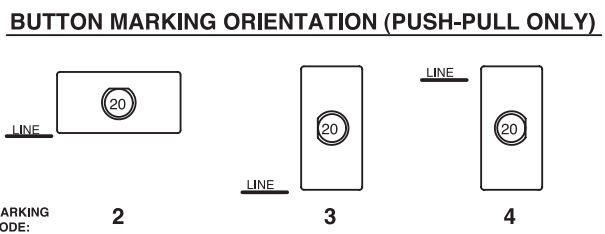
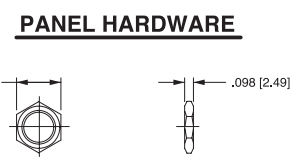
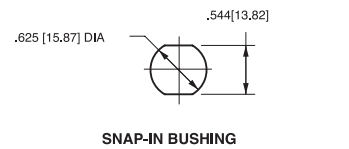
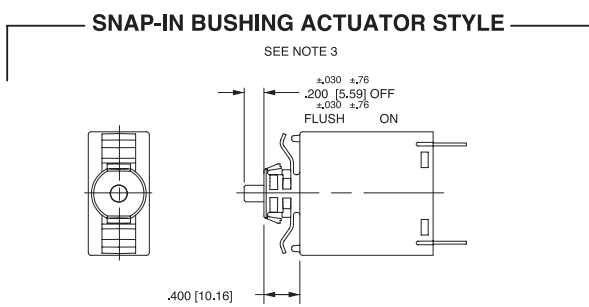
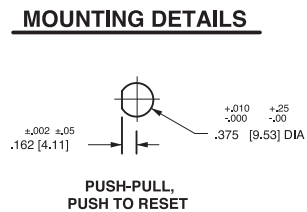
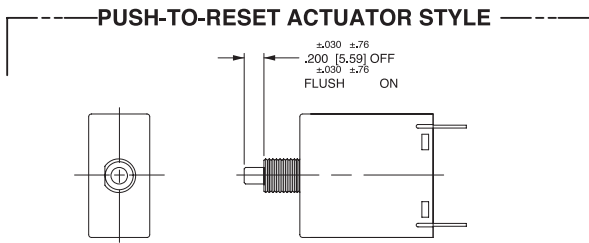
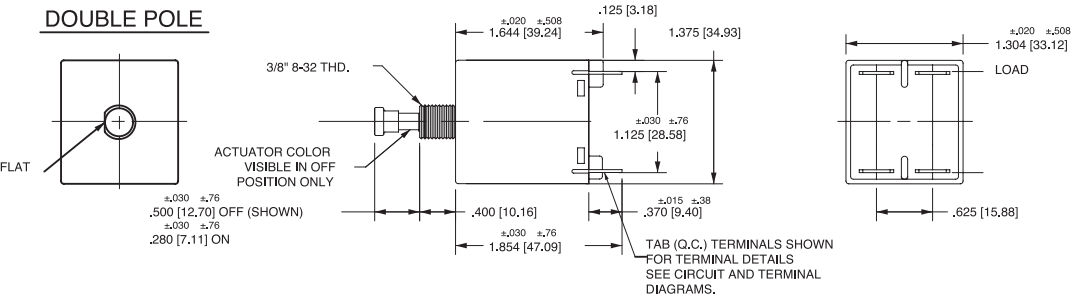
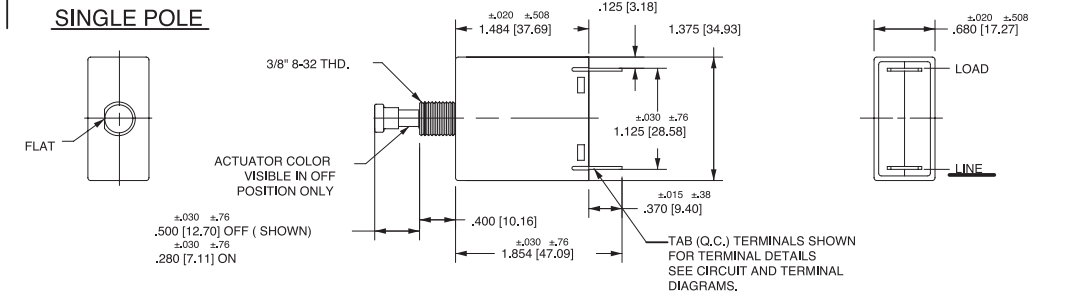


AUXILIARY SWITCH TERMINALS



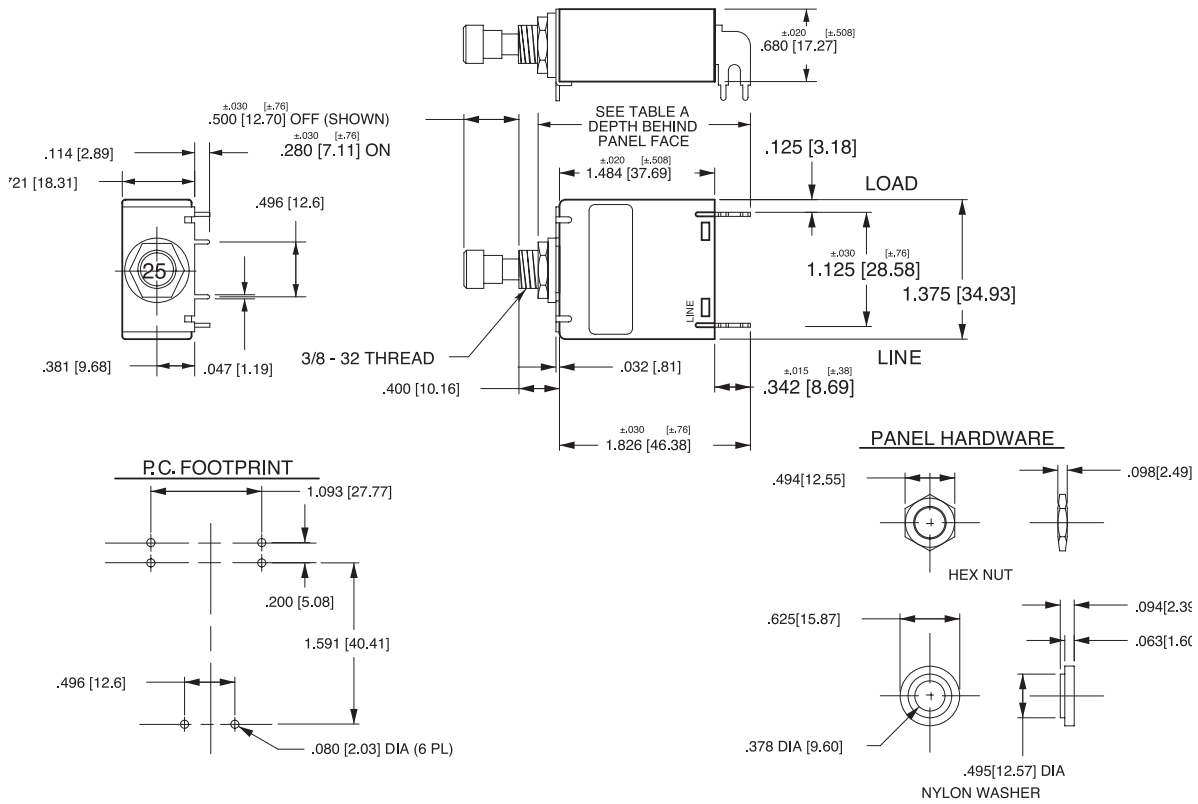
*AVAILABLE THROUGH SPECAL CATALOG PART NUMBER

PUSH-PULL ACTUATOR STYLE

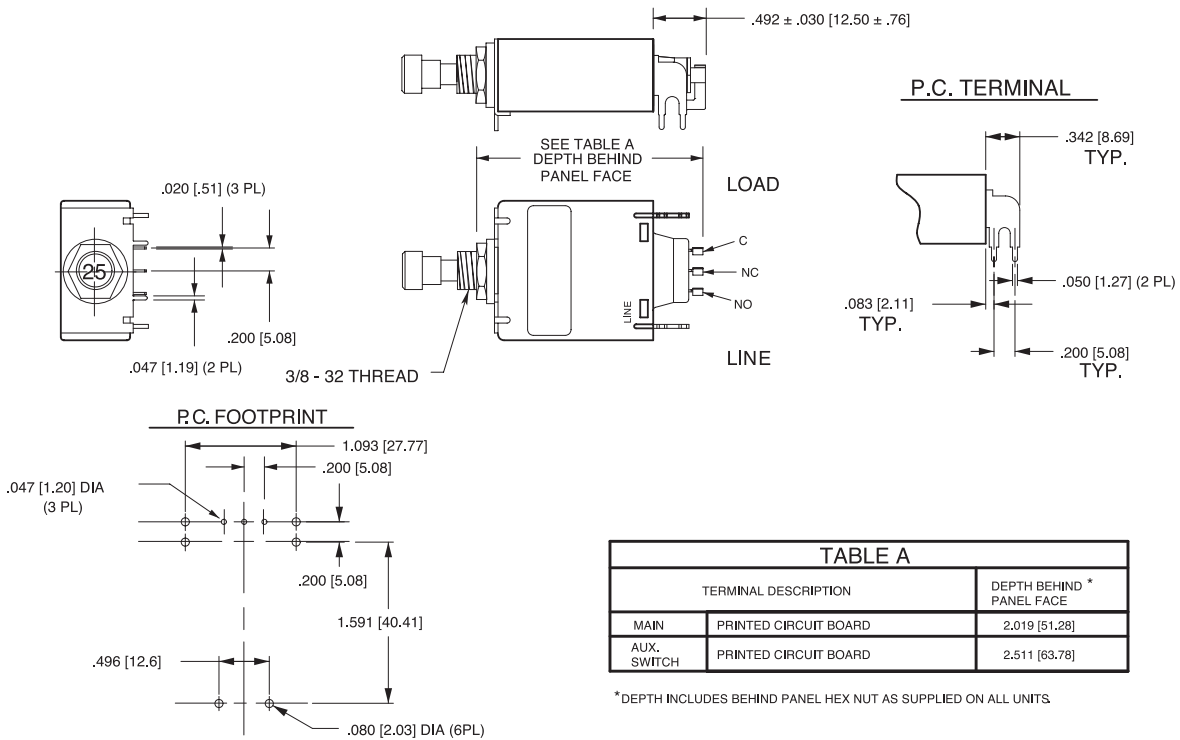


- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.20 [.51] unless otherwise specified.
 - 3 Available with Push-Pull or Push-to-Reset Actuators

PUSH-PULLTYPE SHOWN WITHOUT AUX. SWITCH



PUSH-PULL TYPE SHOWN WITH AUX. SWITCH



Notes:

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

M-Series Rocker UL Recognized – Ordering Scheme



1 SERIES

2 ACTUATOR¹

Non-Illuminated single color

Two Color illuminated single color

A Angled	D Indicate ON	F Angled
B Flat	E Indicate OFF	G Flat

ROCKER STYLE DESCRIPTION (SEE LEGEND TABLE)

STYLE	ROCKERS "ON" (SEE LEGEND TABLE)	ROCKERS "OFF" (SEE LEGEND TABLE)	ANGLE
VERTICAL			LINE
HORIZONTAL			LINE

3 POLES

4 CIRCUIT²

without Auxiliary Switch

with Auxiliary Switch, Silver Contacts

Terminal Type:

A Switch Only (no coil) , Maintained Contacts	M Series Trip (Current) Aux Switch	P³ Switch Only, Maintained Contacts	Q^{3,4} Switch Only, Maintained Contacts	R^{3,16} Switch Only, Maintained Contacts	S³ Series Trip (Current)	T^{3,4} Series Trip (Current)	U^{3,16} Series Trip, Maintained Contacts
B Series Trip (Current)	P³ Switch Only, Maintained Contacts	Q^{3,4} Switch Only, Maintained Contacts	R^{3,16} Switch Only, Maintained Contacts	S³ Series Trip (Current)	T^{3,4} Series Trip (Current)	U^{3,16} Series Trip, Maintained Contacts	
M Series Trip (Current) Aux Switch	Q^{3,4} Switch Only, Maintained Contacts	R^{3,16} Switch Only, Maintained Contacts	S³ Series Trip (Current)	T^{3,4} Series Trip (Current)	U^{3,16} Series Trip, Maintained Contacts		
P³ Switch Only, Maintained Contacts	S³ Series Trip (Current)	T^{3,4} Series Trip (Current)	U^{3,16} Series Trip, Maintained Contacts				
Q^{3,4} Switch Only, Maintained Contacts							
R^{3,16} Switch Only, Maintained Contacts							
S³ Series Trip (Current)							
T^{3,4} Series Trip (Current)							
U^{3,16} Series Trip, Maintained Contacts							

5 FREQUENCY & DELAY

VOLTAGE	FULL LOAD AMP RATING	GENERAL PURPOSE AMP RATING	TUNGSTEN LAMP RATING	POLES BREAKING
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	74	DC, Medium, Hi-Inrush		
22 50/60Hz Short	92	DC, 50/60Hz Short, Hi-Inrush		
24 50/60Hz Medium	94	DC, 50/60Hz Medium, Hi-Inrush		
30 DC, 50/60Hz Instantaneous				

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

6 CURRENT RATING (AMPERES)

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

7 TERMINAL

8 ROCKER ILLUMINATION

Non-Illuminated

Neon⁵

LED^{7,8}

without resistor, 120VAC/250VAC

with resistor, 4-8 VDC

with resistor, 9-16 VDC

A Neon	C Green Glow ⁸
B Red	D Green
D without resistor	G Amber
E with resistor, 4-8 VDC	H K
F with resistor, 9-16 VDC	J L
	M M

9 ACTUATOR & LEGEND COLOR

Solid Color

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

Visi-Rocker⁶

Visi & Legend (remainder of rocker same color as bezel)

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

Illuminated⁸

A	Clear	Legend White
B	Red Transparent	White
C	Green Transparent	White
D	Amber Transparent	White
E	Smoke Gray Transparent	White
F	White Translucent	Black

10 LEGEND¹¹

11 BEZEL COLOR / STYLE⁹

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

12 AGENCY APPROVAL¹⁰

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



1 SERIES
M

2 ACTUATOR¹

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 (SEE LEGEND FOR FULL DESCRIPTION)

STYLE	ANGLED, ON	ANGLED, OFF	FLAT, ON	FLAT, OFF
VERTICAL				
HORIZONTAL				

3 POLES
1 One

4 CIRCUIT²

without Auxiliary Switch
B Series Trip (Current)

with Auxiliary Switch, Silver Contacts
M Series Trip (Current) Aux Switch
S Series Trip (Current)
T³ Series Trip (Current)
U^{3,13} Series Trip, Maintained Contacts

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

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

5 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)⁸

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

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

7 TERMINAL⁹

1 Push-On 0.250 Tab (Q.C.)	A¹¹ Push-In Stud
2 Screw 8-32 w/upturned lugs	P¹² Printed Circuit Board
3 Screw 8-32 (Bus Type)	

8 ILLUMINATION

Non-illuminated Neon⁴

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

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-Rocker⁶	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	
Illuminated⁷	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 LEGEND¹⁰

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

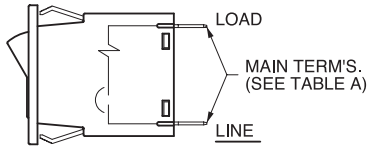
11 BEZEL COLOR / STYLE⁸

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

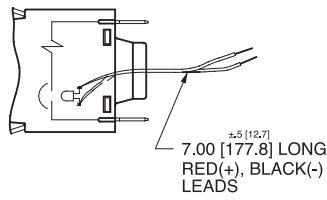
12 AGENCY APPROVAL⁹

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

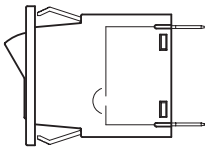
SERIES TRIP



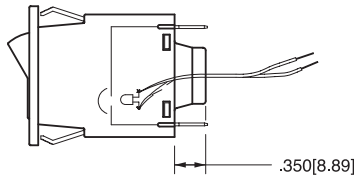
SERIES TRIP W/ ILLUMINATED ROCKER



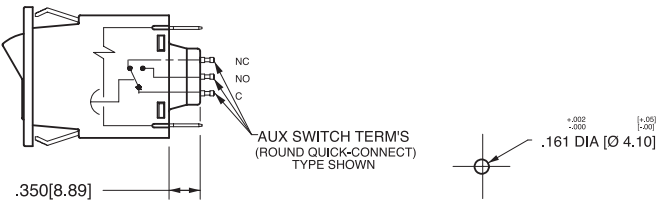
SWITCH ONLY



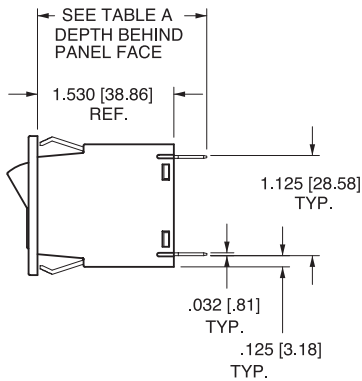
SWITCH ONLY W/ ILLUMINATED ROCKER



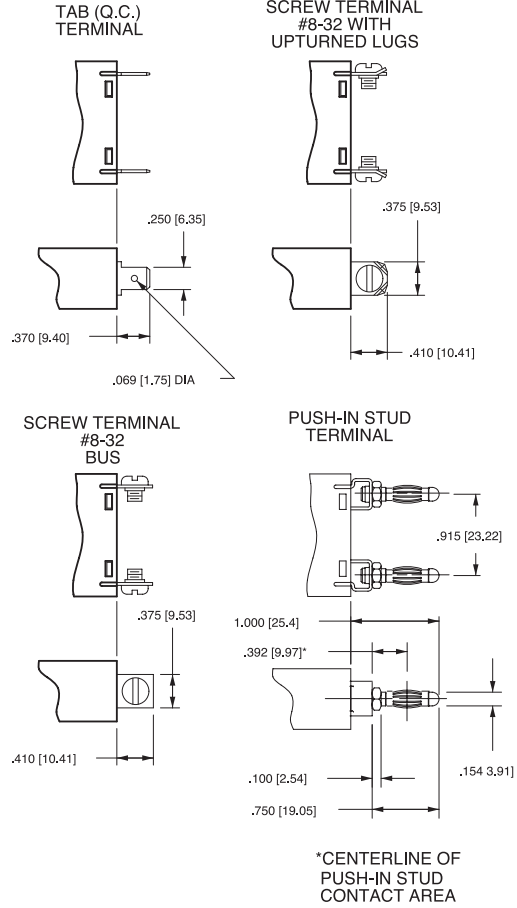
SERIES TRIP W/ AUXILIARY SWITCH



PUSH-IN STUD MATING HOLE

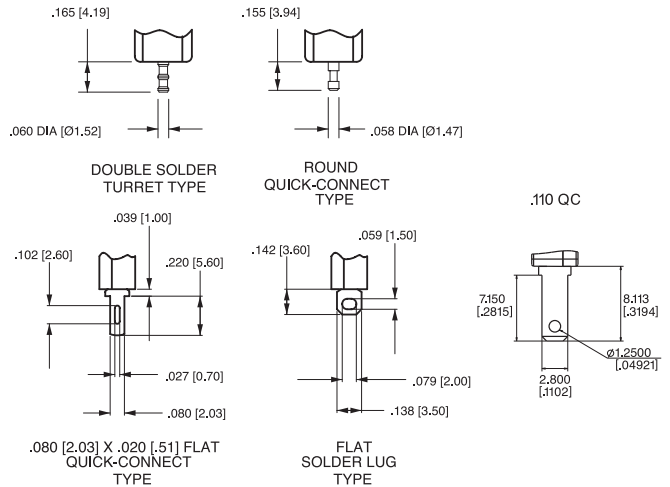


TERMINAL DIMENSIONAL DETAIL



*CENTERLINE OF PUSH-IN STUD CONTACT AREA

AUXILIARY SWITCH TERMINALS



*AVAILABLE THROUGH SPECIAL CATALOG PART NUMBER

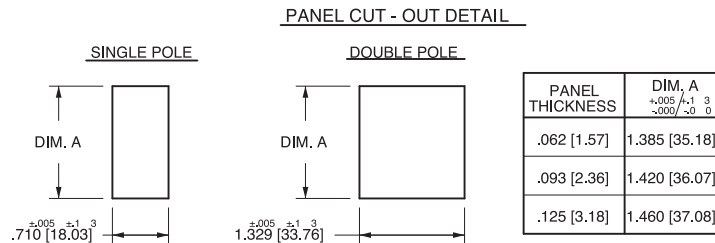
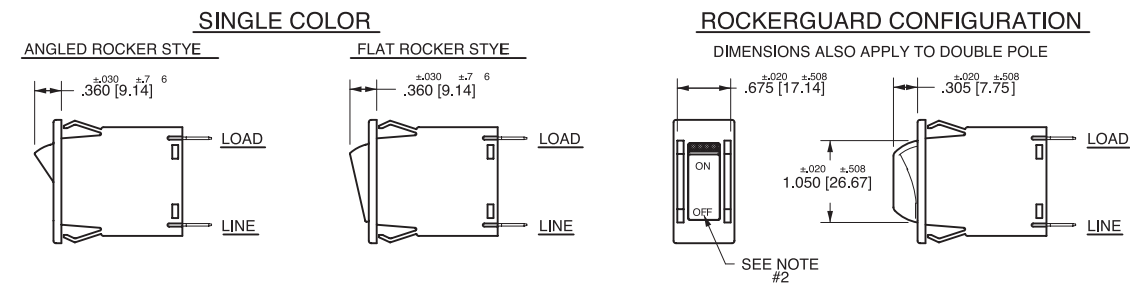
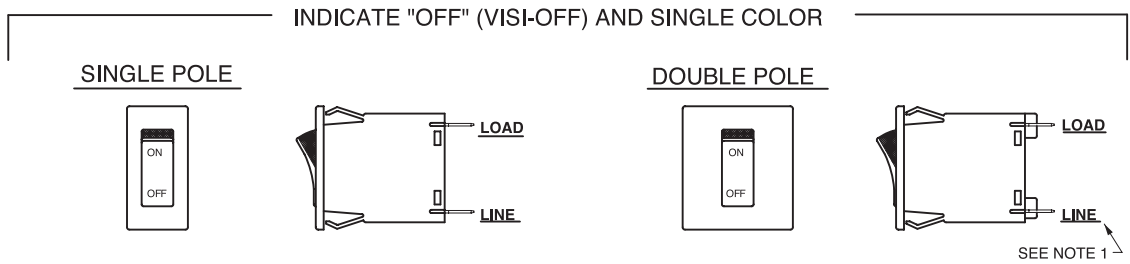
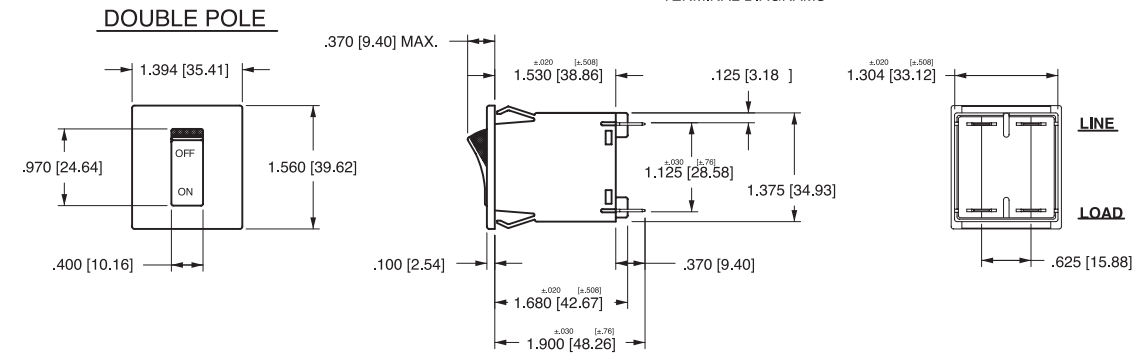
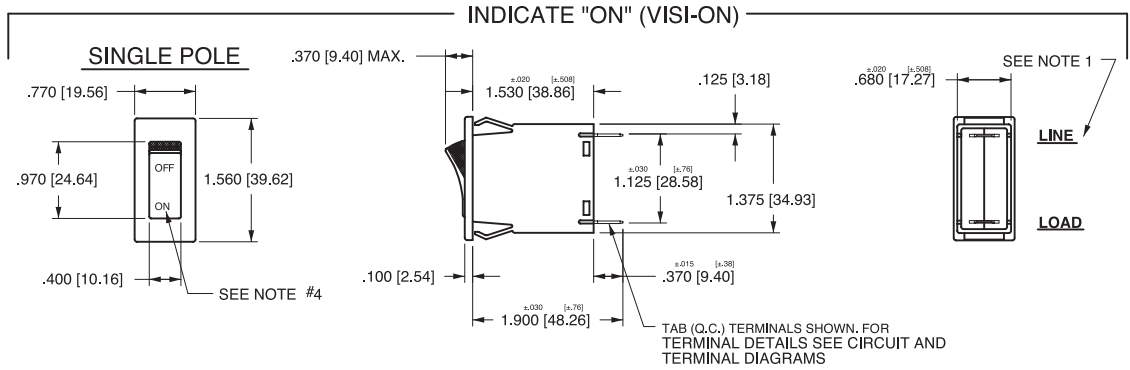
TABLE - A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE
MAIN	TAB (Q.C.)	1.900 [48.26]
	SCREW (#8-32)**	1.940 [49.28]
	PUSH-IN STUD	2.530 [64.26]
* AUX. SWITCH	DOUBLE SOLDER TURRET TYPE	2.045 [51.94]
	ROUND Q.C. TYPE	2.035 [51.69]
	FLAT QUICK CONNECT	2.139 [54.33]
	FLAT SOLDER LUG	2.022 [51.36]

* 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:

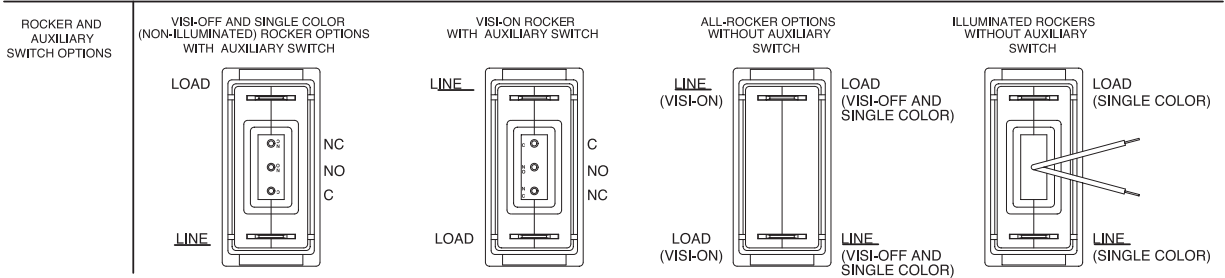
- All dimensions are in inches [millimeters].
- Tolerance ±.020 [.51] unless otherwise specified.
- Schematic shown represents current trip circuit.



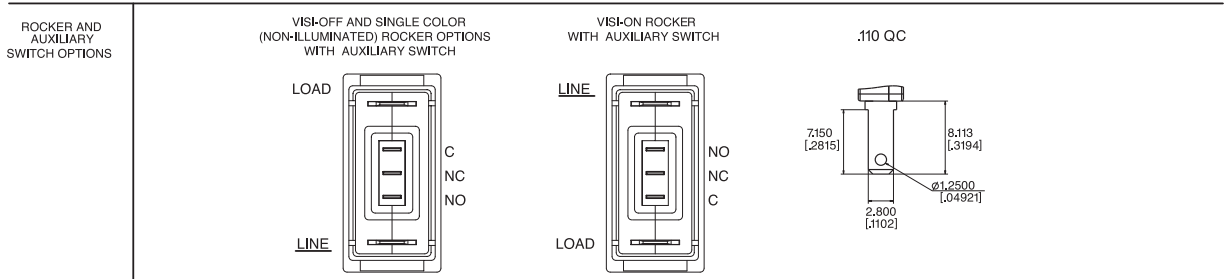
- Notes:
- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
 - 2 I-O, ON-OFF or dual legends available for vertical or horizontal mounting. For pole orientation with horizontal legend, rotate front view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

ONE POLE

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

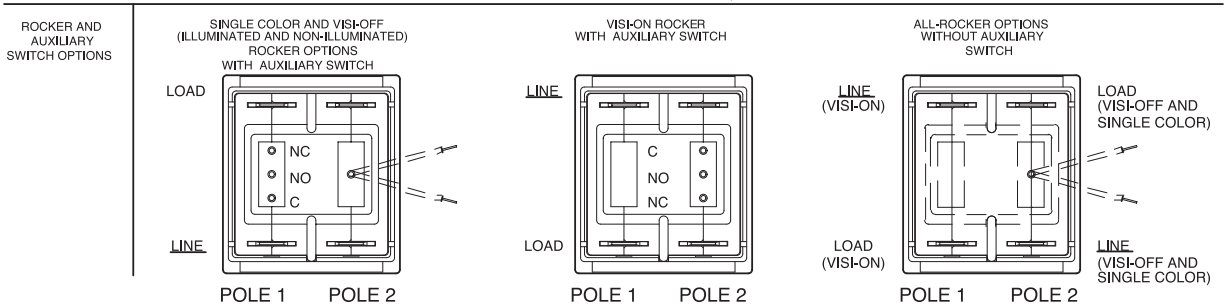


SINGLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX. SWITCH TERMINALS

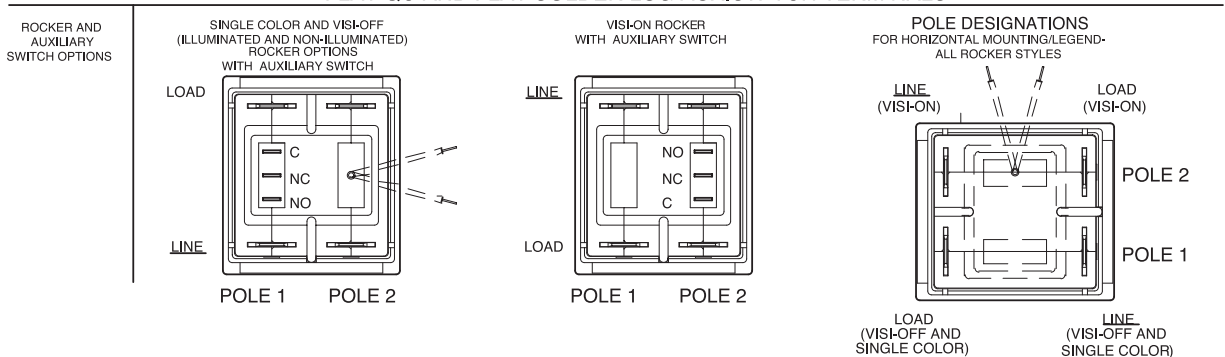


TWO POLE

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



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



MS-Series

CIRCUIT BREAKER

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

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

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



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

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

Typical Applications:

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

MS-Series

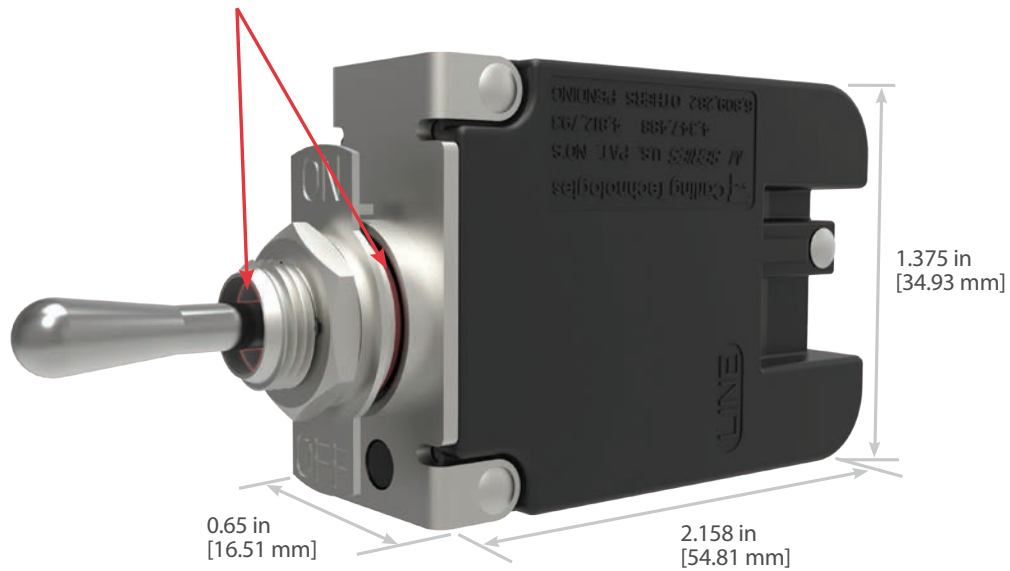
DESIGN FEATURES

SEALS

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

COMPACT SIZE

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

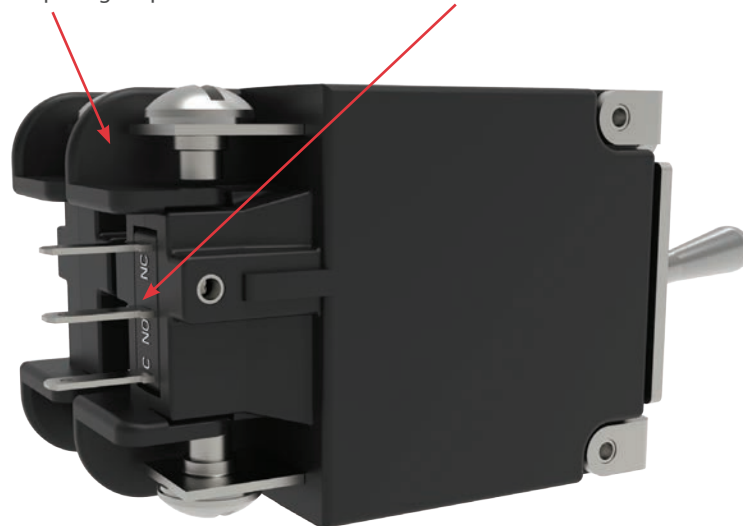


TERMINAL BARRIERS

Meet UL 1077 Spacing Requirements

OPTIONAL AUXILIARY SWITCH

Provides Breaker Status Indication



Electrical Tables

Table A: Lists UL & cUL Configuration & Performance Capabilities

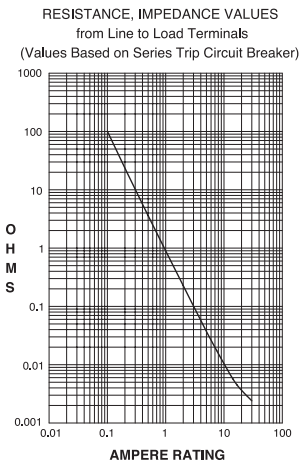
MS-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS							
Circuit Configuration	Voltage			Current Rating		Short Circuit Capacity (Amps) ¹	
	Max Rating	Frequency	Phase	General Purpose Amps	Poles Breaking	UL / cUL	
						U1	U3
Series	65	DC	---	0.02 - 30	1	3000	300
	240	50 / 60	1	0.02 - 30	1, 2	2000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

Notes:

- 1 Short Circuit Current Rating (SC) Codes — The short-circuit current rating, followed by a letter and number designating the test conditions and any calibration following the short-circuit test as defined below:
 - U - Indicates that the short circuit test was performed without a series fuse
 - 1 - Indicates that a re-calibration was not performed as part of the short circuit testing
 - 3 - Indicates that the protector has proven to be suitable for further use after the short circuit test
- Re-calibration, dielectric strength and voltage withstand tests were performed after the short circuit testing

Electrical

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




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

Physical

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

Agency Certifications

UL Standard 1077

 CUL Standard C22.2

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

Mechanical

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

Environmental

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



1 SERIES
M

2 ACTUATOR
S Sealed Toggle

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

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

5 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)

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

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

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

8 ACTUATOR & MARKING COLOR
1 Dull Metallic

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

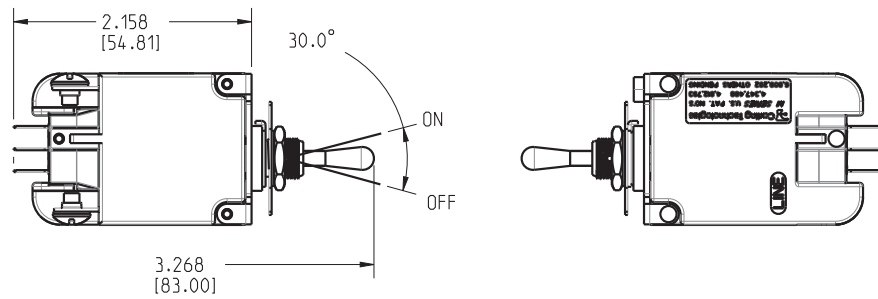
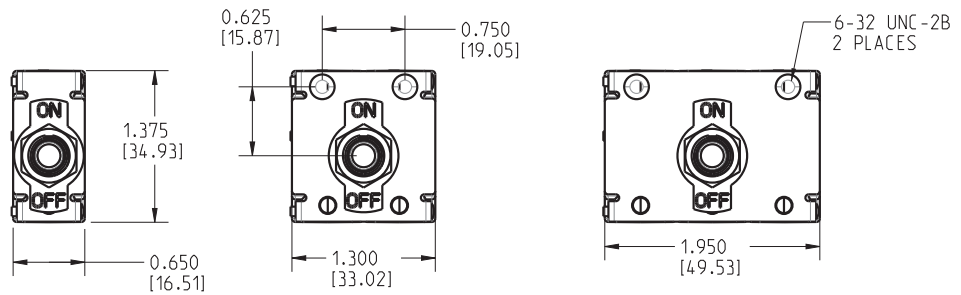
10 LEGEND PLATE
A No Legend Plate
B On-Off Vertical
C On-Off Horizontal
D I-O Vertical
E I-O Horizontal
F Dual Vertical
G Dual Horizontal

11 BUSHING COLOR
A Nickel Plated / Multipole Version

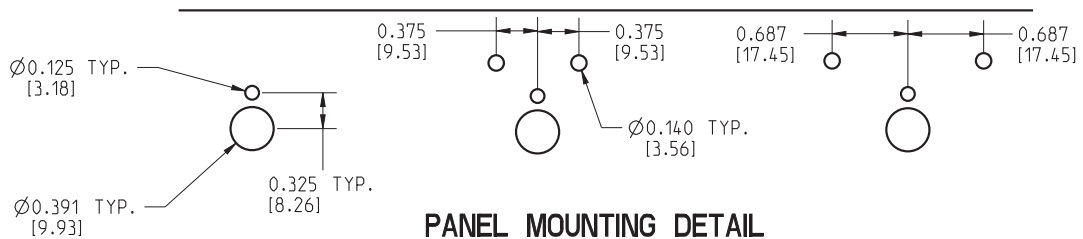
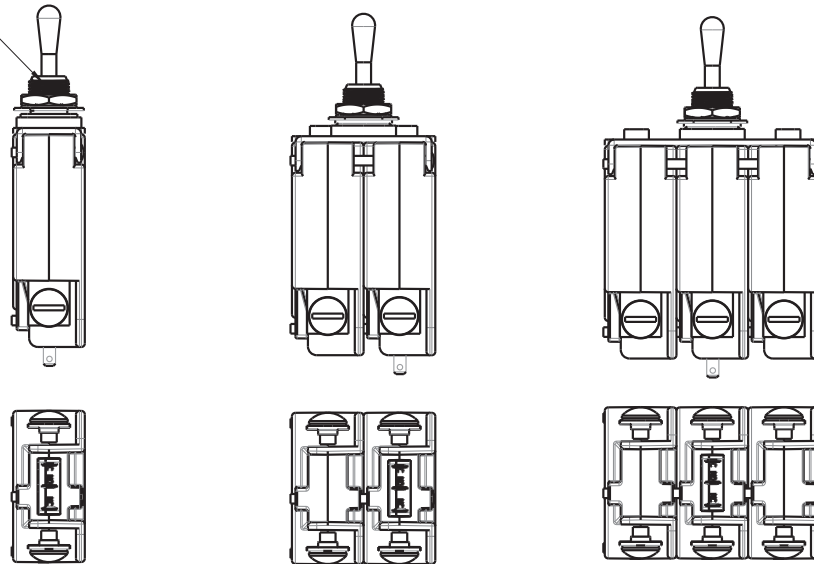
12 VOLTAGE CODE
0A 65 VDC
0D 240 VAC
0C 120/240 VAC³
0N 65 VDC / 120/240 VAC³
17 65 VDC / 240 VAC

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

Form & Fit



.375-32 UNEF-2A THREAD



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

H-Series

CIRCUIT BREAKER

The H-Series hydraulic-magnetic circuit breaker provides dependable circuit protection in a low cost, compact package. By meeting the IEC spacing requirements, the H-Series is the ideal choice for international market applications. It also features a “trip-free” mechanism, which will open the contacts when a fault condition occurs, even if the handle is held in the ON position. Although a low cost option, the H-Series was designed for maximum performance and reliable equipment protection meeting Carling’s stringent quality standards.



Product Highlights:

- ◆ Choice of actuator styles
- ◆ UL1077, CCC, CSA, C22.2 and EN60934 approvals
- ◆ Compact size
- ◆ Temperature stable operation -40°C to 80°C
- ◆ Choice of terminals, including PCB
- ◆ Single or multi-pole configurations

Typical Applications:

- ◆ Telecom/Datacom
- ◆ Marine

Electrical Tables

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

H SERIES - COMPONENT SUPPLEMENTARY PROTECTOR											
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT		MINIMUM POLES	SHORT CIRCUIT CAPACITY (AMPS)			APPLICATION CODES	
	MAX RATING	FREQ.	PHASE	FULL LOAD	UL		CSA	TUV	UL	CSA	
					WITHOUT BACKUP FUSE		WITHOUT BACKUP FUSE	WITHOUT BACKUP FUSE			
SERIES	65	DC	--	1 - 32	1	3000	3000	1500(PC1)	TC1, OL1, U1	TC1, OL1, U1	
	65	DC	--	1 - 32	1	---	500	---	---	TC1, OL1, U3	
	80	DC	--	1 - 25	1	1000	800	1000(PC1)	TC1, OL1, U1	TC1, OL1, U1	
	80 ¹	DC	--	26 - 32	1	1000	1000	1000(PC1)	TC1, OL1, U3	TC1, OL1, U3	
	250	50/60	1	1 - 32	1	1500	1500	1000(PC1)	TC1, OL1, U1	TC1, OL1, U1	
	250	50/60	1	1 - 32	2	1500	1500	1000(PC1)	TC1, OL1, U3	TC1, OL1, U3	
	250	50/60	3	1 - 32	3	1500	1500	1000(PC1)	TC1, OL0, U3	TC1, OL0, U3	

1 - Polarity Sensitive

Electrical

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

Typical Protector Resistance

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

Mechanical

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

Physical

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

Impedance Chart

Current rating in amperes	Series	
	DC-Ohms	50/60Hz-Ohms
1	0.85	0.87
2.5	0.13	0.15
5	0.035	0.036
7.5	0.018	0.019
10	0.01	0.011
15	0.006	0.0061
20	0.005	0.0051
25	0.003	0.0035
30	0.0025	0.0026

Agency Approvals

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

CCC certified, Certificate No. 2010010307447291

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

TUV certified to EN60934, Certificate No. R50204086

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

H – **A** **3** – **B** **0** – **24** – **450** – **1** **B** **1** – **D** **C**

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

1 SERIES

H

2 ACTUATOR¹

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

3 POLE²

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

4 CIRCUIT

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

5 AUXILIARY/ALARM SWITCH

0 w/o Aux Switch **3³** 0.110 Q.C. term w/ gold contacts
1³ 0.110 Q.C. term **4³** 0.110 PC term
2³ 0.110 Solder Lug

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)⁵

CODE	AMPERES		
410	1.000	440 4.000	490 9.000 615 15.000
512	1.250	445 4.500	495 9.500 616 16.000
415	1.500	450 5.000	610 10.000 617 17.000
517	1.750	455 5.500	710 10.500 618 18.000
420	2.000	460 6.000	611 11.000 620 20.000
522	2.250	465 6.500	711 11.500 622 22.000
425	2.500	470 7.000	612 12.000 624 24.000
527	2.750	475 7.500	712 12.500 625 25.000
430	3.000	480 8.000	613 13.000 630 30.000
435	3.500	485 8.500	614 14.000 632 32.000

VOLTAGE RATING

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

8 TERMINAL

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

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS

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

11 MAX. APPLICATION RATING

A 65DC **D** 250AC **M** 80DC⁶ **4** 80VDC/250VAC⁷

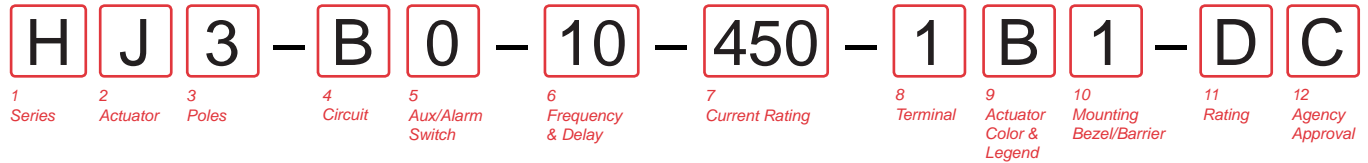
12 AGENCY APPROVAL

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

Notes:

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

H-Series Curved Rocker Actuator – Ordering Scheme



1 SERIES (VISI ROCKER)
H

2 ACTUATOR¹
J Vertical - Indicate OFF **K** Vertical - Indicate ON

3 POLE²
1 One **2** Two **3** Three

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

5 AUXILIARY/ALARM SWITCH
0 w/o Aux Switch **3³** 0.110 Q.C. term w/ gold contacts
1³ 0.110 Q.C. term **4³** 0.110 PC term
2³ 0.110 Solder Lug

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

7 CURRENT RATING (AMPERES)⁵

CODE	AMPERES	450	5,000	611	11,000	621	21,000
410	1.000	450	5,000	611	11,000	621	21,000
512	1.250	455	5,500	711	11,500	622	22,000
415	1.500	460	6,000	612	12,000	623	23,000
517	1.750	465	6,500	712	12,500	624	24,000
420	2.000	470	7,000	613	13,000	625	25,000
522	2.250	475	7,500	614	14,000	626	26,000
425	2.500	480	8,000	615	15,000	627	27,000
527	2.750	485	8,500	616	16,000	628	28,000
430	3.000	490	9,000	617	17,000	629	29,000
435	3.500	495	9,500	618	18,000	630	30,000
440	4.000	610	10,000	619	19,000	632	32,000
445	4.500	710	10,500	620	20,000		

VOLTAGE RATING

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

8 TERMINAL

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

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS⁶

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

11 MAX. APPLICATION RATING

A 65DC	D 250AC	M 80DC ⁷	4 80VDC/250VAC ⁸
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12 AGENCY APPROVAL

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

Notes:

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

H-Series Flat Rocker Actuator – Ordering Scheme

H **3** **3** - **B** **0** - **10** - **450** - **1** **B** **1** - **D** **C**

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

1 SERIES

H

2 ACTUATOR¹

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

3 POLE²

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

4 CIRCUIT

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

5 AUXILIARY/ALARM SWITCH

0 w/o Aux Switch **3³** 0.110 Q.C. term w/ gold contacts
1³ 0.110 Q.C. term **4³** 0.110 PC term
2³ 0.110 Solder Lug

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)⁵

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
410	1.000	450	5.000	611	11.000	621	21.000
512	1.250	455	5.500	711	11.500	622	22.000
415	1.500	460	6.000	612	12.000	623	23.000
517	1.750	465	6.500	712	12.500	624	24.000
420	2.000	470	7.000	613	13.000	625	25.000
522	2.250	475	7.500	614	14.000	626	26.000
425	2.500	480	8.000	615	15.000	627	27.000
527	2.750	485	8.500	616	16.000	628	28.000
430	3.000	490	9.000	617	17.000	629	29.000
435	3.500	495	9.500	618	18.000	630	30.000
440	4.000	610	10.000	619	19.000	632	32.000
445	4.500	710	10.500	620	20.000		

VOLTAGE RATING

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

8 TERMINAL

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

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS⁶

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

11 MAX. APPLICATION RATING

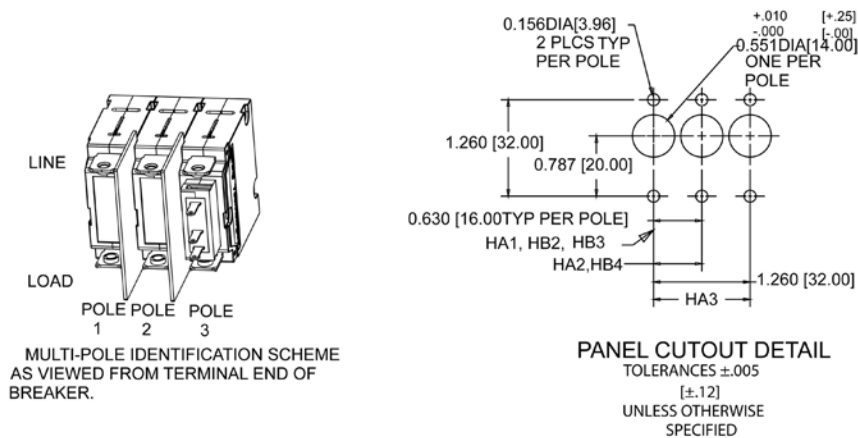
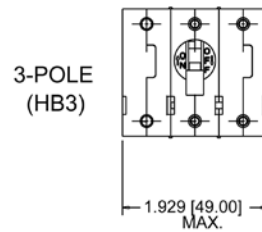
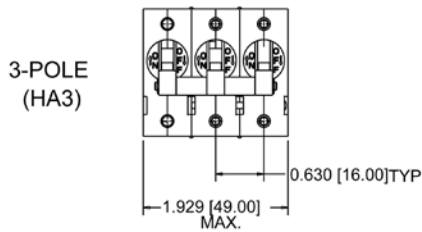
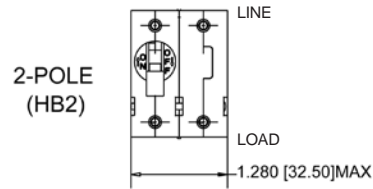
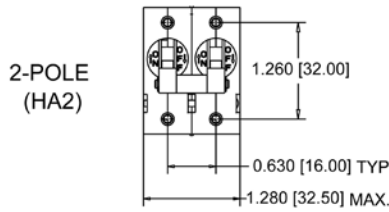
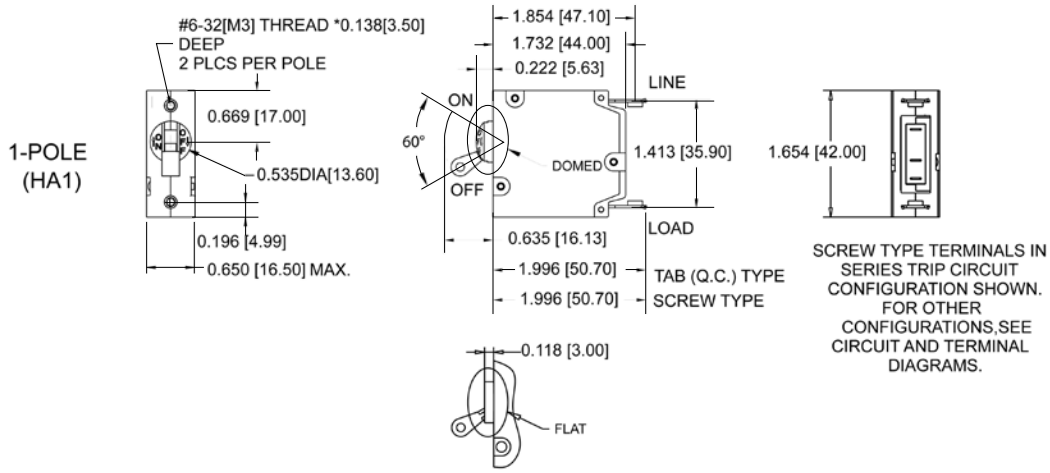
A 65DC
D 250AC
M 80DC⁷
4 80VDC/250VAC⁸

12 AGENCY APPROVAL

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

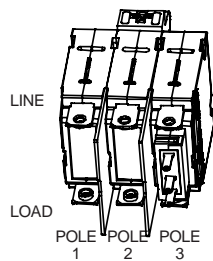
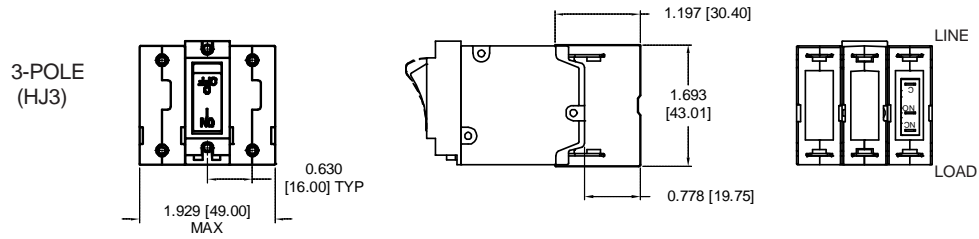
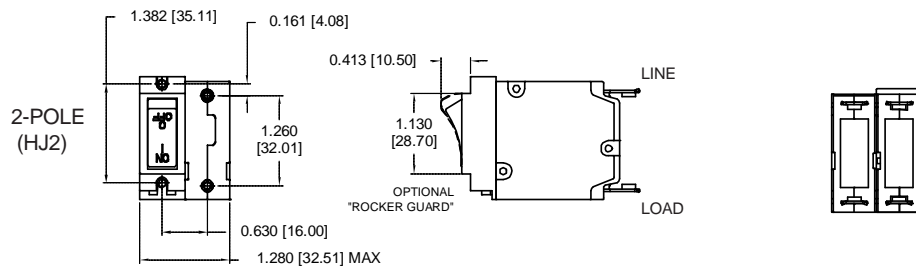
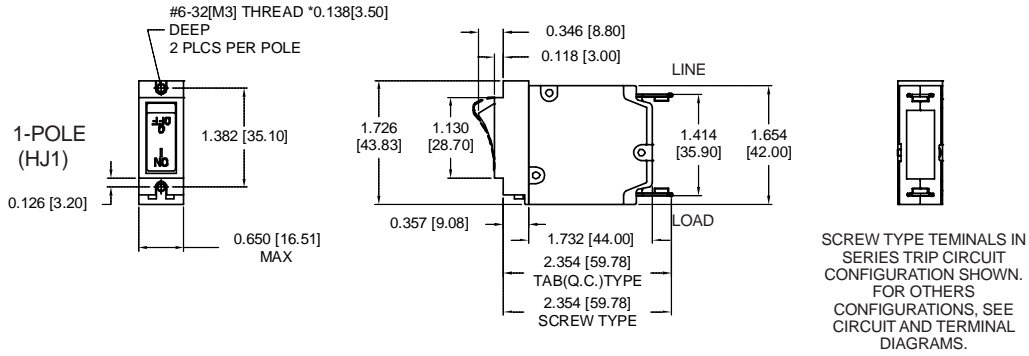
Notes:

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



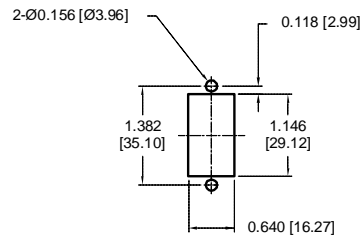
1. ALL DIMENSIONS ARE IN INCHES [millimeters].
2. TOLERANCE $\pm .020$ [.51] UNLESS OTHERWISE SPECIFIED.

H-Series – Dimensional Specifications: in. [mm] – Curved Rocker Actuator



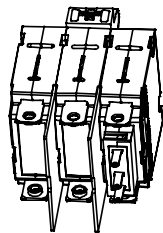
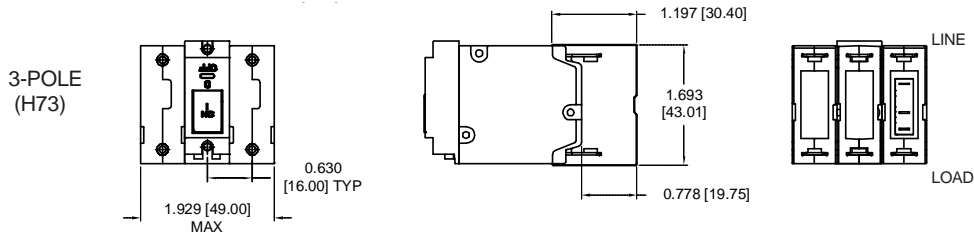
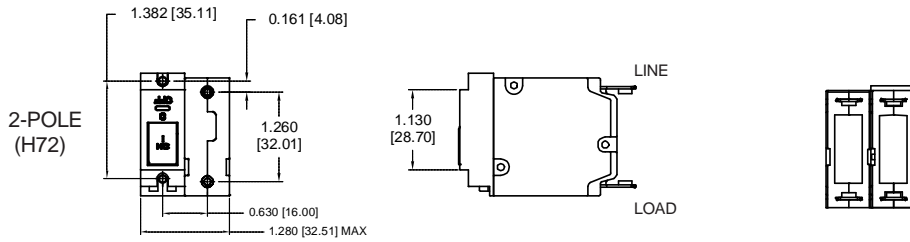
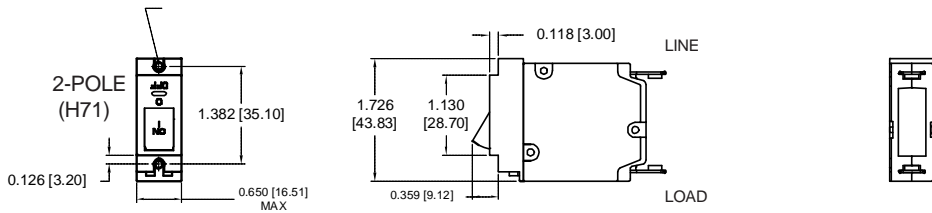
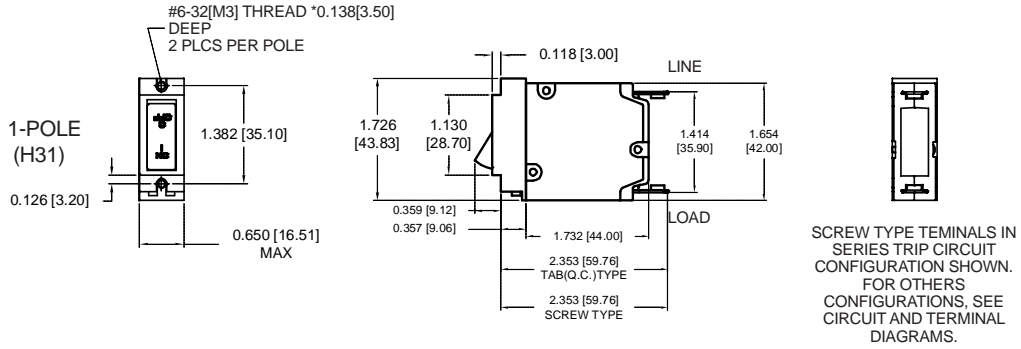
MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

- NOTES:
1. ALL DIMENSIONS ARE IN INCHES [mm]
 2. TOLERANCE ± 0.020 [.51] UNLESS OTHERWISE SPECIFIED.



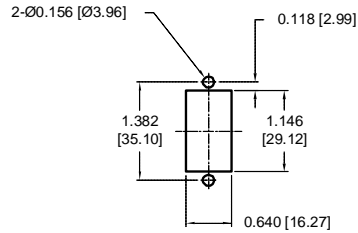
PANEL CUTOUT DETAIL TOLERANCE ± 0.005 [±.12] UNLESS OTHERWISE SPECIFIED

PUSH-TO-RESET ACTUATOR



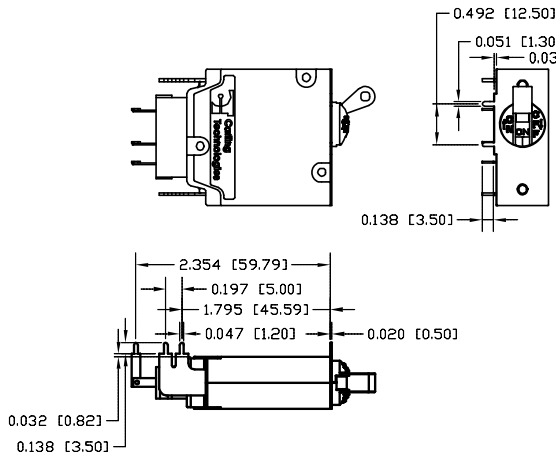
MULTI-POLE IDENTIFICATION SCHEME AS VIEWED FROM TERMINAL END OF BREAKER.

- NOTES:
1. ALL DIMENSIONS ARE IN INCHES [mm]
 2. TOLERANCE ± 0.020 [.51] UNLESS OTHERWISE SPECIFIED.

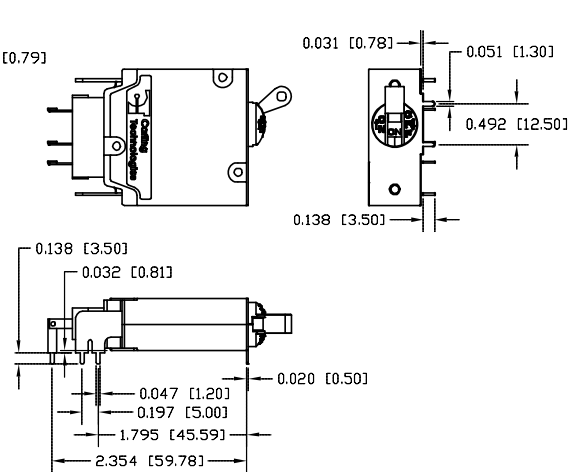


PANEL CUTOUT DETAIL
TOLERANCE ± 0.005 [±.12] UNLESS OTHERWISE SPECIFIED

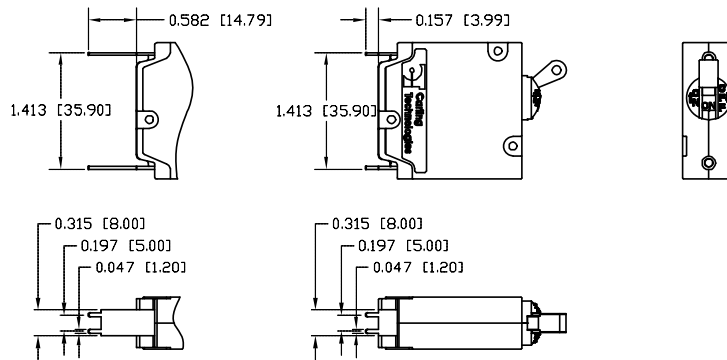
PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE R



PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE L

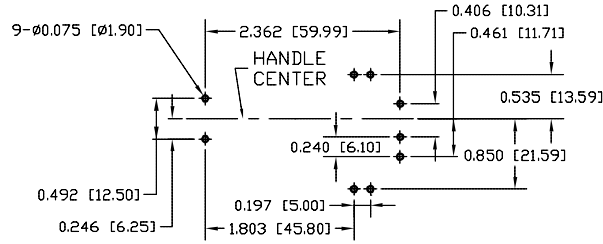


PRINTED CIRCUIT BOARD MOUNTING
TERMINAL CODE S & T

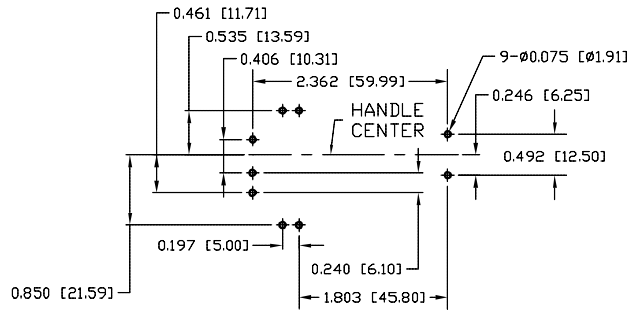


- NOTES:
1. ALL DIMENSIONS ARE IN INCHES [mm]
2. TOLERANCE ± 0.020 [0.51] UNLESS OTHERWISE SPECIFIED.

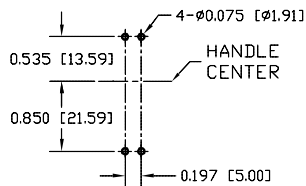
P.C. FOOT PRINT
FOR TERMINAL CODE R



P.C. FOOT PRINT
FOR TERMINAL CODE L

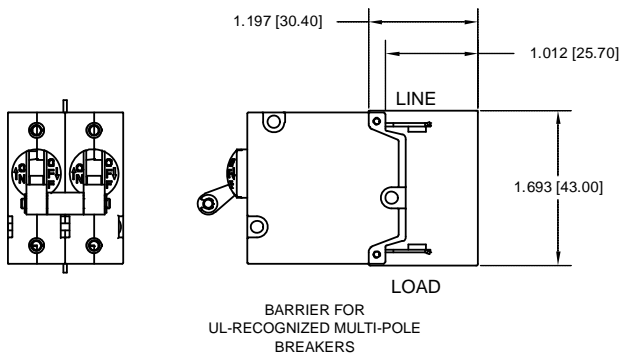
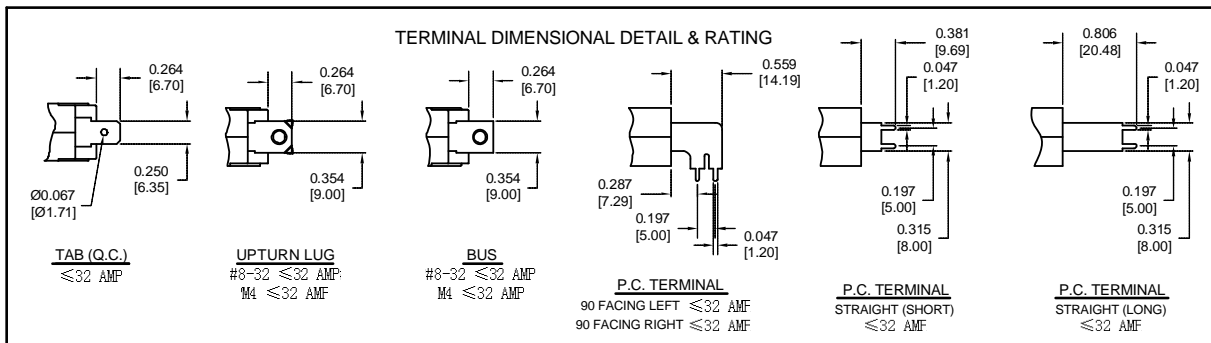


P.C. FOOT PRINT
FOR TERMINAL CODE S & T



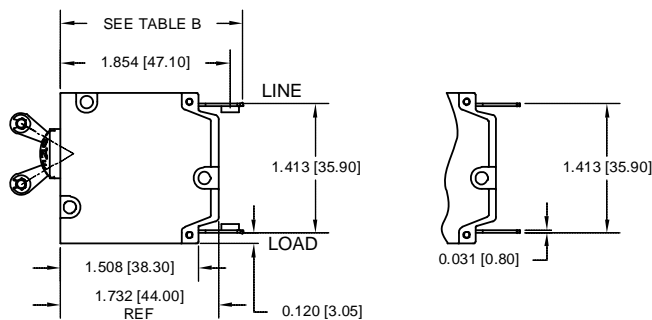
- NOTES:
 1. ALL DIMENSIONS ARE IN INCHES [mm]
 2. TOLERANCE ± 0.020 [.51] UNLESS OTHERWISE SPECIFIED.

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



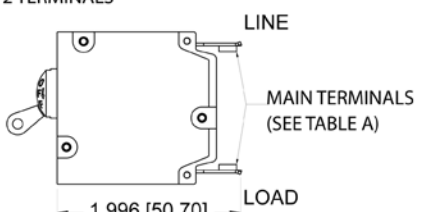
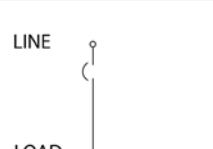
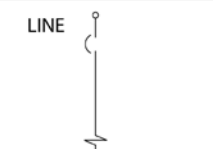
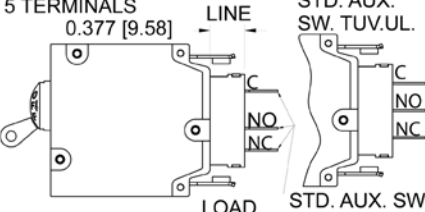
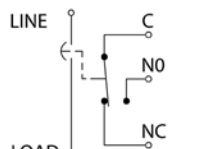
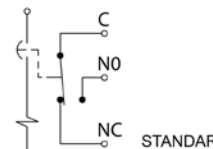
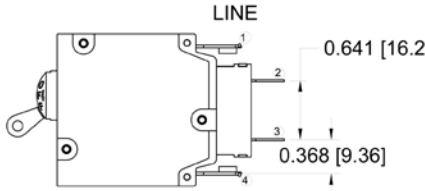
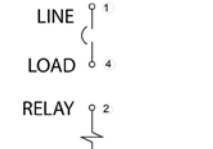
THREAD SIZE	TORQUE
#6-32 & M3 MOUNTING HARDWARE	7-9 IN-LBS [0.8-1.0 NM]
#8-32 & M4 THREAD TERMINAL SCREW	12-15 IN-LBS [1.4-1.7 NM]

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

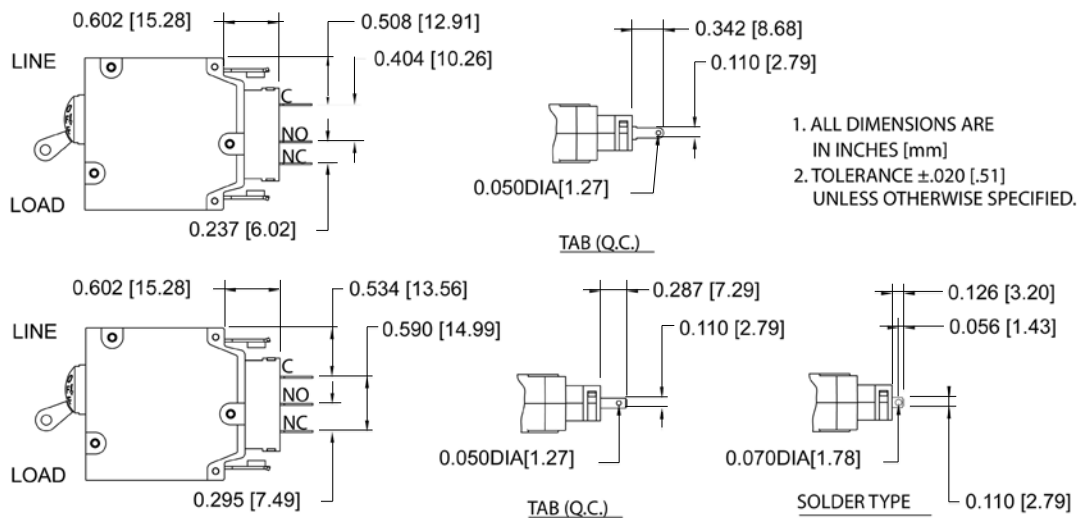


* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS.
WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.

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

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

AUXILIARY SWITCH TERMINAL DETAIL



A-Series

CIRCUIT BREAKER

Well known for their proven reliability, the A-Series hydraulic-magnetic circuit breakers are compact, temperature stable and designed for precision operation in OEM markets requiring general purpose as well as full load amp applications. The A-Series circuit breakers are offered with ratings from 0.02 to 50 amps, up to 277VAC or 80VDC and are available with several choices of pole configurations, time delays, terminals, with a wide range of standard colors, imprinting and actuator styles.

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



Product Highlights:

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

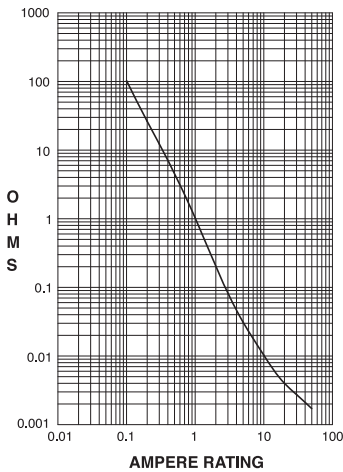
Typical Applications:

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

Electrical

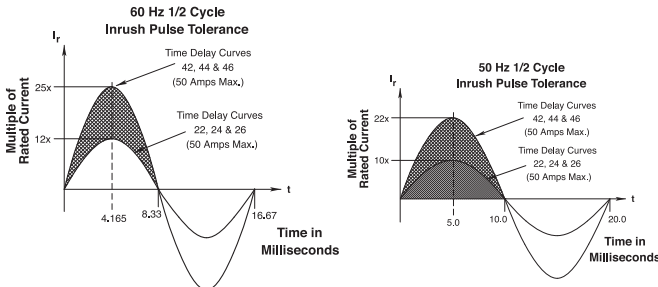
Maximum Voltage	277VAC 50/60 Hz, 80VDC
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 50.0. Other ratings available - consult ordering scheme.
Standard Voltage Coils	DC-6V, 12V; AC-120V, Other ratings available, consult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

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



CURRENT (AMPS)	TOLERANCE (%)
0.100 - 5.0	15%
5.1 - 20.0	25%
20.1 - 50.0	35%

Pulse Tolerance Curves



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

Mechanical

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

Physical

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

Environmental

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

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

Electrical Tables

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

A -SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA	
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE			
SERIES	32	DC	--	0.02 - 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	Handle
	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
				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	
				0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	3	0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1	
				0.02 - 30	---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1	
277	50 / 60	1	0.02 - 30	---	---	---	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	
				0.02 - 30	---	---	3000	TC1,2, OL1,U1	TC1,2, OL1,U1	
	250	50 / 60	3	0.02 - 30	---	5000 ²	---	TC1,2, OL1,C1	TC1,2, OL1,C1	
0.02 - 30				---	5000 ¹	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
277	50 / 60	1	0.02 - 30	---	---	---	TC1,2, OL1,C1	TC1,2, OL1,C1		
SWITCH ONLY	65	DC	--	0.02 - 50	---					
	80	DC	--	0.02 - 30	---					
				0.02 - 30	---					
	250	50 / 60	1	---	31 - 50					
0.02 - 50				---						
277	50 / 60	1	0.02 - 30	31 - 50						

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

Electrical Tables

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

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

Notes:

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

Electrical Tables

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

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

Notes:

- 1 Available with special catalog number only (consult factory).
- 2 2 pole protector required (with one per power line) for 125 / 250 VAC. 1 pole protector required for 125 VAC 1 phase power system

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

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

Notes:

- 1 Parallel Pole Construction

Agency Certifications

UL Recognized

UL Standard 1077



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

UL Standard 508



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

UL Standard 1500



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

UL Listed

UL Standard 489A



Communications Equipment (Guide CCN/DITT, File E189195)

CSA Accepted



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

TUV Certified

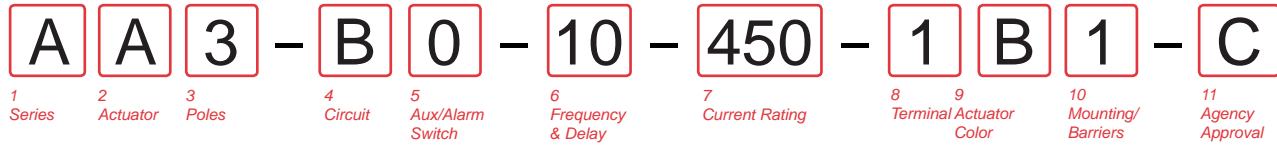


EN60934, under License No. R72040875

VDE Certified



EN60934, VDE 0642 under File No. 10537



1 SERIES

A

2 ACTUATOR¹

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

3 POLES

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

4 CIRCUIT

- A²** Switch Only (No Coil)
- B** Series Trip (Current)
- C** Series Trip (Voltage)
- D³** Shunt Trip (Current)
- E³** Shunt Trip (Voltage)
- F³** Relay Trip (Current)
- G³** 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 SWITCH⁵

- 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.
- 4** S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
- 5** S.P.S.T., 0.093 Q.C. Term. (Gold Contacts)
- 7** S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
- 8** S.P.S.T., 0.187 Q.C. Term.
- 9** S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only
- 10** DC Instantaneous
- 11** DC Ultra Short
- 12** DC Short
- 14** DC Medium
- 16** DC Long
- 20** 50/60Hz Instantaneous
- 21** 50/60Hz Ultra Short
- 22** 50/60Hz Short
- 24** 50/60Hz Medium
- 26** 50/60Hz Long
- 30** DC, 50/60Hz Instantaneous
- 31** DC, 50/60Hz Ultra Short
- 32** DC, 50/60Hz Short
- 34** DC, 50/60Hz Medium
- 36** DC, 50/60Hz Long
- 42⁷** 50/60Hz Short, Hi-Inrush
- 44⁷** 50/60Hz Medium, Hi-Inrush
- 46⁷** 50/60Hz Long, Hi-Inrush
- 52⁷** DC, Short, Hi-Inrush
- 54⁷** DC, Medium, Hi-Inrush
- 56⁷** DC, Long, Hi-Inrush

Notes:

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

7 CURRENT RATING (AMPERES)

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

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁶

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

8 TERMINAL⁹

- 1¹⁰** Push-On 0.250 Tab (Q.C.)
- 2** Screw 8-32 w/upturned lugs
- 3¹¹** Screw 8-32 (Bus Type)
- 4** Screw 10-32 w/upturned lugs and 30° bend
- 5¹¹** 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
- E¹¹** Screw M4 (Bus Type)
- F** Screw M5 w/upturned lugs and 30° bend
- G** Screw M5 (Bus Type) and 30° bend
- H¹¹** Screw M5 (Bus Type)
- L¹²** 0.250 Q.C./ Solder Lug
- M¹¹** M6 Threaded Stud
- Q¹⁴** Push-In Stud
- R** Screw M4 w/upturned lugs and 30° bend
- T¹¹** Screw M4 (Bus Type) and 30° bend
- P¹³** Printed Circuit Board Terminals
- S¹³** Push-On 0.110 Tab (Q.C.)

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS

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

11 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

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 ACTUATOR¹

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

3 POLES²

1 One	3 Three
2 Two	4 Four

4 CIRCUIT

B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH²

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.

6 FREQUENCY & DELAY

11 DC Ultra Short	52³ DC, Short, Hi-Inrush
12 DC Short	54³ DC, Medium, Hi-Inrush
14 DC Medium	56³ DC, Long, Hi-Inrush
16 DC Long	

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
210	0.100	285	0.850	455	5.500
215	0.150	290	0.900	460	6.000
220	0.200	295	0.950	465	6.500
225	0.250	410	1.000	470	7.000
230	0.300	512	1.250	475	7.500
235	0.350	415	1.500	480	8.000
240	0.400	517	1.750	485	8.500
245	0.450	420	2.000	490	9.000
250	0.500	522	2.250	495	9.500
255	0.550	527	2.750	610	10.000
260	0.600	430	3.000	710	10.500
265	0.650	435	3.500	611	11.000
270	0.700	440	4.000	711	11.500
275	0.750	445	4.500	612	12.000
280	0.800	450	5.000	712	12.500
				624	24.000
				625	25.000
				630	30.000
				635³	35.000
				640³	40.000
				645³	45.000
				650³	50.000

8 TERMINAL⁵

1⁶ 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
3⁷ 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
5⁷ Screw 10-32 (Bus Type)	H Screw M5 (Bus Type) and 30° bend
6 Screw 8-32 w/upturned lugs and 30° bend	M⁷ M6 Threaded Stud
7 Screw 8-32 (Bus Type) and 30° bend	P⁸ Printed Circuit Board Terminals
8 Screw 10-32 w/upturned lugs and 30° bend	Q⁹ Push-In Stud

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS

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

11 MAXIMUM APPLICATION RATING

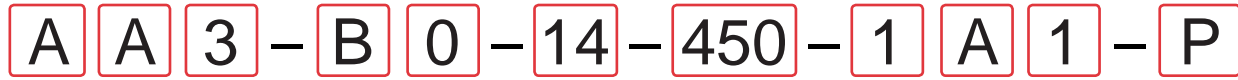
M 80 DC

12 AGENCY APPROVAL

T UL489A LISTED
K UL489A LISTED, VDE CERTIFIED
J UL489A LISTED, TUV CERTIFIED

Notes:

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



1 Series 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 ACTUATOR¹
A Handle, one per pole
B Handle, one per multi-pole unit
S Mid-Trip Handle, one per pole
T Mid-Trip Handle, one per pole & Alarm Switch

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

4 CIRCUIT
A² Switch Only (No Coil) B Series Trip (Current) C Series Trip (Voltage)
D³ Shunt Trip (Current) E³ Shunt Trip (Voltage) H^{3,4} Dual Coil with Shunt Trip Voltage Coil

5 AUXILIARY/ALARM SWITCH⁵
0 w/o Aux Switch 1 S.P.D.T., 0.110 Q.C. Term.
2 S.P.D.T., 0.110 Q.C. Term. 4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)

6 FREQUENCY & DELAY
03 DC 50/60Hz, Switch Only 10 DC Instantaneous 11 DC Ultra Short 12 DC Short 14 DC Medium 16 DC Long 20 50/60Hz Instantaneous 21 50/60Hz Ultra Short 22 50/60Hz Short 24 50/60Hz Medium 26 50/60Hz Long
30 DC, 50/60Hz Instantaneous 31 DC, 50/60Hz Ultra Short 32 DC, 50/60Hz Short 34 DC, 50/60Hz Medium 36 DC, 50/60Hz Long 42⁷ 50/60Hz Short, Hi-Inrush 44⁷ 50/60Hz Medium, Hi-Inrush 46⁷ 50/60Hz Long, Hi-Inrush 52⁷ DC, Short, Hi-Inrush 54⁷ DC, Medium, Hi-Inrush 56⁷ DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)
CODE AMPERES
210 0.100 285 0.850 455 5.500 613 13.000
215 0.150 290 0.900 460 6.000 614 14.000
220 0.200 295 0.950 465 6.500 615 15.000
225 0.250 410 1.000 470 7.000 616 16.000
230 0.300 512 1.250 475 7.500 617 17.000
235 0.350 415 1.500 480 8.000 618 18.000
240 0.400 517 1.750 485 8.500 620 20.000
245 0.450 420 2.000 490 9.000 622 22.000
250 0.500 522 2.250 495 9.500 624 24.000
255 0.550 527 2.750 610 10.000 625 25.000
260 0.600 430 3.000 710 10.500 630 30.000
265 0.650 435 3.500 611 11.000 635⁸ 35.000
270 0.700 440 4.000 711 11.500 640⁸ 40.000
275 0.750 445 4.500 612 12.000 645⁸ 45.000
280 0.800 450 5.000 712 12.500 650⁸ 50.000

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

8 TERMINAL⁹
1¹⁰ Push-On 0.250 Tab (Q.C.) 2 Screw 8-32 w/upturned lugs 3¹¹ Screw 8-32 (Bus Type) 4 Screw 10-32 w/upturned lugs 5¹¹ 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 E¹¹ Screw M4 (Bus Type) F Screw M5 w/upturned lugs and 30° bend G Screw M5 (Bus Type) and 30° bend H¹¹ Screw M5 (Bus Type) R Screw M4 w/upturned lugs and 30° bend T¹¹ Screw M4 (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 Insert, 2 per pole
1 6-32 x 0.195 inches no
A 6-32 x 0.195 inches yes
2 ISO M3 x 5mm no
B ISO M3 x 5mm (multipole only) yes
Front panel Snap-In, 0.75" wide bezel
5 without Handleguard no
6 without Handleguard (multipole only) yes
Front panel Snap-In, 0.96" wide bezel
7 without Handleguard, 1-pole 0.96" wide; multipole units have .105" bezel overhang on all sides no
8 without Handleguard, 1-pole 0.96" wide; (multipole only) .105" bezel overhang on all sides yes

11 AGENCY APPROVAL
P TUV Certified, UL Recognized & CSA Accepted
Q UL 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 auxiliary switch is supplied, mounted in the extreme right pole.
6 Separate pole type voltage coils not rated for continuous duty. Available only with delay codes 10, 20 & 30.
7 Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
8 Available up to two poles with AC or DC delays.
9 Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, G and H.
10 Terminal Code 1: TUV Certification up to 30 amps, but not recommended over 20 amps.
11 Terminal Codes 3, 5, 7, 9, E, G and H (Bus Type) are supplied with Lock Washers. These breakers are only TUV Certified when the washers are used.

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 ACTUATOR¹

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

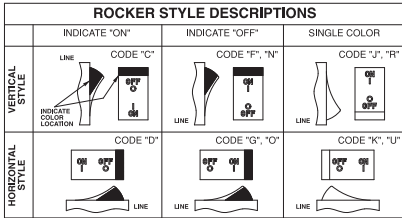
J Vertical legend
K Horizontal legend

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



3 POLES²

1 One 2 Two 3 Three

4 CIRCUIT

B Series Trip (Current)

5 AUXILIARY/ALARM SWITCH³

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.

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)

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

8 TERMINAL⁵

1⁶ Push-On 0.250 Tab (Q.C.)
2 Screw 8-32 w/upturned lugs
3⁷ Screw 8-32 (Bus Type)
4 Screw 10-32 w/upturned lugs
5⁷ 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)
M⁷ M6 Threaded Stud
P⁸ Printed Circuit Board Terminals
Q⁹ Push-In Stud

9 ACTUATOR COLOR & LEGEND

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

10 MOUNTING/BARRIERS¹¹

	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

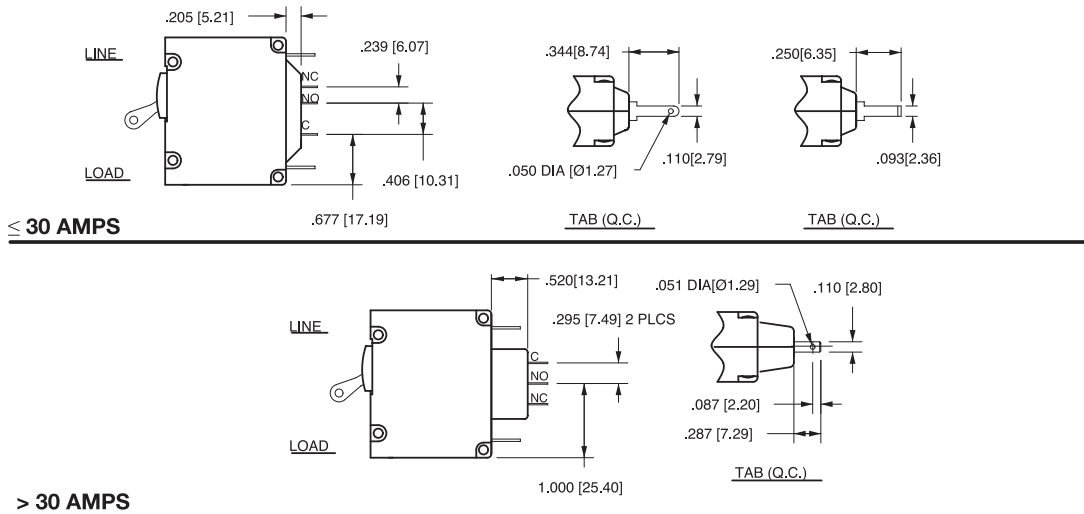
T UL489A LISTED
K UL489A LISTED, VDE CERTIFIED
J UL489A LISTED, TUV CERTIFIED

Notes:

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

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

AUXILIARY/ALARM SWITCH TERMINAL DETAIL



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

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

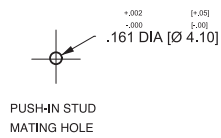
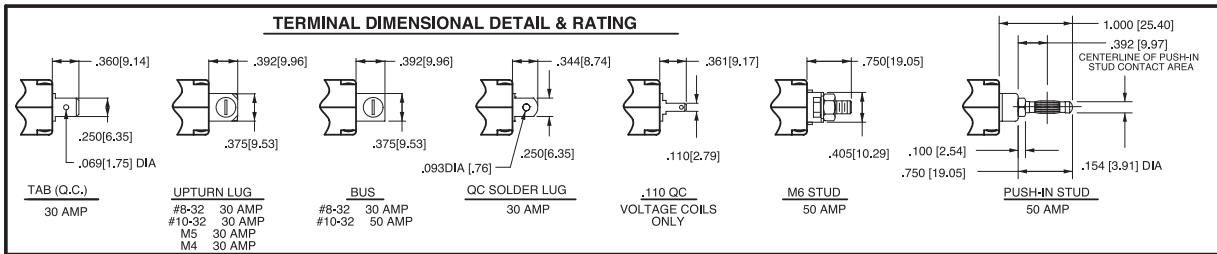


TABLE A TIGHTENING TORQUE SPECIFICATIONS

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

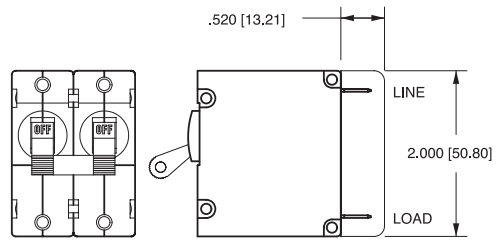
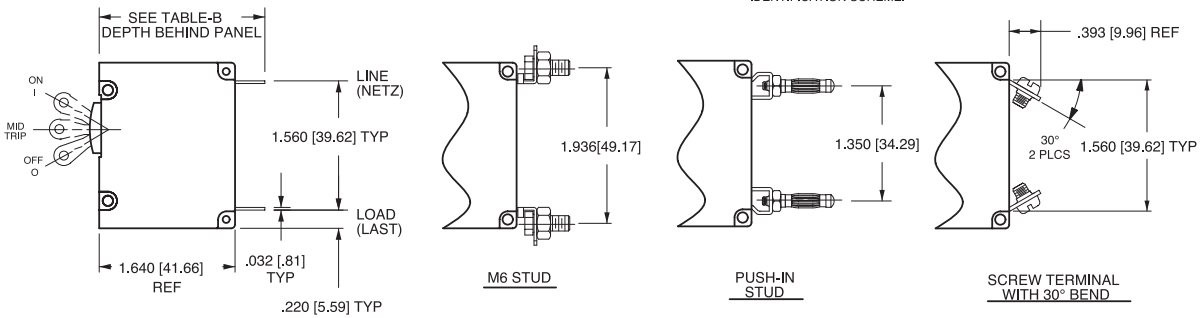


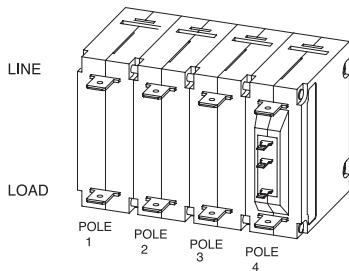
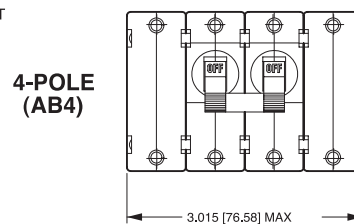
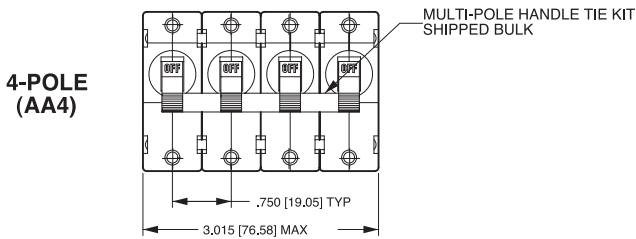
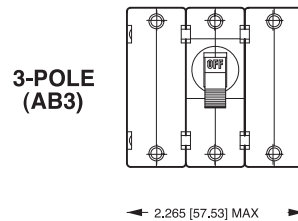
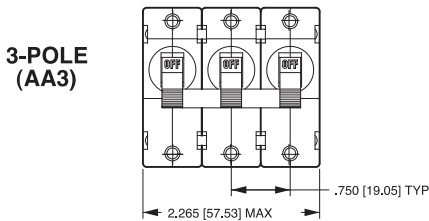
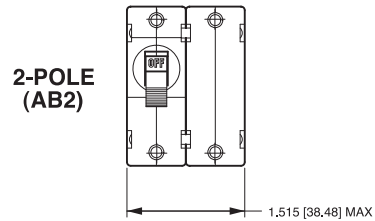
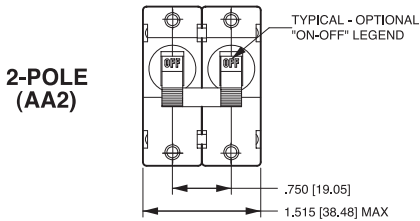
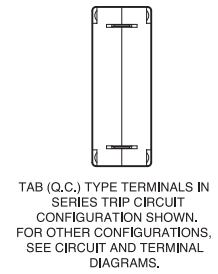
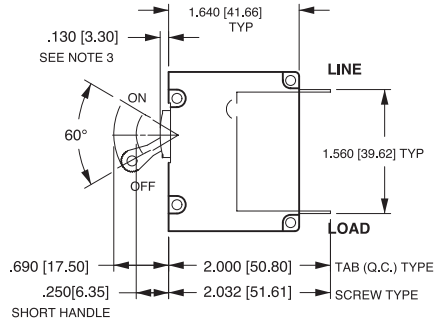
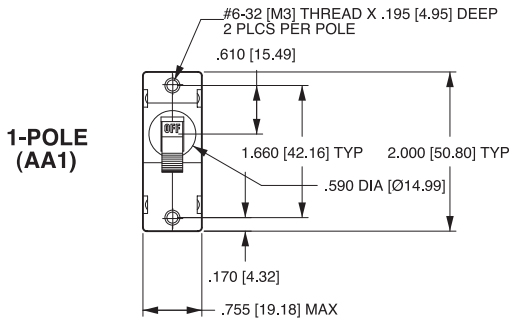
TABLE B

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

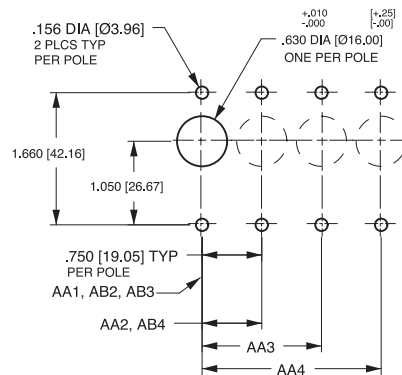
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.



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



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

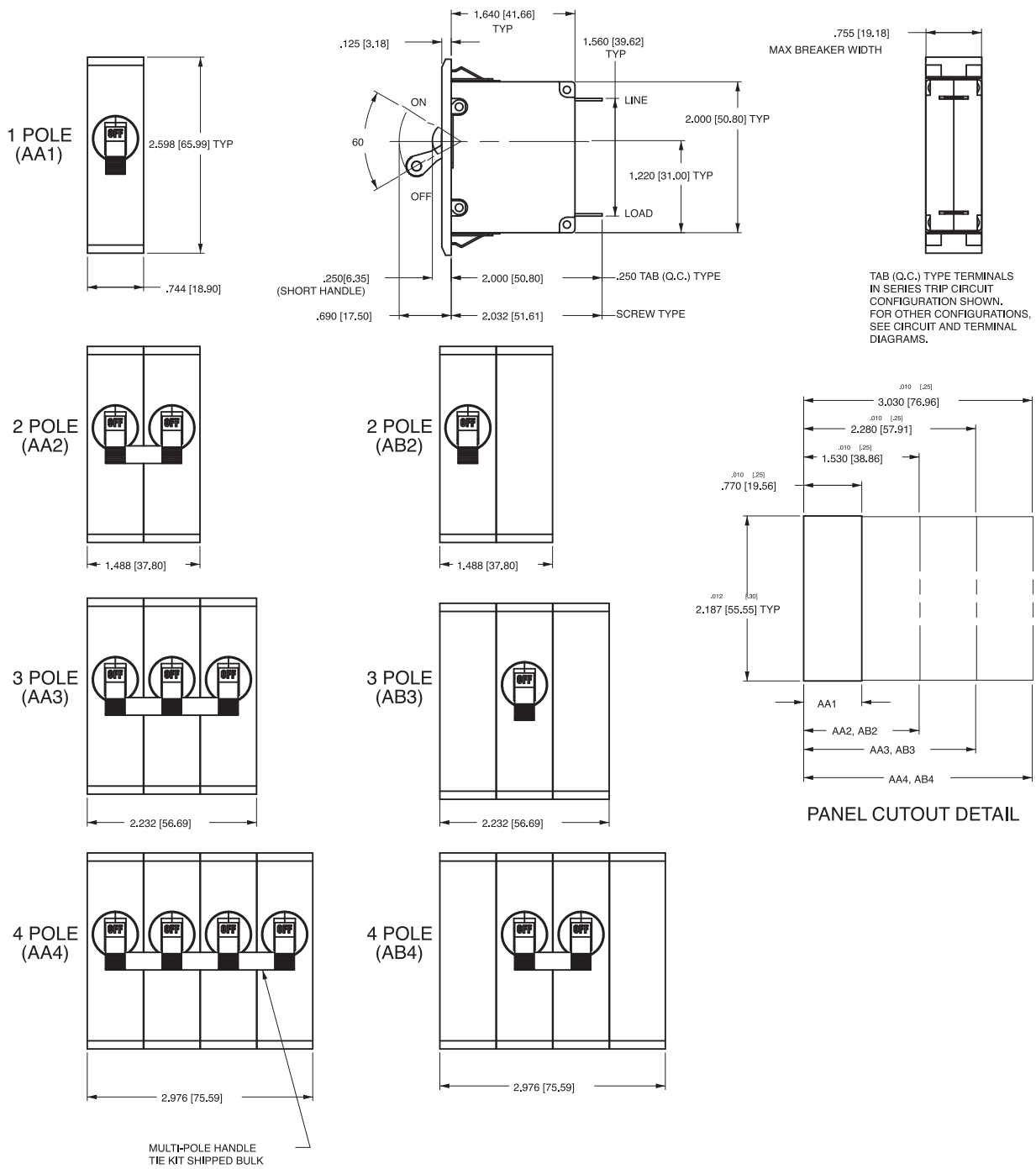


TOLERANCES ±.005 [-.12] UNLESS OTHERWISE SPECIFIED

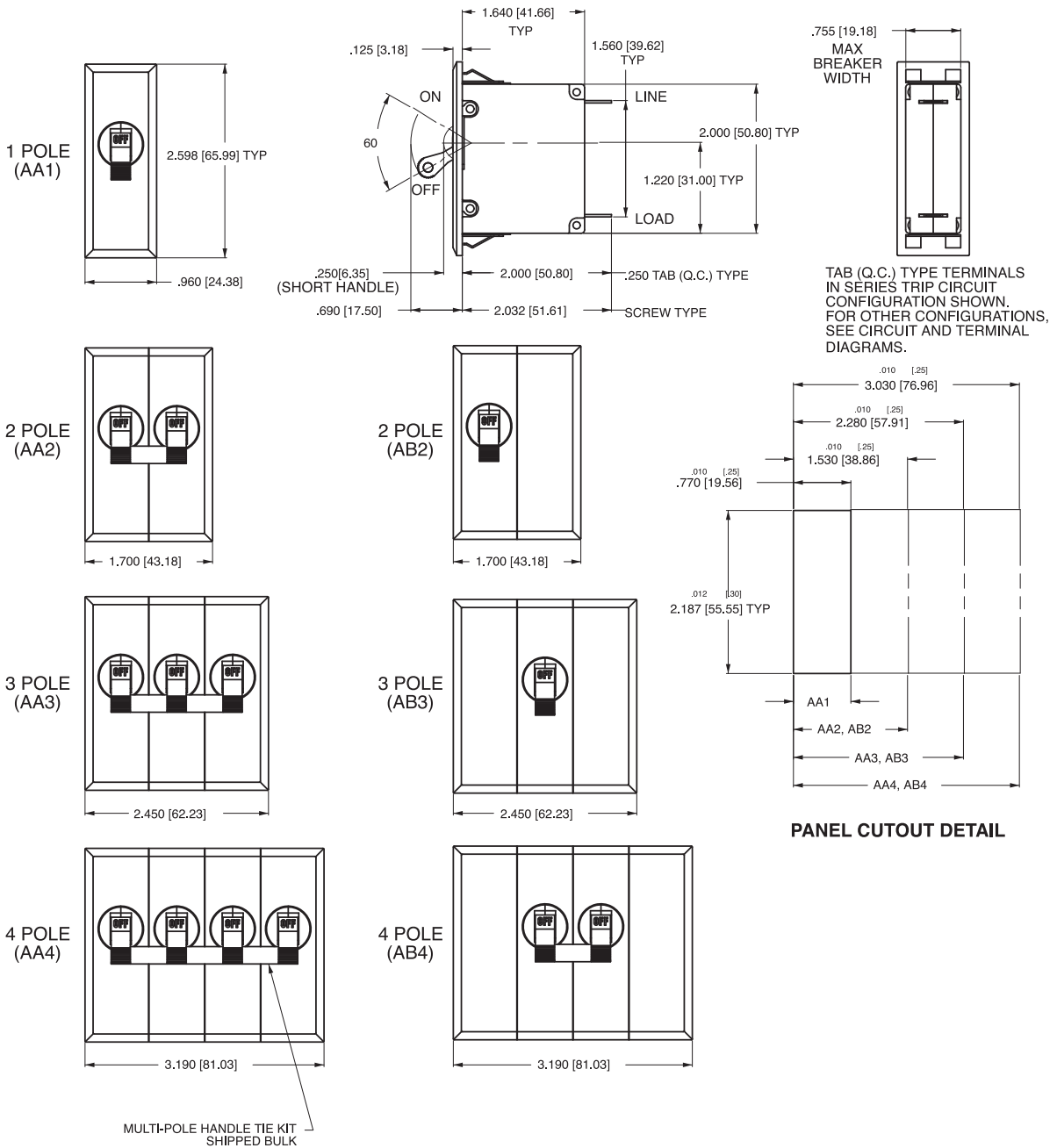
Notes:

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

A-Series Handle – Front Panel Snap-In Mounting Style 5

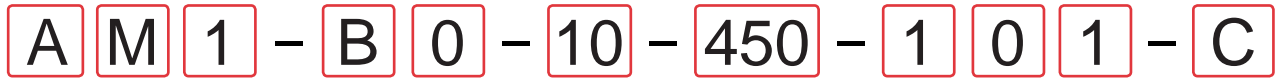


A-Series Handle – Front Panel Snap-In Mounting Style 7



Notes:

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



1 Series 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 ACTUATOR¹
M Sealed Toggle, one per unit

3 POLES
1 One
2 Two
3 Three

4 CIRCUIT

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

5 AUXILIARY/ALARM SWITCH⁵

0 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.	7 S.P.S.T., 0.110 Q.C. Term. (Gold Contacts)
2 S.P.D.T., 0.110 Q.C. Term.	8 S.P.S.T., 0.187 Q.C. Term.
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)	9 S.P.D.T., 0.187 Q.C. Term.

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)

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

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁶

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 TERMINAL⁹

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

9 LEGEND PLATE
0 No legend plate

10 MOUNTING/BARRIERS

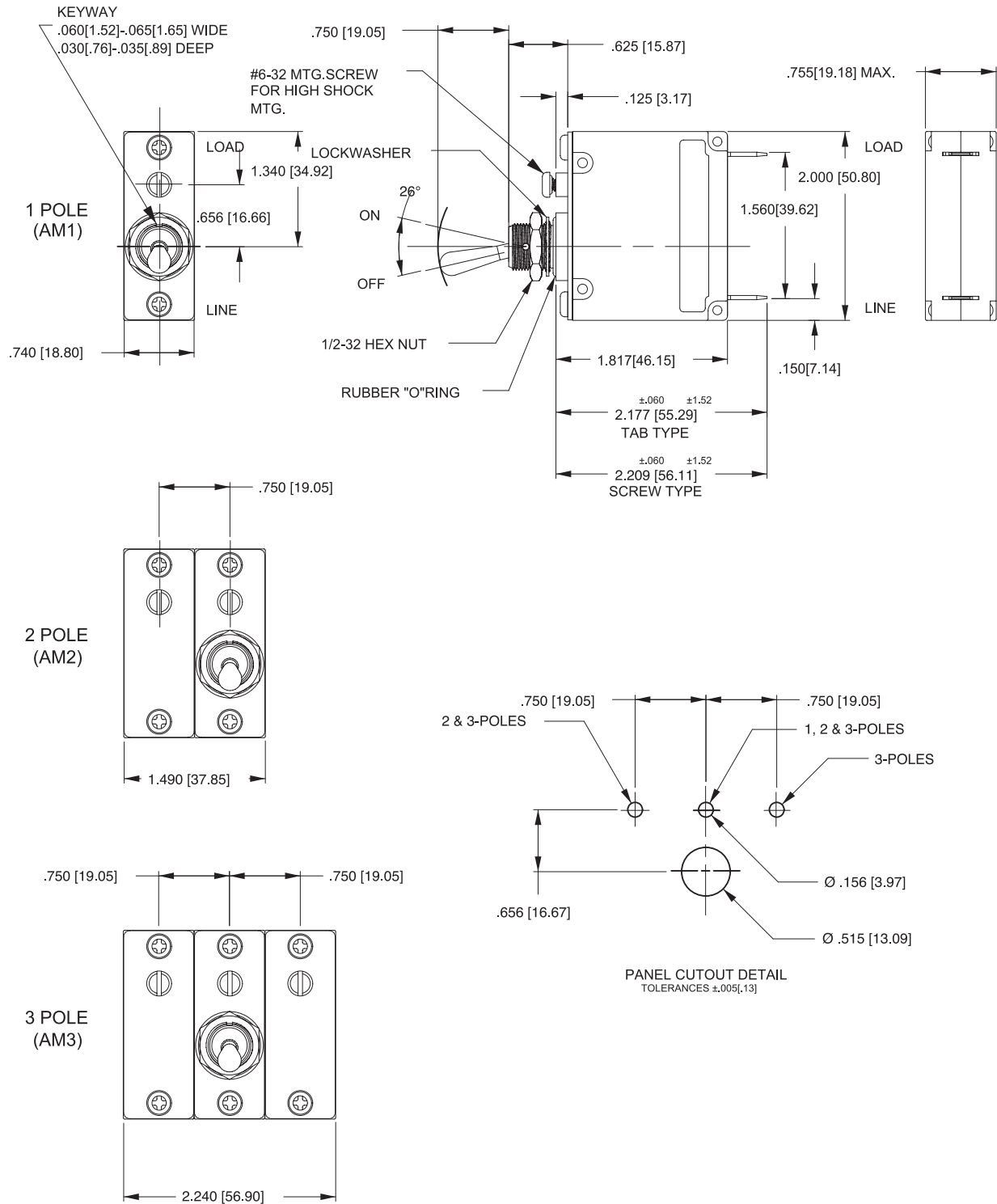
MOUNTING STYLE	BARRIERS
1 Standard Hex Nut	no
A Standard Hex Nut (multipole only)	yes

11 AGENCY APPROVAL

C UL Recognized & CSA Accepted
I UL Recognized, CSA Accepted, UL1500 Ignition Protected

Notes:

- Actuator Code M: Handle location as viewed from front of panel:
2 pole - right pole 3 pole - center pole
- Switch Only circuits, rated up to 50 amps and 3 poles. Only available when tied to a protected pole. For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 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.
- Auxiliary Switch available on Series Trip & Switch Only circuits, limited to 30 amps. On multi-pole breakers, one auxiliary switch is supplied, mounted in the extreme right pole.
- Voltage coils not rated for continuous duty. Available only with delay codes 10 and 20.
- Available with Circuit Codes B & D only. VDE Certified to 30 amps. UL Recognized, CSA Accepted & TUV Certified to 50 amps.
- UL Recognition and CSA Certification available on one and two pole breakers.
- Screw Terminals are recommended on ratings greater than 20 amps. Ratings over 30 amps are only available with Terminal Codes 5, 9, B, F, G, H, M and Q.
- Terminal Code 1: UL Recognition and CSA Certification up to 30 amps, but not recommended over 20 amps.
- Terminal Code L: available up to 30A.
- 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.



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



1 SERIES

A

2 ACTUATOR¹

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

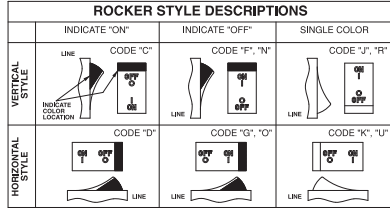
- N** Indicate OFF, vertical legend
- O** Indicate OFF, horizontal legend
- P** Indicate OFF, no legend

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

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

4 CIRCUIT

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

5 AUXILIARY/ALARM SWITCH^{6,7}

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

6 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only
- 10** DC Instantaneous
- 11** DC Ultra Short
- 12** DC Short
- 14** DC Medium
- 16** DC Long
- 20** 50/60Hz Instantaneous
- 21** 50/60Hz Ultra Short
- 22** 50/60Hz Short
- 24** 50/60Hz Medium
- 26** 50/60Hz Long
- 30** DC, 50/60Hz Instantaneous
- 31** DC, 50/60Hz Ultra Short
- 32** DC, 50/60Hz Short
- 34** DC, 50/60Hz Medium
- 36** DC, 50/60Hz Long
- 42⁹** 50/60Hz Short, Hi-Inrush
- 44⁹** 50/60Hz Medium, Hi-Inrush
- 46⁹** 50/60Hz Long, Hi-Inrush
- 52⁹** DC, Short, Hi-Inrush
- 54⁹** DC, Medium, Hi-Inrush
- 56⁹** DC, Long, Hi-Inrush

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020				
025	0.025	225	0.250	420	2.000
030	0.030	230	0.300	522	2.250
035	0.035	240	0.400	527	2.750
040	0.040	245	0.450	430	3.000
045	0.045	250	0.500	435	3.500
050	0.050	255	0.550	440	4.000
055	0.055	260	0.600	445	4.500
060	0.060	265	0.650	450	5.000
065	0.065	270	0.700	455	5.500
070	0.070	275	0.750	460	6.000
075	0.075	280	0.800	465	6.500
080	0.080	285	0.850	470	7.000
085	0.085	290	0.900	475	7.500
090	0.090	295	0.950	480	8.000
095	0.095	410	1.000	485	8.500
110	1.100	512	1.250	490	9.000
115	1.150	515	1.500	495	9.500
120	1.200	517	1.750	610	10.000
				710	10.500
				611	11.000
				711	11.500
				612	12.000
				712	12.500
				613	13.000
				614	14.000
				615	15.000
				616	16.000
				617	17.000
				618	18.000
				620	20.000
				622	22.000
				624	24.000
				625	25.000
				630	30.000
				635 ¹⁰	35.000
				640 ¹⁰	40.000
				645 ¹⁰	45.000
				650 ¹⁰	50.000
				J65	65 AC
				J12	12 AC
				J18	18 AC
				J24	24 AC
				J48	48 AC
				K20	120 AC
				L40	240 AC

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁸

8 TERMINAL¹¹

- 1¹²** Push-On 0.250 Tab (Q.C.)
- 2** Screw 8-32 w/upturned lugs
- 3¹³** Screw 8-32 (Bus Type)
- 4** Screw 10-32 w/upturned lugs
- 5¹³** 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
- E¹³** Screw M4 (Bus Type)
- F** Screw M5 w/upturned lugs and 30° bend
- G** Screw M5 (Bus Type) and 30° bend
- H¹³** Screw M5 (Bus Type)
- L¹⁴** 0.250 Q.C./ Solder Lug
- M¹³** M6 Threaded Stud
- P¹⁵** Printed Circuit Board Terminals
- Q¹⁶** Push-In Stud
- R** Screw M4 w/upturned lugs and 30° bend
- S¹⁷** Push-On 0.110 Tab (Q.C.)
- T** Screw M4 (Bus Type) and 30° bend

9 ACTUATOR COLOR & LEGEND

Actuator or Visi-Color ¹²	Marking:			Marking Color	
	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/BARRIERS²⁰

- 1** STANDARD ROCKER BEZEL, Threaded Insert, 2 per pole
- A** 6-32 X 0.195 inches (multi-pole units only)
- 2** ISO M3 x 5mm
- B** ISO M3 x 5mm (multi-pole units only)
- 3** ROCKERGUARD & PUSH-TO-RESET BEZEL, Threaded Insert, 2 per pole
- C** 6-32 x 0.195 inches (multi-pole units only)
- 4** ISO M3 x 5mm
- D** ISO M3 x 5mm (multi-pole units only)
- 8** FRONT PANEL SNAP-IN BRACKET, 0.744" wide bezel
- H** without Rockerguard (single pole units only)
- 9** FRONT PANEL SNAP-IN BRACKET, 0.96" wide bezel
- J** without Rockerguard (single pole units only)

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 only when tied to a protected pole (Circuit Code B, C, D or H). For .02 to 30 amps, select Current Code 630. For 35 - 50 amps, select Current Code 650.
- 4 Available with terminal Codes 1, 2 and 3. Current Rating limited to 30 amps maximum.
- 5 Consult factory for Dual Coil options, as special catalog number is required. With Shunt construction, Dual Coils will trip instantaneously on line voltage. Dual coils require 30VA minimum power to trip and are rated for intermittent duty only.
- 6 Auxiliary Switch breakers with Series Trip & Switch Only circuits: ≤ 30A, are supplied with standard half shells. 30-50A are supplied with extended boat (B-Style) half shells.
- 7 On multi-pole breakers, one 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.

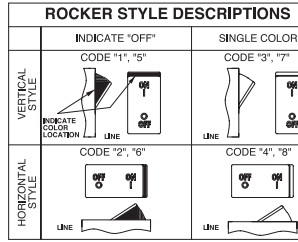
A **1** **1** - **B** **0** - **24** - **630** - **2** **3** **1** - **E**

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 ACTUATOR¹

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



3 POLES²

- 1 One 2 Two 3 Three

4 CIRCUIT

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

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

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)

CODE	AMPERES				
020	0.020	225	0.250	420	2.000
025	0.025	230	0.300	522	2.250
030	0.030	235	0.350	527	2.750
035	0.035	240	0.400	430	3.000
040	0.040	245	0.450	435	3.500
045	0.045	250	0.500	440	4.000
050	0.050	255	0.550	445	4.500
055	0.055	260	0.600	450	5.000
060	0.060	265	0.650	455	5.500
065	0.065	270	0.700	460	6.000
070	0.070	275	0.750	465	6.500
075	0.075	280	0.800	470	7.000
080	0.080	285	0.850	475	7.500
085	0.085	290	0.900	480	8.000
090	0.090	295	0.950	485	8.500
095	0.095	410	1.000	490	9.000
110	0.100	512	1.250	495	9.500
115	0.150	415	1.500	610	10.000
120	0.200	517	1.750	710	10.500
A06	6 DC	A32	32 DC	J12	12 AC
A12	12 DC	A48	48 DC	J18	18 AC
A18	18 DC	A65	65 DC	J24	24 AC
A24	24 DC	J06	6 AC	J48	48 AC
				J65	65 AC
				K20	120 AC
				L40	240 AC

OR VOLTAGE COIL (NORMAL RATED VOLTAGE)⁸

8 TERMINAL¹¹

- | | |
|---|--|
| 1¹² Push-On 0.250 Tab (Q.C.) | E¹³ Screw M4 (Bus Type) |
| 2 Screw 8-32 w/upturned lugs | F Screw M5 w/upturned lugs and 30° bend |
| 3¹³ Screw 8-32 (Bus Type) | G Screw M5 (Bus Type) and 30° bend |
| 4 Screw 10-32 w/upturned lugs | H¹³ Screw M5 (Bus Type) and 30° bend |
| 5¹³ Screw 10-32 (Bus Type) | L¹⁴ 0.250 Q.C./ Solder Lug |
| 6 Screw 8-32 w/upturned lugs and 30° bend | M¹³ M6 Threaded Stud |
| 7 Screw 8-32 (Bus Type) and 30° bend | P¹⁵ 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 | S¹⁶ 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:			Marking Color	
	I-O	ON-OFF	Dual ¹⁷	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/BARRIERS¹⁸

	STANDARD ROCKER BEZEL, Threaded Insert, 2 per pole	BARRIERS
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 ACTUATOR¹⁹		
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

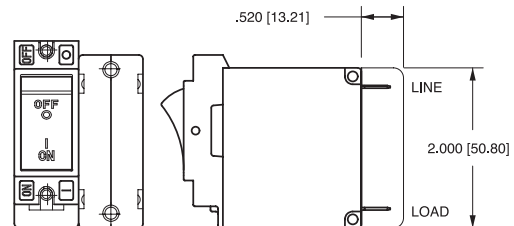
- C** UL Recognized & CSA Accepted
E TUV Certified, UL Recognized & CSA Accepted
I UL Rec. STD 1077, UL Rec. 1500 (ignition protected), & CSA Accepted

Notes:

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

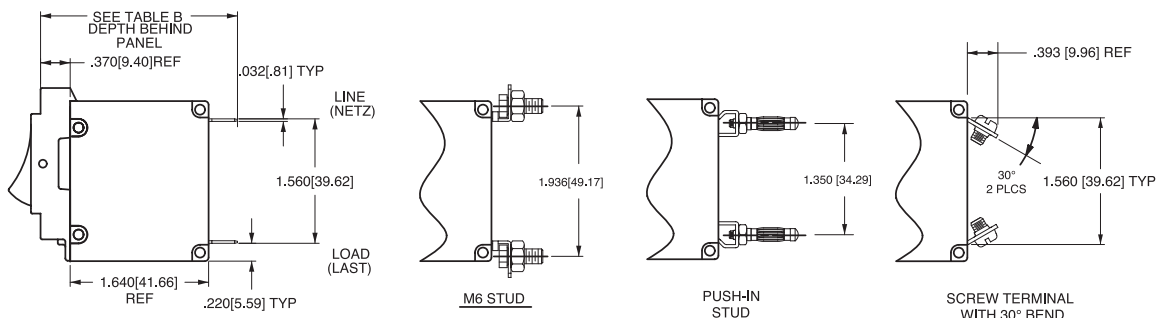
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX. SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX. SWITCH CODE
	ANSI	IEC			ANSI	IEC		
2 TERMINALS 	SWITCH ONLY (NO COIL) 	LINE (NETZ) 	A	0	SERIES TRIP 	LINE (NETZ) (3) 	B C	0
5 TERMINALS 	SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH (4) 	LINE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

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



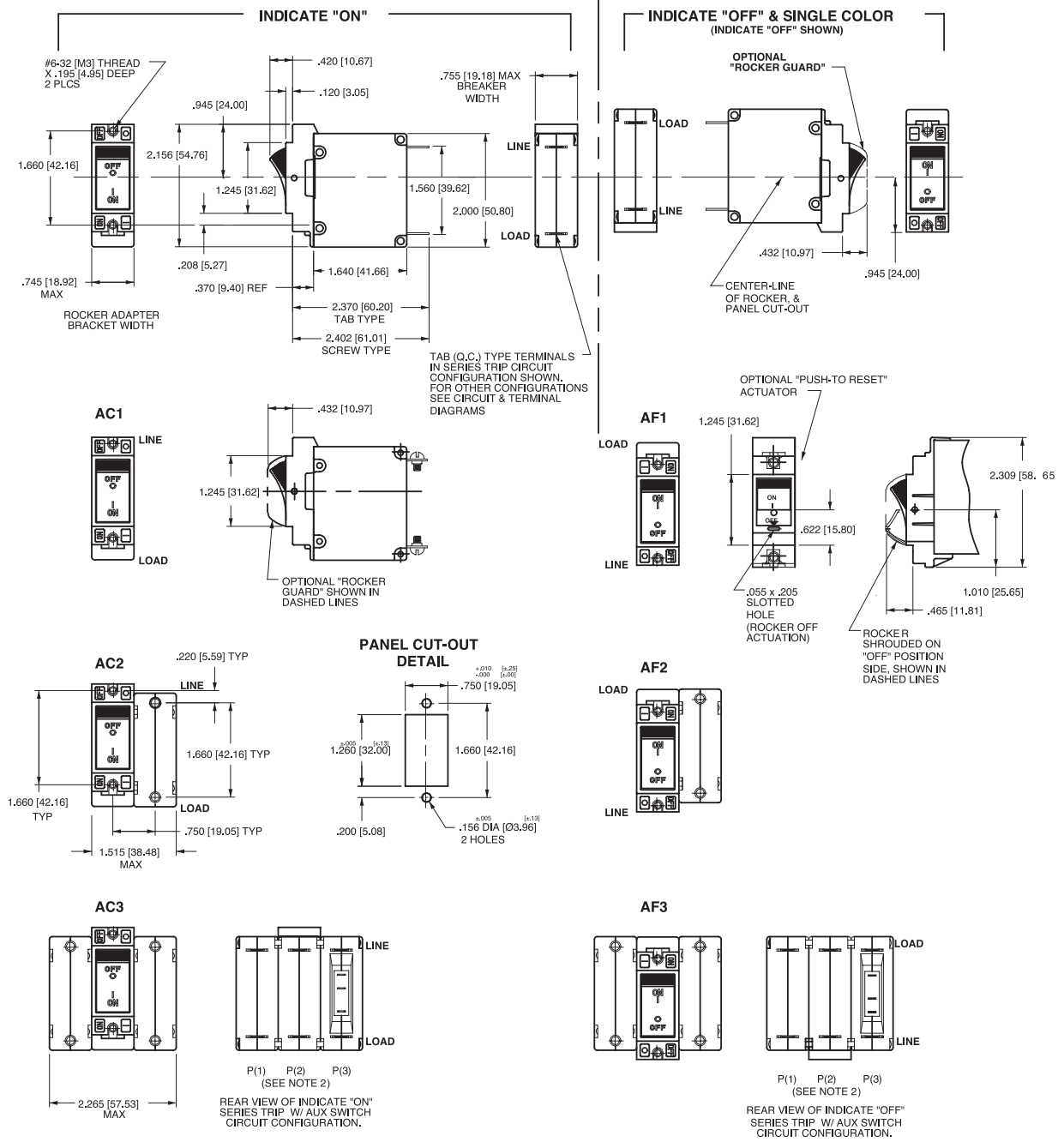
BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

* 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.

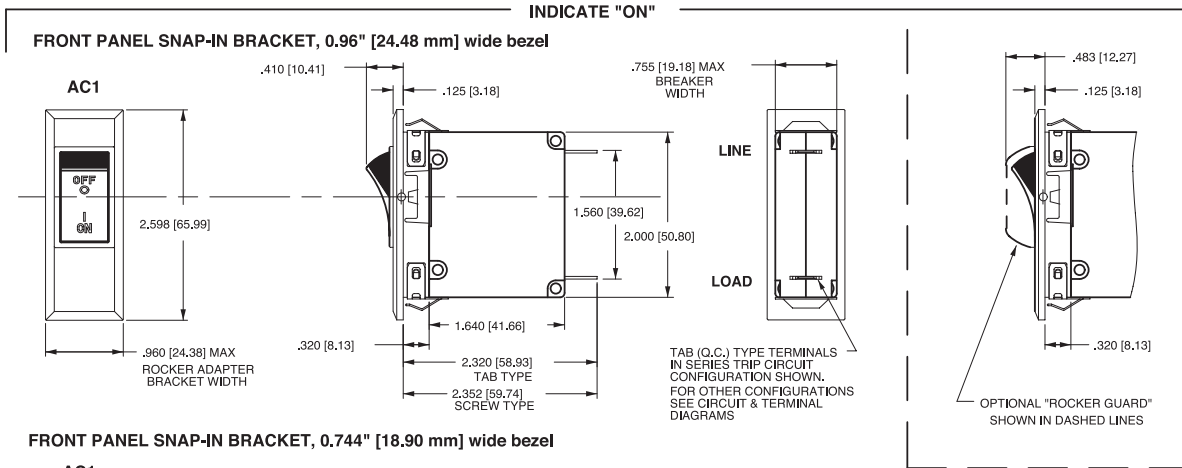


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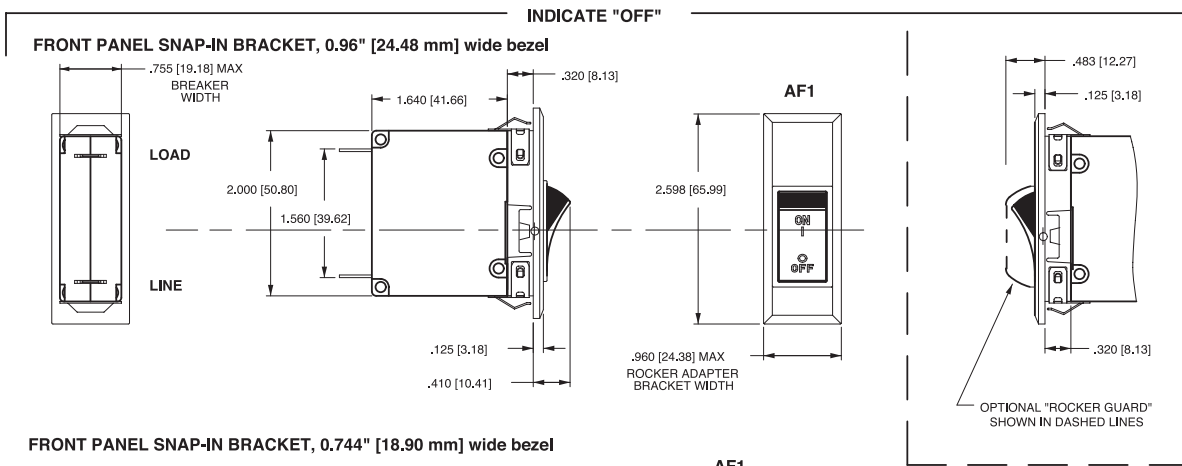
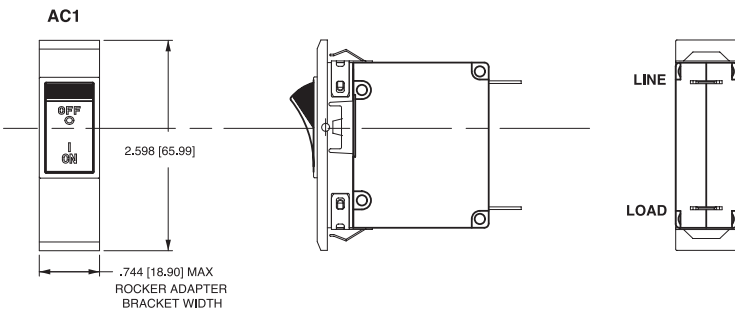
- All dimensions are in inches [millimeters].
- Tolerance $\pm .020$ [.51] unless otherwise specified.
- Schematic shown represents current trip circuit.
- Circuits shown for >30 amps / VDE.



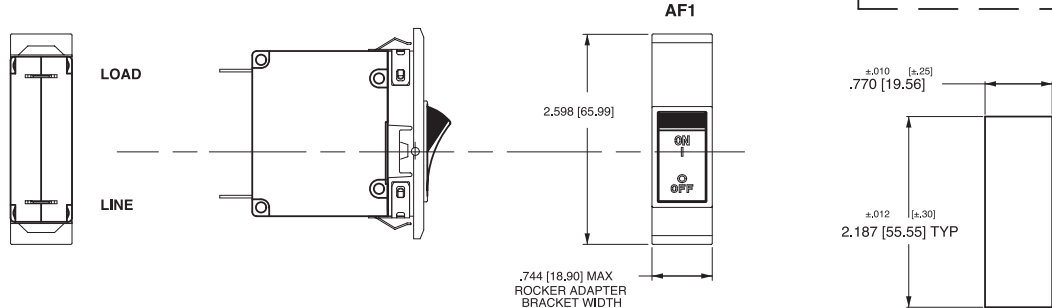
- Notes:
- 1 Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
 - 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
 - 3 All dimensions are in inches [millimeters].
 - 4 Tolerance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



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



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

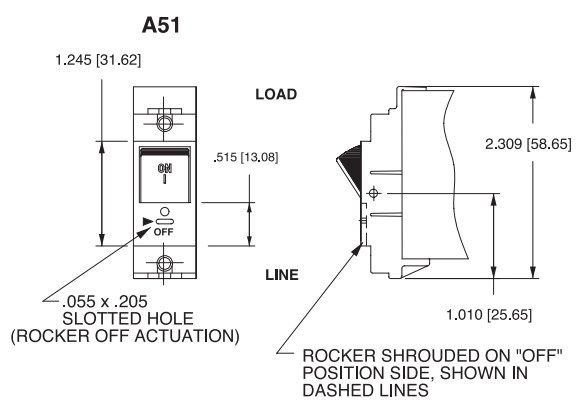
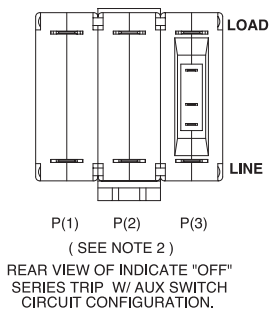
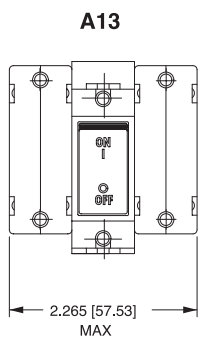
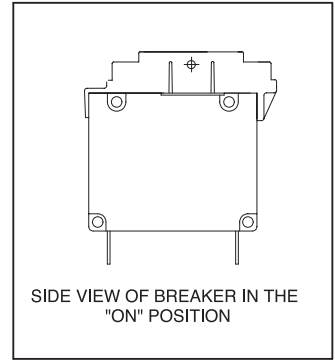
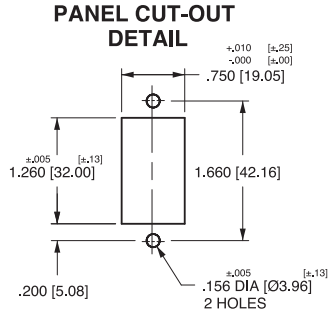
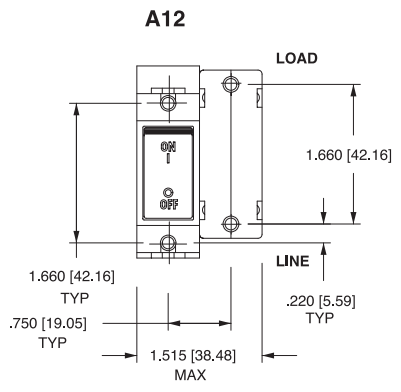
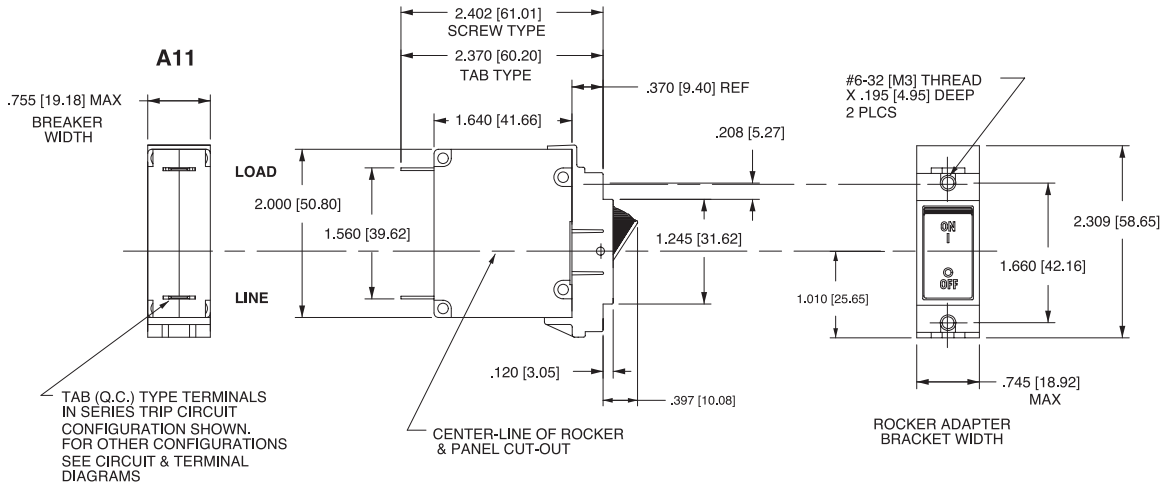


Notes:

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

PANEL CUTOUT DETAIL

INDICATE "OFF" & SINGLE COLOR
(INDICATE "OFF" SHOWN)



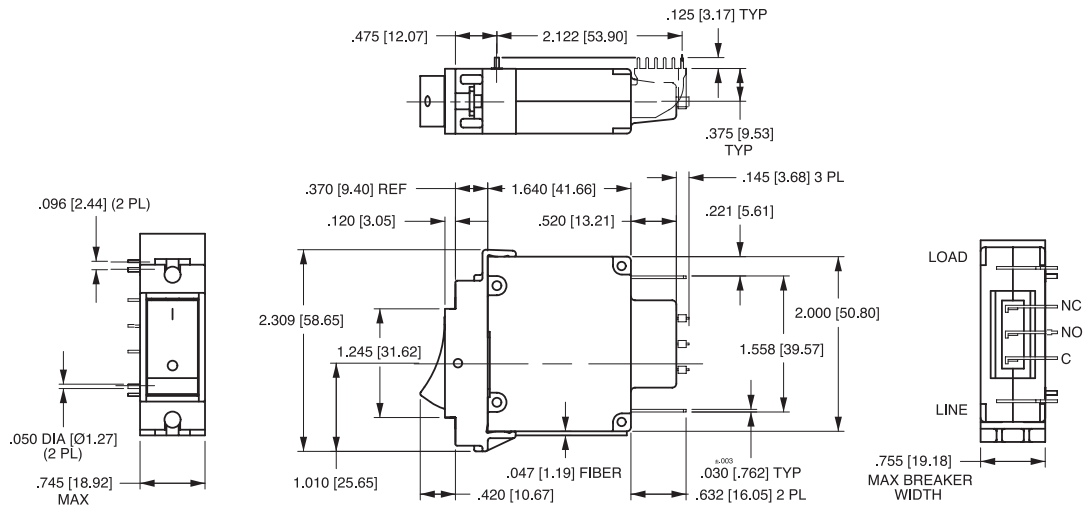
PUSH-TO-RESET ACTUATOR

ACTUATOR SIDE VIEW (SURFACE CONTOURS)

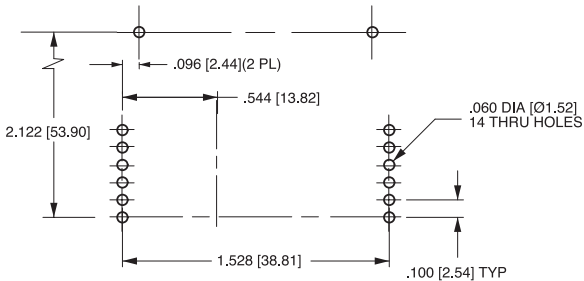
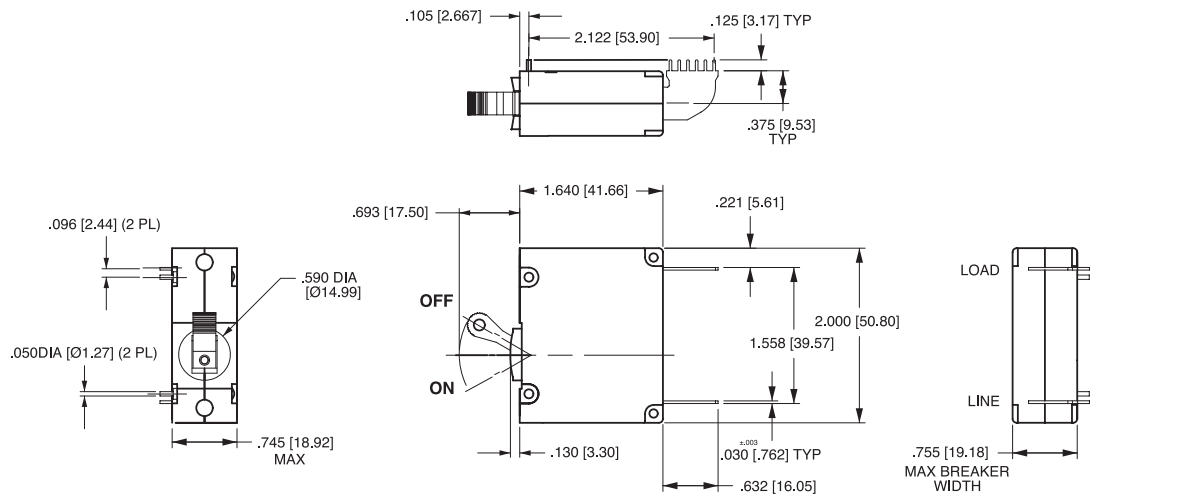


- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 For pole orientation with horizontal legend, rotate front view clockwise 90°.
 - 3 Tolerance ± 0.20 [5.1] unless otherwise specified.

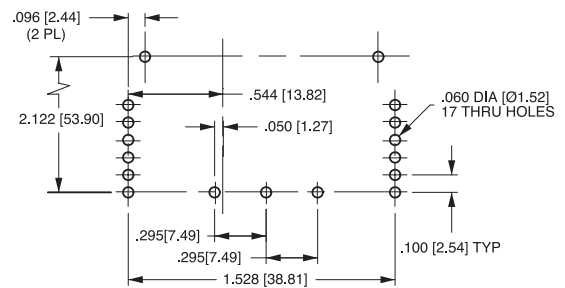
A-SERIES ROCKER



A-SERIES HANDLE



P.C. FOOT PRINT



P.C. FOOT PRINT WITH AUX. SWITCH

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

B-Series

CIRCUIT BREAKER

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



Product Highlights:

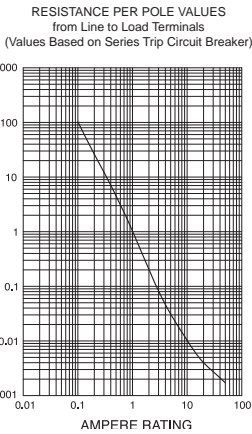
- Meet CSA Standard 22.2 No. 100 for the Generator & Welder markets
- Extra insulation and tongue & groove half-shell constructions
- UL Recognized - UL Standard 508, 1077, 1500
- UL Listed - UL Standard 489, 489A
- CSA Accepted
- TUV Certified
- VDE Certified

Typical Applications:

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

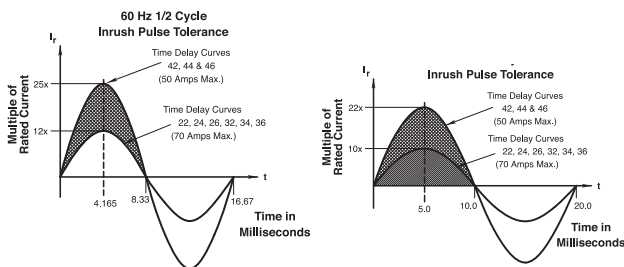
Electrical

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



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

Pulse Tolerance Curves



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

Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.
Trip Free	All B-Series Circuit Breakers will trip on overload, even when Handle is forcibly held in the ON position.
Trip Indication	The operating Handle moves positively to the OFF position when an overload causes the breaker to trip.

Physical

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

Environmental

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

Electrical Tables

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

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

Notes:

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

Electrical Tables

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

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

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

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

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

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

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

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

Notes:

1 Parallel Pole Construction

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

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

Agency Certifications

UL Recognized

UL Standard 1077



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

CSA Accepted



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

UL Standard 508



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

TUV Certified



EN60934, under License No. R72040875

UL Standard 1500



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

VDE Certified



EN60934, VDE 0642 under File No. 10537

UL Listed

UL Standard 489



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

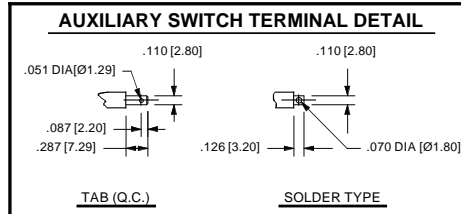
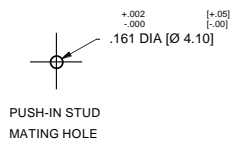
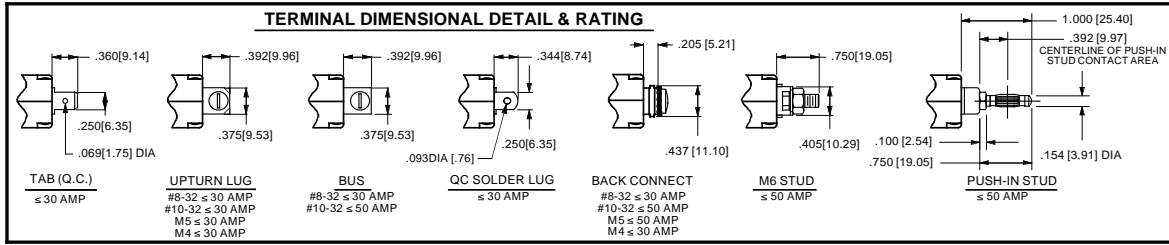
UL Standard 489A

Communications Equipment (Guide CCN/DITT, File E189195)

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

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

- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance ± 0.020 [.51] unless otherwise specified.
 - Alarm Switch available with .110 x .020 Q.C. & Solder Lug Terminals Only.



**TABLE A
TIGHTENING TORQUE SPECIFICATIONS**

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

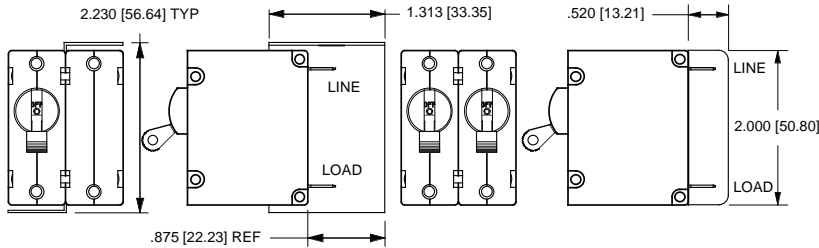
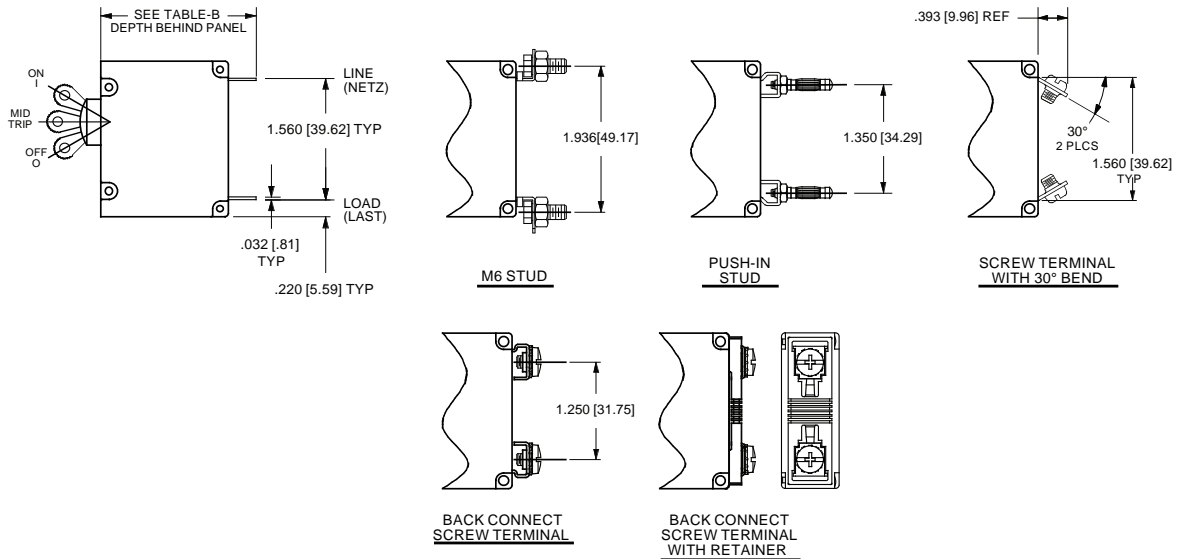


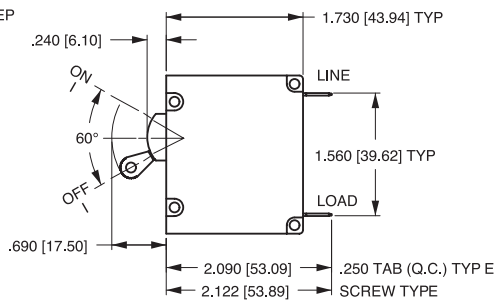
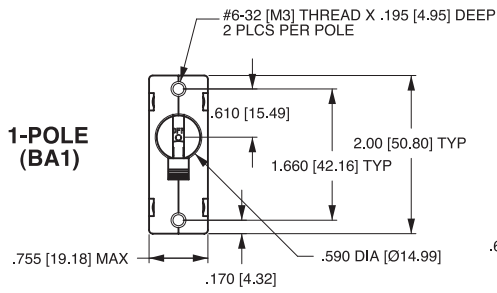
TABLE B

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

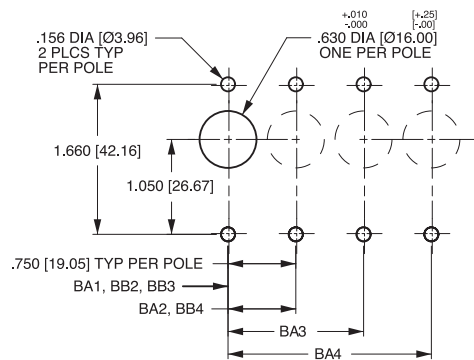
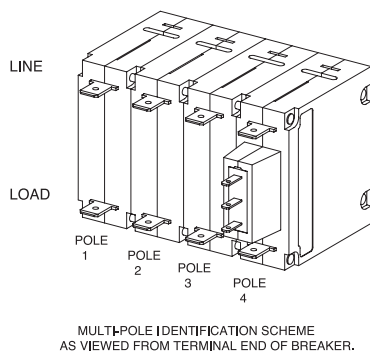
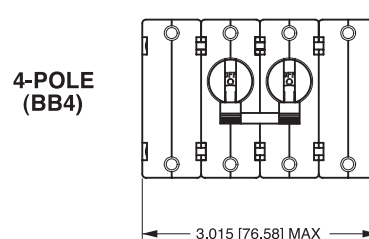
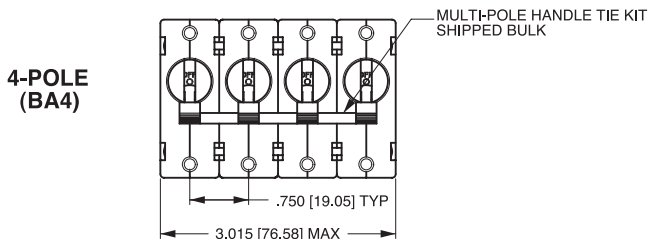
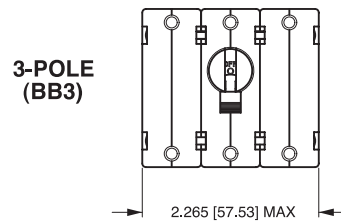
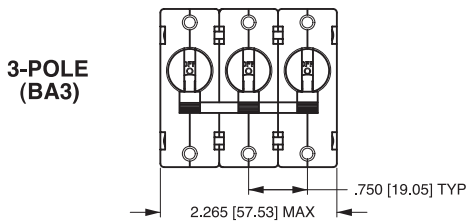
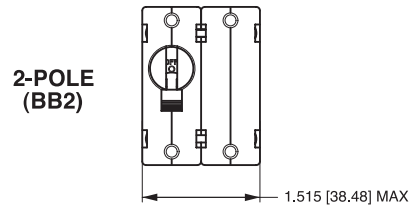
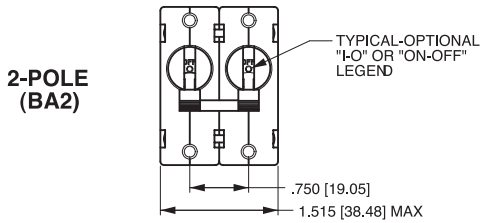
* AVAILABLE ON SERIES TRIP AND SWITCH ONLY CIRCUITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, AS SHOWN IN MULTI-POLE IDENTIFICATION SCHEME.



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

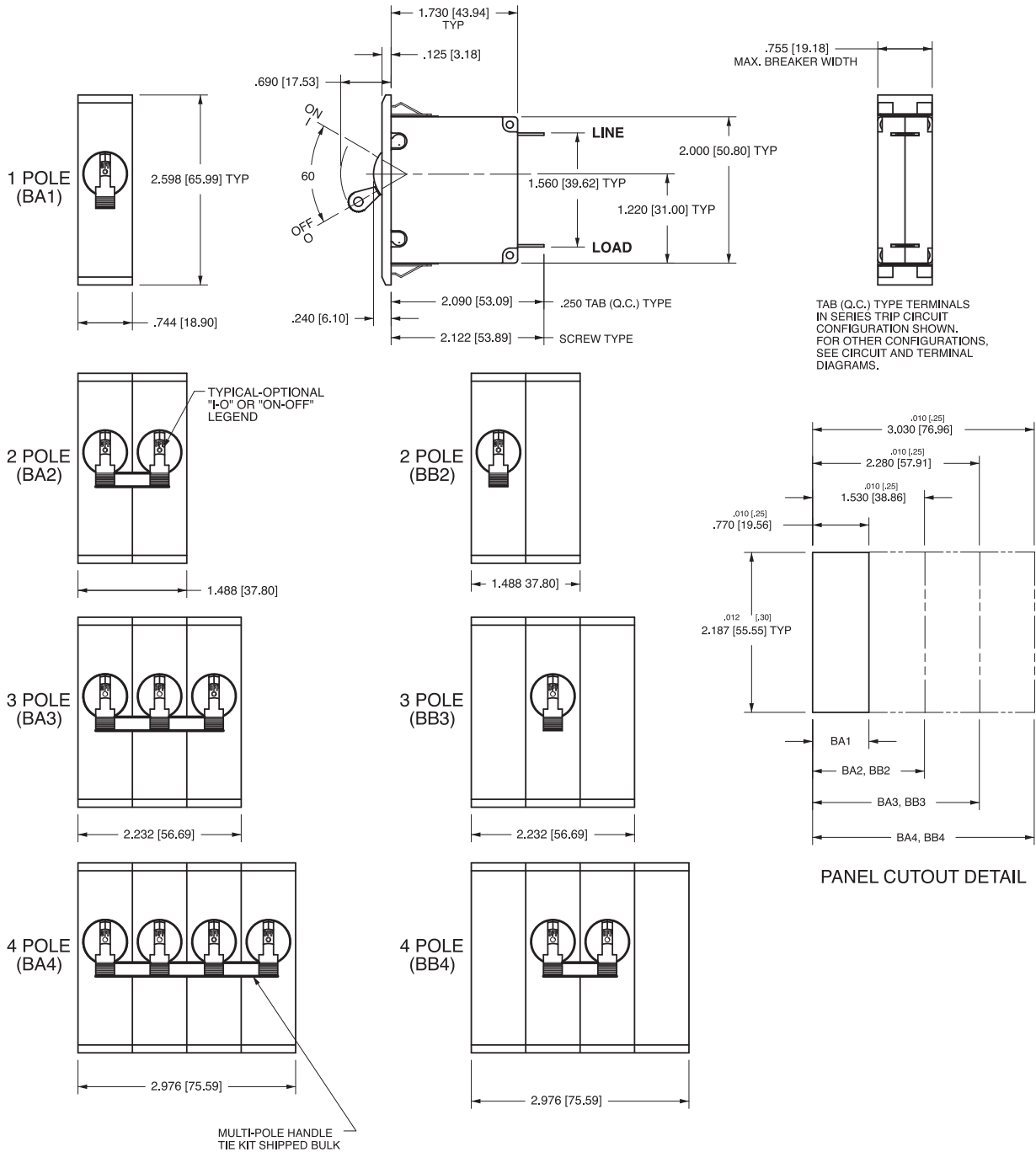


TAB (Q.C.) TYPE TERMINALS IN SERIES TRIP CIRCUIT CONFIGURATION SHOWN. FOR OTHER CONFIGURATIONS, SEE CIRCUIT AND TERMINAL DRAWINGS.



- Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ± 0.20 [5.1] unless otherwise specified.

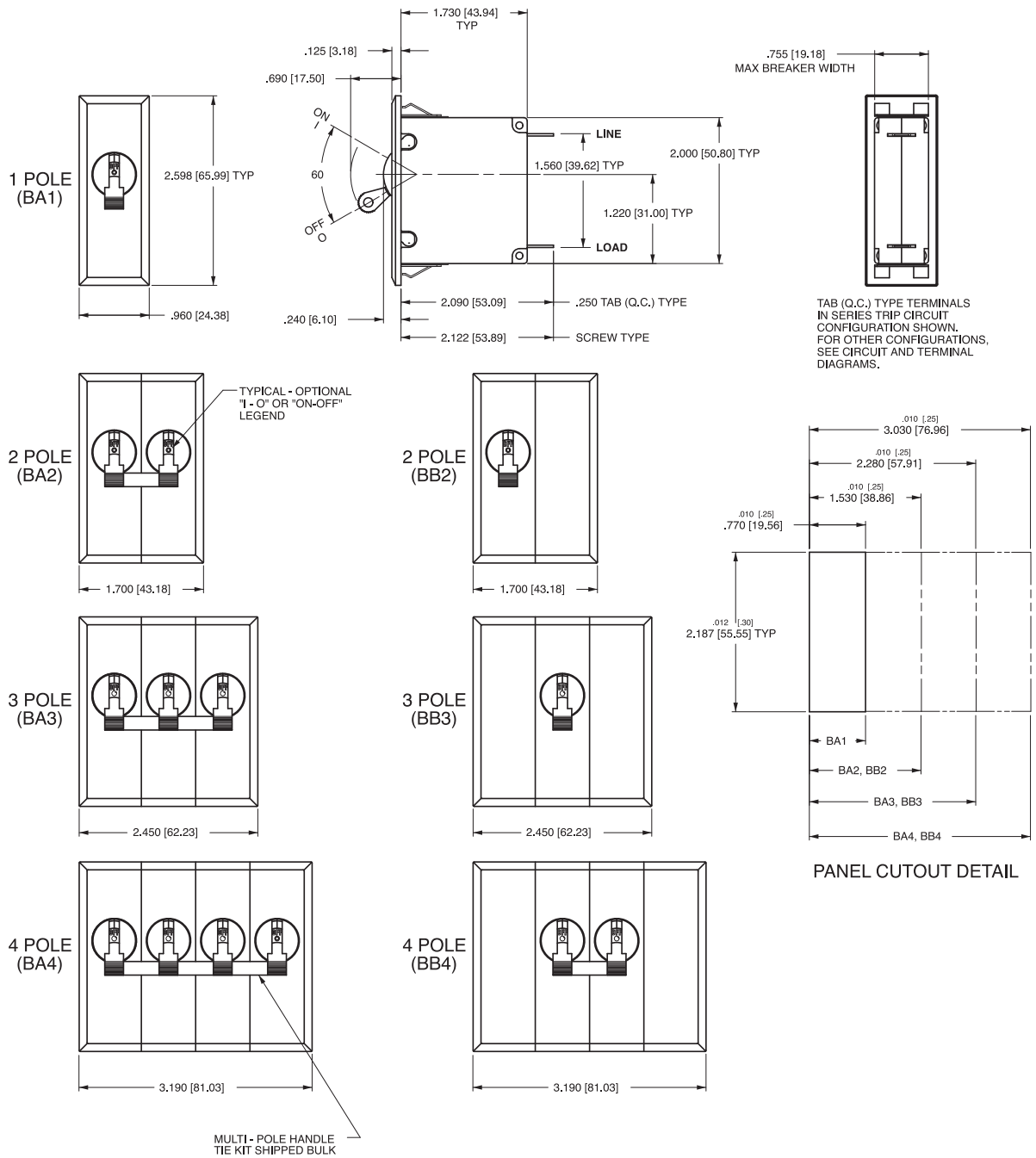
B-Series Handle – Front Panel Snap-in Mounting Style 5



Notes:

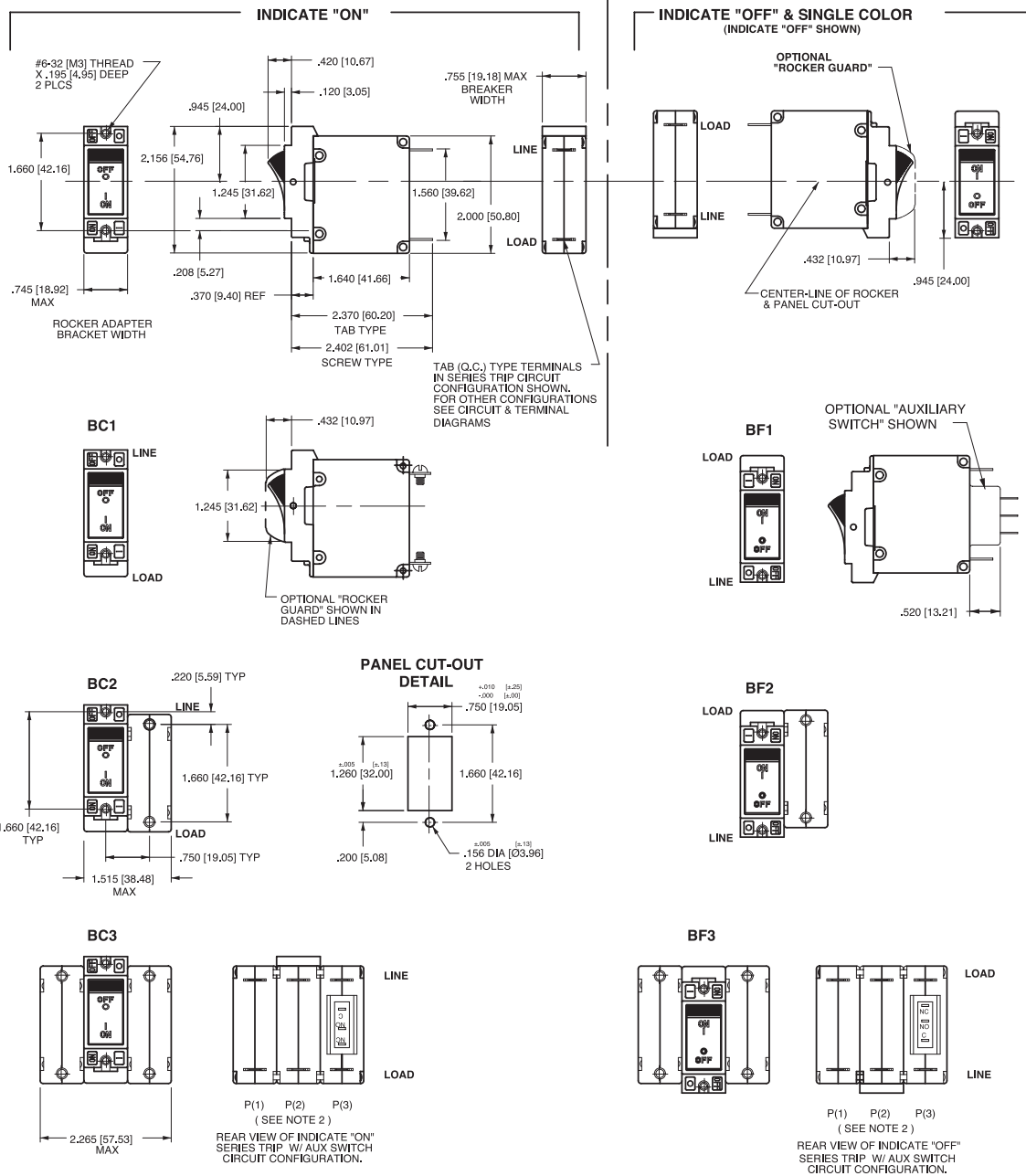
- 1 All dimensions are in inches [millimeters].
- 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
- 3 Tolerance ±.020 [.51] unless otherwise specified.

B-Series Handle – Front Panel Snap-In Mounting Style 7



Notes:

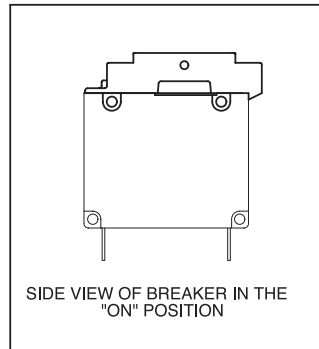
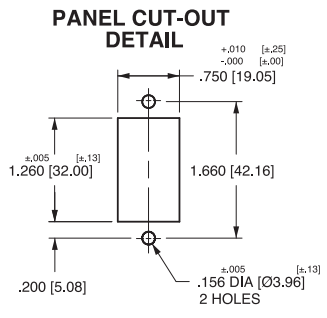
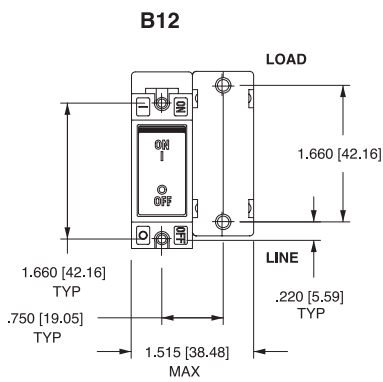
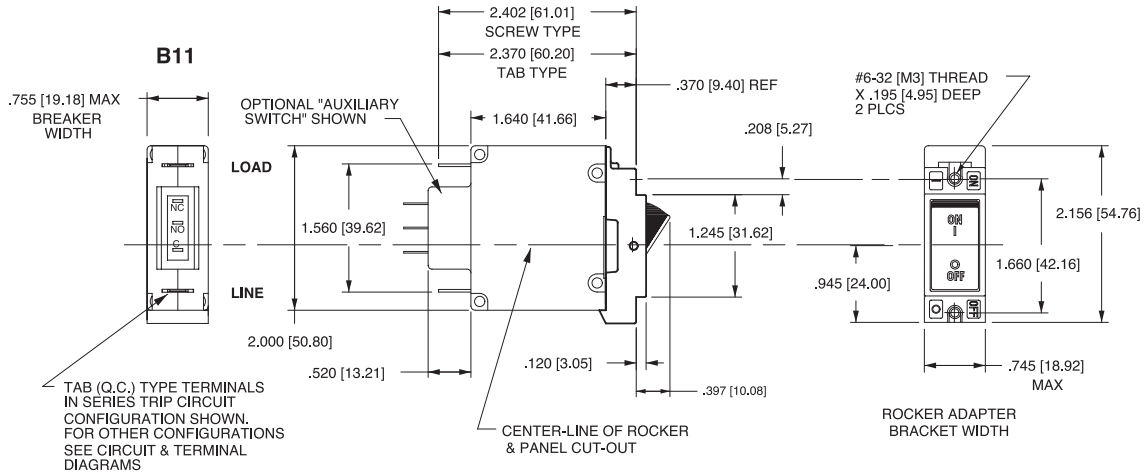
- 1 All dimensions are in inches [millimeters].
- 2 Recommended panel thickness: .040 [1.02] to .100 [2.54].
- 3 Tolerance ± 0.020 [.51] unless otherwise specified.



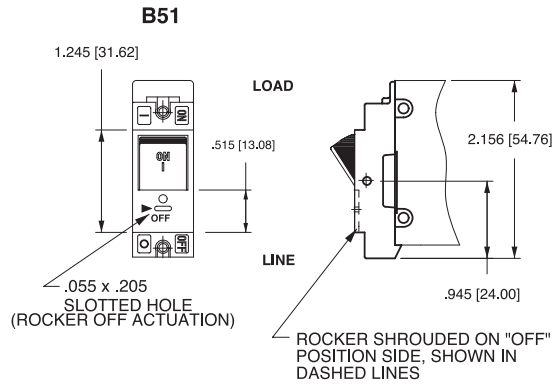
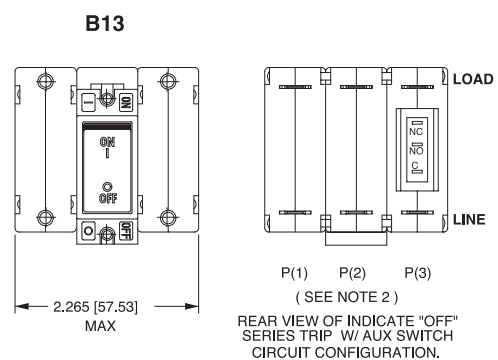
Notes:

- 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.

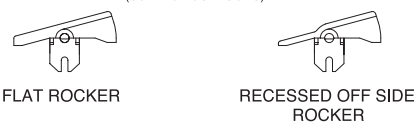
INDICATE "OFF" & SINGLE COLOR
(INDICATE "OFF" SHOWN)



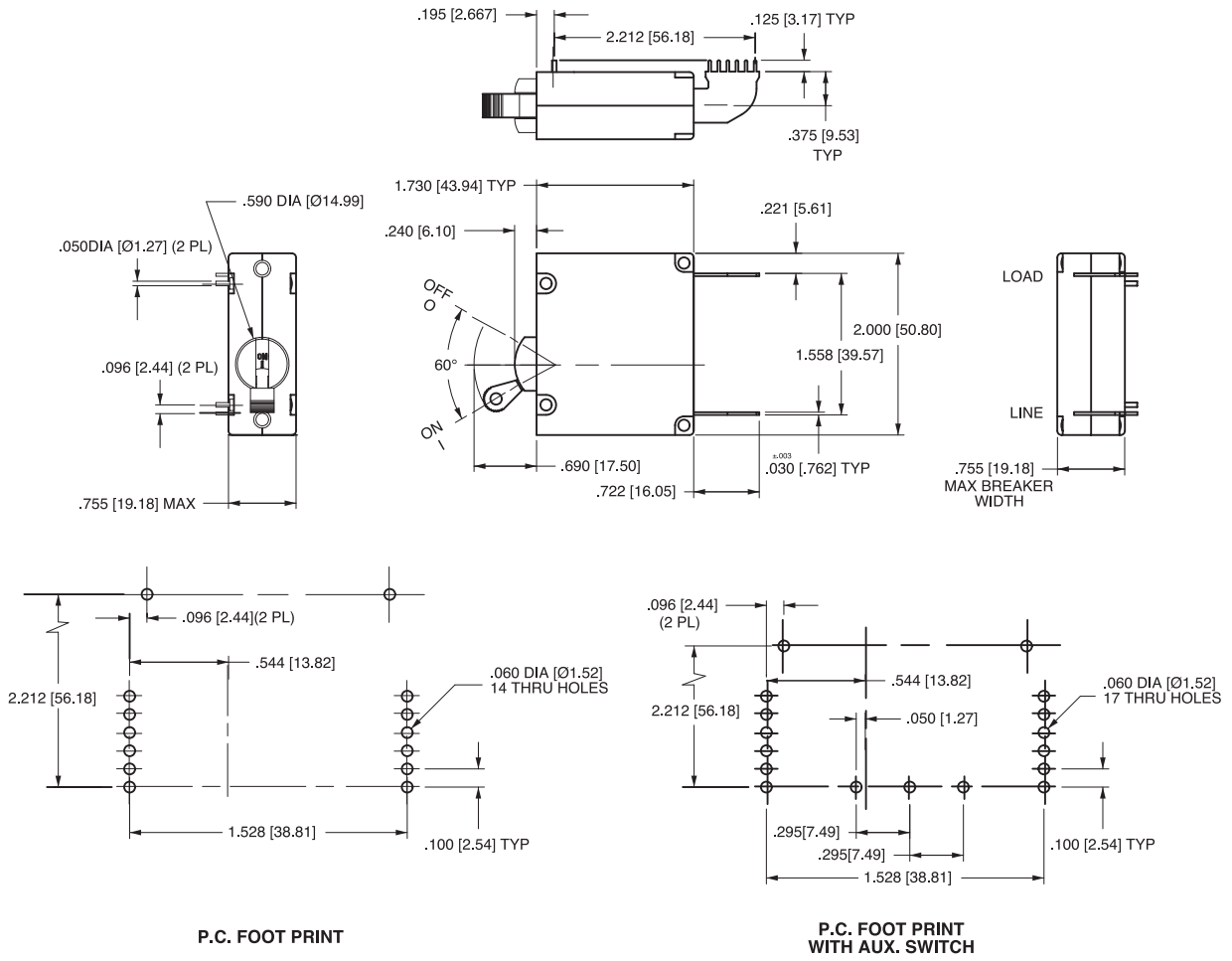
PUSH-TO-RESET ACTUATOR



ACTUATOR SIDE VIEW
(SURFACE CONTOURS)



- 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.



Notes:

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

C-Series

CIRCUIT BREAKER

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



Product Highlights:

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

Typical Applications:

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

Electrical Tables

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

C-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS											
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES		NOTES	
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA		
						WITH BACKUP FUSE 1	WITHOUT BACKUP FUSE				
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		
	80	DC	---	---	71 -100	---	---	5000	TC1,2, OL0,U1	TC1,2, OL0,U1	
				0.02 - 70	---	---	7500	TC1,2, OL1,U1	TC1,2, OL1,U1		
	80	DC	---	---	71 -100	---	---	7500	TC1,2, OL0,U1	TC1,2, OL0,U1	
				0.02 - 70	---	---	10,000	TC1,2, OL1,U1	TC1,2, OL1,U1	Must Have Agency Code "L"	
	125	DC	---	---	71 -100	---	---	10,000	TC1,2, OL0,U1	TC1,2, OL0,U1	Must Have Agency Code "L"
				0.02 - 50	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"	
	125 / 250	DC	---	0.02 - 50	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"	
	250	DC	---	0.02 - 50	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L". 2 Pole Break Required for 250 Volts	
	125	50 / 60	1	0.02 - 100	---	---	---	3000	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				0.02 - 100	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"	
	150	DC	---	---	80 - 100	---	---	5000	TC1, OL0, U3	---	Must Have Agency Code "L"
	150	DC	---	---	101 - 175	---	---	5000	TC1, OL0, U3	---	Must Have Agency Code "L" Parallel Pole
	125 / 250	50 / 60	1	0.02 - 100	---	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	
				0.02 - 50	---	---	3000	TC1,2,OL1,U1	TC1,2,OL1,U1	2 or 3 poles breaking single phase	
				51 - 100	---	---	1000	TC1,2,OL1,U1	TC1,2,OL1,U1	2 or 3 poles breaking single phase	
				0.02 - 100	---	---	5000	TC1,2,OL1,U2	TC1,2,OL1,U2	2 or 3 poles breaking single phase, "L" Agency Code	
	250	50 / 60	1	0.02 - 50	---	---	---	3500	TC1, OL1, U2	TC1, OL1, U2	Per Pole Rating
				0.02 - 100	---	---	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	Must Have Agency Code "L"	
				51 - 70	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1		
				---	0.02 - 100	---	3000	TC1, OL0, U2	TC1, OL0, U2		
	277	50 / 60	1	0.02 - 70	---	---	---	5000	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
				---	0.02 - 90	---	5000	---	TC1,2,OL0,U1	TC1,2,OL0,U1	Must Have Agency Code "L"
	480 / 277	50 / 60	3	0.02 - 30	---	---	---	5000	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase
	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	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
				0.02 - 30	---	5000	---	TC1,2,OL1,C1	TC1,2,OL1,C1	3 poles breaking 3 phase	
	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
				0.02 - 100	---	---	---	---	---		
250	50 / 60	3	0.02 - 70	---	---	---	---	---	---		
			0.02 - 50	---	---	---	---	---			
480 / 277	50 / 60	3	0.02 - 30	---	---	---	---	---	3 poles breaking 3 phase		

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

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

Electrical Tables

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

C-SERIES TABLE B: MANUAL MOTOR CONTROLLERS					
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	HORSEPOWER RATINGS
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	MAX HP
SERIES, SHUNT & RELAY SWITCH ONLY	120 ¹	50 / 60	1	0.02 - 50	7 1/2
	250 ¹	50 / 60	1	0.02 - 20	3
			3	0.02 - 20	5
	277 ¹	50 / 60	1	0.02 - 20	3
480 ²	50 / 60	3	0.02 - 20	5	

Notes for Table B:

1 UL recognized and CSA Accepted at 480V refers to 3 & 4 pole versions used in a 3Ø, wye connected circuit or 2-pole version connected with 2 poles breaking. 1Ø and backed up with series fusing as stated above in note 1.

* Series, Shunt and Relay Trip - Voltage Coil Construction not current coils

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

C-SERIES TABLE C: COMPONENT SUPPLEMENTARY PROTECTORS														
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)						APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS ¹	UL/CSA		VDE		TUV		UL	CSA	
						WITH BACKUP FUSE	WITHOUT BACKUP FUSE	(I _{nc}) WITH BACKUP FUSE	(I _{cn}) WITHOUT BACKUP FUSE	(I _{nc}) WITH BACKUP FUSE	(I _{cn}) WITHOUT BACKUP FUSE			
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
			---	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 - 70	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1
	0.10 -100	---				---	5000	---	---	5000	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
	415	50 / 60	3	0.10 - 90	---	---	5000	---	---	5000	5000	TC1,2, OL1,U1	TC1,2, OL1,U1	Agency Code J or R Only
0.10 - 30				---	5000	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker	
DUAL COIL	80	DC	---	0.10 - 30	---	---	7500	---	1500	5000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
SHUNT	250	50 / 60	1 & 3	0.10 - 30	---	---	5000	3000	1500	3000	1500	TC1,2, OL1,U1	TC1,2, OL1,U1	
	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	
SHUNT	415	50 / 60	3	0.10 - 30	---	5000	---	3000	1500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Rocker
						5000	---	5000	2500	3000	1500	TC1,2, OL1,C1	TC1,2, OL1,C1	Handle/ Agency F, H, J, or R

Notes 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 Tables

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

C SERIES TABLE D : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	INTERRUPTING CAPACITY (AMPS)	CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	WITHOUT BACKUP FUSE	
SERIES	80	DC	---	0.10 - 100	50,000 ¹	Limited to 2 Poles Max from 71 - 100 Amps.
					10,000	Limited to 2 Poles Max from 71 - 100 Amps.
	125	DC	---	0.10 - 100	5,000	1 - 3 Poles
	125 / 250	DC	---	0.10 - 50	5,000	1 or 2 Poles (2 Poles Required for 250 Volts)
	120	50 / 60	1	0.10 - 50	10,000	1 - 3 Poles
				51 - 70	5,000	1 - 3 Poles
	120 / 240	50 / 60	1	0.10 - 50	5,000	2 or 3 Poles. 1 Pole of a 3 Pole Unit is Neutral
				0.10 - 50	10000 ¹	2 or 3 Poles. 1 Pole of a 3 Pole Unit is Neutral
240	50 / 60	1	0.10 - 30	5,000	1 Pole	
240	50 / 60	1	0.10 - 20	5,000	2 Pole	
277	50 / 60	1	0.10 - 20	10,000	1 Pole	
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	48	DC	---	0.02 - 100	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	---
				101 - 150	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	---
	65	DC	---	0.02 - 100	1500	TC1,2,OL0,U1	TC1,2,OL0,U1	---
	80	DC	---	0.02 - 70	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	---
	125	50 / 60	1	0.02 - 70	5000	TC1,2,OL1,U1	TC1,2,OL1,U1	---
				71 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	---
	250	50 / 60	1	0.02 - 70	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	---
				71 - 100	1500	TC1,2,OL1,U1	TC1,2,OL1,U1	2 Poles Breaking Single Phase

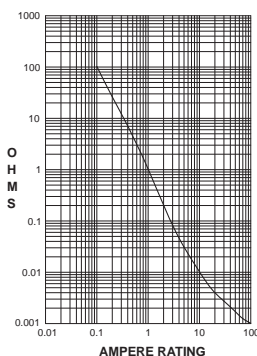
Table F: Lists UL Listed configurations and performance capabilities as Circuit Breakers for use in Communications Equipment (Guide DITT, File E189195), under UL489A.

C-SERIES TABLE F : PARALLEL POLE CONSTRUCTION UL489A LISTED FOR COMMUNICATIONS EQUIPMENT				
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	GENERAL PURPOSE AMPS	WITHOUT BACKUP FUSE
SERIES	80	DC	110 - 250	10,000

Electrical

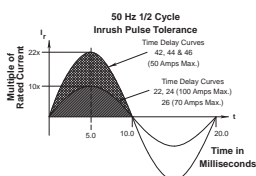
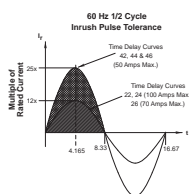
- Maximum Voltage AC, 480 WYE/277 VAC, 50/60 Hz (see Table A.)
UL489: AC,240 VAC. (See Table D), 50/60 Hz, 125 VDC
- Current Rating Standard current coils: 0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 25.0, 30.0, 35.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0 and 100 amps. Other ratings available, see Ordering Scheme.
- Standard Voltage Coils DC - 6V, 12V; AC - 120V; other ratings available, see Ordering Scheme.
- Auxiliary Switch Rating SPDT; 10.1 amps-250VAC, DC Aux. Switch 1.0A, 65 VDC. 0.5A, 80VDC, 1/4 HP, 125VAC, VDE & TUV 1.0 125 VAC.
- Insulation Resistance Minimum of 100 Megohms at 500 VDC.
- Dielectric Strength UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. C-Series Circuit Breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.
- Resistance, Impedance Values from Line to Load Terminal - based on Series Trip Circuit Breaker.

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



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	15%
5.1 - 20.0	25%
20.1 - 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 Config. Series (with or without auxiliary switch, mid trip & mid trip with alarm switch) Shunt & Relay with current or voltage trip coils, Dual Coil, Switch Only (with or without aux. switch). UL489: Series (with or without auxiliary switch, mid-trip & midtrip with alarm switch).
- Weight Approx. 112 grams/pole (3.95 oz).
- Standard Colors Housing: Black

Environmental

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

Agency Certifications:

UL Recognized

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



UL Standard 508 Motor Controllers, Manual
(Guide CCN/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)



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

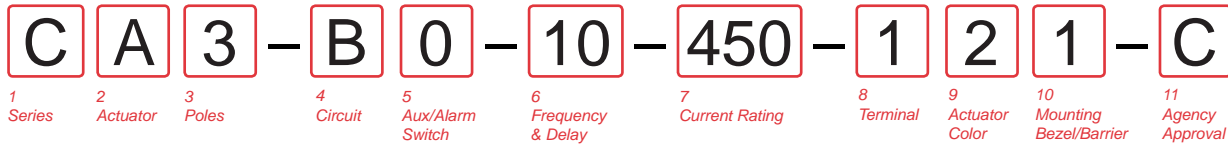
EN60934, under License No.
R72041016



VDE Certified

EN60934, VDE 0642 under File No.
10537





1 SERIES

C

2 ACTUATOR¹

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

3 POLES²

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

4 CIRCUIT³

- | | |
|--------------------------------------|---|
| A ³ Switch Only (no coil) | F ⁴ Relay Trip (current) |
| B Series Trip (current) | G ⁴ Relay Trip (voltage) |
| C Series Trip (voltage) | H ^{4,5} Dual Coil with Shunt Trip Voltage Coil |
| D ⁴ Shunt Trip (current) | K ^{4,5} Dual Coil with Relay Trip Voltage Coil |
| E ⁴ Shunt Trip (voltage) | |

5 AUXILIARY/ALARM SWITCH

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

6 FREQUENCY & DELAY

- | | |
|---|---|
| 03 ³ DC 50/60Hz, Switch Only | 30 DC 50/60Hz Instantaneous |
| 10 ⁷ DC Instantaneous | 31 DC 50/60Hz Ultra Short |
| 11 DC Ultra Short | 32 DC 50/60Hz Short |
| 12 DC Short | 34 DC 50/60Hz Medium |
| 14 DC Medium | 36 DC 50/60Hz Long |
| 16 DC Long | 42 ⁸ 50/60Hz Short, Hi-Inrush |
| 20 ⁷ 50/60Hz Instantaneous | 44 ⁸ 50/60Hz Medium, Hi-Inrush |
| 21 50/60Hz Ultra Short | 46 ⁸ 50/60Hz Long, Hi-Inrush |
| 22 50/60Hz Short | 52 ⁸ DC Short, Hi-Inrush |
| 24 50/60Hz Medium | 54 ⁸ DC Medium, Hi-Inrush |
| 26 50/60Hz Long | 56 DC Long, Hi-Inrush |

Notes:

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

7 CURRENT RATING (AMPERES)

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

VOLTAGE COIL (NOMINAL RATED VOLTAGE)⁷

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

8 TERMINAL¹⁵

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

9 ACTUATOR COLOR & LEGEND¹⁶

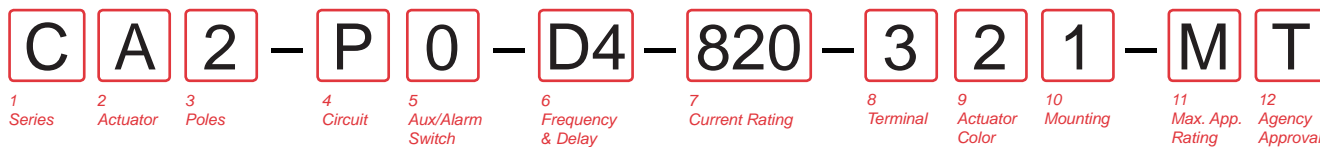
Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	A	B	1	Black
Black	C	D	2	White
Red	F	G	3	White
Green	H	J	4	White
Blue	K	L	5	White
Yellow	M	N	6	Black
Gray	P	Q	7	Black
Orange	R	S	8	Black
Black (short handle) ¹⁷	T	U	9	White

10 MOUNTING/BARRIERS

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

11 AGENCY APPROVAL

- C UL Recognized, CSA Accepted
- D VDE Certified, UL Recognized, CSA Accepted
- E TUV Certified, UL Recognized, CSA Accepted
- H UL489 Construction: VDE Certified, UL Recognized, CSA Accepted
- I UL 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



1 SERIES
C

2 ACTUATOR¹
A Handle, one per pole
S Mid-Trip Handle, one per pole
T Mid-Trip, one per pole & Alarm Switch

3 POLES⁴
1 One 2 Two 3 Three

4 CIRCUIT⁵
B Series Trip P Series Trip (parallel pole)

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

6 FREQUENCY & DELAY⁷
D1 DC Ultra Short 11 DC Ultra Short
D2 DC Short 12 DC Short
D4 DC Medium 14 DC Medium
D6 DC Long 16 DC Long

7 CURRENT RATING (AMPERES)

CODE	AMPERES			
810	100.00	813 130.00	817 170.00	820 200.00
811	110.00	814 140.00	917 175.00	922⁴ 225.00
812	120.00	815 150.00	818 180.00	825⁴ 250.00
912	125.00	816 160.00	819 190.00	

8 TERMINAL⁶
3 Stud 1/4-20
6 Stud M6
A Plug-In Stud

9 ACTUATOR COLOR²

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

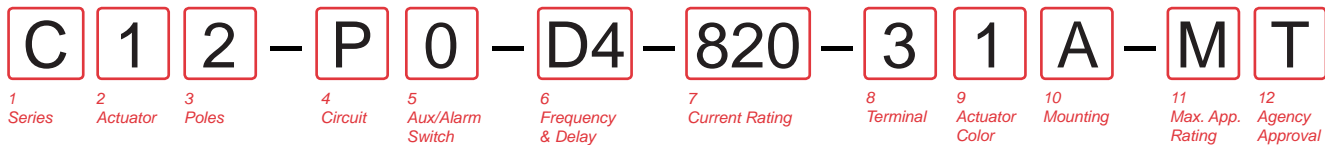
10 MOUNTING
Threaded Insert
1 6-32 x 0.195 inches
2 ISO M3 x 5mm

11 MAXIMUM APPLICATION RATING
M 80 DC

12 AGENCY APPROVAL⁸
A Without Approval
J UL489A Listed, TUV Certified
T UL489A Listed
K UL489A Listed, VDE Certified (up to 200 amps)
7 UL489A Listed, TUV Certified (up to 250 amps)

Notes:

- Handle moves to Mid-Position only upon electrical trip of C/B when Actuator S is specified. When Actuator Code T is specified, handle moves to Mid Position and Alarm Switch actuates only upon electrical trip of C/B.
- Standard Handle colors are White, Black, Red & Yellow.
- Breakers with Terminal Codes 3 & 6 are supplied with bus bars connecting the Line and Load Terminals. For Terminal Code A, Line and Load Terminals must be connected to a copper bus bar having a minimum cross-section of 0.078 square inches. Terminal code A not available on the single pole unit.
- Rating for 101 to 125 amps are available in 1 pole size. Ratings from 110 to 200 amps are available in 2-pole size. For ratings from 225-250 amps, specify 3-pole size.
- Circuit code B only available with 1 pole.
- 1 pole only available with terminal codes 3 and 6.
- Delays 11, 12, 14, and 16 are only available with 1 pole.
- Agency code K and 7 not available with 1 pole.
Agency code J only available with 1 pole.



1 SERIES

C

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

- ### 3 POLES²
- | | | |
|--------------|--------------|----------------|
| 1 One | 2 Two | 3 Three |
|--------------|--------------|----------------|

- ### 4 CIRCUIT³
- | | |
|----------------------|--------------------------------------|
| B Series Trip | P Series Trip (parallel pole) |
|----------------------|--------------------------------------|

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

- ### 6 FREQUENCY & DELAY⁵
- | | |
|--------------------------|--------------------------|
| D1 DC Ultra Short | 11 DC Ultra Short |
| D2 DC Short | 12 DC Short |
| D4 DC Medium | 14 DC Medium |
| D6 DC Long | 16 DC Long |

7 CURRENT RATING (AMPERES)²

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

- ### 8 TERMINAL⁴
- 3** Stud 1/4-20
 - 6** Stud M6
 - A** Plug-In Stud

9 ACTUATOR COLOR

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

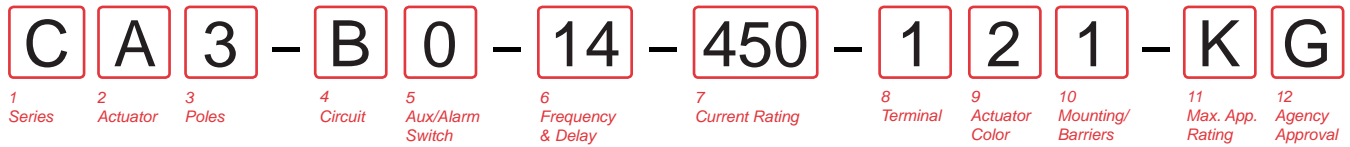
- ### 10 MOUNTING
- #### ROCKER / MOUNTING INSERT STYLE
- A** Standard Rocker Bezel - 6-32 Inserts
 - B** Standard Rocker Bezel - M3 Inserts
 - C** Rocker Guard Bezel - 6-32 Inserts
 - D** Rocker Guard Bezel - M3 Inserts
 - E** Standard Bezel with recessed Off Side Flat Rocker - 6-32 Inserts
 - F** Standard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

- ### 11 MAXIMUM APPLICATION RATING
- M** 80 DC

- ### 12 AGENCY APPROVAL⁶
- A** Without Approval
 - J** UL489A Listed, TUV Certified
 - T** UL489A Listed
 - 7** UL489A Listed, TUV Certified

Notes:

- 1 Breakers with Terminal Codes 3 & 6 are supplied with bus bars connecting the Line and Load Terminals. For Terminal Code A, Line and Load Terminals must be connected to a copper bus bar having a minimum cross-section of 0.078 square inches. Terminal code A not available on the single pole unit.
- 2 Ratings for 101 to 125 amps are available in 1-pole size. Ratings from 110 to 200 amps are available in 2-pole size. For ratings from 225-250 amps, specify 3-pole size.
- 3 Circuit code B only available with 1-pole.
- 4 1 pole only available with terminal codes 3 and 6.
- 5 Delays 11, 12, 14, and 16 are only available with 1 pole.
- 6 Agency code K and 7 not available with 1 pole. Agency code J only available with 1 pole.



1 SERIES

C

2 ACTUATOR¹

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

3 POLES²

- 1 One
- 2 Two
- 3 Three

4 CIRCUIT

- B Series Trip (current)

5 AUXILIARY/ALARM SWITCH³

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

6 FREQUENCY & DELAY

- 11 DC Ultra Short
- 12 DC Short
- 14 DC Medium
- 16 DC Long
- 21 50/60Hz Ultra Short
- 22 50/60Hz Short
- 24 50/60Hz Medium
- 26 50/60Hz Long
- 42⁴ 50/60Hz Short, Hi-Inrush
- 44⁴ 50/60Hz Medium, Hi-Inrush
- 46⁴ 50/60Hz Long, Hi-Inrush
- 52⁴ DC Short, Hi-Inrush
- 54⁴ DC Medium, Hi-Inrush
- 56⁴ DC Long, Hi-Inrush

Notes:

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

7 CURRENT RATING (AMPERES)⁵

CODE	AMPERES				
210	0.100	295	0.950	470	7.000
215	0.150	410	1.000	475	7.500
220	0.200	512	1.250	480	8.000
225	0.250	415	1.500	485	8.500
230	0.300	517	1.750	490	9.000
235	0.350	420	2.000	495	9.500
240	0.400	522	2.250	610	10.000
245	0.450	425	2.500	710	10.500
250	0.500	527	2.750	611	11.000
255	0.550	430	3.000	711	11.500
260	0.600	435	3.500	612	12.000
265	0.650	440	4.000	712	12.500
270	0.700	445	4.500	613	13.000
275	0.750	450	5.000	614	14.000
280	0.800	455	5.500	615	15.000
285	0.850	460	6.000	616	16.000
290	0.900	465	6.500	617	17.000
618	18.000	620	20.000	622	22.000
624	24.000	625	25.000	630	30.000
635	35.000	640	40.000	660	60.000
640	40.000	670	70.000	680	80.000
655	85.000	685	85.000	690	90.000
695	95.000	810	100.000		

8 TERMINAL⁶

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

9 ACTUATOR COLOR & LEGEND¹¹

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

10 MOUNTING/BARRIERS

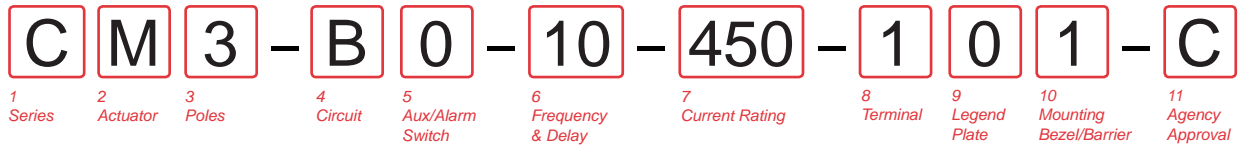
MOUNTING STYLE	BARRIERS ¹²
Threaded Insert	
1 6-32 x 0.195 inches	yes
2 ISO M3 x 5mm	yes

11 MAXIMUM APPLICATION RATING

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

12 AGENCY APPROVAL¹¹

A	w/o approvals
F	UL489 Listed, CSA Certified & VDE Certified
G	UL489 Listed & CSA Certified
J	UL489 Listed, CSA Certified & TUV Certified



1 SERIES
C

2 ACTUATOR¹
M Sealed Toggle, one per pole

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

4 CIRCUIT

A² Switch Only (no coil)	F³ Relay Trip (current)
B Series Trip (current)	G³ Relay Trip (voltage)
C Series Trip (voltage)	H^{3,4} Dual Coil with Shunt Trip
D³ Shunt Trip (current)	Voltage Coil
E³ Shunt Trip (voltage)	K^{3,4} Dual Coil with Relay Trip
	Voltage Coil

5 AUXILIARY/ALARM SWITCH

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

6 FREQUENCY & DELAY

03² DC 50/60Hz, Switch Only	30 DC 50/60Hz Instantaneous
10⁶ DC Instantaneous	31 DC 50/60Hz Ultra Short
11 DC Ultra Short	32 DC 50/60Hz Short
12 DC Short	34 DC 50/60Hz Medium
14 DC Medium	36 DC 50/60Hz Long
16 DC Long	42⁷ 50/60Hz Short, Hi-Inrush
20⁶ 50/60Hz Instantaneous	44⁷ 50/60Hz Medium, Hi-Inrush
21 50/60Hz Ultra Short	46⁷ 50/60Hz Long, Hi-Inrush
22 50/60Hz Short	52⁷ DC Short, Hi-Inrush
24 50/60Hz Medium	54⁷ DC Medium, Hi-Inrush
26 50/60Hz Long	56 DC Long, Hi-Inrush

7 CURRENT RATING (AMPERES)⁹

CODE	AMPERES						
020	0.020	235	0.350	430	3.000	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	660⁹	60.000
090	0.090	512	1.250	610	10.000	670⁹	70.000
095	0.095	415	1.500	710	10.500	680⁹	80.000
210	0.100	517	1.750	611	11.000	685⁹	85.000
215	0.150	420	2.000	711	11.500	690⁹	90.000
220	0.200	522	2.250	612	12.000	695⁹	95.000
225	0.250	425	2.500	712	12.500	810⁹	100.000
230	0.300	527	2.750	613	13.000		

VOLTAGE COIL (NOMINAL RATED VOLTAGE)⁷

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

8 TERMINAL

1⁹ Stud 10-32	6¹¹ Stud M6
2¹⁰ Screw 10-32	7¹² 0.250 Double Click Connect
3¹¹ Stud 1/4-20	9¹¹ 7/16" Clip Terminal
4¹⁰ Stud M5 x 0.8	A¹³ Plug-In Stud
5¹⁰ Screw M5 x 0.8	C¹⁰ 5/16" Clip Terminal

9 LEGEND PLATE
0 No Legend

10 MOUNTING/BARRIERS

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

11 AGENCY APPROVAL

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

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

C **C** **3** - **B** **0** - **14** - **450** - **1** **2** **1** - **D**

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

1 SERIES

C

2 ACTUATOR¹

Two Color Visi-Rocker

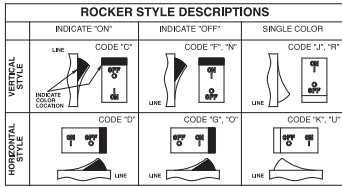
- C** Indicate ON, vertical legend
- D** Indicate ON, horizontal legend
- E** Indicate ON, no legend
- F** Indicate OFF, vertical legend
- G** Indicate OFF, horizontal legend
- H** Indicate OFF, no legend

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 POLES²

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

4 CIRCUIT

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

5 AUXILIARY/ALARM SWITCH⁶

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

6 FREQUENCY & DELAY

- 03** DC 50/60Hz, Switch Only
- 10⁷** DC Instantaneous
- 11** DC Ultra Short
- 12** DC Short
- 14** DC Medium
- 16** DC Long
- 20⁷** 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
- 42⁸** 50/60Hz Short, Hi-Inrush
- 44⁸** 50/60Hz Medium, Hi-Inrush
- 46⁸** 50/60Hz Long, Hi-Inrush
- 52⁸** DC Short, Hi-Inrush
- 54⁸** DC Medium, Hi-Inrush
- 56⁸** DC Long, Hi-Inrush

Notes:

- 1 Push-To-Reset actuators have OFF portion of rocker shrouded.
- 2 Multi-pole breakers have all poles identical except when specifying 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. Auxiliary switch codes 2, 3 & 4 are VDE approved.
- 7 Voltage coils not rated for continuous duty. Available only with delay codes 10 & 20.
- 8 Available with Circuit Codes B & D only, and up to 50 amps maximum.
- 9 Current Ratings 60-70 are available up to four poles maximum. Ratings 71-100 are available up to two poles maximum.
- 10 Terminal Code 1 available to 60 amps maximum.
- 11 Terminal Codes 2,4,5 & C available to 50 amps maximum.
- 12 Terminal Codes 3,6 & 9 available to 100 amps maximum.
- 13 Terminal Code 7 available to 25 amps maximum.
- 14 Terminal Code A available to 100 amps maximum.
- 15 Terminal Codes 7, 9 & C are not VDE approved.
- 16 Color shown is visi and legend with remainder of rocker black
- 17 Legend on Push-to-reset bezel/shroud is white when single color rocker is ordered. Dual = ON-OFF/I-O legend with actuator codes C - G, and J, K, N, O, R, & U. None = no legend with actuator codes H, L, P, V. Rockerguard available with actuator codes C - L. Push-to-reset available with actuator codes N, O, P, R, U, V.
- 18 VDE/TUV approval requires Dual (I-O, ON-OFF) or I-O markings on rocker.
- 19 VDE/TUV: 30 amps max.; UL/CSA: 50 amps max.; Available in 2 - 4 poles only and limited to AC Delays. "General Purpose amps" not rated for "full load amps" or to be used in applications with a motor.

7 CURRENT RATING (AMPERES)

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

VOLTAGE COIL (NOMINAL RATED VOLTAGE)⁷

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

8 TERMINAL

- ¹¹⁰ Stud 10-32
- ²¹¹ Screw 10-32
- ³¹² Stud 1/4-20
- ⁴¹¹ Stud M5 x 0.8
- ⁵¹¹ Screw M5 x 0.8
- ⁶¹² Stud M6
- ⁷¹³ 0.250 Double Quick Connect
- ⁹ 7/16" Clip Terminal
- ^{A14} Plug-In Stud
- ^C 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND^{16,17,18}

Actuator or Visi-Color	Marking:	Marking Color:
Color:	I-O ON-OFF Dual/None	Single Color Rocker/Handle Visi-Rocker
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/BARRIERS¹

	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
	ROCKERGARD 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

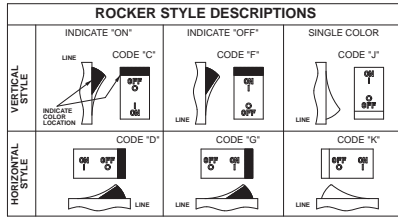
C

2 ACTUATOR¹

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



3 POLES¹

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

4 CIRCUIT

B Series Trip (current)

5 AUXILIARY/ALARM SWITCH²

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

6 FREQUENCY & DELAY

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

Notes:

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

7 CURRENT RATING (AMPERES)⁴

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	295	0.950	470	7.000	618	18.000
215	0.150	410	1.000	475	7.500	620	20.000
220	0.200	512	1.250	480	8.000	622	22.000
225	0.250	415	1.500	485	8.500	624	24.000
230	0.300	517	1.750	490	9.000	625	25.000
235	0.350	420	2.000	495	9.500	630	30.000
240	0.400	522	2.250	610	10.000	635	35.000
245	0.450	425	2.500	710	10.500	640	40.000
250	0.500	527	2.750	611	11.000	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

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

9 ACTUATOR COLOR & LEGEND¹¹

Actuator or

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

10 MOUNTING/BARRIERS¹²

	Standard Rocker Bezel Threaded Insert, 2 per pole	BARRIERS ¹³
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 AC¹⁴
D 240 AC
F 277 AC
K 120 AC
M 80 DC

12 AGENCY APPROVAL

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

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

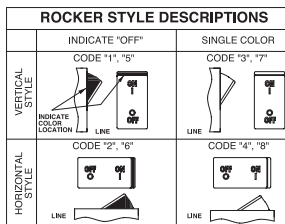
2 ACTUATOR¹

Two Color Visi-Rocker

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

Single color

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



3 POLES²

- 1 One 2 Two 3 Three

4 CIRCUIT

- B Series Trip (current)

5 AUXILIARY/ALARM SWITCH²

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

6 FREQUENCY & DELAY

- 11 DC Ultra Short 26 50/60Hz Long
- 12 DC Short 42⁴ 50/60Hz Short, Hi-Inrush
- 14 DC Medium 44⁴ 50/60Hz Medium, Hi-Inrush
- 16 DC Long 46⁴ 50/60Hz Long, Hi-Inrush
- 21 50/60Hz Ultra Short 52⁴ DC Short, Hi-Inrush
- 22 50/60Hz Short 54⁴ DC Medium, Hi-Inrush
- 24 50/60Hz Medium 56⁴ DC Long, Hi-Inrush

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

7 CURRENT RATING (AMPERES)⁵

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	295	0.950	470	7.000	618	18.000
215	0.150	410	1.000	475	7.500	620	20.000
220	0.200	512	1.250	480	8.000	622	22.000
225	0.250	415	1.500	485	8.500	624	24.000
230	0.300	517	1.750	490	9.000	625	25.000
235	0.350	420	2.000	495	9.500	630	30.000
240	0.400	522	2.250	610	10.000	635	35.000
245	0.450	425	2.500	710	10.500	640	40.000
250	0.500	527	2.750	611	11.000	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

- 1⁷ Stud 10-32
- 2⁸ Screw 10-32
- 3⁹ Stud 1/4-20
- 4⁸ Stud M5 x 0.8
- 5⁸ Screw M5 x 0.8
- 6⁹ Stud M6
- 9^{9,10} 7/16" Clip Terminal
- A⁹ Plug-In Stud
- C^{8,10} 5/16" Clip Terminal

9 ACTUATOR COLOR & LEGEND¹²

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

10 MOUNTING/BARRIERS¹²

	STANDARD ROCKER BEZEL Threaded Insert, 2 per pole	BARRIERS ¹⁵
A	6-32 X 0.195 inches	yes
C	ISO M3 x 5mm	yes
	RECESSED OFF ROCKER 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 AC¹⁶
- D 240 AC
- F 277 AC
- K 120 AC
- M 80 DC

12 AGENCY APPROVAL

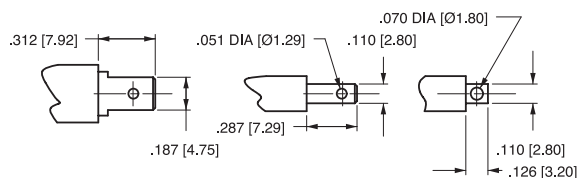
- A without approvals
- G UL 489 Listed & CSA Certified
- J UL489 Listed, CSA Certified & TUV Certified

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

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

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

AUXILIARY / ALARM SWITCH TERMINAL DETAIL³



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

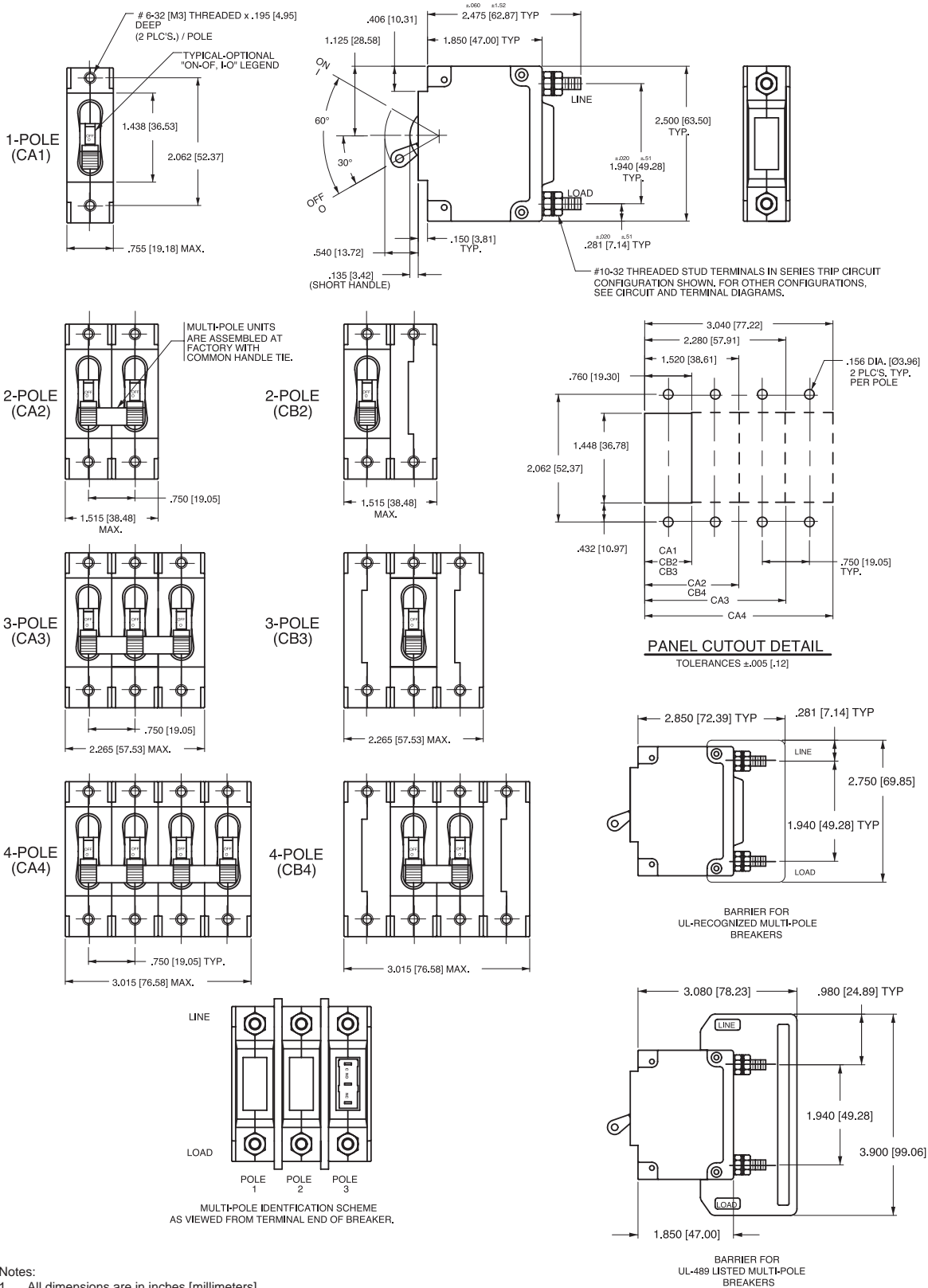
Notes:

- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [.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 multi-pole identification scheme.

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

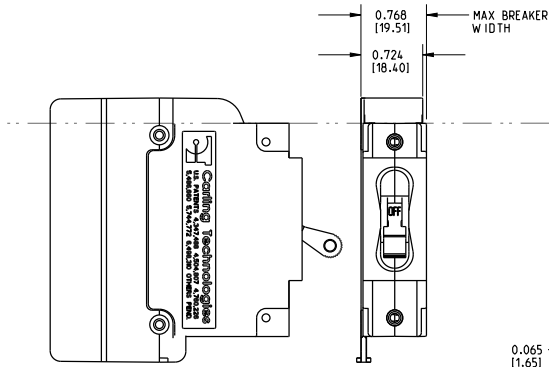
HANDLE POSITION VS. AUX/ALARM SWITCH MODE					
CIRCUIT BREAKER MODE	STANDARD C/B			MID TRIP C/B	
	HANDLE POSITION	AUX. SWITCH MODE	HANDLE POSITION	STANDARD ALARM SWITCH MODE	REVERSE ALARM SWITCH MODE ⁴
OFF					
ON					
ELECTRICAL TRIP					

- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [0.51] unless otherwise specified.
 - 3 Schematic shown represents current trip circuits.
 - 4 Available only as special catalog number.

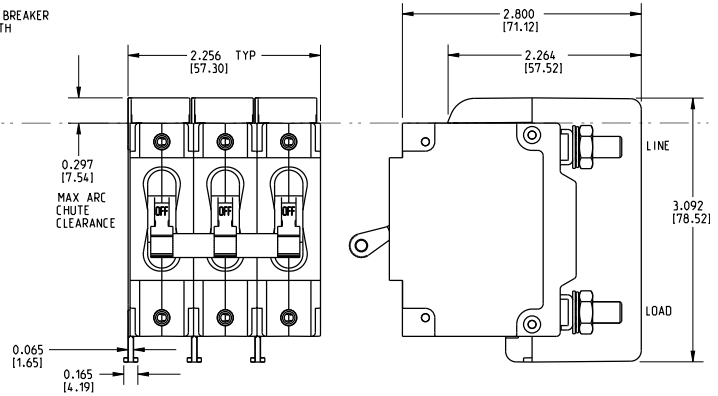


- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ±.020 [.51] unless otherwise specified.

1-POLE (CA1)
w/ ARC CHUTE BARRIER

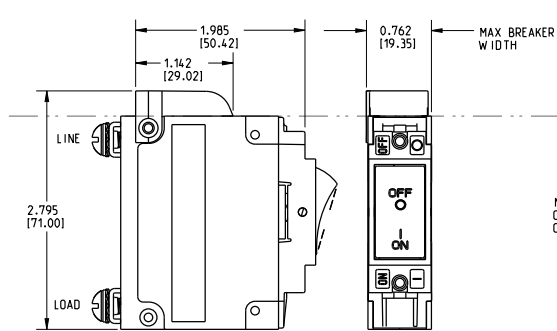


3-POLE (CA3)
w/ ARC CHUTE BARRIER

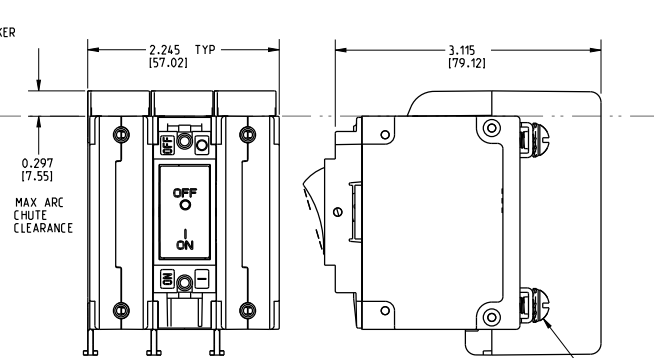


INDICATE "ON"

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



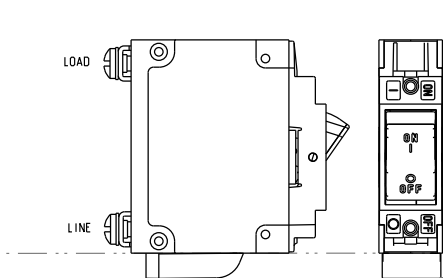
3-POLE (CC3,CD3)
w/ ARC CHUTE BARRIER



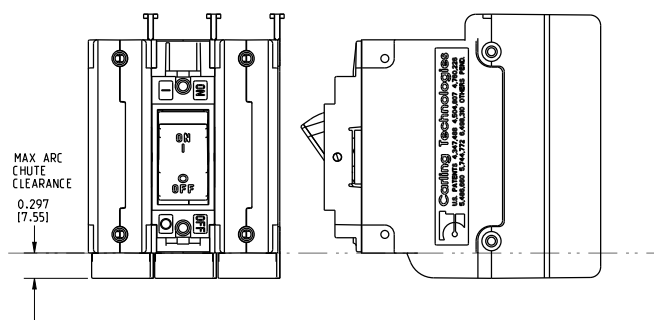
SCREW TYPE TERMINALS IN SERIES TRIP CIRCUIT CONFIGURATION SHOWN.

INDICATE "OFF" / SINGLE COLOR

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



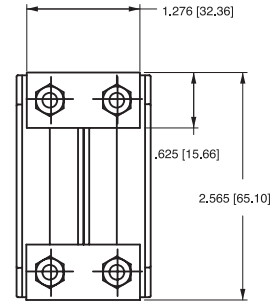
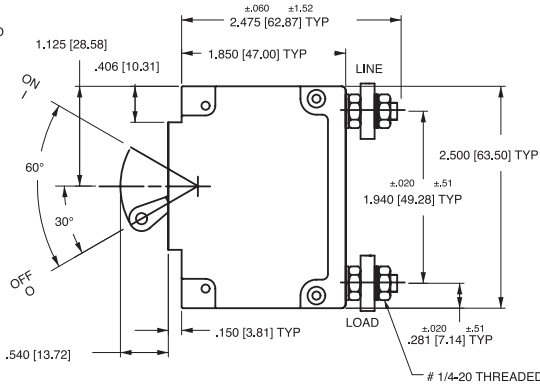
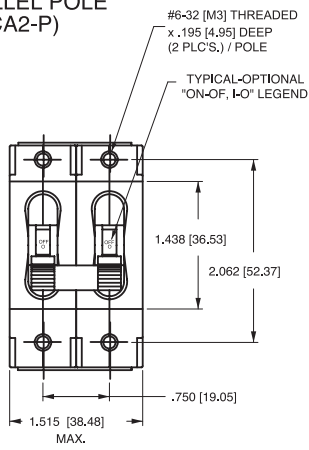
3-POLE (CF3,CG3,C13,C23)
w/ ARC CHUTE BARRIER



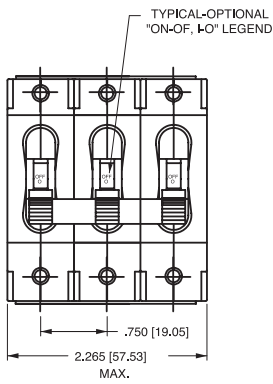
Notes:

- 1 Only 1-pole and 3-pole configurations shown. Arc chute (w/o barrier) and arc chute barrier also available for 2-pole construction.
- 2 Dimensions apply to all variations shown.
- 3 Notice that line and load terminal orientation for indicate on and indicate off rocker circuit breakers are opposite.
- 4 Screw type terminals shown for Rocker style (CF1, C11, etc) circuit breakers. For other terminal configurations see circuit and terminal diagrams.
- 5 All dimensions are in inches [millimeters].
- 6 Tolerance $\pm .020$ unless otherwise specified.
- 7 Must be ordered under a special catalog number.

PARALLEL POLE (CA2-P)

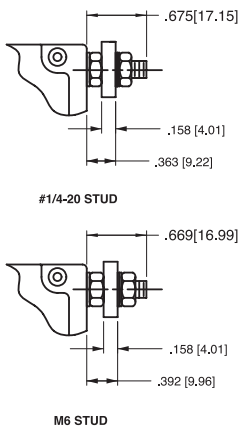
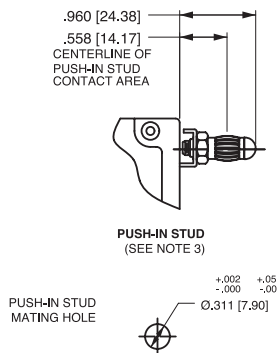


PARALLEL POLE (CA3-P)

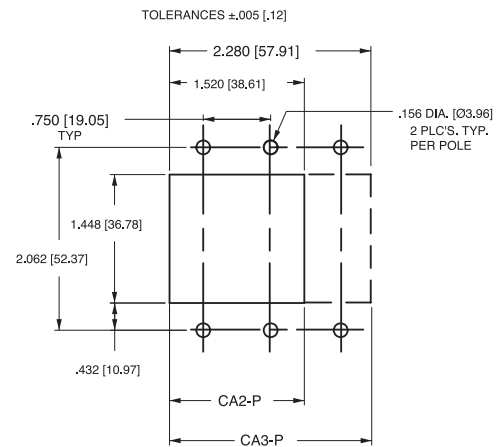


CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC (CA2-P SHOWN)		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC		
<p>±.060 ±1.52 1.388 [47.00] TYP</p>	<p>SERIES TRIP</p> <p>LINE LOAD</p> <p>LINE (NETZ) LOAD (LAST)</p>		P	0
<p>PUSH-IN STUD</p> <p>.400 [10.16] .225 [5.72]</p>	<p>SERIES TRIP WITH AUXILIARY SWITCH</p> <p>LINE LOAD C NO NC</p> <p>LINE (NETZ) LOAD (LAST) C NO NC</p>		P	2 3 4

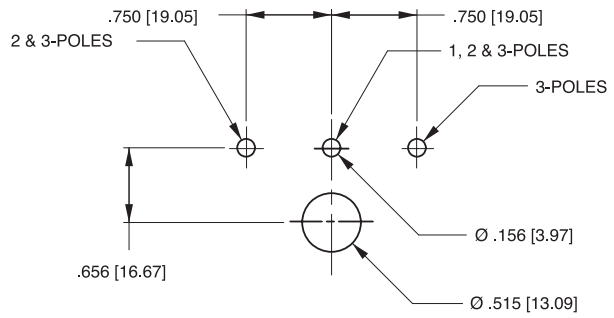
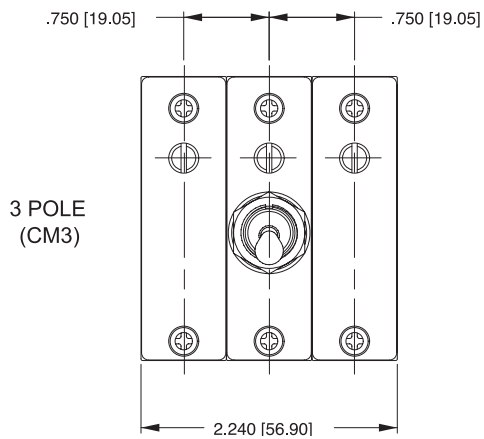
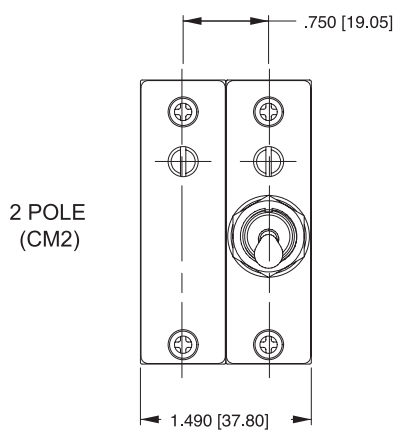
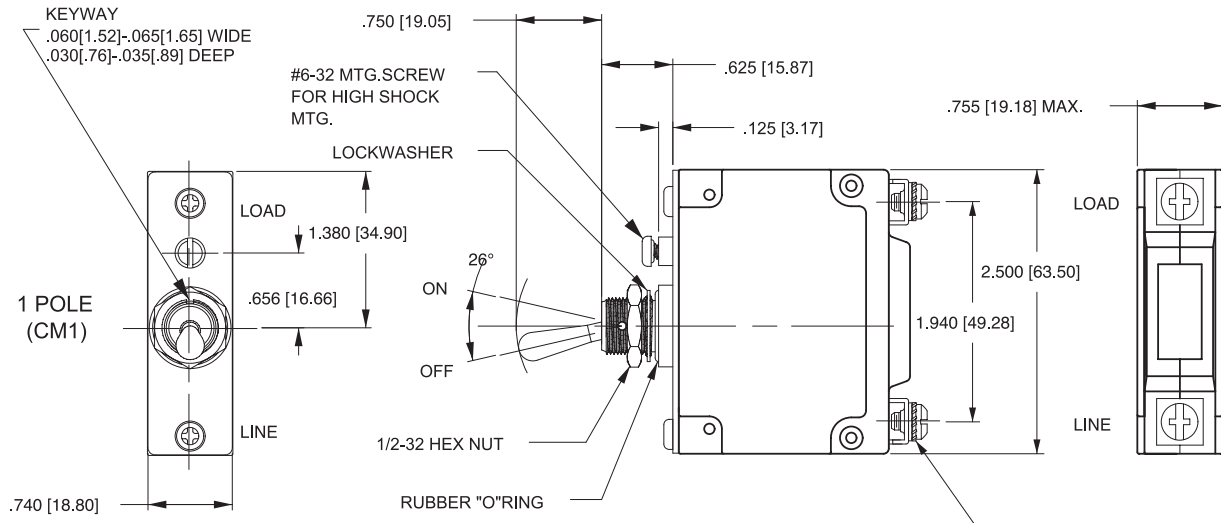
TERMINAL DETAILS



PANEL CUTOUT DETAIL

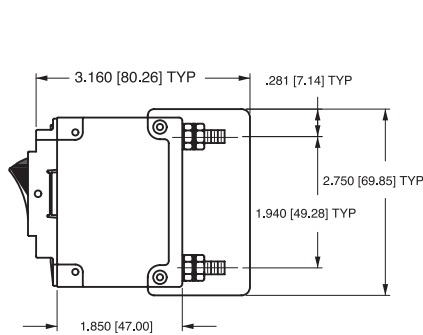


- Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ±.020 [.51] unless otherwise specified.

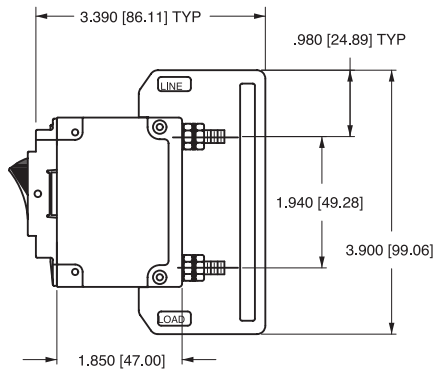


- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ±.020 [.51] unless otherwise specified.

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>2.160 [54,86] TYP</p> <p>LINE</p> <p>MAIN TERM'S. (SEE TABLE A)</p> <p>LOAD</p> <p>±.031 [.79]</p> <p>.625 [15,88] TYP</p> <p>SERIES TRIP (2 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL)</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ), LOAD (LAST)</p>		A	0	<p>SWITCH TRIP</p> <p>ANSI: LINE, LOAD</p> <p>IEC: LINE (NETZ) (3), LOAD (LAST)</p>		BC	0
<p>.675 [17,15] TYP</p> <p>.970 [24,64]</p> <p>1.265 [32,13]</p> <p>AUX. SWITCH TERM'S.(3 PLCS.)</p> <p>SERIES TRIP W/AUX. SWITCH (5 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH</p> <p>ANSI: LINE, C, NO, NC, LOAD</p> <p>IEC: LINE (NETZ), C, NO, NC, LOAD (LAST)</p>		A	3 4	<p>SERIES TRIP WITH AUXILIARY SWITCH</p> <p>ANSI: LINE, C, NO, NC, LOAD</p> <p>IEC: LINE (NETZ) (3), C, NO, NC, LOAD (LAST)</p>		BC	3 4
<p>SERIES TRIP (3 TERM'S.)</p>	<p>SHUNT TRIP</p> <p>ANSI: LINE, SHUNT, LOAD</p> <p>IEC: LINE (NETZ) (3), SHUNT (NEBENSCHLUSS), LOAD (LAST)</p>		DE	0	<p>DUAL COIL; SERIES TRIP CURRENT COIL, SHUNT TRIP VOLTAGE COIL</p> <p>ANSI: LINE, SHUNT, LOAD, VOLTAGE COIL</p> <p>IEC: LINE (NETZ), SHUNT, LOAD (LAST), VOLTAGE COIL</p>		H	0
<p>.646 [16,41]</p> <p>±.031 [.79]</p> <p>.812 [20,62] TYP</p> <p>.646 [16,41] TYP</p> <p>SERIES TRIP (4 TERM'S.)</p>	<p>RELAY TRIP</p> <p>ANSI: LINE (1), LOAD (2), RELAY (3), RELAY (4)</p> <p>IEC: RELAY (RELAIS) (3), LINE (NETZ) (1), RELAY (RELAIS) (4), LOAD (LAST) (2)</p>		FG	0	<p>DUAL COIL; SERIES TRIP CURRENT COIL, RELAY TRIP VOLTAGE COIL</p> <p>ANSI: LINE (1), LOAD (2), RELAY (3), RELAY (4), VOLTAGE COIL</p> <p>IEC: LINE (NETZ) (1), RELAY (RELAIS) (3), LOAD (LAST) (2), VOLTAGE COIL (4)</p>		K	0



BARRIER FOR UL-RECOGNIZED MULTI-POLE BREAKERS

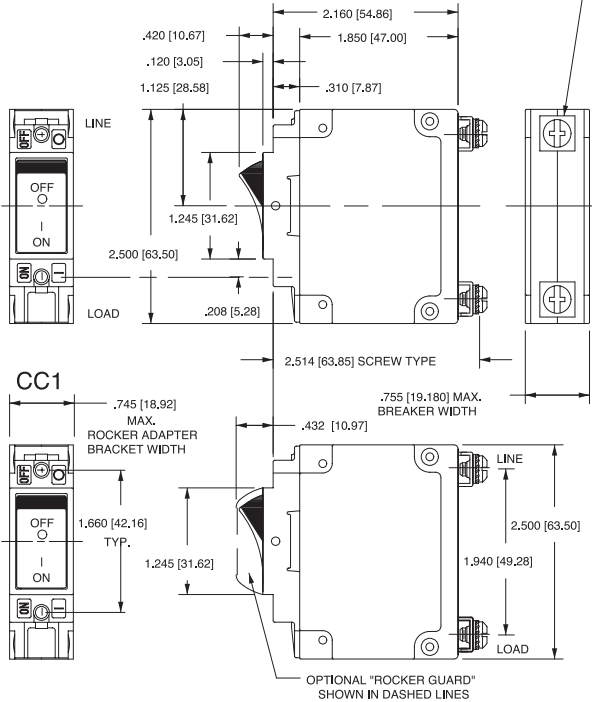


BARRIER FOR UL-489 LISTED MULTI-POLE BREAKERS

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

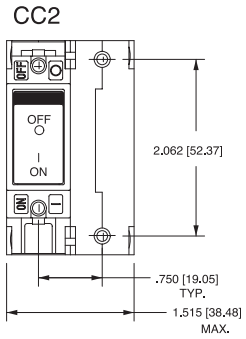
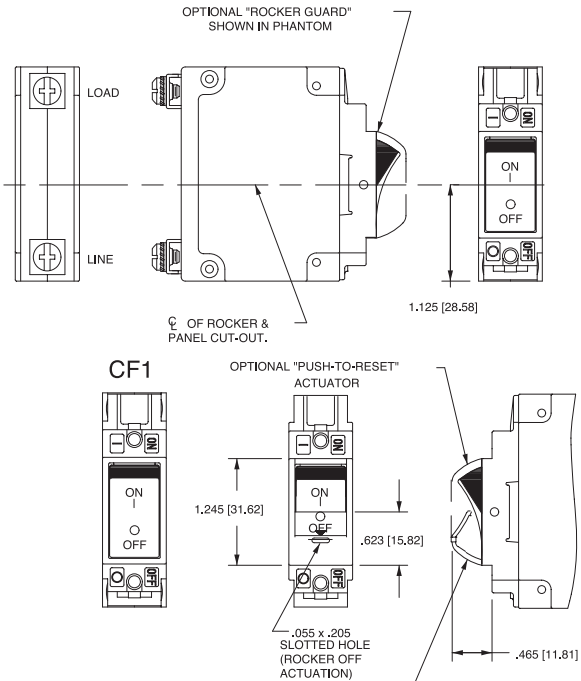
INDICATE "ON"

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

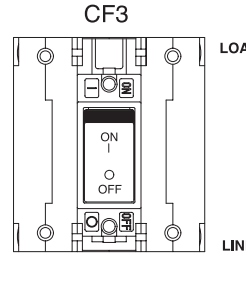
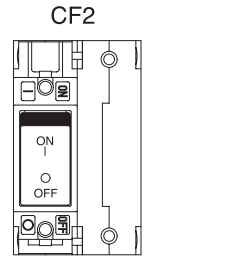
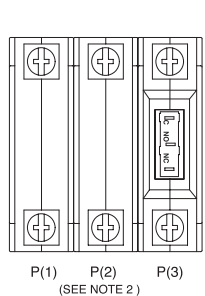
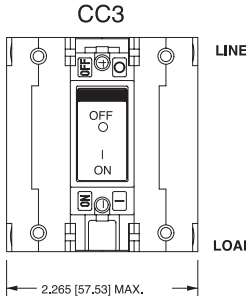
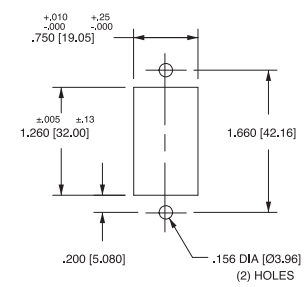


INDICATE "OFF" & SINGLE COLOR

(INDICATE "OFF" SHOWN)



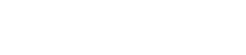
PANEL CUT-OUT DETAIL



ROCKER SHROUDED ON "OFF" POSITION SIDE, SHOWN IN DASHED LINES.



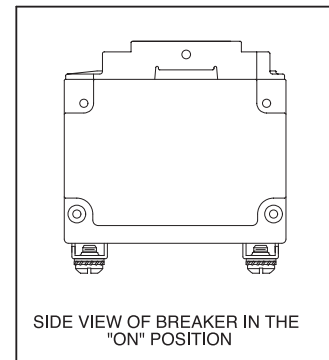
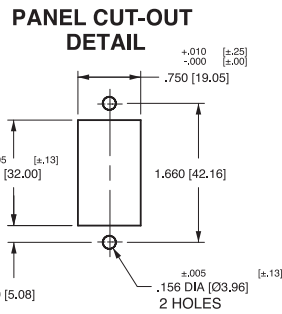
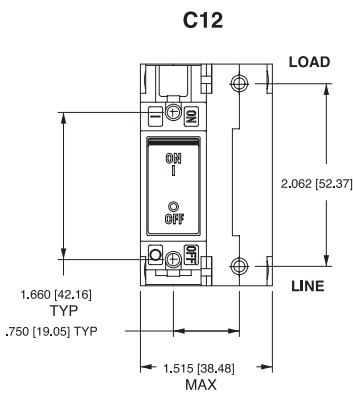
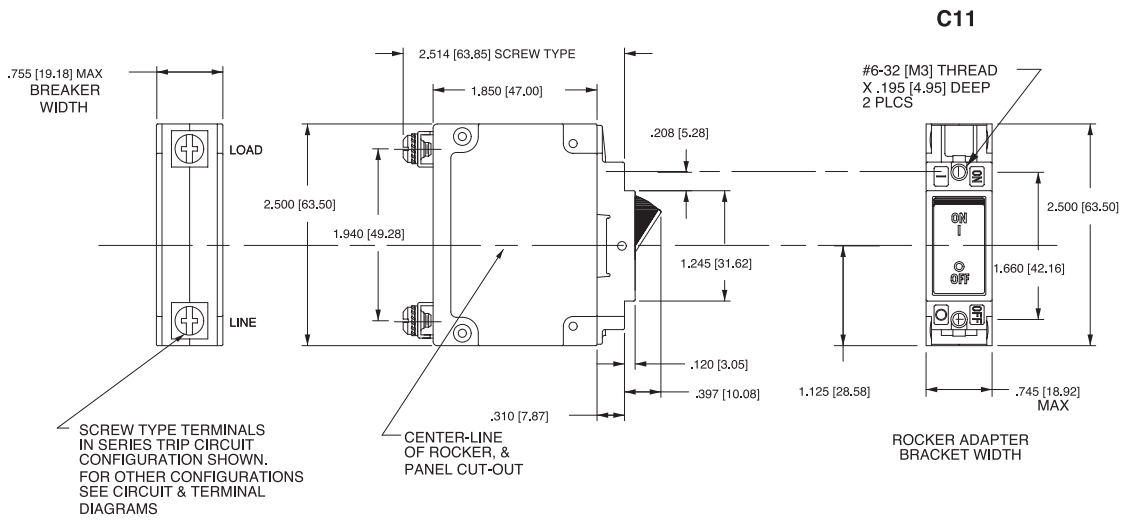
REAR VIEW OF INDICATE "ON" SERIES TRIP W/ AUX SWITCH CIRCUIT CONFIGURATION.



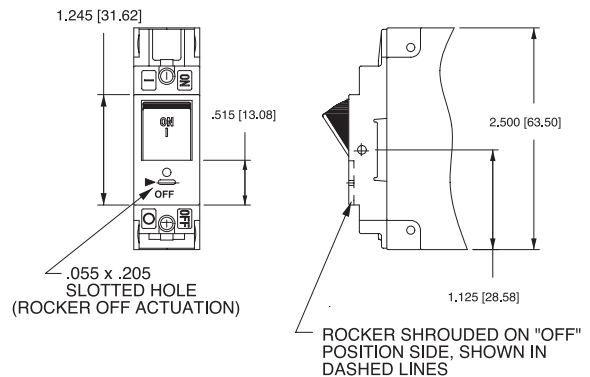
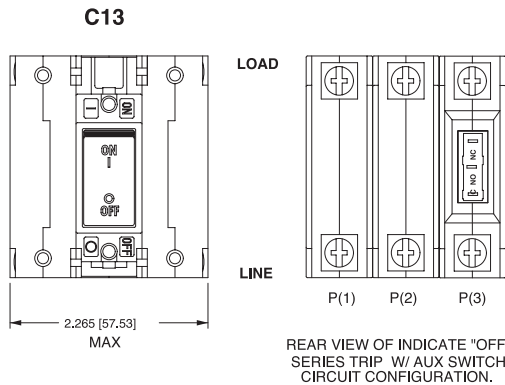
REAR VIEW OF INDICATE "OFF" SERIES TRIP W/ AUX SWITCH CIRCUIT CONFIGURATION.

- 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 ± 0.020 [.51] unless otherwise specified.

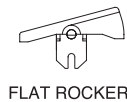
INDICATE "OFF" & SINGLE COLOR



PUSH-TO-RESET ACTUATOR



ACTUATOR SIDE VIEW (SURFACE CONTOURS)



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

D-Series

CIRCUIT BREAKER

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

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



Product Highlights:

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

Typical Applications:

- ♦ Industrial Controls
- ♦ Renewable Energy

Electrical

Maximum Voltage	AC, 480 wye/277 VAC (See Table A), 50/60 Hz, 65VDC
Standard Current Coils	0.100, 0.250, 0.500, 0.750, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0 & 50.0. Other ratings available - consult factory.
Standard Voltage Coils	DC - 6V, 12V; AC - 120V, other ratings available, see ordering scheme.
Insulation Resistance	Minimum of 100 Megohms at 500 VDC.
Dielectric Strength	UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. D-Series circuit breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between adjacent poles per Publications EN 60950 and VDE 0805.
Resistance, Impedance	Values from Line to Load Terminal - based on Series Trip Circuit Breaker

Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute; with rated Current and Voltage.
Trip Free	All D-Series Circuit Breakers will trip on overload, even when actuator is forcibly held in the ON position.
Trip Indication	The operating actuator moves positively to the OFF position when an overload causes the breaker to trip.

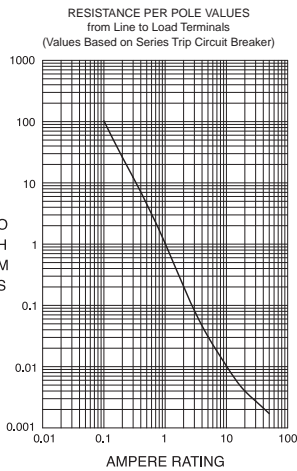
Physical

Number of Poles	Rocker Type: 1-3; Handle Type: 1-4
Internal Circuit Config.	Switch Only and Series Trip with current or voltage trip coils.
Weight	Approximately 128 grams/pole (Approximately 4.57 ounces/pole)
Standard Colors	Housing - Black; Actuator - See Ordering Scheme.
Mounting	Mounts on a standard 35mm Symmetrical DIN Rail (35 x 7.5 or 35 x 15mm per DIN EN5002).

Environmental

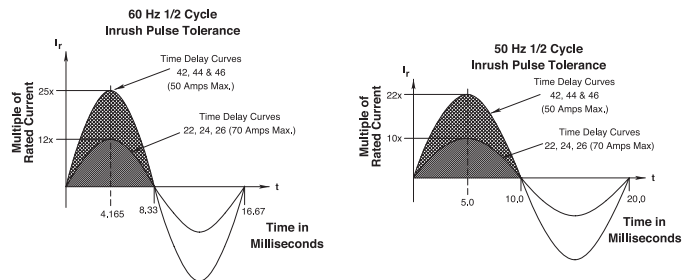
Designed and tested in accordance with requirements of specification MIL-PRF-55629 & MIL-STD-202 as follows:

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



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

Pulse Tolerance Curves



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

Electrical Tables

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

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

Table A Notes:

- 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

Agency Certifications

UL Recognized
UL Standard 1077


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

CSA Accepted


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

UL Listed
UL Standard 508


Switches, Industrial Control (Guide NRNT2, File E148683)

VDE Certified


EN60934, VDE 0642 under File No. 10537



1 SERIES

D

2 ACTUATOR¹

Handle²

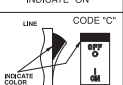
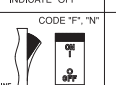

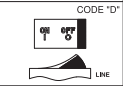
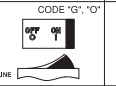







- A** Handle, one per pole
- B** Handle, one per multipole unit

Visi-Rocker³

- 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 Rocker³

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

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

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
10⁵ 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	42⁶ 50/60Hz Short, Hi-Inrush
16 DC Long	44⁶ 50/60Hz Medium, Hi-Inrush
20⁵ 50/60Hz Instantaneous	46⁶ 50/60Hz Long, Hi-Inrush
21 50/60Hz Ultra Short	52⁶ DC, Short, Hi-Inrush
22 50/60Hz Short	54⁶ DC, Medium, Hi-Inrush
24 50/60Hz Medium	56⁶ DC, Long, Hi-Inrush

Notes:

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

7 CURRENT RATING (AMPERES)

CODE 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:

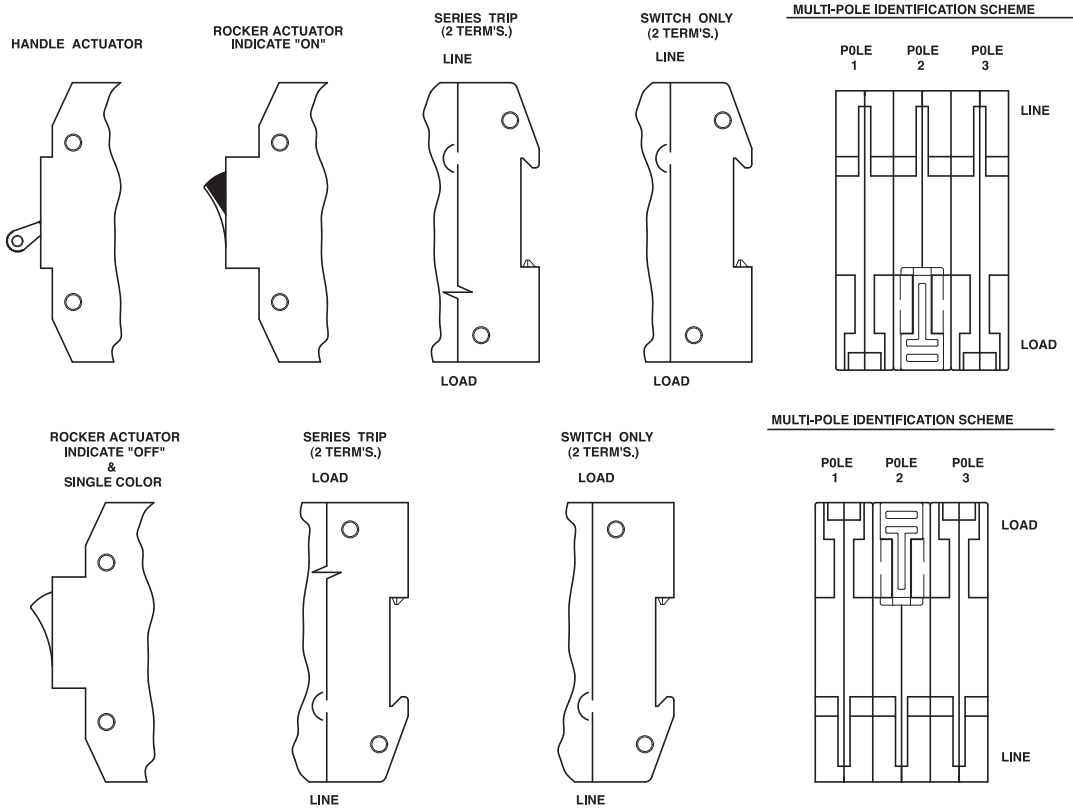
Color	I-O	ON-OFF	Dual	Marking Color: Single Color Rocker/Handle	Visi-Rocker (Actuator Black) ⁷
White	A	B	1	Black	White
Black	C	D	2	White	N/A
Red	F	G	3	White	Red
Green	H	J	4	White	Green
Blue	K	L	5	White	Blue
Yellow	M	N	6	Black	Yellow
Gray	P	Q	7	Black	Gray
Orange	R	S	8	Black	Orange

9 MOUNTING/VOLTAGE

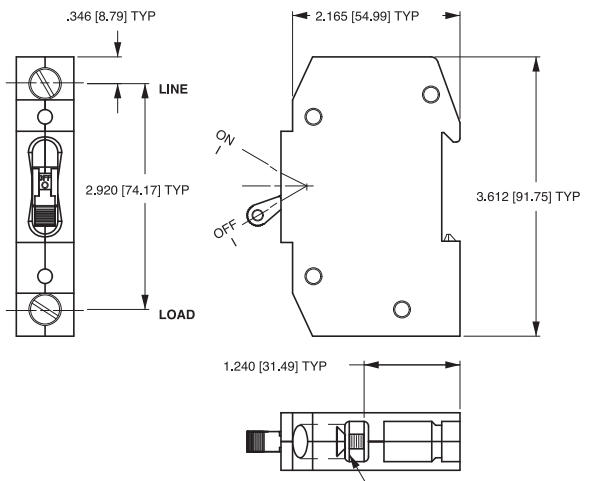
	MOUNTING STYLE	VOLTAGE
	Threaded Insert	
1	6-32 x 0.195 inches	< 300
C⁸	6-32 X 0.195 inches	≥ 300
2	ISO M3 x 5mm	< 300
D⁸	ISO M3 x 5mm	≥ 300

10 AGENCY APPROVAL

- C** UL Recognized & CSA Accepted
- D⁹** VDE Certified, UL Recognized & CSA Accepted



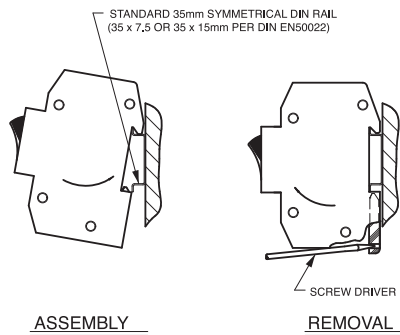
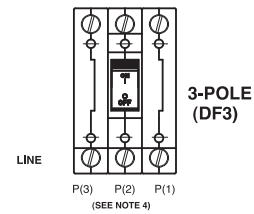
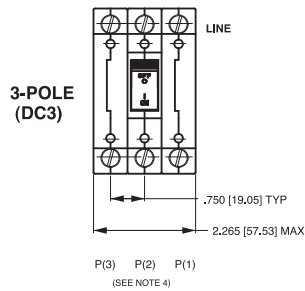
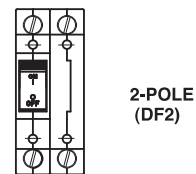
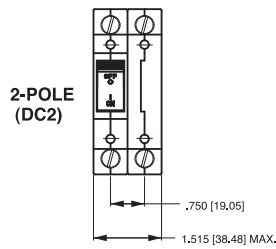
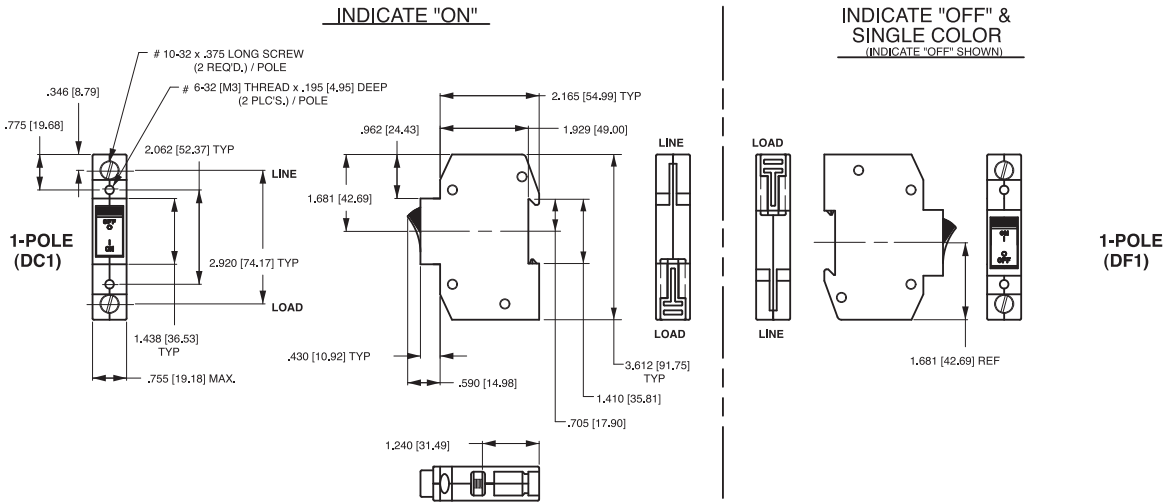
(HANDLE ACTUATOR SHOWN)



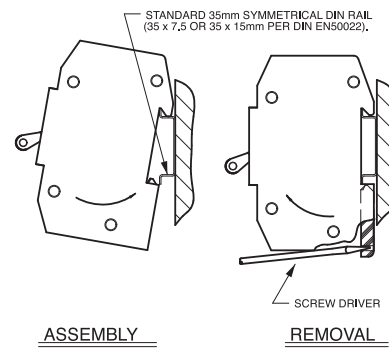
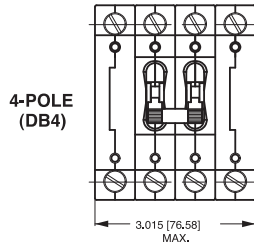
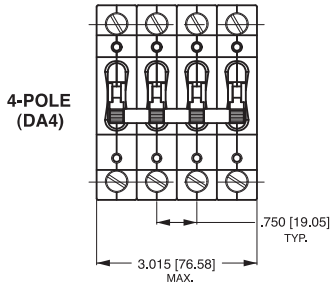
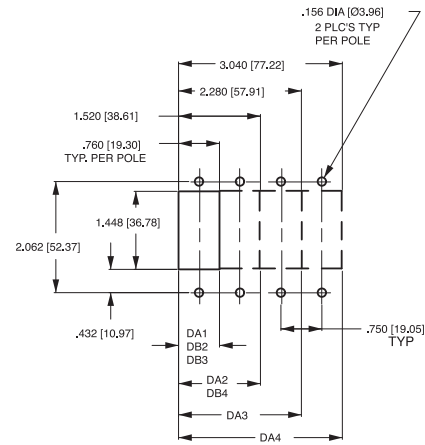
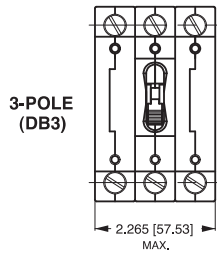
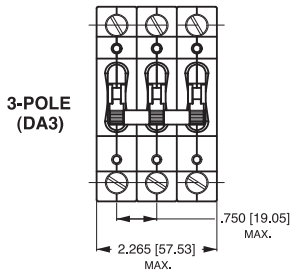
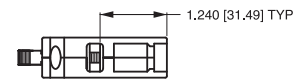
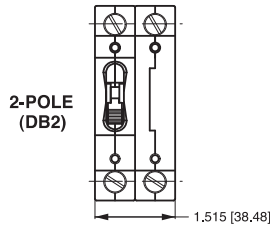
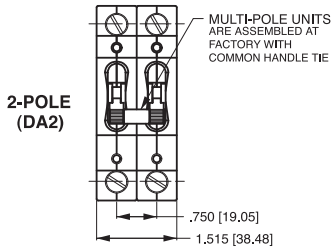
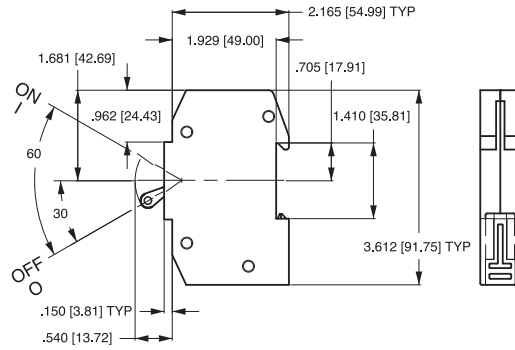
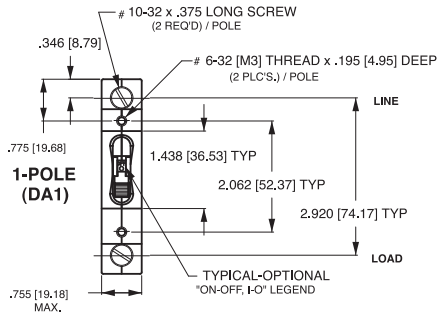
TERMINALS ARE SUPPLIED WITH #10-32 SCREW AND PRESSURE PLATE PER TERMINAL

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

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



- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.020 [.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 ±.010 [.25] unless otherwise specified.

G-Series

DIN-RAIL CIRCUIT BREAKER

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

G-Series DIN Rail Circuit Breaker:

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

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



Eco-Friendly

Resources:

Download 3D CAD Files

[IGS >](#)

[STP >](#)

Product Highlights:

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

Typical Applications:

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

G-Series

DESIGN FEATURES



Electrical Tables

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

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

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

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

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

Electrical

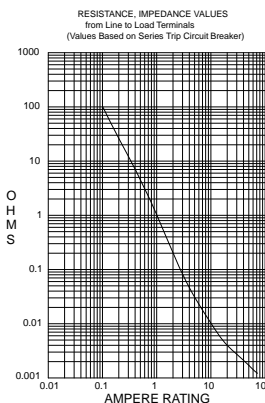
Maximum Voltage AC: 240VAC (single pole), 480VAC (3 poles, additional pole shall be dedicated for neutral break)
DC: 80VDC (single pole & multipole)

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

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

Insulation Resistance Dielectric Strength Minimum of 100 Megohms at 500 VDC
UL, CSA: 1960 V 50/60 Hz for one minute between all electrically isolated terminals. G-Series circuit breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.

Resistance, Impedance Values from Line to Load Terminal - based on series trip circuit breaker.



CURRENT (AMPS)	TOLERANCE (%)
0.1 - 5.0	15%
5.1 - 20.0	25%
20.1 - 63.0	35%

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

Mechanical

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

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

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

Physical

Number of Poles 1 pole ≤ 63A, 2 poles ≤ 63A per pole

Weight Approx. 172 grams/pole (4.13 oz).

Standard Colors Housing: Black

Environmental

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

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

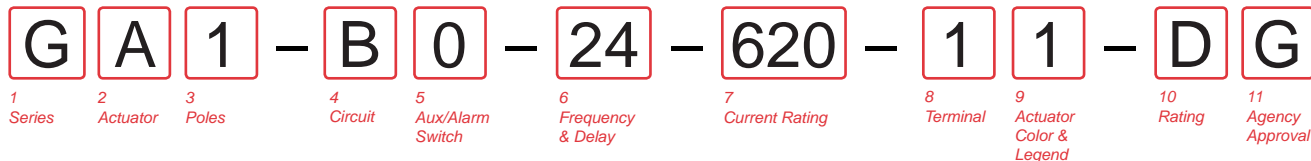
Vibration Withstands 0.060" excursion from 10-55 Hz & 10 Gs 55-500 Hz, @ rated current per Method 204C, Test Cond. A. Instantaneous & ultrashort curves tested @ 90% of rated current.

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

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

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

Operating Temperature -40°C to +85°C



1 SERIES
G

2 ACTUATOR
A Handle, one per pole
S¹ Mid-Trip Handle, one per pole

3 POLES
1 One
2 Two
3 Three

4 CIRCUIT
B Series Trip (current)

5 AUXILIARY/ALARM SWITCH³
0 without Aux Switch
1 S.P.D.T., Screw Terminal
3 S.P.D.T. Screw Terminal (Gold Contacts)
5 Plug-in Terminal
6 Plug-in Terminal (Gold Contacts)

6 FREQUENCY & DELAY

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

6 CURRENT RATING (AMPERES)

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

8 TERMINAL
1 Screw Terminal

9 ACTUATOR COLOR & LEGEND

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

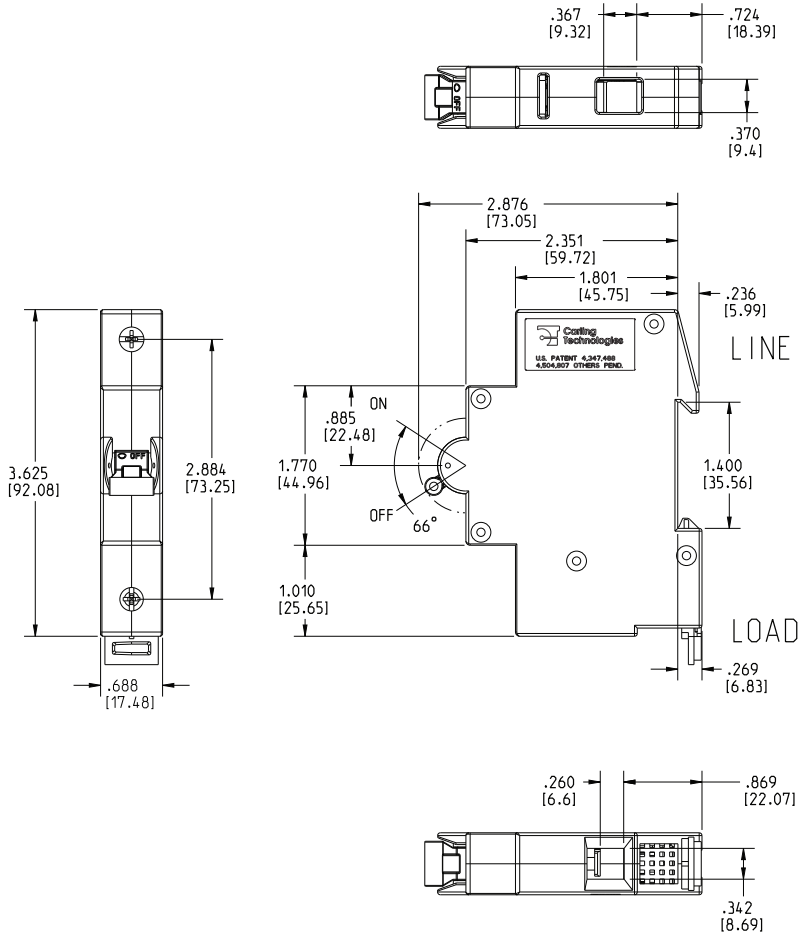
10 APPLICATION RATING

B 125 VDC⁵
C 120/240 VAC⁶
D 240 VAC⁷
K 120 VAC⁸
M 80 VDC⁹

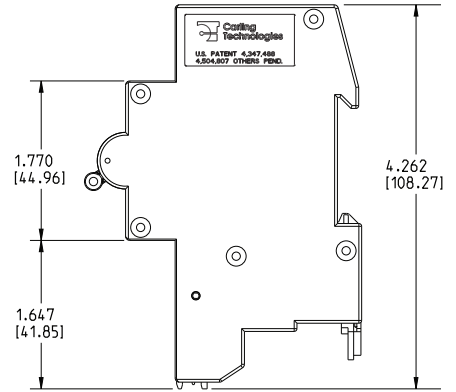
11 AGENCY APPROVAL
A Without Approvals
G UL489 Listed

- Notes:
- Mid-trip Handle(s) available at 1 pole unit and 2 pole unit only.
 - Third pole of a 3 pole unit is switch only pole.
 - On multi-pole breakers one auxiliary switch is supplied, mounted in the extreme left pole when viewed from front of panel.
 - Hi Inrush Delays limited to 50A maximum.
 - 125VDC for 2 pole unit only.
 - 120/240VAC for 2 pole and 3 pole unit only. Limited to 50A maximum, and third pole of a 3-pole unit is switch only pole.
 - 240VAC for 1 pole unit only, limited to 25A maximum
 - 120VAC for 1 pole unit only, limited to 50A maximum.
 - 80VDC for 1 pole unit only

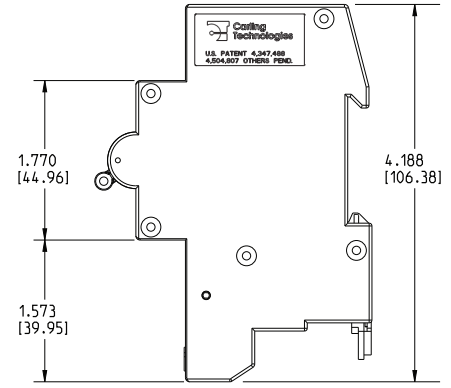
1 POLE WITHOUT AUXILIARY SWITCH



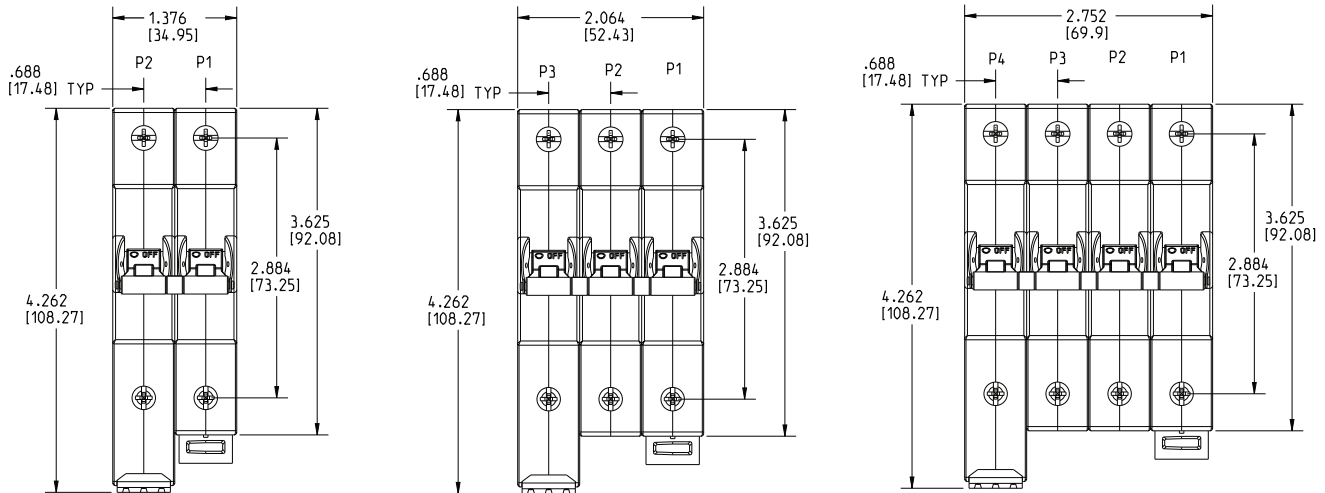
1 POLE WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



1 POLE WITH AUXILIARY SWITCH (SCREW TERMINAL BLOCK)

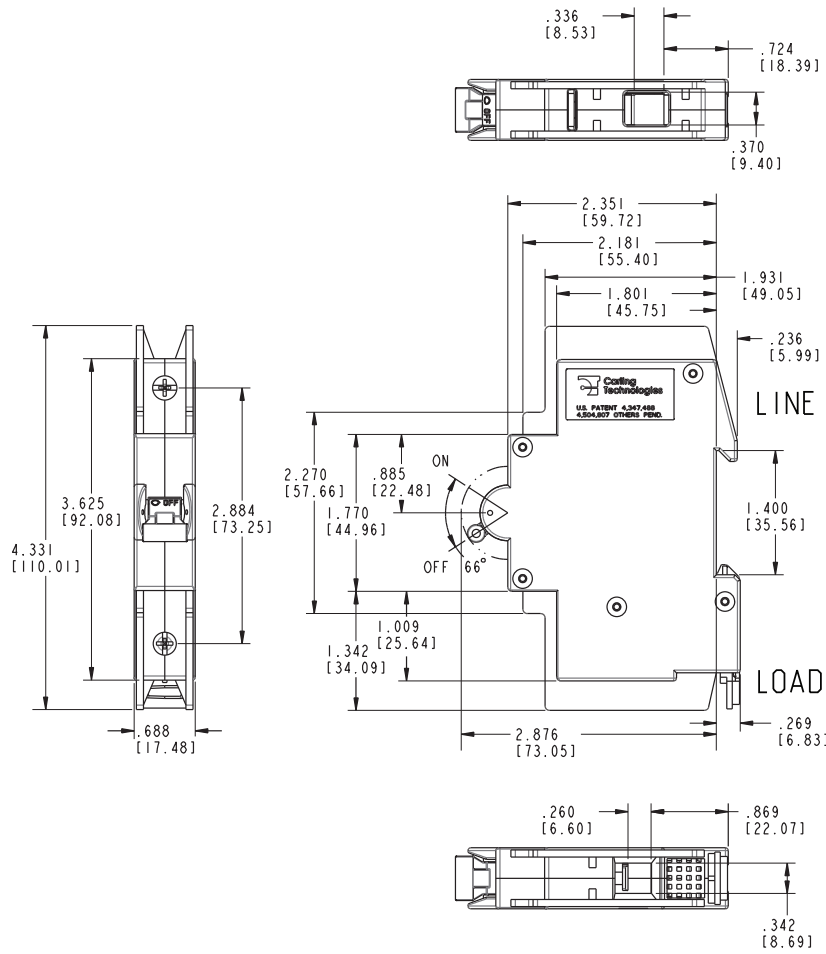


MULTIPLE POLES WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)

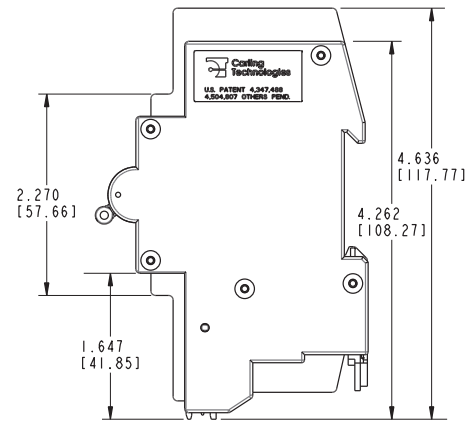


- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [51] unless otherwise specified.

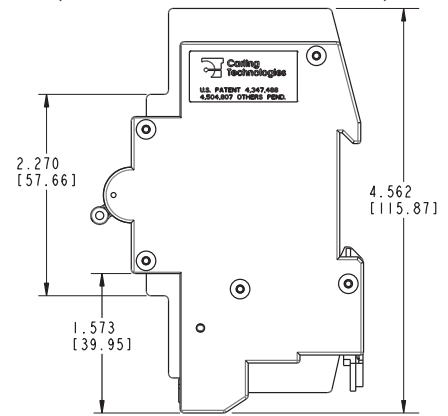
1 POLE WITHOUT AUXILIARY SWITCH



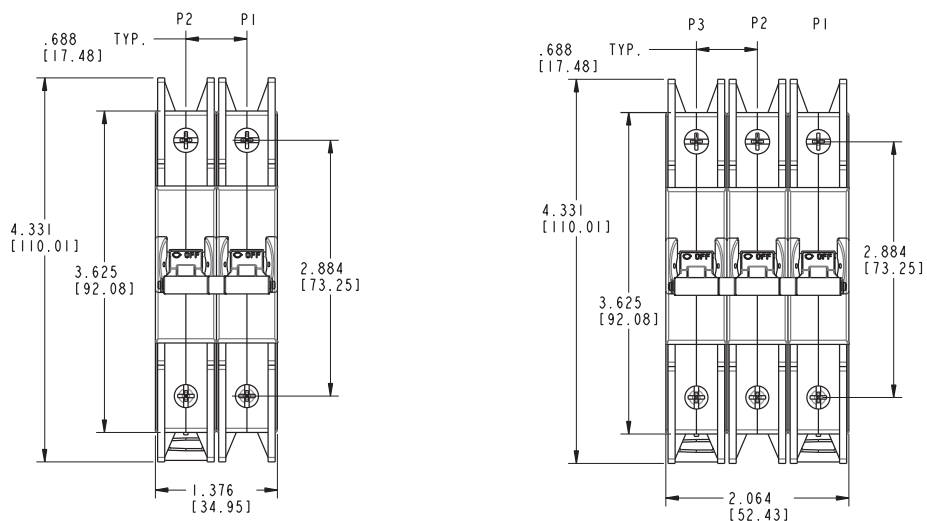
1 POLE WITH AUXILIARY SWITCH (PLUG-IN TERMINAL BLOCK)



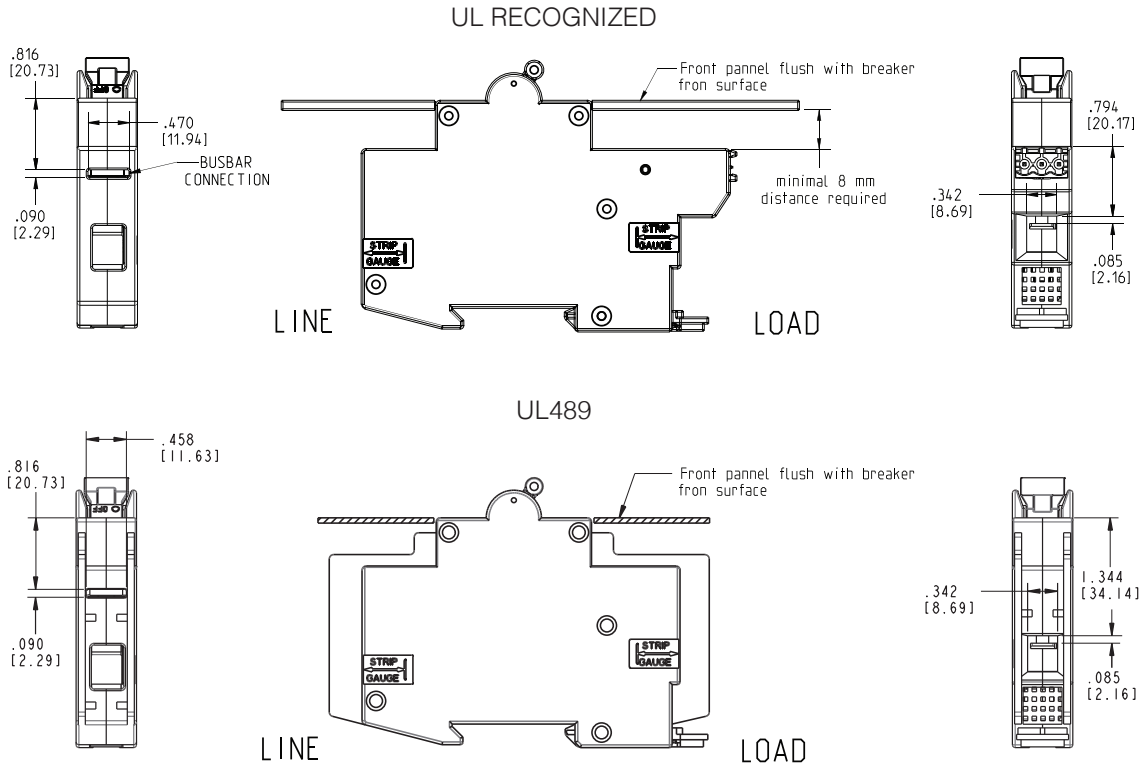
1 POLE WITH AUXILIARY SWITCH (SCREW TERMINAL BLOCK)



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



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



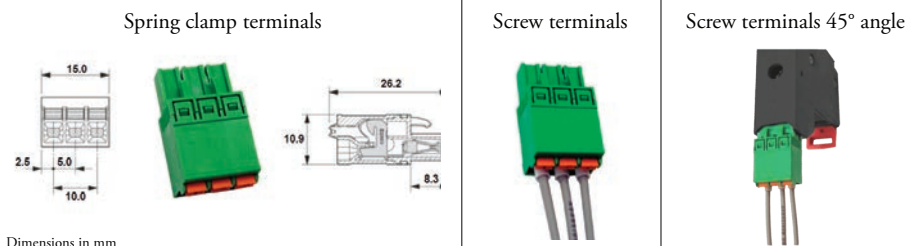
Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

Auxiliary contact with internal connector



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

Example plugs:



Dimensions in mm

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

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

L-Series

CIRCUIT BREAKER

The L-Series high performance, compact hydraulic-magnetic circuit breaker is ideally suited for the rigors and confined spaces found in today's telecom/datacom power distribution units and rack systems. It provides best in class performance in an innovative low profile, space saving package complementing the overall spatial objectives required by telecommunications and data-communications systems designers in their quest to reduce the overall size of equipment, while increasing transmission capacity.

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

Number of poles: 1-3. Maximum current and voltage ratings: .2-32A, 120/240-240VAC. Maximum interrupting capacity: 5000 Amps.



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



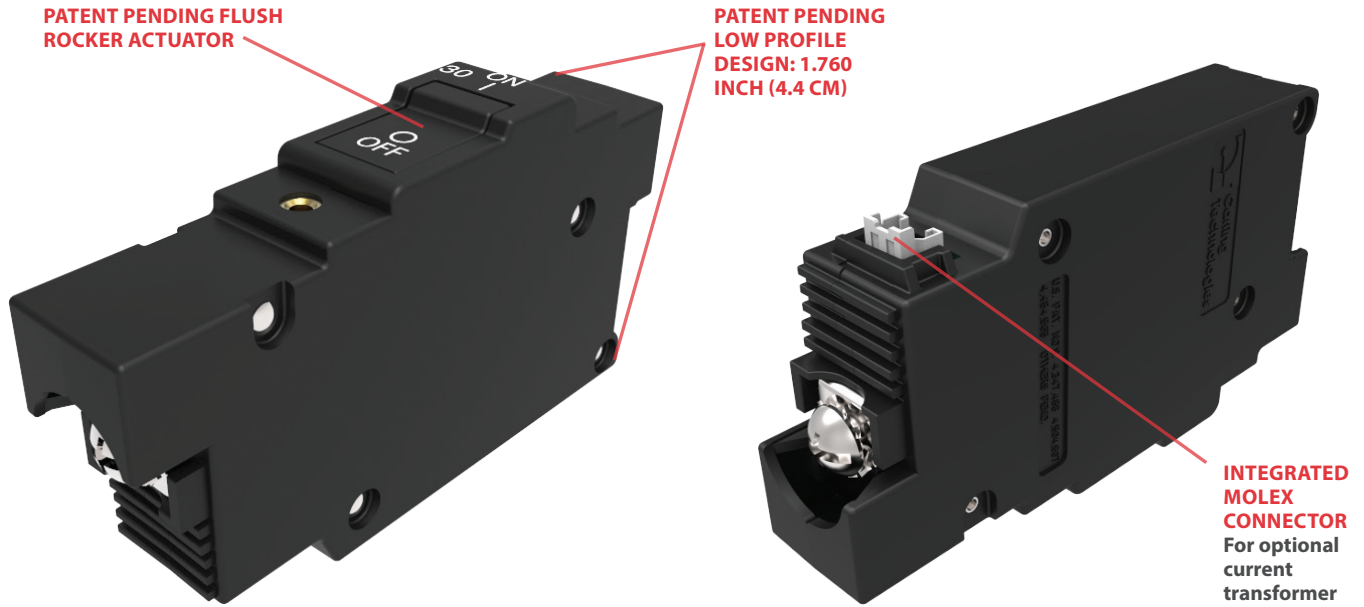
Product Highlights:

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

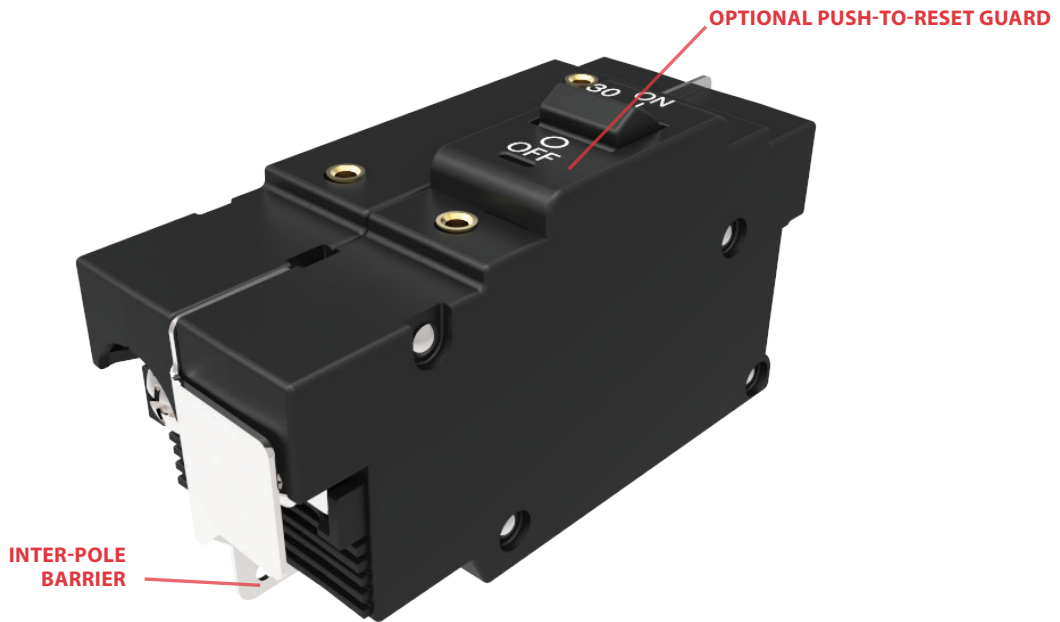
Typical Applications:

- Telecom/Datacom

1-Pole Configuration with Low Profile Rocker Actuator



2-Pole Configuration with Push-To-Reset Guard



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

Electrical Tables

Voltage, Current and IC Ratings

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

Notes:

* Breaking both sides of the line

** 3rd pole to be neutral break

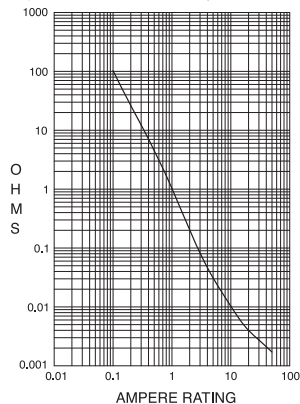
Time Delay

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

Impedance

RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals

(Values Based on Series Trip Circuit Breaker)



Current (amps)	Tolerance (%)
0.1-5.0	+/-15
5.1-32.0	+/-25

Electrical

Current Metering

Integrated current transformer.
 Measurement range: 1-32 Amps
 Voltage output: 10mV per Amp
 according to the formula below:
 $2(\text{Amp}) \leq I \leq 32(\text{Amp})$
 $V = 0.01 \times I \pm 2\%$

$$\left| \frac{\frac{V - V_{10}}{I - I_{10}}}{\frac{V_{10}}{I_{10}}} \right| \leq 0.85\%$$

Where V=CT output in volts V10=CT output in volts with I=I10=10 (A); I=primary current in amperage (50/60 Hz). Phase shift between primary current and CT output is 0.25±0.25°. Maximum crest factor of primary

current

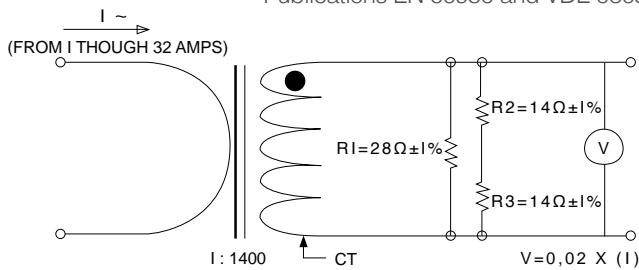
is 1.73.

R1 shall be integrated in the breaker.
 R2 and R3 are provided by end user and external to the breaker.

user

Connection:

below Load Terminal. 2-pin connector, Molex 35362-0250. Mating Connector housing – Molex PN35507-0200. Dielectric Strength UL, CSA-1960V 50/60 Hz for one minute between all electrically isolated terminals. Comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between main circuits of adjacent poles per Publications EN 60950 and VDE 0805



Insulation Resistance

Minimum of 100 Megohms@500VDC

Overload

50 operations @ 600% of rated

Interrupt Capacity

See Table 1

Environmental

Environmental
 Operating Temp
 Vibration

MIL-PRF-55629 and MIL-STD-202G -40°C to +85 °C
 Withstands 0.06” excursion from 10-55 Hz and 10Gs 55-500 Hz at rated current per MIL-PRF-55629 and MIL-STD-202G, Method 204D, Test Condition A. Instantaneous and ultra-short curves tested at 90% of rated current.

Shock

Withstands 100 Gs, 6 ms saw tooth while carrying rated current per MIL-PRF-55629 and MIL-STD-202G, Method 213B, Test Condition “I”. Instantaneous and ultra short curves tested at 90% of rated current.

Thermal Shock

MIL-PRF-55629 and MIL-STD-202G, Method 107G, Condition A (5-cycles at -55°C to +25°C to +85°C to +25°C).

Moisture Resistance

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

Salt Spray

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

Physical

Number of Poles
 Termination

1-3 poles
 Screw Terminals with the following thread sizes: 10-32, 8-32, M5, M4 Standard for 2 & 3 poles
 Threaded Insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per Pole)

Termination Barrier
 Mounting

Rocker, with or without guard
 Series Trip
 Housing - Glass Filled Polyester
 Rocker – Nylon 6/6
 Line/Load Terminals – Copper Alloy; Bright Acid Tin Plated

Actuator
 Internal Circuit Config.
 Materials

Weight
 Standard Color

~107 Grams (~3.76 Ounces) per pole
 Housing - Black, Rocker - Black

Mechanical

Endurance

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

Trip Free

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

Trip Indication

The operating actuator moves positively to the “Off” position when an overload causes the breaker to trip

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



1 SERIES

L

- ### 2 ACTUATOR
- 1 Single Color Low Profile Rocker, Vertical Legend
 - 2 Single Color Low Profile Rocker, Horizontal Legend
 - 3 Single Color Push to Reset Low Profile Rocker, Vertical Legend
 - 4 Single Color Push to Reset Low Profile Rocker, Horizontal Legend

- ### 3 POLES
- 1 One
 - 2 Two
 - 3 Three

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

- ### 5 CURRENT METERING
- 0 Without Current Transformer
 - 1² Integrated Current Transformer, 1 per unit
 - 2 Integrated Current Transformer, 1 per pole

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

7 CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
210	0.100	415	1.500	610	10.000
215	0.150	517	1.750	710	10.500
220	0.200	420	2.000	611	11.000
225	0.250	522	2.250	711	11.500
230	0.300	425	2.500	612	12.000
235	0.350	527	2.750	712	12.500
240	0.400	430	3.000	613	13.000
245	0.450	435	3.500	614	14.000
250	0.500	440	4.000	615	15.000
255	0.550	445	4.500	616	16.000
260	0.600	450	5.000	617	17.000
265	0.650	455	5.500	618	18.000
270	0.700	460	6.000	620	20.000
275	0.750	465	6.500	622	22.000
280	0.800	470	7.000	624	24.000
285	0.850	475	7.500	625	25.000
290	0.900	480	8.000	630	30.000
295	0.950	485	8.500	632	32.000
410	1.000	490	9.000		
512	1.250	495	9.500		

- ### 8 TERMINAL
- 2 Screw Terminal, 8-32 (Bus Type)
 - 4 Screw Terminal, 10-32 (Bus Type)
 - E Screw Terminal, M4 (Bus Type)
 - H Screw Terminal, M5 (Bus Type)

9 ACTUATOR COLOR & LEGEND

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

- ### 10 MOUNTING INSERTS³
- 1 6-32 X .195 Threaded Inserts
 - A 6-32 X .195 Threaded Inserts with Terminal Barrier
 - 2 ISO M3 X 5 mm Threaded Inserts
 - B ISO M3 X 5 mm Threaded Inserts with Terminal Barrier

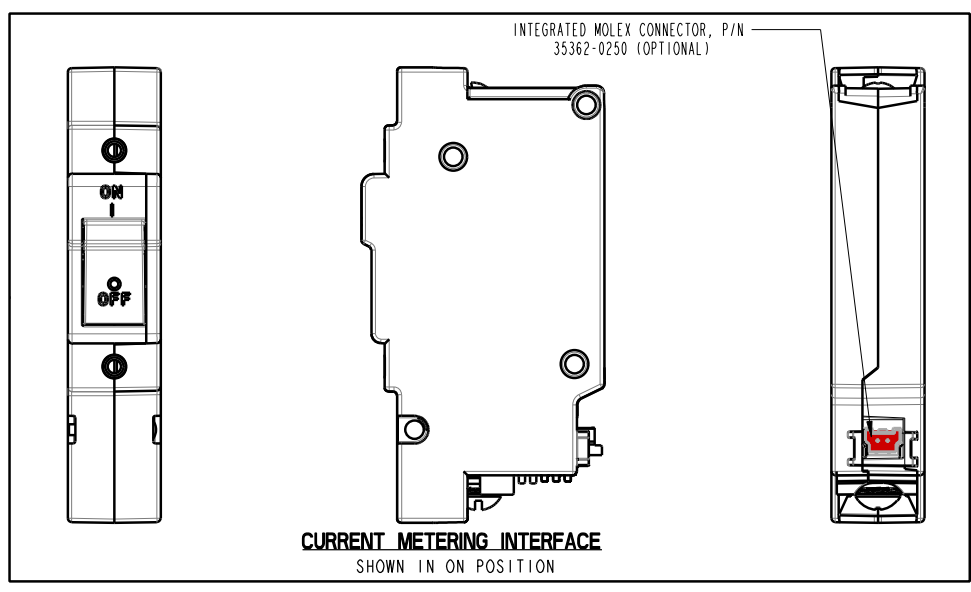
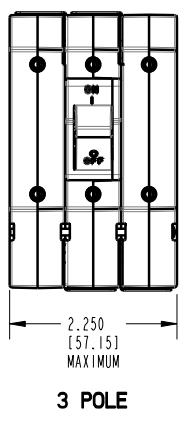
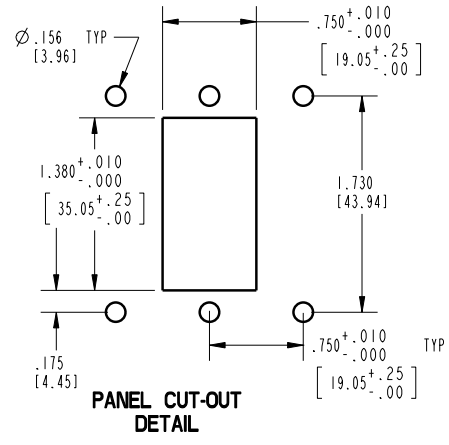
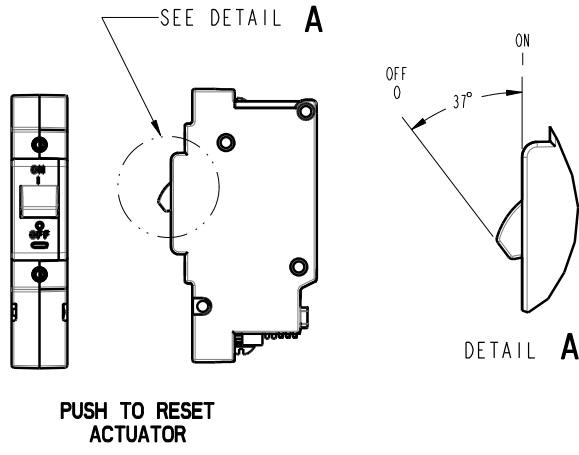
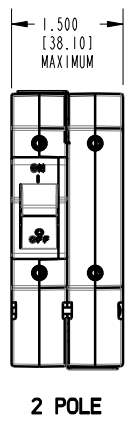
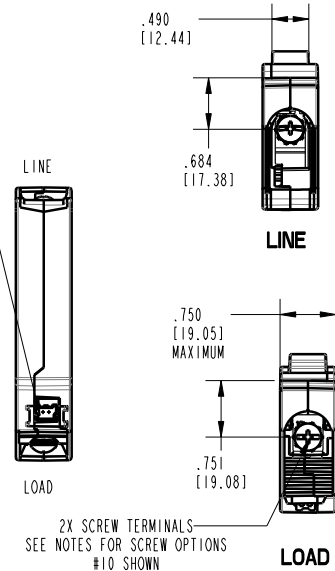
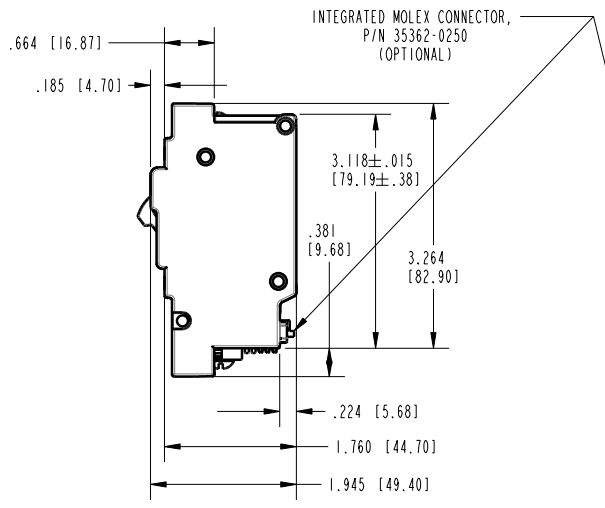
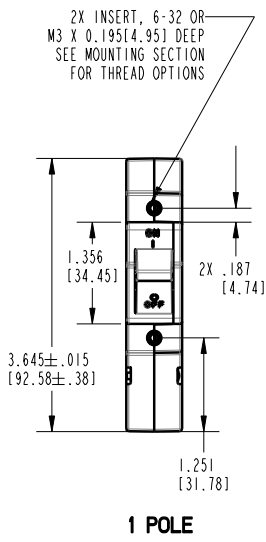
- ### 11 MAX. APPLICATION RATING
- C¹ 120/240 VAC (2 or 3 Pole only)
 - D 240 VAC
 - P⁴ 415Y/240 VAC (TUV only) 240 VAC 3 phase Delta

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

Notes:

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

L-Series Circuit Breaker - Dimensional Specifications in.[mm]



NOTES:
 1. SCREWS HAVE COMBINATION HEAD
 2. SCREW THREAD OPTIONS: #8-32, #10-32, MAX.7, M5X.8

N-Series

CIRCUIT BREAKER

The high-performance N-Series hydraulic-magnetic circuit breaker is ideally suited for the rigors and confined spaces of telecom and datacom power distribution units and rack systems. Its innovative, low profile design features easily accessible load and line terminals and sliding barriers for effortless installation. The optional current transformer allows for remote outlet metering and monitoring of power usage thus facilitating load adjustments and maximizing efficiency. A patent pending, flush-rocker actuator and push-to-reset guard offer additional protection against accidental switching.



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

- ♦ 240 VAC, 277 VAC, 120/240 VAC
- ♦ UL 489 Compliant Sliding Terminal Barriers
- ♦ 22,000 Amps Max Interrupting Capacity
- ♦ 1 – 30 Amps Current Rating
- ♦ Optional Current Transformer
- ♦ EN60947-2 Certified

Typical Applications:

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

CURRENT TRANSFORMER

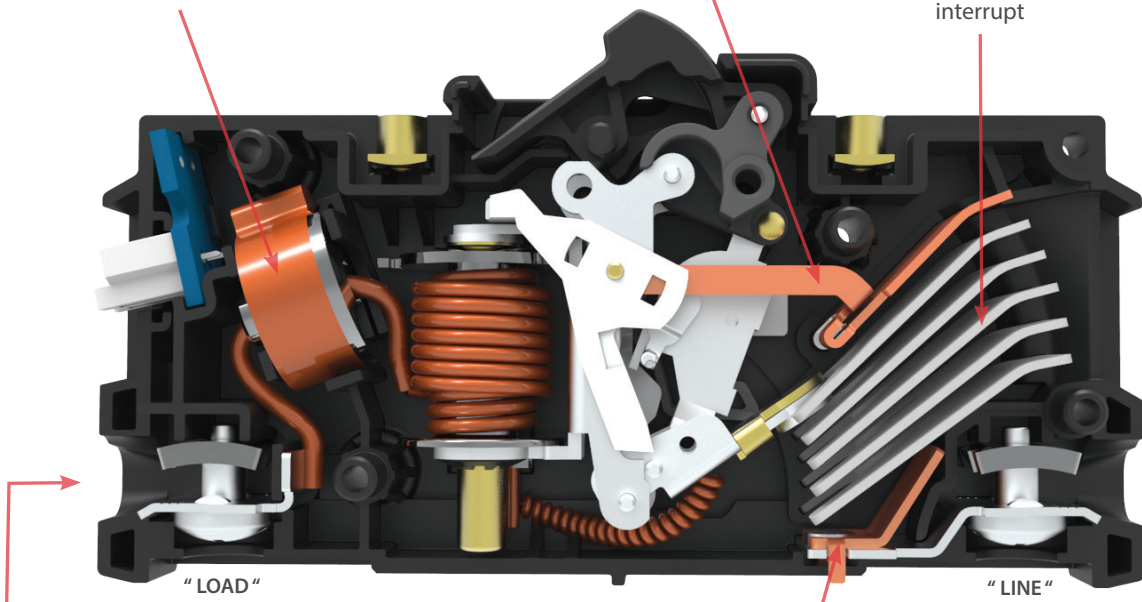
Remote current sensing via molex connector

UPPER ARC RUNNER

Optional, for 277 VAC rated breakers

GRIDS (5x)

Arc deionizing splitter plates that increase arc voltage for quick interrupt



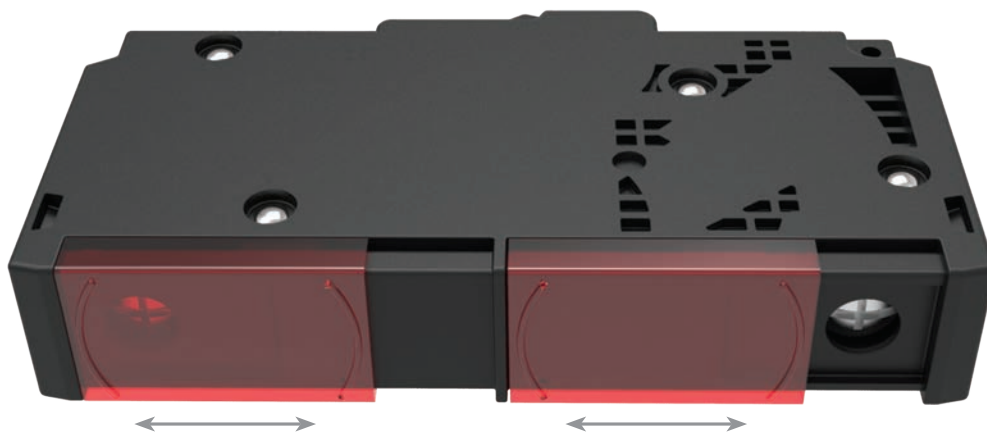
TERMINAL

Allows for easy hook-up of wires on both sides of the breaker

LOWER ARC RUNNER

Motivates arc off of the stationary contact

SLIDING TERMINAL BARRIERS



Electrical Tables

Table 1: Voltage and Current Ratings

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

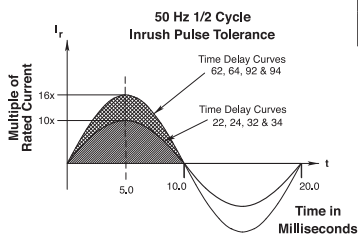
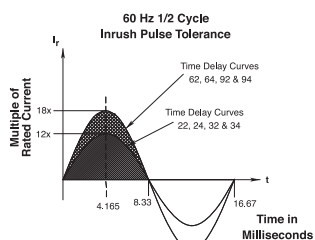
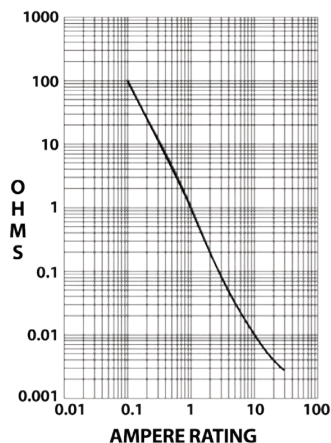
Table 2: Time Delay

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

Electrical: Impedance / Resistance

RESISTANCE, IMPEDANCE VALUES

Across Line and Load Terminals



Current (amps)	Tolerance (%)
0.1 - 5.0	+/-15
5.1 - 30.0	+/-25

Electrical

Current Metering

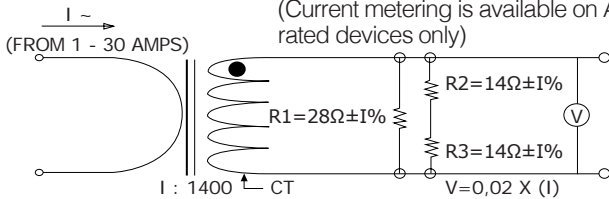
Integrated current transformer.
 Measurement range: 1-30 Amps.
 Voltage output: 10mV per Amp
 according to the formula below:
 $2 \text{ (Amp)} \leq I \leq 30 \text{ (Amp)}$

$$V = 0.01 \cdot I \pm 2\%$$

$$\left| \frac{\frac{V}{I} - \frac{V_{10}}{I_{10}}}{\frac{V_{10}}{I_{10}}} \right| \leq 0.85\%$$

Where V=CT output in volts
 V_{10} =CT output in volts with
 $I=I_{10}=10 \text{ (A)}$; I =primary current in
 amperage (50/60 Hz). Phase shift
 between primary current and CT
 output is $0.25 \pm 0.25^\circ$. Maximum
 crest factor of primary current is 1.73.
 R1 shall be integrated in the breaker.
 R2 and R3 are provided by end user
 and external to the breaker.
 Connection: below Load Terminal.
 2-pin connector, Molex 35362-0250.
 Mating Connector housing – Molex
 PN35507-0200.

(Current metering is available on AC
 rated devices only)



Dielectric Strength

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

Insulation Resistance
 Overload

Minimum of 100 Megohms @ 500VDC
 50 operations @ 600% of rated current
 for AC rated devices

Interrupt Capacity

See table 1

Mechanical

Endurance

10,000 “On-Off” operations @ 6 per
 minute; with rated current & voltage

Trip Free

Trips on overload even when
 actuator is forcibly held in the “On”
 position

Trip Indication

The operating actuator moves
 positively to the “Off” position
 when an overload causes the
 breaker to trip

Environmental

Environmental
 Operating Temperature
 Vibration

MIL-PRF-55629 and MIL-STD-202G
 -40°C to +85°C
 Withstands 0.06” excursion
 from 10-55 Hz and 10Gs 55-500 Hz
 at rated current per MIL-PRF-55629
 and MIL-STD-202G, Method 204D,
 Test Condition A. Instantaneous and
 ultra-short curves tested at 90% of
 rated current

Shock

Withstands 50 Gs, 6 ms saw tooth
 while carrying rated current per
 MIL-PRF-55629 and MIL-STD-202G,
 Method 213B, test condition “I”.
 Instantaneous and ultra short curves
 tested at 90% of rated current

Thermal Shock

MIL-PRF-55629 and MIL-STD-202G,
 Method 107G, Condition A (5-cycles
 at -55°C to +25°C to +85°C to +25°C)

Moisture Resistance

MIL-PRF-55629 and MIL-STD-202G,
 Method 106G, i.e., Ten 24-hour
 cycles at +25°C to +65°C, 80-98% RH
 Method 101, Condition A (90-95%
 RH @ 5% NaCl Solution, 96hrs)

Salt Spray

Physical

Number of Poles
 Termination

1 - 2 poles
 Wire ready and touch proof wire
 clamp (See Figure 1). Accepts up
 to (2) #10 AWG wires per terminal.
 Designed for use with solid,
 stranded and flexible stranded
 wires, with or without ferrule or pin
 terminals. Also accepts straight fork
 and flanged fork terminals.

Termination Torque
 Termination Barrier

15-20 in-lbs (Line & Load terminals)
 Integral sliding barrier to comply
 with spacing requirements
 (See figure 1)

Mounting

Threaded Insert: #6-32 UNC-2B, or
 M3X0.5-6H B ISO (2 per Pole)

Insert Termination Torque
 Actuator

7-9 in-lbs
 Rocker, with or without guard
 (See figures 1, 2, and 4)

Internal Circuit Config.
 Materials

Series Trip
 Housing - Glass Filled Polyester
 Rocker – Nylon
 Line/Load Terminals - Copper Alloy;
 Bright Acid Tin Plated
 Weight
 Standard Color
 ~107 grams (~3.76 ounces) per pole
 Housing – Black. Rocker - Several
 (See ordering scheme for colors)

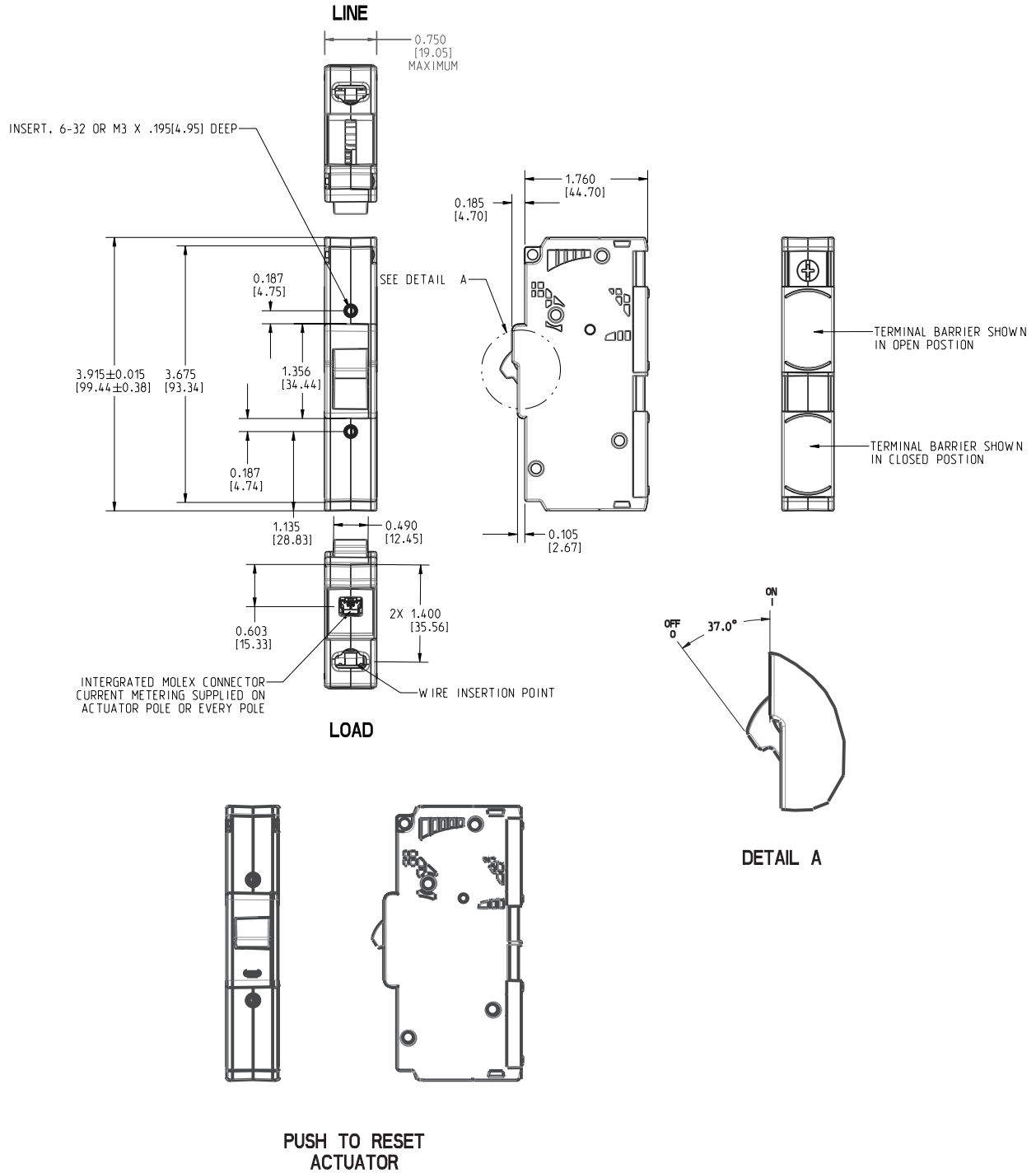
Agency Approvals

UL 489, cUL, TUV EN60947-2

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

Form & Fit

Figure 1. N-Series 1-Pole Construction



Notes:

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

Form & Fit

Figure 2. N-Series 2-Pole Construction

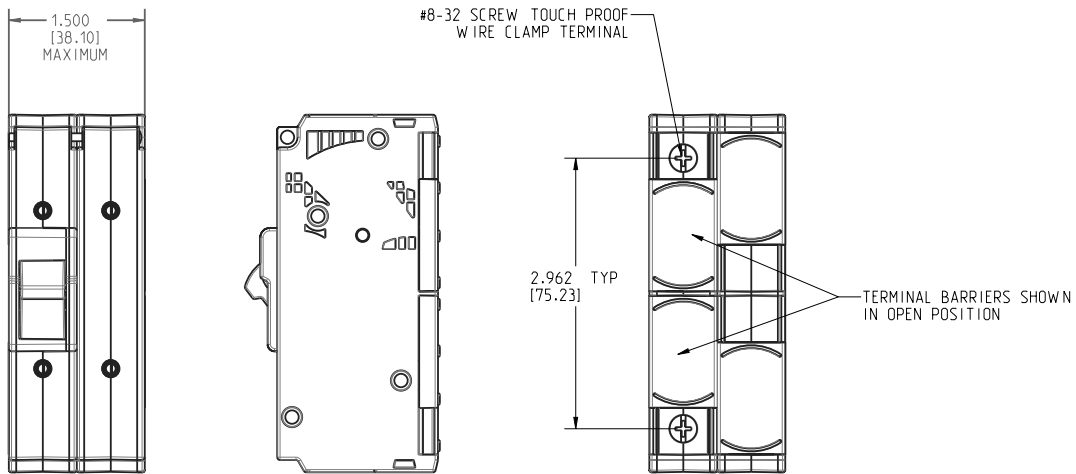
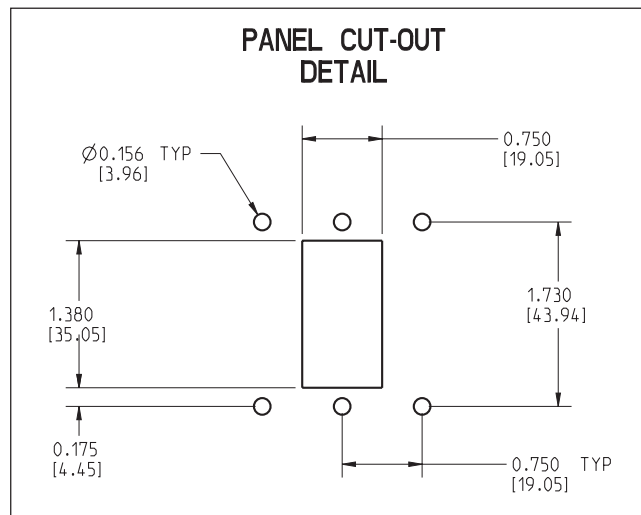


Figure 3. N-Series Panel Cut-Out



Notes:

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

CX-Series

CIRCUIT BREAKER

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



Resources:

Download 3D CAD Files



Watch Product Video



Product Highlights:

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

Typical Applications:

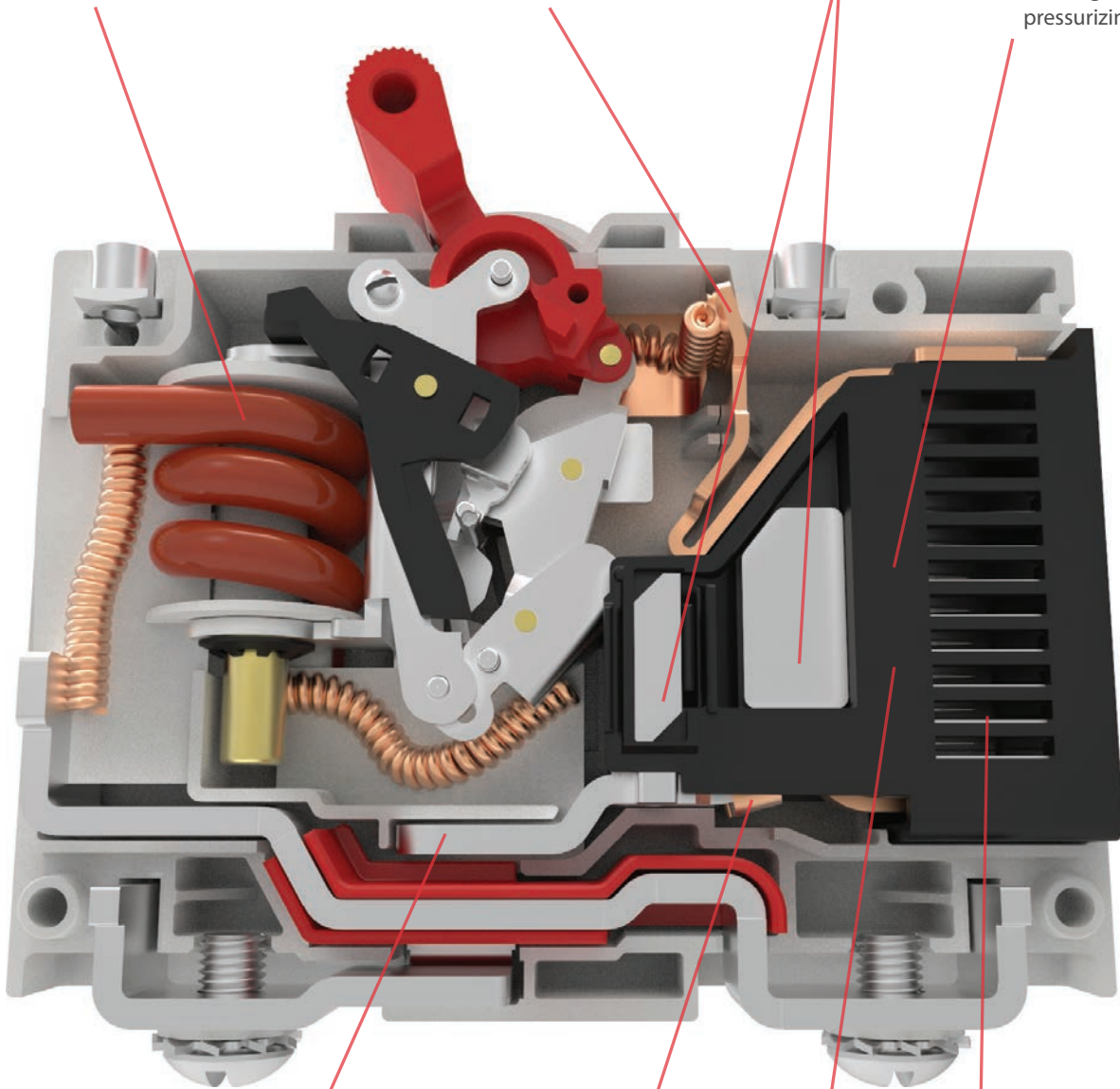
- ◆ Renewable Energy
- ◆ Power Distribution Units

HYDRAULIC/MAGNETIC SENSING COIL

UPPER ARC RUNNER
Aids in motivating arc off of movable contact and into arc chamber

MAGNETS

ARC SPLITTER RETAINER
w/ integrated pressurizing walls



PATENT PENDING MAGNETIC FLUX BOOSTING TERMINAL CONFIGURATION
Design enhances motivation of arc into arc chamber

LOWER ARC RUNNER
Aids in motivating arc off of stationary contact and into arc chamber

LARGE ARC GAP
To generate high arc voltages

(12) ARC DEIONIZING SPLITTER PLATES

Electrical Tables

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

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

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

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

Notes:
 1 Requires inclusion of a relay trip voltage coil

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

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

Notes:
 1 Two poles in series.
 2 Two poles in series in parallel with 2 poles in series.

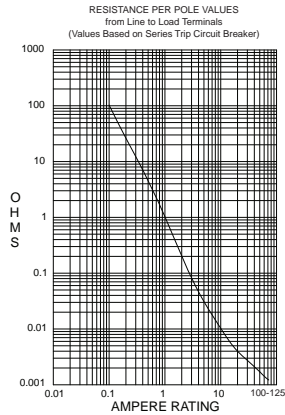
Table D: TUV Certified Configuration to IEC / EN 60947-2. Low Voltage Switchgear and Controlgear - Circuit Breakers

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

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

Electrical

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



Current (amps)	Tolerance (%)
0.1 -5.0	15%
5.1-20.0	25%
20.1-125	35%

Physical

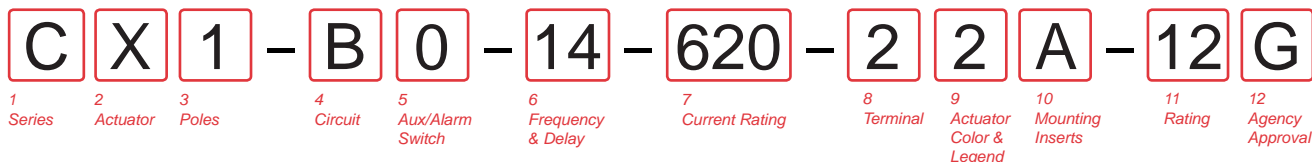
Number of Poles 1- 2 poles, + Auxiliary Switch Pole.
 Termination 10-32 or M5 Screw Terminals
 1/4-20 or M6 Threaded Stud Terminals
 Termination Barrier Standard with multi-pole constructions
 Mounting Threaded insert: #6-32 UNC-2B, or M3X0.5-6H B ISO (2 per pole)
 Actuator Handle, 1 per pole.
 Internal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

Mechanical

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

Environmental

Shock Withstands 100 Gs, 6ms saw tooth while carrying rated current per MIL-PRF-55629 and MIL-STD-202G, Method 213G, Test Condition "I". Instantaneous and ultra short curves tested at 90% of rated current
 Vibration Withstands 0.060" excursion from 10-55 Hz & 10 Gs 55-500 Hz, at rated current per MIL-PRF-55629 and MILSTD-202G, Method 240D, Test Cond. A. Instantaneous & ultrashort curves tested at 90% of rated current.
 Moisture Resistance MIL-PRF-55629 and MIL-STD-202G, Method 106G, i.e., Ten 24-hour cycles at +25°C to +65°C, 80-98% RH.
 Salt Spray Method 101, Condition A (90-95% RH at 5% NaCl Solution, 96 hrs).
 Thermal Shock MIL-PRF-55629 and MIL-STD-202G, Method 107G, Condition A (5-cycles at -55°C to +25°C to +85°C to +25°C).
 Operating Temperature -40°C to +85°C.



1 SERIES
C

2 ACTUATOR
X Handle, one per pole

3 POLES
1 One
2 Two

4 CIRCUIT
B Series Trip (current)

5 AUXILIARY/ALARM SWITCH
0 Without Aux Switch

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

7 CURRENT RATING (AMPERES)

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

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

9 ACTUATOR COLOR & LEGEND

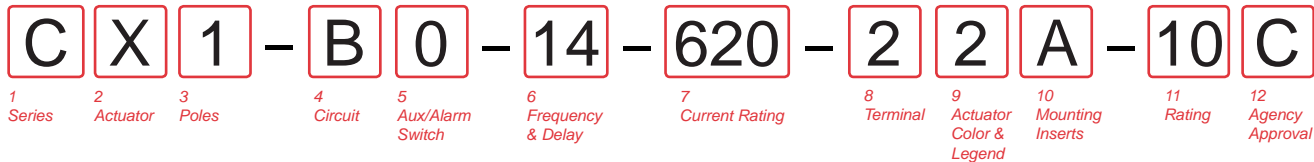
Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	A	B	1	Black
Black	C	D	2	White
Red	F	G	3	White
Green	H	J	4	White
Blue	K	L	5	White
Yellow	M	N	6	Black
Gray	P	Q	7	Black
Orange	R	S	8	Black

10 MOUNTING INSERTS
A 6-32 Thread
B M3 Thread

11 MAX. APPLICATION RATING
12 250 VDC
13 250/500 VDC ¹
15 205/410 VDC

12 AGENCY APPROVAL
A Without Approvals
G UL 489 Listed
S UL 489 Listed, TUV to IEC60947-2 ¹

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



1 SERIES
C

2 ACTUATOR
X Handle, one per pole

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

4 CIRCUIT
A Switch Only (no coil) ^{1, 9}
B Series Trip (current)
G Relay Trip (voltage) ^{1, 2, 3, 9}

5 AUXILIARY SWITCH
0 Without Aux Switch

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

7 CURRENT RATING (AMPERES) ⁶

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

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

9 ACTUATOR COLOR & LEGEND

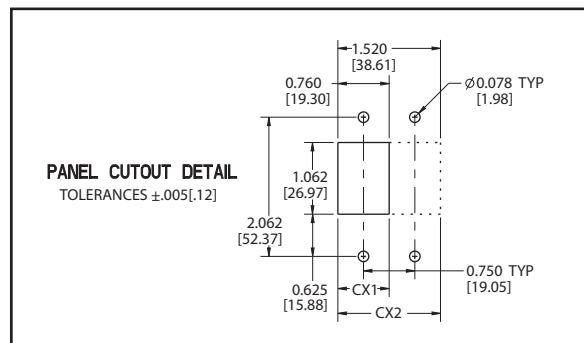
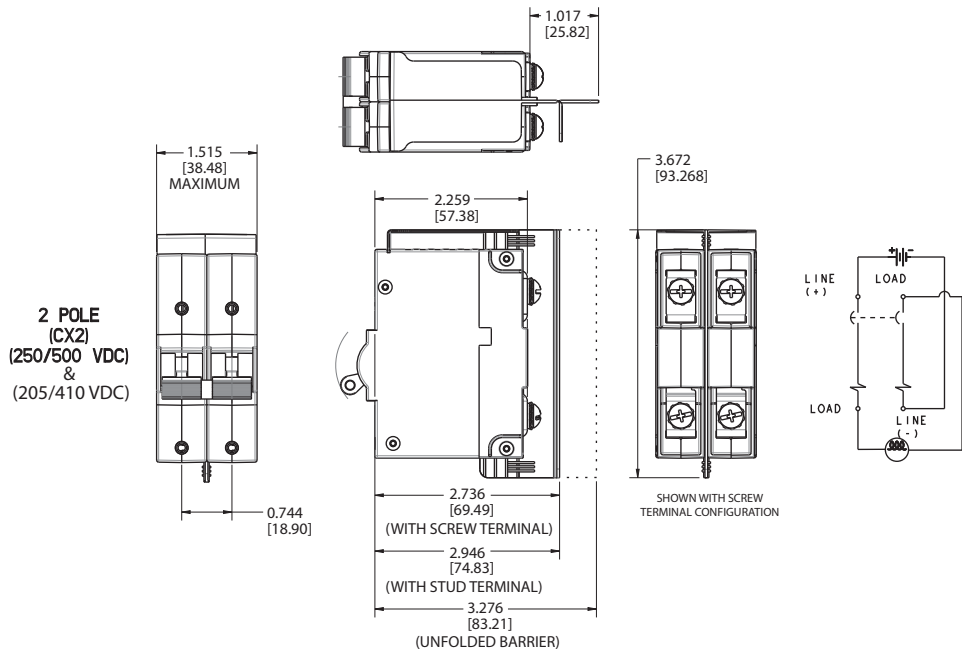
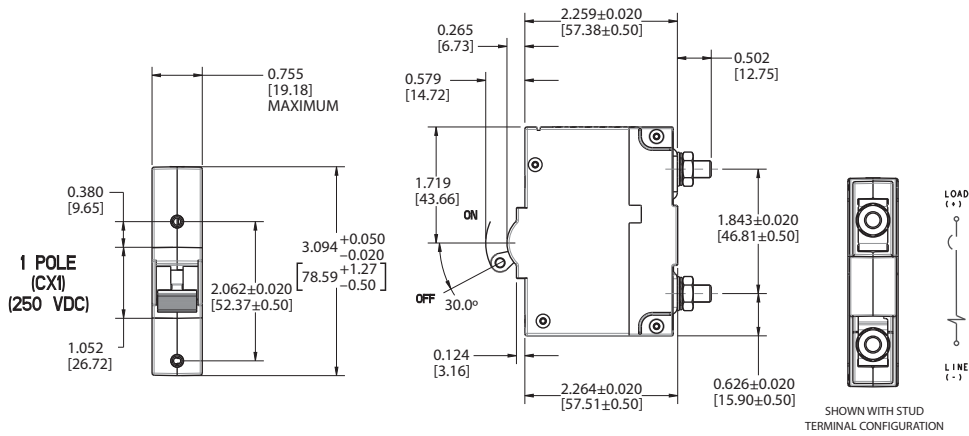
Actuator Color	I-O	ON-OFF	Dual	Legend Color
White	A	B	1	Black
Black	C	D	2	White
Red	F	G	3	White
Green	H	J	4	White
Blue	K	L	5	White
Yellow	M	N	6	Black
Gray	P	Q	7	Black
Orange	R	S	8	Black

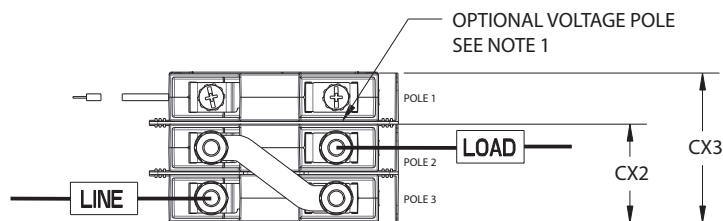
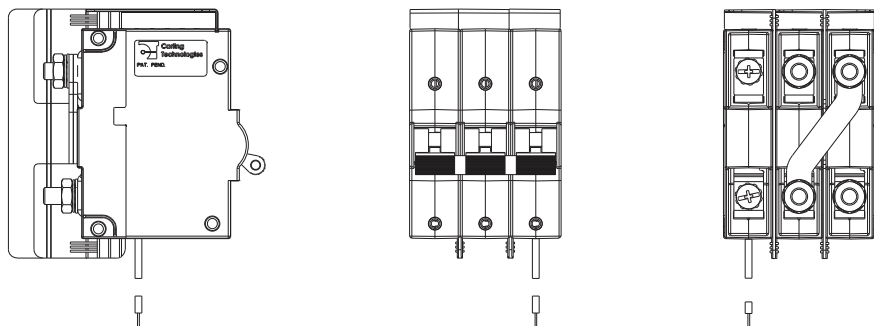
10 MOUNTING INSERTS
A 6-32 Thread
B M3 Thread

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

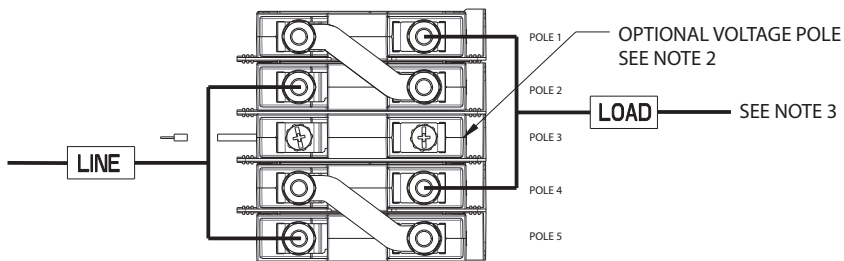
12 AGENCY APPROVAL
A Without Approvals
C UL 1077 Recognized
W UL 1077 Recognized & TUV Certified IEC/ EN 60947-2 ⁹

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





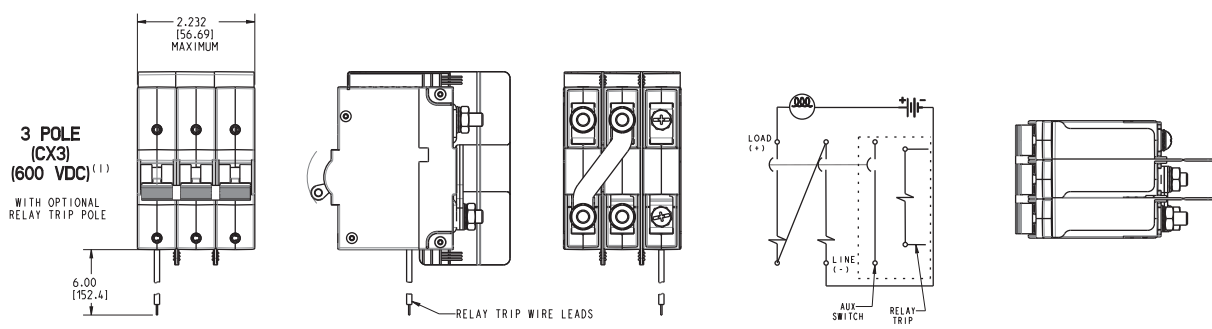
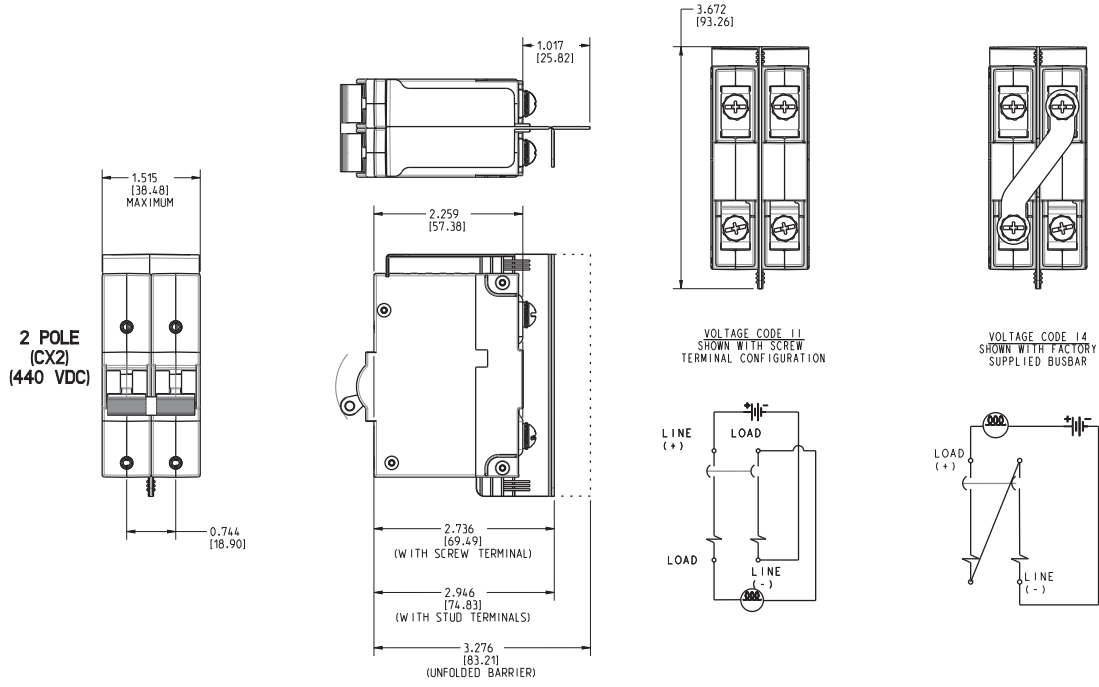
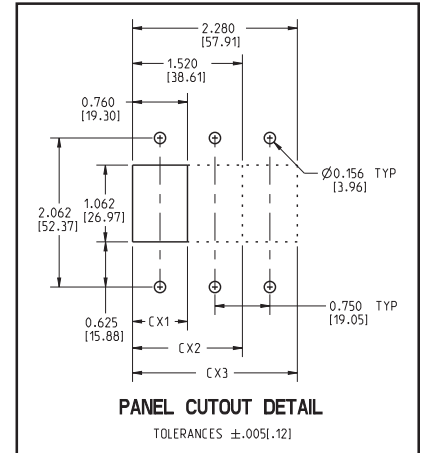
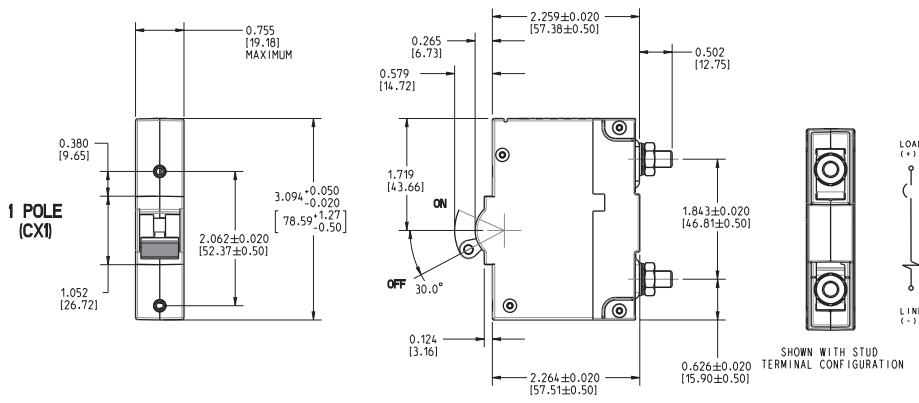
CX3 - 2 POLE SWITCH (CX2)SHOWN
WITH OPTIONAL VOLTAGE POLE
50A-100A DEVICE, 600VDC



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

Notes:

- 1 3 pole configuration supplied with voltage coil on pole 1. Optional location pole 3. Consult factory.
- 2 5 pole configuration supplied with voltage coil in center pole. (Pole 3)
- 3 Line & Load connections requires bus connection as shown. Minimum cross selection .127 in² (81.94 mm²)



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

E-Series

E-Series

CIRCUIT BREAKER

The E-Series hydraulic-magnetic circuit breaker is ideally suited for higher current and voltage applications. It is UL listed and CSA certified for branch circuit protection, which does not require a fuse back up. It is also UL recognized and CSA certified as a supplementary protector and as a manual motor controller.

Its physical features include front and back mounting, screw and stud terminals and heavy duty box wire connectors for solid wire or a pressure plate connector for standard wire. The E-series is available with handle actuators and can be configured as .1-125 amps, up to 600VAC or 125VDC, with choice of time delays, actuator colors and 1 to 6 poles configuration. Additionally, a Power Selector device is also available.



Product Highlights:

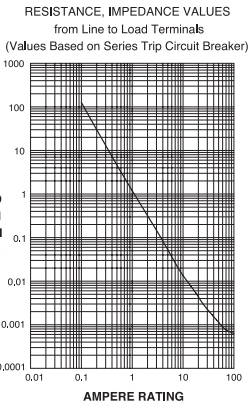
- ♦ UL listed and CSA certified
- ♦ Certified for circuit branch protection
- ♦ Recognized as a supplementary protector and as a manual motor controller
- ♦ Optional power selector device

Typical Applications:

- ♦ High Voltage/High Current Applications
- ♦ Renewable Energy
- ♦ Military
- ♦ Industrial Controls
- ♦ Generators

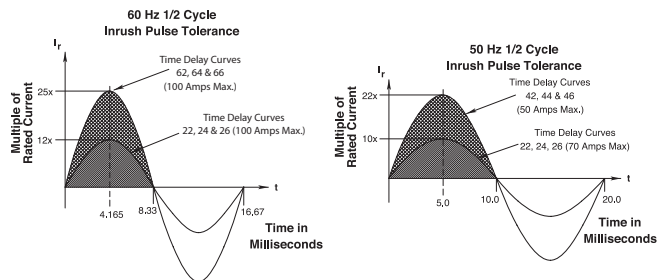
Electrical

Maximum Voltage	600VAC 50/60 Hz, 125VDC (See Table A)
Current Ratings	Standard current coils: 0.100, 0.250, 0.500, 1.00, 2.50, 5.00, 7.50, 10.0, 15.0, 20.0, 25.0, 30.0, 50.0, 60.0, 70.0 & 100 Amp.
Auxiliary Switch Rating	SPDT; 10.1A 250VAC, 1.0A 65VDC; 0.5A 80VDC, 0.1A 125VAC (with gold contacts).
Insulation Resistance	Minimum of 100 Megohms at 500 VDC.
Dielectric Strength	UL, CSA: 2200 V 50/60 Hz for one minute between all electrically isolated terminals. E-Series Circuit Breakers comply with the 8mm spacing and 3750V 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.
Resistance, Impedance	Values from Line to Load Terminal - based on Series Trip Circuit Breaker.



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 5.0	± 15%
5.1 - 20.0	± 25%
20.1 - 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 Mounting	1 - 6 A 3" minimum spacing must be provided between the circuit breaker arc venting area on back connected E-Series circuit breakers and grounded obstructions. E-Series circuit breakers must be mounted on a vertical surface.
Connectors, Box Type	Front connected E-Series circuit breakers are supplied with box type pressure connectors that accept copper or aluminum conductors as follows: 1/0-14 Copper, 1/0-12 Aluminum.
Internal Circuit Configuration	Series and Switch Only, (with or without auxiliary switch). Shunt with current coils.
Weight	Approximately 252 grams/pole (Approximately 9 ounces/pole)
Standard Colors	Housing-Black; Actuator - See Ordering Scheme.

Environmental

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

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

Agency Certifications

UL Recognized

UL Standard 1077



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

CSA Accepted



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

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

CSA Certified



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

UL Standard 1500



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

TUV Certified



EN60934 under License No. R72031056

UL Listed

UL Standard 489



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

VDE Certified



EN60934, VDE 0642 under File No. 10537

Electrical Tables

Table A: Lists UL Listed (489) & CSA Certified (C22.2 No. 5) configurations & performance capabilities as a Molded Case Circuit Breaker.

E SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	INTERRUPTING CAPACITY (AMPS) WITHOUT BACKUP FUSE	HIGH INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY	PHASE			
SERIES	80	DC	---	0.10 - 100	5,000	50,000
	125	DC	---	0.10 - 100	5,000	10,000
	125	DC	---	0.10 - 125	10,000	---
	120	50 / 60	1	0.10 - 125	10,000	---
	240	50 / 60	1	0.10 - 30	5,000	10,000
	240	50 / 60	1	31 - 100	5,000	---
	120 / 240	50 / 60	1	0.10 - 30	5,000	10,000
	120 / 240	50 / 60	1	31 - 100	5,000	---
	120 / 240	50 / 60	1	101 - 125	10,000	---
	240	50 / 60	3	0.10 - 100	5,000	---

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

E - SERIES TABLE B: COMPONENT SUPPLEMENTARY PROTECTORS										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING		SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES		
	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	UL/CSA		UL	CSA	
						WITH BACKUP FUSE ³	WITHOUT BACKUP FUSE			
SERIES & SHUNT	125	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	
	125	DC	---	---	101 - 120	---	5,000	TC1,2, OL0, U1	TC1,2, OL0, U1	
	150	DC	---	---	0.02 - 125	---	5,000	TC1, OL0, U3	TC1, OL0, U3	
	160	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	
	150 / 300	DC	---	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	
	120 / 240	50 / 60	1	---	0.02 - 100	---	5,000	TC1,2, OL0, U1	TC1,2, OL0, U1	
	240	50 / 60	1	0.02 - 100	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	
	250	50 / 60	1	0.02 - 100	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1	
	277	50 / 60	1	0.02 - 100	---	---	---	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1
							10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	480	50 / 60	1 & 3	0.02 - 100	---	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	480 ¹	50 / 60	1 & 3	0.02 - 50	---	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	600	50 / 60	1 & 3	0.02 - 100	---	---	10,000	---	TC1,2, OL1, C1	TC1,2, OL1, C1
	600 ²	DC	---	---	0.02 - 125	---	---	5,000	TC1, OL0, U3	TC1, OL0, U3
SWITCH ONLY	125	DC	---	0.02 - 120	---	---	---	---	---	
	160	DC	---	0.02 - 100	---	---	---	---	---	
	240	50 / 60	1	0.02 - 100	---	---	---	---	---	
	277	50 / 60	1	0.02 - 100	---	---	---	---	---	
	480	50 / 60	1 & 3	0.02 - 100	---	---	---	---	---	

Table B Notes:

- 1 Per pole opposite polarity rating - Delta Configuration.
- 2 4 Poles connected in series
- 3 Requires branch circuit backup with a UL Listed Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amp rating and not to exceed 225A.

Electrical Tables

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

E -SERIES TABLE C: COMPONENT SUPPLEMENTARY PROTECTORS WITH VDE										
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	SHORT CIRCUIT CAPACITY (AMPS)			APPLICATION CODES		CONSTRUCTION NOTES
	MAX. RATING	FREQUENCY	PHASE		UL/CSA		VDE (Icn)	UL	CSA	
				WITH BACKUP FUSE ¹	WITHOUT BACKUP FUSE	WITHOUT BACKUP FUSE				
SERIES & SHUNT	125	DC	---	0.1 - 100	---	5,000	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	1 or 2 Poles
	240	50 / 60	1 & 3	0.1 - 100	---	5,000	5,000	TC1,2, OL1, U1	TC1,2, OL1, U1	1 - 5 Poles. Up to 4 Current Poles, 1 Voltage Pole
	415	50 / 60	1 & 3	0.1 - 100	10,000	---	4,000	TC1,2, OL1, C1	TC1,2, OL1, C1	2 - 5 Poles. Up to 4 Current Poles, 1 Voltage Pole
SWITCH ONLY	125	DC	---	0.1 - 125						
	240	50 / 60	1 & 3	0.1 - 100						
	415	50 / 60	1 & 3	0.1 - 100						

Table C Notes:

¹ Requires branch circuit backup with a UL LISTED Type K5 or RK5 fuse rated 15A minimum and no more than 4 times full load amp rating and not to exceed 225 amps.

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

E SERIES TABLE D : UL1500 (Marine Ignition Protection)							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING FULL LOAD AMPS	SHORT CIRCUIT CAPACITY (AMPS) WITHOUT BACKUP FUSE	APPLICATION CODES	
	MAX. RATING	FREQUENCY	PHASE			UL	CSA
				SERIES	65		
125	50 / 60	1	0.02 - 100		1,500	TC1,2,OL1,U1	TC1,2,OL1,U1
250	50 / 60	1	0.02 - 100		1,500	TC1,2,OL1,U1	TC1,2,OL1,U1

E - **A** **2** - **B** **0** - **24** - **450** - **1** **2** **A** - **C** **B**

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

1 SERIES
E

2 ACTUATOR
A Handle, one per pole

3 POLES¹

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

4 CIRCUIT²

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 SWITCH⁴

0	without Auxiliary Switch	6	S.P.S.T. 0.110 Q.C. Terminals
2	S.P.D.T. 0.110 Q.C. Terminals	7	S.P.S.T. 0.110 Q.C. Terminals (Gold Contacts)
3	S.P.D.T. 0.139 Solder Lug	8	S.P.S.T. 0.187 Q.C. Terminals
4	S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)	9	S.P.D.T. 0.187 Q.C. Terminals

6 FREQUENCY & DELAY

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

7 CURRENT RATING (AMPERES)⁷

CODE	AMPERES	
020	0.020	235 0.350
025	0.025	240 0.400
030	0.030	245 0.450
035	0.035	250 0.500
040	0.040	255 0.550
045	0.045	260 0.600
050	0.050	265 0.650
055	0.055	270 0.700
060	0.060	275 0.750
065	0.065	280 0.800
070	0.070	285 0.850
075	0.075	290 0.900
080	0.080	295 0.950
085	0.085	410 1.000
090	0.090	512 1.250
090	0.095	415 1.500
210	0.100	517 1.750
215	0.150	420 2.000
220	0.200	522 2.250
225	0.250	425 2.500
230	0.300	527 2.750
		613 13.000
		614 3.000
		435 3.500
		440 4.000
		445 4.500
		450 5.000
		455 5.500
		460 6.000
		465 6.500
		470 7.000
		475 7.500
		480 8.000
		485 8.500
		490 9.000
		495 9.500
		610 10.000
		710 10.500
		611 11.000
		711 11.500
		612 12.000
		712 12.500
		613 13.000
		614 14.000
		615 15.000
		616 16.000
		617 17.000
		618 18.000
		620 20.000
		622 22.000
		624 24.000
		625 25.000
		630 30.000
		635 35.000
		640 40.000
		650 50.000
		660 60.000
		670 70.000
		680 80.000
		690 90.000
		810 100.000
		811 110.000
		812 120.000
		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		

Notes:

- 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.
- 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.
- 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.

8 TERMINAL¹²

BACK CONNECTED (FRONT MOUNTED ONLY) MAX. RATING

1 ⁹	10-32 Stud (All Terminals)	50 A
2 ⁹	1/4-20 Stud (All Terminals)	120 A
A ⁹	M5 Stud (Line & Load)	50 A
B ⁹	M6 Stud (Line & Load)	100 A

FRONT CONNECTED (BACK MOUNTED ONLY) MAX. RATING

3 ¹⁰	Box Wire Connector (Line & Load)	100 A
C ¹¹	Box Wire Connector 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 & LEGEND¹³

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

10 MOUNTING/BARRIERS

BACK CONNECTED (FRONT MOUNTED ONLY)

Mounting Inserts

A	6-32
B	ISO M3

FRONT CONNECTED (BACK MOUNTED ONLY)¹⁴

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

11 MAXIMUM APPLICATION RATING¹⁵

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

- 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 Auxiliary Switch Codes 0,2,3 & 4 only.
- 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.
- Frequency & Delay Codes 92,94 & 96 are not VDE Certified.
- Current Coil Ratings 0.100 - 100 amps are VDE Certified.
- 125 A rating (Code 912) available as a Switch Only (Circuit Code A), rated 125 VDC (Code B). 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.
- Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
- Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
- Terminal Codes A,B,D,E,G & H are not VDE Certified.
- VDE approvals require Dual (I-O, ON-OFF) or I-O markings on all handles.
- 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.
- Application ratings B,D,J,T & W are available with VDE.
- 415, 480 & 600 VAC ratings require 3 or 4 pole break 3Ø and 2 pole break 1Ø.



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

1 SERIES
E

2 ACTUATOR
A Handle, one per pole

3 POLES¹

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

4 CIRCUIT²

B	Series Trip (current)	C ³	Series Trip (voltage)
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5 AUXILIARY SWITCH⁴

0	without Auxiliary Switch	6	S.P.S.T. 0.110 Q.C. Terminals
2	S.P.D.T. 0.110 Q.C. Terminals	7	S.P.S.T. 0.110 Q.C. Terminals (Gold Contacts)
3	S.P.D.T. 0.139 Solder Lug	8	S.P.S.T. 0.187 Q.C. Terminals
4	S.P.D.T. 0.110 Q.C. Terminals (Gold Contacts)	9	S.P.D.T. 0.187 Q.C. Terminals

6 FREQUENCY & DELAY

10 ⁵	DC Instantaneous	26	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

7 CURRENT RATING (AMPERES)⁷

CODE AMPERES

020	0.020	235	0.350	430	3.000	614	14.000
025	0.025	240	0.400	435	3.500	615	15.000
030	0.030	245	0.450	440	4.000	616	16.000
035	0.035	250	0.500	445	4.500	617	17.000
040	0.040	255	0.550	450	5.000	618	18.000
045	0.045	260	0.600	455	5.500	620	20.000
050	0.050	265	0.650	460	6.000	622	22.000
055	0.055	270	0.700	465	6.500	624	24.000
060	0.060	275	0.750	470	7.000	625	25.000
065	0.065	280	0.800	475	7.500	630	30.000
070	0.070	285	0.850	480	8.000	635	35.000
075	0.075	290	0.900	485	8.500	640	40.000
080	0.080	295	0.950	490	9.000	650	50.000
085	0.085	410	1.000	495	9.500	660	60.000
090	0.090	512	1.250	610	10.000	670	70.000
090	0.095	415	1.500	710	10.500	680	80.000
210	0.100	517	1.750	611	11.000	690	90.000
215	0.150	420	2.000	711	11.500	810	100.000
220	0.200	522	2.250	612	12.000	811	110.000
225	0.250	425	2.500	712	12.500	812	120.000
230	0.300	527	2.750	613	13.000	912 ⁸	125.000

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

A06	6 DC, 5 DC	A65	65 DC, 55 DC	J48	48 AC, 40 AC
A12	12 DC, 10 DC	B25	125 DC, 100 DC	J65	65 AC, 55 AC
A18	18 DC, 15 DC	J06	6 AC, 5 AC	K20	120 AC, 65 AC
A24	24 DC, 20 DC	J12	12 AC, 10 AC	L40	240 AC, 130 AC
A32	32 DC, 25 DC	J18	18 AC, 15 AC		
A48	48 DC, 40 DC	J24	24 AC, 20 AC		

8 TERMINAL⁷

BACK CONNECTED (FRONT MOUNTED ONLY)	MAX. RATING
1 ⁸ 10-32 Stud (All Terminals)	50 A
2 ⁸ 1/4-20 Stud (All Terminals)	125 A
FRONT CONNECTED (BACK MOUNTED ONLY)	MAX. RATING
3 ⁹ Box Wire Connector (Line & Load)	100 A
C ¹⁰ Box Wire Connector 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 & LEGEND¹²

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

10 MOUNTING/BARRIERS

BACK CONNECTED (FRONT MOUNTED ONLY)

Mounting Inserts

A	6-32
B	ISO M3

FRONT CONNECTED (BACK MOUNTED ONLY)¹¹

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

1	120 VAC
B	125 VDC, 120 A
C ¹³	120/240 VAC, 100 A
D	240 VAC, 100 A

12 AGENCY APPROVAL

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

- Notes:
- 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.
 - Series Trip construction available w/ either front or back connected terminals.
 - Series Trip construction with a voltage coil is not available as a single pole unit and must be tied to a protected pole.
 - On multi-pole units, only one auxiliary switch is normally supplied mounted in the extreme right pole per Figure A. Back mounted units require special mounting provisions when auxiliary switch is specified. VDE Certification on auxiliary switch codes 0, 2, 3 & 4 only.
 - Voltage Trip Coils are not rated for continuous duty. Available only with Frequency & Delay Codes 10 & 20.
 - Frequency & Delay Codes 92, 94 & 96 are not VDE Certified.
 - Current Ratings under 0.100 amps are not VDE Certified.
 - 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.
 - Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
 - Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
 - 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.
 - VDE Certification requires dual (I-O, ON-OFF) markings on all handles.
 - Not available with VDE Certification.

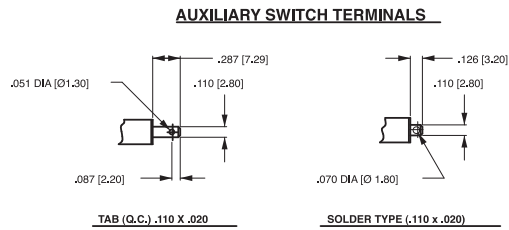
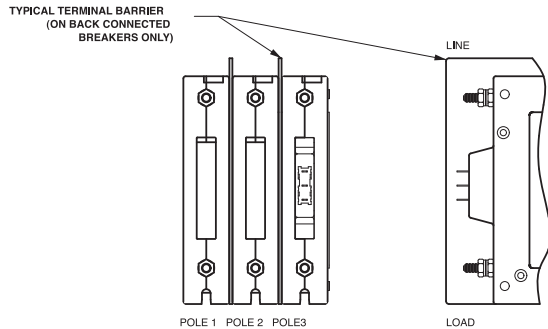
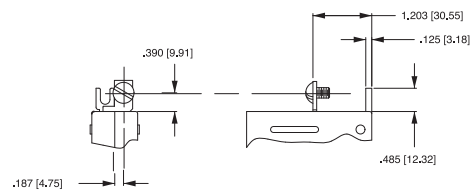
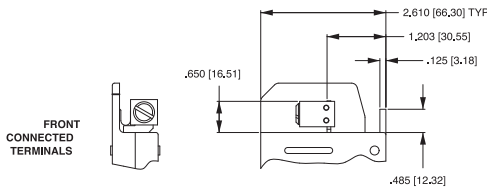
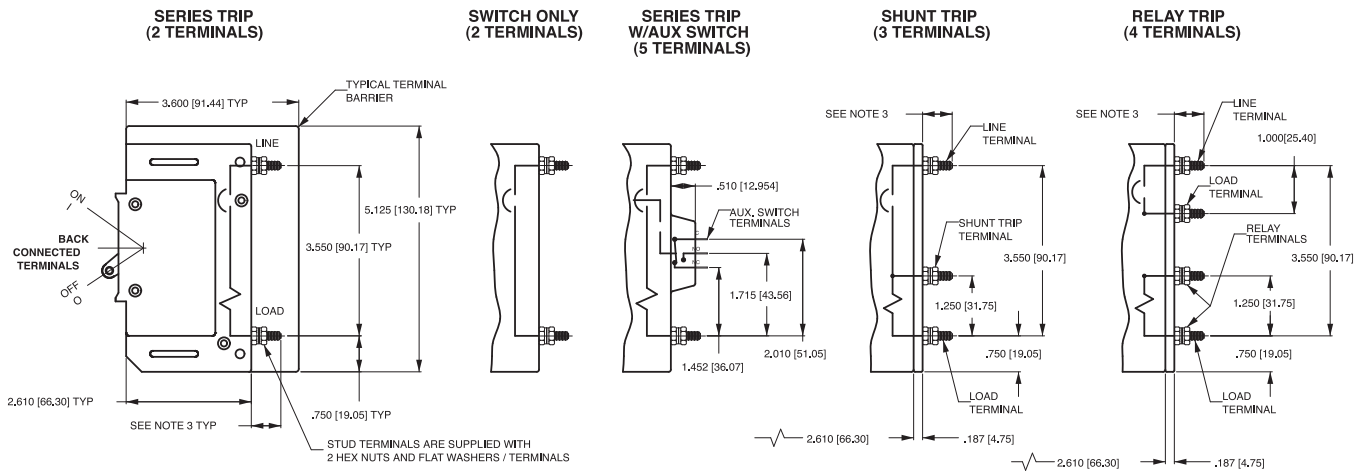
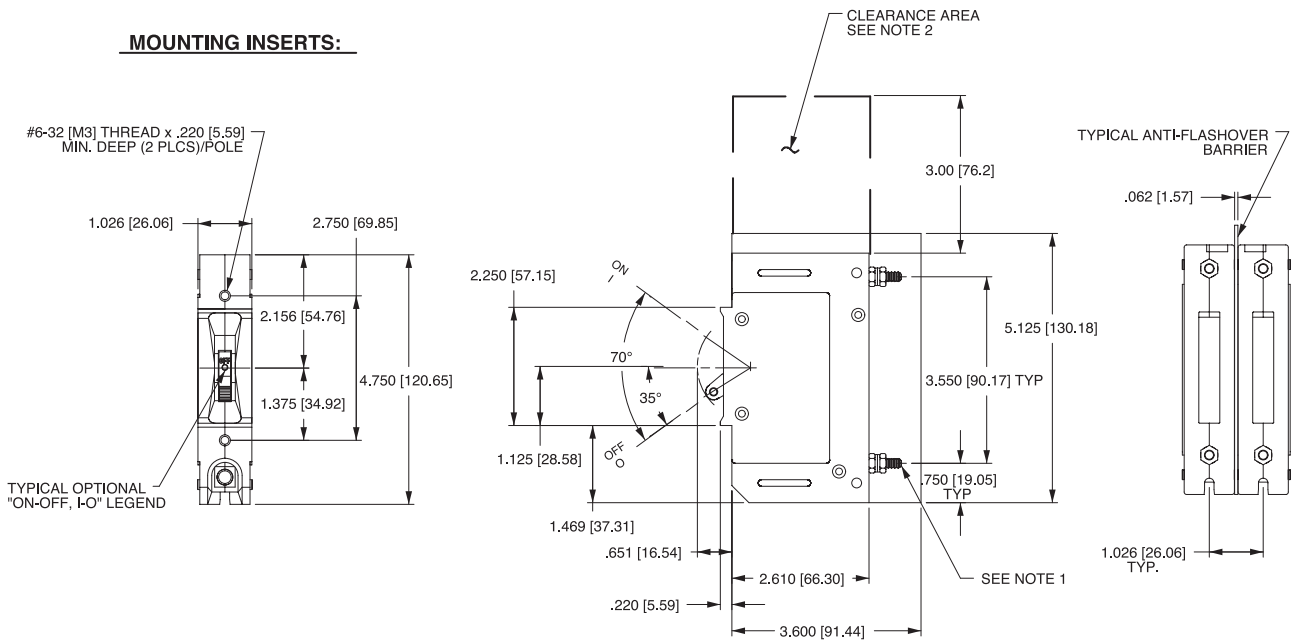


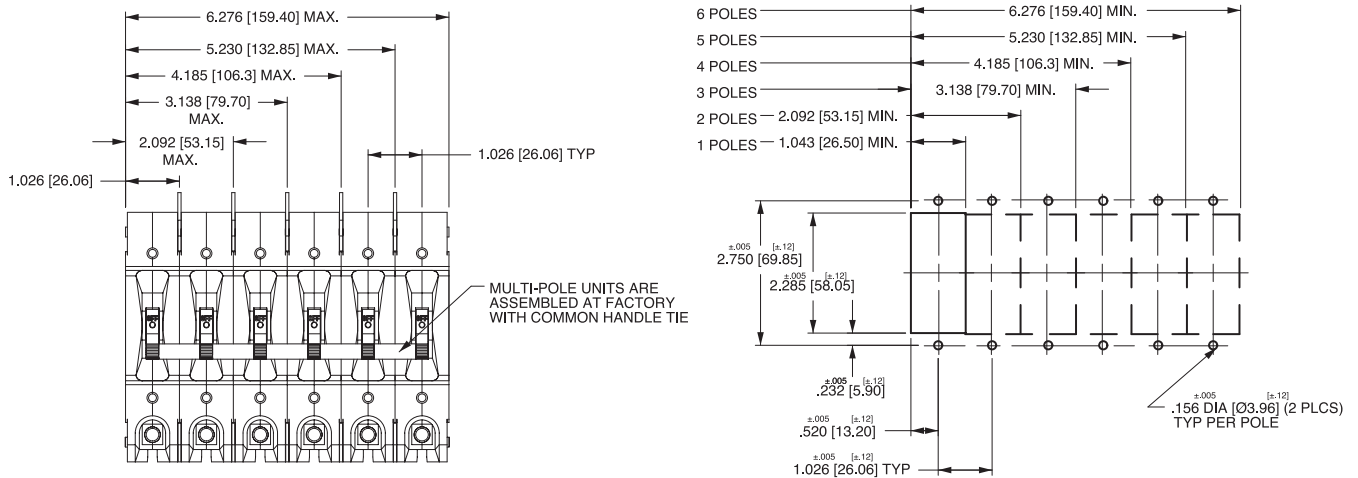
TABLE A TIGHTENING TORQUE SPECIFICATIONS		
THREAD SIZE TERMINAL TYPE	WIRE SIZE	TORQUE
#6-32 [M3] HARDWARE	—	7-9 IN-LBS (0.8-1.0 NM)
#10-32 THD TERMINAL SCREW	ALL	15-20 IN-LBS (1.7-2.3 NM)
1/4-20 THD TERMINAL SCREW	ALL	30-35 IN-LBS (3.4-4.0 NM)
#10-32 STUDS	ALL	15-20 IN-LBS (1.7-2.3 NM)
1/4-20 STUDS	ALL	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)
	3-10 AWG	50 IN-LBS (5.7 NM)

- Notes:
- 1 All dimensions are in inches [millimeters].
 - 2 Tolerance ± 0.02 [.51] unless otherwise specified.
 - 3 0-50 amps: 10-32 & M5 Studs. $6.25 \pm .062 / 15.88 \pm 1.574$ long.
 - 4 51-120 amps: 1/4-20 & M6 Studs. $.750 \pm .062 / 19.05 \pm 1.574$ long.

MOUNTING INSERTS:



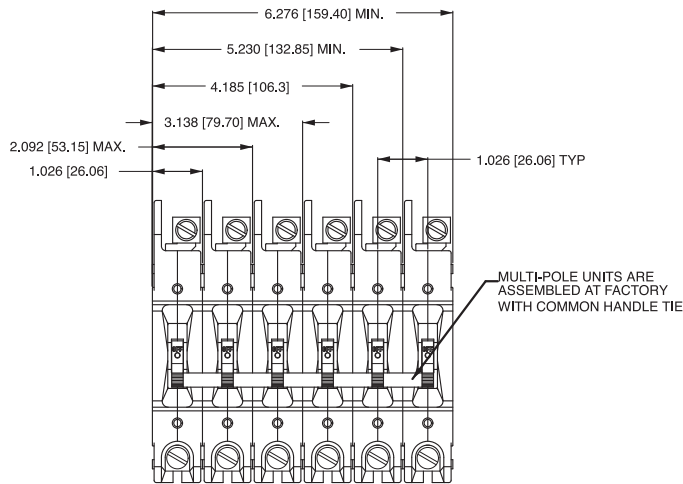
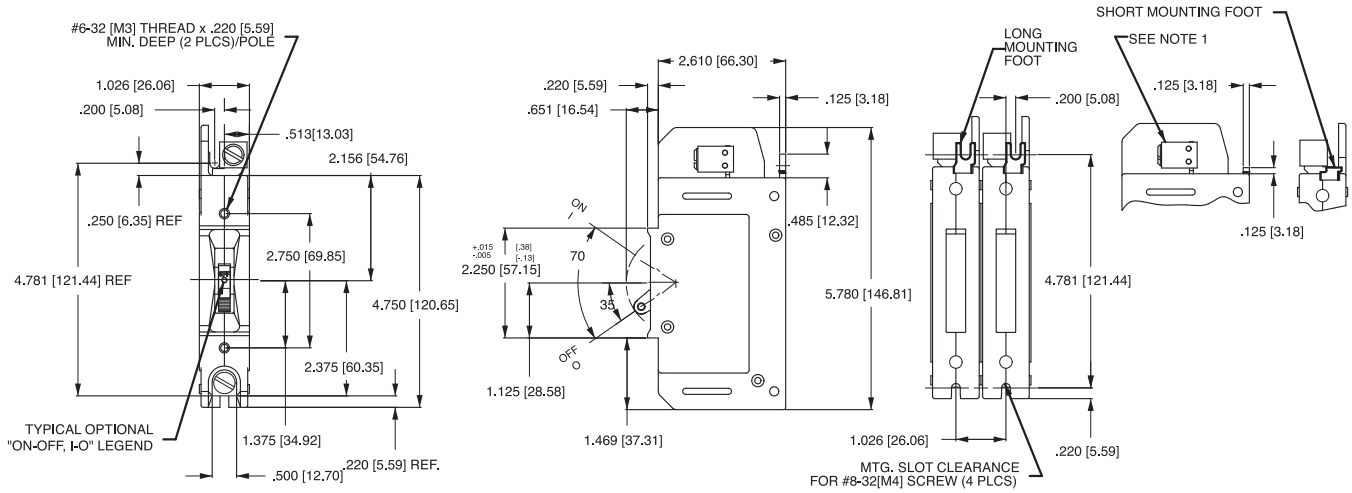
PANEL CUTOUT DETAIL



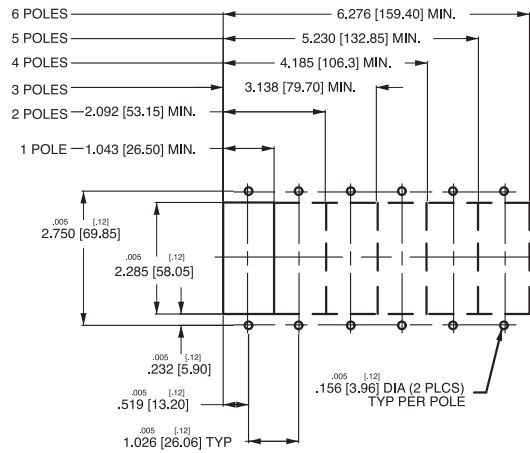
Notes:

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

MOUNTING INSERTS:



PANEL CUTOUT DETAIL



Notes:

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

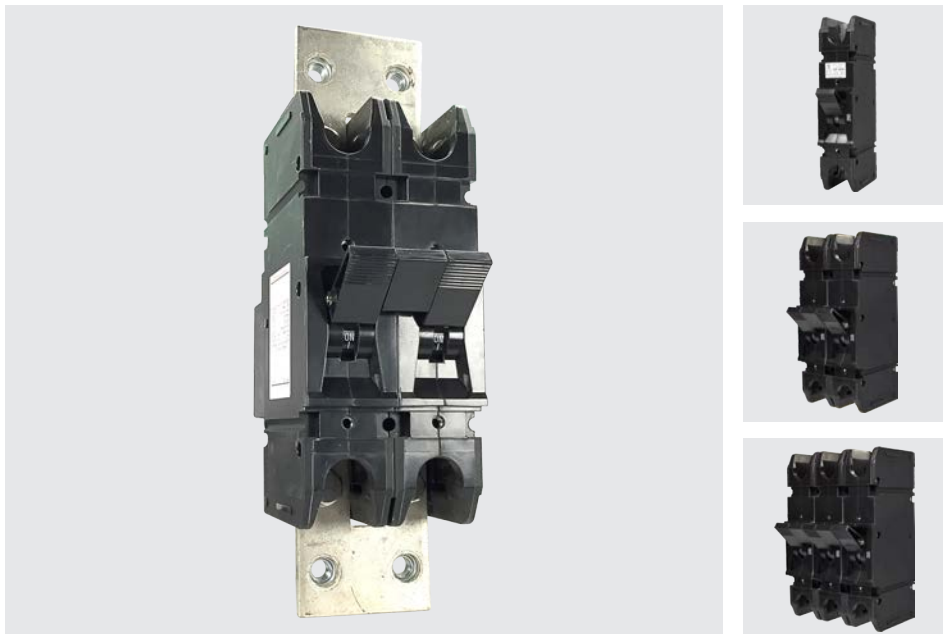
F-Series

F-Series

CIRCUIT BREAKER

The F-Series hydraulic-magnetic high amperage circuit breakers are designed to handle high current applications in extremely hot and/or cold locations. Due to its time-proven hydraulic-magnetic design, the F-Series load sensing mechanism is insensitive to changes in ambient or enclosure temperature, providing a consistent trip point over temperatures ranging from -40°C to +85°C. Additionally, the F-Series circuit breakers come with a choice of overload time delays, making them ideal for critical applications having inductive loads.

Further, the F-Series breakers are available up to 700A and an optional 25 millivolt metering shunt construction provides a safe method for monitoring current flowing through the breaker by simply connecting a meter with light gauge wire to the appropriate terminals located on the shunt housing at the rear of the breaker. Applications can be customized by measuring and displaying percentage of current, watts or safe/danger zones.



Product Highlights:

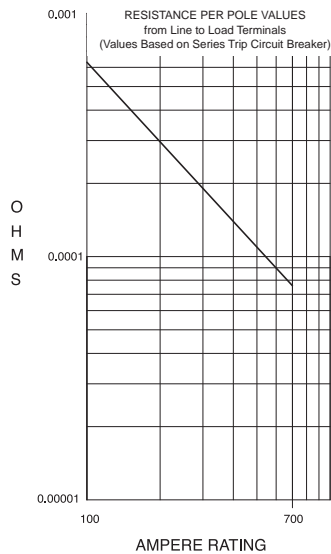
- ♦ AC ratings to UL 489
- ♦ DC voltage ratings up to 700A with metering shunt section
- ♦ Consistent trip point over temperatures ranging from -40°C to +85°C
- ♦ Optional 25 millivolt metering shunt construction

Typical Applications:

- ♦ Ideal for applications under extreme temperatures
- ♦ Higher Amperage Applications
- ♦ Battery Disconnect Systems
- ♦ Solar Power Systems
- ♦ Military

Electrical

Maximum Voltage	125VDC, 277VAC
Current Ratings	Standard current coils: 100, 125, 150, 175, 225, 250 amps. 300, 350, 400, 500, 600, 700 amps available as parallel pole construction.
Auxiliary Switch Rating	SPDT; 10.1 Amps @ 250VAC, 1.0 Amps @ 65VDC, 0.5 Amps @ 80VDC 0.1 Amps @ 125VAC (with gold contacts).
Insulation Resistance	Minimum: 100 Megohms at 500 VDC
Dielectric Strength	1960 VAC, 50/60 Hz for one minute between all electrically isolated terminals, except 2500 VAC for one minute between alarm/aux. switch and main terminals with contacts in open and closed position. F-Series circuit breakers comply with the 8mm spacing & 3750VAC 50/60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces, between adjacent poles and from main circuits to auxiliary circuits per Publications EN 60950 and VDE 0805.
Resistance, Impedance	Values from Line to Load Terminal - based on Series Trip Circuit Breaker.



Mechanical

Endurance	4000 ON-OFF operations with rated Current & Voltage & 4000 operations with no load (8000 operations total) @ 5 per minute. Parallel Pole construction: 1000 operations with rated Current and Voltage @ 5 per minute.
Trip Free	All F-Series Circuit Breakers will trip on overload, even when the actuator is forcibly held in the ON position.
Trip Indication	The operating actuator moves positively to the OFF position when an overload causes the circuit breaker to trip.

Physical

Number of Poles	1 - 3 Poles Note: Ratings over 250 Amps only available with parallel pole.
Internal Circuit Config.	Series (with or without auxiliary switch), Switch Only (with or without auxiliary switch).
Available Accessories	Factory installed: DC Current Metering Shunt (25 mV @Ir)
Weight	Varies depending on construction. Consult factory.
Standard Colors	Housing - Black; Actuator- Black or White with contrasting ON-OFF legend.

Environmental

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

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

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

Electrical Tables

Table A: Lists UL Listed (489) and CSA Certified (C22.2 N0. 5.1-M) configurations and performance capabilities as a Molded Case Circuit Breaker

F SERIES TABLE A : UL489 LISTED BRANCH CIRCUIT BREAKERS						
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	INTERRUPTING CAPACITY (AMPS)	
	MAX RATING	FREQUENCY	PHASE		FULL LOAD AMPS	UL / CSA 1 - 3 POLES
				SERIES		
	120 / 240 ¹	50 / 60	1	100 - 250	10,000	---
	277	50 / 60	1	100 - 250	10,000	---
	208Y / 120	50 / 60	3	100 - 250	10,000	---

Notes:
 1 120/240V rating available in 2 or 3 poles. In a 3 pole construction the center pole is Neutral.
 2 TUV constructions are not available with AC ratings and 150-250 amp ratings only.

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

F-SERIES TABLE B : UL489 LISTED BRANCH CIRCUIT BREAKERS				
CIRCUIT CONFIGURATION	VOLTAGE		CURRENT RATING	INTERRUPTING CAPACITY (AMPS)
	MAX. RATING	FREQUENCY		
SERIES	125	DC	251 - 700	50,000

Agency Certifications

UL Listed

UL 489



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

TUV Certified



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

UL 489A

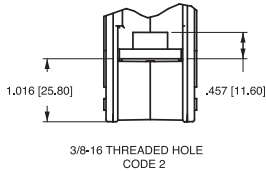
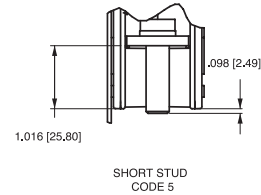
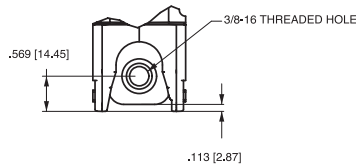
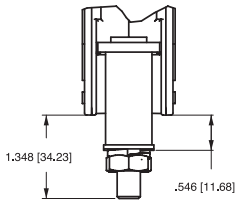


Circuit Breakers for Use in Communications Equipment (Guide DITT, File E189195)

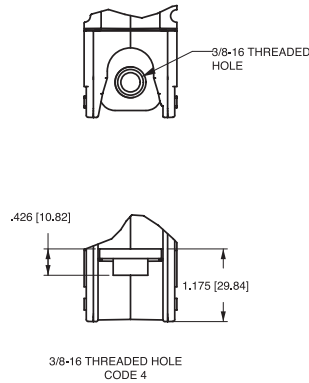
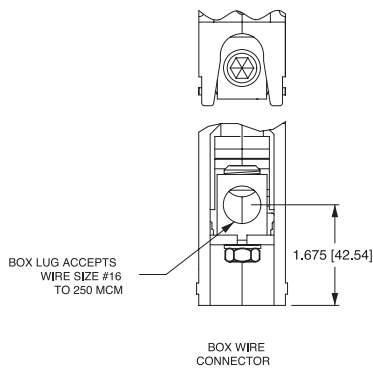
F SERIES NON-PARALLEL POLE CONSTRUCTION:

CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>SERIES TRIP (2 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL)</p>	<p>SWITCH ONLY (NO COIL)</p>	A	0	<p>SWITCH TRIP</p>	<p>SWITCH TRIP</p>	BC	0
<p>SERIES TRIP W/AUX. SWITCH (5 TERM'S.)</p>	<p>SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH</p>	<p>SWITCH ONLY (NO COIL) WITH AUXILIARY SWITCH</p>	A	2 3 4 5 9	<p>SERIES TRIP WITH AUXILIARY SWITCH</p>	<p>SERIES TRIP WITH AUXILIARY SWITCH</p>	BC	2 3 4 5 9

TERMINAL DETAILS
BACK CONNECT



FRONT CONNECT



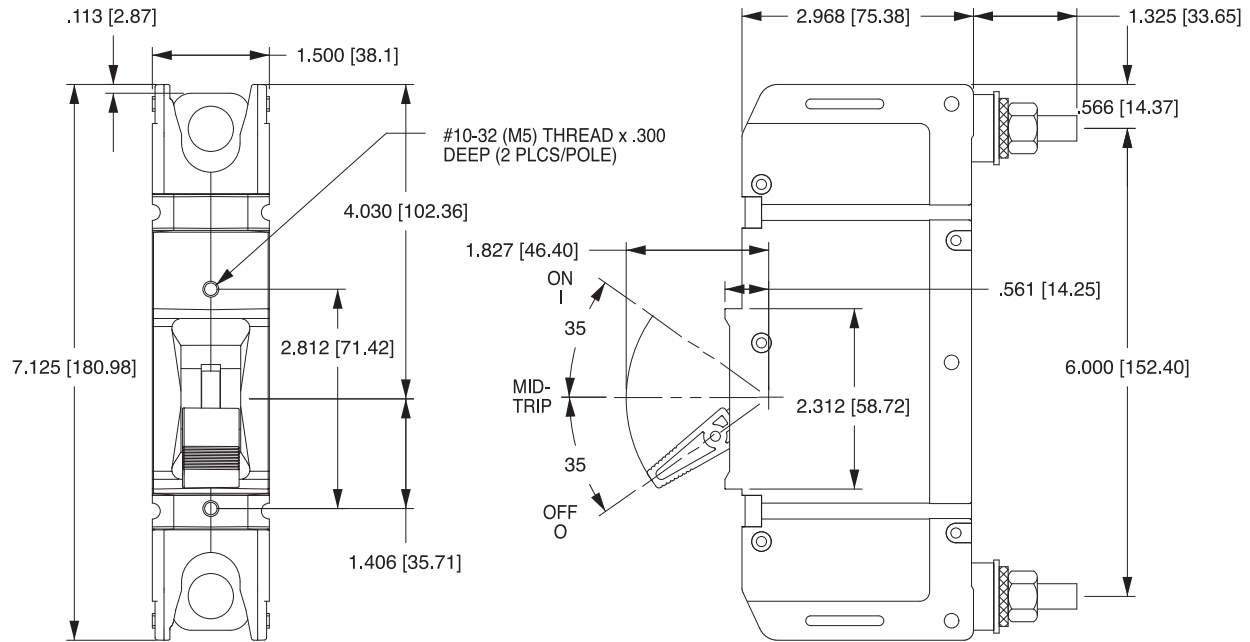
- Notes:
- All dimensions are in inches [millimeters].
 - Tolerance $\pm .020$ [.51] unless otherwise specified.

F-SERIES PARALLEL POLE CONSTRUCTION:

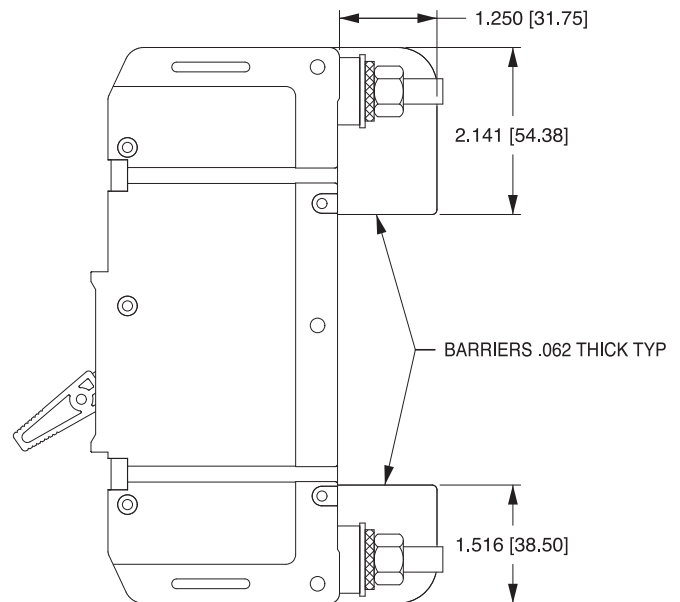
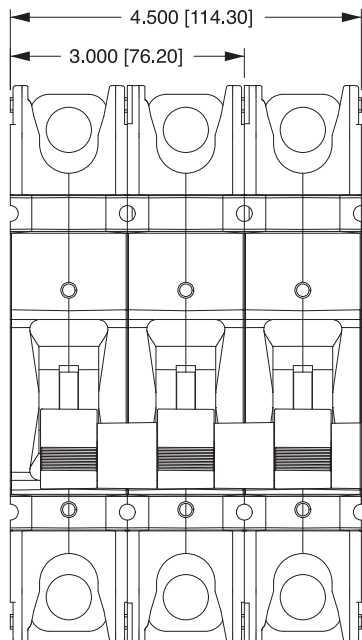
CIRCUIT BREAKER PROFILE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE	CIRCUIT SCHEMATIC		CIRCUIT CODE	AUX SWITCH CODE
	ANSI	IEC			ANSI	IEC		
<p>SERIES TRIP (2 TERMS.)</p>	<p>SWITCH ONLY (NO COIL)</p>		A	0	<p>SERIES TRIP</p>		BC	0
<p>SERIES TRIP W/AUX. SWITCH (5 TERMS.)</p>	<p>SWITCH ONLY (NO COIL) WITH ALARM OR AUX. SWITCH</p>		A	B	<p>SERIES TRIP WITH ALARM OR AUX. SWITCH</p>		BC	B
<p>SERIES TRIP W/METERING SHUNT (4 TERMS.)</p>	<p>SWITCH ONLY (NO COIL) WITH METERING SHUNT</p>		N	0	<p>SERIES TRIP CURRENT COIL WITH METERING SHUNT</p>		M	0
<p>RELAY TRIP (4 TERMS.)</p>	<p>SWITCH ONLY WITH ALARM OR AUX. SWITCH AND METERING SHUNT</p>		N	A	<p>SERIES TRIP WITH ALARM OR AUX. SWITCH AND METERING SHUNT</p>		M	A

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

SERIES TRIP BACK CONNECT (STUD TERMINALS SHOWN)

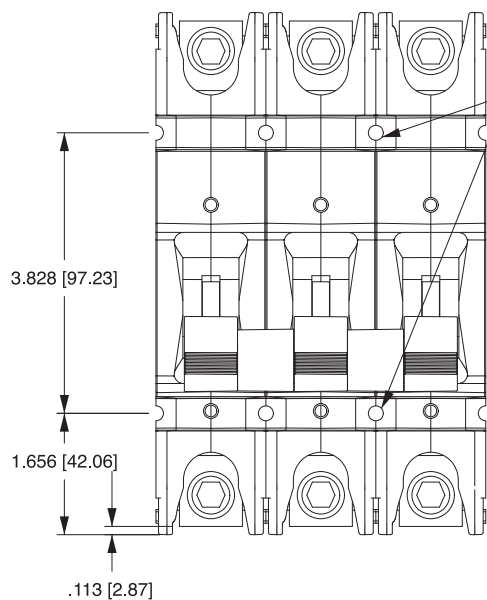


MULTIPOLE SERIES TRIP, SHOWING TERMINAL BARRIER

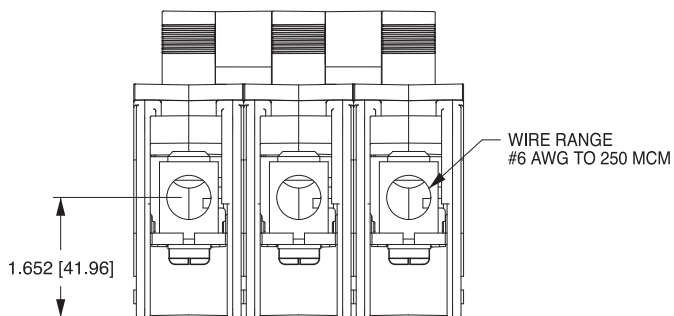
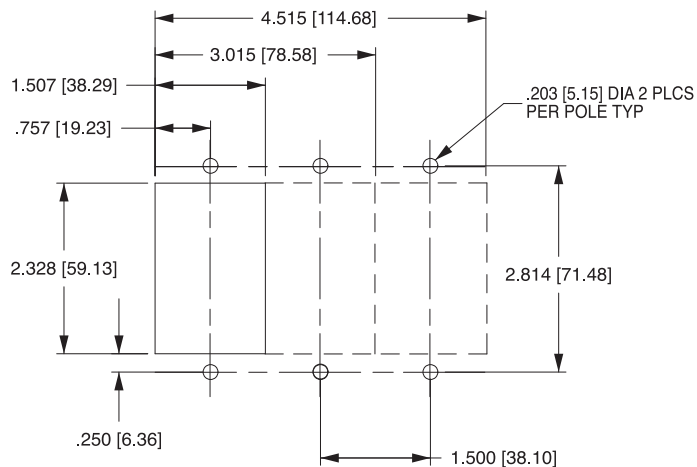


- Notes:
 1 All dimensions are in inches [millimeters].
 2 Tolerance ± 0.020 [.51] unless otherwise specified.

**SERIES TRIP FRONT CONNECT
(BOX LUG TERMINALS SHOWN)**

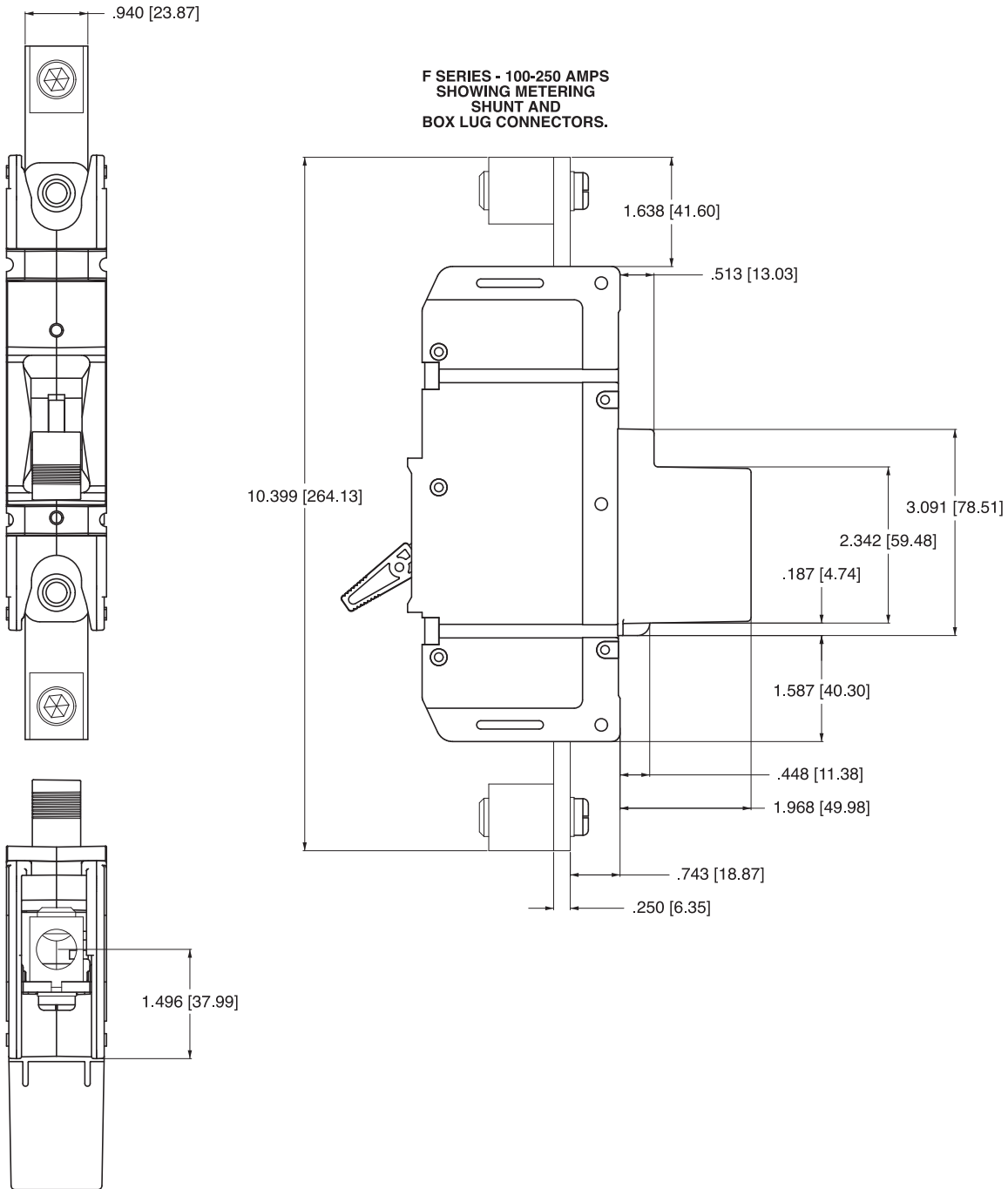


PANEL CUTOUT DETAIL



Notes:

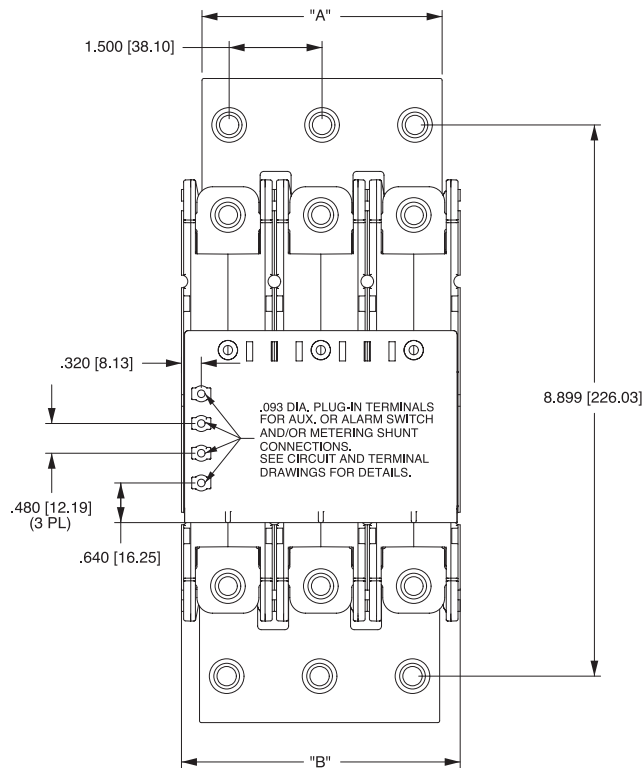
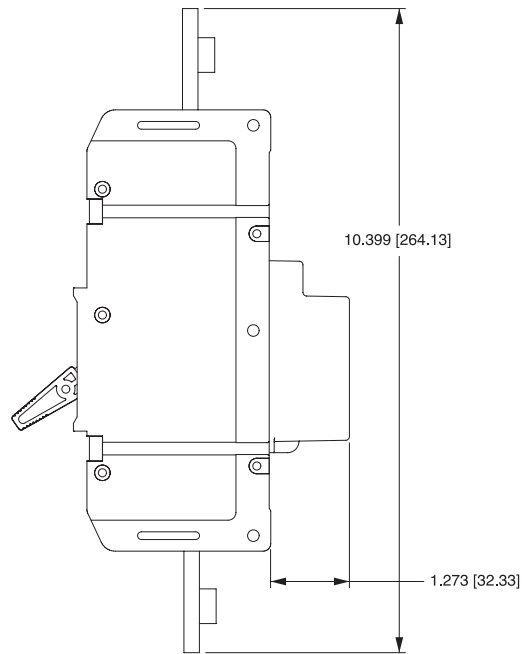
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [.51] unless otherwise specified.



F-Series breakers are available up to 700A, and are also available with a 25 millivolt metering shunt construction. This optional construction provides a safe method for monitoring current flowing through the breaker by simply connecting a meter with light gauge wire to the appropriate terminals located on the shunt housing at the rear of the breaker. You can customize the application by measuring and displaying percentage of current, watts or safe/danger zones.

Notes:

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

C-Series

REMOTE OPERATED CIRCUIT BREAKER

The C-Series remote operated circuit breaker consists of a custom designed remote operated motor module (housed within a circuit breaker molding) coupled to a C-Series hydraulic-magnetic circuit breaker. The remote operated circuit breaker (ROCB) offers the convenience of remote ON, OFF, and Reset capability combined with the safety and accuracy of a standard magnetic current sensing device. This allows operation of the circuit breaker from various locations in a system, facility or site without sacrificing the ability to manually operate the breaker if required. Service, diagnostics, load shedding and power distribution control functions can now be performed in areas that were previously unattended, inaccessible.

The ROCB module can be mounted on either side of the host breaker, while occupying only the width of a standard C-Series pole. Several interface methods are available.



Eco-Friendly

Product Highlights:

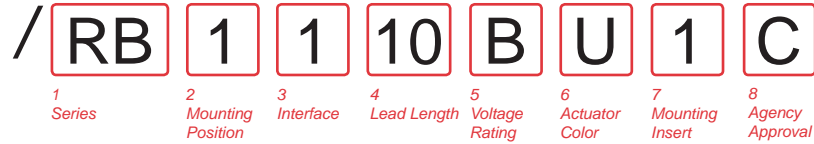
- ◆ ON-OFF and trip indication
- ◆ Load shedding
- ◆ Energy management
- ◆ Compact size
- ◆ Automatic reset capable
- ◆ Choice of interface styles
- ◆ Panel mounting
- ◆ Manual Operation Override
- ◆ Fits into industry standard cut-out

ROCB Motor Specifications:

- ◆ Voltage input: 12 VDC to 80 VDC
- ◆ Start current: < 1 amp
- ◆ Switching time: < 2 seconds
- ◆ Operating Temperature: -25°C to 80°C

To order a remote operated circuit breaker, add / plus the remote module part number to the end of the C-Series circuit breaker catalog number. ex. CA1BO24620121C/RB1110BU1C

Match color & mounting inserts of breaker.



1 SERIES
RB

2 MOUNTING POSITION
As viewed from back of breaker, line side up, pole 1 left.
1 Left Side
2 Right Side

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

4 LEAD LENGTH

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

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

6 ACTUATOR COLOR
T White
U Black
V Red
W Yellow

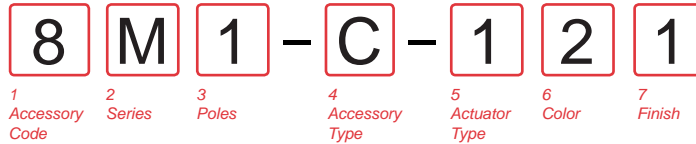
7 MOUNTING INSERT
1 6-32 x 0.195"
2 ISO M3 x 5mm

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

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

Panel Hole Plug

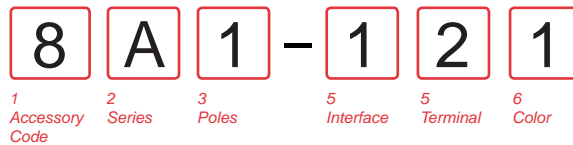
Threaded insert A & B-Series hole plugs are available in gloss finish. Snap-In A & B-Series hole plugs are available in matte finish.



1 ACCESSORY CODE 8	5 ACTUATOR TYPE & MOUNTING STYLE <table border="1"> <thead> <tr> <th>Actuator Type</th> <th>Mounting Style</th> </tr> </thead> <tbody> <tr> <td>1 M-Series Rocker</td> <td>Front Panel Snap-In</td> </tr> <tr> <td>2 A & B-Series Rocker</td> <td>6-32 Threaded Insert</td> </tr> <tr> <td>3 A & B-Series Rocker</td> <td>ISO M3 Threaded Insert</td> </tr> <tr> <td>6 C & D-Series Handle</td> <td>6-32 Threaded Insert</td> </tr> <tr> <td>7 C & D-Series Handle</td> <td>ISO M3 Threaded Insert</td> </tr> <tr> <td>8 A, B, C & D-Series Handle</td> <td>Front Panel Snap-In</td> </tr> </tbody> </table>	Actuator Type	Mounting Style	1 M-Series Rocker	Front Panel Snap-In	2 A & B-Series Rocker	6-32 Threaded Insert	3 A & B-Series Rocker	ISO M3 Threaded Insert	6 C & D-Series Handle	6-32 Threaded Insert	7 C & D-Series Handle	ISO M3 Threaded Insert	8 A, B, C & D-Series Handle	Front Panel Snap-In
Actuator Type	Mounting Style														
1 M-Series Rocker	Front Panel Snap-In														
2 A & B-Series Rocker	6-32 Threaded Insert														
3 A & B-Series Rocker	ISO M3 Threaded Insert														
6 C & D-Series Handle	6-32 Threaded Insert														
7 C & D-Series Handle	ISO M3 Threaded Insert														
8 A, B, C & D-Series Handle	Front Panel Snap-In														
2 SERIES A A & B-Series C C & D-Series M M-Series	6 COLOR 1 White (M-Series only) 2 Black 7 Gray (M-Series only)														
3 POLES 1 One Pole A, B, C & D-Series Front Panel Snap-In Only 2 Multi-Pole Inner 3 Multi-Pole Outer	7 FINISH 1 Matte 2 Gloss (A & B-Series only)														
4 ACCESSORY TYPE C Panel Hole Plug															

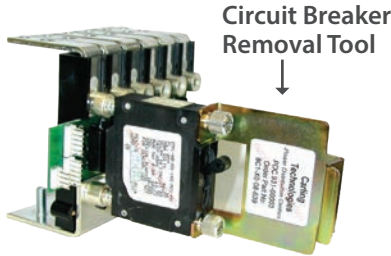
A & B-Series PCB Socket

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.



1 ACCESSORY CODE 8	4 INTERFACE WITH AUXILIARY SWITCH 1 Yes 2 No
2 SERIES A A & B-Series	5 AUXILIARY SWITCH TERMINAL TYPE 1 TAB, 0.110 Inches (Symmetrical terminal spacings) 3 None
3 POLES 1 One Pole	6 COLOR B Black

C-Series with Push-In Stud Terminals Removal Tool



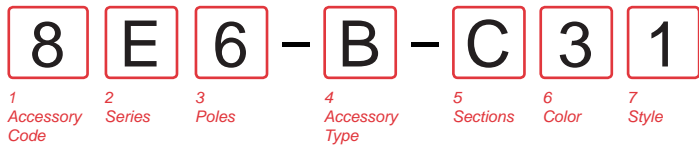
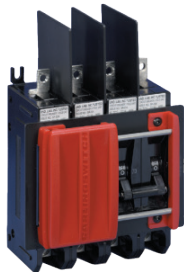
8C1-X0-08-639

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.



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

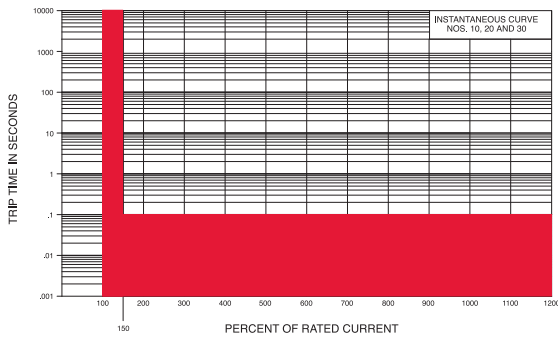
M, MS-SERIES TIME DELAY VALUES										
TRIP TIME SECONDS	PERCENT OF RATED CURRENT									
	Delay	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
	10, 20, 30	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
12, 22, 32, 62, 72, 92	No Trip	.300 - 7.00	.200 - 5.00	.100 - 2.00	.030 - .500	.008 - .300	.006 - .150	.005 - .100	.005 - .100	.005 - .100
14, 24, 34, 64, 74, 94	No Trip	3.00 - 70.0	2.00 - 40.0	1.00 - 15.0	.100 - 4.00	.008 - 2.00	.006 - .800	.005 - .350	.005 - .160	.005 - .160

Notes:

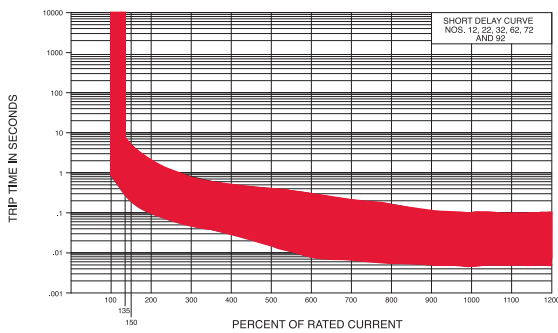
- 1 Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
- 2 Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
- 3 All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
- 4 The minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 18 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration, such as switching power supplies, highly capacitive loads and transformer loads.

Dual Rated AC/DC

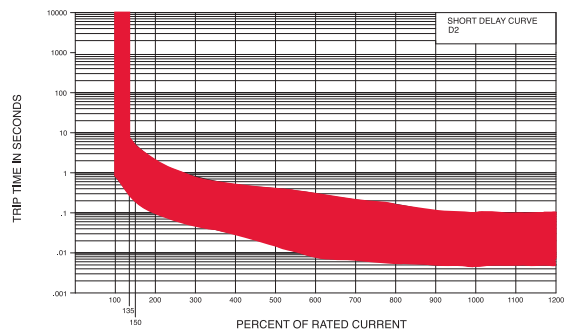
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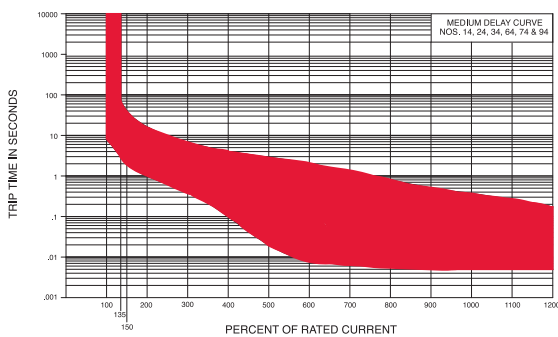
Short



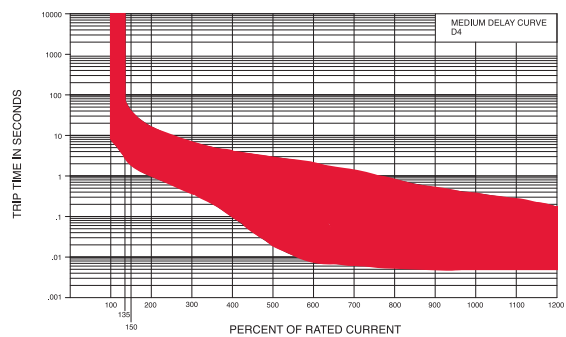
Short D2



Medium



Medium D4



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

Notes:

UL489 C-Series Breakers available with Delay Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46.

Delay Curves 11,12,14,16,21,22,24,26,42,44,46,52,54,56: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.

Delay Curves 32,34,36: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.

Delay Curves 10,20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.

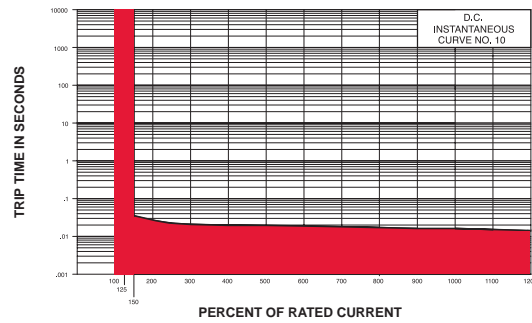
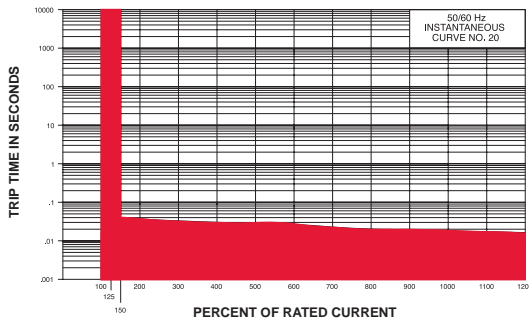
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.

On 50 amp and less current ratings, the minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 25 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents such as switching power supplies, highly capacitive loads and transformer loads.

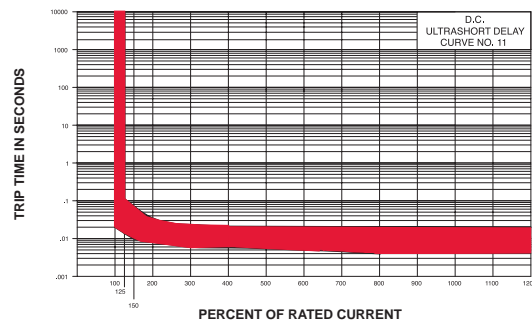
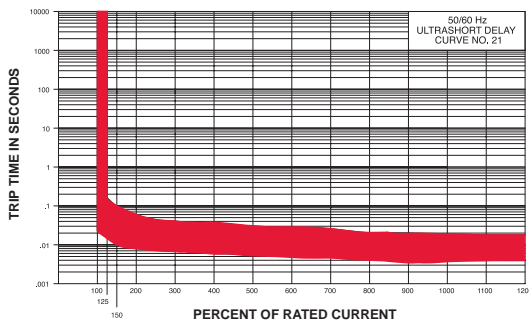
AC

DC

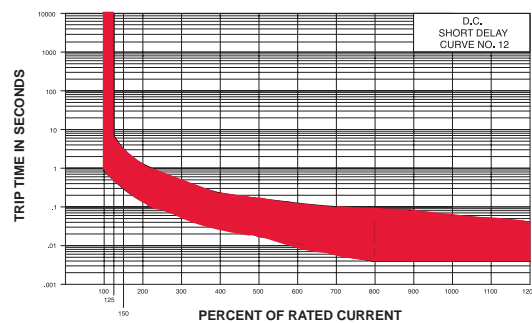
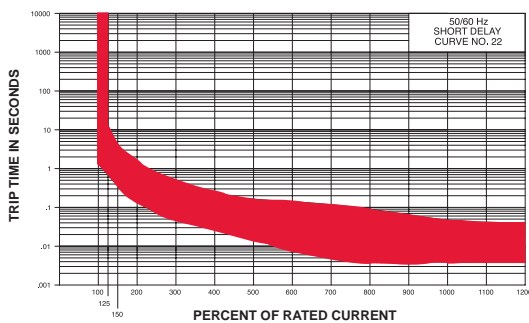
Instantaneous



Ultrashort

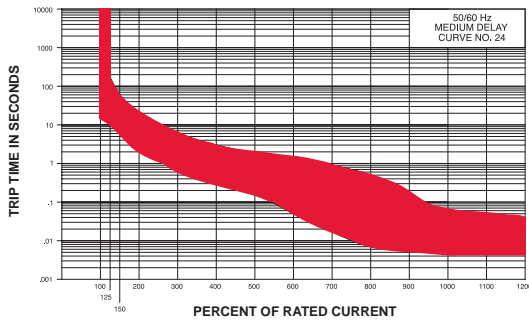


Short

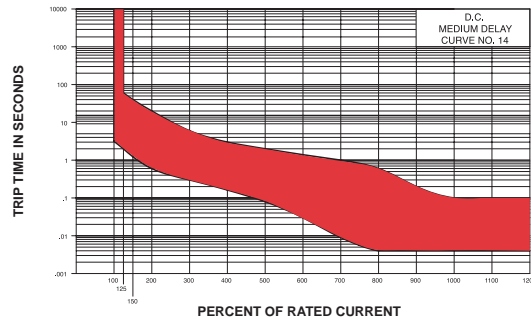


Medium

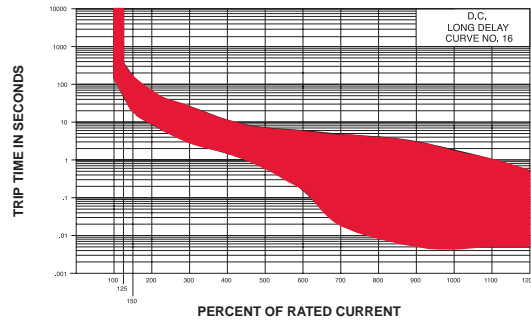
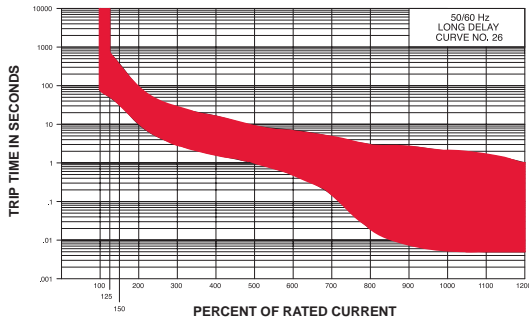
AC



DC

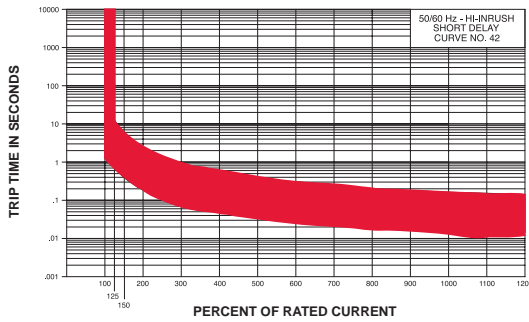


Long

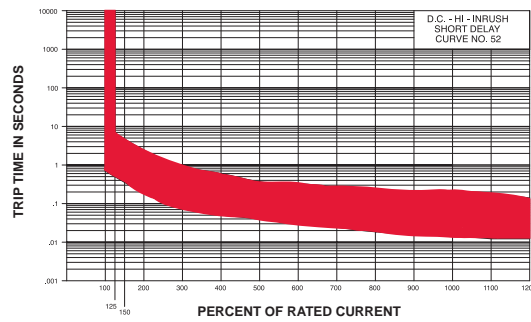


Short

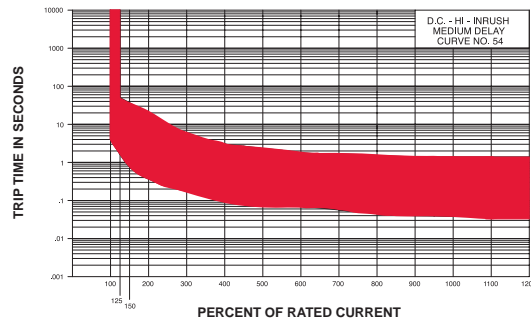
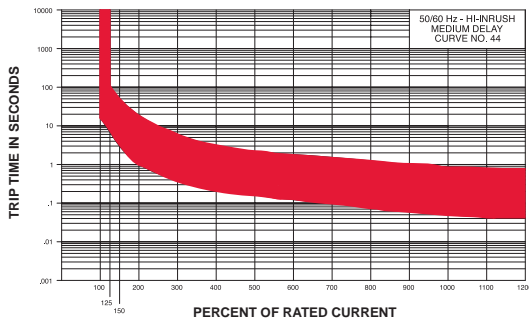
High Inrush AC



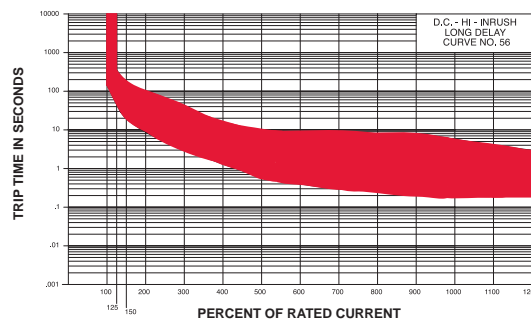
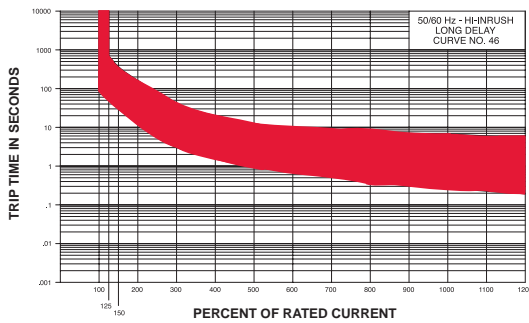
High Inrush DC



Medium

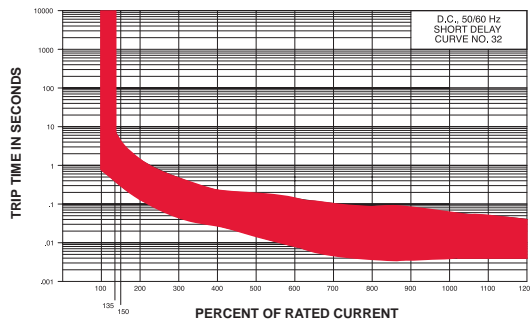


Long

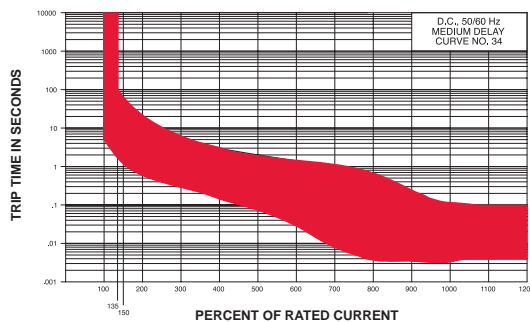


AC/DC

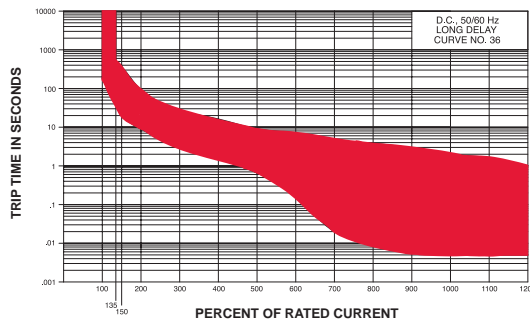
Short



Medium



Long



E-SERIES TIME DELAY VALUES											
TRIP TIME (SECONDS)	PERCENT OF RATED CURRENT										
	Delay	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
10	No Trip	May Trip	---	---	.001 - .038	.001 - .032	.001 - .021	.001 - .019	.001 - .019	.001 - .019	.001 - .019
12, 72	No Trip	.600 - 7.00	---	---	.330 - 2.00	.150 - .800	.033 - .160	.016 - .071	.010 - .048	.008 - .040	.008 - .040
14, 74	No Trip	11.0 - 110	---	---	6.00 - 45.0	3.00 - 18.0	.280 - 3.50	.013 - 1.50	.010 - .130	.009 - .090	.009 - .080
16, 76	No Trip	100 - 800	---	---	50.0 - 360	20.0 - 120	3.00 - 25.0	.020 - 11.0	.010 - .700	.009 - .230	.009 - .200
20	No Trip	May Trip	---	---	.001 - .040	.001 - .031	.001 - .020	.001 - .020	.001 - .020	.001 - .020	.001 - .020
22, 62	No Trip	.800 - 5.00	---	---	.400 - 2.30	.150 - .900	.034 - .170	.020 - .080	.012 - .051	.010 - .040	.009 - .040
24, 64	No Trip	7.20 - 90.0	---	---	4.40 - 35.0	2.00 - 15.0	.500 - 3.50	.025 - 1.60	.012 - .330	.010 - .070	.009 - .050
26, 66	No Trip	50.0 - 500	---	---	32.0 - 250	14.0 - 120	2.50 - 24.0	.320 - 7.00	.0125 - 3.10	.011 - .130	.010 - .055
30	No Trip	May Trip	---	---	.001 - .040	.001 - .032	.001 - .020	.001 - .020	.001 - .020	.001 - .020	.001 - .020
32, 92	No Trip	May Trip	.450 - 5.20	---	.330 - 2.30	.150 - .900	.033 - .170	.016 - .080	.009 - .051	.008 - .040	.008 - .040
34, 94	No Trip	May Trip	5.80 - 73.0	---	4.40 - 45.0	2.00 - 18.0	.280 - 3.60	.013 - 1.60	.010 - .330	.009 - .090	.009 - .080
36, 96	No Trip	May Trip	42.0 - 600	---	32.0 - 360	14.0 - 120	2.50 - 25.0	.020 - 11.0	.010 - 4.10	.009 - .330	.009 - .200

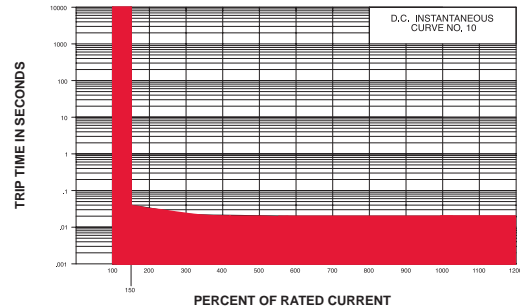
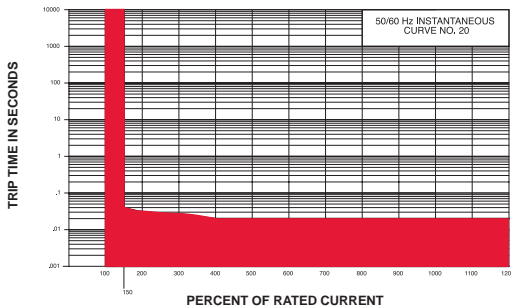
NOTES

Delay Curves 10,20,30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in these curves.
 Delay Curves 12,14,16,22,24,26,62,64,66,72,74,76: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in these curves.
 Delay Curves 32,34,36,92,94,96: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in these curves.
 All curves: Data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
 The minimum inrush pulse tolerance handling capacity on the above standard delays is 16 times rated current & 20 times rated current for high inrush delays based on a 60Hz 1/2 cycle, 8.33 ms pulse.

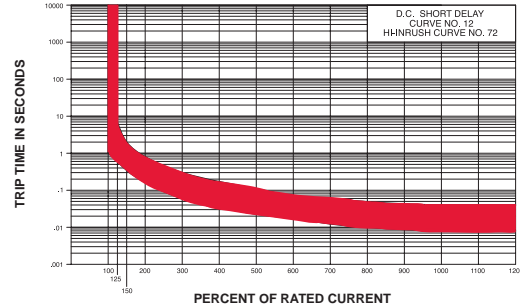
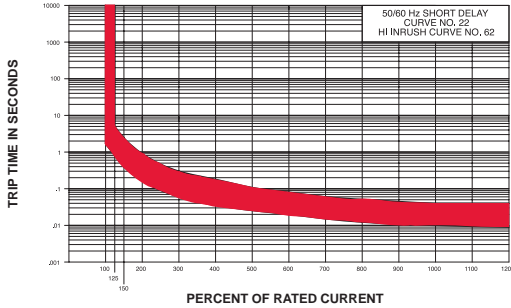
Instantaneous

AC

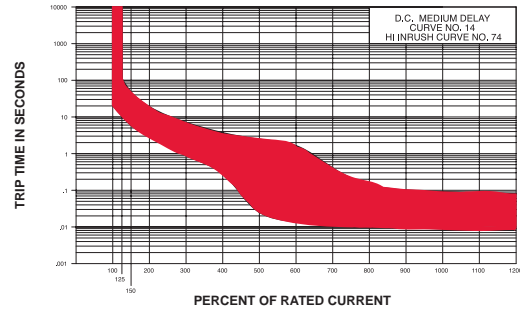
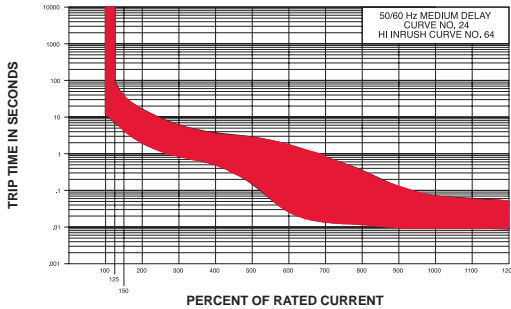
DC



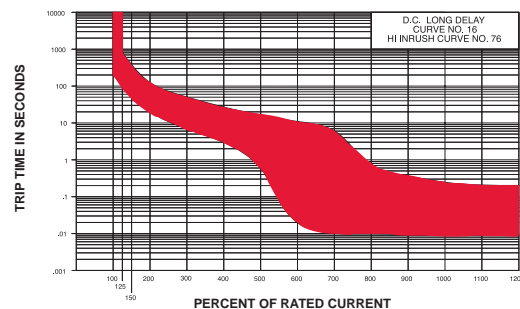
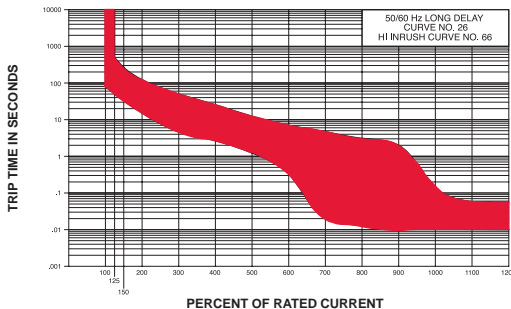
Short



Medium

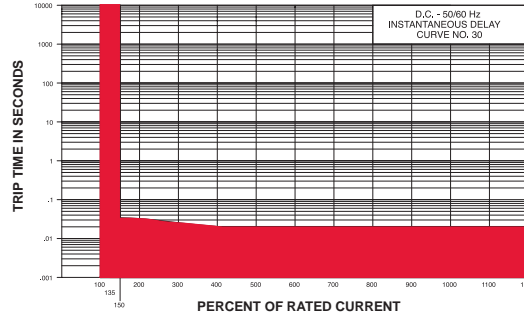


Long

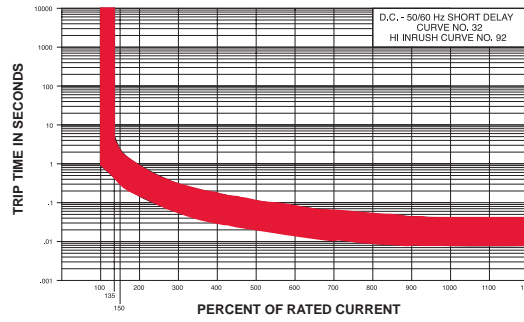


AC/DC

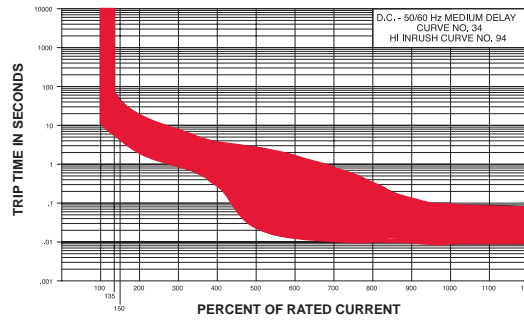
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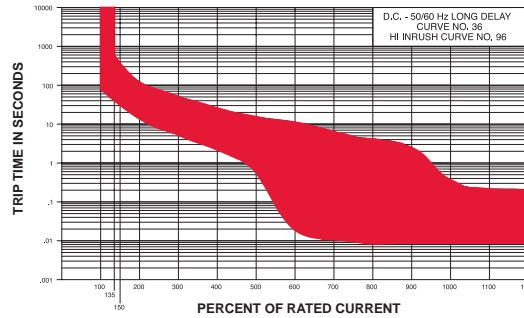
Short



Medium



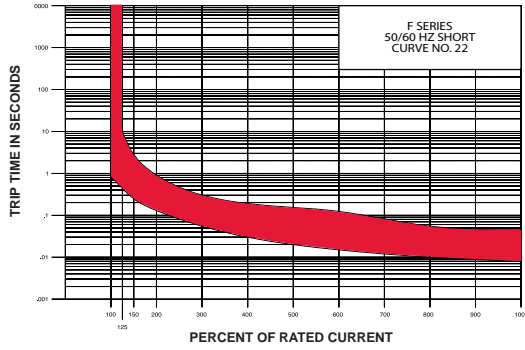
Long



F-SERIES TIME DELAY VALUES									
TRIP TIME SECONDS	PERCENT OF RATED CURRENT								
	Delay	100%	125%	150%	200%	400%	600%	800%	1000%
11	No Trip	.013 - .125	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020	.004 - .020
12	No Trip	.475 - 10.0	.275 - 2.80	.140 - .850	.030 - .190	.015 - .125	.010 - .050	.008 - .038	.008 - .038
14	No Trip	10.0 - 110	6.00 - 40.0	2.50 - 15.0	.500 - 3.00	.180 - 1.00	.010 - .280	.008 - .080	.008 - .080
16	No Trip	110 - 1000	60.0 - 400	22.0 - 150	4.00 - 25.0	1.00 - 5.50	.010 - 1.80	.008 - .390	.008 - .390
22	No Trip	.700 - 12.0	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .045
24	No Trip	10.0 - 160	6.00 - 60.0	.220 - 20.0	.300 - 3.00	.050 - 1.30	.007 - .500	.005 - .060	.005 - .060
26	No Trip	50.0 - 700	32.0 - 350	10.0 - 90.0	1.50 - 15.0	.500 - 7.00	.020 - 3.00	.006 - 2.00	.006 - 2.00

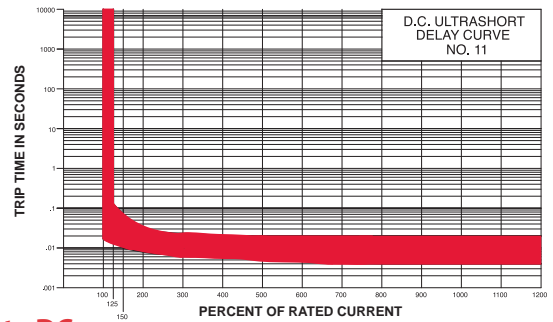
Short - AC 22

AC



Ultrashort - DC

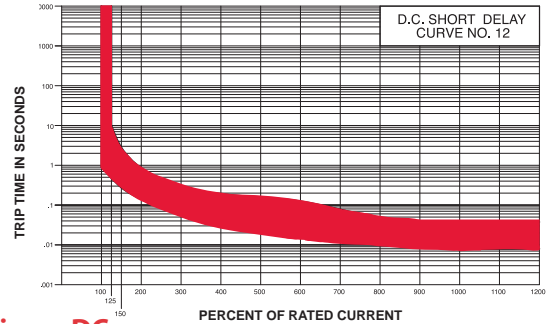
DC



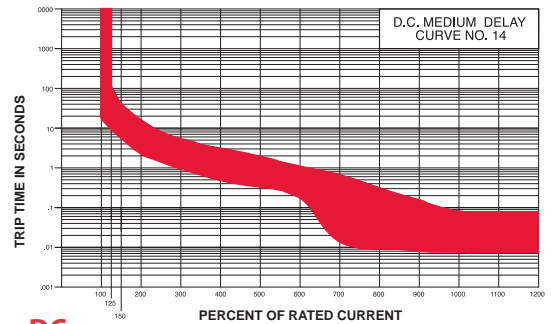
Medium - AC 24



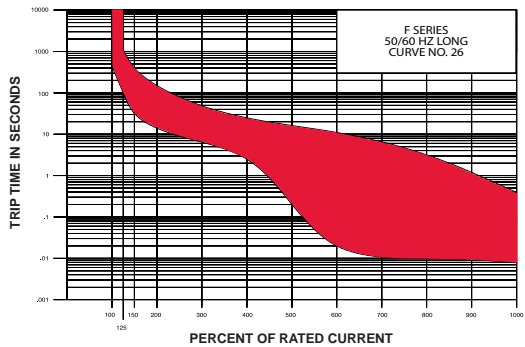
Short - DC



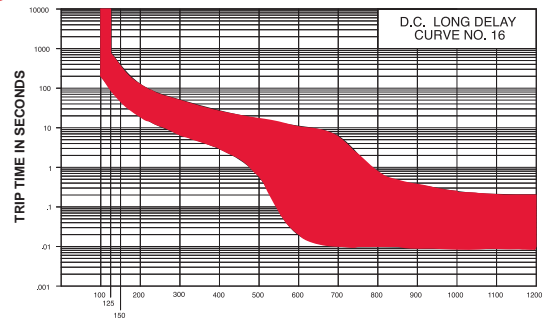
Medium - DC



Long - AC 26



Long - DC



A

Alternating Current

A periodic current (sine wave) whose average value over a cycle is zero. The current reverses at regular intervals of time and has alternately positive and negative values.

Ambient Temperature

The temperature of the medium in which the heat of a device is dissipated. The ambient temperature is often specified in standards for device performance (such as the UL Standards) as the basis for determining the heat rise of the component.

Ampacity

The current carrying capacity of a conductor or device.

Ampere *see coulomb*

1) The classic definition of an ampere is a unit of electric current flow equivalent to the motion of 1 coulomb of charge, or 6.28×10^{18} electrons, past any cross section in 1 second. This is an intuitive way to think about an ampere, it is the flow of a huge number of electrons through a conductor.

2) In 1948 this alternative definition was adopted: A unit of electric current in the meter-kilogram-second system. It is the steady current that when flowing in straight parallel wires of infinite length and negligible cross section, separated by a distance of one meter in free space, produces a force between the wires of 2×10^{-7} newtons per meter of length.

B

Battery *see cell*

Two or more cells connected together. Thus a group of batteries connected together can also be referred to as a battery

Battery Bank

When groups of 6V or 12V batteries are wired in series or parallel or a combination to increase voltage or capacity the entire group is referred to as a battery bank. When batteries are connected in series the amp-hour rating is the same and the voltage is additive. When batteries are connected in parallel the voltage is the same and the amp-hour rating is additive.

Battery State-Of-Charge

The term is used to describe and estimate of how much energy the battery is able to deliver. There have been many attempts to develop improved state-of-charge estimates. The most common methods include specific gravity, at-rest open-circuit voltage, and amp-hour measurement.

Branch Circuit *see main*

The portion of the wiring system after the main circuit protection device.

Break (rating)

The amount of current that can be passing through a set of contacts, such as those in a solenoid, when they open, without damaging the contacts. This can be a rating for a single event or over some number of cycles, generally 1000, 10,000 or 1000,000.

Bus, Busbar

A bus is a group of common connections, often consisting of a strip of copper or brass with a number of screws or bolt studs for the connection of wires. It may be a negative or a positive bus.

C

Cascade Circuit

A series arrangement of more than one protector connected between the power source and the load.

CE (Conformité Européen)

The CE marking is a conformity marking consisting of the letters "CE". The CE marking is applied to products regulated by certain European health, safety and environmental protection legislation. The CE marking is obligatory for products it applies to. The manufacturer affixes the marking certifying that the product conforms to applicable regulations, in order to be allowed to sell his product in the European market.

Cell

An electrochemical system that converts chemical energy into electrical energy. Typically consisting of two conductive plates with different galvanic potential immersed in an electrolyte.

Charge

Classically refers to an accumulation of electrons producing an electrostatic charge. In common use it often refers to restoring energy to a battery. Specifically, it would refer to the part of a multistage battery charging cycle when the voltage was held constant at or about the gassing voltage.

Circuit

A closed path of electrically, or electro-magnetically connected, components or devices that is capable of current flow. Typically consisting of loads, sources, conductors, and circuit protection (circuit breakers and fuses). For example: A battery, fuse, and bilge pump connected together with wire are a circuit. The path must be continuous and closed.

Circuit Breaker

A device that, like a fuse, interrupts a current in an electric circuit when the current becomes too high. Unlike a fuse, a circuit breaker can be reset after it has been tripped. When a high current passes through the circuit breaker, the heat it generates or the magnetic field it creates causes a trigger to rapidly separate the pair of contacts that normally conduct the current.

Circular 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:

$$A = \pi r^2$$

$$A = 3.1428 \times (.0005)^2 = 2 \text{ inches}$$

$$A = .0000007857 \text{ square inches}$$

Cold Cranking Amperes (CCA) *see marine cranking amperes*

CCA is the discharge load in amps, which a battery can sustain for 30 seconds at 0° F. and not fall below 1.2 volts per cell (7.2V on 12V battery). This battery rating measures a burst of energy that an engine needs to start in a cold environment. This rating is used mainly for rating batteries for engine starting capacity and does not apply to NiCad batteries, NiMH batteries or Alkaline batteries.

Common Trip

A feature on a multi-pole protector in which an overload on any pole will cause all poles to open.

Conductivity

Conductance is the reciprocal of resistance, which depends on the receptivity constant of the material. Receptivity is the resistance of a conductor having unit cross section and unit length. Conductivity is the reciprocal of the receptivity. Its units are 1/ohm-cm or ohm/cm, or 1/ohm-circular mils/ft

Conductor

That part of an electrical circuit whose resistance relative to the balance of the circuit is zero. For example, in a circuit consisting of a light bulb and a battery, connected together with wire, the wire is referred to as the conductor.

Converter

An electrical device that converts one type of electrical energy into another. Battery chargers convert AC power to DC to charge the battery, inverters convert DC power into AC, both are converters. Often used in RV industry to mean a power supply that runs the domestic DC loads when shore power is available.

Coordination

The ability of the protector with the lowest rating in a cascade arrangement to trip before those with higher ratings (See Cascade Circuit).

Coulomb *see amperage*

The measurement unit of electric charge, which is determined by the number of electrons in excess (or less than) the number of protons. Classically a charge of 1 coulomb = 6.25×10^{18} electrons. The meter-kilogram-second unit of electrical charge equal to the quantity of charge transferred in one second by a steady current of one ampere.

Cranking (Starting)

Normally associated with "cranking current" which is the current required by the starter circuit prior to engine starting. The cranking current varies significantly during the starting cycle. Initially, there is a large surge of current required to overcome the inertia and compression of the engine. This surge can be two to four times the average cranking current. Once the engine is turning there are peaks and valleys as the pistons go through the compression and exhaust cycles. The cranking current rating is used for sizing batteries, cables, and battery switches.

Current *see amperage*

Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms. The common symbol for current is the uppercase letter I. The standard unit is the ampere, symbolized by A. Physicists consider current to flow from relatively positive points to relatively negative points; this is called conventional current or Franklin current. Electrons, the most common charge carriers, are negatively charged. They flow from relatively negative points to relatively positive points. Electric current can be either direct or alternating. Direct current (DC) flows in the same direction at all points in time, although the instantaneous magnitude of the current might vary. In an alternating current (AC), the flow of charge carriers reverses direction periodically. The number of complete AC cycles per second is the frequency, which is measured in hertz. An example of pure DC is the current produced by an electrochemical cell. The output of a power-supply rectifier, prior to filtering, is an example of pulsating DC. The output of common utility outlets is AC.

Current Limitation

A protective device that reduces the available short circuit peak current to a lesser value.

Current Rating

The maximum current in amperes that a device will carry continuously under defined conditions without exceeding specified performance limits.

Current Transformer *see ammeter*

The "CT", as current transformers are commonly referred to, is used by AC ammeters to "sense" current flow in a wire in an AC circuit. It is a toroidal coil of wire through which a wire whose current we wish to measure is passed. It is normally encapsulated and looks like a "doughnut", which is how electrician's commonly refer to it. The doughnut has two wires coming out of it, which are connected to the AC ammeter. As current flows in the AC wire we wish to measure, it induces a current flow in the current transformer. The magnitude of the current varies directly with the current flowing in the AC wire. Current transformers are rated by the number of maximum amps that can flow in the measured wire and the current generated, by the CT, at that current flow. For example: A 50:5 CT is rated for 50 amps flowing in the measured wire, and it generates 5 amps of current as a consequence.

D

Delay

A difference in time between the initiation of an event and its occurrence, or between an event's observation and enunciation of it. This is usually used to refer to the time between the application of overcurrent to a fuse or circuit breaker and the time when the device opens.

Derating

A decrease in a device's rating, usually amperage, due to its application in ambient conditions different from those in which it was tested or for which it was designed originally.

dielectric strength

The maximum voltage stress that a material can withstand without rupture.

Digital

A digital signal is one which has only two valid values denoted as 1 or 0. Commonly these are equated to distinctly different voltage. For example: A voltage of +5V would equal a 1 and a voltage of 0V would equal a 0. A digital meter is one that displays values as numerical values rather than as the position of a meter on a relative scale.

Direct Current (DC)

An electric current that always flows in the same direction. The magnitude may vary but the current direction is always the same. Commonly referred to as DC. Examples of direct current sources are batteries, fuel cells, and photovoltaic cells. DC sources such as battery chargers and alternators actually use rectified AC current as the source.

Discharge

Refers to the consumption of energy from a battery, or to the electrostatic discharge associated with a lightning bolt, capacitor, etc.

Double Pole

Indicates a switch, relay, or circuit breaker with two separate conductive paths, which are opened or closed when the device is operated.

Duty, Continuous

The requirement that demands operation at a constant load for an indefinite period of time.

Duty, Intermittent

The requirement that demands operation for alternate intervals of (1) load/no load; (2) load/rest; or (3) load/no load/rest.

E

Earth

The third planet from the sun in Astronomy, but in electrical terms it refers to a connection, which is made to a conductor that is connected to the planet Earth. In grounded electrical systems there is a connection, which is a copper rod or some other highly electrically conductive connection, to the actual Earth. This is to ensure a safe conductive path for a short circuit, which in turn helps prevent electrocution.

Electron *see coulomb*

A negatively charged subatomic particle, that is either free (not attached to any atom), or bound to the nucleus of an atom. In electrical conductors, current flow results from the movement of free electrons from atom to atom individually, and from negative to positive electric poles in general. The charge on a single electron is considered as the unit electrical charge. It is assigned negative polarity. Electrical charge quantity is not usually measured in terms of the charge on a single electron, as this is an extremely small charge. Instead, the standard unit of electrical charge quantity is the coulomb, symbolized by C, representing about 6.25×10^{18} electrons.

Electromotive Force (EMF)

Commonly referred to as voltage, electromotive force is the energy per unit of charge that is supplied by a source of electrical energy such as a battery, charger or alternator.

Electromagnetic Interference (EMI).

Noise generated by a load (typically by electrical switching action). Usually specified as meeting agency limits for conducted EMI (noise reflected back onto the power bus) or radiated EMI (noise emitted into the area surrounding a device).

Energy *see power*

The classically simple definition is, the capacity to do work. Energy may be manifested as, mechanical motion, thermal heat, or electrical power, which is consumed, radiated, dissipated, or stored over a period of time. The energy in a direct-current circuit is equal to the product of the voltage in volts, the current in amperes, and the time in seconds. The units for energy are Watt-hours. In alternating current (AC) circuits, the expression for energy is more complex.

Effective or RMS value

The value of alternating current that will produce the same amount of energy in a resistance as the corresponding value of direct current.

F

Fault

A defect in the normal circuit configuration, usually due to unintentional grounding. Commonly referred to as a short circuit.

Fault Current

The current that may flow in any part of a system under fault conditions.

Feeder

All circuit conductors between the service entrance equipment and the final branch circuit protector.

Field

Typically refers to a magnetic field. Specifically used when discussing the rotating electro-magnetic field associated with an alternator. By varying the field current, thus its strength, the output of the alternator may be controlled.

Frequency *see hertz*

For an oscillating or varying current, frequency is the number of complete cycles per second in alternating current direction. The standard unit of frequency is the hertz, abbreviated Hz. If a current completes one cycle per second, then the frequency is 1 Hz; 60 cycles per second equals 60 Hz (the standard alternating-current utility frequency).

Fuse

Safety device, consisting of a strip of low-melting-point alloy, which is inserted in an electric circuit to prevent excess current from flowing. If the current becomes too high the alloy strip melts, opening the circuit.

G

Generator

A rotating machine capable of generating electrical power. In the narrow definition generator refers to a DC machine and alternator refers to an AC machine. However, in common use the term generator is used to refer to AC machines as well.

Green Wire

The green wire is the non-current carrying safety grounding wire in an AC system in the United States. It is connected to an exposed metal part in the electrical system to provide a path for fault current in the case of a short circuit.

Ground Fault

GFI (Ground Fault Interruptor)

GFI is generic term referring to both GFCCI and GFP

GFCCI (Ground Fault Circuit Interruptor) *see* GFI

A device intended for the protection of personnel that functions to de-energize a circuit, or portion thereof, within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

GFP (Ground Fault Protector) *see* GFI

A device intended to protect equipment by interrupting the electric current to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protection device of that supply circuit.

ground, ground conductor

A point in a circuit which is at zero potential with respect to the Earth, or which is at the lowest potential in the system, (as with a floating ground).

grounding, grounding conductor

The AC conductor, not normally carrying current, used to connect the metallic non-current carrying parts of electrical equipment to the AC system and engine negative terminal, or its bus, and to the shore AC grounding conductor through the shore power cable. This term can also refer to the normally non-current carrying conductor used to connect metallic non-current carrying parts of direct current devices to the engine negative terminal, or its bus, to minimize stray current corrosion.

Grounded

The AC current carrying conductor that is intentionally maintained at ground potential, also called neutral.

H

Hertz *see frequency*

Hertz is a unit of frequency of one cycle per second. It replaces the earlier term of "cycle per second (cps)." The abbreviation for Hertz is Hz.

High Inrush (HI-INRUSH)

A load that exhibits, upon application of power, a steep wave front transient of very high current amplitude for a short duration.

Hot

Hot usually refers to the ungrounded current carrying conductors in an AC system. These would typically have a voltage of 120V or 240V in the United States. The term Hot is also used to describe a circuit that is energized, and has a potential greater than ground.

I

Inductance

An effect in electrical systems in which electrical currents store energy temporarily in magnetic fields before that energy is returned to the circuit.

Instantaneous Trip

Indicates that no intentional delay is purposely introduced in the opening time of a protector.

Interrupt Rating (AIC)

The fault current that a device, normally a fuse or circuit breaker is capable of interrupting without damage.

interrupting capacity

The maximum fault current that can be interrupted by a protective device without failure of the device.

inverter

An inverter converts DC power stored in a battery to AC power which is used by most household appliances.

IP ignition protection

Devices, which operate in a potentially explosive environment, must be ignition protected. This would include engine rooms with gasoline engines. There is a very specific set of tests which a device must pass to claim ignition protection. They include operating safely in an explosive mixture of propane and air.

isolation transformer

A transformer that is inserted in series with the incoming AC power to provide a magnetic coupling for power between the ship's systems and the AC grid. By magnetically coupling the power there is no direct connection by wires, which isolates the ships AC system from the AC grid.

L

Let-Through Current

The actual fault current passing through a protective device as compared to the current available to the device.

Line *see load*

The conductors that are at the supply of energy to a circuit. Line normally refers to the current carrying non-grounded conductor.

Line Loss *see voltage drop*

The power loss that occurs due to amperage flowing through the resistance of conductors over their length.

Listed (UL Listed)

Indicates that a device or component has met certain specifications as set forth by Underwriters Laboratory. Further, it means that the device or component has been tested for conformance and 'listed' with UL so it can use the UL logo and claim conformance to the specification.

Load *see line*

A device that consumes power and does work.

M

Make (Rating)

The current that a breaker, switch, or relay can connect without damaging the device.

Make Before Break

Describes a switch action that connects the new circuit before disconnecting the old. This type of switch action is required for battery switches in order to avoid an open circuit for the engine alternator, which can cause extreme voltages that can damage the alternator and accessory electronics.

N

NEC *see National Electrical Code*

NEMA

National Electrical Manufacturers Association

National Electrical Code (NEC)

The NEC is developed and maintained by the National Fire Protection Association which describes how residential, commercial, and RV electrical systems must be installed. The NEC is adopted, sometimes with revision, by states that also adopt the Uniform Building Code. Electrical inspections required by most building permits follow the NEC. While not required aboard boats, the NEC is a valuable guide to safe electrical systems. The goal of the NEC is personal safety and fire prevention.

Neutral (Ground) *see single phase*

The grounded current carrying conductor in a single phase, four wire, 120/240V AC system.

Neutral-to-Ground Bonding

Connecting the ground and the neutral together via an electrical conductor.

Nuisance Trip

A circuit breaker or fuse, which trips or blows without the circuit actually being overloaded. This may be due to a surge current which requires a slow tripping breaker or a slow blow fuse.

O

Ohm

The unit for resistance equals $V/I = \text{volt/current}$. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

Ohm's law

States that the ratio of the EMF (Electromotive Force) applied to a closed circuit to the current in the circuit is a constant. That constant is the resistance of the circuit. It may be stated as $V=IR$ (or $E=IR$, using E as the abbreviation of EMF whose units are volts). The unit of resistance is the ohm.

Open

Indicates a condition in an electric circuit in which there is a break in the conductive path. The break may be intentional such as an open switch or relay or it may be unintentional such as a broken wire or a blown fuse. In any case, the continuous conductive path required for an electric circuit is not available.

Overcurrent

When the current in a circuit exceeds the rating of the devices or conductors in it. Fuses and circuit breakers protect from overcurrent by opening the circuit if such a condition exists and persists.

Overload Current

The current value in excess of the rated current of the protective device.

Overload Rating (OL)

Designates whether the protector or family of protectors has been tested for general use or motor-starting applications:

OL0 - tested at 1.5 times amp rating for general use

OL1 - tested at 6 times amp rating or 10 times DC rating for motor starting application.

P

Panelboard

A collection of circuit breakers, switches, and instrumentation installed into a panel, which provides the central point for power distribution and monitoring for the electrical system. May also refer to a smaller panel, which is located remotely from the main panel, which is used to supply loads in the adjacent area. "Panelboard" is a term generally used only by NEC. In the marine industry they are usually called "panels", or "circuit breaker panels", or "distribution panels".

Parallel Circuit

An electrical circuit in which the positive connections are all in common and the negative connections are all in common. The voltage of the system appears across each branch of the circuit. The current varies as required by each load or source.

Pigtail

Wires which protrude from a device to connect it to the circuit. Often used in encapsulated products. Sometimes refers to a method of hooking up circuits in which a group of conductors are connected together and then one wire is connected to the circuit, this is done in order to simplify wiring.

Polarity

Refers to the electrical charge, which may be positive or negative. It also refers to the positive and negative terminals of a battery or load in a DC system. In AC systems it refers to the connections made to the hot and neutral. There is often a reverse polarity light that indicates if the neutral and hot are reversed.

Polarized System

An electrical system in which the positive and negative or the hot and neutral must be connected in a particular way and cannot be switched. Sometimes there are mechanical preventions to insure the correct polarity. For example, in an AC plug the physical configuration of the plug and receptacle force a polarized connection.

Pole *see toggle*

Indicates a conductive path in a switch or relay. Switches that are single pole have one conductive path; switches that are two pole have two conductive paths. Also refers to the magnetic poles on an electromagnet or a permanent magnet

Potential

The voltage across a circuit element. Implies the potential to do work.

Power

Electrical power is the rate at which electrical energy is converted to another form, such as motion, heat, or an electromagnetic field. The common symbol for power is the uppercase letter P. The standard unit is the watt, symbolized by W. In utility circuits, the kilowatt (kW) is often specified instead; 1 kW = 1000 W. Power in a direct current (DC) circuit is equal to the product of the voltage in volts and the current in amperes. This rule also holds for low-frequency alternating current (AC) circuits in which energy is neither stored nor released. At high AC frequencies, in which energy is stored and released (as well as dissipated or converted), the expression for power is more complex. In a DC circuit, a source of V volts, delivering I amperes, produces P watts according to the formula: $P = VI$ When a current of I amperes passes through a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = I^2 R$ When a potential difference of V volts appears across a component having a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = V^2 / R$

Power Factor

In an AC circuit loads other than resistance shift the phase angle between the voltage and the current. This shift is the result of energy being stored and released in an inductor for example. To calculate the power consumed one must consider this phase shift. We do so by using the following formula $P = VI \cos \phi$, where ϕ is the difference in phase angle between the voltage and current. Cosine ϕ is called the power factor. For resistive loads the power factor is equal to 1 because the phase angle equals 0. For pure inductive loads the power factor is 0 because the phase angle is +90°.

R

Recognized (UL Recognized)

A device that is UL Recognized differs from a device that is UL Listed. A Recognized device is expected to be installed within a larger assembly by a manufacturer, not in the field, and this larger assembly is then expected to be tested by UL. The UL Recognition then allows UL to skip testing of the specific embedded Recognized component. UL Recognition has little value for end users installing devices in the field.

Rectifier

A device that allows current to flow in only one direction, such as a diode. Used to convert, or rectify AC current into DC.

Regulator (Voltage Regulator)

A device, which uses a feedback loop to control the output of an alternator or other source. By measuring the output voltage and controlling the alternator field current, for example, the regulator is able to continuously adjust the alternator output to the desired voltage.

Resistance

The opposition to the flow of current in an electric circuit as defined by Ohm's law. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

Reverse Polarity

Describes a situation where the neutral and hot wires of an AC system are reversed. Most AC panels have an indicator to announce this condition, as it can be very dangerous.

RMS (Root-Mean-Square)

Root-mean-square (RMS) refers to the most common mathematical method of defining the effective voltage or current of an AC wave. To determine RMS value, three mathematical operations are carried out on the function representing the AC waveform:

- (1) The square of the waveform function (usually a sine wave) is determined.
- (2) The function resulting from step (1) is averaged over time.
- (3) The square root of the function resulting from step (2) is found.

In a circuit whose impedance consists of a pure resistance, the RMS value of an AC wave is often called the effective value or DC-equivalent value. For example, if an AC source of 100 volts RMS is connected across a resistor, and the resulting current causes 50 watts of heat to be dissipated by the resistor, then 50 watts of heat will also be dissipated if a 100-volt DC source is connected to the resistor. For a sine wave, the rms value is 0.707 times the peak value, or 0.354 times the peak-to-peak value. Household utility voltages are expressed in RMS terms. A so-called "117-volt" AC circuit has a voltage of about 165 volts peak (pk), or 330 volts peak-to-peak (pk-pk).

S

Safety Green (Ground) Wire

The non-current carrying conductor in a three wire 120V or four wire 240V AC circuit, it provides a safe path for fault current. See also green ground wire.

Self-Limiting

A device whose ability to limit output power regardless of input power is intrinsic to its design.

Short Circuit

A conductive path of zero resistance. Typically refers to an unintentional connection between two conductors of opposite polarity. If a voltage is applied to a short circuit the current becomes very large and can start a fire, thus the need for short circuit, or overcurrent, protection in the form of fuses or circuit breakers.

Short-Circuit Current Rating (SC)

The short-circuit current rating in kiloamperes (kA), followed by a letter and number designating the test conditions and any calibration following the short-circuit test as defined below:

C - a short circuit test was conducted with series overcurrent protection

U - a short circuit test was conducted without series overcurrent protection

1 - a recalibration test and dielectric strength test were not conducted as part of short circuit testing

1a - the supplementary protector was permanently open after the short-circuit test. A dielectric strength test and a voltage withstand test were conducted. (CSA only)

2 - a recalibration test and dielectric strength test were conducted as part of short-circuit testing

3 - a recalibration test, dielectric strength test and voltage withstand test were conducted as part of short circuit testing. (CSA only) Note: The C3 rating is not available.

Sine Wave

A waveform that can be expressed as the graph of the equation $y = \sin x$. The utility AC power is a sine wave.

Single Phase

The typical 120/240V AC system in the United States is a single phase system, meaning that the current flow in the two conductors is in phase or that they both cross zero at the same time.

Stray Current

Unwanted current flows which occur due to a partial short circuit.

surge

A large amount of current during the initial starting phase of a motor for example.

Surge Capacity

The measurement of the ability to withstand surge currents without damage.

Switch

An electro-mechanical device that is intended to open an electrical circuit and thus turn a load or source on or off.

Switchboard *see panel board*

T

Terminal

A connection point or device for an electrical circuit. A terminal strip is a series of screws which may or may not be in common to which wires are connected. Also refers to the connecting device which may be crimped on the end of a wire to enable it to be connected to the circuit with a screw, such as a ring terminal.

Terminal Studs

A threaded bolt onto which ring terminals may be placed and then fastened with a nut. Normally used for high current connections.

Thermal

Thermal most commonly refers to a thermal circuit breaker, which uses the thermal effect of excess current flow to create differential expansion in a bi-metallic blade to open a circuit. time-current curve see delay

A curve which depicts the relationship between the amount of current a fuse or breaker can withstand with respect to time.

Time Delay

The introduction of an intentional delay to the opening function of a protective device.

Toggle *see pole*

A switch which has a handle type actuator that can be placed in, at the most, three positions.

Total Clearing Time

The time elapsing from initiation of overload current to final current interruption.

Transfer Switch, AC see selector switch, source isolation

An electrical relay or manual switch which selects an AC source alternative, such as a generator, shore power, or inverter.

Transformer, isolation see isolation transformer

Trip Free

A circuit breaker designed to trip when subjected to a fault current, even if the reset lever is held in the ON position.

Tripping Current (TC)

Tripping current is coded as a percentage of the amp rating. Codes for UL & CSA products:

TC0 - tripping current is less than 125% of amp rating

TC1 - tripping current is between 125 and 135% of amp rating

TC2 - tripping current is more than 135% of amp rating

TC3 - tripping current is standardized at 135% and at 200% of amp rating (CSA only)

U

Ultimate Trip Current

The minimum value of current that will cause tripping of a protective device.

Ungrounded Conductor

Any conductor that is not connected to the Earth ground system.

V

Volt (Voltage)

The unit of electric potential and electromotive force, equal to the difference of electric potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

Voltage Drop

Conductor's voltage reduction due to resistance.

Voltage Rating

The maximum voltage at which a device is designed to operate.

Voltage Trip

A protective device that is factory calibrated to trip at a predetermined voltage value.

W

Watt

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

Wire Sizing

The process of selecting the appropriate sized conductor for the amount of current to be carried while considering the length of the circuit.

Withstand Voltage

The maximum voltage level that can be applied between circuits or components without causing a breakdown.

There are several catalogs available featuring complete details on all Carling Technologies products. Below is a complete list of catalogs available in print and online as eCatalogs and downloadable PDF files. Please visit our website at www.carlingtech.com or scan the QR codes below for complete details.

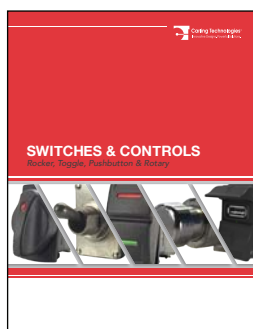


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Switches & Controls



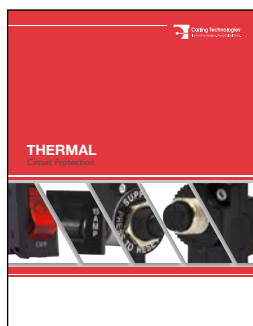
Features a complete line and ordering details for Switches & Control products including Rocker, Toggle, Pushbutton, and Rotary style switches.

Hydraulic-Magnetic



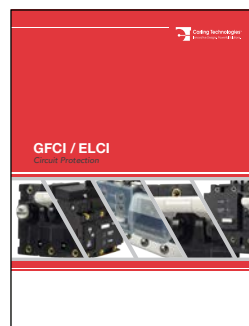
Features a complete line and ordering details for all hydraulic-magnetic circuit breakers.

Thermal's



Features a complete line and ordering details for all thermal circuit breakers.

GFCI's



Features a complete line and ordering details for all GFCIs/ELCIs.

On-Off Highway



Features specific transportation products such as switches, controls and custom solutions.

Marine



Features all marine application products such as switches, ELCIs, thermal and hydraulic-magnetic circuit breakers.

Telecom/Datacom



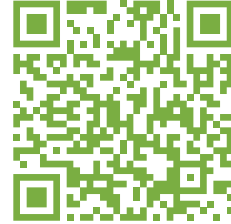
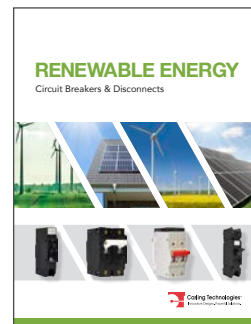
Features a complete line of hydraulic-magnetic circuit protection products specific for telecom and datacom systems.

Military



Features a complete line of COTS (Commercial-Off-The-Shelf) Military grade switches and circuit breakers.

Renewable Energy



Features a complete line of circuit protection and disconnect products for photovoltaic energy systems.

Worldwide Headquarters

Carling Technologies, Inc.

60 Johnson Avenue, Plainville, CT 06062-1177
Phone: 860.793.9281 Fax: 860.793.9231
Email: sales@carlingtech.com www.carlingtech.com

Northern Region Sales Office: nrs@carlingtech.com
Southeast Region Sales Office: sers@carlingtech.com
Midwest Region Sales Office: mrs@carlingtech.com
West Region Sales Office: wrs@carlingtech.com
Latin America Sales Office: lars@carlingtech.com

Asia-Pacific Headquarters

Carling Technologies, Asia-Pacific Ltd.,

Kowloon, Hong Kong

Phone: Int + 852-2737-2277 Fax: Int + 852-2736-9332
Email: sales@carlingtech.com.hk

Shenzhen, China: shenzhen@carlingtech.com
Shanghai, China: shanghai@carlingtech.com
Pune, India: india@carlingtech.com
Kaohsiung, Taiwan: taiwan@carlingtech.com
Yokohama, Japan: japan@carlingtech.com

Europe | Middle East | Africa Headquarters

Carling Technologies LTD

4 Airport Business Park, Exeter Airport,
Clyst Honiton, Exeter, Devon, EX5 2UL, UK
Phone: Int + 44 1392.364422 Fax: Int + 44 1392.364477
Email: ltd.sales@carlingtech.com

Germany: gmbh@carlingtech.com
France: sas@carlingtech.com





Carling Technologies™
Innovative Designs. Powerful Solutions.

GFCI / ELCI

Circuit Protection



CATALOG

FOUNDED IN 1920



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

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



SWITCHES & CONTROLS

- Rocker
- Toggle
- Pushbutton
- Rotary

CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

MULTIPLEXED POWER SYSTEMS

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

STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

GLOBAL LOCATIONS:

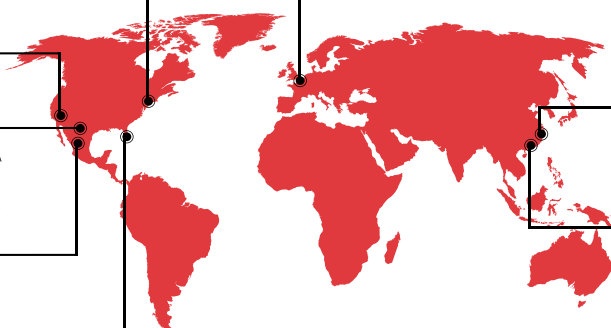
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Generators



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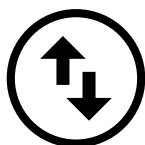


2200+
EMPLOYEES

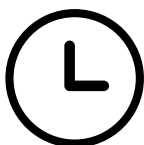


150+
ENGINEERS

COMPETITIVE ADVANTAGES⁺



Vertical
Integration



Reliable &
On-Time Delivery



Excellent
Customer Service



Innovative &
Eco-Friendly Products



70+
DISTRIBUTORS



50+
REP FIRMS

GFCI/ELCI Circuit Protection

This catalog features Carling Technologies' current line of GFCIs/ELCIs products, which offer maximum equipment protection against overload and short circuits.

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

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

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

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

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

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

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PB-Series



PC-Series

POLES	1-3 poles, 3rd pole switched neutral	1-poles (1 circuit breaker + 1 GFCI sensor module), 120V, 2-pole (2 circuit breakers + 1 GFCI sensor module), 120/240V, or 120V with neutral break 2-pole (2 circuit breakers + 1 GFCI sensor module), 240VAC, 3-pole 120/240V with neutral break (sensor module has 2 pole width)
ACTUATOR STYLE	handle, rocker, flat rocker	handle, rocker, flat rocker, push-to-reset
LEAKAGE CURRENT TRIP LEVEL	30mA & 6mA	30mA & 6mA
LEAKAGE CURRENT TRIP TIME	For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds, complying with UL-1053 & ABYC E11. For 6mA leakage trip: ≤25ms	For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds, complying with UL-1053 & ABYC E11. For 6mA leakage trip: ≤25ms
MAX CURRENT & VOLTAGE RATINGS	0.10 - 30 amps @ 120/240VAC	0.10 - 50 amps @ 120/240VAC - 240VAC
MAX INTERRUPTING CAPACITY	5,000A	5,000A
AVAILABLE CIRCUITS	series trip	series trip
TERMINATION	.250" tabs, 8-32, 10-32, M4,M5 screw with upturned lugs, 8-32, 10-32, M4,M5 screw, bus type	10-32 threaded stud
MOUNTING METHOD	front panel	front panel
OPERATING TEMPERATURE	-35° C to +65° C	-35° C to +65° C
APPROVALS	UL 489, UL 1077, UL 1500	CSA Approved, UL 1053, UL 1500

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

PB-Series

GFCI/ELCI & PANEL SEAL

The new PB-Series, AC Residual Current Circuit Breaker with Overcurrent Protection (RCBO), combines the ground fault protection of a GFCI with the familiar overcurrent tripping characteristics of a normal circuit breaker. It utilizes the hydraulic magnetic principle which provides precise operation and performance even when exposed to extremely hot and/or cold application environments. These 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.



Resources:

[Download 3D CAD Files](#)

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

Product Highlights:

- Overload, short circuit and ground fault protection in a single package
- Handle or rocker style actuators
- Wiping Contacts - Mechanical linkage with two-step actuation - cleans contacts, provides high, positive contact pressure & longer contact life.
- A trip-free mechanism, a safety feature which makes it impossible to manually hold the contacts closed during overload or fault conditions.
- A common trip linkage between all poles, another safety feature, ensures that an overload in one pole will trip all adjacent poles.
- Front panel mounting
- Integral push-to-test button

Benefits:

- Increases safety around boats and marinas
- Protects against electrical shock hazards in areas near water
- Protects against defects in wires & conductors
- Reduces fire and shock hazards from defects in permanently installed appliances such as water heaters, battery chargers, lighting fixtures, etc.
- Detects lower level ground faults which do not trip ordinary circuit breakers, but can lead to fires, and shock hazards for boating occupants

Typical Applications:

- Marine
- Generators
- Lighting

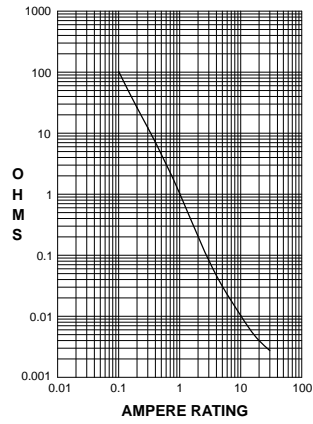
Electrical Tables

Table A: UL Listed configurations and performance capabilities as Circuit Breakers.

PB-SERIES TABLE A					
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING (AMPS)	INTERRUPTING CAPACITY (AMPS)
	MAX RATING VOLTS	FREQUENCY HERTZ	PHASE		
SERIES	120	60	1	.10-30	5000

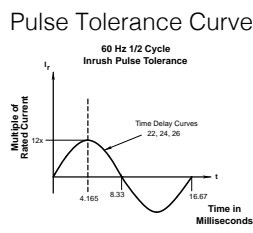
Electrical

Maximum Voltage 120/240VAC 60 Hz
 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 amps. Other ratings available, see ordering scheme.
 Insulation Resistance Minimum of 100 Megohms at 500 VDC.
 Dielectric Strength UL, CUL - 1500 V 60 Hz for one minute between all electrically isolated terminals. PB-Series circuit breakers comply with the 8mm spacing and 3750V 60 Hz dielectric requirements from hazardous voltage to operator accessible surfaces and between adjacent poles
 Impedance Values from Line to Load Terminal.



Ampere Rating

CURRENT (AMPS)	TOLERANCE (%)
0.100 - 5.0	± 15%
5.1 - 20.0	± 25%
20.1 - 30.0	± 35%



Leakage To Ground

Standard Must Trip 120/240VAC 60 Hz
 Leakage Current Ratings 5 & 30 milliamps. 5± 1mA
 For other ratings, consult factory.
 Trip Time 300 ms Max. @ 100%, 40ms Max. @ 500% of must trip leakage current.
 Test Button On unit face along side of actuator.

Mechanical

Endurance 10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.
 Trip Free All PB-Series Circuit Breakers will trip on overload or ground fault, even when Handle is forcibly held in the ON position.
 Trip Indication The operating Handle moves positively to the OFF position when an overload or ground fault causes the breaker to trip.

Physical

Number of Poles 1 - 3 poles, where the third pole is neutral
 Internal Circuit Config. Series Trip
 Weight Approximately 65 grams/pole. (2.32 ounces/pole.)
 Standard Colors Housing- Black; Actuator - See Ordering Scheme.

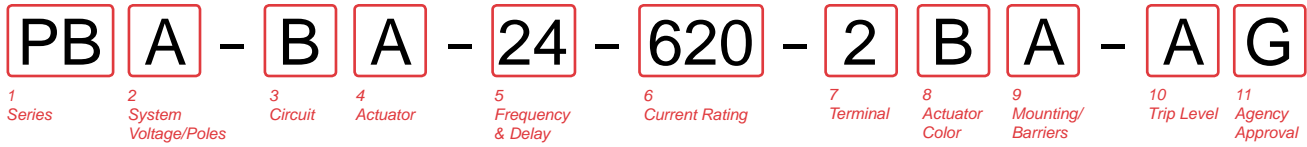
Environmental

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". 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 -35° C to +65° C
 Corrosion Tested FMG Test. 3 weeks @ 30°C 75% RH, 100ppb H2S, 20ppb Cl2, 200ppb NO2

Agency Certifications

UL Listed
 UL Standard 489 Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)
 UL Standard 1077 Supplementary Protectors
 UL Standard 1053 Ground Fault Sensing and Relaying Equipment

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

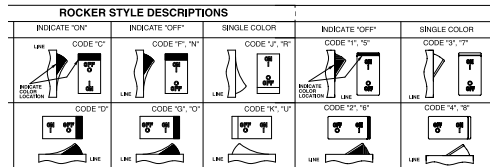


1 SERIES
PB

2 SYSTEM VOLTAGE / POLES
A 120 VAC single phase, one pole
B 120/240 VAC single phase, two pole
C 120/240 VAC single phase with switched neutral, three pole
D 120 VAC two pole with switched neutral

3 CIRCUIT
B Series Trip (Current)

4 ACTUATOR 1
Handle
A one per pole
B one per multipole unit
Two Color Curved Visi-Rocker
C Indicate ON, vertical legend
D Indicate ON, horizontal legend
F Indicate OFF, vertical legend
G Indicate OFF, horizontal legend
Single Color Curved Rocker
J Vertical legend
K Horizontal legend
Two Color Flat Visi-Rocker
1 Indicate OFF, vertical legend
2 Indicate OFF, horizontal legend
Single Color Flat Rocker
3 Vertical legend
4 Horizontal legend



5 FREQUENCY & DELAY
22 60Hz Short
24 60Hz Medium
26 60Hz Long

6 CURRENT RATING (AMPERES)

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

7 TERMINAL 2
1³ 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 Screw 8-32 (Bus Type) **E** Screw M4 (Bus Type)
4 Screw 10-32 w/upturned lugs **H** Screw M5 (Bus Type)
5 Screw 10-32 (Bus Type)

8 ACTUATOR COLOR & LEGEND

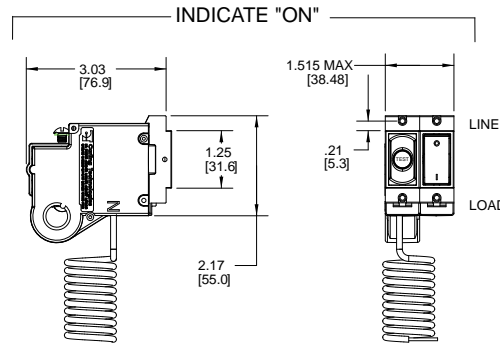
Handle Actuator Color	I-O	ON-OFF	Dual	Rocker Single	Actuator Color Visi-Rocker
White	A	B	1	Black	White
Black	C	D	2	White	N/A
Red	F	G	3	White	Red
Green	H	J	4	White	Green
Blue	K	L	5	White	Blue
Yellow	M	N	6	Black	Yellow
Gray	P	Q	7	Black	Gray
Orange	R	S	8	Black	Orange

9 MOUNTING/BARRIERS
MOUNTING STYLE BARRIERS
Threaded Insert, 2 per pole
A 6-32 X 0.195 inches yes
B ISO M3 x 5mm yes

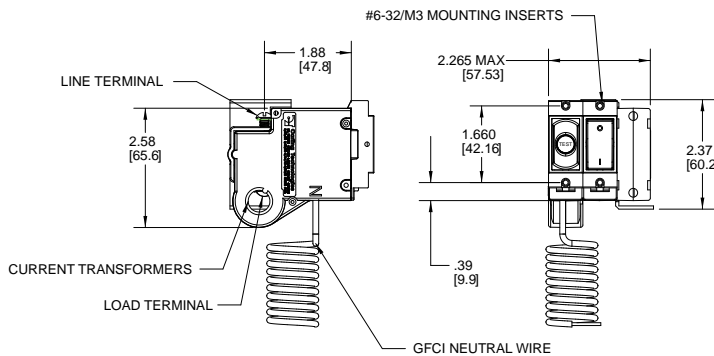
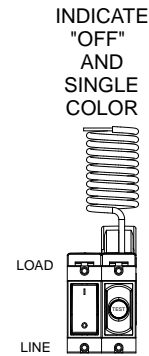
10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT
A 5 MA (CLASS A GFCI) ^{3,4}
E 30 MA (ELC)

11 AGENCY APPROVAL
G UL489 Listed, CSA Certified
C UL1077
I UL1077/UL1500 Ignition Protected ⁵

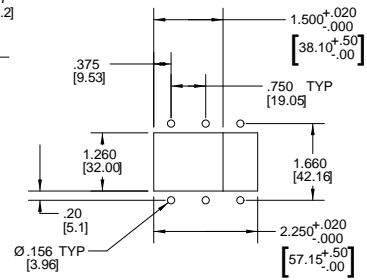
- Notes:
1 Actuator Code:
A: Handle tie pin spacer(s) and retainers provided unassembled with multi-pole units.
B: Handle location as viewed from front of breaker:
2 pole - left pole 3 pole - center pole
2 Screw Terminals are recommended on ratings greater than 20 amps.
3 Available with leakage current trip level - Max trip current code E, and agency approval C.
4 30mA per UL1053, available with agency approval codes C & G.
5 UL1500 only available with 30MA trip level.



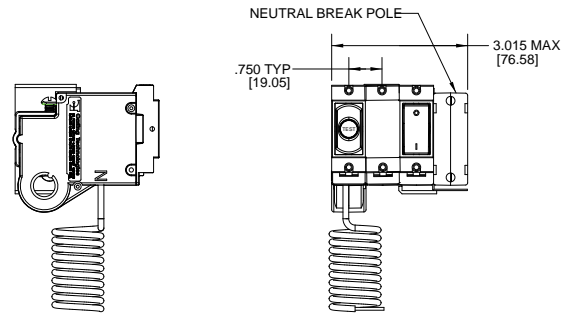
1-POLE 120 VAC VERSION



2-POLE 120/240 VAC VERSION

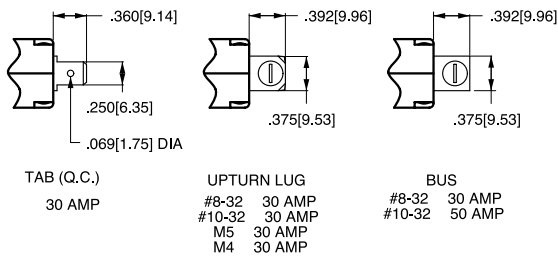


PANEL CUTOUT



2-POLE 120/240 VAC WITH NEUTRAL BREAK

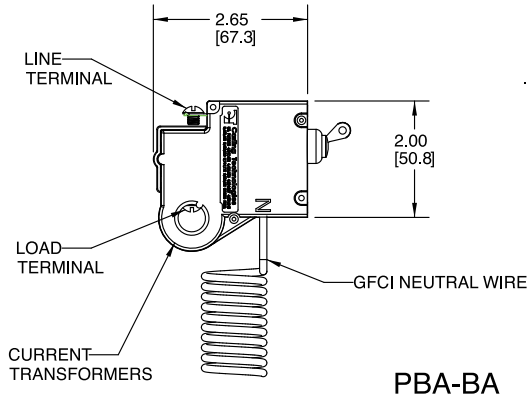
TERMINAL DIMENSIONAL DETAIL & RATING



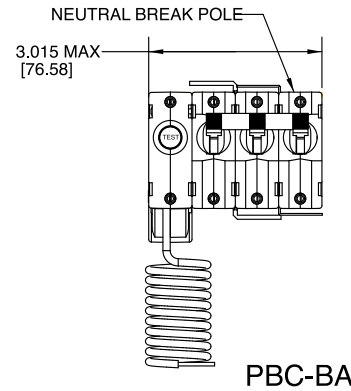
- Notes:
1 All dimensions are in inches [millimeters].
2 Tolerance ± 0.020 [.51] unless otherwise specified.

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]

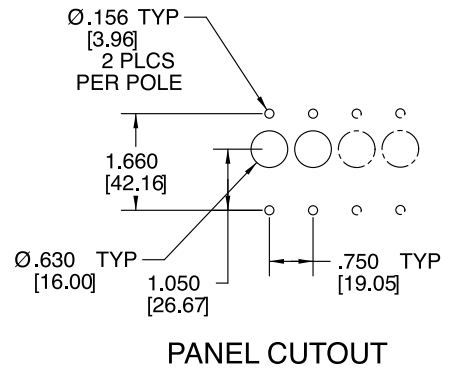
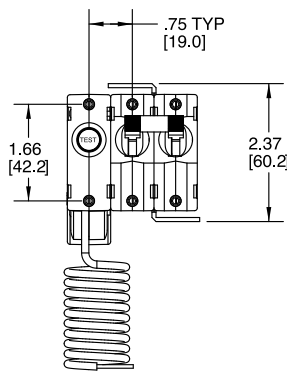
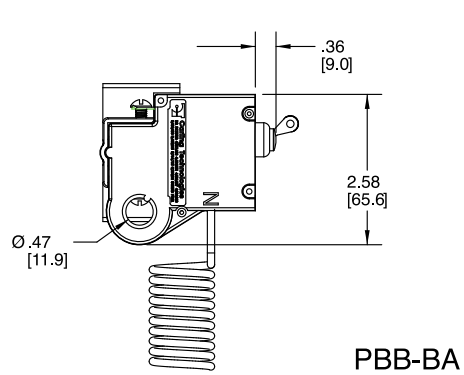
TYPICAL 1-POLE 120 VAC VERSION



TYPICAL 2-POLE 120/240 VAC WITH NEUTRAL BREAK VERSION



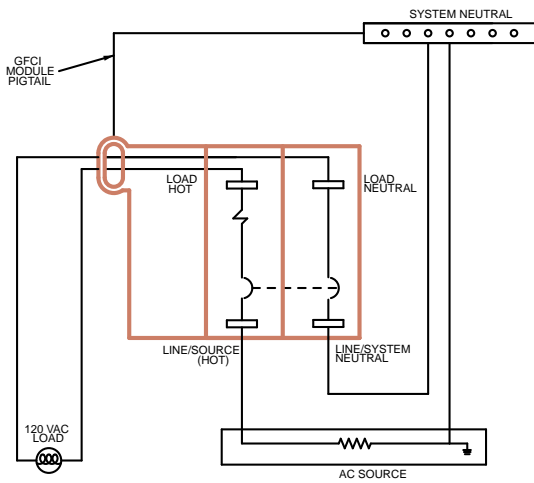
TYPICAL 2-POLE 120/240 VAC VERSION



Notes:

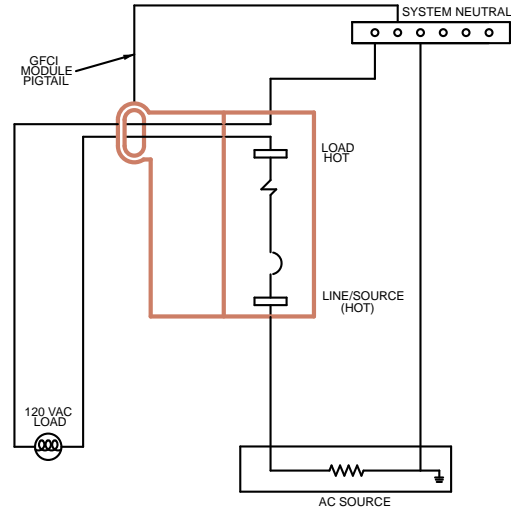
- 1 All dimensions are in inches [millimeters].
- 2 Tolerance ± 0.020 [.51] unless otherwise specified.

120 VAC with Switched Neutral



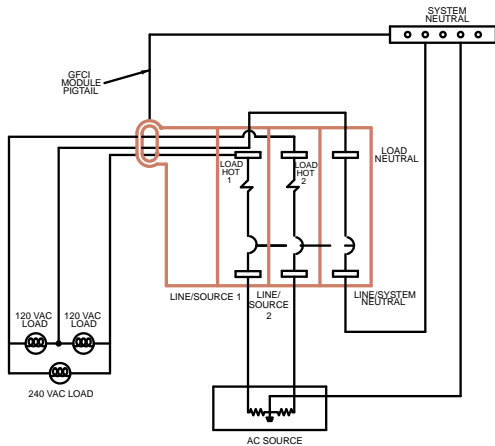
120 VAC WITH SWITCHED NEUTRAL

120 VAC without Switched Neutral



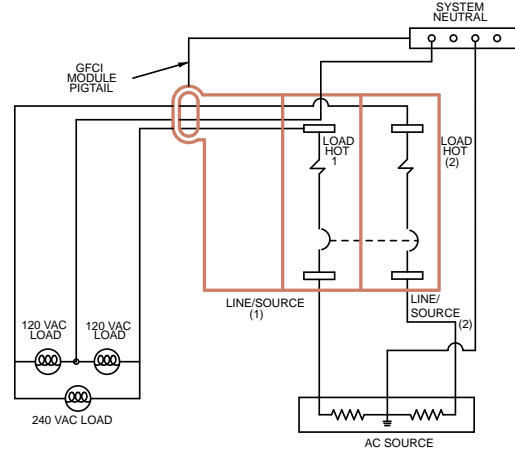
120 VAC WITHOUT SWITCHED NEUTRAL

120/240 VAC with Switched Neutral

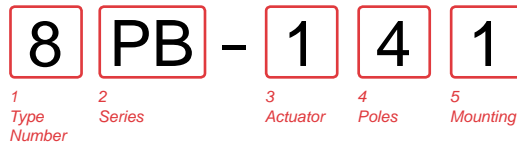


120 VAC WITH SWITCHED NEUTRAL

120/240 VAC without Switched Neutral



120 VAC WITHOUT SWITCHED NEUTRAL



1 TYPE NUMBER
8 Circuit Breaker Assembly

2 SERIES
PB

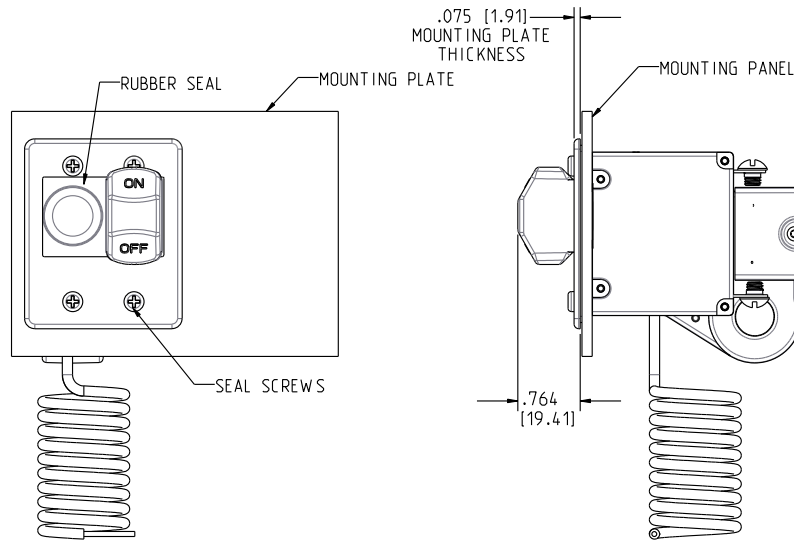
3 ACTUATOR TYPE
1 Handle, one per pole
2 Handle, one per multipole unit
A Rocker²

4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE
2 Two
3 Three
4 Four

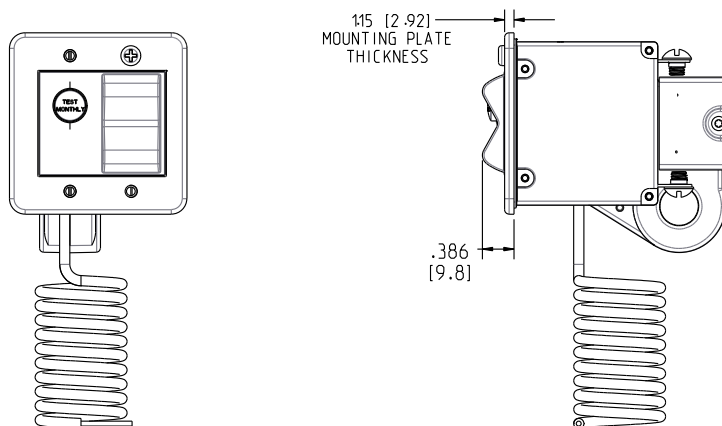
5 MOUNTING SCREWS / PLATE MATERIAL¹
1 6-32 Thread Phillips Head
2 M-3 Thread Phillips Head
3 6-32 Thread Slotted Head
4 M-3 Thread Slotted Head
5 6-32 Thread Phillips Head with Stainless Steel Plate
6 M-3 Thread Phillips Head with Stainless Steel Plate
7 6-32 Thread Slotted Head with Stainless Steel Plate
8 M-3 Thread Slotted Head with Stainless Steel Plate

Notes:
1 Screws supplied to accommodate mounting panel thickness of 1/8" ± 1/32". Consult Factory for additional options
2 Available for Flat and Curved Rocker options - No Rockerguard Bracket

Handle Style Panel Seal

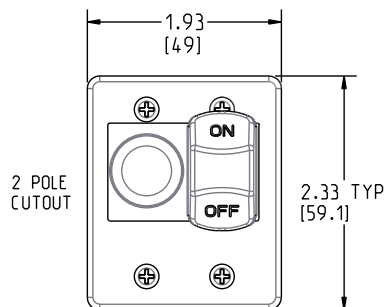


Rocker Style Panel Seal

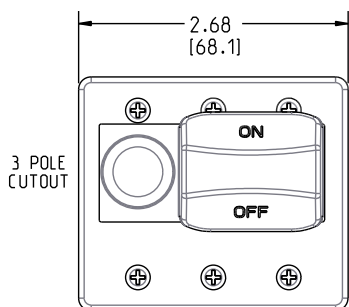


Handle Actuator

HANDLE, 1 PER POLE

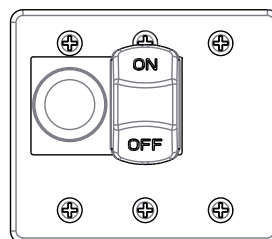


8PB-12

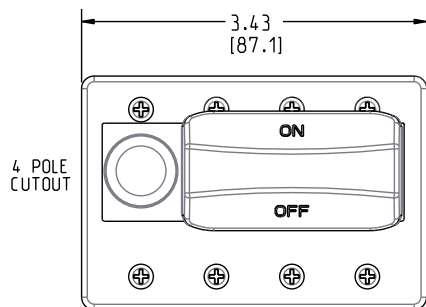


8PB-13

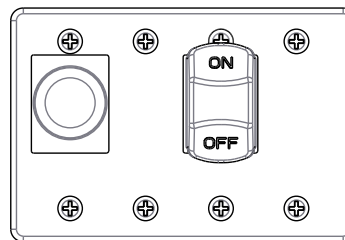
HANDLE, 1 PER MULTIPOLE UNIT



8PB-23

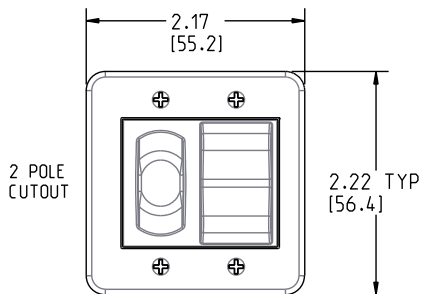


8PB-14

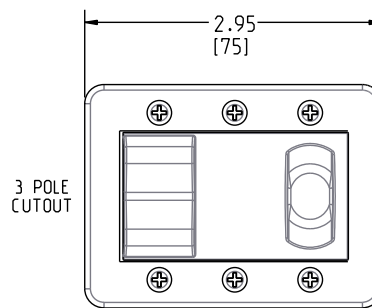


8PB-24

Rocker Actuator



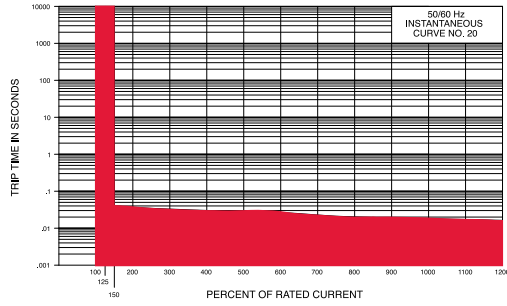
8PB-A2



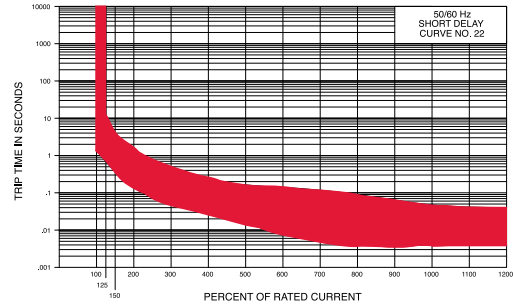
8PB-A3

Time Delay Curves

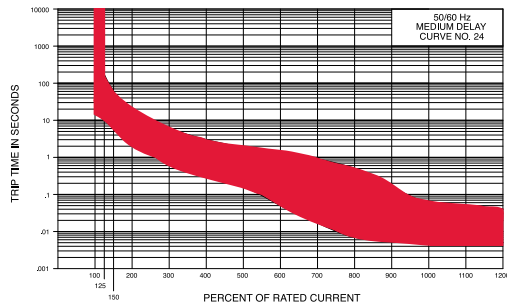
Instantaneous



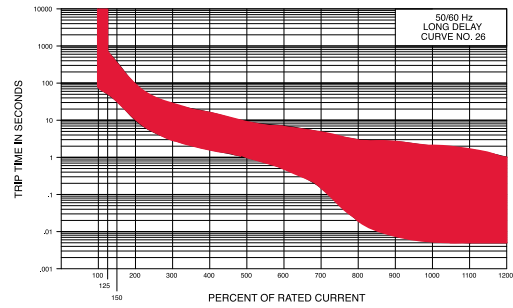
Medium



Short



Long



PC-Series

GFCI/ELCI & PANEL SEAL

The PC-Series, AC Residual Current Circuit Breaker with Overcurrent Protection (RCBO), combines the ground fault protection of a GFCI with the familiar overcurrent tripping characteristics of a normal circuit breaker. The PC-Series utilizes the hydraulic-magnetic principle which provides precise operation and performance even when exposed to extremely hot and/or cold application environments.



Resources:

Download 3D CAD Files

[IGS >](#)

[STP >](#)

Product Highlights:

- ◆ Overload, short circuit and ground fault protection in a single package
- ◆ Handle style actuators and rocker style “acuguard”
- ◆ Wiping Contacts - Mechanical linkage with two-step actuation - cleans contacts, provides high, positive contact pressure & longer contact life
- ◆ A trip-free mechanism, a safety feature which makes it impossible to manually hold the contacts closed during overload or fault conditions.
- ◆ A common trip linkage between poles ensures that an overload in one pole will trip all adjacent poles.
- ◆ Front panel mounting
- ◆ Integral push-to-test button
- ◆ Two integrated LED indicators show if a breaker is closed w/ Line Voltage present, or has opened due to leakage current, opened due to overcurrent, or closed w/ no Line Voltage present.
- ◆ Optional Hot/Neutral reversal detection and protection

Benefits:

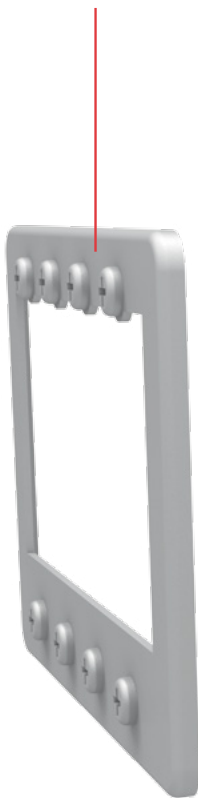
- ◆ Increases safety around boats, marinas and generators
- ◆ Protects against electrical shock hazards in areas near water
- ◆ Protects against defects in the wires & conductors
- ◆ Reduces fire and shock hazards from defects in permanently installed appliances such as water heaters, battery chargers, lighting fixtures, etc.
- ◆ Detects low level ground faults, which do not trip ordinary circuit breakers, that can lead to fires and shock hazards for boating occupants

Typical Applications:

- ◆ Marine
- ◆ Generators
- ◆ Lighting

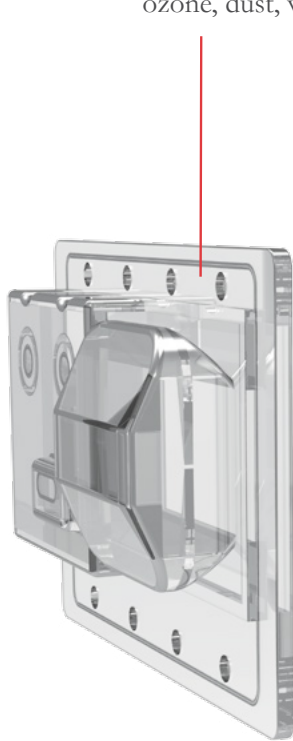
MOUNTING PLATE

Available in stainless steel or zinc chromate plated carbon steel



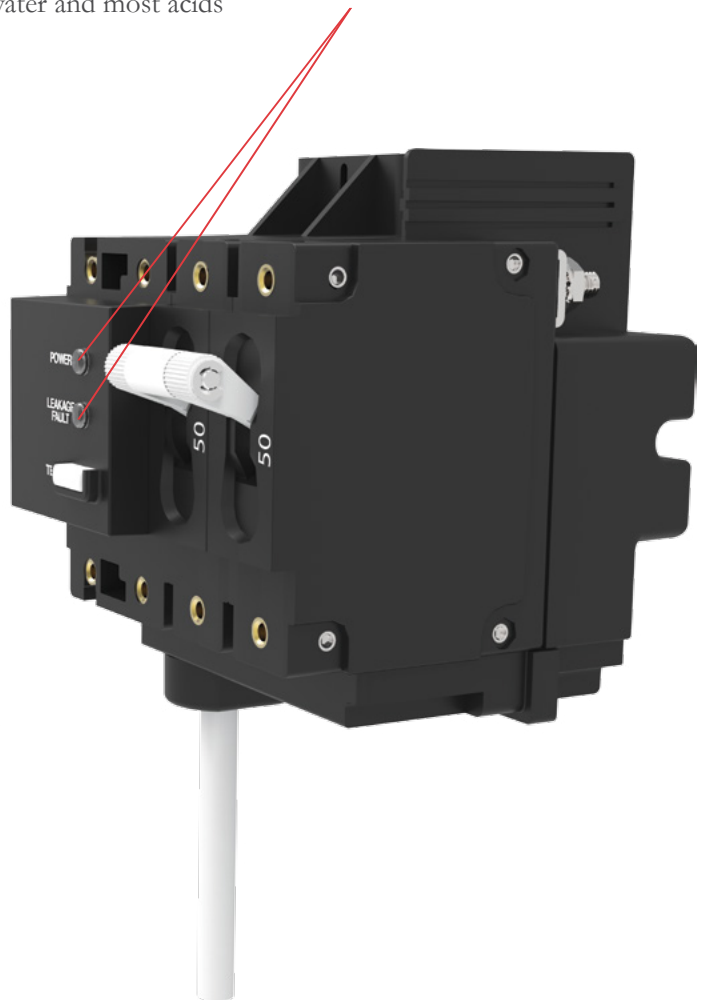
OPTIONAL SEAL

IP66/67 panel seals provide ideal protection against salt spray, ozone, dust, water and most acids



LEDs

Two separate lights that indicate power and ground fault leakage



Electrical Tables

Table A: UL Listed & CSA Certified configurations as a Ground Fault Circuit Interruptor

TABLE A : UL LISTED / CSA 22.2 No. 144.1 CONFIGURATIONS AS A GROUND FAULT CIRCUIT INTERRUPTOR							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
SERIES	120	50 / 60	1	1 - 50	5000	6	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	6	2 or 3 Poles. One pole of a three pole unit must be Neutral

Table B: UL Recognized as an Earth Leakage Circuit Interruptor - 120 and 120/240V

TABLE B : UL RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 120 and 120/240V							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
SERIES	120	50 / 60	1	1 - 50	5000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral
SERIES IGNITION PROTECTED	120	50 / 60	1	1 - 50	3000	30	1 or 2 Poles. One pole of a two pole unit must be Neutral
	120/240	50 / 60	1	1 - 50	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral

Table C: UL Recognized as an Earth Leakage Circuit Interruptor - 240V

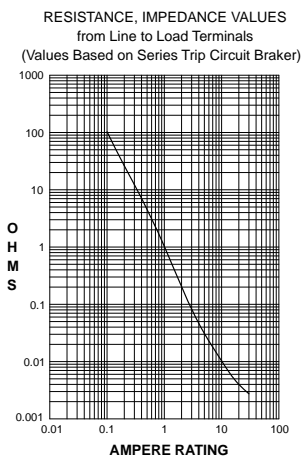
TABLE C : UL RECOGNIZED CONFIGURATIONS AS AN EARTH LEAKAGE CIRCUIT INTERRUPTOR - 240V							
CIRCUIT CONFIGURATION	VOLTAGE			CURRENT RATING	SHORT CIRCUIT CAPACITY	GROUND FAULT TRIP LEVEL	NOTES
	MAX. RATING	FREQUENCY	PHASE	AMPS	AMPS	MILLIAMPS	
SERIES	240	50 / 60	1	1 - 30	5000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 11
SERIES IGNITION PROTECTED	240	50 / 60	1	1 - 50	3000	30	2 or 3 Poles. One pole of a three pole unit must be Neutral. Suffix 12

Agency Certifications

UL Standard 489	Circuit Breakers, Molded Case, (Guide DIVQ, File E129899)
UL Standard 1077	Supplementary Protectors
CSA 22.2 No. 144.1	Class A Ground Fault Circuit Interrupters
UL Standard 1053	Ground Fault Sensing and Relaying Equipment
UL Standard 1500	Ignition Protection

Electrical

Current Ratings	1 - 50 Amps maximum
Voltage Rating	120VAC, 120/240VAC, 240VAC
Current Trip Level	30mA & 6mA
Current Trip Time	For 30mA leakage trip: ≤ 22.2mA, shall not trip 30mA, shall trip within .10 seconds The above complies with & ABYC E11. For 6mA leakage trip: ≤25ms
Operating Frequency	50/60 Hz for 30mA leakage trip 60 Hz for 6mA leakage trip
Interrupt Capacity	5,000 Amps
Impedance	



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

Innovative Features

Indicator	<p>Two integrated LEDs, Red & Green</p> <ul style="list-style-type: none"> ◆ Green LED On, Red LED Off Line Voltage is present, the breaker is closed, and the device is protecting the circuits against over current and leakage current. ◆ Green LED Off, Red LED On The device has detected leakage current and has opened the circuit breaker. ◆ Green LED Flashing, Red LED Off The circuit breaker has opened due to over current or has been turned off manually ◆ Green LED Off, Red LED Off Line Voltage is not present ◆ Green LED Flashing, Red LED Off, Amber LED ON Indicates Hot & Neutral are reversed and the circuit breaker is open
Neutral Protection	When neutral is grounded on load side of circuit
Test Button	Located on Ground Fault Module

Mechanical

Endurance	10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.
Trip Free	Trips on short circuit, overload or leakage to ground, even when actuator is forcibly held in the "On" position

Physical

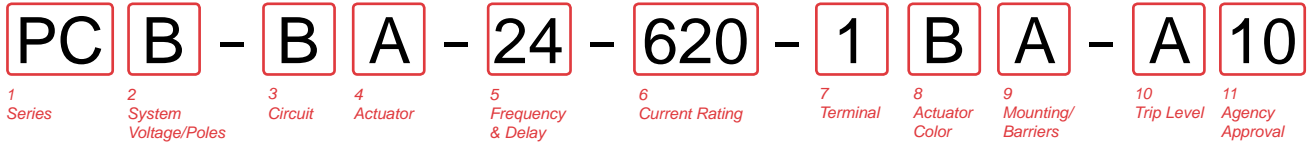
Number of Poles (Breakers only)	1-pole (1 Circuit Breaker + 1 GFCI Sensor Module), 120V 2-pole (2 Circuit Breakers + 1 GFCI Sensor Module), 120/240V or 120V with Neutral Break. 240VAC two pole. 3-pole 120/240V with Neutral Break (Sensor module has 2 pole width) Circuit Breaker Line Side: #10-32, Threaded stud. GFCI Sensor Module Load Side: #10-32 threaded stud. Neutral pigtail.
Termination	Front Panel, #6-32 and M3 threaded inserts.
Mounting	Handle, Flat Rocker, Curved Rocker (with or without rocker guard), Push-to-Reset Rocker
Actuator	

Environmental

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

Shock	Withstands 100 G, 6ms, sawtooth at rated current per Method 213, Test Condition "I".
Vibration	Withstands 0.06" excursion from 10-55 Hz, and 10 G 55-500 Hz, a rated current per Method 204C, Test Condition A. Instantaneous & ultrashort curves tested at 90% of rated current.
Moisture Resistance	93% RH at 30°C for 168 Hours.
Operating Temperature	-35°C to +66°C
Corrosion	<p>Humidity: 30±2°C, 70±2% relative humidity</p> <p>Mixed Flowing Gases: 100 ppb H₂S, 20 ppb Cl₂, 200±50 ppb NO₂</p>

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



1 SERIES
PC

2 SYSTEM VOLTAGE / POLES
A 120 VAC single phase, 1 pole
B 120/240 VAC single phase, 2 pole
C 120/240 VAC single phase with switched neutral, 3 pole
D 120 VAC single phase with switched neutral, 2 pole
E 120 VAC single phase with reversed polarity indicator, 2 pole
F 120/240 VAC single phase with reversed polarity indicator, 3 pole
G 240 VAC single phase, 2 pole

3 CIRCUIT
B Series Trip (Current)

4 ACTUATOR
Handle
A 1 per breaker pole
B 1 per unit
Two Color Curved Visi-Rocker
C Indicate ON, vertical legend
D Indicate ON, horizontal legend
F Indicate OFF, vertical legend
G Indicate OFF, horizontal legend
Single Color Curved Rocker
J Vertical legend
K Horizontal legend
Two Color Curved Visi-Rocker Push-to-Reset
N Indicate OFF, Vertical legend
O Indicate OFF, Horizontal legend

Single Color Curved Rocker Push-to-Reset
R Vertical legend
U Horizontal legend
Two Color Flat Visi-Rocker
1 Indicate OFF, vertical legend
2 Indicate OFF, horizontal legend
Single Color Flat Rocker
3 Vertical legend
4 Horizontal legend
Two Color Flat Visi-Rocker Push-to-Reset
5 Indicate OFF, vertical legend
6 Indicate OFF, horizontal legend
Single Color Flat Rocker Push-to-Reset
7 Vertical legend
8 Horizontal legend

ROCKER STYLE DESCRIPTIONS				
INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR	INDICATE "OFF"	SINGLE COLOR
LINE	CODE "1", "N"	CODE "1", "R"	CODE "1", "S"	CODE "1", "T"

5 FREQUENCY & DELAY
20 50/60Hz Instantaneous
21 50/60Hz Ultra Short
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long

6 CURRENT RATING (AMPERES)

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

7 TERMINAL
1 Stud, 10-32 threaded

8 ACTUATOR COLOR & LEGEND

Handle Actuator Color	I-O	ON-OFF	Dual	Rocker Single	Actuator 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

9 MOUNTING/BARRIERS

ACTUATOR STYLE	BARRIERS
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
Standard Bezel with Recessed Off-Side Flat Rocker	
Threaded Insert, 2 per pole	
E 6-32 X 0.195 inches	yes
F ISO M3 x 5mm	yes
Push-to-Reset Bezel	
Threaded Insert, 2 per pole	
G 6-32 X 0.195 inches	yes
H ISO M3 x 5mm	yes

10 LEAKAGE CURRENT TRIP LEVEL - MAX. TRIP CURRENT
A 6 MA (CLASS A GFCI)
E 30 MA (ELCI) 1,2

11 AGENCY APPROVAL
AA without Approvals
10 CSA certified
11 UL 1053 1,2
12 UL 1053 & UL 1500 1,2

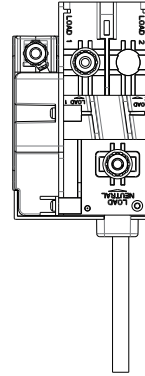
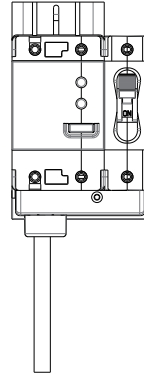
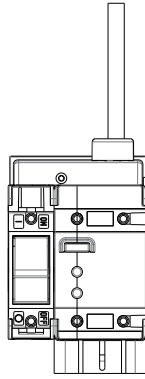
Notes:
 1 This device meets the requirements of ABCY E11.
 2 30mA per UL1053, available with agency approval codes 11 & 12.

INDICATE OFF / SINGLE COLOR
ROCKER ACTUATOR

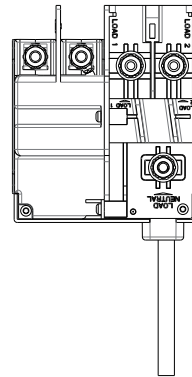
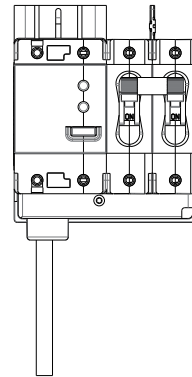
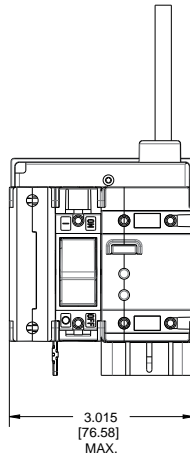
HANDLE / INDICATE ON
ROCKER ACTUATOR

TERMINAL
LOCATIONS

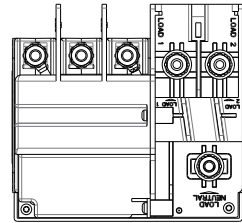
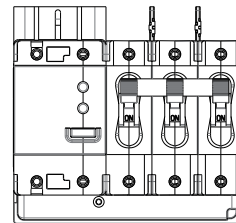
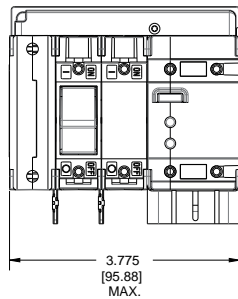
PCA
120 VAC
VERSION



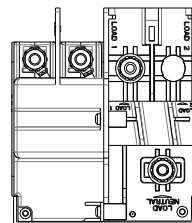
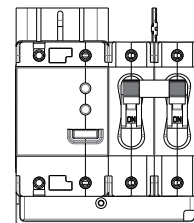
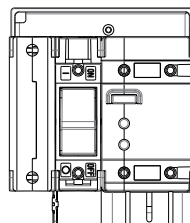
PCB
120/240 VAC
VERSION



PCC
120/240 VAC
VERSION
W/ NEUTRAL BREAK



PCD
120 VAC
VERSION
W/NEUTRAL BREAK

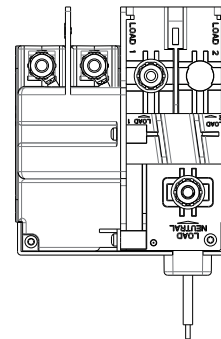
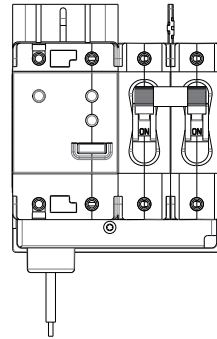
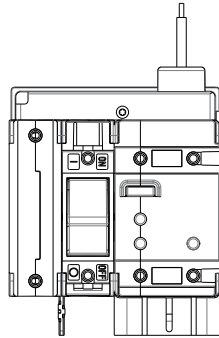


INDICATE OFF / SINGLE COLOR
ROCKER ACTUATOR

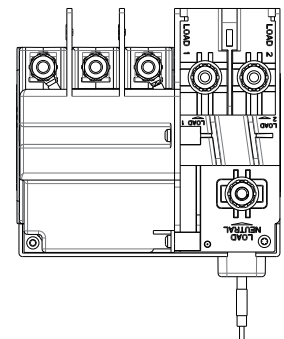
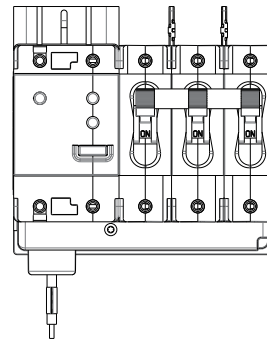
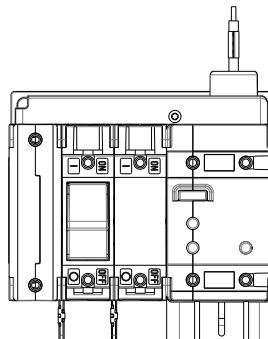
HANDLE / INDICATE ON
ROCKER ACTUATOR

TERMINAL
LOCATIONS

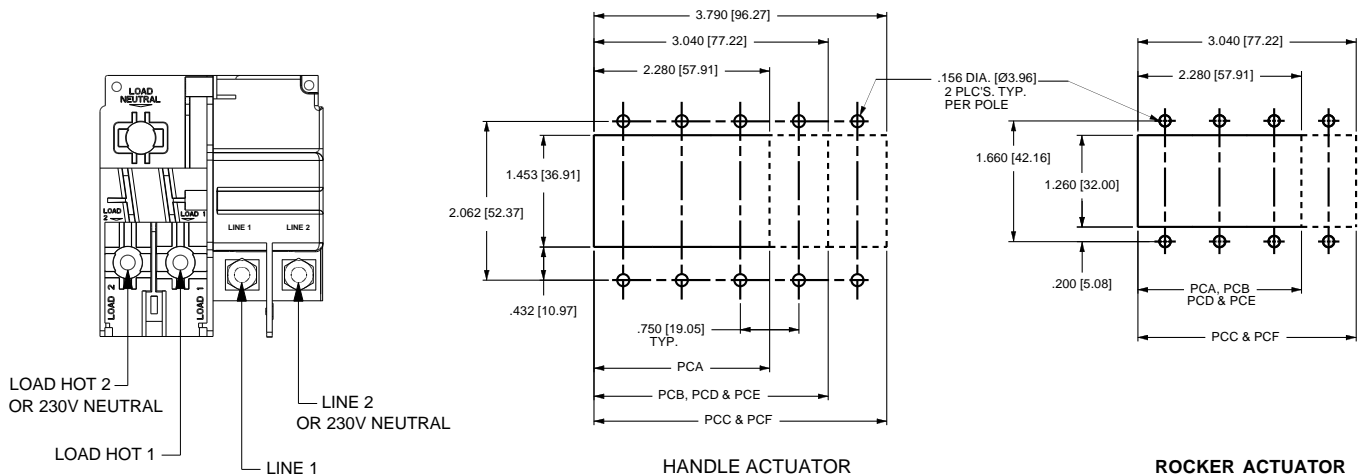
PCE
120 VAC VERSION
W/ REVERSE POLARITY
INDICATOR



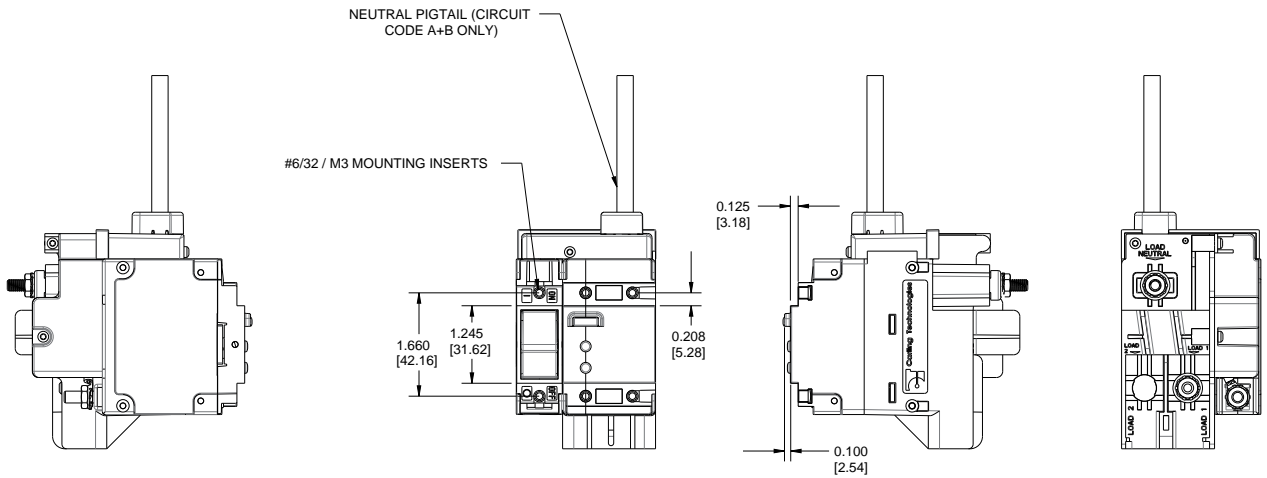
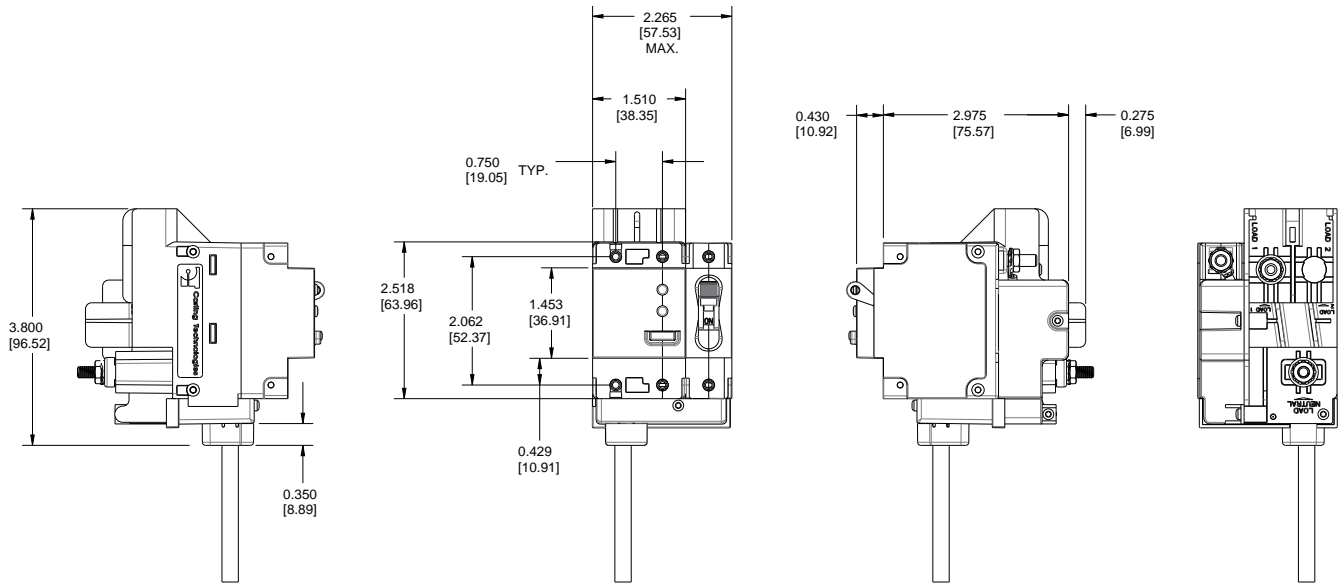
PCF
120/240 VAC VERSION
W/ REVERSE POLARITY
INDICATOR



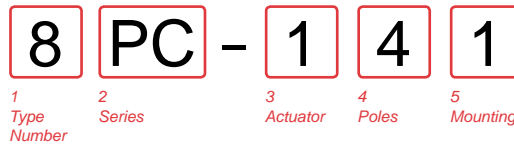
NOTE: NEUTRAL & GROUND PIGTAIL WIRES - SUPPLIED 12" LONG MIN. (CIRCUIT CODES A,B,E & F)



PANEL CUTOUT DETAIL
TOLERANCES ±.005 [0.12]



Notes:
For additional circuit breaker dimensions, reference the C-Series Breakers in the Carling Circuit Protection catalog



1 TYPE NUMBER
8 Circuit Breaker Assembly

2 SERIES
PC

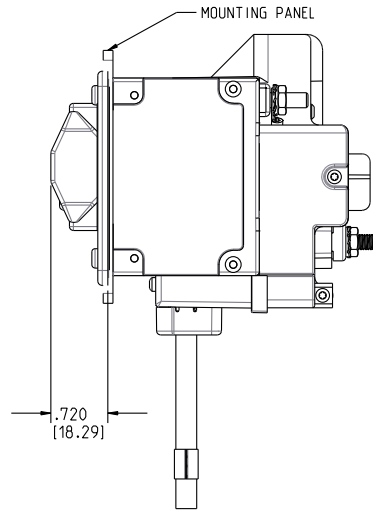
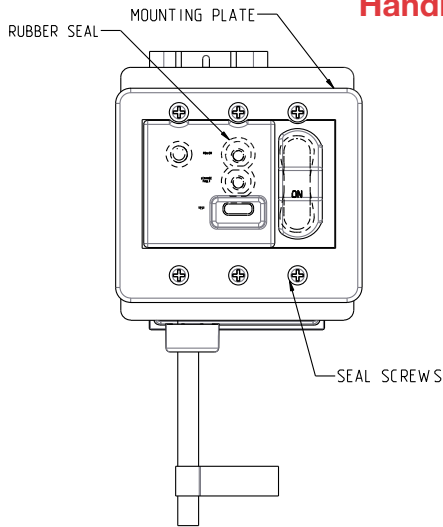
3 ACTUATOR TYPE
1 Handle, one per pole
2 Handle, one per multipole unit
A Rocker²

4 POLES PER UNIT - INCLUDING ELECTRONIC MODULE
3 Three
4 Four
5 Five

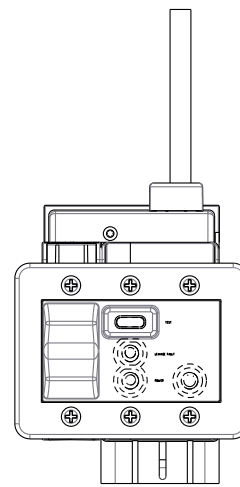
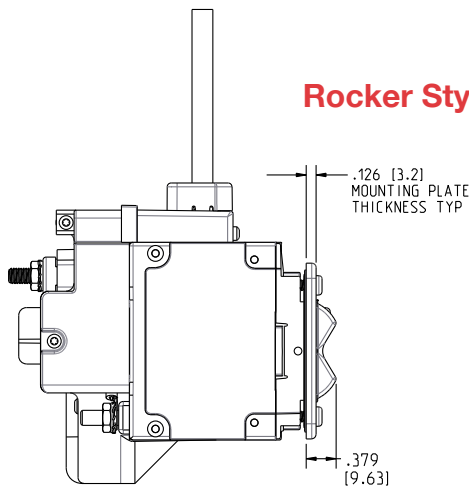
5 MOUNTING SCREWS / PLATE MATERIAL¹
1 6-32 Thread Phillips Head
2 M-3 Thread Phillips Head
3 6-32 Thread Slotted Head
4 M-3 Thread Slotted Head
5 6-32 Thread Phillips Head w/ Stainless Steel Plate
6 M-3 Thread Phillips Head w/ Stainless Steel Plate
7 6-32 Thread Slotted Head w/ Stainless Steel Plate
8 M-3 Thread Slotted Head w/ Stainless Steel Plate

Notes:
1 Screws supplied to accommodate mounting panel thickness of 1/8" ± 1/32". Consult Factory for additional options
2 Available for Flat and Curved Rocker options - No Rockerguard Bracket

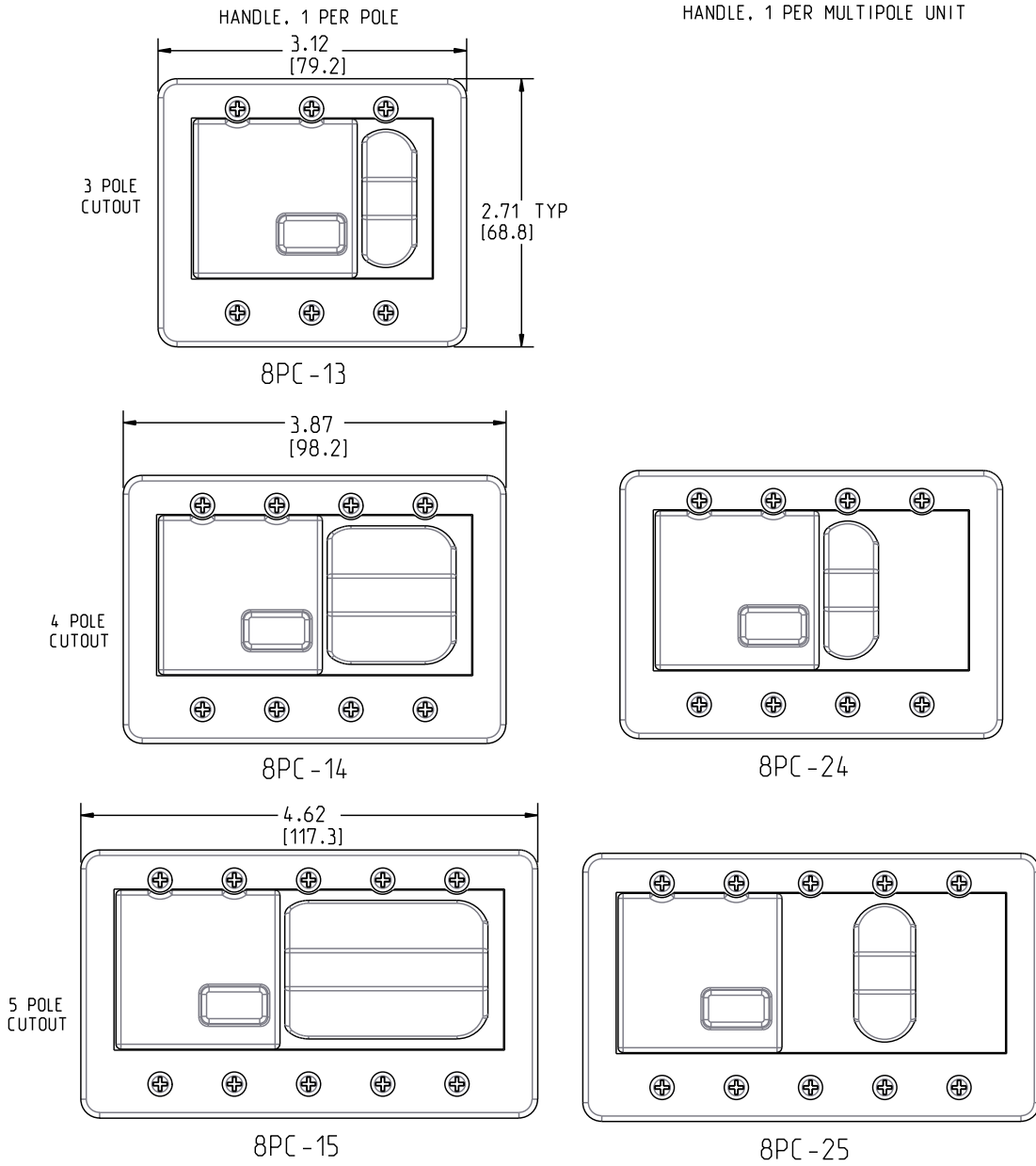
Handle Style Panel Seal



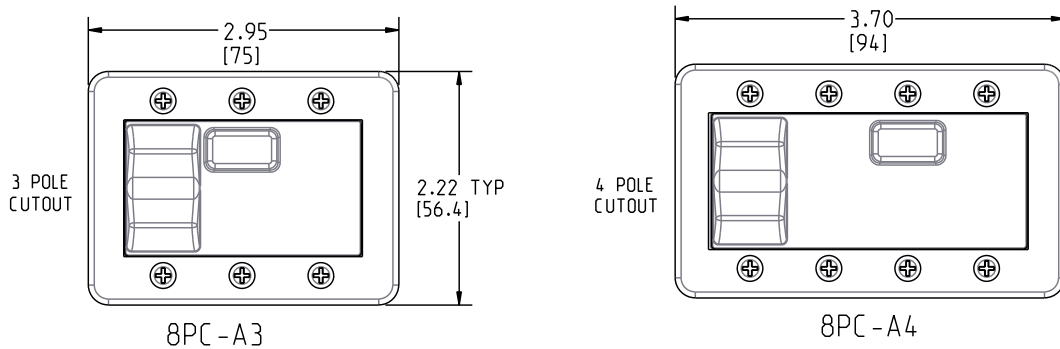
Rocker Style Panel Seal



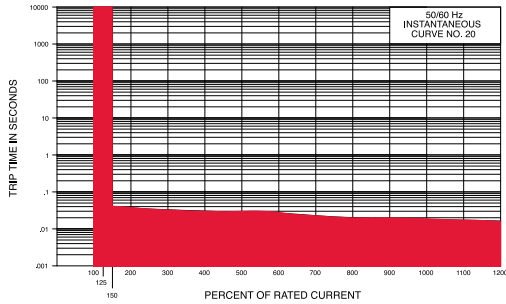
Handle Actuator



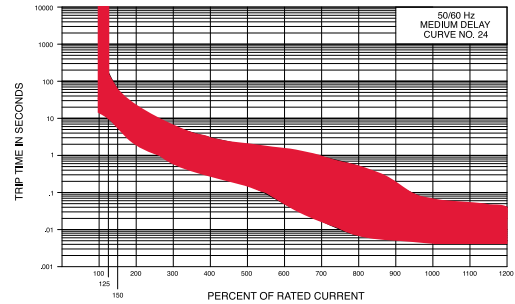
Rocker Actuator



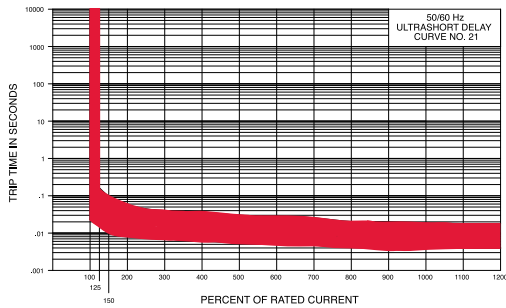
Time Delay Curves Instantaneous



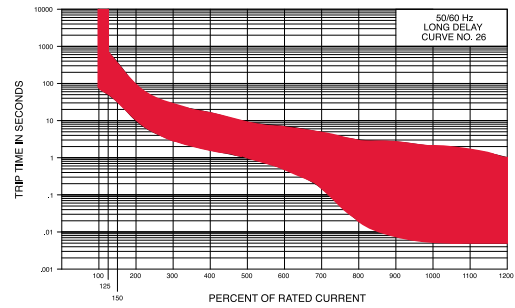
Medium



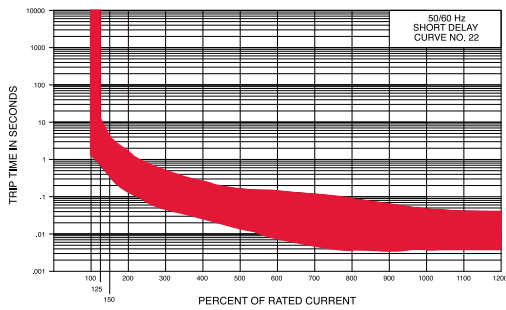
Ultra Short



Long



Short



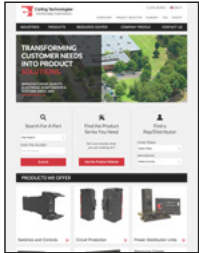
TIME DELAY VALUES									
PERCENT OF RATED CURRENT									
DELAY	100%	125%	150%	200%	400%	600%	800%	1000%	1200%
20	No Trip	May Trip	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
21	No Trip	.014 - .150	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
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

Notes:

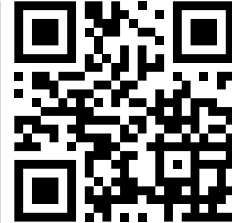
Other time delay values available, consult factory.
 Delay Curves 21,22,24,26: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.
 Delay Curve 20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time 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.
 The minimum inrush pulse tolerance handling capability is 12 times the rated current. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse.

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

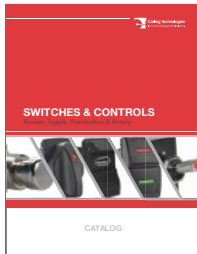
www.carlingtech.com



Watch Company Profile Video



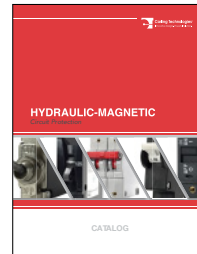
Switches & Controls



catalog

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

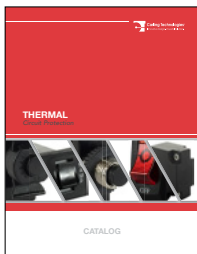
Hydraulic-Magnetic



catalog

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

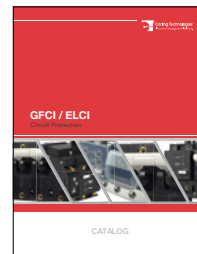
Thermal



catalog

Complete line and ordering details for all thermal circuit breakers.

GFCI / ELCI



catalog

Complete line and ordering details for all GFCIs/ELCIs.

Marine



catalog



brochure

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

On-Off Highway



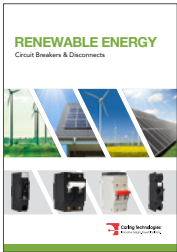
catalog



brochure

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

Renewable Energy



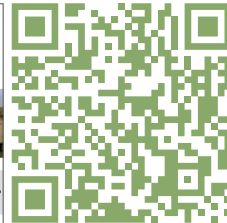
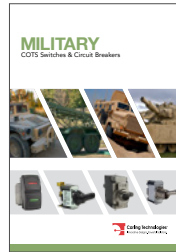
catalog



brochure

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

Military



catalog



brochure

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

Telecom/Datacom



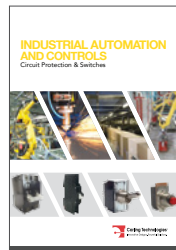
catalog



brochure

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

Industrial Automation

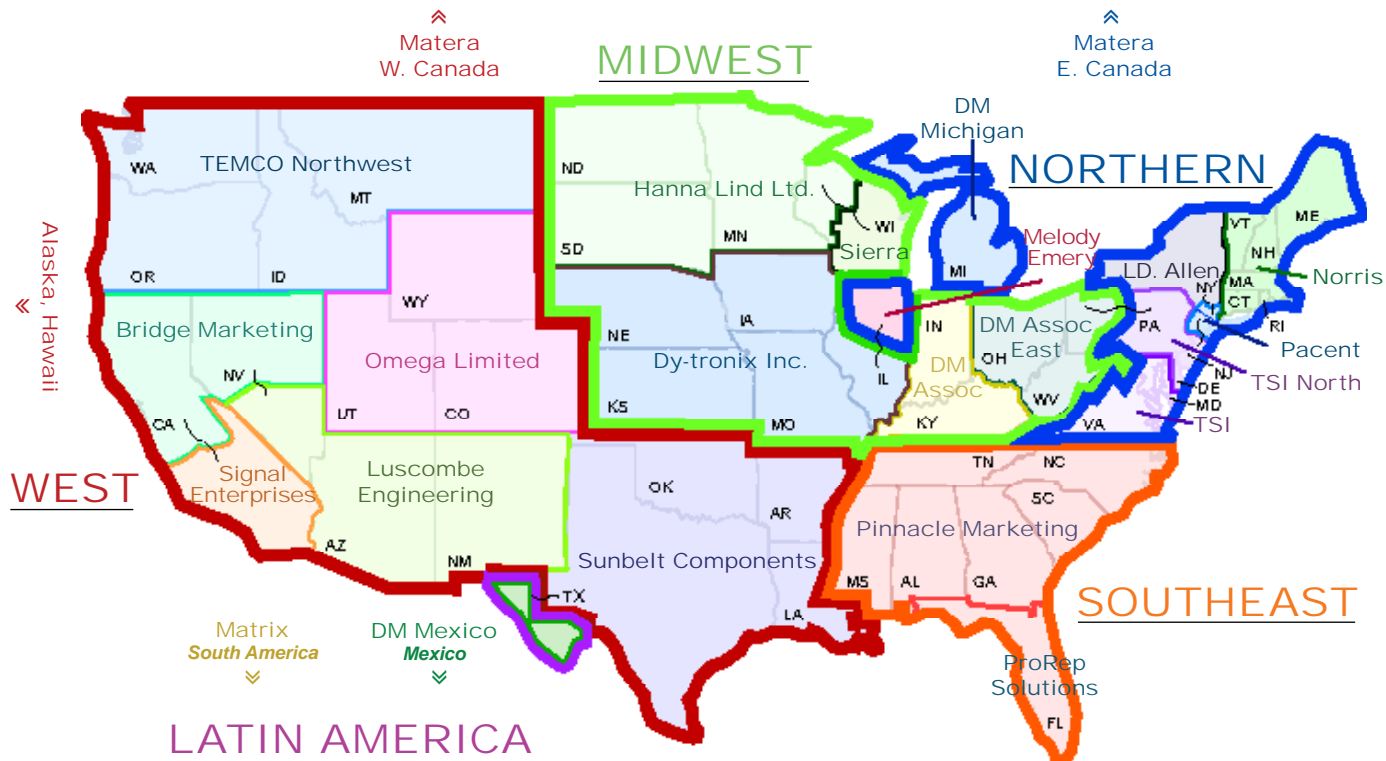


brochure

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

Authorized Sales Representatives

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



Americas



Europe
Middle East
Africa



Asia-Pacific
Oceania

About Carling

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

To view all of Carling’s environmental, quality, health & safety certifications please visit www.carlingtech.com/environmental-certifications

Worldwide Headquarters

Carling Technologies, Inc.
60 Johnson Avenue, Plainville, CT 06062-1177
Phone: 860.793.9281 Fax: 860.793.9231
Email: sales@carlingtech.com www.carlingtech.com

Northern Region Sales Office: nrsm@carlingtech.com
Southeast Region Sales Office: sersm@carlingtech.com
Midwest Region Sales Office: mrsrm@carlingtech.com
West Region Sales Office: wrsm@carlingtech.com
Latin America Sales Office: larsm@carlingtech.com

Asia-Pacific Headquarters

Carling Technologies, Asia-Pacific Ltd.,
Kowloon, Hong Kong
Phone: Int + 852-2737-2277 Fax: Int + 852-2736-9332
Email: sales@carlingtech.com.hk

Shenzhen, China: shenzhen@carlingtech.com
Shanghai, China: shanghai@carlingtech.com
Pune, India: india@carlingtech.com
Kaohsiung, Taiwan: taiwan@carlingtech.com
Yokohama, Japan: japan@carlingtech.com

Europe | Middle East | Africa Headquarters

Carling Technologies LTD
4 Airport Business Park, Exeter Airport,
Clyst Honiton, Exeter, Devon, EX5 2UL, UK
Phone: Int + 44 1392.364422 Fax: Int + 44 1392.364477
Email: ltd.sales@carlingtech.com

Germany: gmbh@carlingtech.com
France: sas@carlingtech.com



SWITCHES & CONTROLS

Rocker, Toggle, Pushbutton & Rotary



CATALOG

FOUNDED IN 1920



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

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



SWITCHES & CONTROLS

- Rocker
- Toggle
- Pushbutton
- Rotary

CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

MULTIPLEXED POWER SYSTEMS

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

STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

GLOBAL LOCATIONS:

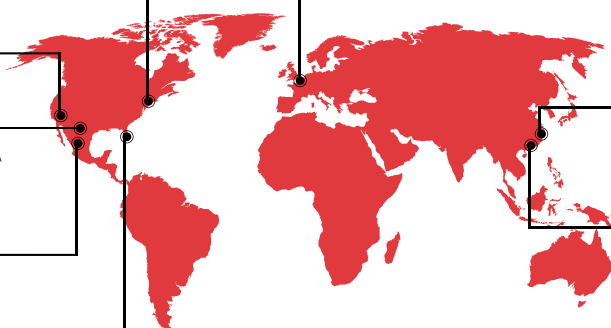
Carling Technologies
World Headquarters
Plainville, CT, USA
ISO9001:2008
ISO/TS16949:2009

Maretron
Phoenix, AZ, USA

Carling Technologies
Brownsville, TX, USA
ISO14001:2004
ISO9001:2008
ISO/TS16949:2009

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ISO14001:2004
ISO9001:2008
ISO/TS16949:2009

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Exeter, UK
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ISO/TS16949:2009

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ISO/TS16949:2009

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Zhongshan, China
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ISO9001:2008
ISO/TS16949:2009

OTHER SERVED INDUSTRIES:



Medical



Industrial Control



Audio / Visual



Commercial Food



HVAC



Floor Care



Generators



Small Appliances



Security Systems



Test & Measurement

WORLDWIDE NUMBERS:

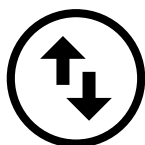


2200+
EMPLOYEES

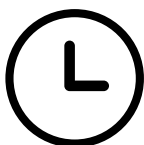


150+
ENGINEERS

COMPETITIVE ADVANTAGES⁺



Vertical
Integration



Reliable &
On-Time Delivery



Excellent
Customer Service






Innovative &
Eco-Friendly Products



70+
DISTRIBUTORS



50+
REP FIRMS

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TIH/TII-Series <i>Non-Illuminated, 3P/4P</i>	6	LMR-Series	<i>Mirror Rotate</i>
LTIL-Series <i>Illuminated, 1P</i>	6	LW-Series	<i>Washer/Wiper</i>
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LTA-Series <i>Mini-Tippette®, Illuminated, 1P</i>	18	H-Series	<i>3 Pole</i>
TG/LTG-Series <i>1P or 2P</i>	20	I-Series	<i>4 Pole</i>
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TLG-Series <i>Adjacent Indicator Light, 1P</i>	24	D-Series	<i>Double Insulated all Nylon</i>
Circuit Designation Chart	26	110-Series	<i>Quick Make/Break, AC/DC</i>
RR/LRR-Series <i>Round, with or without Illumination, 1P</i>	27	DK/EK-Series	<i>Heavy Duty, AC/DC</i>
R/RSC-Series <i>Curvette®, Non-Illuminated, 1P</i>	29	MAAOA/215	<i>High Temperature</i>
LRA-Series <i>Curvette®, Illuminated, 1P</i>	31	Hexboot Accessories.....	135
RG-Series <i>Super Curvette®, Non-Illuminated, 1P/2P</i> ...	33	Hardware Accessories	136
LRG-Series <i>Super Curvette®, Illuminated, 2P</i>	35	Pushbutton Switches	
Small-Sized Rocker Switches		16-3P-Series	<i>Light Actuation Force</i>
610/620-Series <i>Non-Illuminated, 1P or 2P</i>	37	172-Series	<i>High-Amperage, Momentary</i>
611/621-Series <i>Rocker/Paddle/Visi-Rocker®, 1P/2P</i>	39	P26-Series	<i>AC Rated with Metal Cap</i>
622/632-Series <i>With or without Illumination</i>	41	P27-Series	<i>AC Rated with Plastic Cap</i>
651/652-Series <i>Non-Illuminated, 1P</i>	43	641-Series	<i>1-3 Pole Maintained for Foot Controls</i>
Sealed Switches		110-Series	<i>AC/DC for Foot Controls</i>
V-Series <i>Rocker Actuator</i>	45	P-Series	<i>Metal Construction Heavy Duty</i>
V-Series <i>Paddle Actuator</i>	56	PP-Series	<i>Plastic Construction Heavy Duty</i>
V-Series  <i>Rotary</i>	64	Hardware Accessories	136
V-Series  <i>V-Charger Dual Port USB 2.0</i>	71	Rotary	
V-Series <i>Actuators Separately</i>	75	R135-Series	<i>ON-OFF Repeating Action</i>
V-Series <i>Accessories</i>	76	700/800-Series	<i>Up to 8 Positions</i>
VP-Series <i>Illuminated Indicators</i>	78	V-Series 64
W-Series <i>Fully Submersible</i>	81	Terminology/Agency Approvals	158
L-Series <i>Rocker Actuator</i>	86		
L-Series <i>Paddle Actuator</i>	95		

Switches and Controls, Carling Technologies is the leading manufacturer of switches and controls serving OEMs worldwide. Carling Technologies broad product range offers a full line of rocker, toggle, pushbutton, rotary and mini switches for a wide variety of applications. Featuring cutting edge designs and advanced features, Carling products are well known for their performance and reliability.

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

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

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

Custom Design Solutions can be tailor-made for most any application using our extensive engineering resources.

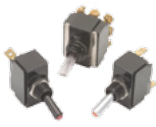





Other Products such as hydraulic-magnetic, thermal and ground fault circuit breakers are also available.

SEALED SWITCHES					
	 <i>V-Rotary</i>	 <i>ST-Series</i>	 <i>V-Series</i>	 <i>W-Series</i>	 <i>L-Series</i>
Poles	one, two	one, two	one, two	one, two	one, two
Ratings	dry circuit to 15A 24VDC 15A 150VAC 10A 250VAC	16A 12V 16A 18V 15A 24V 15A 125VAC 10A 250VAC	dry circuit to 15A 24VDC 15A 150VAC 10A 250VAC	dry circuit to 10A 24VDC	dry circuit to 15A 125VAC 10A 250VAC 20A 18VDC
Sealed Actuator	IP67, rotary knob	IP68, bat	IP66, rocker, paddle, locking rocker	IP68 including connector, bezel-less rocker, paddle & locking rocker	IP67, rocker, paddle, locking rocker
Mounting Hole Specifications	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount	.500" dia [12.7mm] bushing mount	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount
Termination	.250 tabs solder lug wire leads	.250 tabs screw terms	.250 tabs solder lug wire leads	.110 tabs	.187 tab .250 tabs
Illumination	incandescent, LED, neon	n/a	incandescent, LED, neon	LED	incandescent, LED
Approvals	pending	UL, cUL pending	UL, CSA, VDE	n/a	n/a






	FULL-SIZED ROCKERS		MID-SIZED AND SMALL-SIZED ROCKERS			
	 <i>S-Series</i>	 <i>TIL / LTIL TIG / LTIG / LS</i>	 <i>RR / LRR</i>	 <i>R / LRA / RSC RG / LRG</i>	 <i>620 / 621 / 622 632 / 651</i>	 <i>T / LTA / TG / LTG / TLG / TTG</i>
Poles	one, two	one, two	one	one, two	one, two	one, two
Ratings	dry circuit to 10A 28VDC	dry circuit to 15A 125VAC 10A 250VAC	up to 12A 125VAC 10A 250VAC	up to 20A 125VAC 15A 250VAC	dry circuit to 12A 125VAC 10A 250VAC 8A 250VAC 1/2 HP 125- 250VAC	up to 20A 125VAC 10A 250VAC
Sealed Actuator	bezel-less rocker	rocker, paddle	rocker	rocker, paddle	rocker, paddle	rocker, lever, paddle, plunger, toggle (bat)
Mounting Hole Specifications	.787" x 1.575" snap-in, keyed	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount screw mount	.795" [20.2mm] round snap-in mount	.480" x 1.072" [12.19mm x 27.23mm] .866" x 1.182" [22mm x 30mm] snap-in mount	.508" x .756" [12.9mm x 19.2mm] snap-in mount	.550" x 1.125" [13.97mm x 28.57mm] 1.00" x 1.125" [25.4mm x 28.57mm] snap-in mount
Termination	.110 Tabs	.187 tab solder lug .250 tabs screw terms wire leads	.187 tab	solder lug .250 tabs wire leads PC terms	.187 tab solder lug wire leads PC terms	.187 tab solder lug .250 tabs wire leads
Illumination	LED	incandescent, neon	incandescent, neon	incandescent, neon	incandescent, LED, neon	incandescent, neon
Approvals	n/a	UL, CSA, VDE	UL, CUL	UL, CSA, VDE	UL, CSA, VDE	UL, CSA




*Options and approvals shown may apply to specific construction combinations only, consult factory for clarification.
 Manufacturer reserves the right to change product specifications without prior notice.

CONTROLS					
	 <i>LD Dimmer</i>	 <i>LMR Mirror</i>	 <i>LW Wiper</i>	 <i>N-Series</i>	 <i>V-Charger</i>
Poles	multi-function	multi-function	multi-function	one	one
Ratings	up to 10A 12VDC 5A 24VDC	up to 1A 14VDC .5A 28VDC	up to 8A 14VDC 4A 28VDC	.4VA 28VDC	12V/24VDC
Actuator	rocker, paddle	joystick	rocker, paddle	rocker, paddle	sealed spring-loaded access doors
Mounting Hole Specifications	.867" x 1.734" [22mm x 44mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount
Termination	.250 tabs	wire leads with connector	.187 tabs	.187 tabs	.250 tabs
Illumination	LED	n/a	LED	LED	LED
Approvals	n/a	n/a	n/a	n/a	n/a

TOGGLE SWITCHES						
	 <i>LT-Series</i>	 <i>F / G / H / I</i>	 <i>C / D</i>	 <i>110-Series</i>	 <i>DK / EK</i>	 <i>MAAOA / 215</i>
Poles	one, two	one, two, three, four	one	one, two	one, two	one
Ratings	dry circuit to 15A 125VAC 10A 250VAC 15A 12-28VDC	dry circuit to 20A 125VAC 20A 277VAC	up to 20A 125VAC 10A 250VAC	up to 6A 125VAC/DC 3A 250VAC/DC	up to 20A 125VAC/DC 10A 250VAC/DC	up to 20A 125VAC 10A 250VAC 1/2HP 125- 250VAC
Actuator	paddle, toggle (bat)	paddle, toggle (bat)	paddle, toggle (bat)	toggle (bat), toggle (ball)	toggle (bat), toggle (ball)	toggle (bat)
Mounting Hole Specifications	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.656" x 1.218" [16.66mm x 30.54mm] snap-in mount
Termination	.187 tabs solder lug .250 tabs screw terms wire leads PC terms	.187 tabs solder lug .250 tabs screw terms wire leads PC terms	solder lug .250 tabs screw terms wire leads	solder lug .250 tabs screw terms wire leads	screw terms	.250 tabs screw terms wire leads
Illumination	incandescent, neon	n/a	n/a	n/a	n/a	n/a
Approvals	n/a	UL, CSA	UL, CSA	UL, CSA	UL, CSA	UL, CSA

*Options and approvals shown may apply to specific construction combinations only, consult factory for clarification.

PUSHBUTTON					
	 <i>16-3P</i>	 <i>170 / 172</i>	 <i>P26 / P27</i>	 <i>641 / 110</i>	 <i>P / PP</i>
Poles	one	one	one	one, two, three	one
Ratings	up to 3A 125VAC	up to 15A 125VAC 10A 250VAC	dry circuit to 6A 125VAC 3A 277VAC	up to 5A 125VAC 2A 250VAC	up to 20A 125VAC 10A 250VAC
Mounting Hole Specifications	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount
Termination	solder lug wire leads	solder lug screw terms wire leads	.250 tabs solder lug wire leads	solder lug wire leads PC terms	.250 tabs screw terms wire leads
Approvals	UL, CSA	UL, CSA	UL, CSA	UL, CSA	UL, CSA, TUV

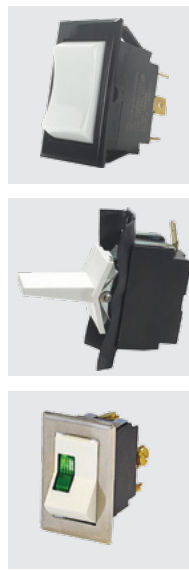
ROTARY			
	 <i>R135</i>	 <i>700 / 800</i>	 <i>V-Rotary</i>
Poles	one	one	one, two
Ratings	1.5A 250VAC 3A 125VAC 5A 12VDC	up to 3A 250VAC 6A 125VAC	dry circuit to 15A 24VDC 20A 12VDC
Actuator	round	asymmetrical	ergonomic
Mounting Hole Specifications	.375" dia [9.52mm] bushing mount .500" dia [12.7mm] snap-in mount	.500" dia [12.7mm] bushing mount	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount
Termination	wire leads	.125 tabs solder lug .250 tabs	solder lug .250 tabs wire leads
Illumination	n/a	n/a	incandescent, LED
Approvals	UL, CSA	UL, CSA	pending

*Options and approvals shown may apply to specific construction combinations only, consult factory for clarification.

Tippette

FULL SIZED ROCKER SWITCHES

The Tippette Series is a traditionally styled rocker switch, available in sealed or unsealed versions. These switches are appropriate for use in general purpose applications which may or may not require a modicum of environmental protection. The Tippette Series is available in both illuminated and non-illuminated versions and features a wide variety of circuits, actuator styles and bracket options. This versatile offering includes international agency certifications and ratings to 26 amps for select circuits.



Electrical

Contact Rating	15 amps, 125 VAC 10 amps, 250 VAC 3/4 HP 125-250 VAC 15 amps, 12-30 VDC
Life	25,000 cycles circuit dependent 50,000 cycles circuit dependent consult factory for applicable circuits.
Contacts	Fine silver, silver cad-oxide
Terminals	Brass or copper/silver plate 1/4" (6.3mm) Quick Connect terminations standard. Solder lug - Brass Tin Plated Wire Lead 16 gauge standard 105°C 600VAC Screw Terminals - Brass

Physical

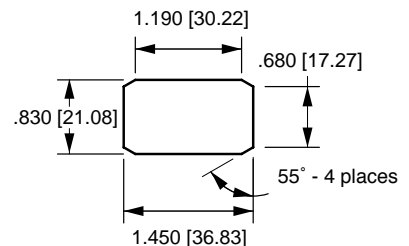
Lighted	Incandescent - rated 10,000 hours Neon - rated 25,000 hours
Seals	Bracket - Actuator WBL/MBL optional external gasket panel seal
Base	Phenolic (150°C)
Rocker/Bracket	Nylon 66 (105°C)

Mechanical

Endurance	100,000 cycles minimum
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Mounting

MOUNTING HOLE
(Nylon Snap-in Brackets)
Panel Thickness:
.040 min. - .250 max.



*Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.

Agency Certifications



Select circuits and constructions with VDE/IEC approvals are available. Consult factory

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

TIGA51 - 6M - BL - MBL

1 Base Part Number 2 Actuator Style 3 Actuator Color 4 Bracket

1 BASE PART NUMBER: SERIES/POLES / CIRCUITRY ^{8,11} / RATING ⁷ / TERMINATION ¹⁰

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 6-28VDC

Single Pole in Double Pole base ²

solder	.250	screw	wire		
lug	tab	term.	leads		
TIGA50	TIGA51	TIGA54	TIGA55	On-None-Off	
TIGA5A	TIGA5B	TIGA5E	TIGA5F	(On)-None-Off	
TIGA5L	TIGA5M	TIGA5S	TIGA5T	On-None-(Off)	
TIGB50	TIGB51	TIGB54	TIGB55	On-None-On	
TIGB5A	TIGB5B	TIGB5E	TIGB5F	On-None-(On)	
TIGC50	TIGC51	TIGC54	TIGC55	On-Off-On	
TIGC5A	TIGC5B	TIGC5E	TIGC5F	On-Off-(On)	
TIGC5L	TIGC5M	TIGC5S	TIGC5T	(On)-Off-(On)	

Three Pole

solder	.250	screw	wire		
lug	tab	term.	leads		
TIHK50	TIHK51	TIHK54	TIHK55	On-None-Off	
TIHK5A	TIHK5B	TIHK5E	TIHK5F	(On)-None-Off	
TIHK5L	TIHK5M	TIHK5S	TIHK5T	On-None-(Off)	
TIHL50	TIHL51	TIHL54	TIHL55	On-None-On	
TIHL5A	TIHL5B	TIHL5E	TIHL5F	On-None-(On)	
TIHM50	TIHM51	TIHM54	TIHM55	On-Off-On	
TIHM5A	TIHM5B	TIHM5E	TIHM5F	On-Off-(On)	
TIHM5L	TIHM5M	TIHM5S	TIHM5T	(On)-Off-(On)	

VDE APPROVED

10A 250VAC, 15A 125VAC, 12(6)A 250VAC T85

Single Pole in Double Pole base ²

solder	.250	wire			
lug	tab	lead			
TIGA90	TIGA91	TIGA95		On-None-Off	
TIGB90	TIGB91	TIGB95		On-None-On	
TIGC90	TIGC91	TIGC95		On-Off-On	

Double Pole

solder	.250	screw	wire		
lug	tab	term.	leads		
TIGK50	TIGK51	TIGK54	TIGK55		
TIGK5A	TIGK5B	TIGK5E	TIGK5F		
TIGK5L	TIGK5M	TIGK5S	TIGK5T		
TIGL50	TIGL51	TIGL54	TIGL55		
TIGL5A	TIGL5B	TIGL5E	TIGL5F		
TIGM50	TIGM51	TIGM54	TIGM55		
TIGM5A	TIGM5B	TIGM5E	TIGM5F		
TIGM5L	TIGM5M	TIGM5S	TIGM5T		

Four Pole

solder	.250	screw	wire		
lug	tab	term.	leads		
TIHK50	TIHK51	TIHK54	TIHK55		
TIHK5A	TIHK5B	TIHK5E	TIHK5F		
TIHK5L	TIHK5M	TIHK5S	TIHK5T		
TIHL50	TIHL51	TIHL54	TIHL55		
TIHL5A	TIHL5B	TIHL5E	TIHL5F		
TIHM50	TIHM51	TIHM54	TIHM55		
TIHM5A	TIHM5B	TIHM5E	TIHM5F		
TIHM5L	TIHM5M	TIHM5S	TIHM5T		

Double Pole

solder	.250	wire			
lug	tab	lead			
TIGK90	TIGK91	TIGK95			
TIGL90	TIGL91	TIGL95			
TIGM90	TIGM91	TIGM95			

Additional ratings up to 20A 125-277VAC, 1 1/2HP 125 VAC, 2HP 250VAC are available. Consult factory for specifics.

2 ACTUATOR STYLE

1S	Angular/Smooth Face Gloss ¹²	6M	Curved/Smooth Face Matte ³
1C	Angular/Cross Serrations Gloss ¹²	6S	Curved/Smooth Face Gloss ³
1F	Flatted/Smooth Face Gloss ¹²	7S	Rounded Paddle/Smooth Face Gloss ¹
1L	Angular/Longline Serrations Gloss ^{1,12}	7N	Witch's Hat/Narrow ¹⁴
2L	Long Smooth/Narrow ¹⁴	7P	Witch's Hat/Wide ¹⁴

3 ACTUATOR COLOR ⁹

BL Black WH White RD Red

4 BRACKET STYLE ⁹

A	Screw Mount ⁵
B	Screw Mount ^{5,12}
C	Screw Mount ⁵
H	Screw Mount ⁵
NBL	Nylon Black
WBL	Water shedding Black ⁴
MBL	Marine Style Black ^{4,6}
FN	Metal Snap-In ⁵
FN BLK	Black Metal Snap-In ⁵
FN SS	Stainless Steel Snap-In ⁵
FW	Wide Stainless Steel Snap-In ⁵

Notes:

- NBL, FN, & FW brackets only.
- For single pole switch in a single pole base, specify TIL with single pole circuitry/rating/termination.
- NBL, WBL, & MBL brackets only. With 6M actuator, brackets also will be matte finish.
- 6M & 6S actuators only.
- Not available with 6M & 6S actuators.
- Consists of WBL bracket, neoprene seal, and dummy rivets at open holes. Consult factory for agency approval status.
- All ratings are appropriate for usage in low voltage applications.
- For additional special circuits, see catalog.
- Custom colors are available, consult factory.
- .187 tab and PC terminations are also available. Consult factory for catalog number callout.
- () momentary
- Not available with WBL or MBL style brackets.
- Available with bracket A, C or H only.
- Not available with MBL, WBL or H brackets. Can be supplied as a double rocker to control separate poles of a TIG, TIH or TII switch. Consult factory for details.

LTILA51 - 6M - BL - RC - MBL - 12V

1 Base Part Number 2 Actuator Style 3 Actuator Color 4 Lens Color 5 Bracket 6 Lamp Voltage

1 BASE PART NUMBER: SERIES / POLES / ILLUMINATION / CIRCUITRY ¹² / RATING ¹⁰ / TERMINATION ¹⁴

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 15-28VDC

illuminated Single Pole in Double Pole base

solder	.250	screw	wire		
lug	tab	term.	leads		
LTILA50	LTILA51	LTILA54	LTILA55	On-None-Off	
LTILA5A	LTILA5B	LTILA5E	LTILA5F	(On)-None-Off	
LTILA5L	LTILA5M	LTILA5S	LTILA5T	On-None-(Off)	
LTILB50	LTILB51	LTILB54	LTILB55	On-None-On	
LTILB5A	LTILB5B	LTILB5E	LTILB5F	On-None-(On)	
LTILC50	LTILC51	LTILC54	LTILC55	On-Off-On	
LTILC5A	LTILC5B	LTILC5E	LTILC5F	On-Off-(On)	
LTILC5L	LTILC5M	LTILC5S	LTILC5T	(On)-Off-(On)	

illuminated Double Pole

solder	.250	screw	wire		
lug	tab	term.	leads		
LTIGK50	LTIGK51	LTIGK54	LTIGK55		
LTIGK5A	LTIGK5B	LTIGK5E	LTIGK5F		
LTIGK5L	LTIGK5M	LTIGK5S	LTIGK5T		
LTIGL50	LTIGL51	LTIGL54	LTIGL55		
LTIGL5A	LTIGL5B	LTIGL5E	LTIGL5F		
LTIGM50	LTIGM51	LTIGM54	LTIGM55		
LTIGM5A	LTIGM5B	LTIGM5E	LTIGM5F		
LTIGM5L	LTIGM5M	LTIGM5S	LTIGM5T		

Additional ratings up to 12A 250VAC, 17A 125 VAC, 3/4 HP 125 VAC, 1HP 250VAC are available. Consult factory for specifics. Three pole switch is also available: Substitute H for fourth digit of part number. ex. LTIIHK51

2 ACTUATOR STYLE ⁴

1S	Angular/Smooth Face Gloss ¹
1C	Angular/Cross Serrations Gloss ¹
1L	Angular/Longline Serrations Gloss ¹
6M	Curved/Smooth Face Matte ³
6S	Curved/Smooth Face Gloss ³
7S	Rounded Paddle/Smooth Face Gloss ²

3 ACTUATOR COLOR ¹¹

BL Black WH White RD Red

4 LENS COLOR ¹³

AM	Amber	RC	Red	GN	Green ⁷
LU	Blue ⁷	CL	Clear	WH	White

5 BRACKET STYLE ¹¹

NBL	Nylon Black
WBL	Water shedding Black ⁵
MBL	Marine Style Black ^{5,8}
FN	Metal Snap-In ^{4,6}
FN BLK	Black Metal Snap-In ^{4,6}
FN SS	Stainless Steel Snap-In ^{4,6}

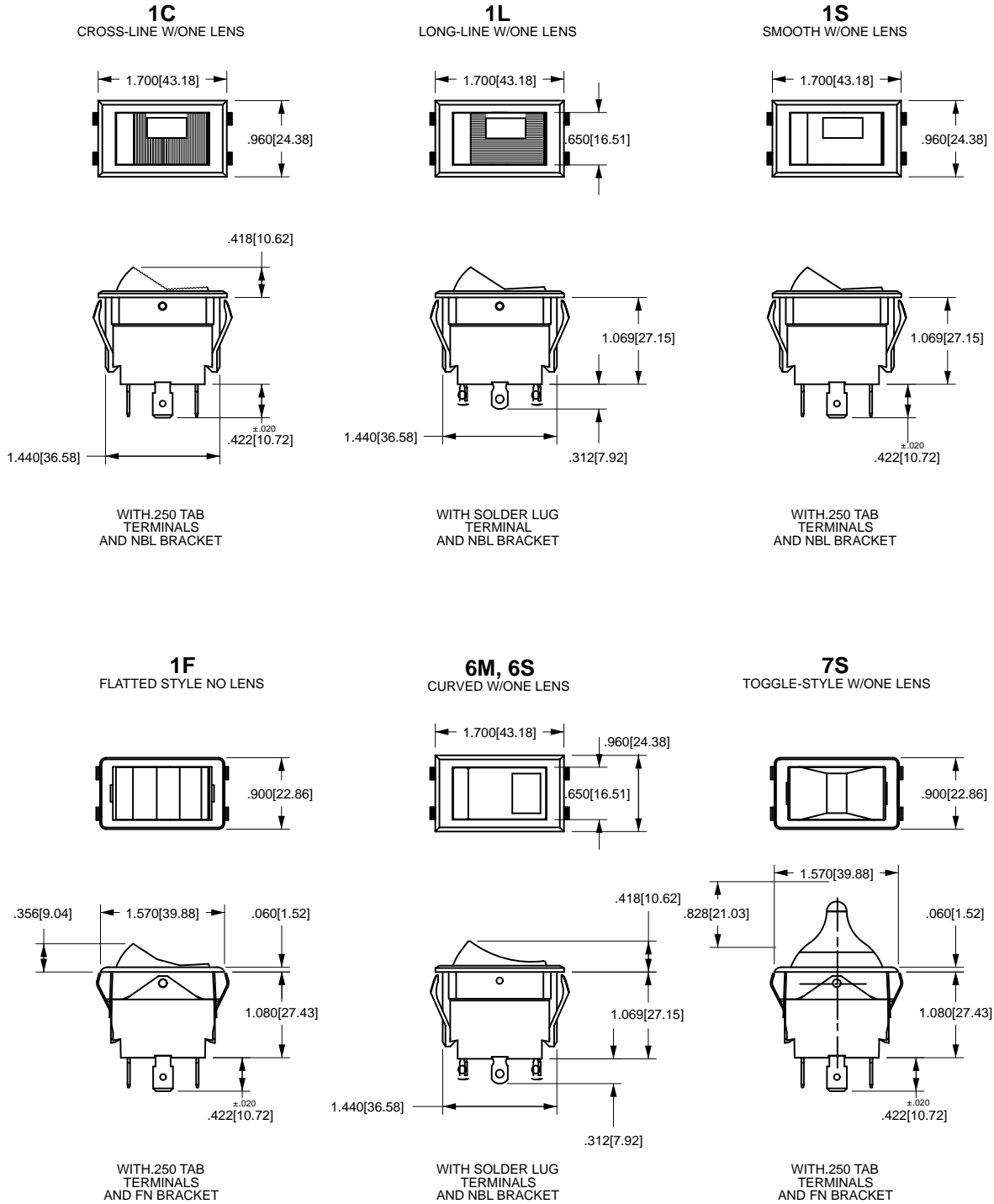
6 LAMP VOLTAGE

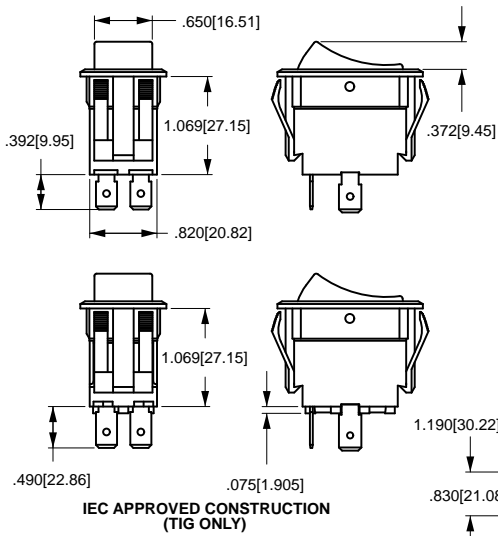
neon ⁹	
125N	125 volt 250N 250 volt
incandescent	
6V	6 volt 12V 12 volt 18V 18 volt
24V	24 volt 28V 28 volt

Notes:

- NBL, FN, & FW brackets only. Double pole circuits provided with 3 pole base.
- LTIL-Series with NBL, FN, & FW brackets only.
- NBL, WBL, & MBL brackets only. With 6M actuator, bracket will also be matte finish.
- 1S, 1C, 1L & 7S with NBL bracket only available with LTIL-Series.
- 6M, 6S actuators only.
- Not available with 6M and 6S actuators.
- Not recommended with neon lamps.
- Consists of WBL bracket, neoprene seal, dummy rivets at open holes. Consult factory for agency approval status.
- Not recommended with blue or green lenses.
- All ratings are appropriate for usage in low voltage applications.
- Custom colors and additional bracket styles are available, consult factory.
- () - momentary
- All double throw circuits supplied with two lenses. To specify two different lens colors, specify second color, after first color. (ex. LTIGM51-6S-BL-RC/GN-WBL-12V)
- .187 tab and PC terminations are also available. Consult factory for catalog number callout.

Dimensional Specifications: in. [mm]

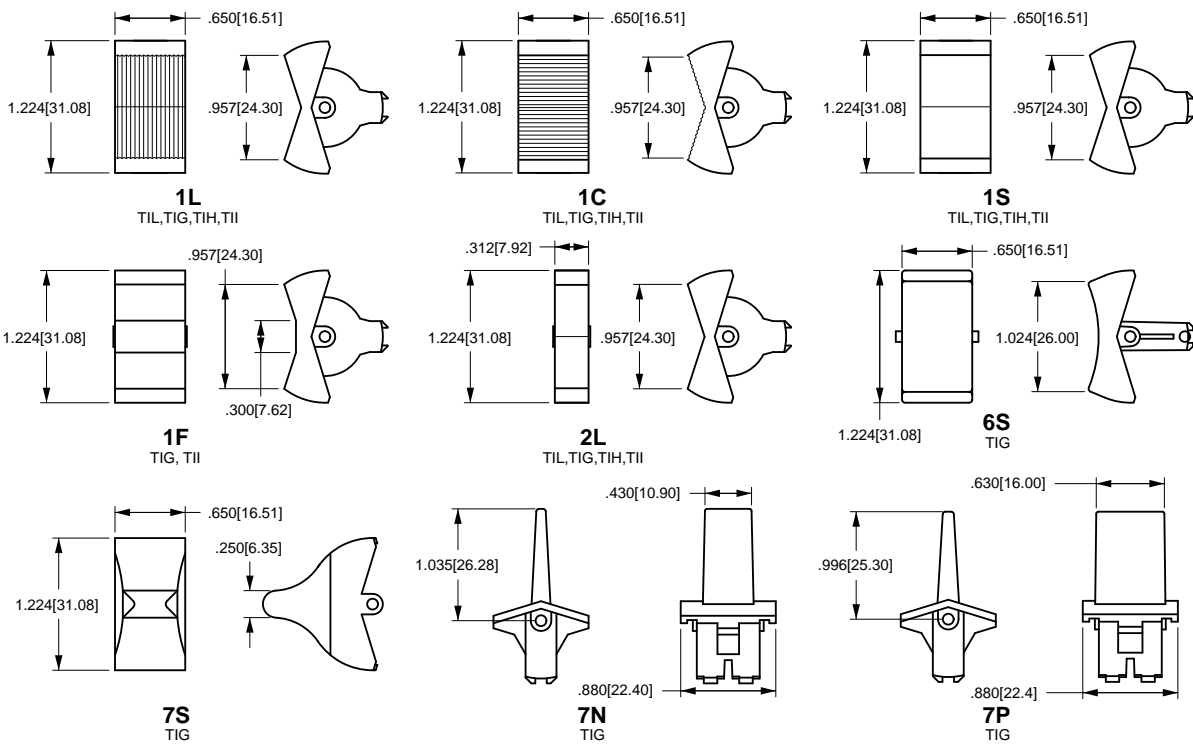




 .125[3.18] DIA .330[8.38] .187[4.74]	 .075[1.91] DIA .437[11.09] .250[6.35]	 .055[1.40] DIA .394[10.00] .187[4.74]
SOLDER LUG	.250 TAB (Q.C.)	.187 TAB (Q.C.)
TERMINAL TYPE		
 #6-32NC-2 THREAD .141[3.58] .370[9.39] .286[7.26]	 6.000[152.40] .500[12.70]	 .187[4.75] .187[4.75] .350[8.89]
SCREW (ASSEMBLED)	WIRE LEAD	PRINTED CIRCUIT

MOUNTING HOLE
(Nylon Snap-in Brackets)
Panel Thickness:
.030 min. - .250 max.
Switch should be mounted at 90°
for maximum water shedding
(45° to 90° acceptable)

* Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.

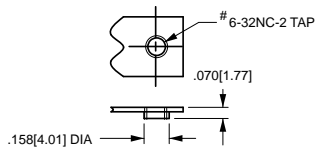


SPECIAL CIRCUITS FOR TIPPETTE ROCKER SWITCHES

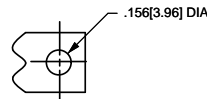
Circuit	Position 1	Position 2	Position 3
Progressive Two Circuit			
GG	BOTH CIRCUITS ON	ONE CIRCUIT ON	OFF
GG	BOTH CIRCUITS (ON)	ONE CIRCUIT ON	OFF
Single Pole Triple Throw			
GE	ON	ON	ON
Two Circuit			
GH	CIRCUIT 1 ON	BOTH CIRCUITS ON	CIRCUIT 2 ON
GP	CIRCUIT 2 ON	CIRCUIT 1 ON	OFF
Reversing Double Pole Double Throw			
GO	ON	OFF	ON
GX	ON	NONE	ON

() Indicates momentary function.

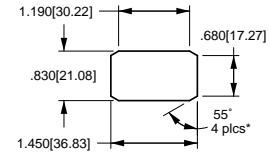
Dimensional Specifications: in. [mm]



TAPPED HOLE
Standard with
A & B Brackets



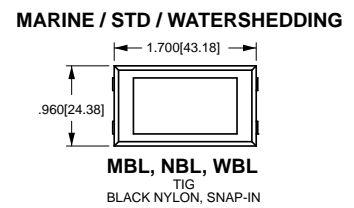
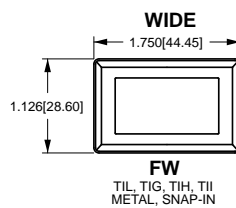
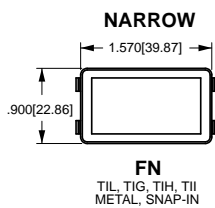
CLEARANCE HOLE
Standard with
C Bracket



MOUNTING HOLE
(Nylon Snap-in Brackets)
Panel Thickness:
.030 min. - .250 max.

* Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.

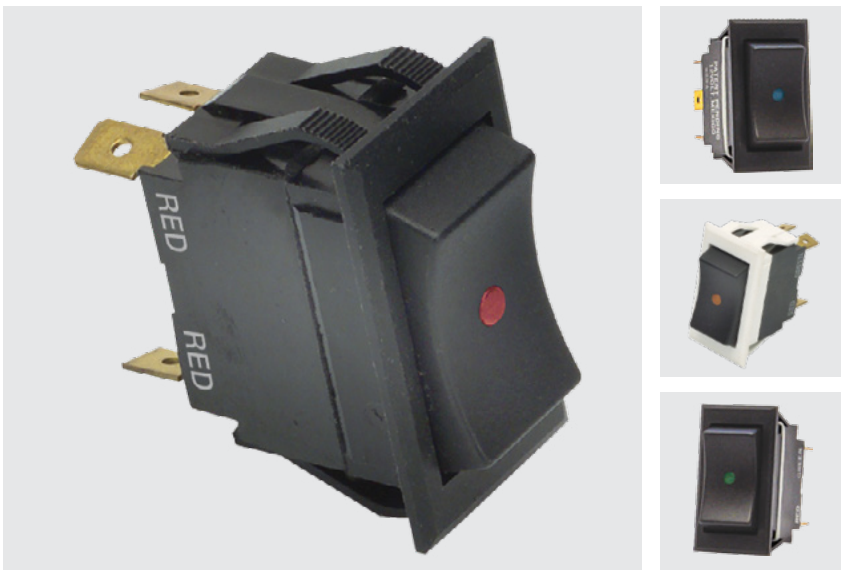
 A TIL	 A TIG	 A TII	 A TIH
 B TIL	 B TII, TIG		
 CX TIL	 C TIG	 C TIH, TII	
 H TIG		 GCP / GMP GLOSS FINISH / MATTE FINISH HOLE PLUG FOR TIL, TIG, TIH & TII	



LS-Series

ROCKER SWITCHES

The LS-Series Softspot illuminated rocker switches feature a three-color high brightness light sequence, from a single lamp. These switches are designed with a standard nylon snap-in bracket and “Drip-Dry” construction that protects the front panel from dust and moisture.



Product Highlights:

- ◆ Water Resistant Construction
- ◆ Independent or Dependent Illumination
- ◆ Up to 3 Different Colors Under a Single Lens
- ◆ Multiple Termination Options

Typical Applications:

- ◆ Marine
- ◆ Transportation



Dielectric Strength

1000V - live to dead metal parts

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

LS1511 - 13 - BL - BL - 012

1
Base Part Number

2
Lighting Sequence

3
Actuator Color

4
Base Color

5
Lamp Voltage

1 BASE PART NUMBER: SERIES / POLES / ILLUMINATION / CIRCUITRY / RATING / TERMINATION³
10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 15-28VDC

Single Pole	Solder Lug	.250 Tab QC	Screw Terms	Wire Leads
On-None-Off	LS1510	LS1511	LS1514	LS1515
On-None-(Off)	LS1520	LS1521	LS1524	LS1525
(On)-None-Off	LS1530	LS1531	LS1534	LS1535
On-None-On	LS1540	LS1541	LS1544	LS1545
On-None-(On)	LS1550	LS1551	LS1554	LS1555
On-Off-On	LS1560	LS1561	LS1564	LS1565
On--Off-(On)	LS1570	LS1571	LS1574	LS1575
(On)-Off-(On)	LS1580	LS1581	LS1584	LS1585

2 LIGHTING SEQUENCE^{1,2}

	position 1	position 2	position 3
01	red	red	red
02	amber	amber	amber
03	green	green	green
10	red	---	none
11	red	clear	red
12	red	clear	amber
13	red	clear	green
14	red	clear	blue
15	red	clear	clear
20	amber	---	none
21	amber	clear	red
22	amber	clear	amber
23	amber	clear	green
24	amber	clear	blue
25	amber	clear	clear
30	green	---	none
31	green	clear	red
32	green	clear	amber
33	green	clear	green
34	green	clear	blue
35	green	clear	clear
40	blue	---	none
41	blue	clear	red
42	blue	clear	amber
43	blue	clear	green
44	blue	clear	blue
45	blue	clear	clear
50	clear	---	none
51	clear	clear	red
52	clear	clear	amber
53	clear	clear	green
54	clear	clear	blue
55	clear	clear	clear

3 ACTUATOR COLOR⁴

BL	Black
WH	White

4 BASE COLOR⁴

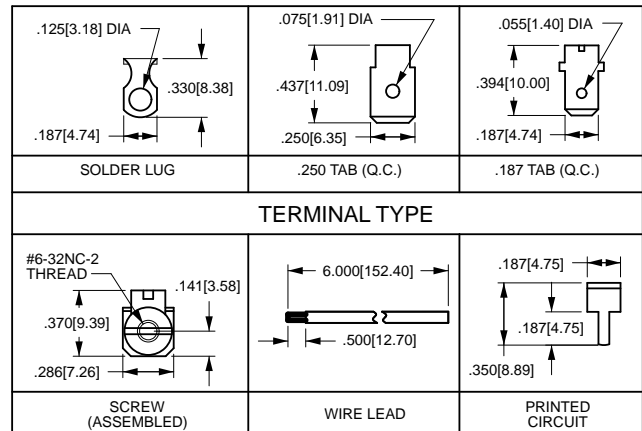
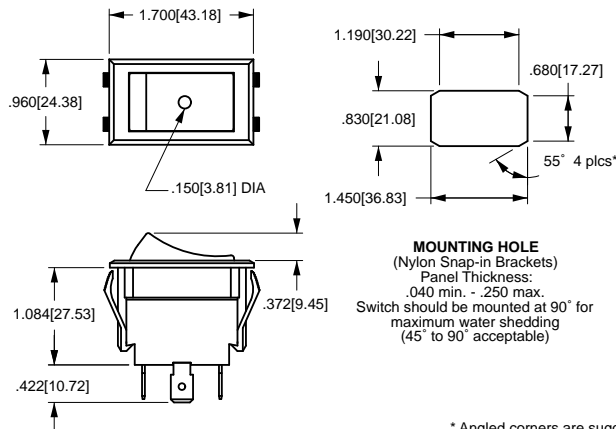
BL	Black
WH	White

5 LAMP VOLTAGE²

incandescent	
6V	6 volt
12V	12 volt
18V	18 volt
24V	24 volt
28V	28 volt
neon	
125N	125 volt neon
250N	250 volt neon

Notes:

- Independent lamp is standard. Dependent lamp with ON-OFF function (including momentary) is available with Lighting Sequences 10, 20, 30, 40 and 50. (No light in OFF position.)
- Green and blue not recommended with 125 volt or 250 volt neon lamps.
- Additional terminations available. Consult factory.
- Custom colors available. Consult factory.
- () Indicates momentary function.



* Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.

S-Series

S-Series ROCKER SWITCHES

S-Series rocker switches are designed for use in the enclosed cabs of today's trucks, with special focus afforded to the vehicle operator. With features including abbreviated travel ½ throw actuation, ergonomic rockers, illumination in up to three detent switch positions, and a non-teasable snap action circuit, these switches provide the driver with easily recognizable and simple to operate controls. Designers will appreciate the 10A, 24VDC rating, space saving compact envelope, clean bezel-less design, integrated low insertion force connector and polarized switch base for quick installation. Most any illumination and switch circuitry is easily accommodated with the S-Series 10 terminal base.



Product Highlights:

- ◆ Abbreviated travel ½ throw actuation
- ◆ Ergonomic rockers
- ◆ Recognizable and simple to operate controls
- ◆ Compact Design

Typical Applications:

- ◆ On-Highway Transportation Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment
- ◆ Marine



Electrical

Contact Rating	10A@ 24VDC
Dielectric Strength	1500 Volts RMS between pole to pole
Insulation Resistance	50 Megaohms
Contact Resistance	10 milliohms max. @ 4VDC
Contact Bounce	<20 milliseconds
Life	100,000 cycles maintained circuit, 50,000 cycles momentary circuit at rated voltage and current gold plated
Circuitry	SP, DP 2 & 3 position, 1/2 or full throw
Terminals	.110 Tabs, Silver Plated Brass

Mechanical

Endurance	250,000 cycles minimum
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Physical

Lighted	LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC.)
Bracket	Acetal
Base	Nylon 66 GF
Rocker	Polycarbonate
Weight	25 gms max.

Connector

Amp/Tyco MCP 2.8 receptacle housing P/N 1418994-1 mates with Amp/Tyco MCP 2.8 flat type receptacle. Based on wire size, choose P/N below:

1-968880-1	20-24 awg wire
1-968849-1	17-20 awg wire
1-968851-1	13.5-17 awg wire

Actuator Travel (Angular Displacement)

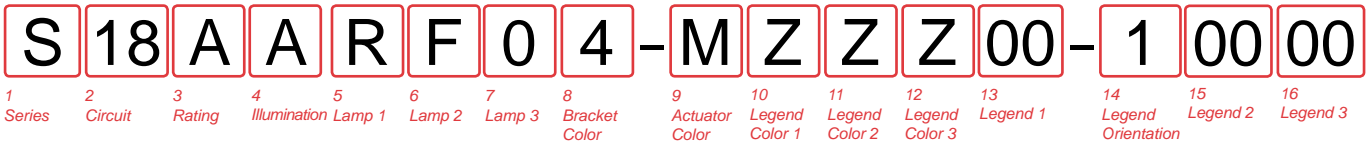
2 position (1/2 throw)	12°
3 position (full throw)	12° from center

Environmental

Operating Temperature	-40°C to +85°C
Vibration	Per IEC 68-2.6 test Fc and 68-2.47 Test Criteria - no noise or contact chatter below 10ms.
Cold Test	Per IEC 68-2-1 -40°C for 72 hours Test Criteria - pre & post test contact resistance.
Dry Heat Test Criteria	Per IEC 68-2-2 + 85°C for 72 hours Test Criteria - no loss of circuit during test, pre & post test contact resistance.
Handling Shock	Drop from height of 1 meter, 3 times, 4 sides. Test criteria - No loss of circuit during test, pre & post test contact resistance.
Thermal Shock	Per IEC 68-2-14, -40°C to +85°C. Test criteria - pre & post test contact resistance.

Mounting Specifications

Snap in Mount	40mm x 20mm keyed hole (see dimensional specifications for details.)
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1 SERIES
S

2 CIRCUIT

Terminal Connections as viewed from bottom of switch: () - momentary
 1 - - 2 SP - single pole uses terminals
 3, 5 & 7. DP - double pole uses terminals
 3 - - 4
 3, 5, 7 & 4, 6, 8.
 5 - - 6
 7 - - 8
 9 - - 10

Position:	1	2	3
SP	5 & 7, 6 & 8	Connected Terminals	3 & 5, 4 & 6
16	ON	OFF	ON
18	(ON)	OFF	(ON)

SPECIAL CIRCUITS

31	(6 & 8)	4, 5, 6, 7	OFF
41	51 ON	OFF	NONE ¹
42	52 (ON)	OFF	NONE ¹
43	53 (ON)	3 & 5	NONE ¹
44	54 ON	3 & 5	NONE ¹
45	55 (ON)	OFF	ON
46	56 NONE	5 & 7	ON
47	57 NONE	5 & 7	(ON)
75	(5 & 7, 3 & 6)	5 & 7, 4 & 6	(3 & 5, 4 & 6)
98 ²	(5 & 7, 2 & 6)	5 & 7, 4 & 6	(5 & 9, 4 & 6)

3 RATING

1	0.4VA 28VDC Resistive
A ³	10.5mA 1.5A 28VDC, 5A 28V 50A Inrush Lamp Load
B ⁴	3.5A 28VDC, 18A Inrush
C ³	10mA 10A 28VDC
D ³	20mA 10A 14VDC

4 ILLUMINATION

	Lamps	Illumination Type	Lamp wired to Terminals
S	NONE	INDEPENDENT	-
A	1	INDEPENDENT	1 (+) 2 (-)
C	1	INDEPENDENT	1 (+) 2 (-)
	2	INDEPENDENT	9 (+) 2 (-)
D	1	INDEPENDENT	1 (+) 2 (-)
	2	INDEPENDENT	9 (+) 10 (-)
E	1 & 3	INDEPENDENT	1 (+) 2 (-)
		PARALLEL	
F	1	INDEPENDENT	1 (+) 10 (-)
		SNAP	
G	1 & 2	INDEPENDENT	1 (+) 10 (-)
		DEPENDENT	9 (+) 2 (-)
H	1 & 2	INDEPENDENT	1 (+) 2 (-)
		DEPENDENT	9 (+) 10 (-)
J	1, 2 & 3	INDEPENDENT	1 (+) 2 (-)
		DEPENDENT	5 (+) 10 (-)
		INDEPENDENT	1 (+) 2 (-)
K	1 & 2	INDEPENDENT	1 (+) 2 (-)
		INDEPENDENT	9 (+) 10 (-)
		3.3K RESISTOR IN PARALLEL	

5,6,7 LAMP (SAME CODING FOR ALL 3 SELECTIONS)

Selection 5: specifies lamp 1 located above terminals 1 (+) & 2 (-).
 Selection 6: specifies lamp 2 located in center of rocker.
 Selection 7: specifies lamp 3 located above terminals 9 (+) & 10 (-).

No lamp	0	Red	Orange	Yellow	Green
LED	A	C	E	H	
12VDC	B	D	F	J	
24VDC					

8 BRACKET COLOR

1	Black
4	Dark Carbon

9 ACTUATOR

Standard Rocker, Laser Etched	Black M	Titan Gray N	Dark Carbon R
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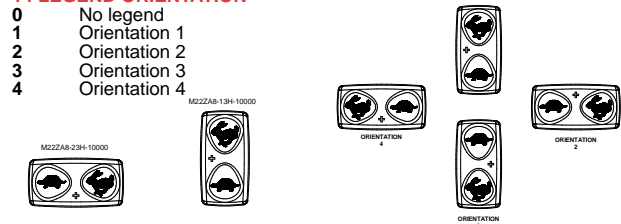
10, 11, 12 LEGEND COLOR

Z	No Legend
1	Clear

13 LEGEND 1⁵

00	No Legend
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14 LEGEND ORIENTATION



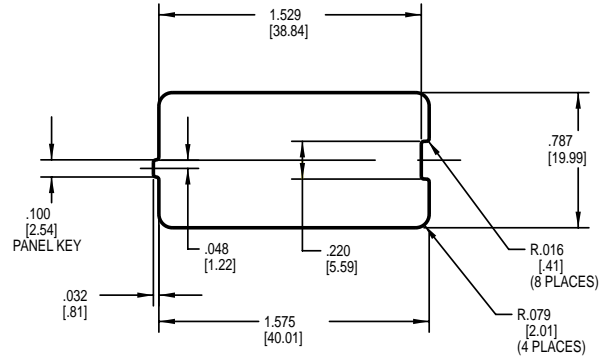
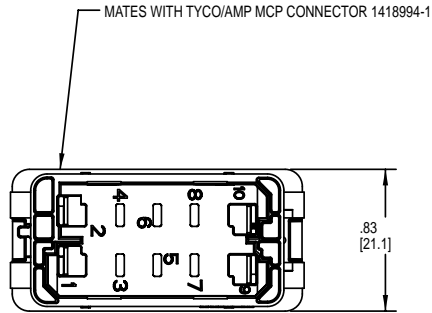
15,16 LEGEND 2,3⁶

00	No legend
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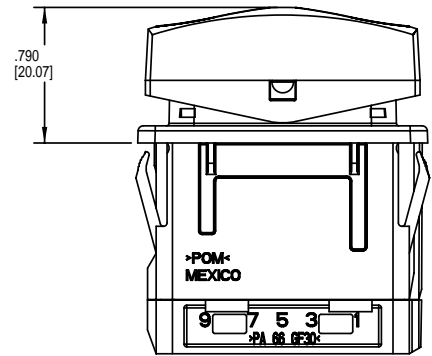
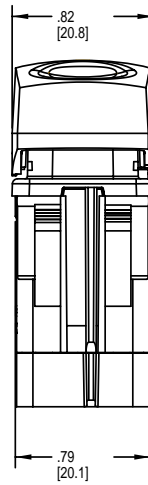
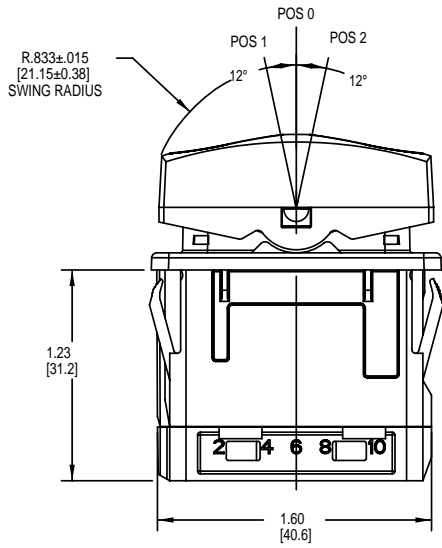
Notes:

- Indicates 1/2 travel for actuator.
- Snap-Action Contact Mechanism
- Not available with circuit 98.
- Available with circuit 98 only.
- Located over T1-2.
- Legend 2 located in center of rocker, Legend 3 located over T9-10. Legend 2 options are limited due to a very small marking area. Consult factory for specifics.

Dimensional Specifications: in. [mm]



PANEL THICKNESS: 2.5±0.1mm
 PANEL OPENING CLEARANCE: ±5°
 SCALE 2.000

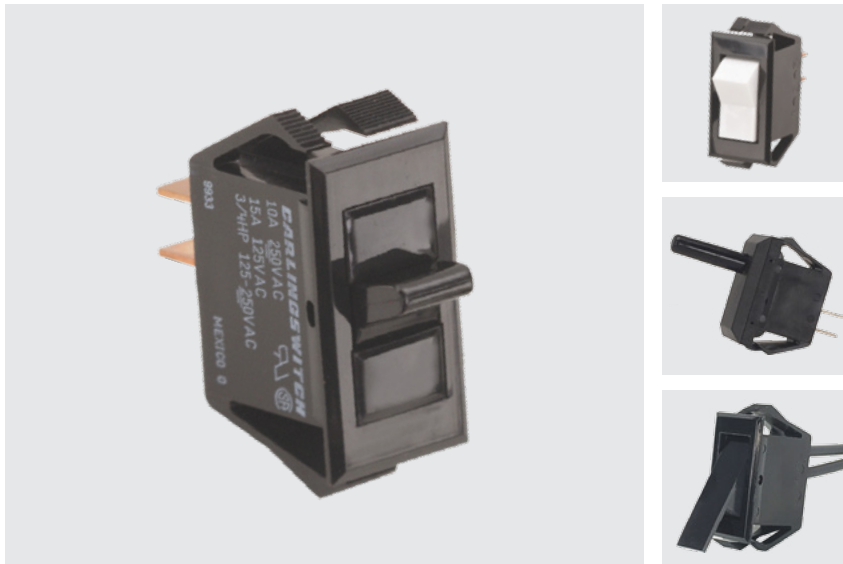


T-Series

T-Series

SINGLE POLE ROCKER & PADDLE SWITCHES

The predecessor to the Corvette series whose versatility has allowed it to stand the test of time. Traditional styling coupled with self cleaning contacts, integrated wire leads, a multitude of circuits, ratings, and actuator choices has made the TA/LTA-Series appeal to a wide range of markets.



Product Highlights:

- Ratings Up To 20A
- Rocker, Paddle, Plunger or Door Interlock Actuators
- Integrated Wire Lead Construction
- Self-Cleaning Wiping Style Contacts

Typical Applications:

- Appliance
- HVAC
- Food Service
- Transportation



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts

Electrical Life

100,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

TA201 - T B - B

¹ Base Part Number

² Actuator Style

³ Actuator Color

⁴ Bezel Color/Style

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING ⁴ / TERMINATION

10A 250 VAC, 15A 125 VAC, 3/4 HP 125-250 VAC
Solder Lugs .250 Tabs Wire Leads

Standard Base

ON-NONE-OFF	TA200	TA201	TA205
ON-NONE-ON	TB200	TB201	TB205
ON-OFF-ON	TC200	TC201	TC205

5A 250 VAC, 10A 125 VAC, 1/2 HP 125-250 VAC

(ON)-NONE-OFF	TA10A	TA10B	TA10F
ON-NONE-(OFF)	TA10L	TA10M	TA10T
ON-NONE-(ON)	TB10A	TB10B	TB10F

T-SERIES WITH PLUNGER ACTUATOR^{1,2}

10A 250 VAC, 16A 125 VAC, 1/2 HP 125-250 VAC			
OFF-NONE-(ON)	-	TA25B-PLB-B	TA25F-PLB-B
ON-NONE-(OFF)	-	-	TA25T-PLB-B

T-SERIES WITH MOMENTARY ROCKER ACTUATOR

10A 250 VAC, 15A 125 VAC, 20A 125-250 VAC "H", 3/4 HP 125-250 VAC			
(ON)-NONE-OFF	-	TA22B-TLB-B	-
ON-NONE-(OFF)	-	TA22M-TLB-B	-

2 ACTUATOR STYLE

T	Rocker	PS	Short Paddle
P	Paddle		

3 ACTUATOR COLOR ⁵

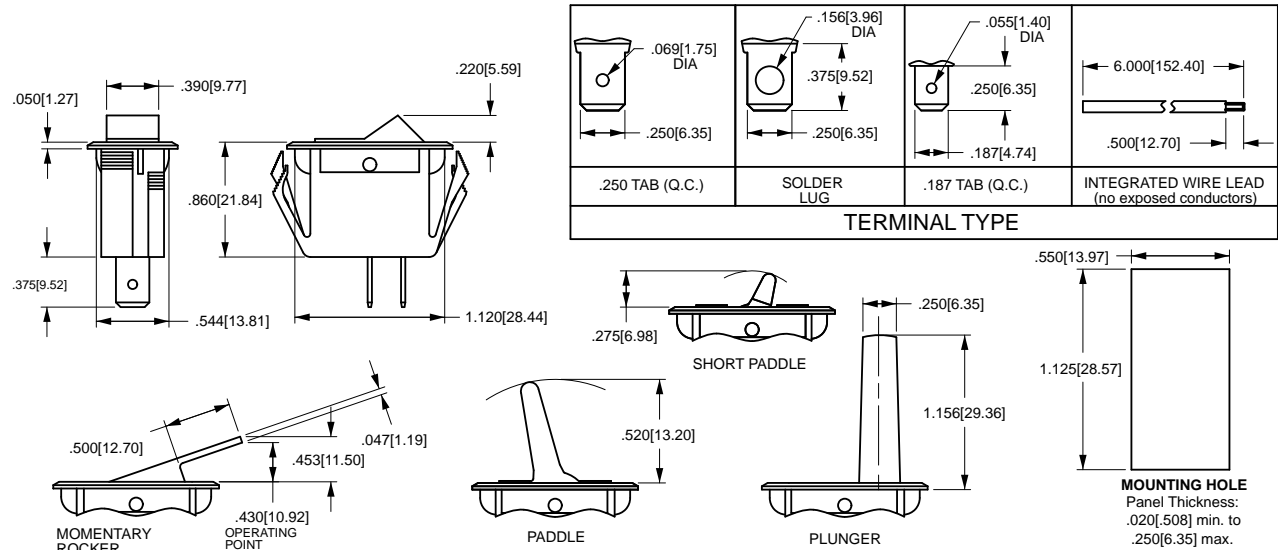
B	Black	W	White
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4 BEZEL COLOR ⁵

B	Black	W	White
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Notes:

- Imprinting is available. Consult factory.
- ¹ Optional plunger support option is available for applications requiring extensive lateral travel, consult factory for details.
- ² Maintained circuit not available with TA22 and TA25 Series.
- ³ .187 tab terminals also available. Consult factory for catalog number callout.
- ⁴ Additional ratings are available. Consult factory.
- ⁵ Additional colors are available. Consult factory.
- () Indicates momentary function.



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

LTA-Series

SINGLE POLE LIGHTED ROCKER SWITCHES

The illuminated predecessor to the Corvette series whose versatility has allowed it to stand the test of time. Traditional styling coupled with self cleaning contacts, integrated wire leads, and various actuator choices has made the LTA-Series appeal to a wide range of markets.



Product Highlights:

- ♦ Neon or Incandescent Illumination
- ♦ Long Paddle, Short Paddle or Rocker Actuators
- ♦ Good for 125/250VAC or Low Voltage DC Applications
- ♦ Integrated Wire Lead Construction

Typical Applications:

- ♦ Appliance
- ♦ HVAC
- ♦ Food Service
- ♦ Transportation



Dielectric Strength

UL/CSA:
 1000V - live to dead metal parts
 750V - across open contacts

Electrical Life

100,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

LTA201 - P R - B -A 125N

1 Base Part Number 2 Actuator Style 3 Actuator Color 4 Bezel Color/Style 5 Lens Color 6 Lamp Voltage

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING 1 / TERMINATION
10A 250VAC; 15A 125VAC; 3/4 HP 125-250VAC
 OFF-NONE-ON Solder Lugs .250 Tabs .187 Tabs Wire Leads
LTA200 LTA201 LTA203 LTA205

2 ACTUATOR STYLE 3
T Rocker **PS** Short Paddle
P Paddle

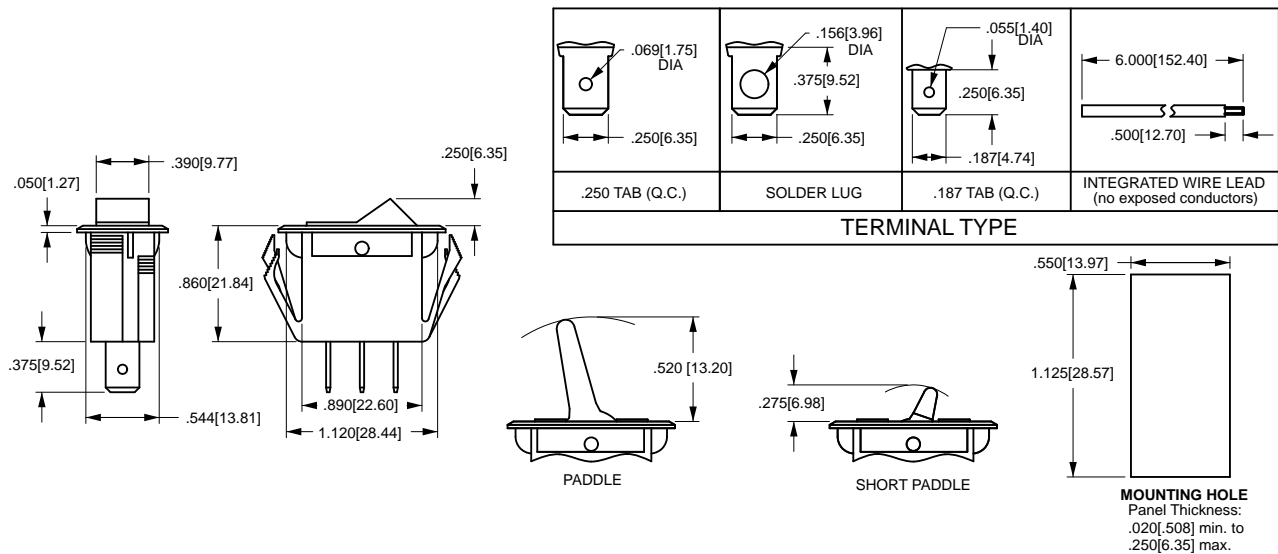
2 ACTUATOR STYLE 1
A Amber **R** Red
C Clear **G** Green 2

4 BEZEL COLOR 1
B Black **W** White

5 LENS COLOR 2,3
 / No Lens **-G** Green
-A Amber **-R** Red
-C Clear **-LU** Blue

6 LAMP VOLTAGE 2
006V 6V incandescent **024V** 24V incandescent
012V 12V incandescent **125N** 125V neon
018V 18V incandescent **250N** 250V neon

Notes:
 1 Additional ratings and colors are available. Consult factory for details.
 2 Neon lamps not recommended with green or blue rocker/lenses.
 3 Lens color is specified only if actuator style is P or PS. If style is T (rocker), then use / as the code in position 5.



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

TG/LTG

TG/LTG-Series

ROCKER SWITCHES

The TG-Series Mini Tippette rocker switches are single or double pole and feature an all nylon double-insulated construction. These switches are designed with snap-in mounting for fast, low cost assembly. The illuminated version (LTG) is available with either a paddle or rocker actuator. These AC rated switches are also suitable for low-voltage DC applications assuring compatibility for a wide range of markets.



Product Highlights:

- ◆ Single or Double Pole
- ◆ Gloss Finish Surfaces
- ◆ Illuminated or Non-Illuminated
- ◆ 20 Available Circuit Options

Typical Applications:

- ◆ Appliance
- ◆ HVAC
- ◆ Food Service
- ◆ Transportation



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts

Electrical Life

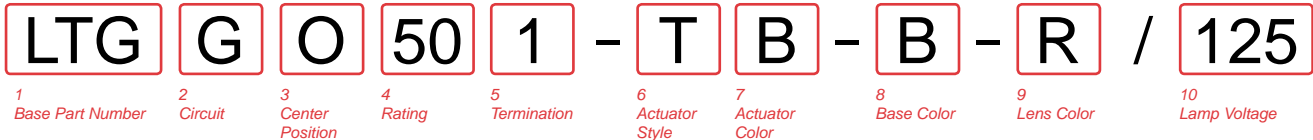
50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)



1 BASE PART NUMBER: SERIES	
TG	Double Pole, Non-Lightded
LTG	Double Pole with Indicator Lights

2 CIRCUIT 1	
See Circuit Designation Chart	

3 CENTER POSITION	
C	Center OFF, Three position
O	No Center OFF, Two position

4 RATING	
40	5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC
41	5A 250VAC, 10A 125VAC
50	10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC
51	10A 250VAC, 15A 125VAC

5 TERMINATION / FUNCTION				
	Solder Lug	.250 Tab QC	.187 Tab QC	Wire Leads
On-None-Off	0	1	3	5
(On)-None-Off	A	B	D	F
On-None-(Off)	L	M	R	T
On-None-On	0	1	3	5
On-None-(On)	A	B	D	F
On-Off-On	0	1	3	5

6 ACTUATOR STYLE	
P	Paddle
T	Rocker

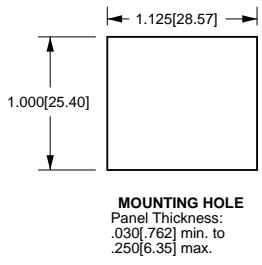
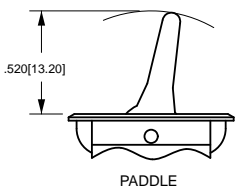
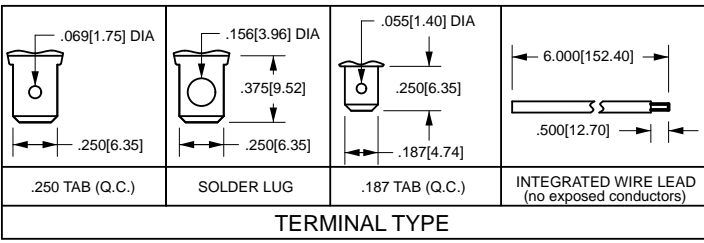
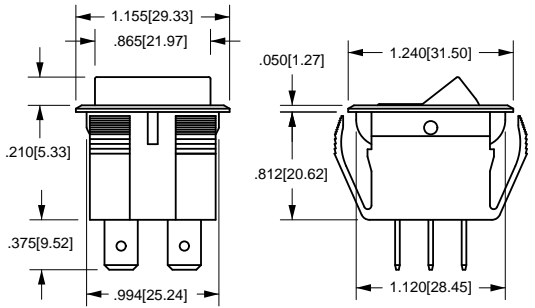
7 ACTUATOR COLOR 2	
B	Black
W	White

8 BASE COLOR 2	
B	Black
W	White

9 LENS COLOR 3		
A	Amber	C Clear
		R Red

10 LAMP VOLTAGE	
<i>incandescent</i>	
6V	6 volt
12V	12 volt
18V	18 volt
24V	24 volt
28V	28 volt
<i>neon</i>	
125N	125 volt neon
250N	250 volt neon

Notes:
Imprinting is available. Consult factory.
Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.
1 TG available with circuits A, B, C, D, E, F ; LTG available with circuits G, H, I, J, M, N, P, Q, R, T, U, V, Y, Z.
2 Custom colors are available. Consult factory.
3 Specify lens color for LTG-Series only.
() Indicates momentary function.

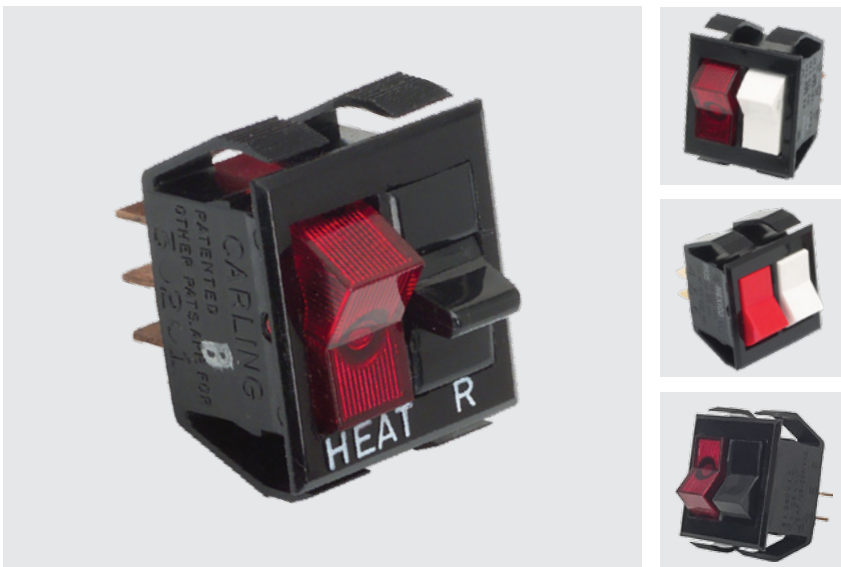


*Manufacturer reserves the right to change product specification without prior notice.

TTG-Series

ROCKER SWITCHES

The TTG-Series Mini Tippette snap-in rocker switches consist of two single pole illuminated or non-illuminated switches in a common base. Each pole can have the same or different switch function. These switches are AC rated up to 20 amps and are also suitable for low-voltage DC applications, in a wide range of markets.



Product Highlights:

- ♦ Independent or Dependent Illumination
- ♦ Ratings up to 20 Amps
- ♦ Diamond or Long Line Lens Options
- ♦ Self-Cleaning Wiping Style Contacts

Typical Applications:

- ♦ Appliance
- ♦ HVAC
- ♦ Food Service
- ♦ Transportation



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts

Electrical Life

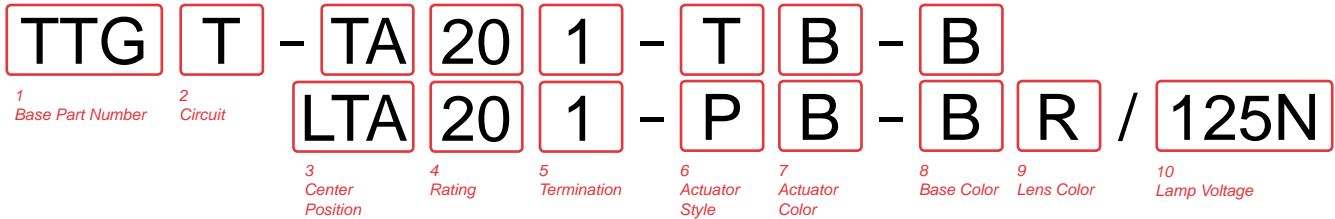
50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)



1 BASE PART NUMBER: SERIES
TTG Two Single Pole switches in one base

2 CIRCUIT 1
See Circuit Designation Chart

3 BASIC SWITCH NUMBER
TA On-None-Off TC On-Off-On, Lighted
TB On-None-On LTA On-None-Off, Lighted

4 RATING
10 5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC
11 5A 250VAC, 10A 125VAC, 5A 125VAC L
20 10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC
21 10A 250VAC, 15A 125VAC
22 10A 250VAC, 15A 125VAC, 20A 125-250VAC H, 3/4HP 125-250VAC

5 TERMINATION / FUNCTION

	Solder Lug	.250 Tab QC	.187 Tab QC	Wire Leads
On-None-Off	0	1	3	5
(On)-None-Off	A	B	D	F
On-None-(Off)	L	M	R	T
On-None-On	0	1	3	5
On-None-(On)	A	B	D	F
On-Off-On	0	1	3	5

6 ACTUATOR STYLE
P Paddle PS Short Paddle
T Rocker

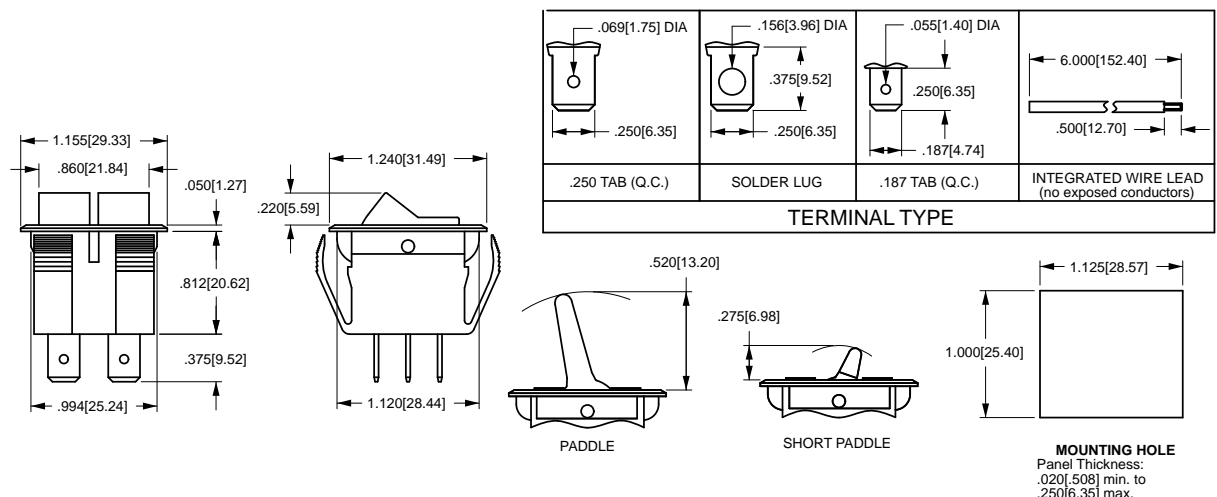
7 ACTUATOR COLOR
unlighted²
B Black W White
lighted³
A Amber C Clear G Green LU Blue R Red

8 BASE COLOR 2
B Black W White

9 LENS COLOR 4
A Amber G Green R Red
C Clear LU Blue W White

10 LAMP VOLTAGE
incandescent
6V 6 volt 12V 12 volt 18V 18 volt 24V 24 volt 28V 28 volt
neon
125N 125 volt neon 250N 250 volt neon

Notes:
Imprinting is available. Consult factory.
Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.
1 TG available with circuits A, B, C, D, E, F, L, T, U
G, H, I, J, M, N, P, Q, R, T, U, V, Y, Z.
2 Custom colors are available. Consult factory.
3 Specify lens color for LTA with rocker only.
4 Specify lens color for LTA with paddle actuators only.
(.) Indicates momentary function.



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

TLG-Series

ROCKER SWITCHES

The TLG-Series Mini Tippette snap-in rocker switches are single pole, rocker or paddle actuated with an adjacent indicator light. These single-actuator-switches are AC rated to 20 amps and are also suitable for low voltage DC applications.



Product Highlights:

- ◆ Maintained or Momentary Circuitry
- ◆ Rocker Paddle or mixed Rocker/Paddle actuators
- ◆ Illuminated or Non-Illuminated
- ◆ Integrated wire lead construction

Typical Applications:

- ◆ Appliance
- ◆ HVAC
- ◆ Food Service
- ◆ Transportation



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts

Mechanical Life

100,000 cycles

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Operating Temperature

32°F to 185°F (0°C to 85°C)

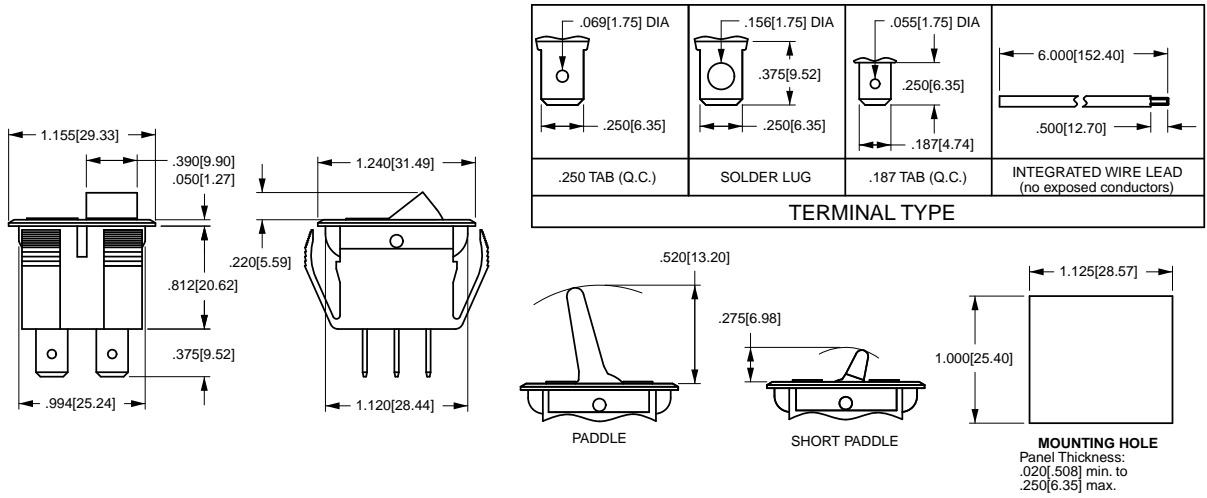


1 Base Part Number 2 Circuit 3 Lens Design 4 Lens Color 5 Center Position 6 Rating 7 Termination 8 Actuator Style 9 Actuator Color 10 Base Color 11 Lens Color 12 Lamp Voltage

1 BASE PART NUMBER: SERIES TLG Single Pole with adjacent Indicator Light		8 ACTUATOR STYLE ² P Paddle PS Short Paddle T Rocker	
2 CIRCUIT ⁴ See Circuit Designation Chart.		9 ACTUATOR COLOR <i>unlighted</i> ² A Amber <i>lighted</i> B Black C Clear W White G Green LU Blue R Red	
3 LENS DESIGN D Diamond L Long Line		10 BASE COLOR ² B Black W White	
4 LENS COLOR A Amber G Green W White C Clear R Red		9 LENS COLOR ^{1,3} A Amber G Green R Red C Clear LU Blue W White	
5 BASIC SWITCH NUMBER TA On-None-Off TC On-Off-On TB On-None-On LTA On-None-Off, Lighted		10 LAMP VOLTAGE ¹ <i>incandescent</i> 6V 6 volt neon 12V 12 volt 125N 125 volt neon 18V 18 volt 250N 250 volt neon 24V 24 volt 28V 28 volt	
6 RATING 10 5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC 11 5A 250VAC, 10A 125VAC, 5A 125VAC L 20 10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC 21 10A 250VAC, 15A 125VAC 22 10A 250VAC, 15A 125VAC, 20A 125-250VAC H, 3/4HP 125-250VAC			

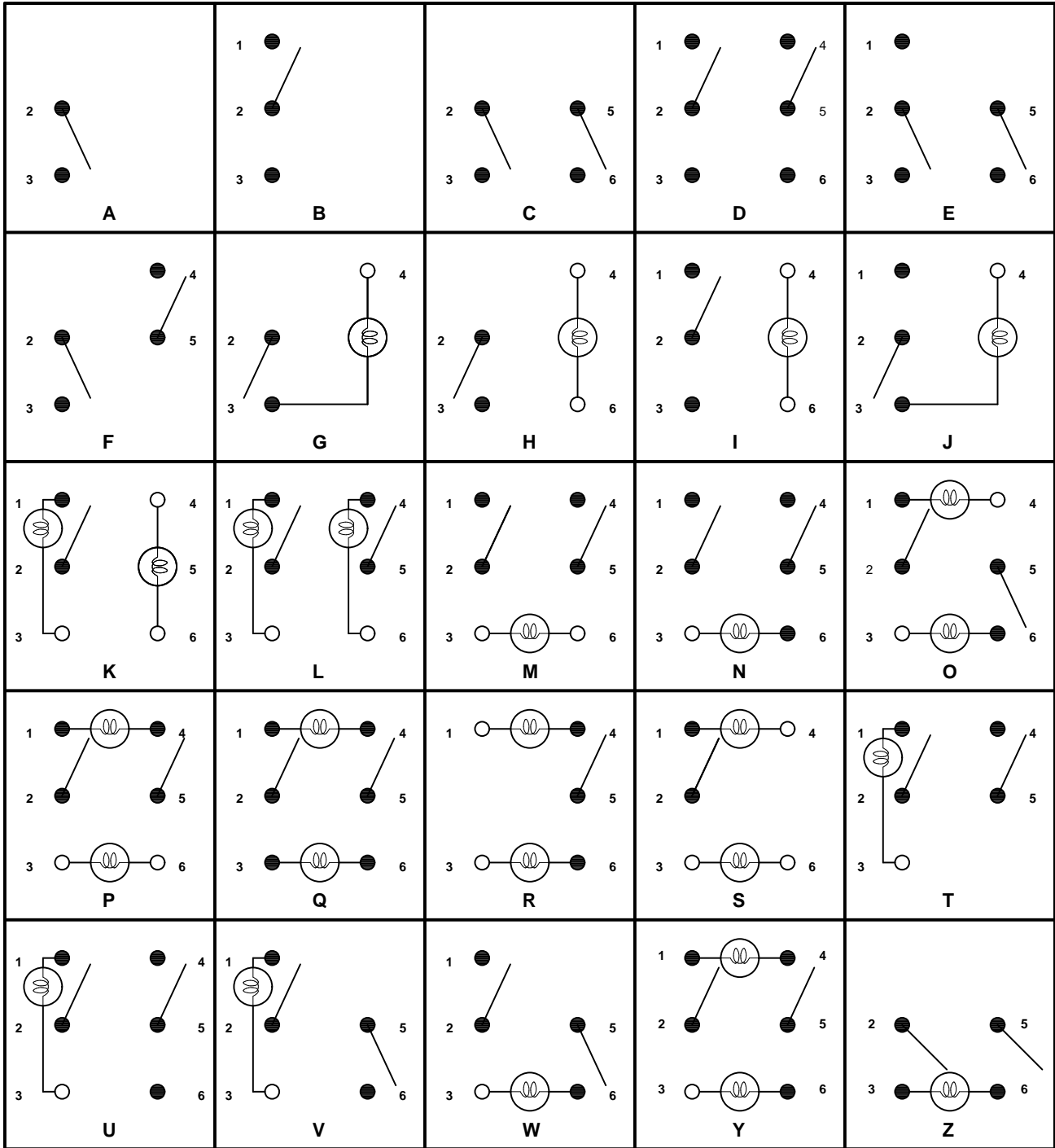
7 TERMINATION / FUNCTION				
	Solder Lug	.250 Tab QC	.187 Tab QC	Wire Leads
On-None-Off	0	1	3	5
(On)-None-Off	A	B	D	F
On-None-(Off)	L	M	R	T
On-None-On	0	1	3	5
On-None-(On)	A	B	D	F
On-Off-On	0	1	3	5

Notes:
Imprinting is available. Consult factory.
Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.
1 Neon Lamps not recommended with green or blue actuators and lenses.
2 Custom colors are available. Consult factory.
3 Specify lens color only if actuator is lighted paddle.
4 Available with circuits G, H, I, J, K only.
() Indicates momentary function.



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

Circuit Designation Chart:



● CONTACT TERMINAL
Will make contact with switching lever

○ ISOLATED TERMINAL
Does not make contact with switching lever

● CONTACT TERMINAL AND SWITCH LEVER

○ BULB

RR/LRR-Series

ROUNDED ROCKER SWITCHES

Carling Technologies' RR and LRR-Series round rocker switches feature a uniquely sculpted rocker design with electrical ratings of up to 12A 125VAC, 10A 250VAC and fit an industry standard cutout, making installation a snap. The lighted LRR-Series can be wired to accommodate dependent or independent, illumination, neon or incandescent lamps with red, green, amber or white translucent rockers. Standard or custom actuator legends are available.



Product Highlights:

- ♦ 125/250VAC or low voltage 12/24VDC
- ♦ Neon or Incandescent Illumination
- ♦ Industry Std. 20.2mm mounting hole
- ♦ Maintained or momentary circuitry

Typical Applications:

- ♦ Appliance
- ♦ Vacuum Cleaners
- ♦ Office Automation
- ♦ Food Service
- ♦ Audio Visual
- ♦ Test & Measurement



CURVETTE

R/RSC-Series

SINGLE POLE ROCKER & PADDLE SWITCHES

Since its introduction, the Curvette switch has become the barometer for versatility and performance in the miniature switch market. Self cleaning contacts, International approvals, along with a wide variety of circuits, ratings, and actuator options make the Curvette the switch of choice for many markets.



Product Highlights:

- ♦ Two color visi rocker to indicate “on” function
- ♦ Ratings to 20A
- ♦ Oval or rectangular bezels
- ♦ Patented mounting wings accommodate a wide range of panel openings

Typical Applications:

- ♦ Appliance
- ♦ HVAC
- ♦ Food Service
- ♦ Transportation



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts
VDE:
4000V - live to dead metal parts;
750V - across open contacts

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

Electrical Life

100,000 cycles

RA901 - V B - B - 9 - V

¹ Base Part Number

² Actuator Style

³ Actuator Color

⁴ Bezel Color/Style

⁵ Rocker Legend

⁶ Visi-Rocker End/Legend Color

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING 1 / TERMINATION

10A 250 VAC; 16A 125 VAC; 3/4 HP 125-250 VAC; 10(4) A 250 VACu T85

	Solder Lugs	.250 Tabs	Wire Leads
OFF-NONE-ON	RA900	RA901	RA905
ON-NONE-ON	RB900	RB901	RB905
ON-OFF-ON ³	RC910	RC911	RC915
OFF-NONE-ON ²	RD220	RD221	RD225

15A 250 VAC; 20A 125 VAC; 3/4 HP 125-250 VAC

	Solder Lugs	.250 Tabs
OFF-NONE-ON	RSCA200	RSCA201
ON-NONE-ON	RSCB200	RSCB201

2 ACTUATOR STYLE

M Momentary Rocker	R Rocker
P Paddle	V Visi-rocker (2 color)

3 ACTUATOR COLOR

1 Black (gloss)	B Black (matte)
2 White (gloss)	W White (matte)

4 BEZEL COLOR / STYLE

STANDARD

B Black (matte)	
W White (matte)	

OVAL

1 Black (gloss)	
2 White (gloss)	

5 ROCKER LEGEND

	molded in	hot stamp
NO LEGEND	0	0
Off-On vertical	1	A
Off-On horizontal	2	B
I-O horizontal	8	D
I-O vertical	9	E
dual OFF-ON/I-O	n/a	H

6 VISI-ROCKER END / LEGEND COLOR

N N/A
B Black
V Visi-red
W White

Notes:

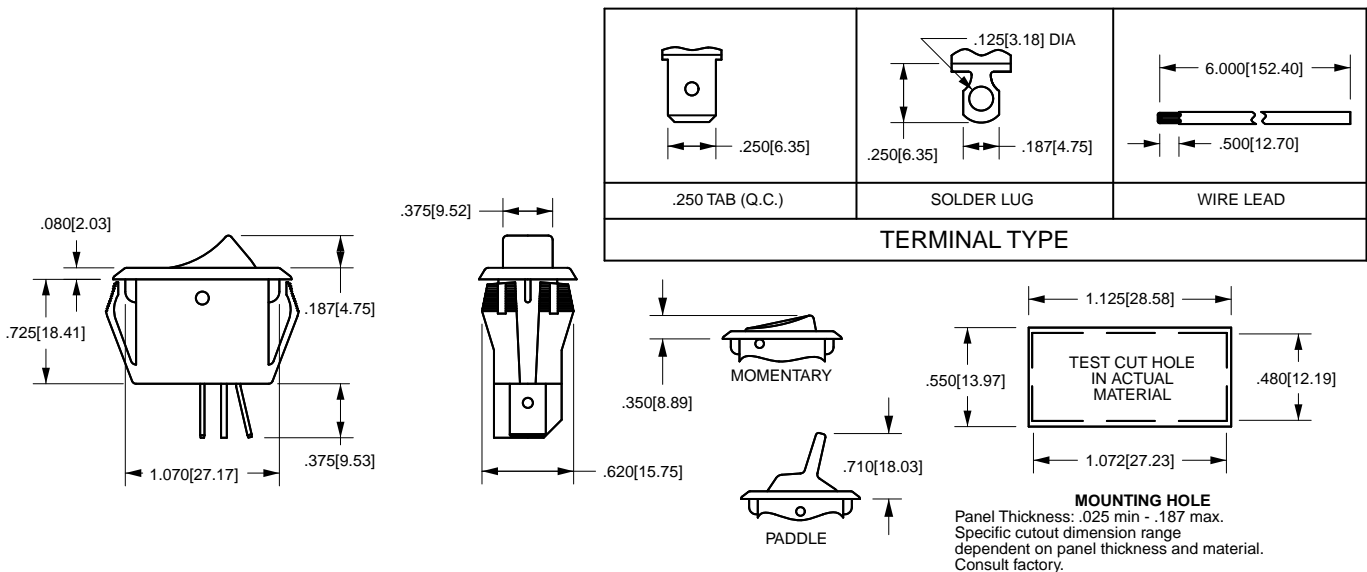
PC Terminals also available, consult factory for details.

1 For additional ratings, consult factory.

2 Rating is 8A 250 VAC, 12A 125 VAC, 1/2 HP 125-250 VAC, and must specify M actuator style.

3 Not rated at 3/4 HP 125-250 VAC

() indicates momentary function.



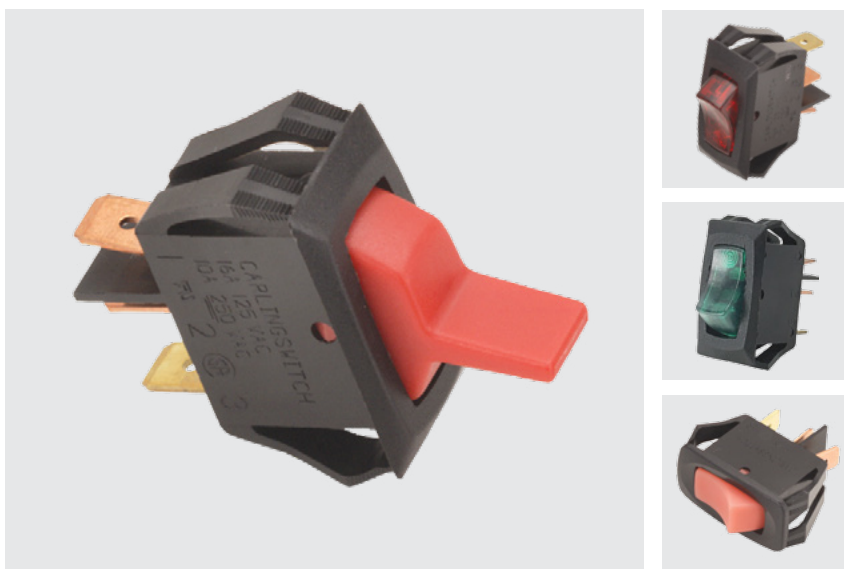
*Manufacturer reserves the right to change product specification without prior notice.

CURVETTE

LRA-Series

SINGLE POLE LIGHTED ROCKER & PADDLE SWITCHES

Since its introduction, the Curvette switch has become the barometer for versatility and performance in the miniature switch market. This lighted version features the very same self cleaning contacts, International approvals, along with a wide variety of circuits, ratings, and actuator options that make the Curvette the switch of choice for various applications.



Product Highlights:

- ◆ Clear or translucent style rockers
- ◆ Neon or Incandescent illumination
- ◆ Self-cleaning wiping style contacts
- ◆ UL, CSA and VDE approved

Typical Applications:

- ◆ HVAC
- ◆ Office Lighting
- ◆ Transportation
- ◆ Commercial Food
- ◆ Lawn & Garden
- ◆ Power Strip



Dielectric Strength

UL/CSA:
1000V-live to dead metal parts
VDE:
4000V - live to dead metal parts;
750V - across open contacts

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

Electrical Life

100,000 cycles

LRA911 - R S - B / 250N

1 Base Part Number 2 Actuator Style 3 Actuator Color 4 Bezel Color/Style 5 Lamp Voltage

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING 2 / TERMINATION

125 neon lamp (use 125N in Selection 5 Lamp Voltage)
10A 250VAC; 16A 125VAC; 10(4)A 125VACu
Solder Lugs .250 Tabs Wire Leads
OFF-NONE-ON **LRA210** **LRA211** **LRA215**

250 neon lamp (select 250N in selection 5 Lamp Voltage)
15A 250 VAC; 10A 250VAC; 16A 125VAC; 10(4)A 250 T85
Solder Lugs .250 Tabs
OFF-NONE-ON **LRA910** **LRA911** **LRA915**

Incandescent lamp (select 006V-024V in selection 5 Lamp Voltage)
10A 30V
Solder Lugs .250 Tabs Wire Leads
OFF-NONE-ON **LRA510** **LRA511** **LRA515**

2 ACTUATOR STYLE

P Paddle
R Rocker translucent
C Rocker Clear

3 ACTUATOR COLOR

translucent
A Amber
C White
P Yellow
S Red
W Pale Red

clear
A Amber
C Clear
G¹ Green
B¹ Blue
R Red

4 BEZEL COLOR/STYLE

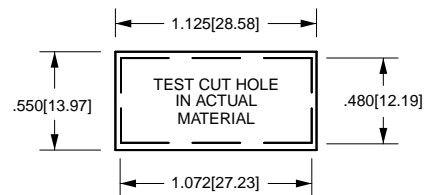
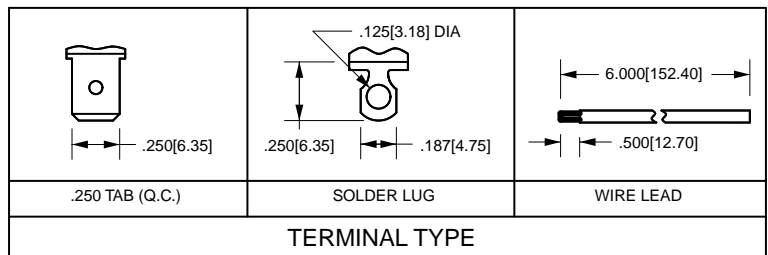
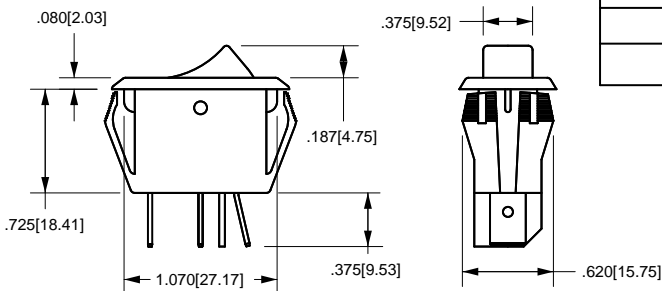
STANDARD
B Black (matte) 
W White (matte)

OVAL
1 Black (gloss) 
2 White (gloss)

5 LAMP VOLTAGE

006V 6 volts incandescent
012V 12 volts incandescent
018V 18 volts incandescent
024V 24 volts incandescent
125N¹ 125 volts neon
250N¹ 250 volts neon

Notes:
LED illumination, PC terminals, independent lamps, and additional color options are available. Consult factory.
1 Neon lamps not available with blue or green actuators.
2 Consult factory for additional ratings.



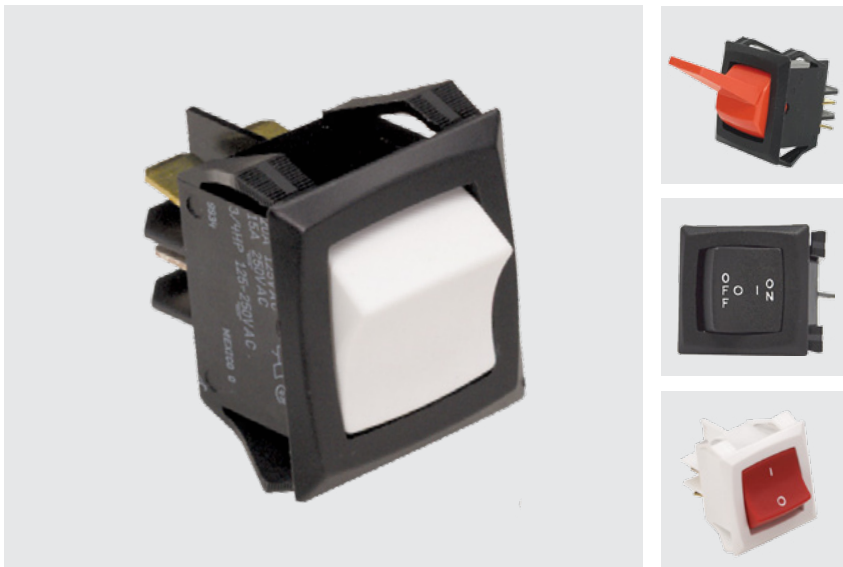
MOUNTING HOLE
Panel Thickness: .025 min. - .187 max.
Specific cutout dimension range dependent on panel thickness and material.
Consult factory.

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

RG-Series

SINGLE/DOUBLE POLE ROCKER & PADDLE SWITCHES

The double pole version of the R-Series incorporates the same sleek lines as the original Corvette, in a double pole envelope. Features include silver-plated butt-action contacts which afford ratings to 20A/125, 15A 250VAC and withstand peak inrush currents up to 100 amps. Paddle or rocker actuators and a choice of solder lug, .250 Tab and wire lead terminations enable this switch to adapt to high current applications.



Product Highlights:

- ◆ Ratings to 20A
- ◆ UL, CSA and VDE approved
- ◆ Rocker or Paddle actuators
- ◆ Fits Euro or American standard mounting holes

Typical Applications:

- ◆ Power Supply
- ◆ Appliance
- ◆ Exercise Equipment
- ◆ Music Equipment



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts & opposite polarity
VDE:
4000V - live to dead metal parts;
1250V - opposite polarity & across open contacts

Electrical Life

50,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

-40°F to 185°F (-40°C to 85°C)

RGSCA901 - R - B - B - A

1
Base Part Number

2
Actuator Style

3
Actuator Color

4
Bezel Color

5
Rocker Legend

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING ¹ / TERMINATION

15A 250 VAC, 20A 125 VAC, 3/4 HP 125-250 VAC, 14(6)A 250 VAC

	Solder Lugs	.250 Tabs	Wire Leads
Standard Base			
OFF-NONE-ON (Single Pole)	RGSCA900	RGSCA901	RGSCA905
ON-NONE-ON (Single Pole)	RGSCB900	RGSCB901	RGSCB905
OFF-NONE-ON (Double Pole)	RGSCC900	RGSCC901	RGSCC905
ON-NONE-ON (Double Pole)	RGSCD900	RGSCD901	RGSCD905

	Solder Lugs	.250 Tabs	Wire Leads
European Base (22 x 30 mm cutout)			
OFF-NONE-ON (Single Pole)	RGSEA900	RGSEA901	RGSEA905
ON-NONE-ON (Single Pole)	RGSEB900	RGSEB901	RGSEB905
OFF-NONE-ON (Double Pole)	RGSEC900	RGSEC901	RGSEC905
ON-NONE-ON (Double Pole)	RGSED900	RGSED901	RGSED905

2 ACTUATOR STYLE

P Paddle R Rocker

3 ACTUATOR COLOR ¹

B Black W White

4 BEZEL COLOR ¹

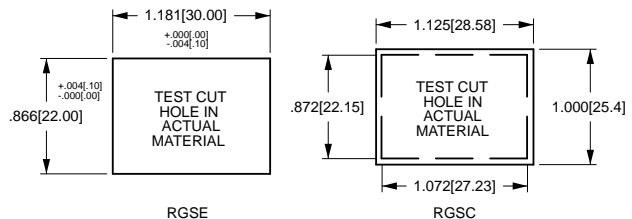
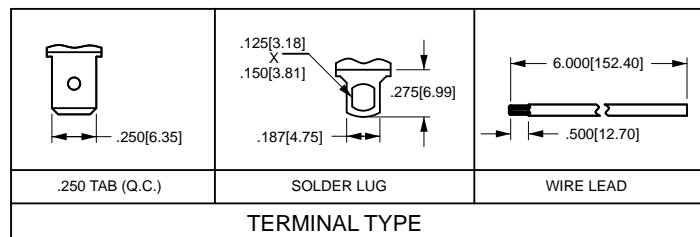
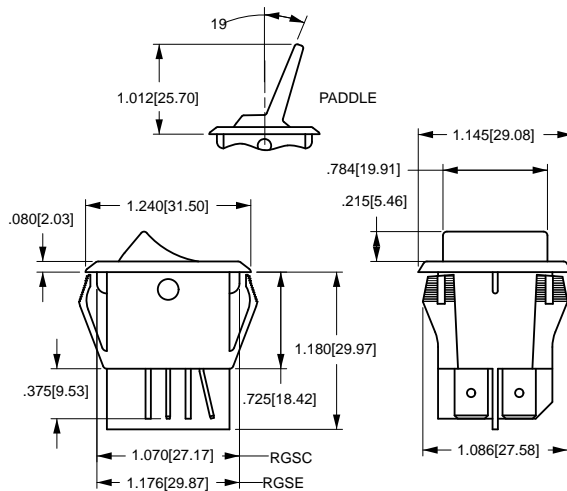
B Black W White

5 ROCKER LEGEND

	hot stamp
NO LEGEND	0
OFF-ON vertical	A
OFF-ON horizontal	B
I-O horizontal	D
I-O vertical	E
Dual OFF-ON, I-O vertical	H
Dual OFF-ON, I-O horizontal	J

Notes:

1 Additional ratings, colors and clear style actuators are available. Consult factory.



MOUNTING HOLE
Panel Thickness: .025 min - .187 max.
Specific cutout dimension range dependent on panel thickness and material.

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

LRG-Series

ILLUMINATED DOUBLE POLE ROCKER & PADDLE SWITCHES

The double pole lighted version of the R-Series incorporates the same sleek lines as the original Curvette, in a double pole envelope. This illuminated version features silver-plated butt-action contacts with ratings to 20A/125, 15A 250VAC and withstand peak inrush currents up to 100 amps. Clear or translucent style rocker actuators and a choice of solder lug, .250 Tab and wire lead terminations enable this switch to adapt to high current applications.

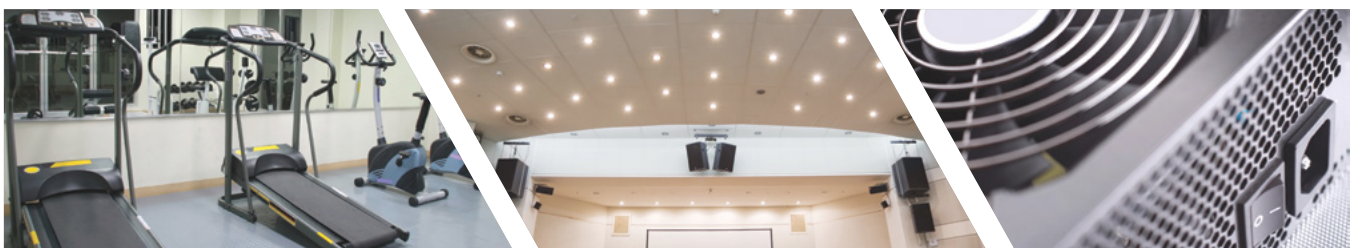


Product Highlights:

- ◆ Ratings to 20A
- ◆ Neon or Incandescent Illumination
- ◆ Silver Plated Butt-contact mechanism
- ◆ Clear or translucent style rockers

Typical Applications:

- ◆ Power Supply
- ◆ Appliance
- ◆ Exercise Equipment
- ◆ Music Equipment



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts & opposite polarity

Electrical Life

50,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

-40°F to 185°F (-40°C to 85°C)

LRGSCK611 - **R** **S** - **B** - **B** / **250N**

¹
Base Part Number

²
Actuator Style

³
Actuator Color

⁴
Bezel Color

⁵
Rocker Legend

⁶
Lamp Voltage

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING ¹ / TERMINATION
15A 250 VAC, 20A 125 VAC, 3/4 HP 125-250 VAC

	Solder Lugs	.250 Tabs	Wire Leads
Standard Base			
OFF-NONE-ON	LRGSCK610	LRGSCK611	LRGSCK615
European Base (22 x 30 mm cutout)			
OFF-NONE-ON (Single Pole)	LRGSEK610	LRGSEK611	LRGSEK615
15A 6-24 V ³			
Standard Base			
OFF-NONE-ON	LRGSCK510	LRGSCK511	LRGSCK515
European Base (22 x 30 mm cutout)			
OFF-NONE-ON (Single Pole)	LRGSEK510	LRGSEK511	LRGSEK515

4 BEZEL COLOR ¹

B Black	W White
----------------	----------------

5 ROCKER LEGEND

	hot stamp
NO LEGEND	O
OFF-ON vertical	A
OFF-ON horizontal	B
I-O horizontal	D
I-O vertical	E
Dual OFF-ON, I-O vertical	H
Dual OFF-ON, I-O horizontal	J

2 ACTUATOR STYLE

R Rocker (translucent)	C Rocker (clear)
-------------------------------	-------------------------

3 ACTUATOR COLOR

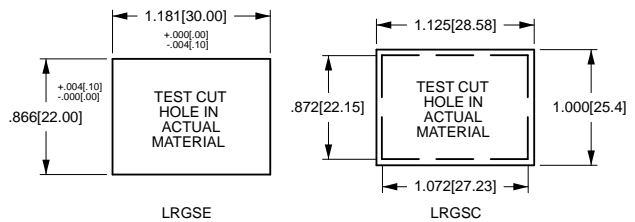
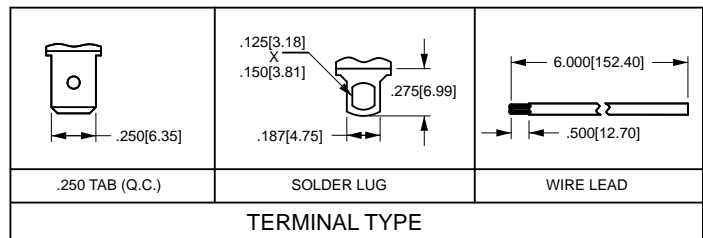
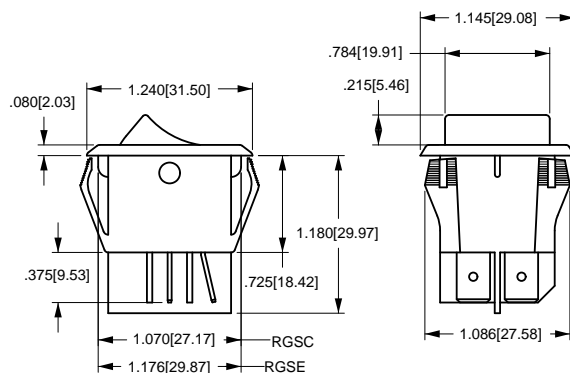
A Amber	L ³ Lime Green
B ^{3,5} Blue	P Yellow
C ⁴ White/Clear	R Red (clear)
G ⁵ Green	S Red
	W Pale Red

6 LAMP VOLTAGE ²

006V 6V incandescent	024V 24V incandescent
012V 12V incandescent	125N 125V neon
018V 18V incandescent	250N 250V neon

Notes:

- Additional ratings, colors and clear style actuators are available. Consult factory.
- Incandescent lamps must specify 15A 24V rating only.
- Available with incandescent lamps only.
- Clear color provided where specified with clear style rocker.
- Available with clear style rocker only.



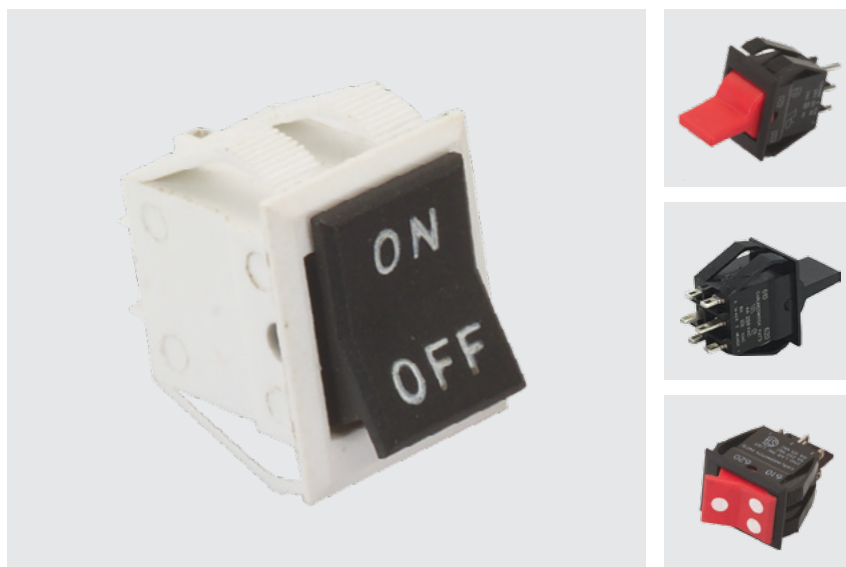
MOUNTING HOLE
 Panel Thickness: .025 min - .187 max.
 Specific cutout dimension range dependent on panel thickness and material.

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

610/620-Series

SUB-MINIATURE ROCKER SWITCHES

The miniature 610/620-Series switches are double insulated and available in single or double pole configurations. These snap-in mounted switches are offered with either a paddle or rocker actuator and with ratings up to 8 amps.



Product Highlights:

- ◆ Single or double pole
- ◆ Paddle rocker actuator options
- ◆ Snap-In mounting method

Typical Applications:

- ◆ Handheld Appliance
- ◆ Audio-Visual
- ◆ Power Supplies
- ◆ Computers



Dielectric Strength

UL/CSA:
1000V - live to dead metal parts & opposite polarity

Electrical Life

50,000 cycles- single pole
50,000 cycles- double pole

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

62012421 - **0** - **0**

¹
Base Part Number

²
Terminal Sealing

³
Legend

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING ¹ / TERMINATION ¹
4A 250VAC; 8A 125VAC
Single Pole

	Solder Lugs	PC Term
On-none-On	62011421	62011422
On-none-(On)	62011431	62011432
On-off-On	62011461	62011462
On-off-(On)	62011471	62011472
(On)-off-(On)	62011481	62011482
Double Pole		
On-none-On	62012421	62012422
On-none-(On)	62012431	62012432
On-off-On	62012461	62012462
On-off-(On)	62012471	62012472
(On)-off-(On)	62012481	62012482

2 TERMINAL SEALING

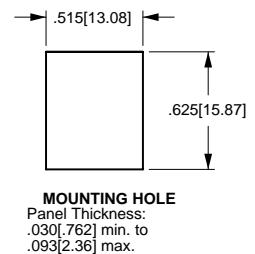
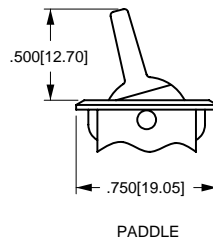
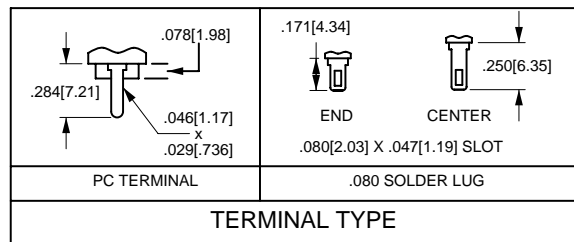
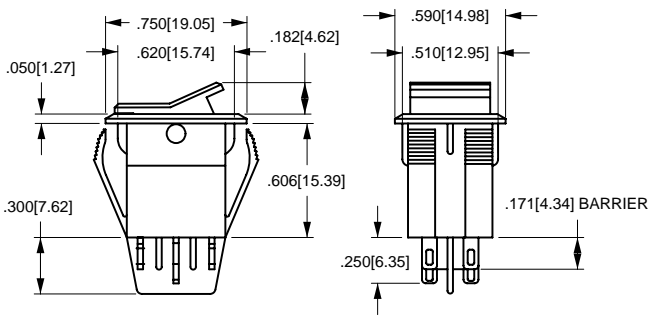
0 None
E Epoxy sealed terminals

3 LEGEND

NO LEGEND hot stamp
On-OFF vertical **0**
On-OFF horizontal **A**
I-O horizontal **B**
I-O vertical **D**
G

Notes:

- ¹ Base part number specifies black rocker and bezel. To specify paddle actuator, change 2nd digit of part number from 2 to 1 (ex. 61012421) For additional ratings and colors, consult factory.
- () indicates momentary function.



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

611/621-Series

SINGLE/DOUBLE POLE ROCKER & PADDLE SWITCHES

The patriarch of the Carling line of sub-miniature switches has its roots deep in the many markets. The 611/621-Series compact size, sleek styling, actuator and termination choices make this switch a cost effective solution to most any switching need. International approvals, single or double pole circuitry, and ratings to 11A 125VAC further the broad appeal of this product family.



Product Highlights:

- ◆ Single or double pole
- ◆ Paddle and single color or dual color visi-rocker options
- ◆ UL, CSA and VDE approvals for select circuits
- ◆ Choice of 7 termination options

Typical Applications:

- ◆ Appliance
- ◆ Audio-Visual
- ◆ Power Supplies



622/632

622/623-Series

MINIATURE ROCKER SWITCHES

A high powered offering packed into a compact sized envelope, the 622/632-Series is a staple of numerous markets. With its silver-alloy butt contacts, the 622/632 will handle inrush spikes up to 125 amps and steady state current to 12A 125VAC. The lighted 632-Series features a multitude of illumination circuit options available with LED, incandescent and neon style lamps.

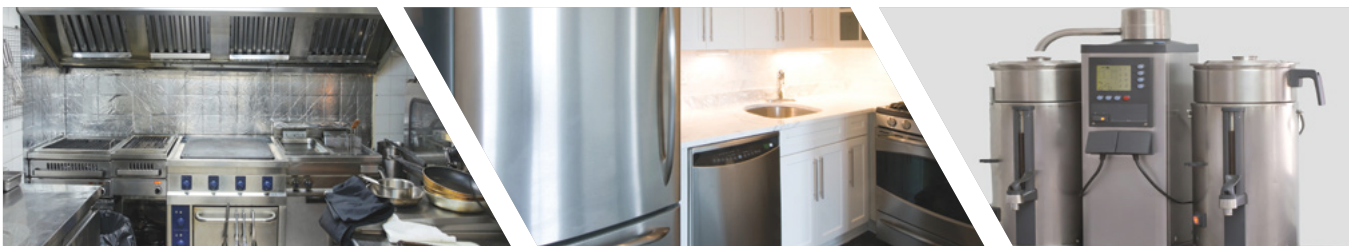


Product Highlights:

- ◆ Illuminated or Non-Illuminated
- ◆ Silver Plated Butt contacts that handle high Inrush spikes
- ◆ Independent or Dependent lamp circuitry
- ◆ Industry standard size mounting hole

Typical Applications:

- ◆ Appliance
- ◆ Food Service
- ◆ Transportation
- ◆ General Purpose



Dielectric Strength

UL/CSA:
1000V-live to dead metal parts
& opposite polarity

Electrical Life

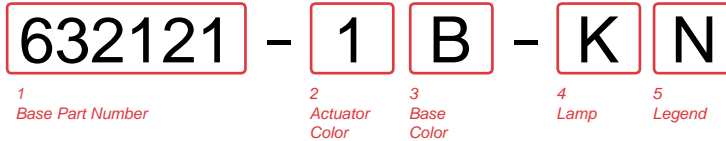
50,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)



BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION
8A 250VAC; 12A 125VAC; 1/2 HP 125-250VAC
622-SERIES NON-ILLUMINATED ROCKER

- ON-none-OFF (Single Pole)
- ON-none-OFF (Double Pole)
- 632-SERIES ILLUMINATED ROCKER**
- ON-none-OFF (Single Pole, dependent lamp) schematic 1
- ON-none-OFF (Single Pole, independent lamp) schematic 3
- ON-none-OFF (Single Pole, independent lamp unballasted) schematic 5
- ON-none-OFF (Double Pole, dependent lamp with 5 terms.) schematic 2
- ON-none-OFF (Double Pole, dependent lamp with 4 terms.) schematic 4

Solder Lugs	.187 Tabs
622121	622122
622221	622222
632121	632122
632321	632322
632521	632522
632221	632222
632421	632422

3 ACTUATOR COLOR ³

622 (non illuminated)	632 (illuminated)
B Black	1 Clear Amber
W White	2 Clear Red
	3 Clear Blue ²
	4 Clear Green
	5 Clear

4 LAMP VOLTAGE / STYLE ¹

N 622 (non illuminated)	A 6V incandescent
1 unballasted LED	C 12V incandescent
2 6V LED	E 18V incandescent
3 12V LED	H 24V incandescent
4 24V LED	J 125V neon
	K 250V neon

3 BASE COLOR ³

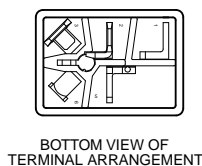
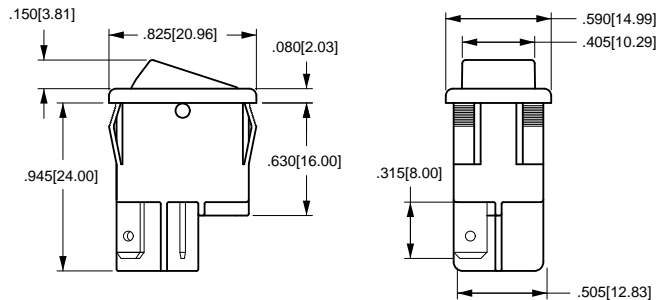
B Black	W White
----------------	----------------

5 ROCKER LEGEND

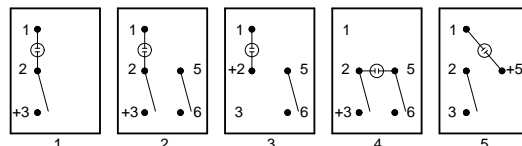
- N** NO Legend
- A** OFF-ON vertical
- B** OFF-ON horizontal
- D** I-O horizontal
- E** I-O vertical
- F** O on rocker radius

Notes:

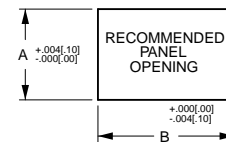
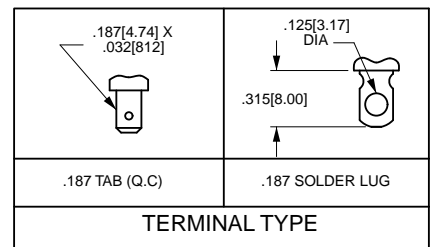
- 1 For all incandescent or LED lamps specify 5 in 5th digit of part number. Example 632151-1B-CN
- 2 Available with incandescent lamps only.
- 3 Additional colors available. Consult factory for details.



632 SCHEMATIC



UNBALLASTED



PANEL THICKNESS	A	B
.030[.76]-.050[1.27]	.508[12.90]	.756[19.20]
.050[1.27]-.078[1.98]	.508[12.90]	.764[19.40]
.078[1.98]-.125[3.17]	.508[12.90]	.780[19.81]

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

651/652-Series

SUB-MINIATURE ROCKER SWITCHES

This sub-miniature switch is ideal for applications with back panel size constraints. It fits in a standard rectangular cutout and is designed to provide ease of insertion along with superior panel retention qualities. A high profile rocker and butt-action contacts provide the user with a crisp positive-type feel and electrical ratings to 12A 125VAC 10A 250VAC. A variety of ratings, circuitry and termination choices will appeal to many market segments.



Product Highlights:

- ♦ Ratings to 12A 125VAC, 6A 250VAC
- ♦ Suitable for low voltage 12/24V DC
- ♦ Solid or 2 color visi-rocker options
- ♦ 5 choices of termination

Typical Applications:

- ♦ Handheld Appliance
- ♦ Audio-Visual
- ♦ Power Supplies



Dielectric Strength

UL/CSA:
1000V-live to dead metal parts

Electrical Life

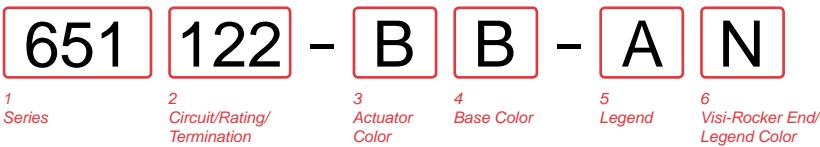
100,000 cycles- maintained
50,000 cycles- momentary
50,000 cycles- T-rating

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)



1 SERIES	
651 Matte Finish	652 Gloss Finish

4 BASE COLOR	
B Black	W White

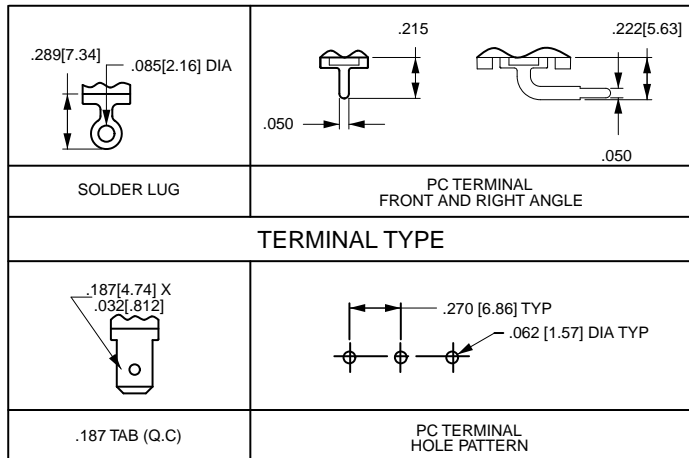
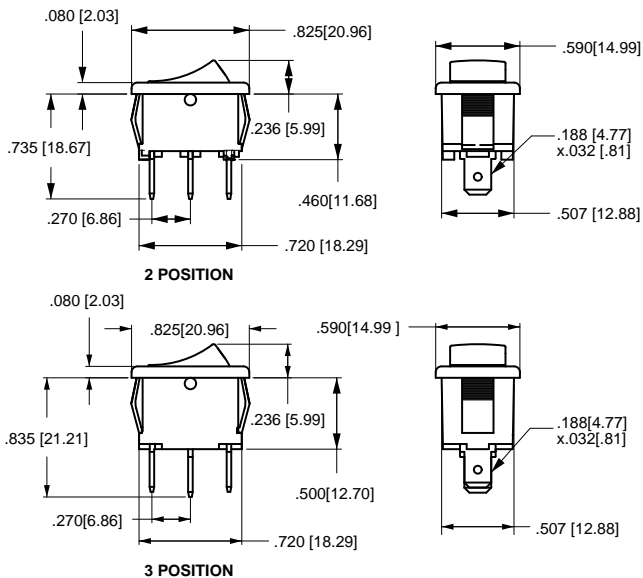
2 CIRCUITRY / RATING / TERMINATION					
10A 250VAC, 10A 125VAC, 1/4 HP, 125-250 VAC					
	.187	.187	PC	PC	Wire
	Solder Lugs	Tabs	Terms	Rt. Angle	Leads
ON-NONE-OFF	121	122	123	124	125
(ON)-NONE-OFF	261 ¹	262	263	264	265
ON-NONE-(OFF)	361 ¹	362	363	364	365
ON-NONE-ON	421	422	423	424	425
ON-NONE-(ON)	561 ¹	562	563	564	565
ON-OFF-ON	681 ²	682	683	684	686
ON-OFF-(ON)	781 ²	782	783	784	785
(ON)-OFF-(ON)	881 ²	882	883	884	885

5 ROCKER LEGEND		
	molded in ⁴	hot stamp
NO LEGEND	0	0
Off-On vertical	1	A
Off-On horizontal	-	B
I-O horizontal	8	D
I-O vertical	9	E
O on rocker end	-	F
II-O-I vertical	-	G
II-O-I horizontal	-	H

3 ACTUATOR COLOR	
B Black	W White

6 VISI-ROCKER END / LEGEND COLOR	
N	N/A
B	Black
V	Visi-red
W	White

Notes:
Additional ratings (including 14V T) & color options are available; Consult factory.
1 Rated 12A 125VAC, 6A 250 VAC, 1/4HP 125-250VAC.
2 Rated 8A 125-250VAC, 1/4HP 125-250VAC.
3 Additional colors available. Consult factory for details.
4 Available with Visi-Rocker option only.
() Indicates momentary function.



RECOMMENDED PANEL OPENING	PANEL THICKNESS	A	B	
	.030[.76]-.050[1.27]	.508[12.90]	.756[19.20]	
	.050[1.27]-.078[1.98]	.508[12.90]	.764[19.40]	
	.078[1.98]-.125[3.17]	.508[12.90]	.780[19.81]	TEST CUT HOLE IN ACTUAL MATERIAL

V-Series

CONTURA SWITCHES

Carling Technologies' sealed V-Series Contura switches are well known for their cutting edge design, high quality, maximum performance and unmatched reliability. These switches are a staple in the marine and transportation industries and have passed a range of environmental, corrosion, temperature, vibration, shock and sealing tests including MIL Std 202F, MIL Std 810C, UL 1500, ISO 8846, IEC 60529 and BS 5490 among others, making them one of the most rugged and reliable switches ever manufactured.

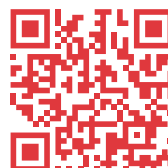


Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

- ◆ Certified to IP66 with dual seals around lamps and rocker stem.
- ◆ Silver plated butt contact mechanism provides reliability up to and beyond 100K electrical cycles
- ◆ Greaseless construction withstands temperature extremes down to -40°C
- ◆ The switch accommodates up to 10 terminals and endless illumination and circuit options.
- ◆ The switch connector allows the user to preload FQC terminals for ease of assembly.
- ◆ Numerous choices of removable rockers allow for style change without having to retest or re-qualify the switch base.

Typical Applications:

- ◆ Marine Panels
- ◆ Emergency Vehicles
- ◆ Trucks
- ◆ Buses
- ◆ Construction Equipment
- ◆ Motorcycles & ATVs
- ◆ Farm Equipment
- ◆ Commercial Appliances
- ◆ Military Vehicles
- ◆ Mining Equipment
- ◆ Golf Carts
- ◆ Floor Cleaning Equipment
- ◆ Utility Vehicles



V-Series Switch

DESIGN FEATURES

INTERCHANGEABLE ACTUATORS

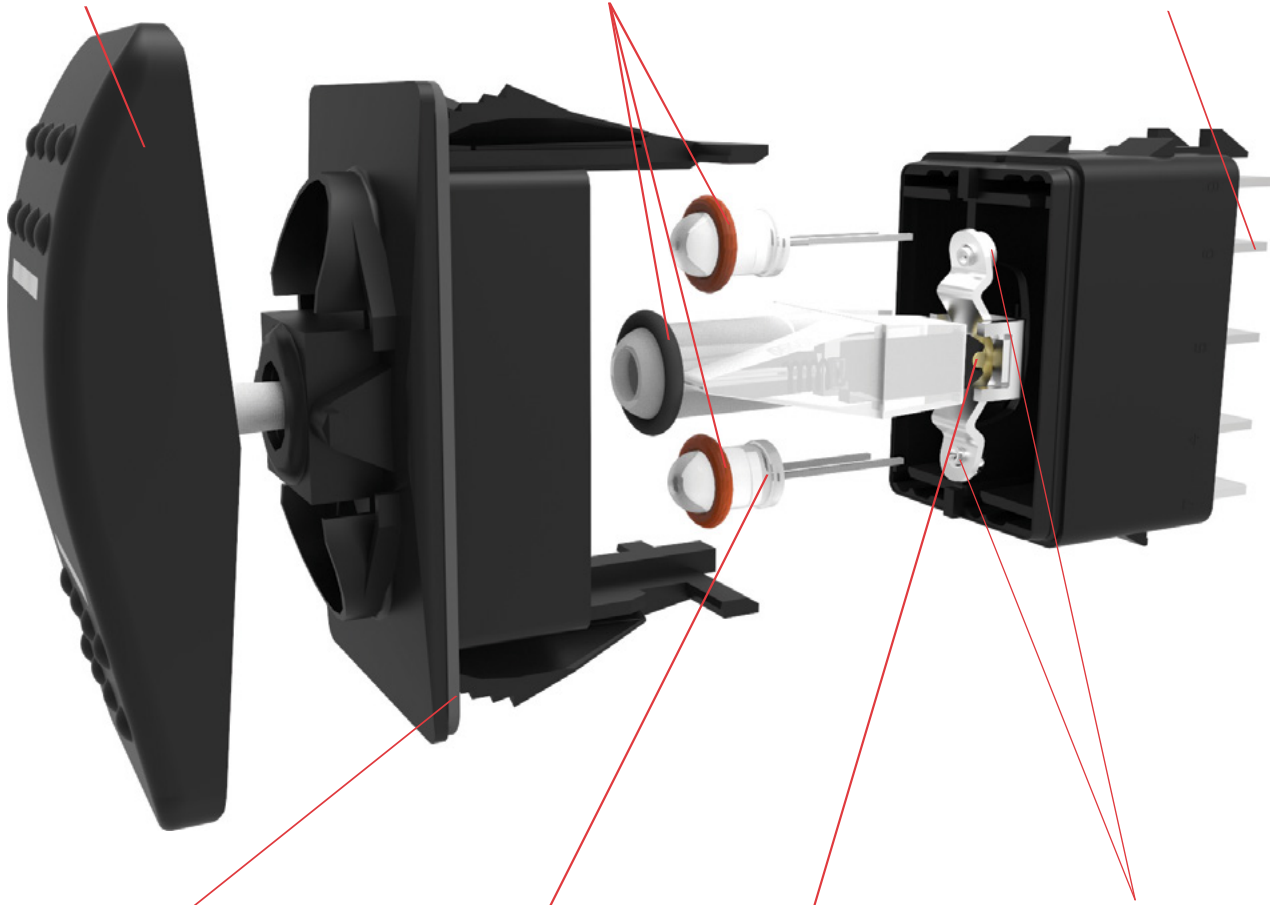
Panel redesign is a snap with our wide range of rocker styles. Achieve maximum design variety with minimum inventory. Simply swap rockers to create an entirely new look for your panel.

DUAL SEAL PROTECTION

Seals out water, dust, debris, and enables switch certification to IP66 for front panel components.

CLEAN CONNECTIONS

Options for both eight and ten terminal base styles with AMP & Packard compatible connectors affords myriad circuit options while providing ease of assembly.



OPTIONAL PANEL SEAL

Prevents water/dust ingress behind panel.

MULTIPLE LIGHTING OPTIONS

In addition to Incandescent lamps, our LED illumination is offered in a wide array of light intensities, colors, as well as dual level, tri-color, and flashing options.

BRASS ROLLER PIN

Robust mechanism eliminates the need for lubricants. Enables switch to withstand -40°C to +85°C temperatures.

SILVER PLATED BUTT CONTACT MECHANISM

Providing 50k to 100k electrical cycles and a variety of different electrical ratings.

Contura II & III



The Contura II & III actuators are constructed of thermoplastic polycarbonate and are offered with a hard nylon overlay or a "soft-touch" elastomer overlay. These models incorporate aesthetic designs on the top and bottom of the rocker featuring two rows of raised "bumps" on the Contura II and three "indented" lines on the Contura III.

Contura X



The raised bracket/bezel on the Contura X helps prevent inadvertent actuation of the rocker, as well as preventing debris from being trapped under the actuator. This curved rocker style is available with a variety of lenses and legends.

Contura IV



The Contura IV's "Shape to create a Shape" actuator works with the curves, contours & advanced styling of the latest panel designs, flowing with these advanced curves & radii. This actuator style fits on the Contura flush bracket/bezel.

Contura XI



The raised bracket/bezel on the Contura XI helps prevent inadvertent actuation of the rocker, as well as preventing debris from being trapped under the actuator. This convex style rocker is available with a wide variety of lenses and legends.

Contura V



The symmetrically curved Contura V actuator provides the perfect complement to the Contura IV's "Shape to create a Shape" design concept. With its flush style mounting bracket, Contura V can be mounted in between two Contura IV's, by itself, or in groups.

Contura XII



The Contura XII version features a paddle style actuator with the raised bracket/bezel of Contura X and XI. The contoured handle design provides intuitive recognition and ease of operation and is available with all Contura X and XI lens and legend offerings.

Contura VI (WAVE)



The Contura VI WAVE sealed rocker switches, when used in a row, create an uniquely appealing "wave" design on your panel. A variety of colors and finishes are available for both rocker and wave insert. Contura VI features bar and oval lenses.

Contura XIV



The Contura XIV represents a sleek new crossover rocker design which should appeal to Trucks, Buses and Heavy Vehicles as well as the Marine Industry. Intuitive feel is provided by recessed ridges along with a Center Groove which effectively defines the boundary between top and bottom switch functions.

Contura VII



Contura VII featuring gently curved corners and edges assuring compatibility with most any panel design. Intuitive feel is maximized by the use of 2 embossed circular pads located at opposite ends of the rocker. Any combination of Bar or Oval style lenses can be located in the pads providing a truly unique look, exclusive to Contura VII.

Illuminated Indicators & Accessories



Alert operator of systems functions or malfunctions, are offered with removable/replaceable lamps in Contura II, II, V or X styles. Accessories include connectors, mounting panels, hole plugs, panel seals, and actuator removal tools. Refer to accessories page for full details

Electrical

Contact Rating	.4VA @ 24VDC (MAX) resistive 15 amps, 125VAC 10 amps, 250VAC 1/2 HP 125-250VAC 20 amps, 4-14VDC 15 amps, 15-28VDC 10A, 14VT 6A, 125VAC L
Dielectric Strength	1500 Volts RMS
Insulation Resistance	50 Megohms
Initial Contact Resistance	10 milliohms max. @ 4VDC
Life	50,000 - 100,000 cycles circuit dependent
Contacts	Silver alloy, silver tin-oxide, fine silver
Terminals	Brass or copper/silver plate 1/4" (6.3mm) Quick Connect terminations standard. Solder lug, Wire Lead

Mechanical

Endurance	150,000 cycles minimum circuit dependent
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Physical

Lighted	Incandescent - rated 10,000 hours Neon - rated 25,000 hours LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC)
Seals	Internal
Base	Optional external gasket panel seal Polyester blend rated to 125°C with a UL flammability rating of 94V0.
Contura II,III,IV,V, VI, VII Actuator	Hard Surface: Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay. Soft Surface: Basic actuator structure molded of thermoplastic polycarbonate with an elastomer overlay.
Contura X,XI,XII Actuator,VP	Nylon 66 Reinforced rated to 105°C
Lens	Polycarbonate rated at 100°C
Contura XIV	Polycarbonate lens/sub-rocker with ABS shell

Actuator Travel (Angular Displacement)

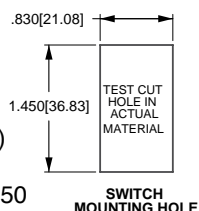
2 position	18°
3 positions	9° from center

Mounting Specifications

Panel Thickness Range

Gaskets	Acceptable Panel Thickness
0	.030 to .250 (.76 to 6.35mm)
1	.030 to .109 & .147 to .157 (.76 to 2.77mm & 3.73 to 3.98mm)

Recommended: No gasket with panel thickness of .032, .062, .093, .125, .187 or .250



Agency Certifications



Environmental

Sealing	Sealed version: IP66, this rating applies to front panel components of the actual switch only, and signifies complete protection against dust as well as powerful jets of water.
Corrosion	Mixed Flowing Gas (MFG) Class III 3 year accelerated exposure per ASTM B-827, B-845 Silver and gold contacts
Operating Temp.	-40°C to +85°C
Vibration 1	Per Mil-Std 202F, Method 204D Test Condition A 0.06 DA or 10G's 10-500 Hz. Tested with VCH connector. Test criteria - No loss of circuit during test, pre and post test contact resistance.
Vibration 2	Resonance search 24-50 Hz 0.40 DA 50-2000 Hz ±10 G's peak Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025 No loss of circuit during test; <10µ seconds chatter.
Shock	Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre and post test contact resistance.
Salt Spray	Per Mil-Std 202F, Method 101D, Test Condition A, 96 Hrs. Sealed version only.
Dust	Per Mil-Std 810C, Method 510.2 Air Velocity 300 ±200 Feet/Min, Test Duration 16 Hrs.
Thermal Shock	Per Mil-Std 202F, Method 107F, Test Cond. A, -55°C to +85°C. Test criteria - pre and post test contact resistance
Moisture Resistance	Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance
Ignition Protection	All Contura switches with sealed construction meet the requirements of UL1500/ISO8846 for ignition protection, in addition to conformance with EC directive 94/25/EC for marine products.

V 1 D A B T O B - A R B 00 - 0 00

1 Series 2 Circuit 3 Rating 4 Termination 5 Illumination 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Color 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES
V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. 8 - -7 8 - -7 Terminals 7, 8, 9 & 10 for lamp circuit only. 1 - -4 1 - -4 2 - -5 2 - -5 3 - -6 3 - -6 10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
1 A	ON	NONE	OFF
2 B	(ON)	NONE	OFF
3 C	ON	NONE	(OFF)
4 D	ON	NONE	ON
5 F	ON	NONE	(ON)
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

	2 & 3	2 & 3, 5 & 4	5 & 4
H*	2 & 3	2 & 3, 5 & 4	5 & 4
G*	2 & 3, 5 & 6	2 & 3	OFF
S*	2 & 3, 5 & 6	2 & 3	1 & 2
M*	(2 & 3, 5 & 6)	2 & 3	OFF
R*	(2 & 3, 5 & 6)	2 & 3	2 & 1
E*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 3

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
A	1	1	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
		2	DOWN	1 (+) 7 (-)
E	5	1	UP	1 (+) 7 (-)
		2	UP	3 (+) 7 (-)
F	6	1	INDEPENDENT	8 (+) 7 (-)
		2	UP	3 (+) 6 (-)
G	7	1	INDEPENDENT	8 (+) 7 (-)
		2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)
U	Y	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY				
J	8	1	DOWN	3 (+) 8 (-)
		2	INDEPENDENT	6 (+) 7 (-)
K	W	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
		2	DOWN	1 (+) 4 (-)
P	V	1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

6,7 LAMP (SAME CODING FOR BOTH SELECTIONS)

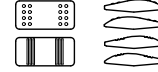
Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6
 No lamp 0
 Neon 1 125VAC 2 250VAC
 Incandescent 4 3V 5 6V
 LED* 6 12V superbright 7 18V superbright 8 24V superbright
 2VDC Red A Amber L Green F
 6VDC B M 12VDC N H 24VDC D P J
 * Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

No Seal	Black	White	Gray
One Seal	B	W	G
	C	Y	H

9 ACTUATOR

0 No Actuator
 A, B Contura II
 C, D Contura III



Actuator orientation above terminals: 3.6 1.4

10 LENS

0 - No Actuator	Z - No Lens	Blue
Clear White Amber Green Red	G M T	
1 6 8	H N U	
2 7 C	J P V	
3 8 D	K R W	
4 9 E	L S Y	

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR COLOR 1 AND TEXTURE

0 - No Actuator	Black	Gray	Red	White
Soft Surface	B	G	R	W
Hard Surface	C	H	S	Y

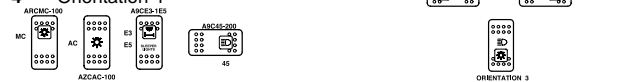
12 ACTUATOR LENS OR BODY LEGENDS 2

11 ON	12 OFF	13 I	14 O
OFF	ON	O	I
15 O O	16 O O	17 O I	18 I O
F N	N F	F	F

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0 No legend (used with codes 11-18 in selection 12)
 1 Orientation 1
 2 Orientation 2
 3 Orientation 3
 4 Orientation 4



14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- Body legends not available on Soft surface actuators; White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Additional ratings available. See V-Series Switch Accessories page.
- Contura II available with two square lenses. Consult factory for details.

V 1 D A S W O B - A Z E 00 - 0

1 Series 2 Circuit 3 Rating 4 Termination Illumination Lock 5 Lamp 6 Bracket 7 Actuator 8 Lens 9 Function 10 Legend 11 Legend 12 Legend 13 Legend Orientation

1 SERIES
V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected	Terminals 1 & 2, 4 & 5
1 A	ON	NONE	OFF
4 D	ON	NONE	ON
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)
9 N	OFF	NONE	ON

SPECIAL CIRCUITS

	2 & 3	2 & 3, 5 & 4	5 & 4
H*	2 & 3	2 & 3, 5 & 4	5 & 4
G*	2 & 3, 5 & 6	2 & 3	OFF
S*	2 & 3, 5 & 6	2 & 3	1 & 2
M*	(2 & 3, 5 & 6)	2 & 3	OFF
R*	(2 & 3, 5 & 6)	2 & 3	2 & 1
E*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

- 1 .4VA @ 28VDC Resistive
- B 15A 24V
- C 20A 18V
- D 20A 12V
- E 20A 14V, 10A 14VT (circuit 1, 4, A & D only)
- F 10A 14V, 6A 14VT (circuit G only)
- M .4VA/20A 12V
- N .4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
C	3	2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)

DOUBLE POLE SWITCHES ONLY

M	R	1	UP	3 (+) 6 (-)
---	---	---	----	-------------

6 LOCK

Lock above terminals 1 & 4 end of switch
W lock

7 LAMP

Lamp above terminals 3 & 6 end of switch

No lamp	0	2 250VAC	7 18V superbright Red	8 24V superbright Red
Neon	1 125VAC	5 6V	6 12V superbright Green	
Incandescent LED*	4 3V			
2VDC	A	Red	Amber	
6VDC	B			
12VDC	C			
24VDC	D			

*Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

	Black	White	Gray
No Seal	B	W	G
One Seal	C	Y	H

9 HARD SURFACE ACTUATOR 1

	Black	Gray	Red	White
Contura II	A	B	G	H
Contura III	C	D	E	F

Actuator orientation above terminals:
3.6 1.4

10 LENS

Z - No Lens	Clear White	Amber	Green	Red	Blue
3	8	D	J	P	V

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR LOCK FUNCTION AND COLOR 1

Lock Color	Up	Down	Up & Down	Center 3
Match Actuator	A	H	R	1
Black	B	J	S	2
White	C	K	T	3
Red	D	L	V	4
Safety Orange	E	M	W	5

12 ACTUATOR LENS OR BODY LEGEND 2

00 - No Legend				
21 OFF	22 ON	23 O	24 I	
25 O	26 O	27 O	28 I	
F	N			

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0	No legend (used with codes 21-28 in selection 12)
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Only available with 3 position circuits. Center OFF and special circuits only available with center position lock function.
- Additional ratings available. See V-Series Switch Accessories page.

V 1 D A B T O B - E P C 00 - 0 00

1 Series 2 Circuit 3 Rating 4 Termination Illumination Lamp 5 Lamp 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Color 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES

V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. 8 - -7 8 - -7 Terminals 7, 8, 9 & 10 for lamp circuit only.
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected	Terminals 1 & 2, 4 & 5
1 A	ON	NONE	OFF
2 B	(ON)	NONE	OFF
3 C	ON	NONE	(OFF)
4 D	ON	NONE	ON
5 F	ON	NONE	(ON)
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

H*	2 & 3	2 & 3, 5 & 4	5 & 4
G*	2 & 3, 5 & 6	2 & 3	OFF
S*	2 & 3, 5 & 6	2 & 3	1 & 2
M*	(2 & 3, 5 & 6)	2 & 3	OFF
R*	(2 & 3, 5 & 6)	2 & 3	2 & 1
E*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
A	1	1	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
E	5	1	DOWN	1 (+) 7 (-)
F	6	2	UP	1 (+) 7 (-)
G	7	1	INDEPENDENT	3 (+) 7 (-)
H	Z	2	UP	3 (+) 6 (-)
U	Y	2	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY				
J	8	1	DOWN	3 (+) 8 (-)
K	W	2	INDEPENDENT	6 (+) 7 (-)
		1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
		2	DOWN	1 (+) 4 (-)
P	V	1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

6.7 LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	0				
Neon	1 125VAC	2 250VAC			
Incandescent	4 3V	5 6V	6 12V superbright	7 18V superbright	8 24V
LED*			Green	Red	
2VDC	A	L	F	R	
6VDC	B	M	G	S	
12VDC	C	N	H	T	
24VDC	D	P	JV		

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

No Seal	Black	White	Gray
One Seal	B	W	G
	C	Y	H

9 ACTUATOR

0	No Actuator	
E	Contura IV, left orientation	
T	Contura IV, left orientation, laser etched	
F	Contura IV, right orientation	
R	Contura IV, right orientation, laser etched	
	Actuator orientation above terminals:	

10 LENS

0	No Actuator	Z	No Lens		
	Clear White	Amber	Green	Red	Blue
1	6	8	G	M	T
2	7	C	H	N	U
3	8	D	J	P	V
4	9	E	K	R	W
5	A	F	L	S	Y

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR COLOR 1,5,6

No Actuator	0	Black	C	Gray	H	Red	S
White	Y	Nickel	D	Pewter	E		

12 ACTUATOR LENS OR BODY LEGENDS 2

11	ON	12	OFF	13	I	14	O
	OFF		ON		O		I
15	O O	16	O O	17	O I	18	I O
	F N		N F		F		
	F		F				

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0	No legend (used with codes 11-18 in selection 12)	
1	Orientation 1	
2	Orientation 2	
3	Orientation 3	
4	Orientation 4	

14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Gloss brow is on left side of E actuator and right side of F actuator.
- Additional ratings available. See V-Series Switch Accessories page.
- Laser etched rocker only available with lens code Z & actuator colors black, nickel or pewter.
- Pewter and nickel colors only available with laser etched actuator.

V 1 D A B T O B - G P C 00 - 0 00

1 Series 2 Circuit 3 Rating 4 Termination Illumination 5 Lamp 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Color 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES

V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. 8 - -7 8 - -7 Terminals 7, 8, 9 & 10 for lamp circuit only. 1 - -4 1 - -4 2 - -5 2 - -5 3 - -6 3 - -6 10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
1 A	ON	NONE	OFF
2 B	(ON)	NONE	OFF
3 C	ON	NONE	(OFF)
4 D	ON	NONE	ON
5 F	ON	NONE	(ON)
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

	2 & 3	2 & 3, 5 & 4	5 & 4
H*	2 & 3	2 & 3	OFF
G*	2 & 3, 5 & 6	2 & 3	1 & 2
S*	2 & 3, 5 & 6	2 & 3	OFF
M*	(2 & 3, 5 & 6)	2 & 3	2 & 1
R*	(2 & 3, 5 & 6)	2 & 3	5 & 1
E*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
A	1	1	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
		2	DOWN	1 (+) 7 (-)
E	5	1	UP	1 (+) 7 (-)
		2	UP	3 (+) 7 (-)
F	6	1	INDEPENDENT	8 (+) 7 (-)
		2	UP	3 (+) 6 (-)
G	7	1	INDEPENDENT	8 (+) 7 (-)
		2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)
U	Y	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY				
J	8	1	DOWN	3 (+) 8 (-)
		2	INDEPENDENT	6 (+) 7 (-)
K	W	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
		2	DOWN	1 (+) 4 (-)
P	V	1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

6,7 LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	0				
Neon	1 125VAC	2 250VAC			
Incandescent	4 3V	5 6V	6 12V	7 18V	8 24V
LED*			superbright	superbright	
	Red	Amber	Green	Red	
2VDC	A	L	F	R	
6VDC	B	M	G	S	
12VDC	C	N	H	T	
24VDC	D	P	J	V	

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

No Seal	Black	White	Gray
One Seal	B	W	G
	C	Y	H

9 ACTUATOR

0	No Actuator
G	Contura V
P	Contura V, laser etched

10 Lens

0 - No Actuator Z - No Lens style & location: #1 / #2

Clear	White	Amber	Green	Red	Blue	
1	6	8	G	M	T	bar
2	7	C	H	N	U	bar/bar
3	8	D	J	P	V	oval
4	9	E	K	R	W	oval/bar
5	A	F	L	S	Y	oval/oval

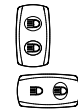
Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR COLOR 1,3,5

No Actuator	0	Black	C	Gray	H	Red	S
White	Y	Nickel	D	Pewter	E		

12 ACTUATOR LENS OR BODY LEGENDS 2,6

11 ON	12 OFF	13 I	14 O
OFF	ON	O	I
15 O O	16 O O	17 O I	18 I O
F N	N F		
F	F		

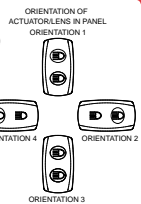
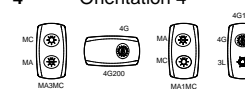


For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0 No legend (used with codes 11-18 in selection 12)

1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4

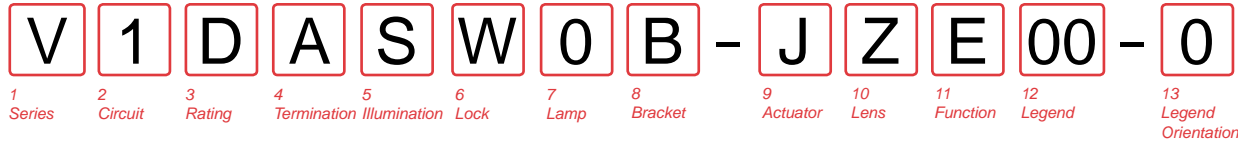


14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- 1 Consult factory to verify horsepower rating for your particular circuit choice.
- 2 Custom colors are available. Consult factory.
- 3 White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- 4 Laser Etched rocker only available with lens code Z & actuator colors black, nickel or pewter.
- 5 Additional ratings available. See V-Series Switch Accessories page.
- 6 Nickel and Pewter colors only available with laser etched actuator.
- 7 Consult factory for laser etched lens callout.



1 SERIES
V

2 CIRCUIT³
Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7	8 - -7	Terminals 7, 8, 9 & 10 for lamp circuit only.	
1 - -4	1 - -4		
2 - -5	2 - -5		
3 - -6	3 - -6		
	10 - -9		

Position:

SP DP	1	2	3
4 A	ON	NONE	OFF
1 D	ON	NONE	ON
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)
9 N	OFF	NONE	ON

3 RATING⁴

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING
Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
C	3	2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
M	R	1	UP	3 (+) 6 (-)

6 LOCK
Lock above terminals 1 & 4 end of switch.
W low profile lock **Y 6** high profile lock

- Notes:
Consult factory to verify horsepower rating for your particular circuit choice.
- 1 Custom colors are available. Consult factory.
 - 2 White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
 - 3 Only available with 3 position circuits. Center OFF and special circuits only available with center position lock function.
 - 4 Additional ratings available. See V-Series Switch Accessories page.
 - 5 Located at T3-6 end of switch.
 - 6 Contura V style only.

7 LAMP
Lamp above terminals 3 & 6 end of switch

No lamp	0				
Neon	1 125VAC	2 250VAC			
Incandescent	4 3V	5 6V			
LED*			6 12V superbright Green	7 18V superbright Red	8 24V superbright Red
2VDC	A Red	L Amber	F Green	R Red	
6VDC	B	M	G	S	
12VDC	C	N	H	T	
24VDC	D	P	J	V	

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR¹, PANEL SEAL

No Seal	Black B	White W	Gray G
One Seal	C	Y	H

9 HARD SURFACE ACTUATOR
CONTURA IV:
Orientation: Black (J), Gray (K), Red (L), White (M)
Left (N), Right (P)
CONTURA V:
Orientation: Black (U), Gray (V), Red (W), White (Y)

Actuator orientation above terminals: 3, 6, 1, 4

10 LENS⁵
Z - No Lens
Clear White Amber Green Red Blue
A B C D E F bar lens
G H J K L M oval lens

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR LOCK FUNCTION AND COLOR¹

Lock Color	Up	Down	Up & Down	Center ³
Match Actuator	A	H	R	1
Black	B	J	S	2
White	C	K	T	3
Red	D	L	V	4
Safety Orange	E	M	W	5
Gray	F	G	N	6

12 ACTUATOR LENS OR BODY LEGEND²

00 - No Legend				
21	22	23	24	
OFF	ON	O	I	
25	26	27	28	
O	O	O	I	
F	N			

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0	No legend
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4

V	1	D	B	G	N	T	B	-	H	A	7	C	B	AC	-	1	00
1 Series	2 Circuit	3 Rating	4 Termination	5 Illumination	6 Lamp	7 Lamp	8 Bracket	9 Actuator	10 Lens	11 Lens	12 Color	13 Insert Color	14 Actuator Lens	15 Legend Orientation	16 Actuator Lens Legend		

1 SERIES
V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 terminal	10 terminal
8 - - 7	8 - - 7
1 - - 4	1 - - 4
2 - - 5	2 - - 5
3 - - 6	3 - - 6
	10 - - 9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
1 A	ON	NONE	OFF
2 B	(ON)	NONE	OFF
3 C	(ON)	NONE	(OFF)
4 D	ON	NONE	ON
5 F	ON	NONE	(ON)
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

H*	2 & 3	2 & 3, 5 & 4	5 & 4
G*	2 & 3, 5 & 6	2 & 3	OFF
S*	2 & 3, 5 & 6	2 & 3	1 & 2
M*	(2 & 3, 5 & 6)	2 & 3	OFF
E*	(2 & 3, 5 & 6)	2 & 3	2 & 1
R*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 3

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
A	1	1	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
E	5	2	DOWN	1 (+) 7 (-)
F	6	1	UP	1 (+) 7 (-)
G	7	2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)
U	Y	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY				
J	8	1	DOWN	3 (+) 8 (-)
K	W	1	INDEPENDENT	6 (+) 7 (-)
		1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
		2	DOWN	1 (+) 4 (-)
P	V	1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

7 LAMP

Lamp above terminals 3 & 6 end of switch

No lamp	0					
Neon	1 125VAC	2 250VAC				
Incandescent LED*	4 3V	5 6V	6 12V superbright	7 18V superbright	8 24V superbright	
	Red	Amber	Green	Red		
2VDC	A	L	F	R		
6VDC	B	M	G	S		
12VDC	C	N	H	T		
24VDC	D	P	J	V		

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

No Seal	B Black	W White	G Gray
One Seal	C	Y	H

9 ACTUATOR

0 No Actuator	H High Insert	L Low Insert
---------------	---------------	--------------

10,11 LENS 4

0 - No Actuator	Z - No Lens				
Clear	White	Amber	Green	Red	Blue
- 7	C	H	N	U	Bar Lens Translucent
3 -	D	J	P	V	Bar Lens Transparent
4 -	E	K	R	W	Oval Lens Transparent
- A	F	L	S	Y	Oval Lens Translucent

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

12 ACTUATOR COLOR

C Black	H Gray	S Red	Y White
---------	--------	-------	---------

13 INSERT COLOR

B Black	N Bright Nickel Plated
C Bright Chrome Plated	S Satin Chrome Plated
D Satin Chrome Painted	T Satin Nickel Plated
	W White

14 ACTUATOR LENS OR BODY LEGENDS 2

00 - No Legend this location/No actuator	
11 ON 12 OFF 13 I 14 O	
OFF ON O I	
15 O O 16 O O 17 O I 18 I O	
F N N F	
F F	

For additional legend options & codes, visit us at www.carlingtech.com.

15 LEGEND ORIENTATION

0	No legend (used with codes 11-18 in selection 12)
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4



16 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators. Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Additional ratings available. See V-Series Switch Accessories page.

V 1 D A B T O B - Z R C 00 - 0 00

1 Series 2 Circuit 3 Rating 4 Termination 5 Illumination 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Color 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES
V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:

SP	DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
1 A	ON	(ON)	NONE	OFF
2 B	ON	(ON)	NONE	OFF
3 C	ON	(ON)	NONE	OFF
4 D	ON	(ON)	NONE	OFF
5 F	ON	(ON)	NONE	OFF
6 J	ON	(ON)	OFF	ON
7 K	ON	(ON)	OFF	ON
8 L	ON	(ON)	OFF	ON

SPECIAL CIRCUITS

H*	G*	S*	M*	R*	E*
2 & 3	2 & 3, 5 & 6	2 & 3, 5 & 6	(2 & 3, 5 & 6)	(2 & 3, 5 & 6)	5 & 6
2 & 3, 5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4
5 & 4	2 & 3	2 & 3	2 & 3	2 & 3	5 & 4

*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

1 .4VA @ 28VDC Resistive
B 15A 24V
C 20A 18V
D 20A 12V
E 20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F 10A 14V, 6A 14VT (circuit G only)
M .4VA/20A 12V
N .4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1 A	2 B	.250 TAB (QC) no barriers	No
2 J	3 K	.250 TAB (QC) with barriers	No
3 C	4 L	.250 TAB (QC) no barriers	Yes T2 to 5
4 D	5 M	Solder Lug no barriers	No
5 E	6 N	Solder Lug	No
6 F	7 O	Wire Leads no barriers	No
7 G	8 P	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
A	1	NONE	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
E	5	2	DOWN	1 (+) 7 (-)
F	6	1	UP	1 (+) 7 (-)
G	7	2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)
U	Y	2	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY				
J	8	1	DOWN	3 (+) 8 (-)
K	W	2	INDEPENDENT	6 (+) 7 (-)
		1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY				
L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
		2	DOWN	1 (+) 4 (-)
P	V	1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

6,7 LAMP (same coding for both selections)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	0	1 125VAC	2 250VAC	6 12V superbright Green	7 18V superbright Red	8 24V superbright Red
Incandescent LED*	4 3V	5 6V				
2VDC	A Red	L Amber	F Green	R Red		
6VDC	B	M	G	S		
12VDC	C	N	H	T		
24VDC	D	P	J	V		

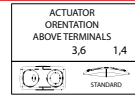
* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

No Seal	Black	White	Gray
One Seal	B	W	G
	C	Y	H

9 ACTUATOR

0 No Actuator
Z Contura VII



10 LENS

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

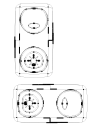
White	Amber	Green	Red	Blue	U	Y	V	W	X	Z
6 B	C	D	E	F	G	H	I	J	K	L
7 C	D	E	F	G	H	I	J	K	L	M
8 D	E	F	G	H	I	J	K	L	M	N
9 E	F	G	H	I	J	K	L	M	N	O
A F	G	H	I	J	K	L	M	N	O	P
1 2	3	4	5							

11 ACTUATOR COLOR/THUMB PRINT COLOR 1

0 N/A - No Actuator
H Grey/Black
Y White/Black
C Black/Black
S Red/Black

14 ACTUATOR LENS OR BODY LEGENDS 2

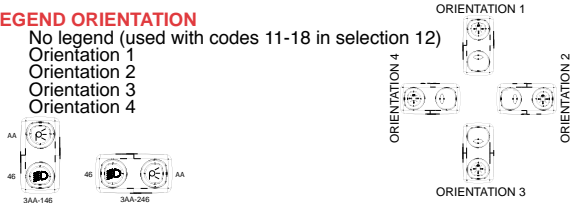
11 ON 12 OFF 13 I 14 O
OFF ON O I
15 O O 16 O O 17 O I 18 I O
F N F
F F



For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION

0 No legend (used with codes 11-18 in selection 12)
1 Orientation 1
2 Orientation 2
3 Orientation 3
4 Orientation 4



14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- 1 Custom colors are available. Consult factory.
- 2 White imprinting is standard on black actuators. Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- 3 Additional ratings available. See V-Series Switch Accessories page.
- 4 Legends available for lighted oval lens version only

V 1 D A B 6 0 1 - 6 P Z 00 - 0 00

1 Series 2 Circuit 3 Rating 4 Termination Illumination Lamp 5 Lamp 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Lens 12 Legend 13 Legend 14 Actuator Orientation Lens Legend

1 SERIES
V

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
1 A	ON	NONE	OFF
2 B	(ON)	NONE	OFF
3 C	ON	NONE	(OFF)
4 D	ON	NONE	ON
5 F	ON	NONE	(ON)
6 J	ON	OFF	ON
7 K	ON	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

	2 & 3	2 & 3, 5 & 4	5 & 4
H*	2 & 3	2 & 3, 5 & 4	5 & 4
G*	2 & 3	2 & 3, 5 & 4	OFF
M*	2 & 3, 5 & 6	2 & 3, 5 & 4	1 & 2
S*	2 & 3, 5 & 6	2 & 3, 5 & 4	2 & 1
E*	5 & 6	5 & 3	5 & 1

*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

1	.4VA @ 28VDC Resistive
B	15A 24V
C	20A 18V
D	20A 12V
E	20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F	10A 14V, 6A 14VT (circuit G only)
M	.4VA/20A 12V
N	.4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) no barriers	No
A	B	.250 TAB (QC) with barriers	No
J	K	.250 TAB (QC) no barriers	Yes T2 to 5
3	5	Solder Lug no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
A	1	1	INDEPENDENT	8 (+) 7 (-)
B	2	1	DOWN	3 (+) 7 (-)
C	3	2	UP	3 (+) 7 (-)
D	4	1	DOWN	3 (+) 7 (-)
E	5	1	UP	1 (+) 7 (-)
F	6	2	UP	3 (+) 7 (-)
G	7	1	INDEPENDENT	8 (+) 7 (-)
H	Z	2	UP	3 (+) 7 (-)
U	Y	1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	10 (+) 9 (-)

SINGLE POLE SWITCHES ONLY

J	8	1	DOWN	3 (+) 8 (-)
K	W	2	INDEPENDENT	6 (+) 7 (-)
		1	INDEPENDENT	8 (+) 7 (-)
		2	INDEPENDENT	6 (+) 7 (-)

DOUBLE POLE SWITCHES ONLY

L	9	1	DOWN	3 (+) 6 (-)
M	R	1	UP	3 (+) 6 (-)
N	T	1	DOWN	3 (+) 6 (-)
P	V	2	DOWN	1 (+) 4 (-)
		1	UP	1 (+) 4 (-)
		2	UP	3 (+) 6 (-)

6,7 LAMP (same coding for both selections)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	0				
Neon	1 125VAC	2 250VAC			
Incandescent LED*	4 3V	5 6V	6 12V	7 18V	8 24V
	Red	Amber	Green	superbright	superbright
2VDC	A	L	F	R	
6VDC	B	M	G	S	
12VDC	C	N	H	T	
24VDC	D	P	J	V	

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.


8 BRACKET COLOR 1, PANEL SEAL (EXTERNAL FOAM GASKET)

X & XI with Flush Bracket X, XI, XII with Raised Bracket

# of gaskets	0	1	2	0	1
Black	B	C	D	1	4
White	W	Y	Z	2	5
Gray	G	H	J	3	6

9 ACTUATOR

No Actuator	0				
Contura X	1	Black	Gray	White	Red
Contura XI	6	2	7	8	9
Contura XII	J	K	N	M	

Actuator orientation above terminals: 

10 LENS - ABOVE LAMP #1 TERMINALS 1,4

11 LENS - ABOVE LAMP #2 TERMINALS 3,6

0 - No Actuator	Z - No Lens	Clear	White	Amber	Green	Red	Blue	Lens Style
3	8	D	J	P	V	Bar		
4	9	E	K	R	W	One piece Square		
5	A	F	L	S	Y	Two piece Square*		(With clear top protective lens)
2	7	C	H	N	U	Two piece Square*		(With smoke top protective lens)
1	6	B	G	M	T	Two piece Square*		(With white top protective lens)

* All bottom lenses are molded of opaque material. Consult factory for other lens colors. Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

12 ACTUATOR LENS OR BODY LEGEND 2

00 - No Legend this location/No actuator				
11 ON	12 OFF	13 I	14 O	
OFF	ON	O	I	
15 O O	16 O O	17 O I	18 I O	
F N	N F			
F F				
21 OFF	22 ON	23 O	24 I	
F F	N N			
25 O	26 O	27 O	28 I	
F F				

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION 3

0	No legend (used with codes 11-18 in selection 12)
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4

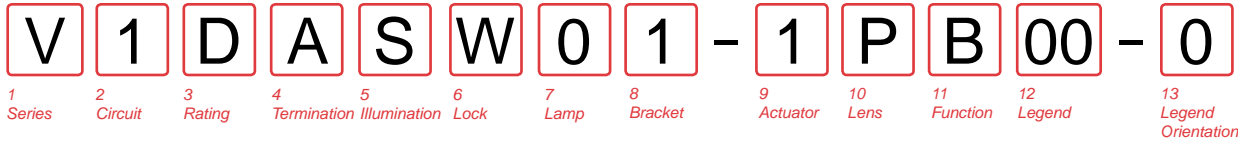


14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at www.carlingtech.com.

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red & gray actuators. Custom colors are available, consult factory.
- With 2 square lenses, use selection 12 for lens above lamp 1, & selection 14 for lens above lamp 2.
- Additional ratings available. See V-Series Switch Accessories page.
- Not available with Contura XI rockers.



1 SERIES
V

2 CIRCUIT
Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:

SP DP	1	2	3
1 A	ON	NONE	OFF
4 D	ON	NONE	ON
6 J	ON	OFF	ON
9 N	OFF	NONE	ON

SPECIAL CIRCUITS

H*	G*	S*	E*
2 & 3	2 & 3, 5 & 6	2 & 3, 5 & 6	5 & 6
2 & 3, 5 & 4	2 & 3	2 & 3	5 & 3
5 & 4	OFF	1 & 2	5 & 1

*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 4

1 .4VA @ 28VDC Resistive
B 15A 24V
C 20A 18V
D 20A 12V
E 20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F 10A 14V, 6A 14VT (circuit G only)
M .4VA/20A 12V
N .4VA/15A 24V

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1 A	2 B	.250 TAB (QC) no barriers	No
J	K	.250 TAB (QC) with barriers	No
3 C	5 D	.250 TAB (QC) no barriers	Yes T2 to 5
C	D	Solder Lug	No
5 E	6 F	Wire Leads no barriers	No
E	F	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION & SWITCH SEALING
Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Sealed	Unsealed	Lamps	Illumination Type	Lamp wired to Terminals
S	0	NONE	-	-
C	3	2	UP	3 (+) 7 (-)
H	Z	2	INDEPENDENT	8 (+) 7 (-)

DOUBLE POLE SWITCHES ONLY

M	R	1	UP	3 (+) 6 (-)
---	---	---	----	-------------

6 LOCK
Lock above terminals 1 & 4 end of switch.
W Lock

Notes:
Consult factory to verify horsepower rating for your particular circuit choice.

- 1 Custom colors are available. Consult factory.
- 2 White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators; Custom colors are available, consult factory.
- 3 Located over T1-4 end of switch.
- 4 Additional ratings available. See V-Series Switch Accessories page.
- 5 Located over T3-6 end of switch.

6,7 LAMP (same coding for both selections)
Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	0				
Neon	1	125VAC	2	250VAC	
Incandescent	4	3V	5	6V	
LED*			6	12V superbright	7 18V superbright
				Green	Red

2VDC Red A Amber L F Green R
6VDC Blue B Amber M G Red S
12VDC Black C Amber N H Red T
24VDC White D Amber P J Red V

* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 FLUSH BRACKET COLOR 1, PANEL SEAL

	Black	White	Gray
No Gasket	1	2	3
One Gasket	4	5	6

9 HARD SURFACE ACTUATOR

Contura X	Black	Grey	Red	White
	1	2	3	4

Actuator orientation above terminals: 3,6 1,4

10 LENS - ABOVE LAMP #2 TERMINALS 5

Z - No Lens	Clear	White	Amber	Green	Red	Blue	Lens Style
3	8	D	J	P	V		Bar
4	9	E	K	R	W		One piece Square
5	A	F	L	S	Y		Two piece Square* (with clear top protective lens)
2	7	C	H	N	U		Two piece Square* (with smoke top protective lens)
1	6	B	G	M	T		Two piece Square* (with white top protective lens)

* All bottom lenses are molded of opaque material. Consult factory for other lens colors.
Lens color for LEDs must be clear, white, or match color of LED.
Green or blue lenses are not recommended with Neon lamps.

11 ACTUATOR LOCK FUNCTION AND COLOR 3

Lock Color	Up	Down	Up & Down
Match Actuator	A	H	R
Black	B	J	S
White	C	K	T
Red	D	L	V
Gray	E	M	W
Safety Orange	F	N	Y

12 ACTUATOR LENS OR BODY LEGEND 2

00 - No Legend

21 OFF	22 ON	23 O	24 I
25 O	26 O	27 O	28 I
F	N		

For additional legend options & codes, visit us at www.carlingtech.com.

13 LEGEND ORIENTATION 3

0 No legend (used with codes 11-18 in selection 12)

1 Orientation 1
2 Orientation 2
3 Orientation 3
4 Orientation 4

13DMC-1 1PMAF-1 45 18K45-2

V 1 D B B C 0 B - F A P C A B - 1 00

1 Series 2 Circuit 3 Rating 4 Termination Illumination 5 Lamp 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Actuator Color 12 Legend 13 Legend Orientation 14 Actuator, Lens Legends

1 SERIES
V

2 CIRCUIT
Terminal Connections as viewed () - momentary from bottom of switch:
8 terminal SP - single pole - uses terminals 1, 2 & 3.
10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6.
Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:

SP DP	1	2	3
1 A	2 & 3, 5 & 6	Connected	Terminals 1 & 2, 4 & 5
2 B	(ON)	NONE	OFF
3 C	(ON)	NONE	OFF
4 D	(ON)	NONE	(OFF)
5 F	(ON)	NONE	(ON)
6 J	(ON)	OFF	(ON)
7 K	(ON)	OFF	(ON)
8 L	(ON)	OFF	(ON)

SPECIAL CIRCUITS

	2 & 3	2 & 3, 5 & 6	5 & 4
H*	2 & 3	2 & 3, 5 & 6	5 & 4
G*	2 & 3, 5 & 6	2 & 3	OFF
M*	(2 & 3, 5 & 6)	2 & 3	OFF
R*	(2 & 3, 5 & 6)	2 & 3	2 & 1
E*	5 & 6	5 & 3	5 & 1
S*	2 & 3, 5 & 6	2 & 3	1 & 2

*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

3 RATING 3

1 .4VA @ 28VDC Resistive
B 15A 24V
C 20A 18V
D 20A 12V
E 20A 14V, 10A 14VT (circuit 1, 4, A & D only)
F 10A 14V, 6A 14VT (circuit G only)

4 TERMINATION / BASE STYLE

8 term	10 Term	Termination	Jumper
1 A	2 B	.250 TAB (QC) no barriers	No
2 J	3 K	.250 TAB (QC) with barriers	No
3 C	4 D	.250 TAB (QC) no barriers	Yes T2 to 5
4 E	5 F	Solder Lug no barriers	No
5 S	6 T	Solder Lug	No
6 U	7 V	Wire Leads no barriers	No
7 Y	8 Z	Wire Leads	No

Note: Codes J & K for circuits H, G & M.

5 ILLUMINATION
Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

S	Lamps	Illumination Type	Lamp wired to Terminals
A	NONE	INDEPENDENT	8 (+) 7 (-)
B	1	DOWN	3 (+) 7 (-)
C	2	UP	3 (+) 7 (-)
D	1	DOWN	3 (+) 7 (-)
E	2	DOWN	1 (+) 7 (-)
F	1	UP	1 (+) 7 (-)
G	2	UP	3 (+) 7 (-)
H	1	INDEPENDENT	8 (+) 7 (-)
I	2	UP	3 (+) 6 (-)
J	1	INDEPENDENT	8 (+) 7 (-)
K	2	UP	3 (+) 6 (-)
L	1	INDEPENDENT	8 (+) 7 (-)
M	2	UP	3 (+) 6 (-)
N	1	INDEPENDENT	8 (+) 7 (-)
O	2	UP	3 (+) 6 (-)
P	1	INDEPENDENT	8 (+) 7 (-)
Q	2	UP	3 (+) 6 (-)
R	1	INDEPENDENT	8 (+) 7 (-)
S	2	UP	3 (+) 6 (-)
T	1	INDEPENDENT	8 (+) 7 (-)
U	2	UP	3 (+) 6 (-)
V	1	INDEPENDENT	8 (+) 7 (-)
W	2	UP	3 (+) 6 (-)
X	1	INDEPENDENT	8 (+) 7 (-)
Y	2	UP	3 (+) 6 (-)
Z	1	INDEPENDENT	10 (+) 9 (-)

6 & 7 LAMP

No lamp	0	2 250VAC	7 18V superbright Red	8 24V superbright Red
Neon	1 125VAC	5 6V	6 12V superbright Green	
Incandescent LED*	4 3V			
2VDC	A	L	F	R
6VDC	B	M	G	S
12VDC	C	N	H	T
24VDC	D	P	J	V


* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

8 BRACKET COLOR & PANEL SEAL

Color	No Gasket	1 Gasket	2 Gasket
Black	B	C	D
Gray	G	H	J
White	W	Y	Z

9 ACTUATOR STYLE

0 No Actuator - Furnished separately
FA Contura XIV
FB Contura XIV - Laser Etched



10 LENS COLOR / STYLE

0 - No Actuator	Z - No Lens				
Clear	White	Amber	Green	Red	Blue
1	6	B	G	M	T
2	7	C	H	N	U
3	8	D	J	P	V
4	9	E	K	R	W
5	A	F	L	S	Y
5	A	N/A	N/A	N/A	N/A

Legend symbols: I (Illumination), T (Termination), U (Up), V (Down), W (Wire Leads), Y (Wire Leads), Z (Zener Diode)

Legend symbols: PAD Printed (square with 'I'), Laser-Etched (square with 'I')

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.


11 ACTUATOR COLOR 1

0 N/A - No Actuator
C Black
S Red
Y White

12 ACTUATOR LENS or BODY LEGEND 2

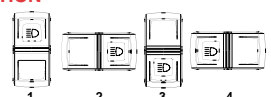
00 - No Legend this location/No actuator

11 ON	12 OFF	13 I	14 O
OFF	ON	O	I
15 O O	16 O O	17 O I	18 I O
F N	N F	F	F



13 LEGEND ORIENTATION

0 No legend
1 Orientation 1
2 Orientation 2
3 Orientation 3
4 Orientation 4



14 ACTUATOR / LENS LEGEND

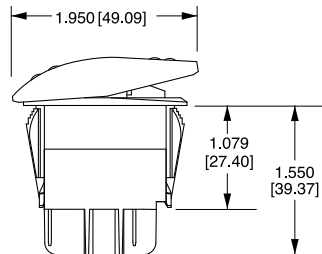
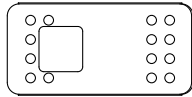
00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.
For legend options & codes, visit us at www.carlingtech.com.

Notes:
Consult factory to verify horsepower rating for your particular circuit choice.
1 Custom colors are available. Consult factory.
2 White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators.
3 Additional ratings available. See V-Series Switch Accessories page.

Dimensional Specifications: in. [mm]

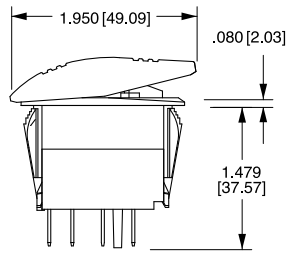
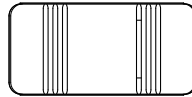
CONTURA II

SHOWN WITH SQUARE LENS



8 TERMINAL BASE W/BARRIERS

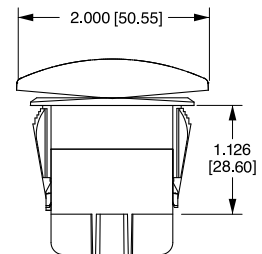
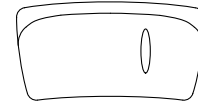
CONTURA III



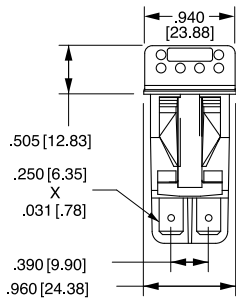
8 TERMINAL BASE W/O BARRIERS

CONTURA IV

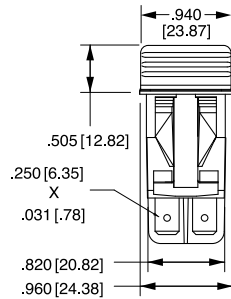
SHOWN WITH BAR LENS



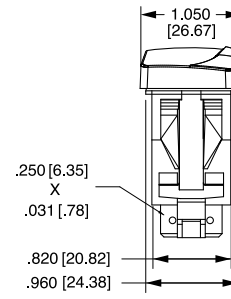
10 TERMINAL BASE W/BARRIERS



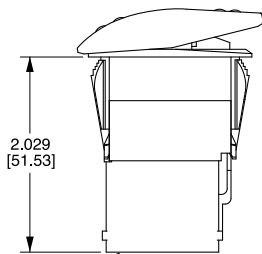
8 TERMINAL BASE W/BARRIERS



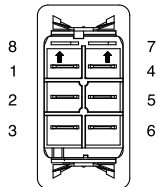
10 TERMINAL BASE W/BARRIERS



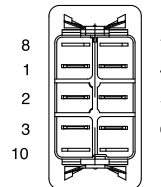
10 TERMINAL BASE W/O BARRIERS



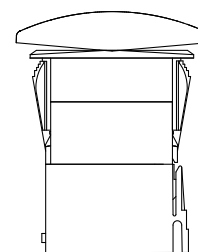
SWITCH SHOWN WITH VCH CONNECTOR 8 TERMINAL



BOTTOM VIEW TERMINAL ARRANGEMENT 8 TERMINAL BASE



BOTTOM VIEW TERMINAL ARRANGEMENT 10 TERMINAL BASE

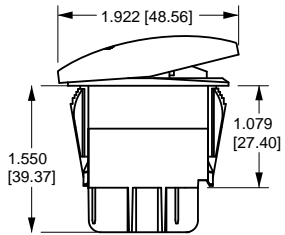
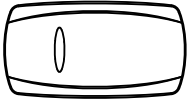


SWITCH SHOWN WITH VC1 CONNECTOR 10 TERMINAL

Dimensional Specifications: in. [mm]

CONTURA V

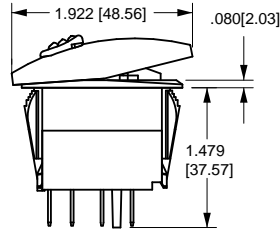
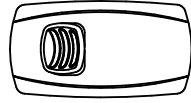
SHOWN WITH BAR LENS



8 TERMINAL BASE W/BARRIERS

CONTURA V

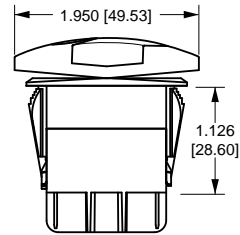
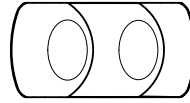
SHOWN WITH LOW PROFILE LOCK



8 TERMINAL BASE W/O BARRIERS

CONTURA VI

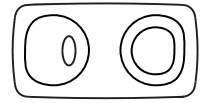
SHOWN WITH OVAL LENS



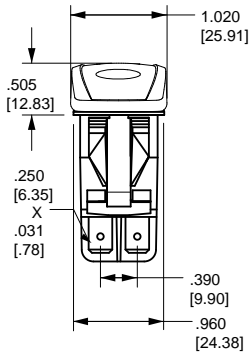
10 TERMINAL BASE W/BARRIER AND LAMP TERMINAL

CONTURA VII

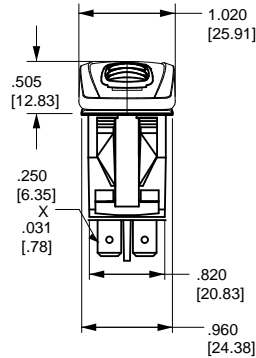
SHOWN WITH LARGE LENS AND BAR LENS



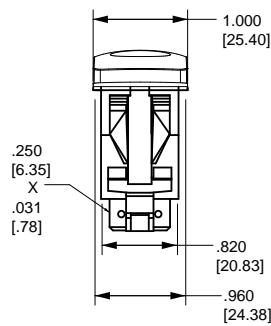
10 TERMINAL BASE W/O BARRIERS



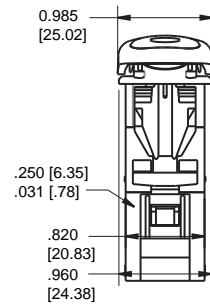
8 TERMINAL BASE W/BARRIERS



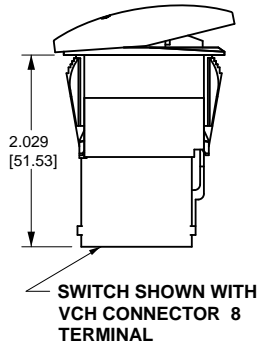
8 TERMINAL BASE W/O BARRIERS



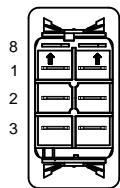
10 TERMINAL BASE W/O BARRIERS



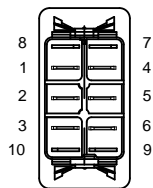
10 TERMINAL BASE W/O BARRIERS



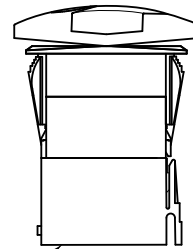
SWITCH SHOWN WITH VCH CONNECTOR 8 TERMINAL



BOTTOM VIEW TERMINAL ARRANGEMENT 8 TERMINAL BASE



BOTTOM VIEW TERMINAL ARRANGEMENT 10 TERMINAL BASE



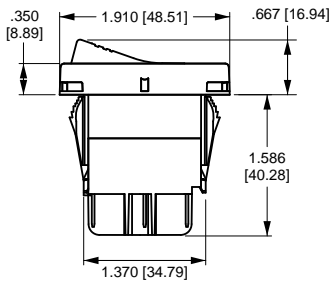
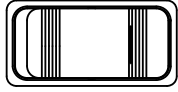
SWITCH SHOWN WITH VC1 CONNECTOR 10 TERMINAL



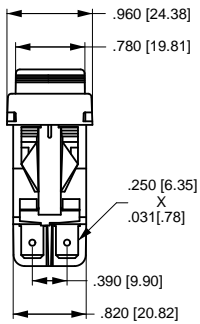
SWITCH SHOWN WITH VC1 CONNECTOR 10 TERMINAL

Dimensional Specifications: in. [mm]

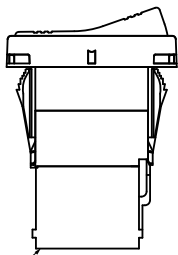
CONTURA X
SHOWN WITH RAISED BRACKET



8 TERMINAL BASE
W/BARRIERS

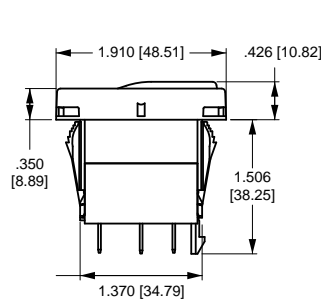
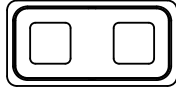


8 TERMINAL BASE
W/BARRIERS

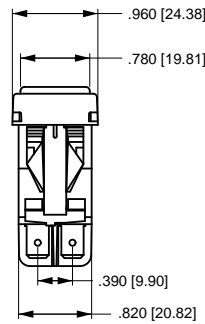


SWITCH SHOWN WITH
VCH CONNECTOR
8 TERMINAL

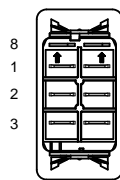
CONTURA XI
SHOWN WITH RAISED
BRACKET AND TWO SQUARE
LENSES



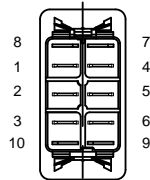
10 TERMINAL BASE
W/O BARRIERS



10 TERMINAL BASE
W/BARRIERS

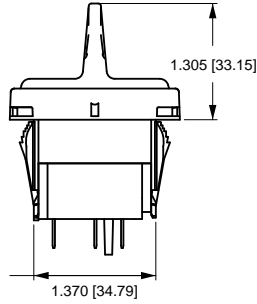
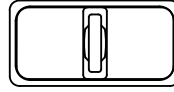


BOTTOM VIEW
TERMINAL
ARRANGEMENT
8 TERMINAL BASE

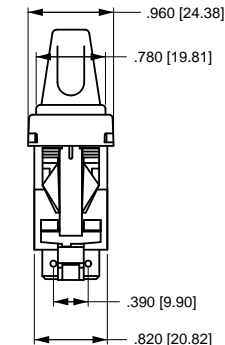


BOTTOM VIEW
TERMINAL
ARRANGEMENT
10 TERMINAL BASE

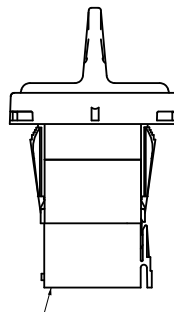
CONTURA XII
SHOWN WITH PADDLE
ACTUATOR



8 TERMINAL BASE
W/O BARRIERS

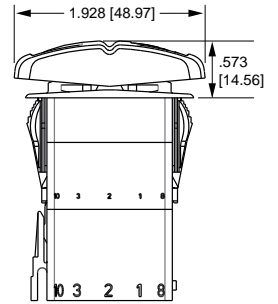
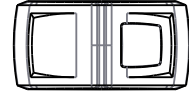


10 TERMINAL
BASE
W/O BARRIERS

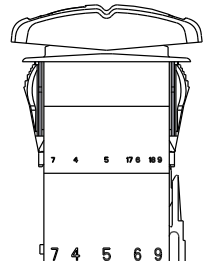
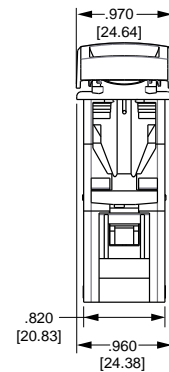


SWITCHES SHOWN WITH
VC1 CONNECTOR
10 TERMINAL

CONTURA XIV
SHOWN WITH LARGE LENS



10 TERMINAL BASE
W/O BARRIERS



SWITCHES SHOWN WITH
VC1 CONNECTOR
10 TERMINAL

Circuit Diagrams:

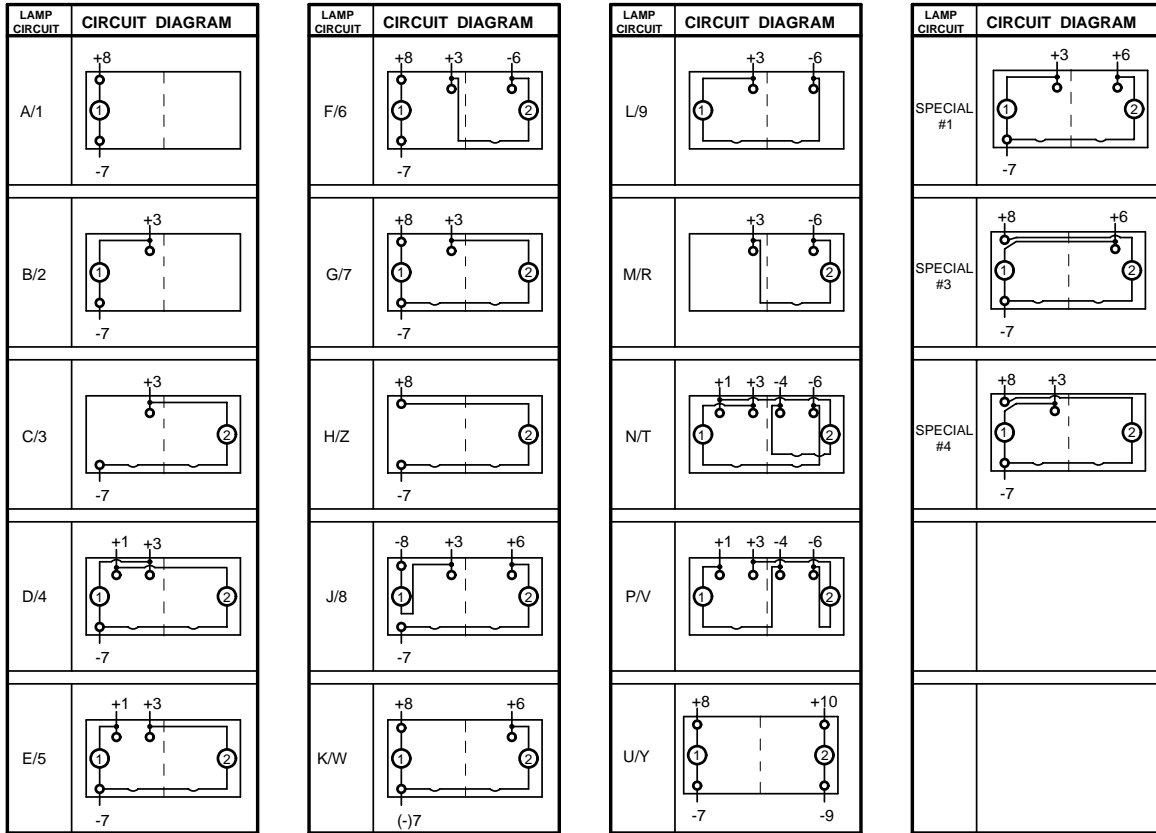
CIRCUIT	CIRCUIT DIAGRAM
1	
2	
3	
4	
5	
6	
7	
8	

CIRCUIT	CIRCUIT DIAGRAM
A	
B	
C	
D	
E	
F	
G	
H	

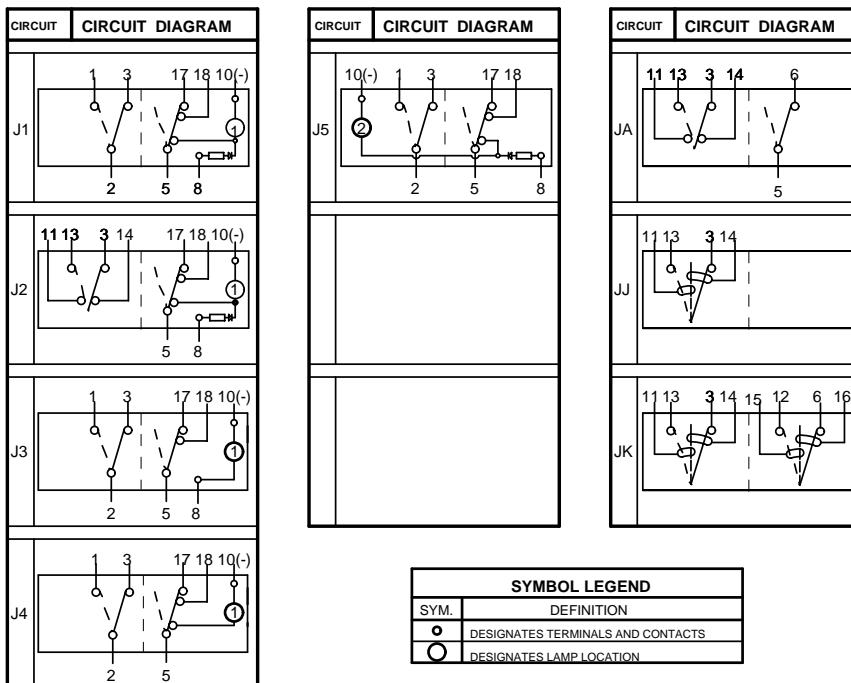
CIRCUIT	CIRCUIT DIAGRAM
J	
K	
L	
M	
R	
S	

SYMBOL LEGEND	
SYM.	DEFINITION
	DESIGNATES TERMINALS AND CONTACTS
	DESIGNATES LAMP LOCATION
	DESIGNATES MAINTAINED CIRCUITS
	DESIGNATES OTHER POSITION
	DESIGNATES MOMENTARY CIRCUITS
	DESIGNATES TWO POSITION CONNECTION
	DESIGNATES EXTERNAL JUMPER PROVIDED BY CUSTOMER

Lamp Circuit Diagrams:



Hazard Warning Circuit Diagrams:



NOTE:
J circuits are available for all non-locking V-Series styles. Consult factory for p/n details.

Rotary

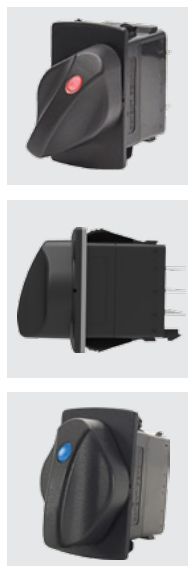
V-Series

CONTURA ROTARY SWITCHES

The V-Series Contura Rotary Switch was designed for maximum performance and reliability leveraging the features of the widely popular V-series Contura Rocker Switches. Available in maintained and momentary circuit options, the V-Series Rotary features a sturdy knob construction, up to three separate LEDs, and fits in an industry standard panel opening.

Internally, the V-Series Contura Rotary uses a patented mechanism that translates rotary to linear motion. This allows for common switch functionality and terminal connections with the V-Series rocker version and requires no harness change. A secondary CAM, which helps drive the mechanism, provides definitive detent positions and prevents the switch from stopping between positions, while improving tactile feel.

The V-Series Rotary also features an innovative PC board that supports the LED and surface mount resistors; and IP67 sealing protection above panel by utilizing LED and actuator stem seals. Together, these features make the V-Series Contura Rotary switch the best choice available in the market today.



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

- ◆ Accommodates up to three separate LEDs
- ◆ Patented mechanism translates rotary into linear motion
- ◆ Secondary CAM for definitive detent positions
- ◆ PC Board supports LED and surface mount resistors
- ◆ IP67 sealing protection above panel
- ◆ Common terminal & circuit functionality with V-Series Rocker switches, with no harness change required

Typical Applications:

- ◆ On/Off Highway Equipment
- ◆ Marine
- ◆ Test & Measurement
- ◆ Instrumentation
- ◆ Speed Control

V-Series Rotary Switch

DESIGN FEATURES

OPTIONAL PANEL SEAL

Prevents water/dust ingress behind panel

SEALS

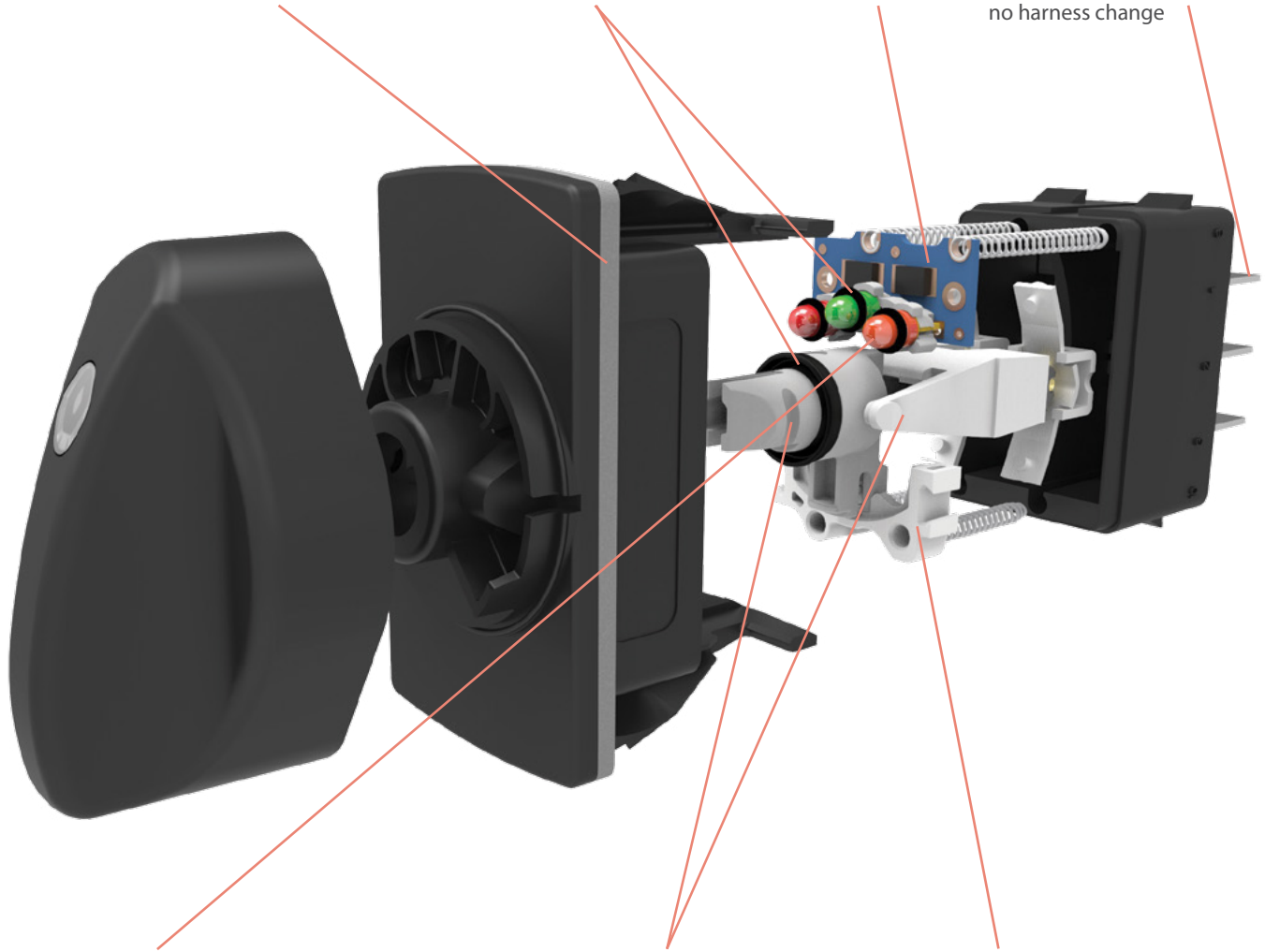
LED and stem seals provide IP67 protection above panel

PC BOARD

Supports LEDs and surface mount resistors

TERMINALS

Same pinout as V-Series Rocker Switches, requiring no harness change



LEDs

Up to three separate LEDs

ROTARY & LINEAR ACTUATOR

Patented mechanism that translates rotary to linear motion

SECONDARY CAM

Provides definitive detent positions with ball & spring located in rotary actuator

Electrical

Rating

Circuit	Voltage	Max Current Resistive
2 Position Maintain	12	20
2 Position Momentary	12	20
3 Position All	12	20
2 Position Maintain	24	15
2 Position Momentary	24	15
3 Position All	24	15

Dielectric Strength 1500 Volts RMS
 Insulation Resistance 50 Megohms
 Initial Contact Resistance 10 Milli Ohm max @ 4VDC
 Life 50,000 Cycles Two Position
 25,000 Cycles Two Position
 Momentary and All Three position
 Terminals 0.250" (6.3mm) Quick Connect

Physical

Function Circuits Single and Double Pole Single
 Throw, SPST, DPST
 Single and Double Pole Double
 Throw, SPDT, DPDT
 Operation Two and Three Position
 Maintained and Momentary
 Knob Rotation Two Position 60 Degrees
 Three Position 30 Degrees from
 Center
 Illumination LED; Red, Green, Amber, Yellow,
 White, Blue
 Seals LED O-ring(s) – Silicone, Bezel
 gasket – Neoprene, Knob seal -
 NBR
 Flammability Exceeds FVMSS 302
 Requirements, Exterior
 Components, UL 94 V-2 or Better
 Interior Components, UL 94 HB or
 Better
 Base Polyester, PBT
 Bracket Nylon 66, PA
 Knob Polybutylene Terephthalate, PBT
 6.5%GF
 Lens Polycarbonate, PC
 Connector Nylon 66, PA
 Mounting Front Panel Snap In, 1.450"
 (36.83mm) X 0.830" (21.08mm)
 Panel Thickness, 0.030" – 0.187"
 (0.76 – 4.75mm)

Mechanical

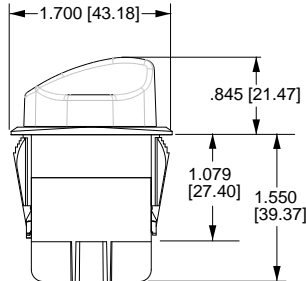
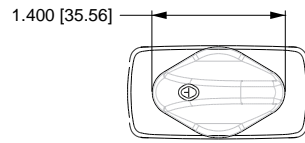
Mechanical Life 100,000 Cycles Maintained Circuits
 50,000 Cycles Momentary Circuits
 Knob Impact 50 Gram weight dropped from a
 height of 18 inches on Top & Sides

Environmental

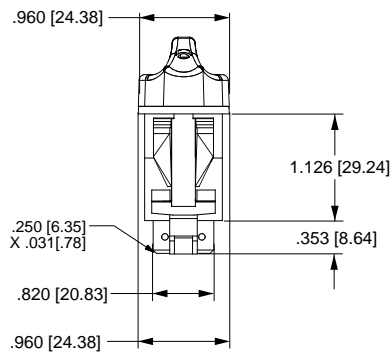
Sealing IP67, in accordance with IEC 60529,
 BS 5490, DIN 40050 & NFC 20 010.
 This rating applies to front panel
 components of the actual switch only,
 and signifies protection against dust
 and the prolonged effects of immersion
 under pressure.
 Dust Mil STD 810, Method 510.2 Air Velocity
 300 Ft/Min Duration 16Hr
 Corrosion IEC 68-2-60 Mixed Flowing Gas (MFG)
 14 Days
 Chemical Splash Gasoline, Diesel, Motor Oil, Brake
 Fluid, Ammonia, Armour All
 Salt Spray Mil STD 202G, Method 101, Test
 Condition A 96 Hr
 Vibration Random Mil STD 202G, Method 214 test
 Condition C 10G's RMS
 Vibration Sinusoidal Mil STD 202G, Method 204D, Test
 Condition A 0.06DA or 10G's 10-500Hz
 Shock MIL-STD 202G, Method 213B Test
 Condition K, 30G's
 Handling Shock 1 Meter Drop onto Hard Surface
 Thermal Shock MIL-STD 202G, Method 107G Test
 Condition A -55 C to 85 C
 Moisture Resistance MIL-STD 202G, Method 106F 10, 25
 C to 65 C Cycles 95% RH
 Thermal Cycling 25 Cycles -40 C to 85 C
 Ignition Protection ISO 8846 with EC Directive 94/25/EC
 for Marine Products
 UV Protection 300 hr Xenon Arc, 1.4W/m2
 wavelength 420 nm
 ESD Human Static Discharge, +/- 15KV
 applied during normal operation
 Shipping/Handling, frequency range
 200-2000 MHz applied voltage is +8KV
 to +15KV and -8KV to -15KV 3
 discharge cycles

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

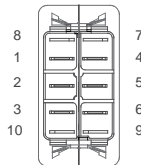
Dimensional Specifications: in. [mm]



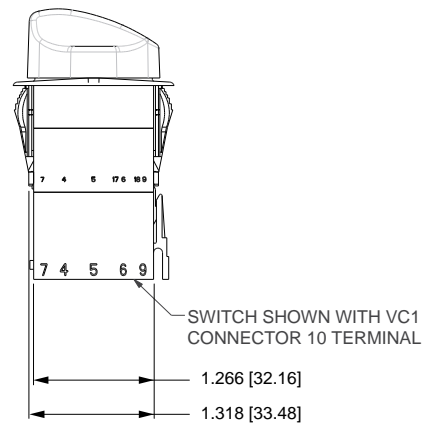
**10 TERMINAL BASE
W/ BARRIERS**



**10 TERMINAL BASE
W/O BARRIERS**

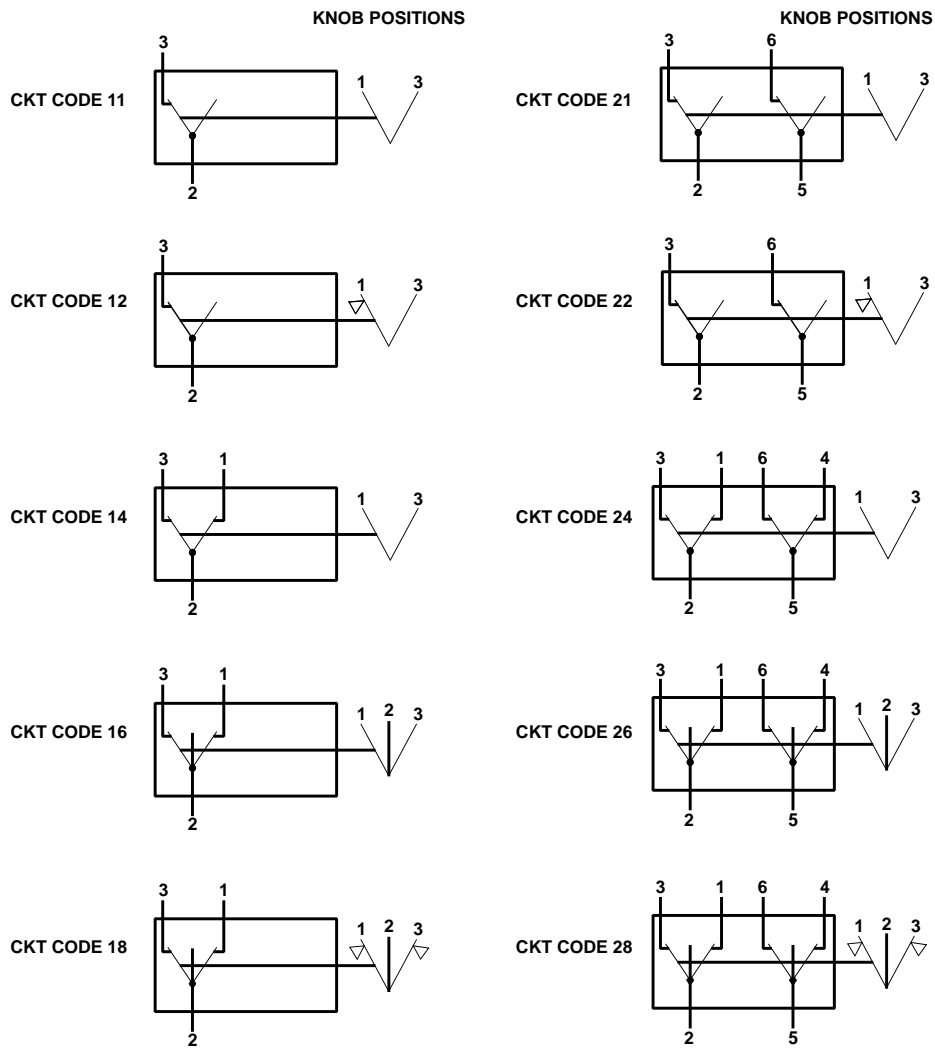


**BOTTOM VIEW
TERMINAL ARRANGEMENT
10 TERMINAL BASE**



SWITCH SHOWN WITH VC1
CONNECTOR 10 TERMINAL

Circuits Diagrams:



LEGEND	
SYMBOL	DEFINITION
⊙	TERMINAL LOCATION
—	MAINTAINED CIRCUIT
—▲—	MOMENTARY CIRCUIT
—/—	INTERNAL CONNECTION (JUMPER TERMINAL)
⌋	2 POSITION CONNECTION
⌋	2 POSITION CONNECTION
P1 P3	2 POSITION
P1 P2 P3	3 POSITION

Lamp Circuit Diagrams:

LAMP CIRCUIT	CIRCUIT DIAGRAM
A	
B	
C	
D	
E	
F	
G	
H	
J	
K	

LAMP CIRCUIT	CIRCUIT DIAGRAM
L	
M	
N	
P	
R	
T	
U	
V	

RV 11 D 2 B C 0 0 B - K R C

1 Series 2 Circuit 3 Rating 4 Termination 5 Illumination 6 Lamp 1 7 Lamp 2 8 Lamp 3 9 Bracket 10 Actuator 11 Lens 12 Knob Color

1 SERIES
RV Rotary Contura

2 CIRCUIT 1
 Terminal Connections as viewed from bottom of switch: () - momentary

8 - - 7	SP - single pole uses 1, 2 & 3.
1 - - 4	DP - double pole uses 1, 2, 3 and 4, 5, 6.
2 - - 5	
3 - - 6	
10 - - 9	

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
11 21	ON	NONE	OFF
12 22	(ON)	NONE	OFF
14 24	ON	NONE	ON
16 26	ON	OFF	ON
18 28	(ON)	OFF	(ON)

3 RATING

1	External
B	.4VA 28VDC Resistive
D	15A 24V
	20A 12V

4 TERMINATION / BASE STYLE

8 Term	10 Term	Termination	Jumper
1	2	.250 TAB (QC) - no barriers	No
A	B	.250 TAB (QC) - with barriers	No
3	4	Solder Lug - no barriers	No
C	D	Solder Lug	No
5	6	Wire Leads - no barriers	No
E	F	Wire Leads	No

5 ILLUMINATION 2

Sealed	Lamps	when illuminated	Terminals
S	NONE		
A	# 1	Independent	8+ 7-
B	# 1	Dependent	3+ 7-
C	# 1	Independent	8+ 7-
	& # 3	Independent	10+ 7-
D	# 1	Dependent	3+ 7-
	& # 3	Dependent	1+ 7-
E	# 1	Independent	8+ 7-
	# 2	Independent	9+ 7-
	# 3	Independent	10+ 7-
F	# 1	Dependent	3+ 7-
	# 2	Independent	9+ 7-
	# 3	Dependent	1+ 7-
G	# 1	Dependent	3+ 7-
	# 3	Independent	8+ 7-
H	# 2	Independent	8+ 7-
J	# 1	Independent	8+ 7-
	# 2	Independent	10+ 7-
K	# 1	Dependent	3+ 7-
	# 2	Dependent	1+ 7-
L	# 1	Dependent	3+ 7-
	# 2	Independent	8+ 7-
M	# 2	Independent	8+ 7-
	# 3	Independent	10+ 7-
N	# 2	Dependent	3+ 7-
	# 3	Dependent	1+ 7-
P	# 2	Independent	10+ 7-
	# 3	Dependent	1+ 7-
R	# 3	Independent	8+ 7-
T	# 3	Dependent	1+ 7-
U	# 1	Dependent	3+ 6-
V	# 1	Dependent	3+ 6-
	# 3	Dependent	1+ 4-

Single Pole Switches Only

6, 7, 8 LAMP #1, 2 AND OR LAMP #3 4
 Selection 6: above terminal 7; Selection 8: above terminal 8


No lamp	0				
LED	Red	Amber	Green	Blue	White
12VDC	C	N	H	E	6
24VDC	D	P	J	K	8

9 BRACKET COLOR & PANEL SEAL 3

Color	No Gasket	1 Gasket	2 Gasket
Black	B	C	D
Gray	G	H	J
White	W	Y	Z

10 ACTUATOR STYLE
K Rotary Knob Standard

ACTUATOR ORIENTATION ABOVE TERMINALS



11 LENS COLOR 4

No Actuation	0				
No Lens	Z				
Clear	White	Amber	Green	Red	Blue
4	9	E	K	R	W

12 KNOB COLOR

Black	Gray	Red
C	H	S

- Notes:
- 1 SP-single pole uses terminals 1,2 & 3. DP-double pole uses terminals 1,2,3,4,5 & 6. Terminals 7,8,9 & 10 are for lamp circuit only.
 - 2 Lamp #1 located at top end of switch, above terminal 4. Lamp #2 located at top end of switch between terminals 1 & 4. Lamp #3 located at top end of switch, above terminal 1. Positive (+) and negative (-) symbols apply to LED lamps only.
 - 3 Mounting hole size is 1.450" (36.83mm) by 0.830" (21.08mm). To mount multiple switches in single panel cut-out order optional interlocking mounting panels.
 - 4 Lens color for LEDs must be clear, white, or match color of LED.

V-Charger

V-SERIES DUAL PORT USB 2.0 CHARGERS

Carling Technologies USB V-Charger is designed to charge tablets, e-readers, mobile and gaming devices, digital cameras, as well as other compatible electronic devices.

Providing a total current of 3.15 amps, the V-Charger delivers fast charging times even in extreme temperatures from -40°C to +80°C. This innovative product safeguards its electronics with integrated over-current and thermal overload protection, as well as optional load dump circuitry, assuring prolonged safe and reliable operation. The center LED indicates charging is in progress. Snap-in mounting for an industry standard 1.450” x .830” panel cutout makes installation easy.

*Additionally, the V-Charger’s double torsion spring-loaded access doors automatically close and provide effortless IP64 sealing protection with precision-fit silicone rubber seals.



Resources:

[Download 3D CAD Files](#)



[Watch Product Video](#)



Product Highlights:

- Dual USB Charging Ports
- 3.15 Amps for Faster Charging
- 10,000 Operating Cycles per Port
- IP64 Sealing Protection
- 12-24 V Operating Voltage
- Protection for Internal Components

Typical Applications:

- On/Off-Highway Equipment
- Golf Carts
- Lawn & Garden Equipment
- Marine
- Military

V-Charger

DESIGN FEATURES

DUAL USB 2.0 PORTS

Total current of 3.15 amps, facilitating faster charges

SPRING LOADED DOORS

Stylish, wing-shaped double doors automatically close to cover and seal each port when not in use

LED

Green LED brightens to indicate charging is in progress



SEALING PROTECTION

Silicone rubber seal perfectly mates with door indent to provide IP64 level of sealing protection

PANEL SEAL

Prevents water ingress beneath panel to protect critical connections

MOUNTING

Fits industry standard panel opening size of 1.450" x .830"

Electrical

USB Type	2.0
Number of USB Ports	2
Operating Voltage	12V/24V DC power systems (9 to 29 VDC)
Output Voltage	5 VDC ± 5%
Max Output Current	3.15A DC Total
Current Draw (No Load)	12V: 0.8 mA, 24V: 1.9 mA
LED Indicator	Green LED brightens when charging is in progress.
Compatibility	Charges mobile devices including iPad, iPhone, iPod, HTC, Galaxy, Blackberry, MP3 Players, Digital Cameras and PDA's
Life	10,000 operating cycles per port minimum
Terminals	Copper/silver plating 1/4" (6.3 mm) Quick Connect terminations
Reverse Polarity	Operational with correct polarity after reverse polarity exposure
ESD	15kV air, 8 kV touch
Overcurrent Protection	Short Circuit
Thermal Overload Protection	Operation will cease if internal temperature reaches 125°C. Charging will resume after sufficient heat loss

Physical

Panel Opening	1.450" x .830"
Panel Thickness	.030 - .156 inches
Panel Mounting Method	Front Panel Insertion
Seals	Silicone and Poron
Depth Behind Panel	See Figures 1 and 2
Connection	VC1, VC2
Weight	55g (0.12 lbs)
Styling	Curved USB port doors
Port Protection	Twin, self-closing doors

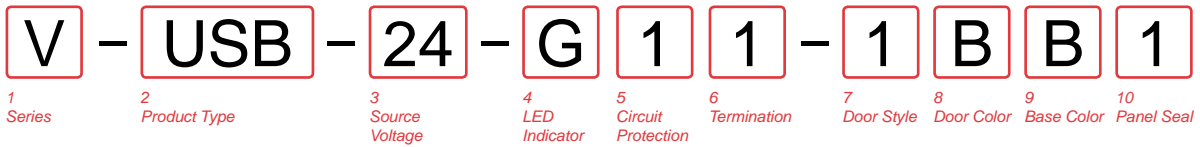
Environmental

Sealing	IP64 for front panel components when USB Ports are covered
Operating Temperature	-40° to +60°C at 3.15A -40° to +70°C at 2.4A -40° to +80°C at 2.1A
Vibration 1 Test	Mil-Std 202G, Method 204D, Condition A. 0.06DA or 10G, 10-500 Hz
Shock Test	Mil-Std 202G, Method 213B, Condition K @ 30-G. No loss of circuit during test.
Chemical Splash	Brush method with USB doors closed: diesel, gasoline, brake fluid, Windex, Armor All
Thermal Shock	MIL-Std 202F, Method 107D, Test Condition A, -55° to +85°C. Test Criteria: Remains functional without damage
Moisture Resistance	Mil-Std 202G, Method 106G. Test Criteria: Remains functional without damage
Thermal Cycling	25 Cycles -40° to +85°C, 2 hours for each temperature every cycle
Salt Spray	Mil-Std 202G, Method 101E, Test Condition A
Dust	Mil-Std 841C Method 510.2 Air Velocity 300 ± 200 Ft/min, test duration: 16 Hr

Mechanical

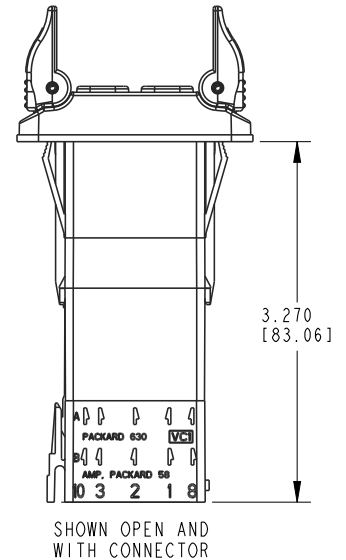
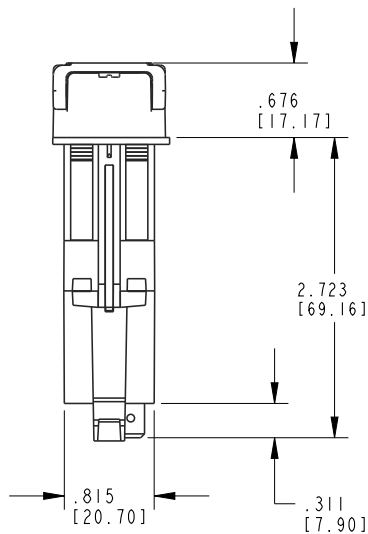
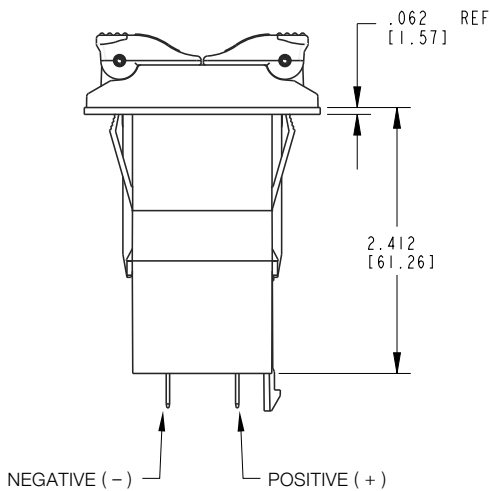
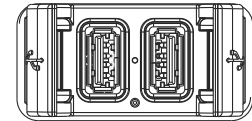
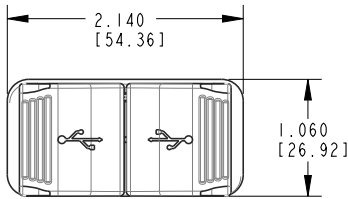
Endurance	10,000 door cycles minimum
-----------	----------------------------

Ordering Scheme



1 SERIES V	6 TERMINATION 1 .250 Tab
2 PRODUCT TYPE USB Charger	7 DOOR STYLE 1 Curved
3 SOURCE VOLTAGE 24 24 / 12 Volts DC	8 DOOR COLOR B Black
4 LED INDICATOR (VOLTAGE MATCHES SOURCE) G Green	9 FRAME COLOR B Black
5 CIRCUIT PROTECTION 1 Reverse Polarity, Thermal Overload & Overcurrent	10 PANEL SEAL 1 Yes

Dimensional Specifications: in. [mm]



Notes:

- 1 Charger to install into 1.450" X 0.830" panel opening

Reduce inventory levels and cost by stocking actuators and base switches separately.

Contura II, III, IV, V, VI, VII, X, XI, XII, XIV Base switches separately: specify **V** with code selections 2-8 in the ordering schemes.

Contura II, III, IV, V Actuator only: **VV** with code **A** or **C** for selection 9, & with selections 10-14 in the ordering schemes.

Contura VI Actuator with lenses and inserts only: **VV** with code selections 9-16

Contura II, III, IV, V, VII Actuator only: **VV** with code **A, C, E, G, P** or **Z** for selection 9 & with selections 10-14 in the ordering schemes.

Contura X, XI, XII, XIV actuators with lenses separately: **VV** with code selections 9-14 in the ordering schemes.

Panel Seal: VPS

Contura X & XI actuators without lenses separately:

VVR	6	1	00	1
1 Actuator Separately	2 Actuator Style/Color	3 Lens Opening	4 Actuator Legend	5 Legend Orientation

1 CONTURA X & XI ACTUATOR SEPARATELY
VVR

2 ACTUATOR STYLE & COLOR

	Black	Gray	White	Red
Contura X	1	2	3	4
Contura XI	6	7	8	9

3 LENS OPENING FOR 1

1	One bar lens	5	square lens on top/ bar lens on bottom (Contura X only)
2	One bar lenses		
3	One square lens		
4	two square lens		

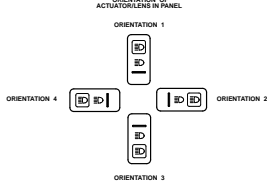
4 ACTUATOR LENS OR BODY LEGEND

00	No Legend this location			
11	ON	12 OFF	13 I	14 O
	OFF	ON	O	I
15	O O	16 O O	17 O I	18 I O
	F N	N F	F	F

For additional legend options & codes, visit us at www.carlingtech.com.

5 LEGEND ORIENTATION 1

0	No legend
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4



Contura X, XI & XII top piece of 2-piece lens separately:

VVT	1	1 TOP OF LENS SEPARATELY
1 Lens Separately	2 Color	
2 COLOR		
1 Clear 2 Smoke 3 White		

Contura X, XI & XII actuator lens assembly:



1 piece lens/bar lens are positioned the same as bottom lens for assembly, minus the top lens. Lenses snap in from bottom.

Notes:

- If actuator lens opening for 2 bar or 2 square lenses, legend orientation 0,1, or 2 must be chosen.
- Center of actuator marking not available for Contura XII.
- Legend is not available for bar style lens.
- Not recommended with neon lamps.
- Must also order top piece of 2 piece square lens separately.

Contura XII actuators without lenses separately:

VVP	J	1	Z	21	1	00
1 Actuator	2 Style & Color	3 Lens Opening	4 Lens Opening	5 Legend	6 Legend Orientation	7 Legend Orientation

1 CONTURA XII ACTUATOR SEPARATELY
VVP

2 ACTUATOR STYLE & COLOR

J	Black	K	Gray	N	White	M	Red
---	-------	---	------	---	-------	---	-----

3,4 LENS OPENING FOR

Z	No lens	1	Bar lens	2	Square lens
---	---------	---	----------	---	-------------

5, 7 LENS OR BODY LEGEND 2

00	No Legend			
	21 OFF	22 ON	23 O	24 I
	25 O F	26 O N	27 O	28 I

For additional legend options & codes, visit us at www.carlingtech.com.

6 LEGEND ORIENTATION 3

0	No legend
1	Orientation 1
2	Orientation 2



Contura X, XI & XII actuator lens assembly separately:

VVL	2	1	00	0
1 Lens Separately	2 Lens Style	3 Lens Color	4 Legend	5 Legend Orientation

1 CONTURA X, XI & XII LENS SEPARATELY
VVL

2 LENS STYLE 3

1	Bar lens
2	One Piece Square lens
3	Bottom of Two-Piece Square lens 5

3 TRANSLUCENT LENS COLOR

1	Clear	2	White	3	Amber	4	Green 4	5	Red	6	Blue 4
---	-------	---	-------	---	-------	---	---------	---	-----	---	--------

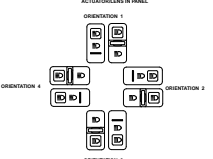
4 LENS OR BODY LEGEND 2

00	No Legend			
	21 OFF	22 ON	23 O	24 I
	25 O F	26 O N	27 O	28 I

For additional legend options & codes, visit us at www.carlingtech.com.

5 LEGEND ORIENTATION 3

0	No legend
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	Orientation 4

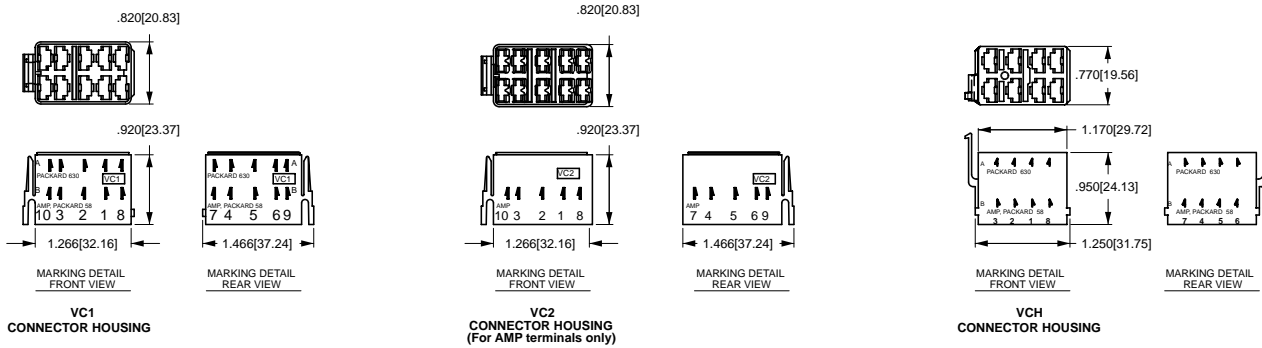
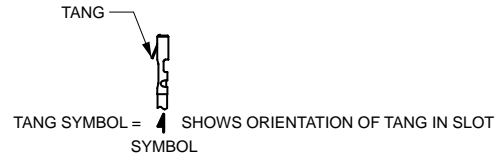


Easily integrate Contura products into your system, with Contura Accessories

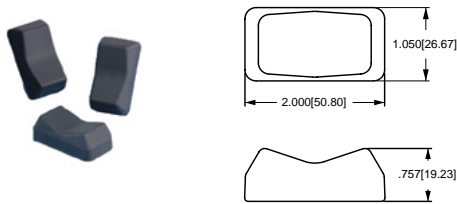
Contura Connectors

Q.C. SELECTION GUIDE					
COMPANY SERIES	PART NO		WIRE RANGE		ORIENTATION
	PLAIN BRASS	TIN PLATED BRASS	AWG	MM ² (REF)	
PACKARD 58 SERIES	02965580		12	3.0	B
	02965471	12010601	(2)16-14	(2)1.0-2.0	
	02965470		16-14	1.0-2.0	
	02965469	06288318	20-18	.5-.8	
PACKARD METRI-PACK 630 SERIES		12084590	10	5.0	A
		12052224	12	3.0	
		12015870	16-14	1.0-2.0	
		12020035	(2)22-18	(2).5-.8	
		12015832	20-18	.5-.8	
		12052222	20-22	.35-.5	
AMP 250 SERIES FASTIN-FASTON	60253-1	60253-2	16-12	1.3-3	B
			(2) 16	(2) 1.3	
	42100-1	42100-2	18-14	.8-2	
	60295-1	60295-2	22-18	.3-9	

NOTE: Consult Delphi Packard and/or Amp on actual part numbers and availability. AMP is a registered trademark of AMP Inc. Harrisburg, PA. Delphi Packard is a registered trademark of Delphi-Packard Electrical Systems Warren, Ohio



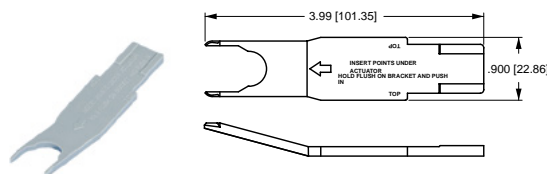
Contura X Boot (P/N VB1-01)



Additional V-Series Ratings

- 1 .4VA @ 28VDC Resistive
- 4 10A 250VAC 1/2 HP, 15A 125 VAC 1/2 HP, No Agency Listings
- 5¹ 10A 250VAC 1/2 HP, 15A 125 VAC 1/2 HP, UL Recognized, CSA Certified
- 6² 15A 125VAC 1/2 HP, 12(2)A 125 VAC μ T85
- 7² 15A 125VAC 1/2 HP, 12(6)A 125 VAC T85
- 8² 10A 250VAC, 15A 125VAC, 1/2 HP 125-250VAC, 12(2)A 250 VAC μ T85
- 9² 10A 250VAC, 15A 125VAC, 1/2 HP 125-250VAC, 12(6)A 250 VAC T85
- B 15A 24V
- C 20A 18V
- D 20A 12V
- E 20A 14V, 10A 14VT (circuits 1, 4, A, & D only)
- F 10A 14V, 6A, 14VT (circuit G only)
- G 20A 6V
- H 20A 3V
- L 15A 125 VAC, 10A 250VAC, 1/2 HP 125-250 VAC; 6A 125 VAC L
- M .4VA/20A 12V (combi-contact)
(combination gold/silver contacts for borderline dry circuit applications)
- N .4VA/15A 24V (combi-contact)
(combination gold/silver contacts for borderline dry circuit applications)

Contura II, III, IV & V Actuator Removal Tool (P/N VRT)



NOTES

Consult factory to determine availability for individual circuits and their HP rating.

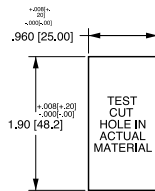
- Not available with Contura 7 or 14 rocker styles.
- Ratings 6 - 9 are UL, CSA & VDE certified, require terminations A or B for double pole circuits, & are not available with illumination circuits 4, 8, D, J, N, & T or with wire lead or solder lug terminations.

Circuits 1, 4, A, D, H, M & E are not available with rating 6 & 8. Rating 7 & 9 only available with circuits 1, 4, A & D. Circuits 2, 3, 5, 7, 8, K, L are 1/2 HP 250VAC only with rating 8. Ratings 6 & 7 must specify lamp code 1 (125VAC neon). Ratings 8 & 9 must specify lamp code 2 (250VAC neon). Rating L available with circuits 1, 4, A & D only.

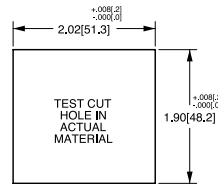
Contura Mounting Panels Dimensional Specifications: in. [mm]

MOUNTING PANEL
For additional units, add 1.03[26.2] per unit.
For more than 2 V-Series Switches, add
middle section. Available in Panel Thicknesses
listed below. Consult factory.

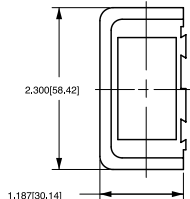
MOUNTING PANEL THICKNESS	
.062[1.57]	.187[4.75]
.093[2.36]	.250[6.35]
.125[3.17]	.375[9.52]



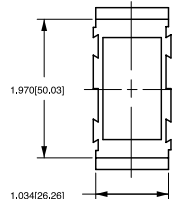
VMS
MOUNTING PANEL
HOLE



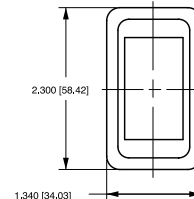
MOUNTING PANEL
OPENING
(2) UNITS



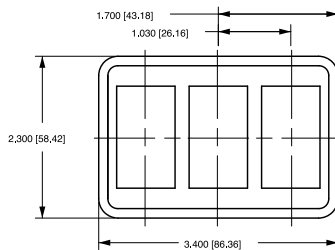
VME
MOUNTING
PANEL
END



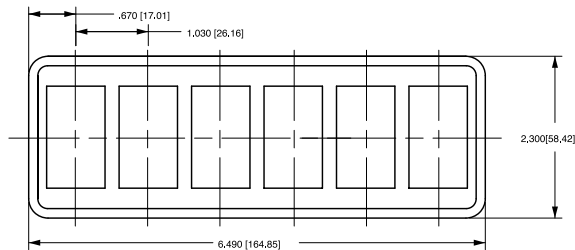
VMM
MOUNTING
PANEL
MIDDLE



VMS
MOUNTING
PANEL



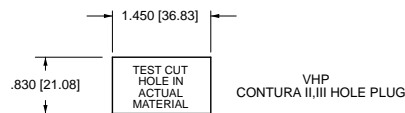
VMS
MOUNTING
PANEL



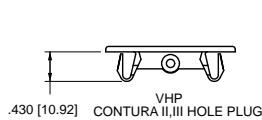
VMS
MOUNTING
PANEL



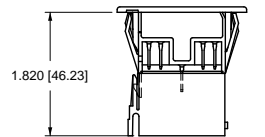
Contura Hole Plug Dimensional Specifications: in. [mm]



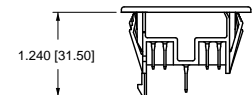
VHP
CONTURA II,III HOLE PLUG



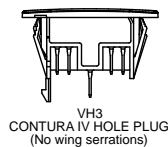
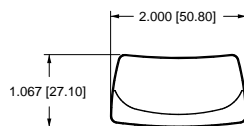
VHP
CONTURA II,III HOLE PLUG



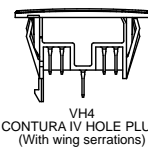
VH1
STANDARD HOLE PLUG
(No wing serrations)
(With VC1 connector attached)



VH2
STANDARD HOLE PLUG
(With wing serrations)



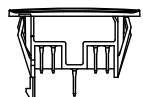
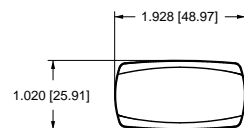
VH3
CONTURA IV HOLE PLUG
(No wing serrations)



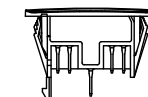
VH4
CONTURA IV HOLE PLUG
(With wing serrations)



DETAIL VIEW
VH1, VH3 & VH5
HOLE PLUGS
(No wing serrations
for ease of removal)



VH5
CONTURA V HOLE PLUG
(No wing serrations)



VH6
CONTURA V HOLE PLUG
(With wing serrations)



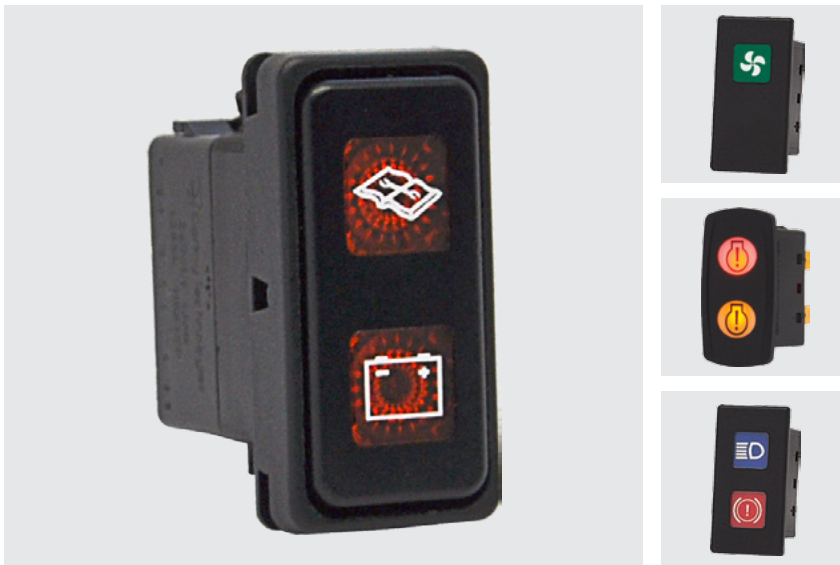
DETAIL VIEW
VH2, VH4 & VH6
HOLE PLUGS
(With wing serrations)



VP-Series

CONTURA ILLUMINATED INDICATORS

The Illuminated Indicator is offered with removable/replaceable lamps, Contura styling, and LED illumination. As a critical safety feature, it's illumination alerts the operator of essential system functions or malfunctions like: oil pressure, high temperature, transmission or other fluid levels, parking brake, or general system malfunction. Three different style housings (flush, raised panel, oval) assure seamless integration with Contura switches and into most any dashboard panel.



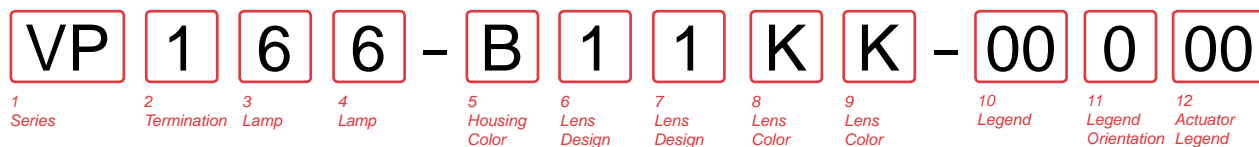
Product Highlights:

- ◆ 3 Styles to choose from
- ◆ Single or double window Illumination
- ◆ 25 lens colors and configurations
- ◆ Available connector for easily installation

Typical Applications:

- ◆ Transportation





1 SERIES
VP Illuminated plug
H2 1 Housing only
H3 2 Lamp module only
HP1-01 VP connector for oval and flush bezel only
VC1-01 VP connector for raised bezel only

2 TERMINATION
1 .250 TAB

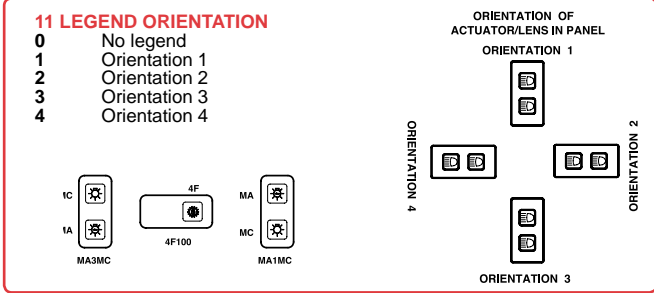
3,4 LAMP (same coding for both selections) 4,5,6,8,9,12
 No lamp **0**
 Neon **1** 125VAC **2** 250VAC
 Incandescent **5** 6V **6** 12V **7** 18V
8 24V
 LED* **A** Amber **G** Green **R** Red
 2VDC **L** **F** **S**
 6VDC **M** **G** **T**
 12VDC **N** **H** **V**
 24VDC **P** **J**
 *Typical current draw for LED is 20ma.

5 HOUSING COLOR
 flush bracket raised bracket ¹³ oval bezel (Contura V)
 Black **B** **6** **1**
 Gray **W** **-** **2**
 White **R** **5** **3**
 Red **G** **-** **4**

6,7 SQUARE LENS DESIGN (same coding for both selections) 4,5,6,11,12
Z no lens
1 transparent diamond square ¹⁰
2 translucent square ⁷
3 laser etched ¹⁰
4 transparent oval
5 translucent oval

8, 9 LENS (same coding for both selections) 3,4,5,6,9
Z No Lens
 Clear **9** White **E** Amber **K** Green **R** Red **W** Blue
4 **A** **F** **L** **S** **Y** Lens Style
5 **A** **F** **L** **S** **Y** One piece Square/Oval ¹¹
2 **7** **C** **H** **N** **U** Two piece Square*
1 **6** **B** **G** **M** **T** Two piece Square*
 (with clear top protective lens)
 (with smoke top protective lens)
 (with white top protective lens)
 *All bottom lenses are molded of opaque material. Consult factory for other lens colors.

10 LAMP #1 LENS OR BODY LEGEND 5
00 No legend
 For legend options, visit us at carlingtech.com



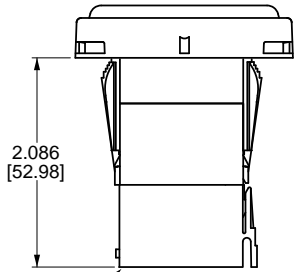
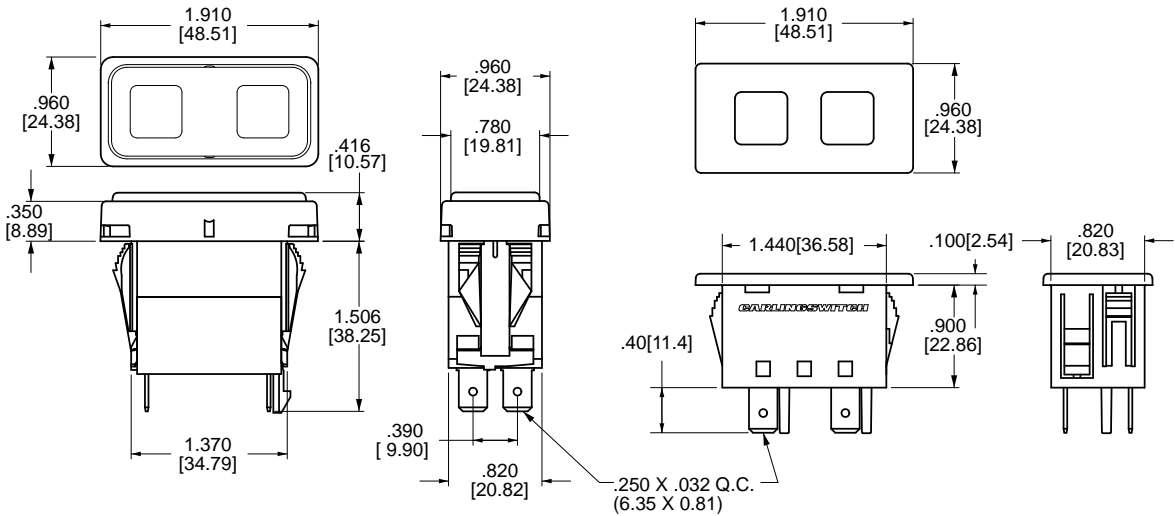
12 LAMP #2 LENS OR BODY LEGEND 5
00 No legend
 For legend options, visit us at carlingtech.com

Notes:

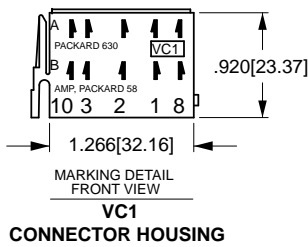
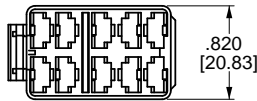
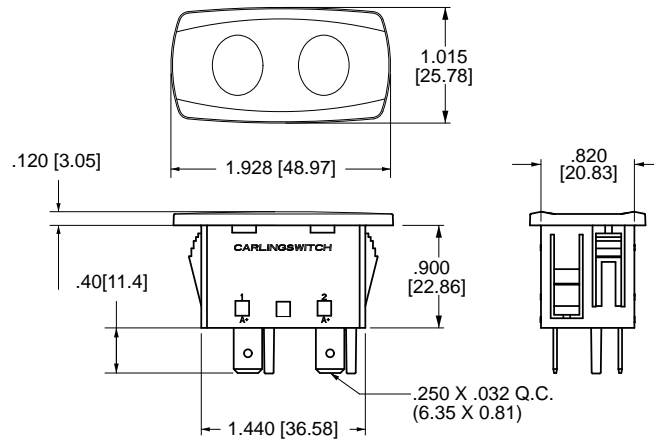
- 1 To order housing with lenses only, specify H2 followed by fields 5-12. (flush bezel only)
- 2 To order lamp module only, specify H3 followed by fields 2-3. (flush bezel only)
- 3 Two piece lens not available with oval bezel.
- 4 If only 1 lamp, specify 0 in selection 4 and Z in selections 7 & 9.
- 5 Lamp and lens #1 located over terminals 1A and 1B for flush & oval bezel.
- 6 Lamp and lens #2 located over terminals 2A and 2B for flush & oval bezel.
- 7 Available with 2 piece lens option only.
- 8 Neon lamps not recommended with blue or green lenses.
- 9 Green or blue lenses not recommended with neon lamps.
- 10 Available with one piece lens option only.
- 11 Oval bezel available with oval lenses only. Oval lens available with oval bezel only.
- 12 Lamp & lens #1 located over terminals 7 & 8, & #2 located over 9 & 10 for raised bezel option.
- 13 Both bracket and insert will be same color. For white bracket with black insert, specify 7. For black bracket with white insert, specify 8.

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

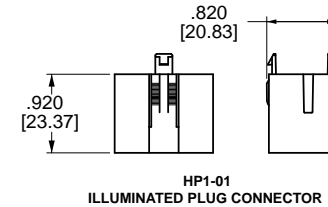
Dimensional Specifications: in. [mm]



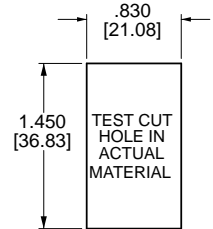
PLUG SHOWN WITH VC1 CONNECTOR



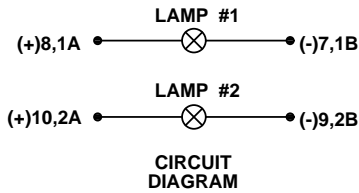
VC1 CONNECTOR HOUSING



HP1-01 ILLUMINATED PLUG CONNECTOR



ILLUMINATED PLUG MOUNTING HOLE (OVAL, FLUSH AND RAISED BEZELS)



CIRCUIT DIAGRAM

(OVAL, FLUSH AND RAISED BEZELS) MOUNTING PANEL THICKNESSES:

.062 [1.57]	.250 [6.35]
.093 [2.36]	.375 [9.52]
.125 [3.17]	.500 [12.70]
.187 [4.75]	

Notes:
Oval and flush bezel styles use terminals 1A, 1B, 2A, 2B. Raised bezel style uses terminals 7, 8, 9, 10.

W-Series

SEALED ROCKER SWITCHES

Carling Technologies set the standard for performance and aesthetics with the widely successful, often imitated, but never duplicated, V-Series rocker switches. Building further upon that platform, Carling has once again raised the bar with the fully sealed W-Series. The W-Series' traditional appearance features complete IP68 protection, including below the panel, where the critical connection is made from the wiring harness. When used in conjunction with the integrated connector, the totally submersible W-Series provides a seal for up to ten individual wires, assuring compatibility with even the most complex circuitry.

The W-Series also offers a wide variety of accoutrements, including endless illumination options featuring dual level and multicolor LEDs, progressive and hazard warning circuits, ratings up to 10A 24V, choice of paddle, rocker, locking or laser etched actuators, hundreds of standard legend choices and the electrical performance and reliability that is the hallmark of Carling Technologies products.



Product Highlights:

- ♦ Fully sealed and submersible
- ♦ IP68 protection, including below the panel
- ♦ Tri-seal design
- ♦ Connector with twin locking tabs

Typical Applications:

- ♦ Marine equipment
- ♦ ON/OFF Highway equipment



W-Series Switch

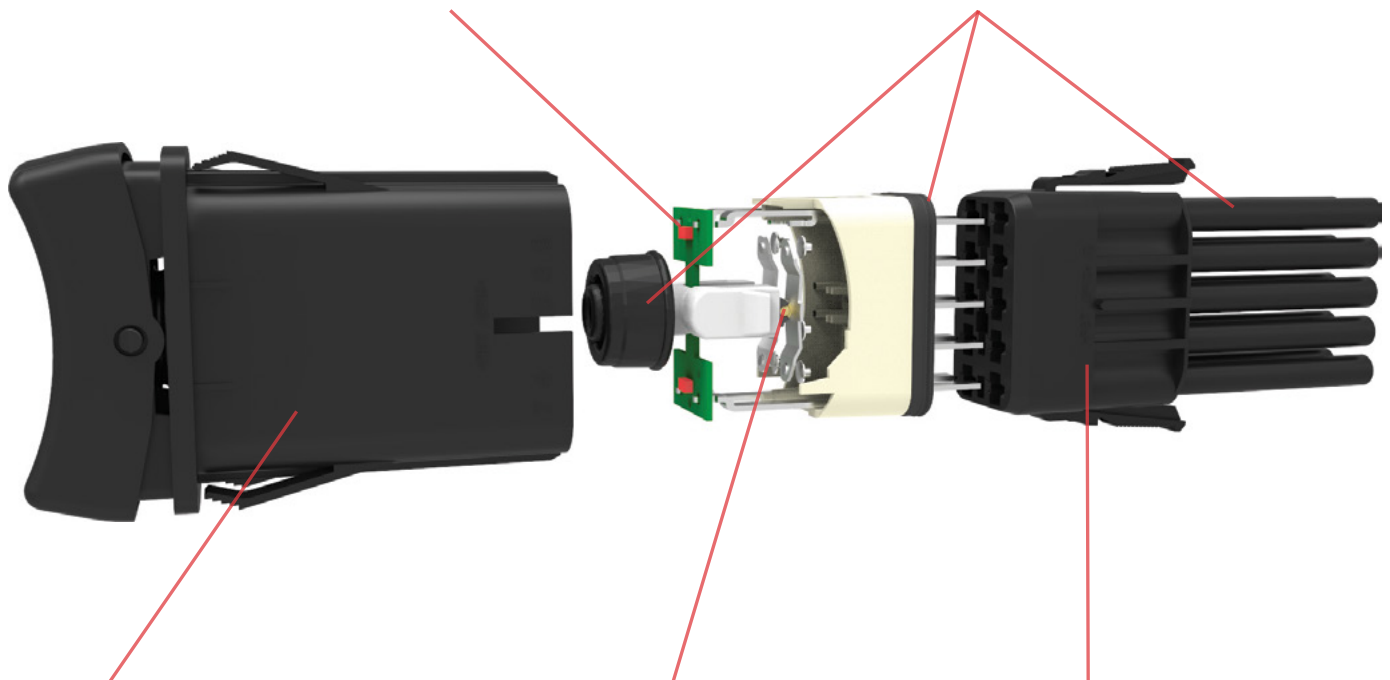
DESIGN FEATURES

ILLUMINATION

Choice of highly reliable SMT LED or incandescent lighting with 21 dependent or independent circuit options.

TRI-SEAL DESIGN

Sealing at actuator, an insert molded neoprene base seal, along with wire lead seals, assures water tight, fully submersible protection.



BODY

One piece polyester 94V0 seamless body acts as an umbrella to protect critical internal components.

ROLLER PIN

Proven reliable mechanism is lubricant free and allows for 100k electrical and 250k mechanical cycles, and withstands extreme temperatures from -40°C to +85°C.

INTEGRATED CONNECTOR

Accommodates Tyco/Amp .110 junior power timer contacts with twin locking tabs to provide a safe, secure, sealed connection.

Electrical

Contact Rating	.4VA @ 24VDC 10 amps, 3-24VDC
Dielectric Strength	1500 Volts RMS
Insulation Resistance	50 Megaohms
Initial Contact Resistance	10 milliohms max. @ 4 VDC
Life	100,000 cycles
Contacts	Silver tin-oxide, 88/12
Terminals	Copper with silver or gold plating
Quick Connect	Connect terminations.
Voltage	3-24 VDC
Overcurrent	15A for 50 cycles

Mechanical

Endurance	250,000 cycles minimum
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Physical

Lighted	LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24 VDC)
Seals	Neoprene
Base	Polyester blend rated to 125C with a UL flammability rating of 94V0.
Actuator	Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay.
Lens	Polycarbonate rated at 100°C
Function	2 & 3 Position Rocker Style
Operation	Maintained & Momentary
Base	PA 6/6 30GF (glass filled)
Actuator	PA 6/6 13GF
Bracket	PBT 10GF
Connector	PBT 10GF, polarized

Actuator Travel (Angular Displacement)

24° full throw

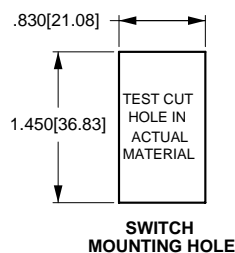
Environmental

Environmental	IP68, Fully sealed
Corrosion/ Chemical Splash	Flowing Mixed Gas (FMG) Class III 3 year accelerated exposure per ASTM B-827, B-845 -40°C to +85°C, 22 cycles, 300 hours
Operating Temperature	Per Mil-Std 202F, Method 204D Test Condition A 0.06 DA or 10G's 10-500 Hz.
Vibration 1	Resonance search 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max.
Vibration 2	Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025
Handling/Drop	One meter onto concrete floor
Salt Spray	Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs.
Dust	IP6X
Thermal Shock	Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C Test criteria - pre and post test contact resistance
Moisture Resistance/ Humidity	Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance

Mounting Specifications

Panel Thickness Range .032 to .125

For optimum panel fit, the following panel thicknesses are suggested: .032, .062, .093, .125



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

W
11
D
2
B
C
0
1
-
A
7
Z
00
-
0
00

1 Series 2 Circuit 3 Rating 4 Termination 5 Illumination 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens 11 Lens 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES
W

2 CIRCUIT

Terminal Connections as viewed () - momentary from bottom of switch: SP - single pole - uses terminals 1, 2 & 3. 8 terminal 10 terminal DP - double pole uses terminals 1, 2, 3, 4, 5 & 6. Terminals 7, 8, 9 & 10 for lamp circuit only.

8 - -7 8 - -7
1 - -4 1 - -4
2 - -5 2 - -5
3 - -6 3 - -6
10 - -9

Position:	1	2	3
SP DP	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
11 21	ON	NONE	OFF
12 22	(ON)	NONE	OFF
13 23	ON	NONE	(OFF)
14 24	ON	NONE	ON
15 25	ON	NONE	(ON)
16 26	ON	OFF	ON
17 27	ON	OFF	(ON)
18 28	(ON)	OFF	(ON)
- 49	ON	ON	ON

3 RATING

B 10A 24V
D 10A 12V
G 10A 6V
H 10A 3V

4 TERMINATION / BASE STYLE

2 .110 TAB (QC)

5 ILLUMINATION

Lamp #1: above terminals 1&4 end of switch.; Lamp #2 above terminals 3&6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

Lamps	Actuator Lens Position	Lamp Wired to Terminals
ILLUMINATION TYPE		
O NONE		
A #1	Independent	8+ 7-
B #1	Down	3+ 7-
C #2	Up	3+ 7-
D #1	Down	3+ 7-
& #2	Down	1+ 7-
E #1	Up	1+ 7-
& #2	Up	3+ 7-
F #1	Independent	8+ 7-
& #2	Up	3+ 6-
G #1	Independent	8+ 7-
& #2	Up	3+ 7-
H #2	Independent	8+ 7-
Selections for Single Pole Switches Only:		
J #1	Down	3+ 8-
& #2	Independent	6+ 7-
K #1	Independent	8+ 7-
& #2	Independent	6+ 7-
Selections for Double Pole Switches Only:		
L #1	Down	3+ 6-
M #2	Up	3+ 6-
N #1	Down	3+ 6-
& #2	Down	1+ 4-
P #1	Up	1+ 4-
& #2	Up	3+ 6-
R #1	Down	3+ 7-
& #2	Up	6+ 7-
S #1	Down	6+ 7-
& #2	Independent	8+ 7-
U #1	Independent	8+ 7-
& #2	Independent	10+ 9-
V #2	Independent	10+ 9-
W #1	Independent	8+ 7-
& #2	Independent	10+ 7-
Y #1 & #2	Independent in Series	8+ 7-
Z #1 & #2	Independent in Parallel	8+ 7-

6,7 LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

No lamp	Red	Amber	superbright Green	White
0				
2VDC	A	L	F	4
6VDC	B	M	G	5
12VDC	C	N	H	6
24VDC	D	P	J	8

* Consult factory for "daylight bright", blue/green and white LED options. Typical current draw for LED is 20ma.

8 BRACKET COLOR 1

1 Black

9 ACTUATOR 1,3

3 Black with Laser Etched
A Black

10 LENS - ABOVE LAMP #1 TERMINALS 1,4
11 LENS - ABOVE LAMP #2 TERMINALS 3,6

0 - No Actuator	Clear	White	Amber	Green	Red	Blue	Z - No Lens
1	-	B	G	M	T		Large Transparent
-	7	C	H	N	U		Large Translucent
3	-	D	J	P	V		Bar Transparent
-	9	E	K	R	W		Bar Translucent
5	A	-	-	-	-		Laser-Etched

Lens color for LEDs must be clear, white, or match color of LED.

12 ACTUATOR LENS OR BODY LEGEND 2

00 - No Legend this location/No actuator

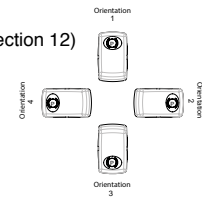
11 ON	12 OFF	13 I	14 O
OFF	ON	O	I
15 O O	16 O O	17 O I	18 I O
F N	N F		
F	F		
21 OFF	22 ON	23 O	24 I
O	26 O	27 O	28 I
F	N		
F			



For additional legend options & codes, visit us at carlingtech.com

13 LEGEND ORIENTATION

0 No legend (used with codes 11-18 in selection 12)
1 Orientation 1
2 Orientation 2
3 Orientation 3
4 Orientation 4



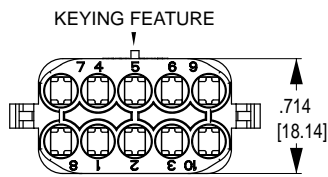
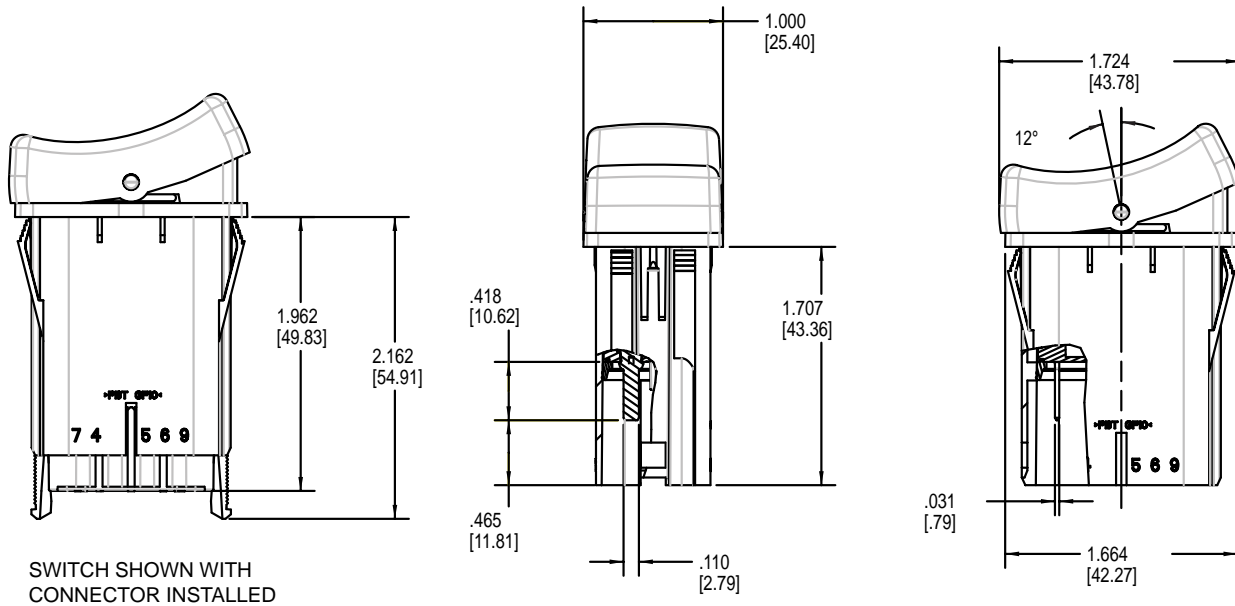
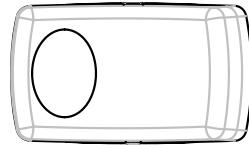
14 ACTUATOR LENS LEGEND 2

00 No legend this location/no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens & one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at carlingtech.com

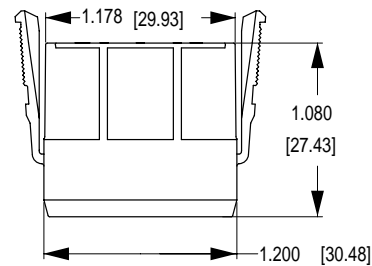
Notes:

- 1 Custom colors are available. Consult factory.
- 2 White imprinting is standard on black actuators; Black imprinting is standard on white, red & gray actuators; Custom colors are available, consult factory.
- 3 Locking rocker version is also available, consult factory for details.

Dimensional Specifications: in. [mm]



WCH CONNECTOR
(190-31214-001)



Notes:
 WCH connector is intended for use with Tyco/Amp .110 Junior Power Timer, female contacts, and wire seals.
 For 14-16 awg wire, specify Tyco/Amp P/N 927766-3
 For 16-20 awg wire, specify Tyco/Amp P/N 927770-3
 Tyco/Amp cable seal P/N 828904-1 (20-18 awg wire) or P/N 828905-1 (16-14 awg wire) is required for each individual wire lead, and Tyco/Amp cable plug, P/N 828922-1, is required to seal each unused connector opening. Consult Tyco/Amp for the cable seal recommended for your specific wire gauge and thickness.

L-Series

SEALED ROCKER SWITCHES

The L-Series rocker switch is an innovative product offering total design flexibility, while at the same time setting new standards for performance and reliability. Its versatile design features include a neatly proportioned size that fits into an industry standard mounting hole of 1.734 x .867 (44.0mm x 22.0mm), countless unique choices for ratings, circuits, colors, illuminations and laser etched legends. These single or double pole switches also feature a broad choice of actuator styles, colors, and lenses with up to twelve terminals offering an extensive range of switch and lamp circuit options, including LED or incandescent illumination. Additionally, an optional plug-in terminal connector enables pre-wiring of wire harness.



Resources:

Download 3D CAD Files



Watch Product Video



Product Highlights:

- ♦ IP67 certified sealed front panel components
- ♦ Withstands temperatures from -40°C to +85°C
- ♦ Vibration, shock, thermoshock, moisture and salt spray resistant

Typical Applications:

- ♦ Construction machinery
- ♦ Agricultural equipment
- ♦ On-highway transportation equipment



L-Series Switch

DESIGN FEATURES

LED LIGHTING

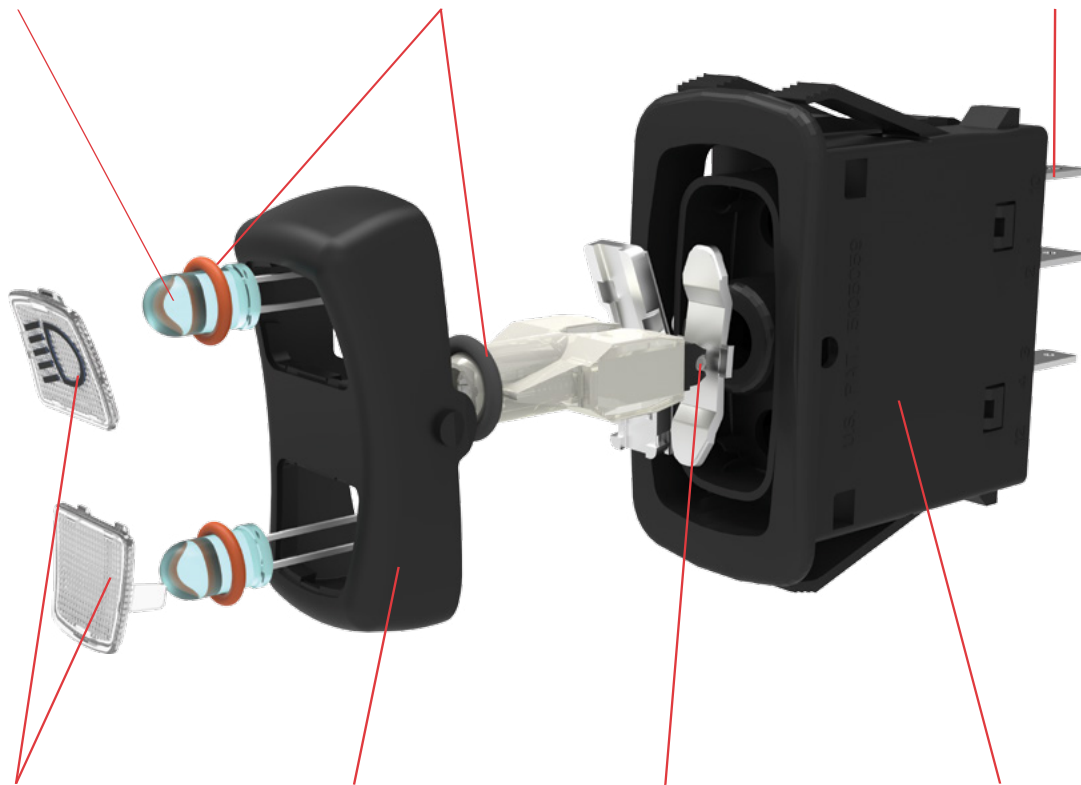
Utilize less current and are not affected by vibration, providing long lasting illumination. Available in 3 standard colors.

SEAL PROTECTION

Locks out elements such as water, dust & debris. Certified to IP67 for front panel components.

TERMINALS

Available with 2 industry standard termination options: .250 or .187 tabs with up to 12 terminal options.



LENS & LEGENDS

Lens available in 2 sizes and 6 standard colors in either translucent or transparent materials. Numerous symbols and text available for imprinting or laser etching.

ACTUATOR

Available in rocker or paddle styles. Several standard color options also available.

ROLLER PIN

Eliminates need for lubricants, increasing the temperature range of the switch from -40° C to +85° C [-40° F to 185° F].

BASE

Fits into industry standard mounting hole of 1.734 x .867 in [44.0mm x 22.0mm].

Electrical

Contact Rating	.4VA @ 24VDC (MAX) resistive 15 amps, 125VAC 10 amps, 250VAC 20 amps, 4-14VDC 15 amps, 15-28VDC
Dielectric Strength	1250 Volts RMS between pole to pole 3750 Volts RMS between live parts and accessible surfaces
Insulation Resistance	50 Megaohms
Initial Contact Resistance	10 milliohms max. @ 4 VDC
Life	100,000 cycles maintained, 50,000 cycles momentary at rated voltage and current
Contacts	90/10 silver-nickel, silver tin-gold
Terminals	Brass or copper/silver plate 3/16" (4.76mm) & 1/4" (6.3mm) Quick Connect terminations standard.

Mechanical

Endurance	250,000 cycles minimum
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Physical

Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24 VDC)
Seals	Rocker, base & bracket are sealed.
Base	Nylon 66 GF rated to 85°C with a flammability rating of 94V0.
Actuator	Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay.
Lock	Acetal
Lens	Polycarbonate rated at 100°C
Function	2 & 3 Position Rocker Style
Bracket	Nylon Zytel
Connector	Nylon 66 rated at 85°C. Polarized.

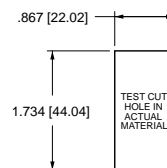
Actuator Travel (Angular Displacement)

2 position	26°
3 positions	13° from center

Environmental

Environmental	IP67 for above panel components of the actual switch, representing an index of protection as applied to electrical equipment in accordance with IEC 529, BS 5490, DIN 400 50 & NFC 20 010.
Corrosion	Mixed Flowing Gas MFG Class III per ASTM B-827 & B-845, Method H, with 3 years exposure.
Operating Temperature	-40°C to + 85°C
Vibration 1	Per Mil-Std 202F, Method 204D Test Condition A 0.06 DA or 10G's 10-500 Hz. Tested with
VCH	connector. Test criteria - No loss of circuit during test and pre and post test contact resistance. Resonance search 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025
Vibration 2	No loss of circuit during test; <10µ chatter. Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre, and post test contact resistance.
Shock	Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs. Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C. Test criteria - pre and post test contact resistance.
Salt Spray	Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance.
Thermal Shock	
Moisture Resistance	

Mounting Specifications



MOUNTING HOLE

Panel Thickness Range
 Acceptable Panel Thickness
 .030 to .156 (.76mm to 3.96mm)
 Recommended:
 .030, .062, .093, .125 and .156

L **11** **E** **3** **C** **H** **N** **1** - **3** **A** **A** **45** - **1** **48**

1 Series 2 Circuit 3 Rating 4 Termination 5 Illumination 6 Lamp 7 Lamp 8 Bracket 9 Actuator 10 Lens Style & Color 11 Lens Style & Color 12 Legend 13 Legend Orientation 14 Actuator Lens Legend

1 SERIES

L

2 CIRCUIT 2

Terminal Orientation



Position:	1	2	3
SP DP	2 & 4, 6 & 8	Connected Terminals	1 & 2, 5 & 6
11 21	ON	NONE	OFF
12 22	(ON)	NONE	OFF
13 23	ON	NONE	(OFF)
14 24	ON	NONE	ON
15 25	ON	NONE	(ON)
16 26	ON	OFF	ON
17 27	ON	OFF	(ON)
18 28	(ON)	OFF	(ON)

CIRCUITS WITH JUMPER TERMINALS

30*	(2,4&5), (1,6&8)	OFF, OFF	(1,2&8), (4,5&6)
31	1, 2 & 5	2, 3 & 7	2, 4 & 8

PROGRESSIVE CIRCUITS

51	3 & 4	2, 3	1 & 2
52	3 & 4	2, 3	OFF
53	(3 & 4)	2, 3	1 & 2
54	(3 & 4)	2, 3	(OFF)
55	(3 & 4)	2, 3	(1 & 2)
56	(3 & 4)	2, 3	(OFF)
57	3 & 4	2, 3	(OFF)
58*	2 & 4	2, 3	1 & 2
61	3 & 4, 7 & 8	2 & 3, 6 & 7	1 & 2, 5 & 6
62	3 & 4, 7 & 8	2 & 3, 6 & 7	OFF, OFF
63	(3 & 4), (7 & 8)	2 & 3, 6 & 7	1 & 2, 5 & 6
64	(3 & 4), (7 & 8)	2 & 3, 6 & 7	OFF, OFF
65	(3 & 4), (7 & 8)	2 & 3, 6 & 7	(1 & 2), (5 & 6)
66	(3 & 4), (7 & 8)	2 & 3, 6 & 7	(OFF, OFF)
67	3 & 4, 7 & 8	2 & 3, 6 & 7	(OFF, OFF)
68	2 & 4, 7 & 8	2 & 4, OFF	OFF, OFF
69*	2 & 4, 1, 7 & 8	2 & 4, OFF	OFF, OFF
70	(2 & 4), (7 & 8)	2 & 4, 5 & 7	(1 & 2), (5 & 7)
71	(2&4), (7 & 8)	2 & 4, 5 & 7	1 & 2, 5 & 7
72	2 & 4, 7 & 8	2 & 4, 5 & 7	1 & 2, 5 & 7
73	(2 & 4), (7 & 8)	2 & 4, OFF	OFF, OFF
80	2 & 4, 6 & 8	2 & 4, OFF	OFF, 5 & 6

HAZARD WARNING CIRCUITS

A2	6, 7 & 8, 3 & 4	NONE	OFF, 1 & 2
A3	6, 7 & 8, 2 & 4	NONE	OFF, 1 & 2

* Available with ratings 1, 4, & E only.

3 RATING 2

- 1** .4VA @ 28VDC Resistive
- 4** 10A 250VAC 1/2 HP, 15A 125VAC 1/2 HP, No Listings
- B** 15A 24V
- C** 20A 18V
- D** 20A 12V
- E** 15A 12V
- G** 20A 6V
- H** 20A 3V

4 TERMINATION 2,3

- 1** .250 (6.4mm) TAB (QC)
- 3** .187 (4.7mm) TAB (QC)

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- 1 Custom colors are available. Consult factory.
- 2 Circuits 30, 31, 58, 69 are not available with rating codes 4, C, D, G or H.
- 3 Termination 3 only available with rating codes 1, B, and E.
- 4 Not available with circuits 11-18, 51-57 and 69.

5 ILLUMINATION

Lamp #1: above terminals 9 & 10 end of switch.; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

S	Lamps	Illumination Type	Lamp Wired to Terminals
A	# 1	Independent	10+ 9-
B	# 2	Independent	12+ 11-
C	# 1	Independent	10+ 9-
	& # 2	Independent	12+ 9-
D	# 1	Dependent	4+ 9-
E	# 1	Independent	10+ 9-
	& # 2	Dependent	4+ 9-
F ⁴	# 1	Independent	10+ 9-
	& # 2	Dependent	8+ 9-
G	# 1	Dependent	4+ 9-
	& # 2	Independent	10+ 9-
H	# 1	Both Independent	10+ 9-
	& # 2	(in series)	
J	# 1	Dependent	4+ 9-
	& # 2	Dependent	1+ 9-
1	# 2	Hazard	6+ 10- 12-
2	# 1	Hazard	6+ 10- 12-

6,7 LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 10 & 9; Selection 7: above terminals 12 & 11

No lamp	0				
Incandescent	4 3V	5 6V	6 12V	7 18V	8 24V
LED*	Red	Amber	Green		
2VDC	A	L	F		
6VDC	B	M	G		
12VDC	C	N	H		
24VDC	D	P	J		

* Consult factory for "daylight bright", blue/green and white LED options. Typical current draw for LED is 20ma.

8 BRACKET COLOR 1

	Black	White	Gray	Red
Standard Bracket	1	2	3	4
Rockerguard at Lamp 1	A	B	C	D
Rockerguard at Lamp 2	E	F	G	H

9 ACTUATOR STYLE AND COLOR 1

	Black	White	Gray	Red	Laser Etched
Rocker	A	B	C	D	3
Paddle	J	N	K	M	4

10 & 11 LENS STYLE AND COLOR

Lens color for LEDs must be clear, white, or match color of LED.

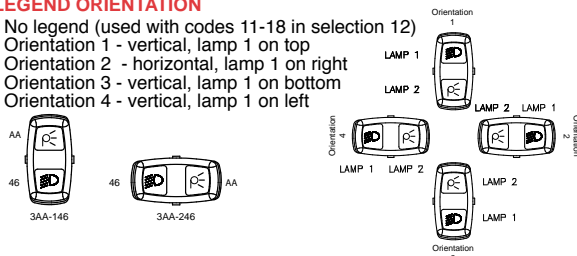
0 - No Actuator	Z - No Lens				
Clear	White	Amber	Green	Red	Blue
1	-	B	G	M	T Large Transparent
-	7	C	H	N	U Large Translucent
3	-	D	J	P	V Bar Transparent
-	9	E	K	R	W Bar Translucent
5	A	-	-	-	- Laser Etched <i>background color</i>

12 LASER ETCHED, LENS OR BODY LEGEND

00 No legend this location / no actuator
For legend options & codes, visit us at carlingtech.com

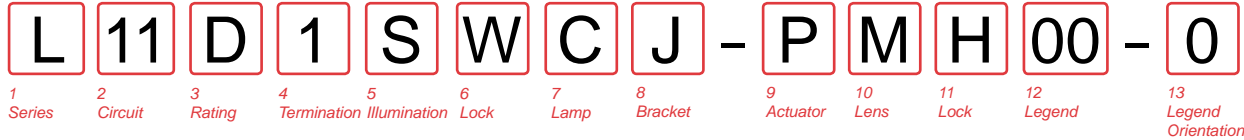
13 LEGEND ORIENTATION

- 0** No legend (used with codes 11-18 in selection 12)
- 1** Orientation 1 - vertical, lamp 1 on top
- 2** Orientation 2 - horizontal, lamp 1 on right
- 3** Orientation 3 - vertical, lamp 1 on bottom
- 4** Orientation 4 - vertical, lamp 1 on left



14 ACTUATOR LENS LEGEND

00 No legend this location / no actuator
For legend options & codes, visit us at carlingtech.com



1 SERIES

L

2 CIRCUIT 5

Terminal Orientation



() - momentary
 SP - single pole - uses terminals 1, 2 & 4.
 DP - double pole uses terminals 5, 6 & 8.
 Terminals 9, 10 & 11 for lamp circuit only.

Position:	1	2	3
SP DP	2 & 4, 6 & 8	Connected Terminals	1 & 2, 5 & 6
11 21	ON	NONE	OFF
14 24	ON	NONE	ON
16 26	ON	OFF	ON
17 27	ON	OFF	(ON)
18 28	(ON)	OFF	(ON)

CIRCUITS WITH JUMPER TERMINALS

30 ²	(2,4&5), (1,6&8)	OFF, OFF	(1,2&8), (4,5&6)
31 ²	1, 2 & 5	2, 3 & 7	2, 4 & 8

PROGRESSIVE CIRCUITS

51	3 & 4	2, 3	1 & 2
52	3 & 4	2, 3	OFF
53	(3 & 4)	2, 3	1 & 2
54	(3 & 4)	2, 3	(OFF)
55	(3 & 4)	2, 3	(1 & 2)
56	(3 & 4)	2, 3	(OFF)
57	3 & 4	2, 3	(OFF)
58	2 & 4	2, 3	1 & 2
61	3 & 4, 7 & 8	2 & 3, 6 & 7	1 & 2, 5 & 6
62	3 & 4, 7 & 8	2 & 3, 6 & 7	OFF, OFF
63	(3 & 4), (7 & 8)	2 & 3, 6 & 7	1 & 2, 5 & 6
64	(3 & 4), (7 & 8)	2 & 3, 6 & 7	OFF, OFF
65	(3 & 4), (7 & 8)	2 & 3, 6 & 7	(1 & 2), (5 & 6)
66	(3 & 4), (7 & 8)	2 & 3, 6 & 7	(OFF, OFF)
67	3 & 4, 7 & 8	2 & 3, 6 & 7	(OFF, OFF)
68	2 & 4, 7 & 8	2 & 4, OFF	OFF, OFF
69	2 & 4, 1, 7 & 8	2 & 4, OFF	OFF, OFF
70	(2 & 4), (7 & 8)	2 & 4, 5 & 7	(1 & 2), (5 & 7)
71	(2&4), (7 & 8)	2 & 4, 5 & 7	1 & 2, 5 & 7
72	2 & 4, 7 & 8	2 & 4, 5 & 7	1 & 2, 5 & 7
73	(2 & 4), (7 & 8)	2 & 4, OFF	OFF, OFF
80	2 & 4, 6 & 8	2 & 4, OFF	OFF, 5 & 6

3 RATING 2

- 1 .4VA @ 28VDC Resistive
- 4 10A 250VAC 1/2 HP, 15A 125VAC 1/2 HP, No Listings
- B 15A 24V
- C 20A 18V
- D 20A 12V
- E 15A 12V
- G 20A 6V
- H 20A 3V

4 TERMINATION 4

- 1 .250 (6.4mm) TAB (QC)
- 3 .187 (4.7mm) TAB (QC)

5 ILLUMINATION

Lamp #1: above terminals 9 & 10 end of switch.; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

Lamps	Illumination Type	Lamp Wired to Terminals
S	None	
B	# 2	Independent 12+ 11-

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- 1 Custom colors are available. Consult factory.
- 2 Additional lamp circuits available. Consult factory.
- 3 Available only with 3 position circuits.
- 4 Termination 3 only available with ratings 1, B and E.
- 5 Circuits 30, 31, 58 and 69, are not available with rating codes 4, C, D, G or H.

6 LOCK

W Lock above terminals 10 & 9.

7 LAMP

Above terminals 12 & 11

No lamp	0				
Incandescent	4 3V	5 6V	6 12V	7 18V	8 24V
LED*	Red	Amber	Green		
2VDC	A	L	F		
6VDC	B	M	G		
12VDC	C	N	H		
24VDC	D	P	J		

* Consult factory for "daylight bright", blue/green and white LED options.
 Typical current draw for LED is 20ma.

8 BRACKET COLOR 1

J Black

9 ACTUATOR STYLE AND COLOR 1

Locking Rocker	Black	Red
	P	R

10 & 11 LENS STYLE AND COLOR

Lens color for LEDs must be clear, white, or match color of LED.

0 - No Actuator Z - No Lens

Clear	White	Amber	Green	Red	Blue	
1	-	B	G	M	T	Large Transparent
-	7	C	H	N	U	Large Translucent
3	-	D	J	P	V	Bar Transparent
-	9	E	K	R	W	Bar Translucent

11 LOCK FUNCTION AND COLOR

Locking Position

Up	Down	Up & Down	Center 3	Lock Color
A	H	R	1	Match Actuator
B	J	S	2	Black
C	K	T	3	White
D	L	V	4	Red
E	M	W	5	Safety Orange

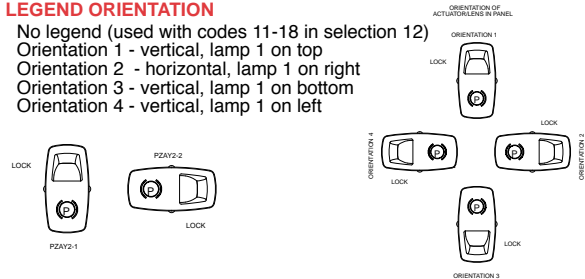
12 LASER ETCHED, LENS OR BODY LEGEND

00 No legend this location / no actuator
 For legend options & codes, visit us at carlingtech.com

13 LEGEND ORIENTATION

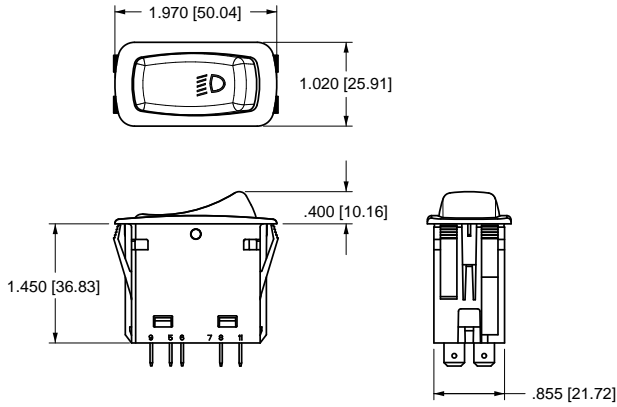
0 No legend (used with codes 11-18 in selection 12)

- 1 Orientation 1 - vertical, lamp 1 on top
- 2 Orientation 2 - horizontal, lamp 1 on right
- 3 Orientation 3 - vertical, lamp 1 on bottom
- 4 Orientation 4 - vertical, lamp 1 on left

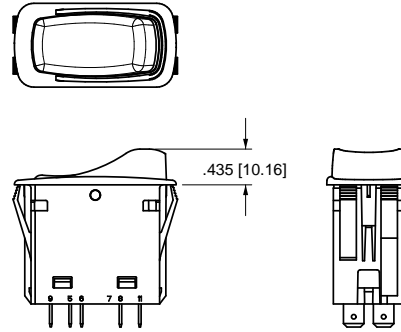


Dimensional Specifications: in. [mm]

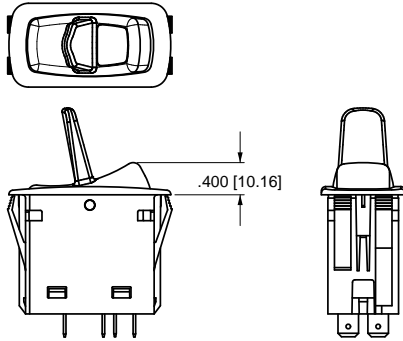
L-SERIES
SHOWN WITH LASER ETCHED
ACTUATOR



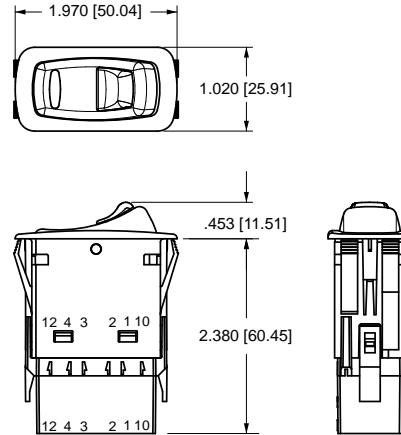
L-SERIES
SHOWN WITH ROCKER GUARD



L-SERIES
SHOWN WITH LARGE LENS
AND PADDLE ACTUATOR

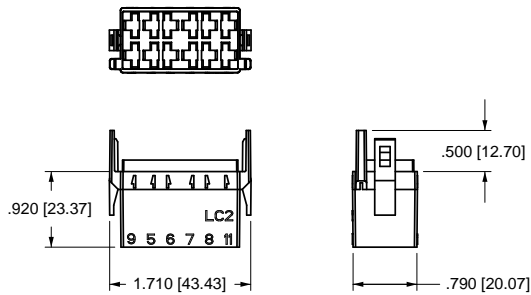


L-SERIES
SHOWN WITH BAR LENS, LOCK
AND CONNECTOR



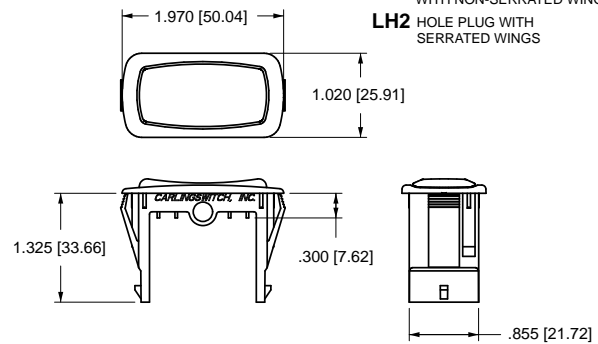
Connector **L-SERIES** CONNECTOR

- LC1-01** BLACK .250 TAB CONNECTOR (PACKARD 630 SERIES)
- LC2-01** BLACK .187 TAB CONNECTOR (PACKARD 480 SERIES)
- LC3-01** BLACK .250 TAB CONNECTOR (AMP ONLY)

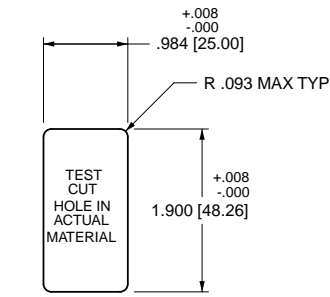


Hole Plug **L-SERIES** HOLE PLUG

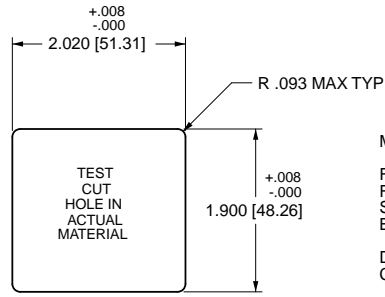
- LH1** REMOVABLE HOLE PLUG WITH NON-SERRATED WINGS
- LH2** HOLE PLUG WITH SERRATED WINGS



Dimensional Specifications: in. [mm]



LMS MOUNTING PANEL HOLE



MOUNTING PANEL OPENING (2) UNITS

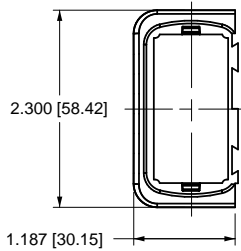
MOUNTING PANEL

FOR ADDITIONAL UNITS, ADD 1.03 [26.2] PER UNIT. FOR MORE THAN 2 L-SERIES SWITCHES, ADD MIDDLE SECTION, AVAILABLE IN PANEL THICKNESSES LISTED BELOW. CONSULT FACTORY

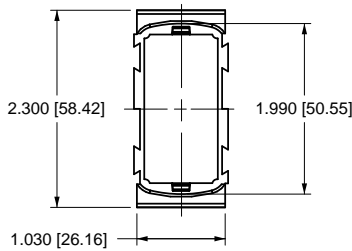
DIMENSIONS: LME 2.02 [51.3mm] PLUS NUMBER OF CENTER BEZELS (LMM) X 1.034 [26.26mm]

MOUNTING PANEL THICKNESS

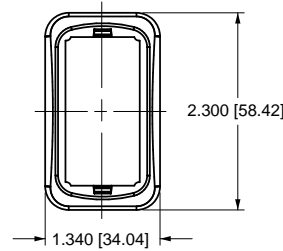
- .062 [1.57]
- .093 [2.36]
- .125 [3.17]
- .156 [3.96]



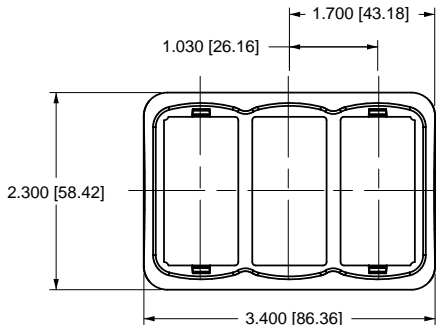
LME MOUNTING PANEL END



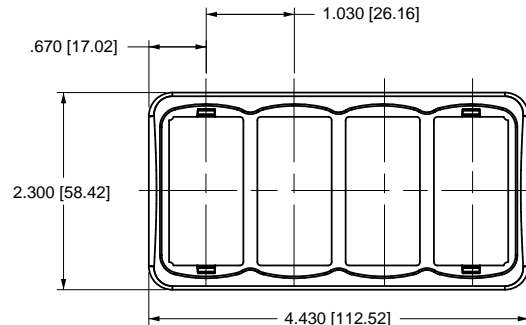
LMM MOUNTING PANEL MIDDLE



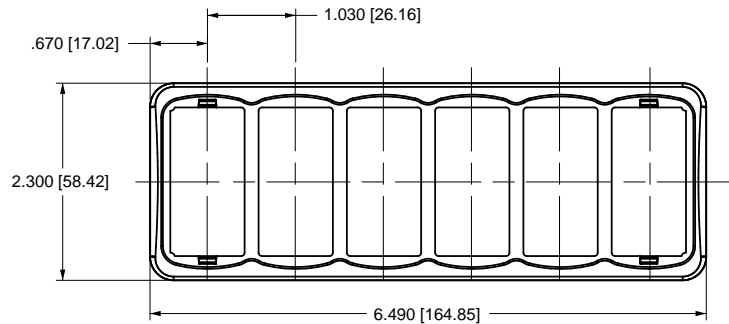
LMS MOUNTING PANEL



LM3 MOUNTING PANEL
PANEL OPENING SIZE: 1.90 X 3.06 [48.3mm X 77.7mm]



LM4 MOUNTING PANEL
PANEL OPENING SIZE: 1.90 X 4.09 [48.3mm X 103.9mm]



LM6 MOUNTING PANEL
PANEL OPENING SIZE: 1.90 X 6.15 [48.3mm X 156.2mm]

Circuit Diagrams:

CIRCUIT CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC
11		22		51	
12		23		52	
13		24		53	
14		25		54	
15		26		55	
16		27		56	
17		28		57	
18		30		58	
21		31		61	

Circuit Diagrams:

CIRCUIT CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC
62		71	
63		72	
64		73	
65		80	
66		81	
67		82	
68		A2	
69		A3	
70			

Lamp Circuit Diagrams:

ILLUMIN. CODE	SCHEMATIC
A	
B	
C	
D	
E	
F	
G	
H	

ILLUMIN. CODE	SCHEMATIC
J	
1	
2	
K	

LEGEND	
SYMBOL	DEFINITION
	TERMINAL LOCATION
	LAMP LOCATION
	MAINTAINED CIRCUIT
	MOMENTARY CIRCUIT
	INTERNAL CONNECTION (JUMPER TERMINAL)
	2 POSITION CONNECTION
	2 POSITION
	3 POSITION

LP-Series

ILLUMINATED INDICATORS

The LP-Series Illuminated Indicators are the perfect complement to the aesthetics, reliability and performance of our L-Series rocker switches. As a critical safety feature, the illumination alerts the operator of essential system functions or malfunctions, such as: Oil Pressure, High Temperature, Transmission or other fluid levels, Parking Brake or General System confirmations. The L-Series styling assures seamless integration into most any dashboard panel.



Product Highlights:

- ◆ Vibration, Shock, and Thermoshock Resistant
- ◆ 12 or 24 Volts
- ◆ Laser Etched or Lens Illumination
- ◆ IP67 Sealing

Typical Applications:

- ◆ On/Off-Highway Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment



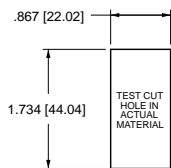
Electrical

Terminals	Brass or copper/silver plate 3/16" (4.76mm) & 1/4" (6.3mm) Quick Connect terminations standard.
Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC)

Physical

Seals	Insert, base & bracket are sealed.
Base	Nylon 66 GF rated to 85°C with a flammability rating of 94VO.
Insert	Polycarbonate rated at 100°C.
Connector	Nylon 66 rated at 85°C. Polarized
Markings	Over 1000 pad printed or laser etched legends available
Bracket	Nylon 66 GF rated to 85°C

Mounting Specifications

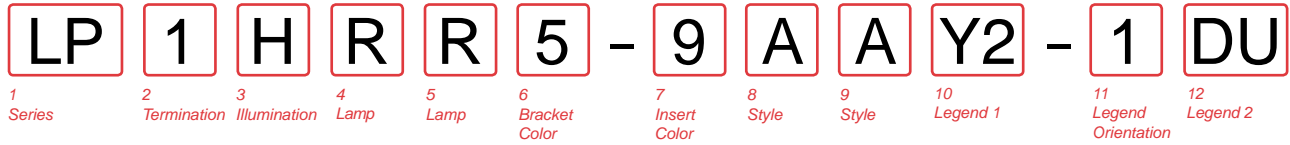


MOUNTING HOLE

Panel Thickness Range
 Acceptable Panel Thickness
 .030 to .156 (.76mm to 3.96mm)
 Recommended:
 .030, .062, .093, .125 and .156

Environmental

Environmental	IP67, representing an index of protection as applied to electrical equipment in accordance with IEC 529, BS 5490, DIN 400 50 & NFC 20 010.
Corrosion Resistance	Mixed Flowing Gas MFG Class III per ASTM B-827 & B-845, Method H, with 3 years exposure.
Operating Temperature	-40°C to +85°C
Vibration 1	Per Mil-Std 202F, Method 204D Test Condition A 0.06 DA or 10G's 10- 500 Hz. Tested with VCH connector. Test criteria - No loss of circuit during test and pre and post test contact resistance.
Vibration 2	Resonance search 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025 No loss of circuit during test; <10µ chatter.
Shock	Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre, and post test contact resistance.
Salt Spray	Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs.
Thermal Shock	Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C. Test criteria - pre and post test contact resistance.
Moisture Resistance	Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance.



1 SERIES
LP L-Series Illumination Plug

2 TERMINATION³
1 .250 (8.35) x .032 (0.51) Quick Connect
3 .187 (4.75) x .032 (0.51) Quick Connect

3 ILLUMINATION

A	LAMPS	ILLUMINATION	LAMP WIRED TO TERMINALS
A	1	—	10 (+) 8 (-)
B	1	—	10 (+) 8 (-)
	2	—	12 (+) 11 (-)
C	1	—	10 (+) 8 (-)
	2	—	12 (+) 8 (-)
E	1 & 2	Parallel	10 (+) 8 (-)
H	1 & 2	Series	10 (+) 8 (-)

LAMP 1 LOCATED ABOVE TERMINALS 9 & 10 END OF BRACKET.
 LAMP 2 LOCATED ABOVE TERMINALS 11 & 12 END OF BRACKET.
 POSITIVE (+) AND NEGATIVE (-) SYMBOLS APPLY TO LED LAMPS ONLY.

4,5 LAMP (same coding for both selections)²
 Selection 4: specifies lamp 1 located above terminals 10 (+) & 9 (-).
 Selection 5: specifies lamp 2 located above terminals 12 (+) & 11 (-).

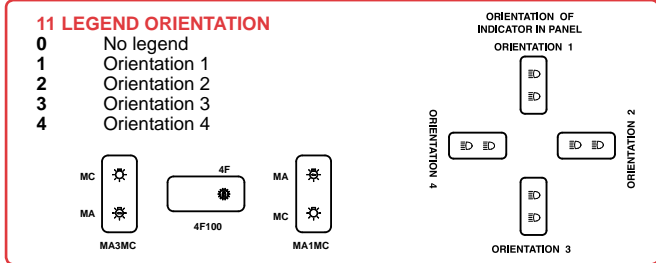
No lamp	0	(position 5 only)			
Incandescent	4	3V	5	6V	6 12V 7 18V 8 24V
LED		Amber		Green	Red
2VDC	L		F		R
6VDC	M		G		S
12VDC	N		H		T
24VDC	P		J		V

6 BRACKET COLOR
5 Black

7 INSERT COLOR^{1,2}
9 Painted Black - Laser Etch
A Clear (Transparent)
B White (Translucent)
C Red (Translucent)
D Amber (Translucent)
E Green (Translucent)
F Blue (Translucent)

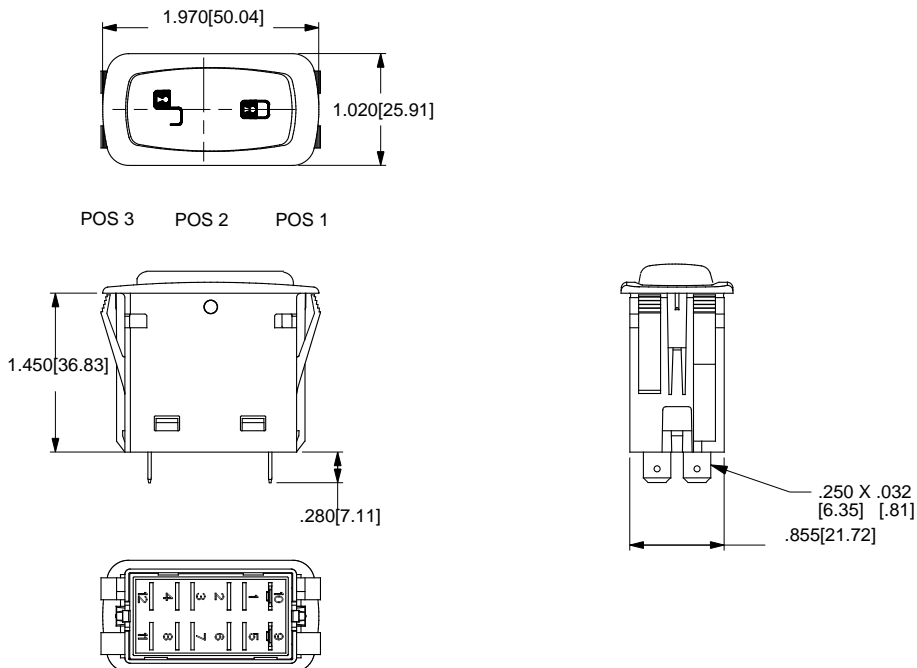
8, 9 STYLE (same coding for both selections)
Z Not Painted (used with Insert Colors A-F)
5 Clear Laser Etch Background Color (used with Insert Color 9)
A White Laser Etch Background Color (used with Insert Color 9)

10 LEGEND OVER LAMP¹
00 No legend
 — Laser Etched or Body Legends
 For legend options, visit us at carlingtech.com



12 LEGEND OVER LAMP²
00 No legend
 — Laser Etched or Body Legends
 For legend options, visit us at carlingtech.com

- Notes:
 1 To order separately, specify LPC and selection 7 code. Ex LPC-9
 2 For LEDs, insert color must be clear, white or match color of LED.
 3 For connector, specify part number LC2-01 (.187 tabs), LC3-01 (.250 tabs).



LD-Series

ELECTRONIC DIMMER CONTROLS

The LD-Series represents a dynamic breakthrough in dashboard technology, with its programmable circuitry, superior design, and unparalleled performance that affords seamless integration into most any dash panel. A variety of options, along with superior performance, functionality, and aesthetics assure compliance with the most stringent customer requirements. Key features include: robust design package with all components encased in switch housing, eliminating wire chafing, providing cost-savings as well; minimized electrical connections; IP67 sealing which prevents PCB degradation and eliminates short circuit potential. Superior heat dissipation is achieved with a heat sink mass which is over 50% larger than competitive products. Fully programmable circuitry lets the designer decide illumination levels and detent positions. EMC eliminates electrical “noise” and provides interference-free radio signals. Ease of assembly is accommodated with polarized integral connectors and an industry standard mounting hole.



Product Highlights:

- ◆ 3 Choices for incremental dimming rates
- ◆ 12 or 24 Volts
- ◆ Laser Etched or Lens Illumination
- ◆ IP67 Sealing

Typical Applications:

- ◆ On/Off-Highway Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment



Electrical

Contact Rating	.4VA @ 24VDC (MAX) resistive 15 amps, 125VAC 10 amps, 250VAC 20 amps, 4-14VDC 15 amps, 15-28VDC
Dielectric Strength	1250 Volts RMS between pole to pole 3750 Volts RMS between live parts and accessible surfaces
Insulation Resistance	50 Megaohms
Initial Contact Resistance	10 milliohms max. @ 4VDC
Life	100,000 cycles maintained, 50,000 cycles momentary at rated voltage and current
Contacts	90/10 silver-nickel, silver tin-oxide, gold
Terminals	Brass or copper/silver plate 3/16" (4.76mm) & 1/4" (6.3mm) Quick Connect terminations standard.

Mechanical

Endurance	.250,000 cycles minimum
-----------	-------------------------

Physical

Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24 VDC)
Seals	Rocker, base & bracket are sealed
Base	Nylon 66 GF rated to 85°C with a flammability rating of 94V0
Rocker	Nylon 66 Reinforced, rated to 105°C (modular lens). Locking rocker, standard rocker & paddle. Laser etching with a polycarbonate actuator
Lock	Acetal
Lens	Polycarbonate rated at 100°C
Bracket	Nylon Zytel
Connector	Nylon 66 rated at 85°C. Polarized

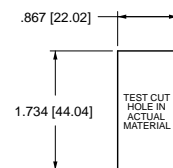
Actuator Travel (Angular Displacement)

2 position	26°
3 positions	13° from center

Environmental

Environmental	IP67 for above panel components of the actual switch, representing an index of protection as applied to electrical equipment in accordance with IEC 529, BS 5490, DIN 400 50 & NFC 20 010.
Corrosion	Mixed Flowing Gas MFG Class III per ASTM B-827 & B-845, Method H, with 3 years exposure
Operating Temperature	-40°C to + 85°C
Vibration 1	Per Mil-Std 202F, Method 204D Test Condition A 0.06 DA or 10G's 10-500 Hz. Tested with VCH connector. Test criteria - No loss of circuit during test and pre and post test contact resistance
Vibration 2	24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025 No loss of circuit during test; <10µ chatter.
Shock	Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre, and post test contact resistance
Salt Spray	Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs.
Thermal Shock	Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C. Test criteria - pre and post test contact resistance
Moisture Resistance	Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance

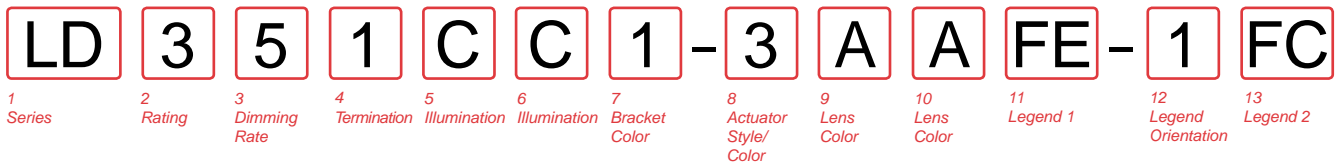
Mounting Specifications



MOUNTING HOLE

Panel Thickness Range
Acceptable Panel Thickness
.030 to .156 (.76mm to 3.96mm)
Recommended:
.030, .062, .093, .125 and .156

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



1 SERIES
LD Electronic Dimmer Control

2 RATING
1 4A, 12 volts
2 10A, 12 volts
A 2A, 24 volts
C 5A, 24 volts

3 DIMMING RATE
1 30 - 100% 8 positions
5 10 - 100% 10 positions
A 0 - 100% 11 positions

4 TERMINATION
1 .250 TABS (6.4 mm)

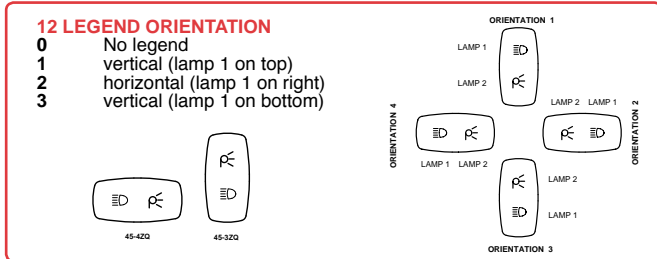
5 & 6 ILLUMINATION
No lamp S
12V LED C N H
24V LED D P J

7 BRACKET COLOR 1
1 Black 2 White 3 Gray

8 ACTUATOR STYLE / COLOR 1
Rocker Laser Etched Black White Gray Red
Paddle 3 A B C D
4 J K M N

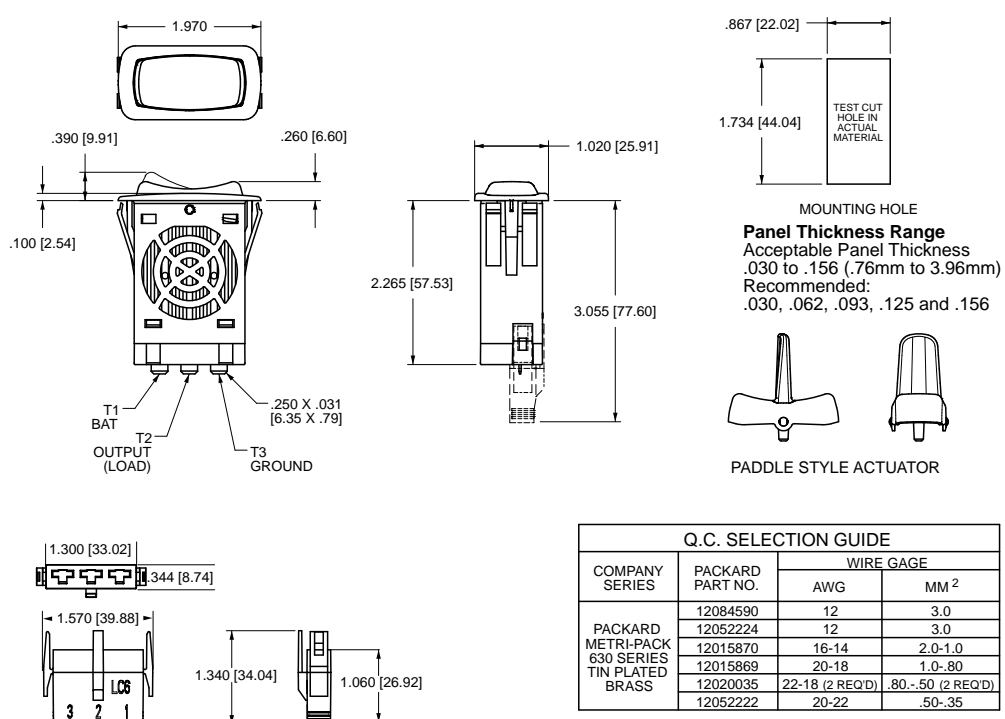
9 & 10 LENS COLOR
Z No Lens
1 Clear 2 White 3 Amber 4 Green 5 Red 6 Blue
7 B G M T
8 C H N U
9 D J P V
10 E K R W
11 A - - - -
Lens Style
Large Transparent
Large Translucent
Bar Transparent
Bar Translucent
Laser Etch

11 LEGEND #1
00 No legend FC Dim FE Bright
For legend options, visit us at carlingtech.com



13 LEGEND #2
00 No legend FC Dim FE Bright
For legend options, visit us at carlingtech.com

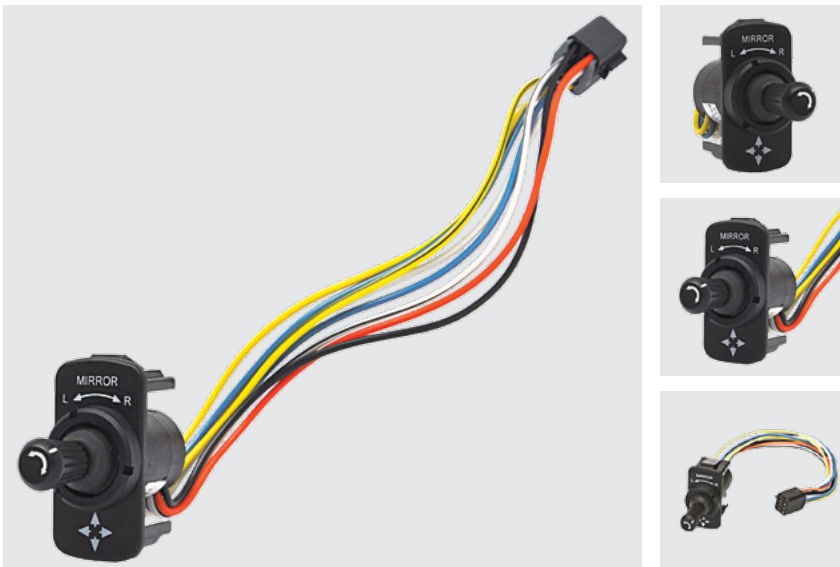
Notes:
1 Custom colors are available. Consult factory.



LMR-Series

MIRROR ROTATE CONTROLS

As an extension of the L-Series family of control products, the LMR-Series provides the means to control one or two mirrors and up to four separate motors from one easy to operate joy stick control. When used in conjunction with our dimmer control and wiper/washer control, Carling Technologies provides a solution to most any dashboard control need within the Transportation market.



Product Highlights:

- ◆ Two or four axis
- ◆ Controls up to four separate motors
- ◆ Industry standard 44 x 22mm mounting hole
- ◆ Includes Delphi-Packard 8 pin connector

Typical Applications:

- ◆ On/Off-Highway Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment



Actuator

4 axis joy stick style

Electrical

1A 14V; .5A 28V

Sealing

internal boot and potted wire leads protect critical components from dust and moisture

Termination ¹

9" wire leads with Delphi-Packard connector #12047886 ³

Mechanism

Sliding contacts in conjunction with a circuit board

LMR - 01 - 1

1 Base Part Number 2 Color 3 Legend

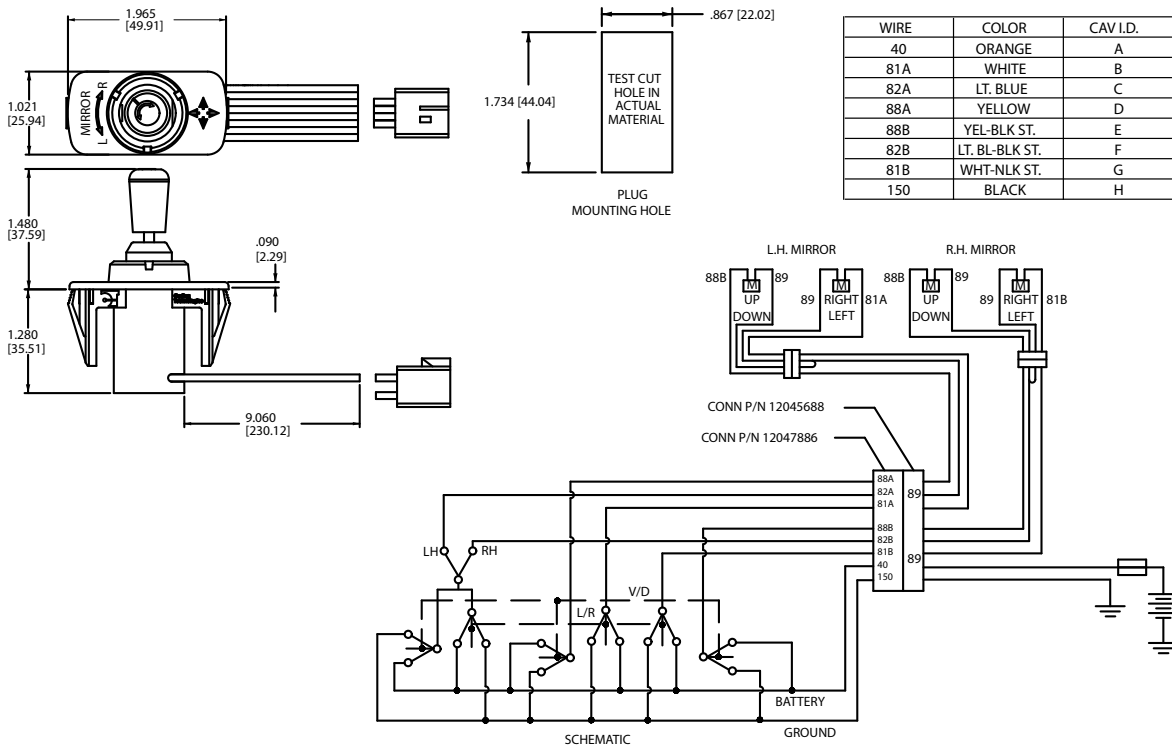
1 BASE PART NUMBER: SERIES / RATING / FUNCTION / TERMINATION
LMR 2 position (left, right), 4 axis (N,S,E,W) with wire leads

2 ACTUATOR /BRACKET COLOR
01 Black

3 LEGEND ²
Z no legend
1 2 arrows symbol (left, right)
2 4 arrows symbol (front, back and left, right)

Notes:

- 1 Compatible with Delphi-Packard #12045688.
- 2 All legends are imprinted in white. All product supplied with Mirror L & R legend on top of bracket and detent and directional legend on actuator.
- 3 Delphi-Packard is a registered trademark of Delphi-Packard Electrical Systems, Warren, Ohio.



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

LW-Series

WIPER/WASHER CONTROLS

The LW-Series Electronic Wiper Washer Control combines two switches into one self-contained unit allowing effortless control of both wash and wipe functions from a singular location. A variety of features and options including, Continuous low and high speed wiper positions, Six intermittent delay intervals ranging from 3-18 seconds, Push-to-wash button and an LED Night-light indicator combine to provide the flexibility to meet most any Cab design. The LW series is available for 14 or 28 volt operation and can be adapted to single or dual relay systems.



Product Highlights:

- ◆ Controls both wash and wipe functions of vehicles
- ◆ 14 or 28 Volts
- ◆ Illuminated or Non-illuminated options
- ◆ Laser etched legends available

Typical Applications:

- ◆ On/Off-Highway Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment



Electrical

Contact Rating	1 relay 8 amps, 14VDC 4 amps, 28VDC 2 relays 1 amps, 14VDC 1 amps, 28VDC
Terminals	.187 (7.4mm) Quick Connect terminations standard.
Protection	Reverse polarity protection Over voltage protection Cold cranking protection according to SAE J1455, Sections. 4.11.1.1.1 and 4.11.1.2.1 Transient voltage protection which includes load dump and inductive switching according to SAE J1455, sec. 4.11.2.2 Electrostatic discharge protection according to SAE J1455 Sec. 4.11.2.2.5.1 (Discharge a 150 pf capacitor that has been charged to a potential of 15kV through 150 Ohm resistor.) Meets all other EMI/EMC requirements for class C trucks.

Mechanical

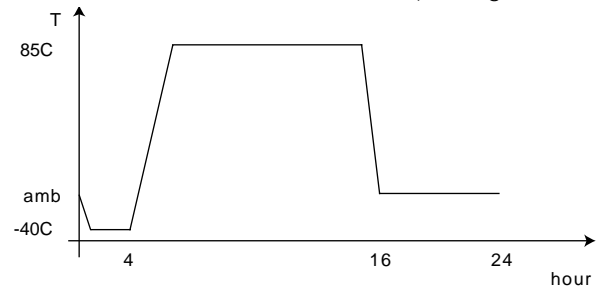
Mechanical Vibration	Sinusoidal Vibration: 10-55-10 Hz, 0.06" DA, one minute-cycle, three hours/axis Random Vibration: Three hours/axis, three mutually perpendicular axes with a test level 4G's. Frequency Amplitude 5Hz 0.16 G2/Hz 100Hz 0.16 G2/Hz 500Hz -3dB/octave roll-off Tests were conducted according to SAE J1455, Sec 5.7 and Sec. 4.9.4. Shock: MIL-STD-202G Method 213B, Test Condition K, 30G's, 11 ms.
Endurance	According to SAE J2349, March 97 for windshield washer switch for Trucks, Buses and Multipurpose Vehicles (20,000 cycle minimum).

Physical Characteristics

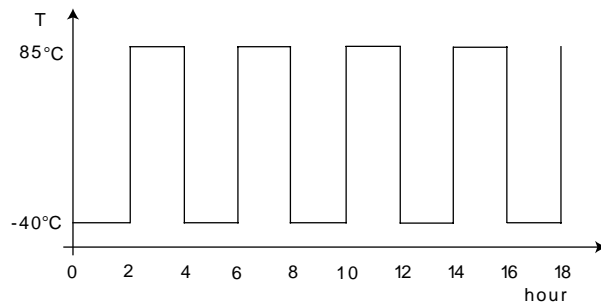
Illumination	LED, rated 100,000 hours 1/2 life
Cover	Acetate
Washer Actuator	Silicone
Toggle Actuator	Nylon 6/6 glass filled
Bracket	Nylon 6/6
Connector	Nylon 6/6 rated 85°C polarized
Washer Function	Momentary
Toggle Function	Maintained Intermittent
Operation	Momentary
Weight	44 grams

Environmental

Operating Temperature	-25°C to +85°C
Temperature Cycle	According to SAE J1455, Sec. 4.1.3.1 (See Figure below)

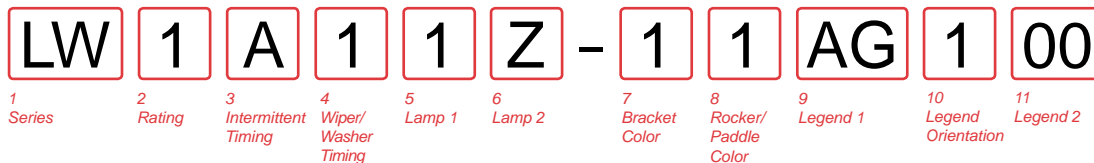


Thermal Shock	According to SAE J1455, Sec. 4.1.3.2 (See Figure below)
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Humidity	According to SAE J1455, Sec. 4.2.3 (30 cycles for 8 hrs. with maximum temperature of 85°C and 95% relative humidity.
Dust Bombardment	According to SAE J1455, Sec. 4.7.3 (with dust concentration of 0.88gm/m ³ for 24 hours.)
Salt Spray	MIL-STD-202G, Method 101D for 96 hours.

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



1 SERIES
LW Wiper/Washer Control with six intermittent positions:
 low, high, wash/wipe

2 RATING 1
1 8A, 14VDC (1 relay) **4** 1A, 14VDC (1 relay)
2 4A, 28VDC (1 relay) **5** 1A, 14VDC (2 relay)
3 1A, 14VDC (1 relay) **6** 1A, 28VDC (2 relay)

3 INTERMITTENT TIMING
A 2-15 seconds

4 WIPER/WASHER TIMING
1 3 seconds

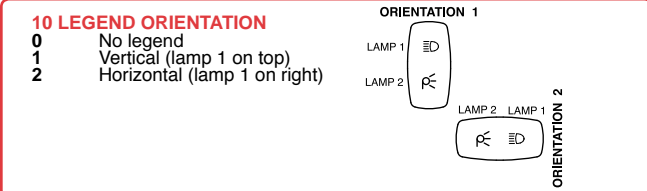
5 LAMP #1 (ABOVE WASH)
Z No Lamp **2** Red LED
1 Green LED **3** Amber LED

6 LAMP #2 (ABOVE WIPE)
Z No Lamp **2** Red LED
1 Green LED **3** Amber LED

7 BRACKET COLOR
1 Black

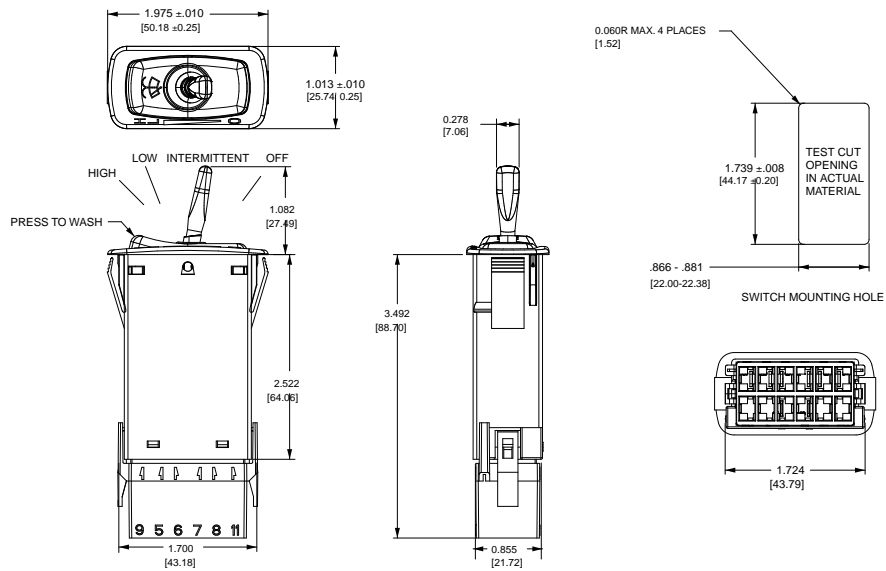
8 ROCKER / PADDLE COLOR
1 Black

9 LEGEND #1
00 No legend
 For legend options, visit us at carlingtech.com



11 LEGEND #2
00 No legend
 For legend options, visit us at carlingtech.com

Notes:
 1 Relay coil current is 1A max. Relay must have an arc suppression in parallel with the coil. Ref P/N LC2-01 for black wiper/washer connector housing.



Principles of operation:

From the OFF position, moving the toggle one step up puts the function into the intermittent slower mode (18 sec.). Moving the toggle another step up reduces the delay time by 3 sec for each of the next six steps. The seventh step up puts the motor into a continuous low-speed mode and the last step up puts the motor into the high-speed mode. Reversing the previous steps puts the motor finally into the stop/parking mode. During the OFF position, intermittent and low-speed modes, pressing the wash button activates the wash function. Wipe function starts after a two second delay from the onset of the washing and continues for three continuous wipes after the wash button is released. For convenience, the wash function is not active during the high-speed mode.

The Wiper Control is designed to interface with single or dual relay systems for intermittent delay and the park function. The high speed is driven directly via a power transistor internal to the module. The coil of the relay is pulled down to ground during the intermittent, low-speed and high-speed modes respectively. (Contact Carling Technologies for wiring diagrams)

N-Series

ADDRESSABLE ROCKER SWITCHES

The N-Series Addressable Switch combines the look and feel of a traditional electro-mechanical control coupled with a built in PCB and provides a flexible, cost effective alternative to a CAN/LIN based switch. The N-Series produces up to 144 individual switch IDs by using a resistive ladder circuit. Different switch IDs are achieved by changing the resistor values tied to individual loads, which can then be assigned to the specific functions that the switch is controlling. Each switch is connected to an ECU and the application software is written to recognize the switch IDs to determine which load is being controlled as well as the selected actuator position. As a result, the wiring harnesses are more simplified and specific loads can now be rearranged without the need for a costly and time consuming harness redesign, giving designers the ultimate in design flexibility.



Resources:

[Download 3D CAD Files](#)

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

Product Highlights:

- ◆ Cost effective alternative to CAN/LIN based switch
- ◆ Up to 144 individual switch IDs
- ◆ Simplified wiring harnesses
- ◆ Readdressable loads without harness redesign
- ◆ Available with paddle or rocker actuator

Typical Applications:

- ◆ On-Highway Transportation Equipment
- ◆ Agricultural Equipment
- ◆ Construction Equipment
- ◆ Marine



Electrical

Contact Rating	.4VA @ 28VDC (MAX)
Dielectric Strength	1250 Volts RMS between pole to pole 3750 Volts RMS between live parts and accessible surfaces
Insulation Resistance	50 Megaohms
Contact Bounce	20 milliseconds max.
Contacts	gold plated
Terminals	Brass or copper/silver plate 3/16" (4.76mm) Quick Connect terminations standard.

Mechanical

Endurance	250,000 cycles minimum
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Physical

Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC)
Seals	Rocker, base & bracket are sealed.
Base	Nylon 66 GF rated to 85°C with a flammability rating of 94V0.
Rocker and Paddle	Nylon 66 Reinforced, rated to 105°C
Laser Etched Rocker	Polycarbonate rated at 100°C.
Lens	Polycarbonate rated at 100°C. Front snap-in.
Connector	Nylon 66 rated at 85°C. Polarized.
Bracket	Nylon Zytel

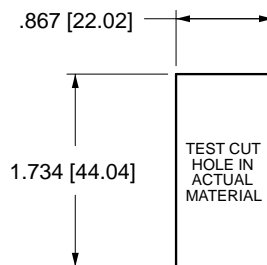
Actuator Travel (Angular Displacement)

2 position	26°
3 position	13° from center

Environmental

Environmental	IP67 for above the panel components of the actual switch, representing an index of protection as applied to electrical equipment in accordance with IEC 529, BS 5490, DIN 400 50 & NFC 20 010.
Operating Temperature	-40°C to +85°C
Vibration	Per SAE J1399 "electronic Tachometer Specification" for Class II truck and bus applications. Test Criteria: No change in resistance and no evidence of physical damage.
Salt Spray	Exposure to 95% water, 5% NCl fog solution at 95 degrees F according to ASTM B 117-90 "Standard Method of Salt Spray (fog) Testing". Test Criteria: No visual evidence of corrosion or external physical damage.
Humidity	Samples were exposed to selected temperature profile, while maintaining 90% +/- 5% relative humidity for 30 cycles. Test Criteria: No evidence of external physical deterioration.

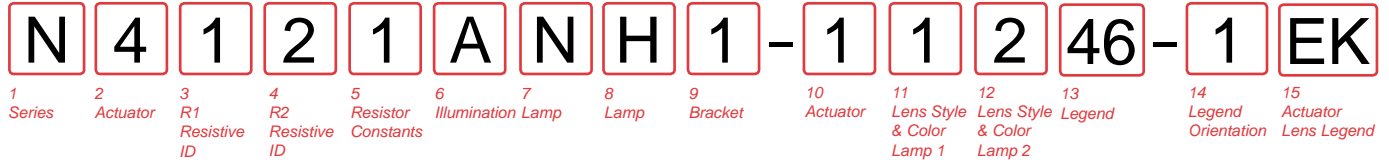
Mounting Specifications



MOUNTING HOLE

Panel Thickness Range

Acceptable Panel Thickness
.030 to .156 (.76mm to 3.96mm)
Recommended:
.030, .062, .093, .125 and .156



1 SERIES
N

2 CIRCUIT²
Terminal Orientation

() - momentary

Position:	1	2	3
STANDARD	2 & 4	Connected Terminals	1 & 2
4	On	NONE	ON
5	(On)	NONE	ON
6	On	ON	ON
7	(On)	ON	On
8	(On)	ON	(On)

3 R1 RESISTIVE IDENTIFICATION

1	1020	7	3570
2	1300	8	4320
3	1620	A	5230
4	2000	B	6340
5	2430	C	7870
6	2940	D	10000

4 R2 RESISTIVE IDENTIFICATION

1	1020	7	3570
2	1300	8	4320
3	1620	A	5230
4	2000	B	6340
5	2430	C	7870
6	2940	D	10000

5 RESISTOR CONSTANTS (INDICATES SWITCH STATE)

	R3	R4	R5
1	1300	10000	5320
2	825	6650	3830

6 ILLUMINATION
Lamp #1: above terminals 9 & 10 end of switch.; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

S	Lamps	Illumination Type	Lamp wired to Terminals
	None		
A	# 1	Standard	10+ 12-
	# 2	Standard	11+ 9-
B	# 1 & 2	Special Parallel	11+ 9-
C	# 1 & 2	Special Parallel	10+ 9-
1	# 1	Independent	10+ 9-
2	# 2	Independent	12+ 11-
3	# 1	Independent	10+ 9-
	# 2	Independent	12+ 9-
4	# 1	Independent	10+ 9-
	# 2	Independent	12+ 11-

7.8 LAMP (SAME CODING FOR BOTH SELECTIONS)
Selection 7: above terminals 10 & 9; Selection 8: above terminals 12 & 11
No lamp 0

LED* 12VDC	Red C	Amber N	Green H
* Consult factory for "daylight bright", blue/green and white LED options. Typical current draw for LED is 20ma.			

9 BRACKET COLOR¹

	Black	White	Gray	Red
Standard Bracket	1	2	3	4
Rockerguard at Lamp 1	A	B	C	D
Rockerguard at Lamp 2	E	F	G	H

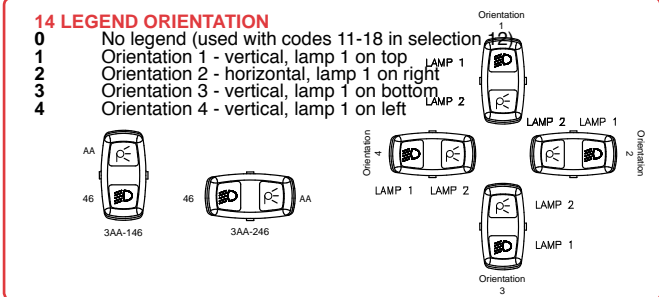
10 ACTUATOR STYLE AND COLOR¹

	Black	White	Gray	Red	Laser Etched
Rocker	A	B	C	D	1
Paddle	J	N	K	M	

11 & 12 LENS STYLE AND COLOR
Lens color for LEDs must be clear, white, or match color of LED.

0 - No Actuator	Z - No Lens	Clear	White	Amber	Green	Red	Blue
1	-	B	G	M	T	Large Transparent	
-	7	C	H	N	U	Large Translucent	
3	-	D	J	P	V	Bar Transparent	
-	9	E	K	R	W	Bar Translucent	
5	A	-	-	-	-	Laser Etch background color	

13 LEGEND ORIENTATION
00 No legend this location / no actuator
For legend options & codes, see pages 54-65 of this catalog.



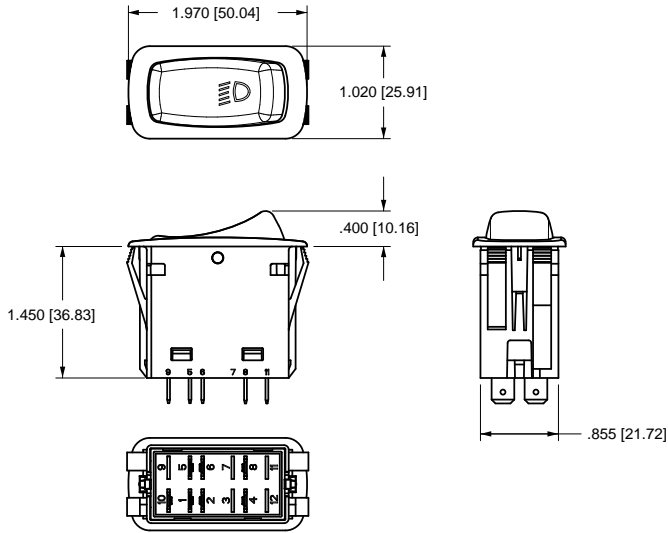
15 ACTUATOR LENS LEGEND
00 No legend this location / no actuator
For legend options & codes, see pages 54-65 of this catalog.

Notes:
1 Custom colors are available. Consult factory.
2 Switch supplied with .187 tab terminals.

Dimensional Specifications: in. [mm]

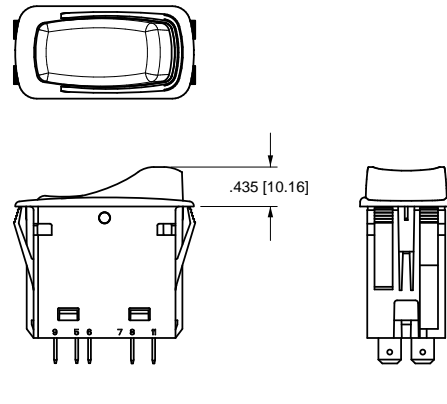
N-SERIES

SHOWN WITH LASER ETCHED ACTUATOR



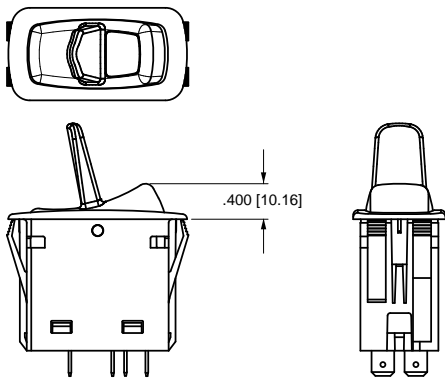
N-SERIES

SHOWN WITH ROCKER GUARD



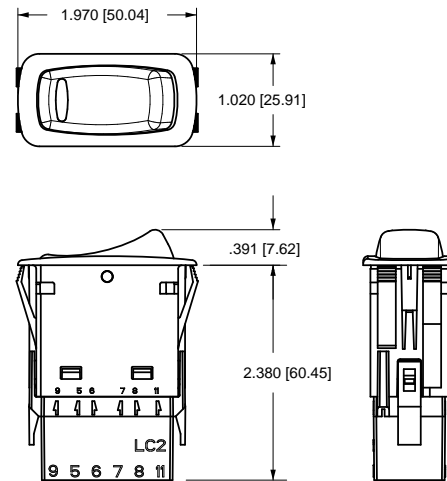
N-SERIES

SHOWN WITH LARGE LENS AND PADDLE ACTUATOR



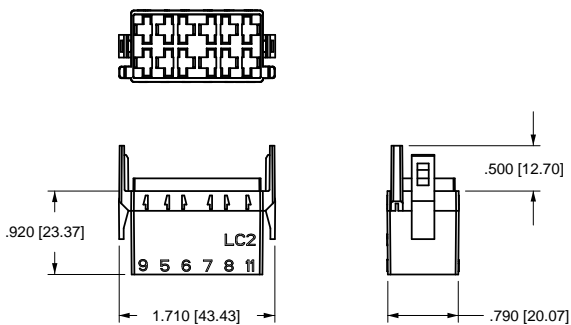
N-SERIES

SHOWN WITH BARS LENS AND CONNECTOR



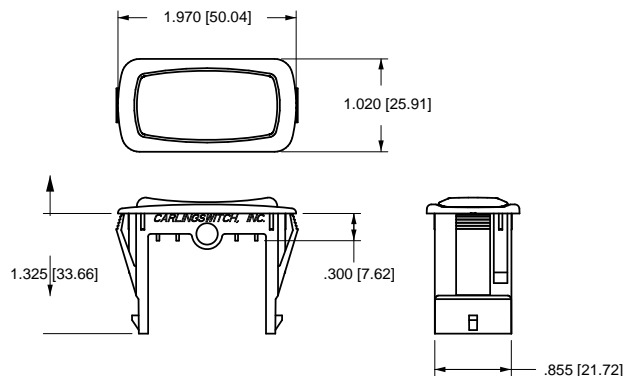
N-SERIES

LC2-01 BLACK .187 TAB CONNECTOR (PACKARD 480-SERIES)



N-SERIES

LH1 REMOVABLE HOLE PLUG WITH NON-SERRATED WINGS
LH2 HOLE PLUG WITH SERRATED WINGS





































Circuit Diagrams:

CIRCUIT CODE	SCHEMATIC
4	<p>INTERNAL CIRCUIT BOARD (TYPICAL)</p>
5	
6	
7	
8	

Lamp Circuit Diagrams:

ILLUM. CODE	SCHEMATIC
A	
B	
C	
1	
2	
3	
4	

LEGEND		LEGEND CODE		
SYMBOL	NAME <small>(SYMBOL MEANING)</small>	BODY	LENS	
			NEGATIVE ¹	POSITIVE
	RUNNING LIGHTS (UNDER POWER)	AA	NA	MA
	LIGHT	AB	NB	MB
	MASTER LIGHT SWITCH	AC	NC	MC
	HORN	AD	ND	MD
	PROPULSION SYSTEM TRIM TRIMMING OPERATION	AE	NE	ME
	VENTILATION FAN OR BLOWER	AF	NF	MF
	WINDSHIELD WASHER	AG	NG	MG
	WINDSHIELD WIPER	AH	NH	MH
	BILGE PUMP	AJ	NJ	MJ
	BILGE BLOWER	AK	NK	MK
	POTABLE WATER PRESSURE	AL	NL	ML
	ENGINE START	AM	ED	MM
	ENGINE STOP	AN	EE	MN
	DRIVE TILT TILT OPERATION	30		31
	EMERGENCY START	32		33
	UP/DOWN LIFT	34		
	TRIM TAB TRIMMING OPERATION	35		36

LEGEND		LEGEND CODE		
SYMBOL	NAME <small>(SYMBOL MEANING)</small>	BODY	LENS	
			NEGATIVE ¹	POSITIVE
	ANCHOR LIGHT	37		38
	ANCHOR	39		40
	WATER FLUSHING TAP FOR OUTBOARDS	41		42
	HIGH BEAM	43	44	45
	LOW / DIPPED BEAM	46	47	48
	SIDE MARKER LIGHT	DG	49	DF
	INTERIOR LIGHT	50	51	52
	WORK LIGHT	53	54	55
	WORK LAMP	56	57	58
	LOADING FLOOR LAMP	CW	59	CY
	ON-WIPER-INT DELAY	60		
	ROTARY BEACON	61	62	63
	LAMP TEST	DK	64	DL
	WINDSHIELD WIPER/WASHER	65	66	67
	HAZARD WARNING	68	69	70
	WARM AIR BLOWER	71	72	73
	HORN REAR	AX	74	Y4

Notes:

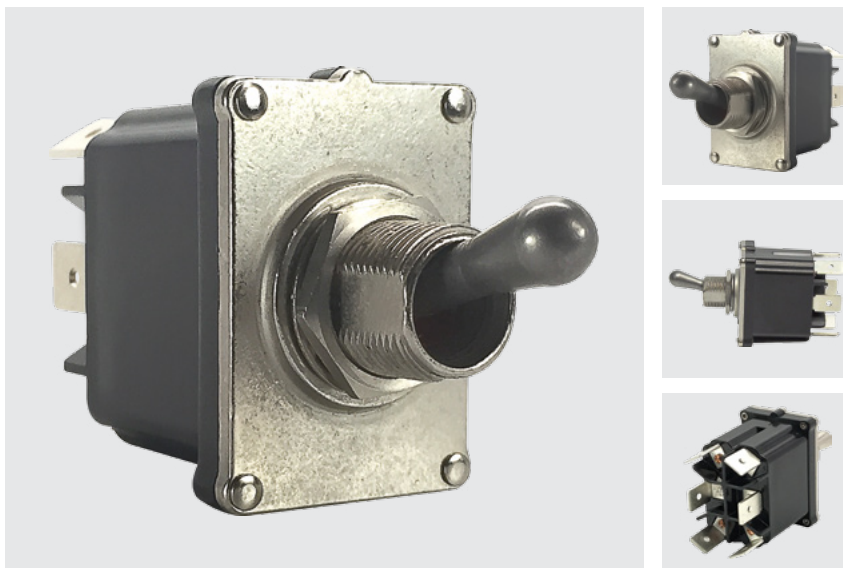
- Negative legends not available on L, LD, LW, and N-Series.
- Many symbols are SAE (J1362), ANSI and ISO approved symbols. Consult factory for custom symbols/icons.
- Use "body" legend codes for laser etched image identification.

ST-Series

SEALED TOGGLE SWITCHES

Designed to comply with MIL-DTL-3950G requirements for environmentally sealed toggle switches, Carling Technologies ST-Series Sealed Toggle Switch features innovative design and performance principles that are sure to withstand the most demanding applications.

The ST-Series features an innovative toggle seal composed of dynamic silicone material that bonds to the metal toggle, pin and bushing, providing ideal sealing and protection against the environment, vibration and shock, while withstanding extreme temperature variations. It also utilizes up to three terminal seals per pole and an optional o-ring assures additional under panel sealing protection. All silicone seals on the ST-Series comply with A-A-59588 for silicone rubber performance specifications and, together, these features meet the international IEC 60529 standard for sealing performance to an IP68 level.



Product Highlights:

- ◆ Designed to comply with MIL-DTL-3950G requirements
- ◆ IEC 60529 IP68 sealing performance
- ◆ Toggle seal bonds to toggle, pin and bushing
- ◆ Complies with UL 61058-1 requirements for spacing between poles

Typical Applications:

- ◆ Military Equipment
- ◆ Armored Vehicles
- ◆ Law Enforcement Vehicles
- ◆ Off-Highway Vehicles
- ◆ Applications that requires stringent sealing and performance capabilities



ST-Series Switch

DESIGN FEATURES

PIN TOGGLE/BUSHING

Keeps metal toggle firmly in place and prevents rotation

BRASS ROLLER PIN

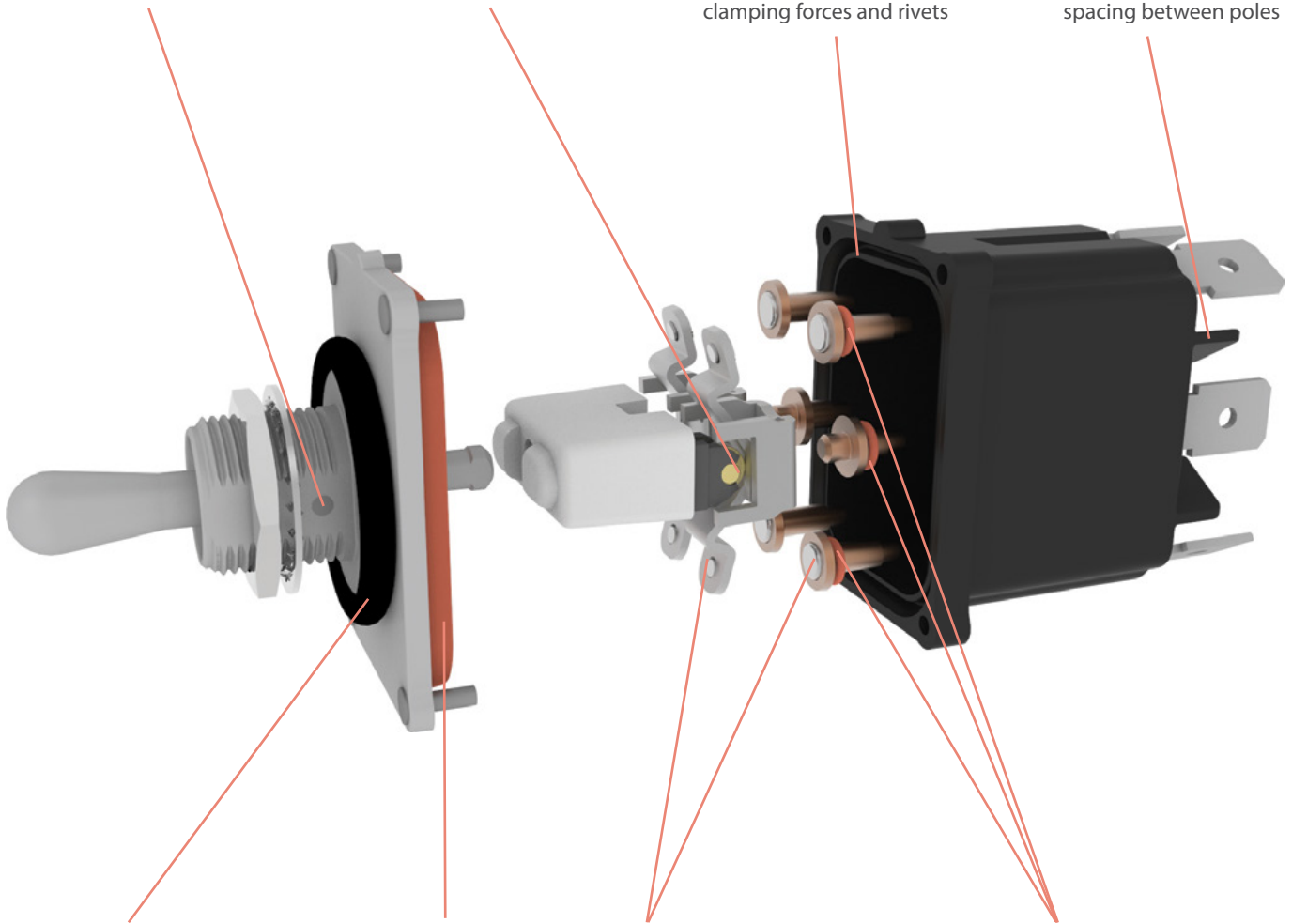
Provides rolling metal on metal actuation for maximum durability

BASE SEAL CHANNEL

Perfectly fits the toggle assembly seal decreasing the dependence on clamping forces and rivets

TERMINAL BARRIERS

Comply with UL-61058-1 electrical requirements for spacing between poles



OPTIONAL O-RING

Assures additional under panel sealing protection

BUSHING/TOGGLE SEAL

Composed of dynamic silicone material that bonds to the metal toggle, pin and bushing

RIVETS

High purity copper composite and silver alloy materials handle various electrical loads and maintain low contact resistance

TERMINAL SEALS

Assure a secure seal at extreme temperatures. Eliminates potential for separated joints associated with insert molded constructions

Electrical

Contact Rating	16 amps, 12V
Dielectric Strength	MIL-STD-202G, Method 301 (1500 Volts RMS)
Insulation Resistance	MIL-STD-202G, Method 302 (50 MegOhms, 500 VDC)
Initial Contact Resistance	MIL-STD-202G, Method 307 (10 milliOhms max. @4VDC, 1 A)
Life	MIL-DTL-3950G, Section 4.8.11 (10-18 cpm, 3-5 in/sec velocity.) Overload: 50 cycles at 150% rated resistive load, .5 sec. min. closed time at room ambient. Resistive Load 3: 20,000 cycles at +71C; 50,000 cycles at +23C ambient, 20,000 cycles at -40C Temperature Rise: performed per UL 61058 30C rise after 6K cycles, 55C at end.
Contacts	Silver Alloy
Terminals	Copper Alloy / silver plated. Tab Terminal: Riveted, vertical ¼" quick-connect; MIL-STD-202G, Method 211 Test Condition A, and B: 25 lb. pull test, two terminal bends.

Physical

Function	Single Pole and Double Pole with Single Throw and Double Throw
Operation	Two and three position circuits
Toggle	Nickel plated brass.
Actuator, Internal	Polyester PBT, UL94-V0 and fungus resistant per ASTM G- 21
Seals	All seals are silicone per A-A-59588-1A.
Mounting	15/32"-32 UNS-2A threaded bushing with a keyway. A single nut and lock washer are supplied unassembled.
Bushing/Top Plate	Zinc/aluminum die cast, with nickel plating.
Base	Polyester PBT, UL94-V0 and fungus resistant per ASTM G-21
Actuation Force	Circuit D, 540G, 1.2Lb Circuit J, from Center 815G, 1.8Lb, from ON 500G, 1.1Lb
Angular Movement	15.5 degrees, each side of center

Mechanical

Life	150,000 cycles total (at ambient temperature). MIL-DTL-3950G, Section 4.8.10 (Continuity after -55C open for 2 hrs; 40,000 cycles at 10-18 cpm. Samples at -55C and samples at +71C.)
------	---

Environmental

Environmental	Operating: -40C to +85C. Storage: -65C to +85C.
Vibration	MIL-STD-202G: Method 204D, Test Condition A (10 G peak, Harmonic, 10Hz to 500Hz sweeps, 9 hours total).
Shock	MIL-STD-202G: Method 213B, Test Condition K (30 G, half sine)
Handling Drop	SAE J1455, Section 4.11.3.1, 1 meter drop in each of three planes
Sealing	MIL-STD-202G, Method 110 (sand and dust) IEC 60529, IP68 (dust-tight and continuous immersion in water)
Salt Atmosphere	MIL-STD-202G, Method 101, Test Condition A (96 hrs)
Thermal Shock	MIL-STD-202G, Method 107, Test Condition A (five cycles in air: -55C, +25C, +125C, +25C)
Moisture Resistance, Humidity	MIL-STD-202G, Method 106 (ten 24-hour stepped cycles)
Chemical Resistance	No permanent loss of function, obvious loss of sealing, distortion, softening, embrittlement, discoloration or corrosion after being brushed for 10 minutes, wetting all exposed surfaces. Relevant chemical compatibility documentation may be used in place of testing.

Chemical	Concentration
Diesel Fuel	100%
Gasoline	100%
Ethylene Glycol	50% in water
Ethanol/Methanol	10% in water

ST **A** **2** **D** **1** - **58**

1 Series 2 Circuit 3 Poles 4 Rating 5 Termination 6 Toggle Style

1 SERIES
ST Sealed Toggle

4 RATING ²
D 16A, 12V

2 CIRCUIT
 Connected Terminals

Position:	1	2	3
A	ON	NONE	OFF
B	(ON)	NONE	OFF
C	ON	NONE	(OFF)
D	ON	NONE	ON
F	ON	NONE	(ON)
J	ON	OFF	ON
K	ON	OFF	(ON)
L	(ON)	OFF	(ON)

5 TERMINATION
1 .250 (6.4mm) TAB (QC)
4 Screw with Cage Clamps

6 TOGGLE STYLE

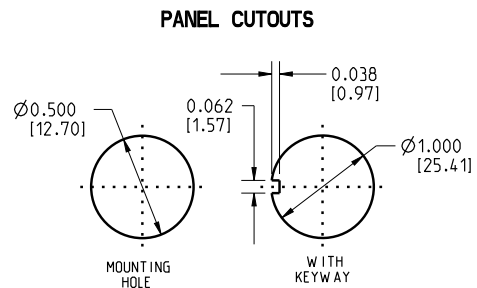
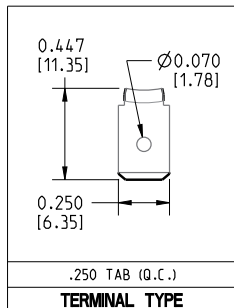
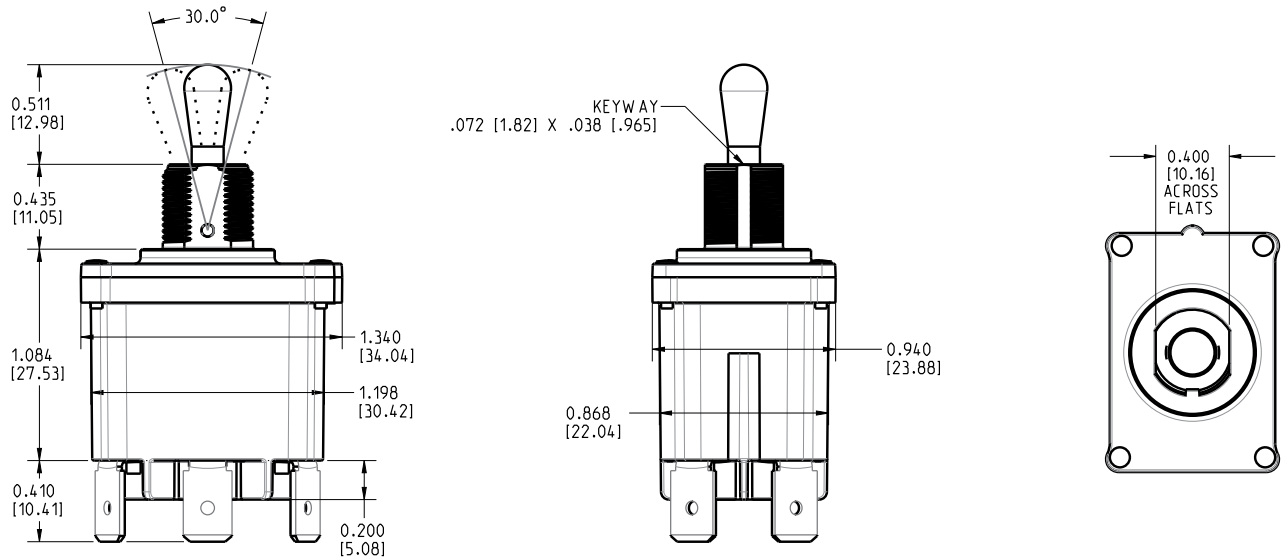
	Toggle Length	Bushing Length
53 Without Panel Seal	.511	.435
58 With Panel Seal (Bulk)	.511	.435

3 POLES

Position:	1	2	3
1	2 to 3	NONE	1 to 2
2	2 to 3, 5 to 6	NONE	1 to 2, 4 to 5

Notes:
 1 Standard hardware is (1) inner tooth lock washer and (1) hex nut bulk.
 2 UL and CUL approved AC Ratings available Q3 2014

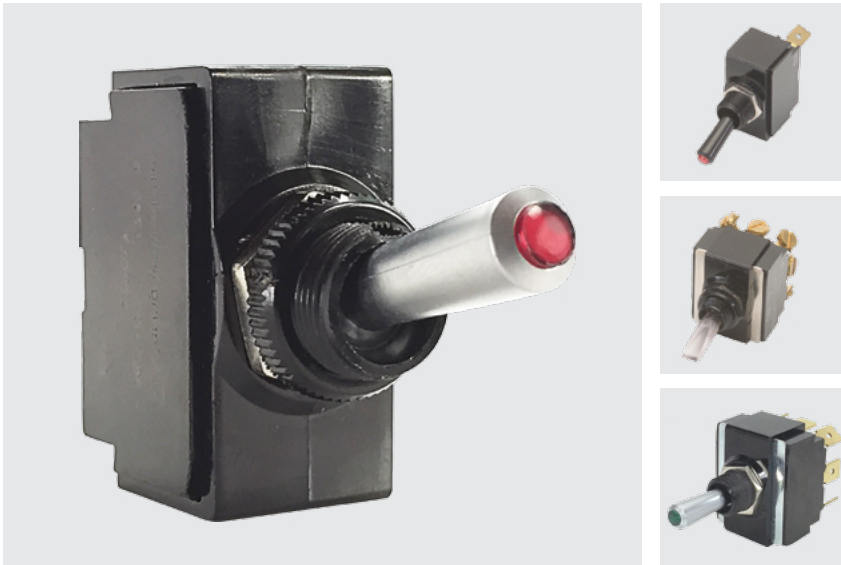
Dimensional Specifications: in. [mm]



LT-Series

TOGGLE SWITCHES

The LT-Series illuminated toggle switches feature up to a three-color lighting sequence from a single lamp. These lighted toggles contain neoprene bushing seals for dust and moisture protection. A variety of circuits and terminations are available.



Product Highlights:

- ◆ 1 or 2 Pole
- ◆ Independent or Dependent Illumination
- ◆ Choice of 5 Actuator Styles
- ◆ Up to 3 different colors under a single lens

Typical Applications:

- ◆ Marine
- ◆ Transportation



Dielectric Strength

1000V - live to dead metal parts

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

LT-1561 - 1 30 - 012

¹
Base Part Number

²
Actuator
Style

³
Lighting
Sequence

⁴
Lamp Voltage

1 BASE PART NUMBER: SERIES / POLES / ILLUMINATION / CIRCUITRY / RATING / TERMINATION ⁵

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 12-28VDC

Single Pole	Solder Lug	.250 Tab QC	Screw Terms	Wire Leads
On-None-Off	LT-1510	LT-1511	LT-1514	LT-1515
On-None-(Off)	LT-1520	LT-1521	LT-1524	LT-1525
(On)-None-Off	LT-1530	LT-1531	LT-1534	LT-1535
On-None-On	LT-1540	LT-1541	LT-1544	LT-1545
On-None-(On)	LT-1550	LT-1551	LT-1554	LT-1555
On-Off-On	LT-1560	LT-1561	LT-1564	LT-1565
On-Off-(On)	LT-1570	LT-1571	LT-1574	LT-1575
(On)-Off-(On)	LT-1580	LT-1581	LT-1584	LT-1585
Double Pole	Solder Lug	.250 Tab QC	Screw Terms	Wire Leads
On-None-Off	LT-2510	LT-2511	LT-2514	LT-2515
On-None-(Off)	LT-2520	LT-2521	LT-2524	LT-2525
(On)-None-Off	LT-2530	LT-2531	LT-2534	LT-2535
On-None-On	LT-2540	LT-2541	LT-2544	LT-2545
On-None-(On)	LT-2550	LT-2551	LT-2554	LT-2555
On-Off-On	LT-2560	LT-2561	LT-2564	LT-2565
On-Off-(On)	LT-2570	LT-2571	LT-2574	LT-2575
(On)-Off-(On)	LT-2580	LT-2581	LT-2584	LT-2585

2 ACTUATOR STYLE

Paddle ¹

1	Clear Paddle
4	Solid Color Paddle

Snapkap Style ²

5	Bright Chrome
6	Satin Chrome
7	Black Molded

Notes:

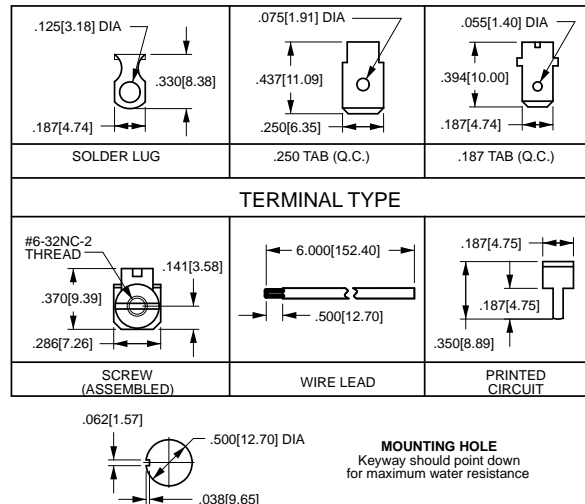
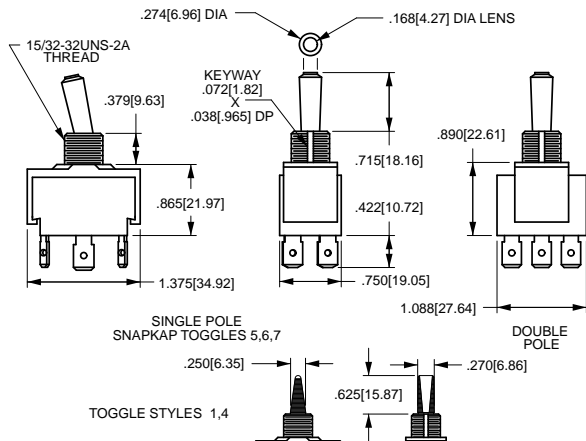
- Solid color paddle available with lighting sequence 01, 02, 10 or 20.
- SnapKap Toggle Lenses are available separately. Consult factory.
- Independent lamp is standard. Dependent lamp with ON-OFF function (including momentary) is available with Lighting Sequences 10, 20, 30, 40 and 50. (No light in OFF position.)
- Green and blue not recommended with 125 volt or 250 volt neon lamps.
- Additional terminations available. Consult factory for details.
- () Indicates momentary function.

3 LIGHTING SEQUENCE ^{3,4}

	position 1	position 2	position 3
01	red	red	red
02	amber	amber	amber
03	green	green	green
10	red	---	none
11	red	clear	red
12	red	clear	red amber
13	red	clear	green
14	red	clear	blue
15	red	clear	clear
20	amber	---	none
21	amber	clear	red
22	amber	clear	amber
23	amber	clear	green
24	amber	clear	blue
25	amber	clear	clear
30	green	---	none
31	green	clear	red
32	green	clear	red amber
33	green	clear	green
34	green	clear	blue
35	green	clear	clear
40	blue	---	none
41	blue	clear	red
42	blue	clear	red amber
43	blue	clear	green
44	blue	clear	blue
45	blue	clear	clear
50	clear	---	none
51	clear	clear	red
52	clear	clear	amber
53	clear	clear	green
54	clear	clear	blue
55	clear	clear	clear

4 LAMP VOLTAGE ⁴

incandescent		neon	
006	6 volt	125N	125 volt neon
012	12 volt	250N	250 volt neon
018	18 volt		
024	24 volt		



F-Series

SINGLE POLE TOGGLE SWITCHES

General purpose workhorses with options tailored to meet most any need. Ratings to 20A 277VAC, various actuator, bushing, termination, and circuit choices allow this versatile switch to easily integrate into a variety of different applications. The F-Series is appropriate for usage in low voltage DC applications.



Resources:

Download 3D CAD Files

[IGS >](#)

[STP >](#)

Product Highlights:

- ♦ Ratings to 20A
- ♦ Suitable for low voltage 12/24V DC
- ♦ Variety of termination options
- ♦ Consult factory for large choice of bushing/toggle length combinations

Typical Applications:

- ♦ Marine
- ♦ Food Service
- ♦ Generator
- ♦ Industrial Control
- ♦ Office Automation



Dielectric Strength

1000V - live to dead metal parts

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

2FA54 - 73 / TABS

¹ Base Part Number

² Actuator Style

³ Tab Terminals

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION¹

	Solder Lug	.250 Tab QC	Screw Terminals
On-None-Off	2FA53	2FA53-.../TABS	2FA54
(On)-None-Off	6FA53	6FA53-.../TABS	6FA54
On-None-(Off)	6FA57	6FA57-.../TABS	6FA58
On-None-On	2FB53	2FB53-.../TABS	2FB54
On-None-(On)	6FB53	6FB53-.../TABS	6FB54
On-Off-On	2FC53	2FC53-.../TABS	2FC54
On-Off-(On)	6FC57	6FC57-.../TABS	6FC58
(On-Off-(On))	6FC53	6FC53-.../TABS	6FC54

Additional ratings up to 20A 125VAC, 12A 250VAC, 1HP 120-240 VAC available. Consult factory for specifics.

2 ACTUATOR STYLE BAT STYLE TOGGLE²

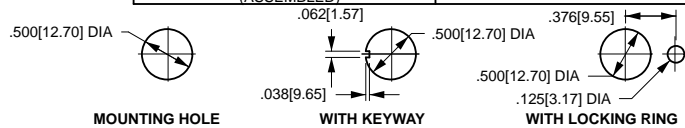
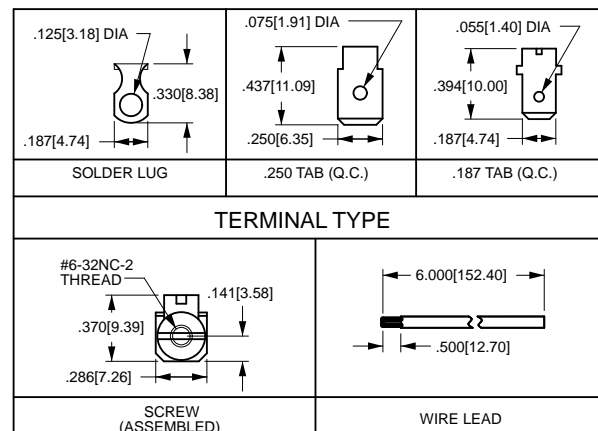
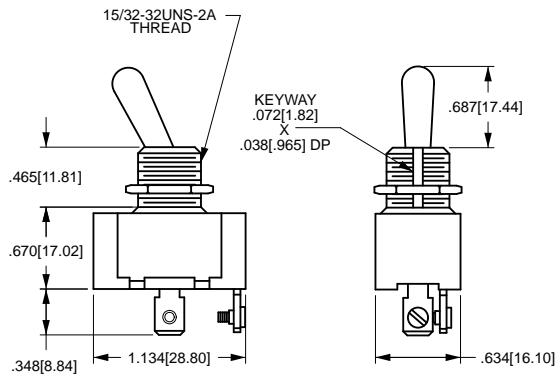
	unsealed	sealed	toggle length	bushing length
73		78	0.687	0.465
E3		E8	2.000	0.465

3 TAB TERMINALS

/TABS Tab Terminals
(blank) Leave blank if tab terminals not required.

Notes:

- 1 Consult factory for .187 tab, wire lead and combination screw/tab/solder lug termination callouts.
- 2 Additional toggle options are available. Consult factory.
- () indicates momentary function.



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

G-Series

TOGGLE SWITCHES

General purpose workhorses with options tailored to meet most any need. Ratings to 20A 277VAC, international approvals, various actuator, bushing, termination, and circuit choices allow this toggle switch to easily integrate into a variety of different applications. The G-Series is appropriate for usage in low voltage DC applications.



Resources:

Download 3D CAD Files

[IGS >](#)

[STP >](#)

Product Highlights:

- ♦ Ratings to 20A 277VAC available
- ♦ Metal bat or nylon bat/paddle actuator styles
- ♦ UL, CSA and VDE approvals for select circuits
- ♦ Suitable for low voltage 12/24V DC

Typical Applications:

- ♦ Marine
- ♦ Food Service
- ♦ Generator
- ♦ Industrial Control
- ♦ Office Automation



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

VDE: 4000V - live to dead metal parts; 1250V - opposite polarity & across open contacts

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0° to 85°C)

2GM51 - 73

¹
Base Part Number

²
Actuator Style

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION ³

Single Pole in Double Pole base

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC

Single Pole in Double Pole base			Double Pole		
solder lug	.250 tab	screw term.	solder lug	.250 tab	screw term.
2GA50	2GA51	2GA54	2GK50	2GK51	2GK54
6GA5A	6GA5B	6GA5E	6GK5A	6GK5B	6GK5E
6GA5L	6GA5M	6GA5S	6GK5L	6GK5M	6GK5S
2GB50	2GB51	2GB54	2GL50	2GL51	2GL54
6GB5A	6GB5B	6GB5E	6GL5A	6GL5B	6GL5E
2GC50	2GC51	2GC54	2GM50	2GM51	2GM54
6GC5A	6GC5B	6GC5E	6GM5A	6GM5B	6GM5E
6GC5L	6GC5M	6GC5S	6GM5L	6GM5M	6GM5S
10A 250VAC, 15A 125VAC, 12 (6)A 250VAC T85/55 ENEC/VDE Approved ¹					
2GA90	2GA91	-	2GK90	2GK91	-
2GB90	2GB91	-	2GL90	2GL91	-
2GC90	2GC91	-	2GM90	2GM91	-

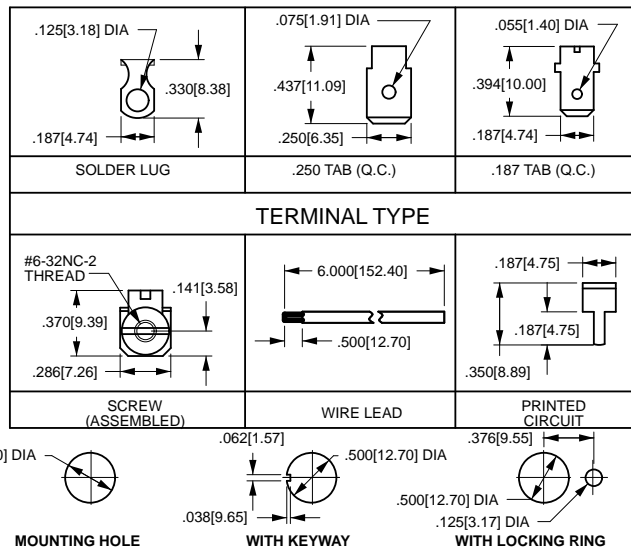
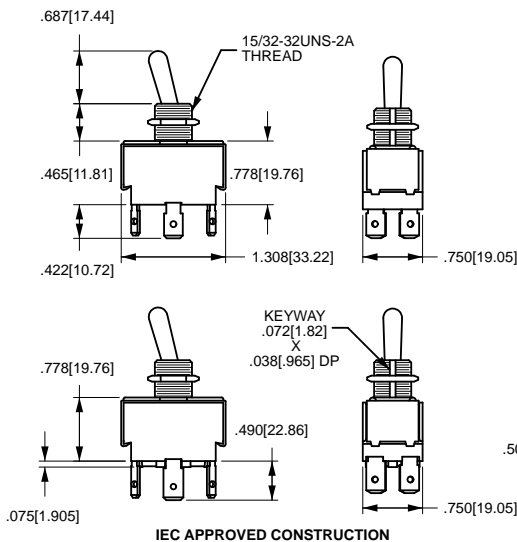
Additional ratings up to 20A 125VAC, 12A 250VAC, 1HP 120-240 VAC available. Consult factory for specifics.

2 ACTUATOR STYLE ⁴

	unsealed	sealed	toggle length	bushing length
BAT	73	78	0.687	0.465
PADDLE ⁵	NBL3	NBL8	0.687	0.465
BAT ²	D-3B-B	-	0.687	0.379
PADDLE ²	-	D-4B-B	0.687	0.379

Notes:

- Not available with 73 or NBL3 style toggles, T55 with 78 and NBL8 style toggles.
- All nylon bushing and toggle.
- Consult factory for .187 tab, wire lead and combination screw/tab/solder lug termination callouts.
- Additional actuator options available. Consult factory.
- Nylon toggle with black ebanol plated bushing.
- () Indicates momentary function.



H/I-Series

TOGGLE SWITCHES

General purpose workhorses with options tailored to meet most any need. Ratings to 17A 125VAC, various actuator, bushing, termination, and circuit choices allow this toggle to easily integrate into a variety of different applications. The H/I-Series is appropriate for usage in low voltage DC applications.



Product Highlights:

- ◆ Ratings up to 600VAC
- ◆ Available reversing and progressive switch circuits
- ◆ Variety of termination options
- ◆ Consult factory for large choice of bushing/toggle length combinations

Typical Applications:

- ◆ Food Service
- ◆ Generator
- ◆ Industrial Control
- ◆ Office Automation



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Electrical Life

50,000 cycles - maintained
25,000 cycles - momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0° to 85°C)

HK251 - 73

1 2
Base Part Number Actuator Style

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION 2
10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 1, 2 or 3 phase

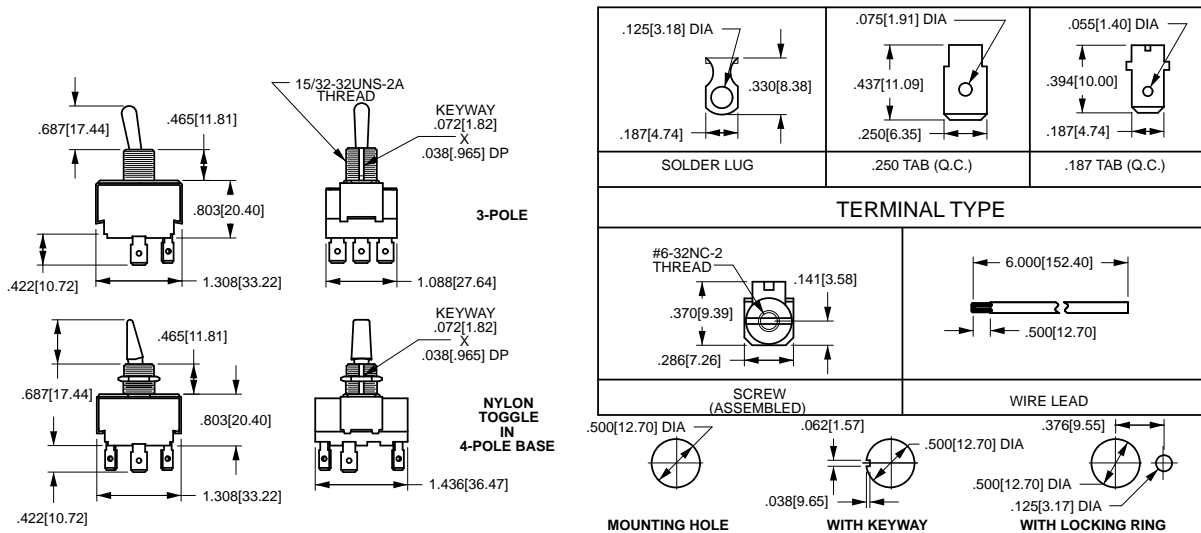
Three Pole				Four Pole			
solder lug	.250 tab	screw term.	wire leads	solder lug	.250 tab	screw term.	wire leads
HK250	HK251	HK254	HK255	IK250	IK251	IK254	IK255
HK25A	HK25B	HK25E	HK25F	IK25A	IK25B	IK25E	IK25F
HK25L	HK25M	HK25S	HK25S	IK25L	IK25M	IK25S	IK25T
HL250	HL251	HL254	HL25E	IL250	IL251	IL254	IL255
HL25A	HL25B	HL25E	HL25F	IL25A	IL25B	IL25E	IL25F
HM250	HM251	HM254	HM25F	IM250	IM251	IM254	IM255
HM25A	HM25B	HM25E	HM25F	IM25A	IM25B	IM25E	IM25F
HM25L	HM25M	HM25S	HM25T	IM25L	IM25M	IM25S	IM25T

Additional ratings up to 20A 125VAC, 12A 250VAC, 1HP 120-240 VAC available. Consult factory for specifics.

2 ACTUATOR STYLE 1

	unsealed	sealed	toggle length	bushing length
BAT	73	78	0.687	0.465
	E3	E8	2.000	0.465
PADDLE ³	NBL3	NBL8	0.687	0.465

- Notes:
 1 Additional actuator options available. Consult factory for details.
 2 Consult factory for .187 tab and combination screw/tab/solder lug termination callouts.
 3 Nylon toggle with black ebanol plated bushing.
 () Indicates momentary function.



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

C-Series

SINGLE POLE TOGGLE SWITCHES

The C-Series single pole compact high current toggle switches are ideal for applications with back panel size constraints. These switches feature self-cleaning contacts and ratings up to 20A 125VAC, 10A 250VAC, 1 1/2 HP 125-250VAC. With a rugged metal construction, these switches figure prominently in markets with stringent current carrying requirements.



Product Highlights:

- ♦ Ratings to 20A 125VAC and 1.5HP 125-250VAC
- ♦ Compact size
- ♦ Self-cleaning wiping style contacts
- ♦ 4 termination choices

Typical Applications:

- ♦ Environmental Controls
- ♦ Marine
- ♦ Food Service
- ♦ Vacuum Cleaners



Dielectric Strength

1000V - live to dead metal parts and opposite polarity.

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

CA201 - 73

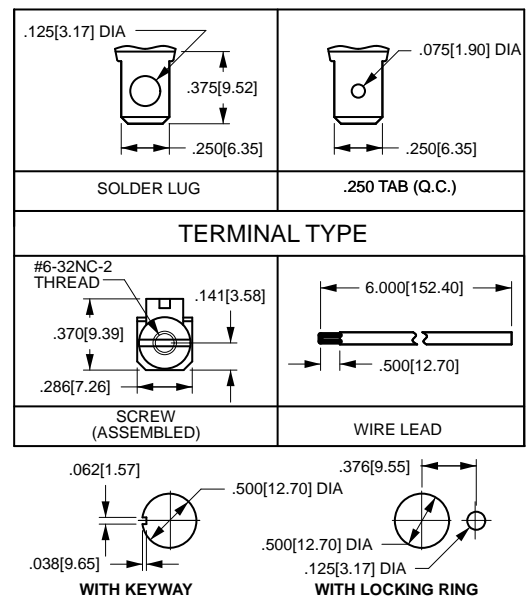
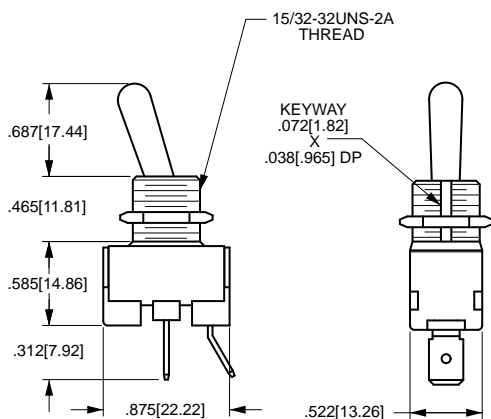
¹
Base Part Number

²
Actuator Style

1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION				
10A 250VAC, 20A 125VAC, 1 1/2 HP 125-250VAC				
Single Pole	Solder Lug	.250 Tab	Screw Term.	Wire Leads
On-None-Off	CA200	CA201	CA204	CA205
On-None-On	CB200	CB201	CB204	CB205

2 ACTUATOR STYLE 1				
BAT	unsealed	sealed	toggle length	bushing length
	73	78	0.687	0.465

Notes:
1 Additional toggle styles available. Consult factory.



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

D-Series

SINGLE POLE TOGGLE SWITCHES

The D-Series single pole compact high current toggle switches are ideal for applications with back panel size constraints. These switches feature self-cleaning contacts and ratings up to 20A 125VAC, 10A 250VAC, 1 1/2 HP 125-250VAC. With an economical double insulated all nylon construction, these switches figure prominently in markets with stringent current carrying requirements.



Product Highlights:

- ◆ Compact all nylon double insulated construction
- ◆ Ratings to 20A 125VAC, 1.5 HP 125-250VAC
- ◆ Integrated wire lead construction
- ◆ Paddle or Bat style actuators

Typical Applications:

- ◆ Environmental Controls
- ◆ Marine
- ◆ Food Service
- ◆ Vacuum Cleaners



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity
 TUV: 4000V - live to dead metal parts; 750V - across open contacts

Electrical Life

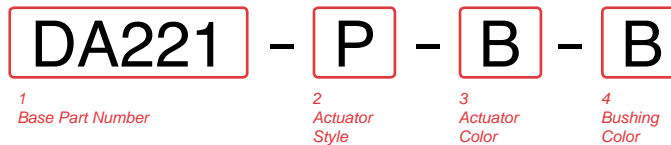
50,000 cycles

Mechanical Life

100,000 cycles

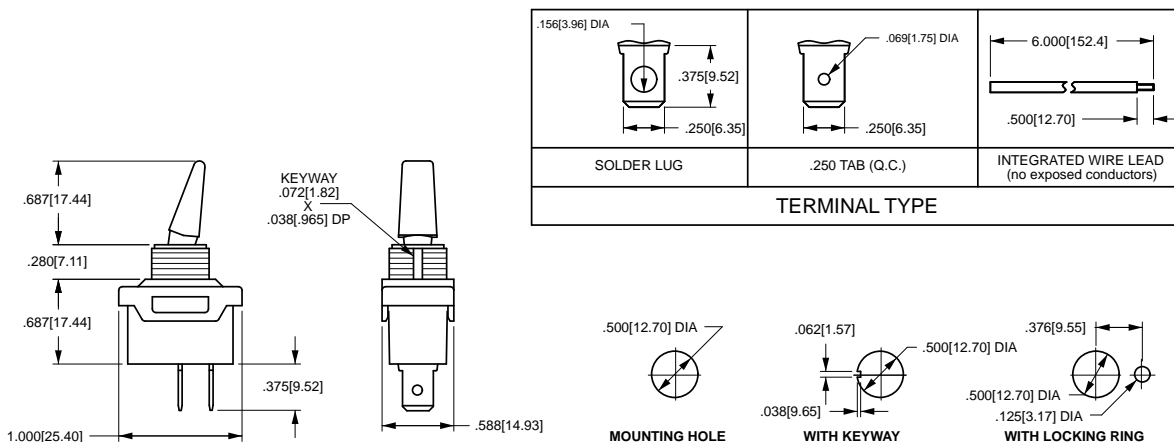
Operating Temperature

32°F to 185°F (0° to 85°C)



1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING ¹ / TERMINATION			
10A 250VAC, 20A 125VAC, 1 1/2 HP 125-250VAC			
On-None-Off	Solder Lug DA220	.250 Tab DA221	Wire Leads DA225
On-None-On	DB220	DB221	DB225
On-Off-On	DC220	DC221	DC225
5A 250VAC, 10A 125VAC, 1/2 HP 125-250VAC, 4(4) 250VACμ TUV approved			
On-None-Off	Wire Leads DA945	Solder Lugs DA940	.250 Tabs DA941
2 ACTUATOR STYLE			
B Bat		P Paddle	
3 ACTUATOR COLOR ²			
B Black		W White	
4 BUSHING COLOR ²			
B Black		W White	

Notes:
 1 DA945 available with wire leads and ON-OFF circuit only.
 2 Additional colors available. Please consult factory.



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

110-Series

HEAVY ACTION TOGGLE SWITCHES

The 110-Series is a compactly designed, versatile metal construction toggle switch which is appropriate for a variety of uses. Features include single or double pole options, maintained or momentary construction with termination choices including solder lug end or bottom, wire leads and .250 tab terminals. The quick make/quick break contact mechanism makes the switch suitable for high voltage (125-250 volt) applications.



Product Highlights:

- ♦ 125/250V AC or DC rated
- ♦ Compact space saving envelope
- ♦ Single or double pole
- ♦ 2 position Maintained or Momentary circuits

Typical Applications:

- ♦ Small Appliance
- ♦ Floor Maintenance
- ♦ Lighting



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

110-S - 73

¹
Base Part Number

²
Actuator Style

1 BASE PART NUMBER: SERIES / CIRCUITRY ¹ / RATING / TERMINATION ²

3A 250V, 6A 125V, AC/DC

	Solder Lug (end)	Solder Lug (bottom)	Screw Terminals	Wire Leads
Single Pole				
On-None-Off	110	110-B	110-S	111-16
Off-None-(On)	110-M-NO	110-BM-NO	110-SM-NO	111-16M-NO
On-None-(Off)	110-M-NC	110-BM-NC	110-SM-NC	111-16M-NC
Double Pole				
On-None-Off	2BK62	-	-	2BK65
On-None-On	2BL62	-	-	2BL65

1A 250V, 3A 125V, AC/DC

Single Pole			
On-None-On	112	-	112-A
On-None-(On)	112-M	-	112-M-A
Double Pole			
On-None-Off	216	-	216A
Off-None-(On)	216-M-NO	-	216A-M-ANO
On-None-(Off)	216-M-NC	-	216A-M-ANC
On-None-On	316	316-B	-
On-None-(On)	316-M	316-BM	-
2 circuit			
1 On - 1 Off	516	516-B	516-A
1 (On) - 1 (Off)	516-M	516-BM	516-AM

6A 120VAC

Single Pole			
On-None-On	2BB62	-	2BB65

5A 250V, 10A 125V, 1/4HP, 125V

Single Pole			
On-None-Off	160H	160H-B	160H-S
			160H-A

2 ACTUATOR STYLE

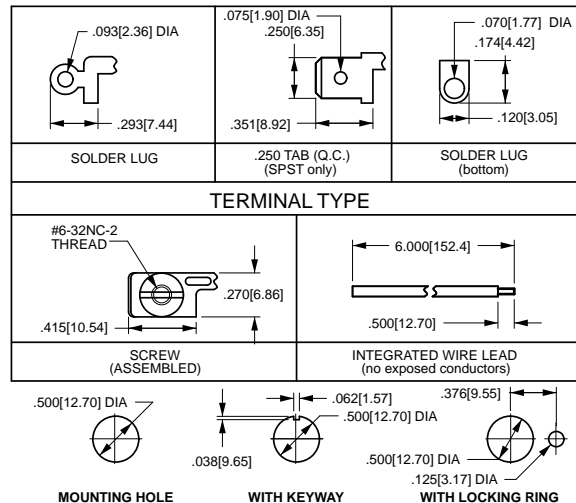
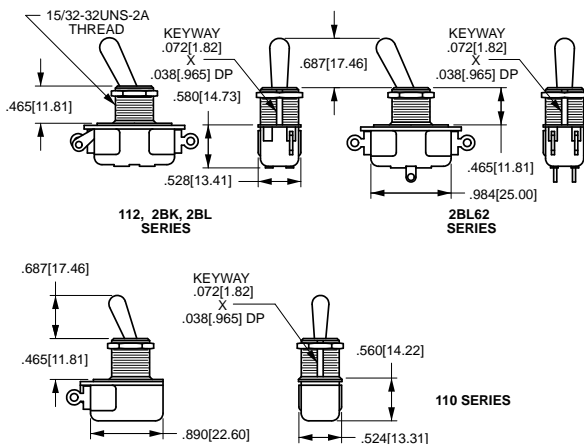
BAT STYLE TOGGLE			
unsealed	sealed	toggle length	bushing length
52	57	0.375	0.343
63	68	0.500	0.465
73	78	0.687	0.46555

BALL STYLE TOGGLE			
unsealed	sealed	toggle length	bushing length
21	-	0.375	0.250
22	-	0.375	0.343
25	-	0.375	0.875

Notes:

- Momentary function only available with 73 toggles.
- 160H and 110-Series are available with .250 tab terminals. Add suffix /TABS to end of part number. ex. 110-73/TABS

() Indicates momentary function.



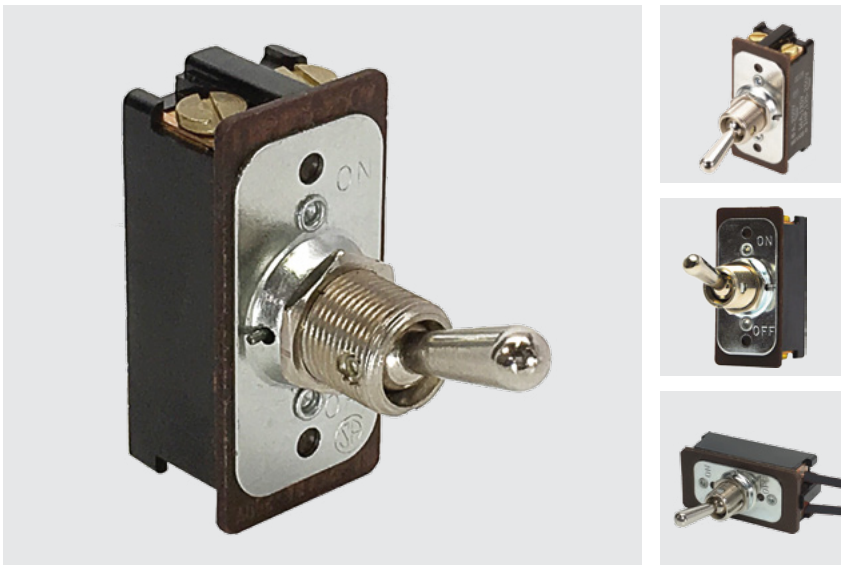
*Manufacturer reserves the right to change product specification without prior notice.

DK/EK

DK/EK-Series

HEAVY DUTY TOGGLE SWITCHES

The switch that can handle your heavy duty requirements. Single or double pole with wire lead or screw terminations, and ratings to 20A 125V 10A 250V, the ac/dc DK/EK-Series is the most heavy duty toggle switch in the Carling line. Its sturdy metal construction and stiff actuation force will withstand the abuses of virtually any stringent application. The quick make/quick break contact mechanism is ideal for high voltage DC applications.

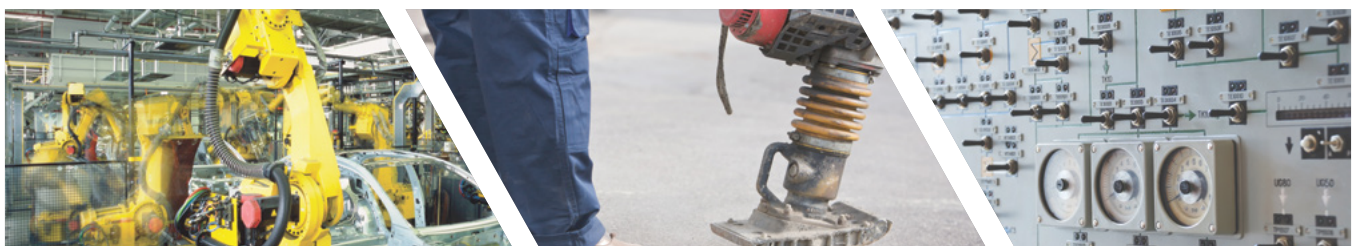


Product Highlights:

- ◆ Ratings up to 20A 125V AC or DC
- ◆ Screw Term or Wire Lead terminations
- ◆ Quick Make / Quick Break contact mechanism
- ◆ Bat or Ball style toggle options

Typical Applications:

- ◆ Industrial Motor Control
- ◆ General Purpose



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

DK284 - 73

¹
Base Part Number

²
Actuator Style

1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION

8A 250V, 16A 125V, 1 HP 125-250V
Screw Terminals Wire Leads

Single Pole
On-None-Off **DA284** **DA285**

Double Pole
On-None-Off **DK284** **DK285**

10A 250V, 20A 125V, 1 1/2 HP 125-250V
Screw Terminals Wire Leads

Single Pole
On-None-Off **EA204** **EA205**

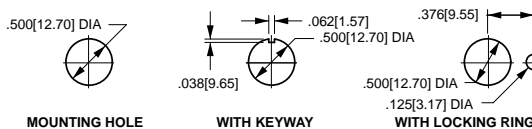
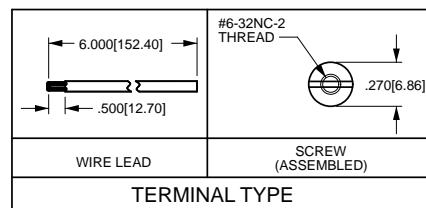
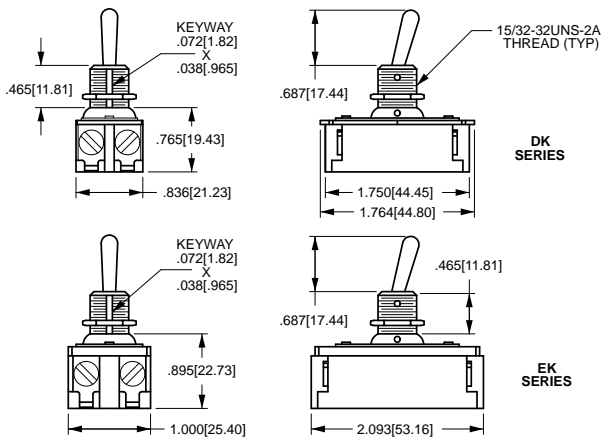
Double Pole
On-None-Off **EK204** **EK205**

2 ACTUATOR STYLE ¹

BAT STYLE TOGGLE
unsealed toggle length bushing length
73 0.687 0.465

BALL STYLE TOGGLE
unsealed toggle length bushing length
32 0.500 0.343

Notes:
1 Additional toggle lengths available. Consult factory for details.



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

MAAOA/215-Series

TOGGLE SWITCHES

The MAAOA/215-Series toggle switches are single pole, AC rated at 20 amps and 125 VAC. These switches are snap-in mounted, with a phenolic toggle and base, and are suitable for high ambient temperature applications.



Product Highlights:

- ♦ High temperature Phenolic base and toggle
- ♦ Ratings to 125VAC
- ♦ Optional embossed On-Off legend
- ♦ Choice of screw, .250 Tab or integrated wire lead connections

Typical Applications:

- ♦ Coffee Makers
- ♦ Food Warmers



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

MAAOA - **BL** / **ON-OFF**

¹
Base Part Number

²
Color

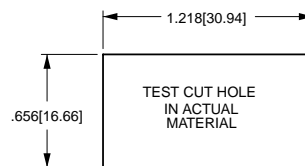
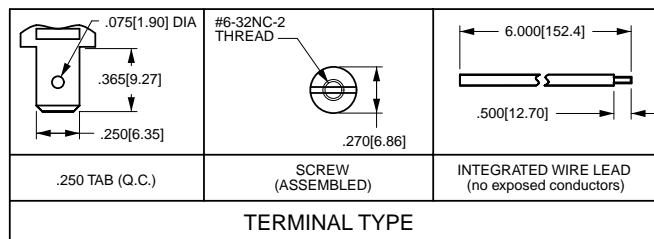
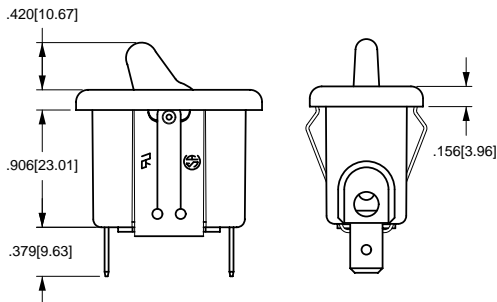
³
Legend

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION			
	10A 250 VAC, 20A 125 VAC, 1/2 HP 125-250 VAC		
	.250 Tabs	Screw Terms.	Wire Leads
Single Pole	MAAOA	215	215A
On-Off	MM-021	-	-
(On)-Off			

2 BASE & ACTUATOR COLOR			
BL	Black	BN	Brown

3 LEGEND ¹	
On-Off	

Notes:
 Panel Cut-Out recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.
 1 Imprinting is available. ON-OFF legend is not standard and must be specified after color. If not specified, switch will be manufactured with no legend.
 () Indicates momentary function.



MOUNTING HOLE
 Panel Thickness: .030[.762] min - .090 [2.28] max.
 Specific cutout dimension range dependent on panel thickness and material.

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

Carling Technologies full or half hexboot is the perfect complement to Carling's line of toggle switches. The boot is compatible with 15/32" threaded bushings and will provide extra protection against the elements in harsh environments.

Product Highlights:

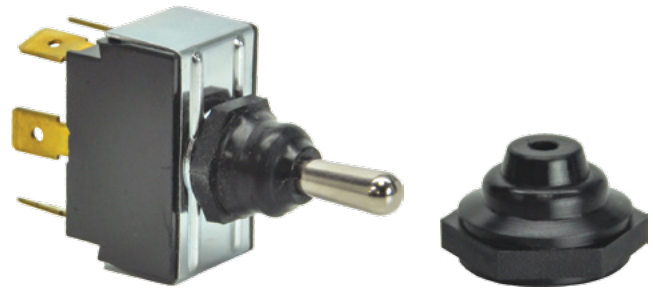
- Flexible tear-resistant silicone rubber overmolded onto a 15/32" brass hexnut
- Full hexboot completely covers toggle actuator and bushing
- Meets ROHS 2011/65/EU directive
- Inhibits the rotation of switches subjected to low frequency vibration
- Complementary, cost effective addition to Carling's toggle switches
- Suitable for toggle models: F-Series, G-Series, 110-Series, C-Series, D-Series, DK/EK-Series, H/I-Series, LT-Series

Full Hexboot



Part #: 999-37246-001

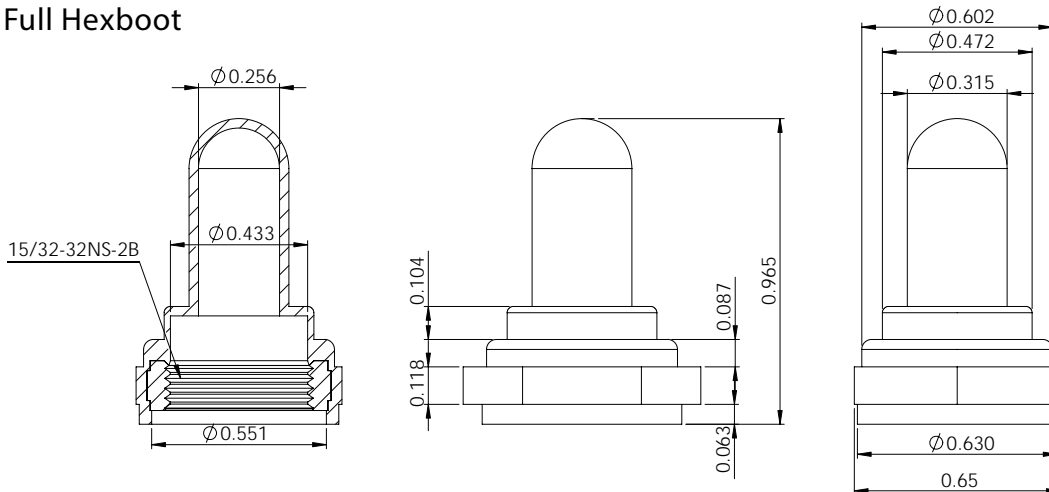
Half Hexboot



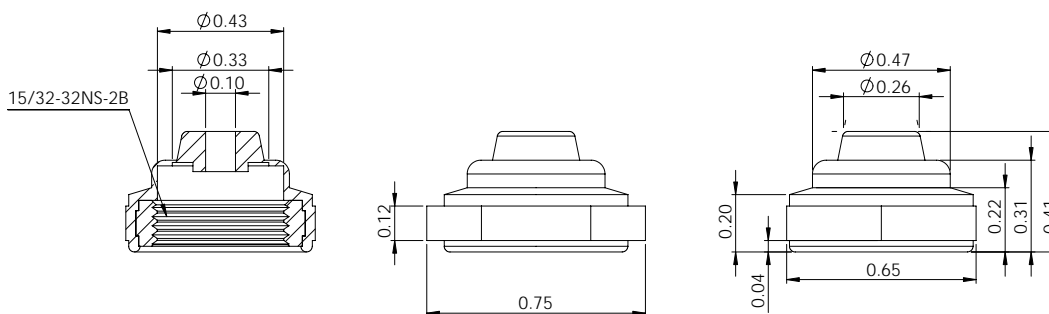
Part #: 999-37245-001

Dimensional Specifications: in. [mm]

Full Hexboot

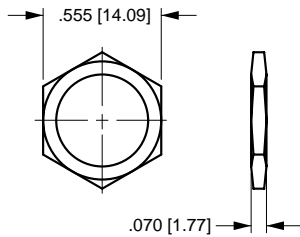


Half Hexboot

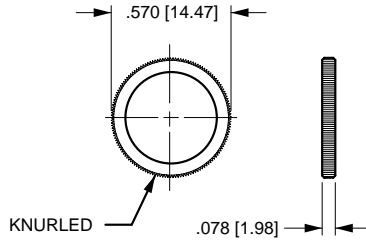


Bushing Accessories

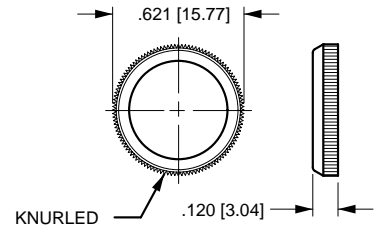
The hardware options and accessories listed below were specifically designed to be used with toggle and pushbutton switches. The drawings are representative of the actual products. When other hardware options are required, please consult factory.



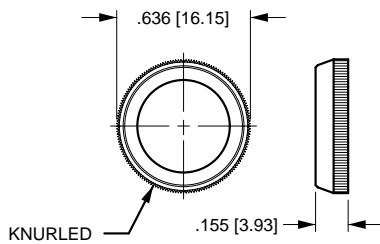
STANDARD HEXNUT
 .562 in. [14.27 mm] X .076 in. [1.93 mm]
 NICKEL: 380-08602
 BLACK: 380-08606



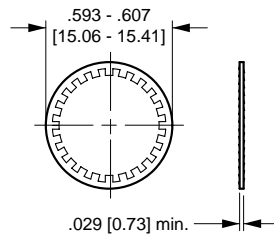
STANDARD FACENUT
 .570 in. [14.47 mm] X .078 in. [1.98 mm]
 NICKEL: 380-08693
 BLACK: 380-08694



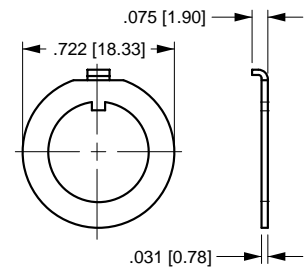
PLASTIC FACENUT
 (Wrench Supplied N/C)
 .625 in. [15.87 mm] X .120 in. [3.04 mm]
 BLACK: 384-17126-001
 RED: 384-17126-002
 WHITE: 384-17126-003



DRESS FACENUT
 .636 in. [16.15 mm] X .155 in. [3.93 mm]
 NICKEL: 380-08810
 BLACK: 380-08811

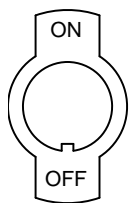


LOCKWASHER
 NICKEL-PLATED: 728-15907

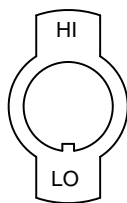


LOCKING RING
 ZINC: 728-15946
 BLACK: 728-15947

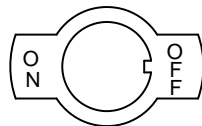
All indicator plates are nickel-plated steel. Odd keyway locations, alternate imprints and plating available on special order. Contact factory for minimum quantities and specifications.



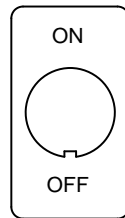
Y01
 272-06747



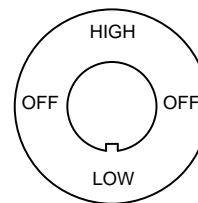
Y02
 272-06764



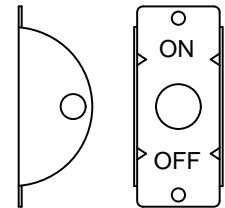
Y51
 272-06842



Y101
 272-06935



Y311
 272-07258



Y500
 272-07293

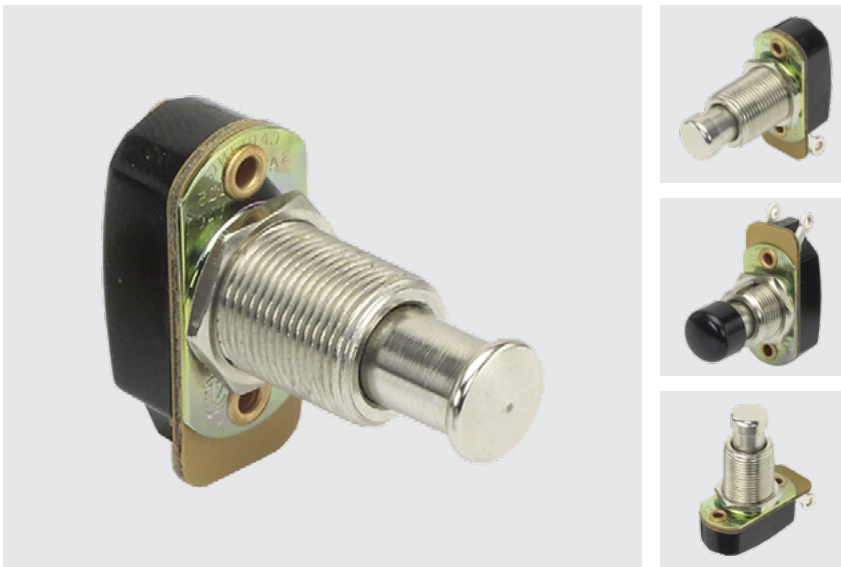
ALL PLATES SHOWN FIT 15/32" (.465 [11.81]) BUSHINGS

16-3P

16-3P-Series

PUSHBUTTON SWITCHES

The 16-3P-Series pushbutton switches are single pole and AC rated up to 3 amps. These momentary action switches have a slow-make, slow-break contact mechanism and require only light actuation force (4 oz. - 1 lb.). These switches are typically used in general purpose applications requiring finger actuation.



Product Highlights:

- ◆ Maintained, Momentary and 2 circuit function choices
- ◆ Available with optional overtravel plunger action
- ◆ Light 4 oz – 1 lb actuation force
- ◆ Metal plunger available with optional colored plastic cap

Typical Applications:

- ◆ Test & Measurement
- ◆ Audio Visual



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

16-3POFF - 4 - CBL

¹
Base Part Number

²
Bushing

³
Actuator Style

1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION

Single Pole

3A 125VAC

Off-(On)
Off-(On) with overtravel ¹
On-(Off)

Solder Lug Wire Leads

16-3P Off	16-3AP Off
16-3P Off-Ov	16-3AP Off-Ov
16-3P On	16-3AP On

1A 125VAC

On-On
On-On with overtravel ¹
1 On-1 Off (2 circuit)
1 On-1 Off with overtravel ¹ (2 circuit)

116-P	116-AP
116-P-OV	116-AP-OV
516-P	516-AP
516-P-OV	516-AP-OV

2 BUSHING STYLE

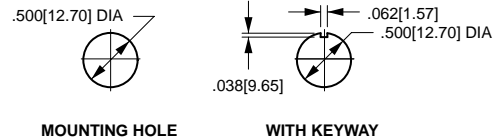
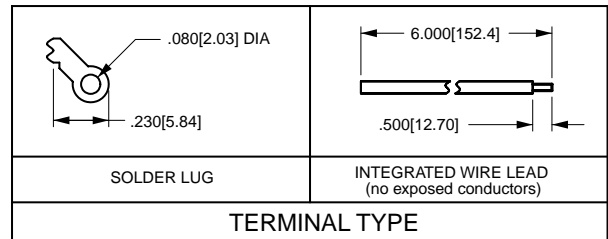
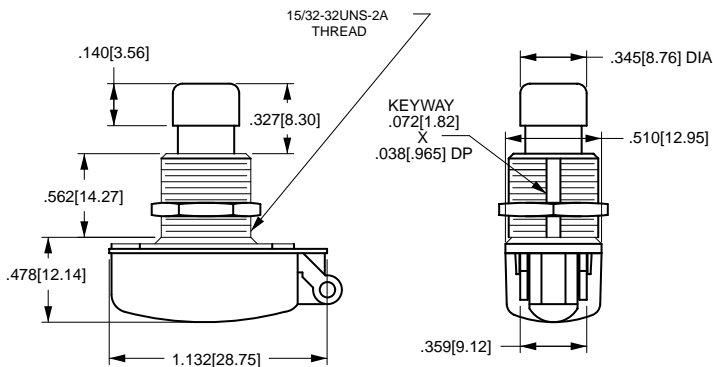
2 .312 length
4 .562 length

3 ACTUATOR STYLE ²

CBL black plastic color cap
CRD red plastic color cap

Notes:

- ¹ Overtravel only available with #4 bushing.
- ² When selection 3 is left blank, a standard nickel plated plunger is supplied.
- () Indicates momentary function.

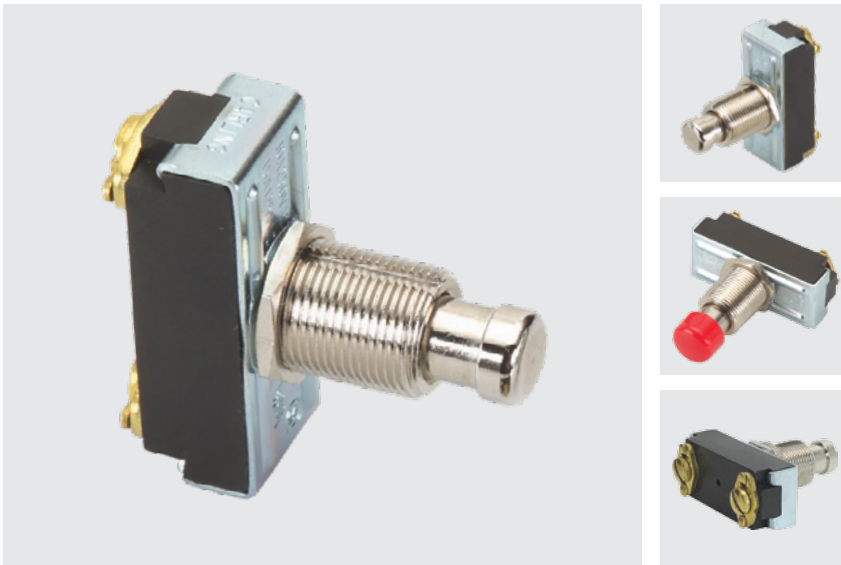


*Manufacturer reserves the right to change product specification without prior notice.

170/172-Series

PUSHBUTTON SWITCHES

The 170/172-Series pushbutton switches are single pole, high amperage switches suitable for shallow back panel applications. These switches are momentary action and require an actuation force of 2.5 lbs. The 170/172-Series switches are equipped with a slow-make, slow-break contact mechanism and are rated at 15 amps at 125VAC.



Product Highlights:

- ◆ Rated to 15A 125VAC
- ◆ Sturdy metal clad construction
- ◆ Metal plunger available with optional colored plastic cap
- ◆ Momentary On or Momentary Off circuitry

Typical Applications:

- ◆ Test & Measurement
- ◆ Meters
- ◆ Horns



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Electrical Life

25,000 cycles - Momentary

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

172 - CBL

¹
Base Part Number

²
Cap Style/Color

1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION
10A 250VAC; 15A 125VAC

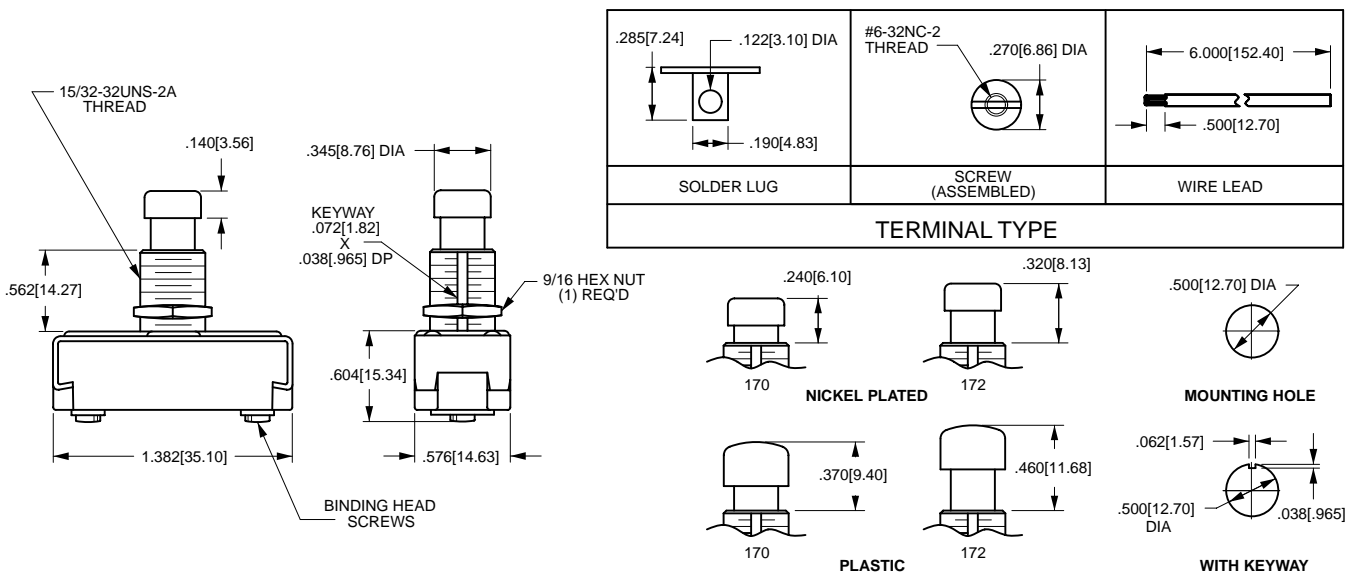
Single Pole	Solder Lug	Wire Leads	Screw Terms.
On-(Off)	170-B	170-A	170
Off-(On)	172-B	172-A	172

2 CAP STYLE / COLOR ¹

CBL	Black Plastic
CGN	Green Plastic
CRD	Red Plastic
CWH	White Plastic

Notes:

- 1 When selection 2 is left blank, a standard nickel plated plunger is supplied.
- () Indicates momentary function.



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

P26-Series

P26-Series

PUSHBUTTON SWITCHES

The P26-Series pushbutton switches are single pole, AC rated for 8 amps at 125 VAC and suitable for shallow back panel applications. These switches are momentary action with a medium actuation force (13 oz. typical). The P26-Series switch is equipped with a slow-make, slow-break contact mechanism.



Product Highlights:

- ◆ 6A 125VAC, 3A 277VAC rated
- ◆ Momentary On or Momentary Off circuitry
- ◆ 4 bushing size combinations
- ◆ Round Metal, Concave Metal and Nylon Style Actuators

Typical Applications:

- ◆ Intercoms
- ◆ Security System
- ◆ Electronic Signs
- ◆ Marine



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)



1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION

Single Pole	Solder Lug	.250 Tab	Wire Leads
3A 250VAC, 6A 125 VAC, 3/4A 125V			
Off - (On)	P26A	P26B	P26F
On - (Off)	P26L	-	P26T
3A 277VAC, 6A 125 VAC ¹			
Off - (On)	P267A	P267B	P267F
On - (Off)	P267L	-	P267T

2 BUSHING STYLE

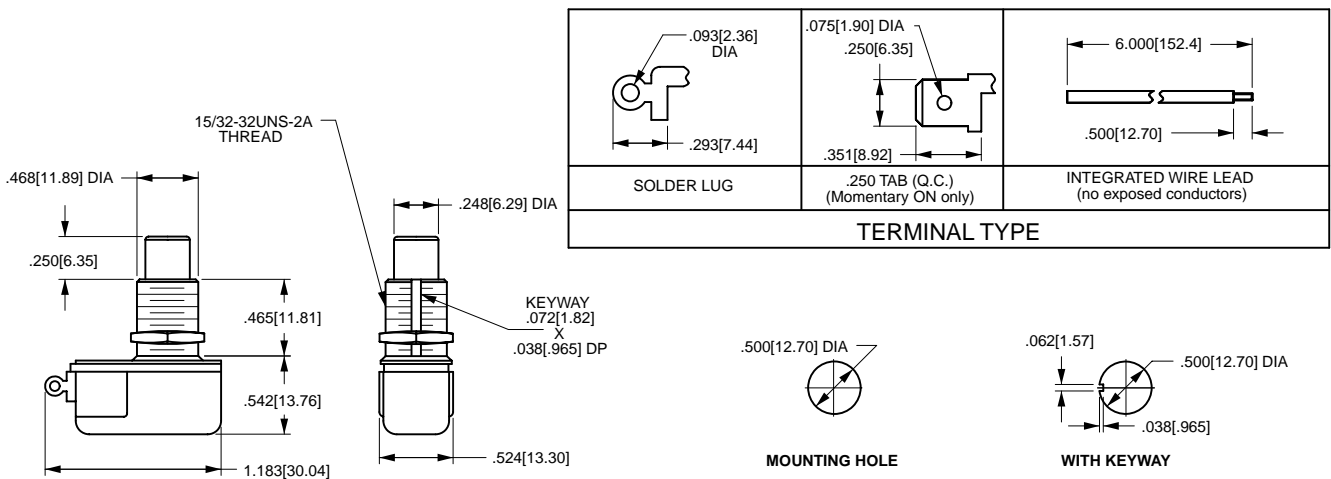
	length	diameter
1A	.406	.375
1B	.406	.468
1C	.465	.375
1D ³	.465	.468

3 BUTTON STYLE / COLOR

BL	Black Nylon
RD	Red Nylon
RND MTL ²	Round Metal
CON MTL ²	Concave Metal

Notes:

- 1 Additional ratings available. Consult factory for details
- 2 Only available with 1D bushing in .562 length
- 3 Length is .562 for RND MTL and CON MTL bottoms
- () Indicates momentary function.



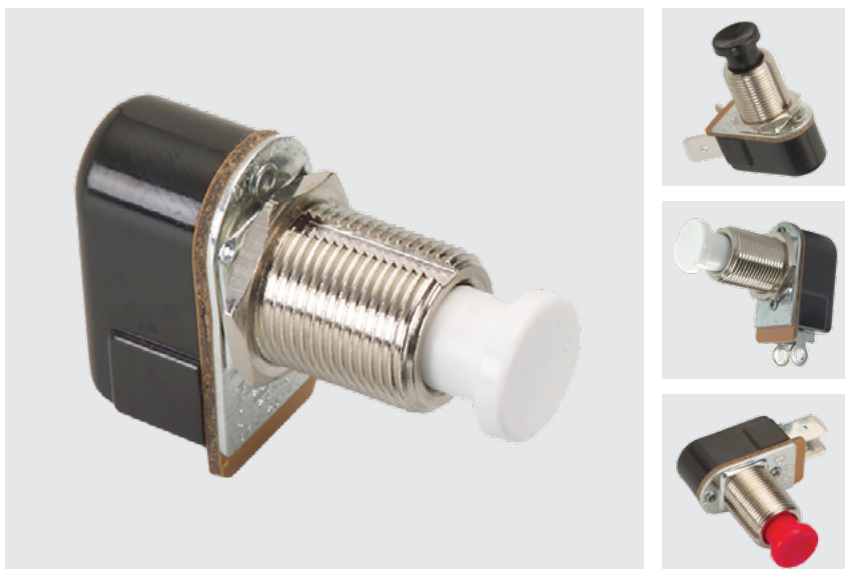
*Manufacturer reserves the right to change product specification without prior notice.

P27-Series

P27-Series

PUSHBUTTON SWITCHES

The P27-Series pushbutton switches are single pole, AC rated switches suitable for general purpose applications with a shallow back panel. These switches are momentary action with a medium actuation force (26 oz. typical). The P27-Series switch is equipped with a slow-make, slow-break contact mechanism, rated at 6 amps with a nylon concave pushbutton.



Product Highlights:

- ◆ Ratings to 6A 125VAC 3A 277VAC
- ◆ Momentary On or Momentary Off circuitry
- ◆ .250 Tab, Solder Lug or Wire Lead terminations
- ◆ Shallow space saving envelope

Typical Applications:

- ◆ Intercoms
- ◆ Security System
- ◆ Electronic Signs
- ◆ Marine



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

P27A - **BL**

1
Base Part Number

2
Button Color

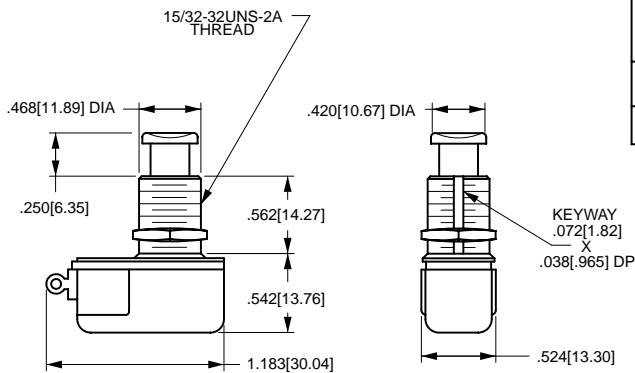
1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION

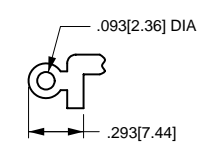
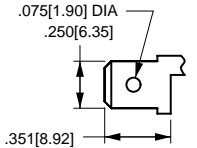
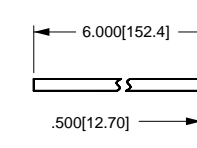
Single Pole	Solder Lug	.250 Tab	Wire Leads
3A 250VAC, 6A 125 VAC, 3/4A 125V			
Off - (On)	P27A	P27B	P27F
On - (Off)	P27L	-	P27T

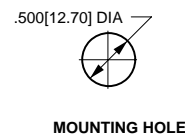
3 BUTTON STYLE / COLOR

BL	Black
RD	Red
WH	White

Notes:
() Indicates momentary function.



 .093[2.36] DIA .293[7.44]	 .075[1.90] DIA .250[6.35] .351[8.92]	 6.000[152.4] .500[12.70]
SOLDER LUG	.250 TAB (Q.C.) (Momentary ON only)	INTEGRATED WIRE LEAD (no exposed conductors)
TERMINAL TYPE		



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

641-Series

PUSHBUTTON SWITCHES

The single, double and triple pole 641-Series represents the most compact offerings of the Carling's pushbutton switch line. These switches are UL approved and meet ENEC spacing requirements. Additionally, the new 3-pole switch affords the versatility to control an extra function or indicator light. Rugged metal construction, self-cleaning contacts and stiff actuation force (3-3 1/2 lbs. typical) have made these switches ideal for most "foot pedal" type applications. These alternate action switches fit a standard .500" mounting hole with options of solder lug, wire lead and PC terminals.



Resources:

[Download 3D CAD Files](#)

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

Product Highlights:

- Available in 1-3 poles
- 3+ lbs. actuation force ideal for Foot pedal applications
- Solder Lug, Wire Lead or PC Terminal options
- Self-cleaning wiping style contacts

Typical Applications:

- Music Equipment
- Test & Measurement Devices
- Audio-Visual Equipment
- Appliances



Electrical

Rating	5A 125VAC, 2A 250VAC
Dielectric Strength	1500V RMS
Insulation Resistance	50 Megohms
Initial Contact Resistance	10 Milli Ohm max @ 4Vdc
Electrical Life	50,000 Cycles
Terminals	Solder Lug, Wire Leads and PC

Mechanical

Mechanical Life	100,000 Cycles
-----------------	----------------

Environmental

Vibration Sinusoidal	Mil STD 202G, Method 204D, Test Condition A 0.06DA or 10G's 10-500Hz
Shock	MIL-STD 2020G, Method 213B Test Condition K, 30G's
Handling Shock	1 Meter Drop onto Hard Surface, all surfaces and planes
Thermal Shock	MIL-STD 2020G, Method 107G Test Condition A -55 C to 85 C
Moisture Resistance	MIL-STD 2020G, Method 106F 10 25 C to 65 C Cycles 95% RH
Thermal Cycling	25 Cycles -40 C to 85 C
Operating Temperature	32°F to 185°F (0°C to +85°C)

Physical

Function Circuits	Three Pole Single Throw, TPST Three Pole Double Throw, TPDT
Operation	Alternate Action, Push ON, Push OFF
Button Travel	0.19 (4.83mm)
Actuation Force	3 to 5 LB, 1360 to 2268 g
Base	Polyester, PBT Glass Filled
Button	Brass, Nickel Plated
Bushing	Brass, Nickel Plated
Plunger	Brass, Nickel Plated
Top Plate	Stainless Steel
Actuator (Internal)	Nylon 6/6
Pin (Internal) ¹	Nylon 6/6
Driver	Cold Rolled Steel
Springs	Music Wire
Movable Contact	Copper
Terminals	Brass (tin plated)
Mounting	½" Dia. Hole, with and without keyway, or with locking ring

Safety & Regulation

Agency	UL 61058, EN 61058 (3 Pole Version) UL 1054 (1 & 2 Pole Version)
Materials	RoHS, REACH

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

64111210

¹
Part Number

1 PART NUMBER: SERIES / POLES / CIRCUITRY / RATING / TERMINATION ¹

**One Pole
2A 250VAC, 5A 125VAC**

Two Pole

Three Pole

solder lug	PC term.	wire leads.	
64111210	64111212	64111215	ON-OFF
64111220	64111222	64111225	ON-ON

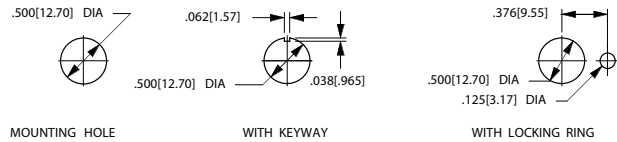
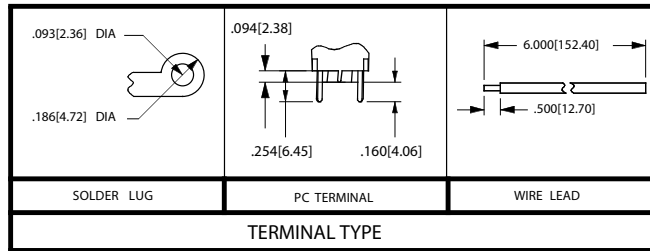
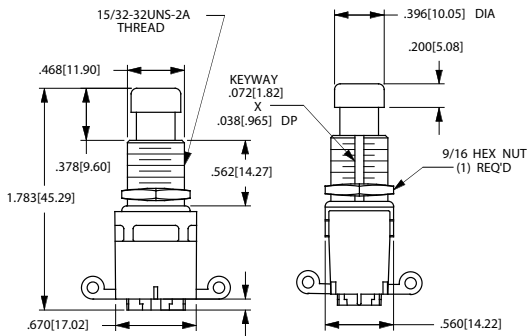
solder lug	PC term.	wire leads
64112210	64112212	64112215
64112220	64112222	64112225

solder lug	PC term.	wire leads
64113210	64113212	64113215
64113220	64113222	64113225

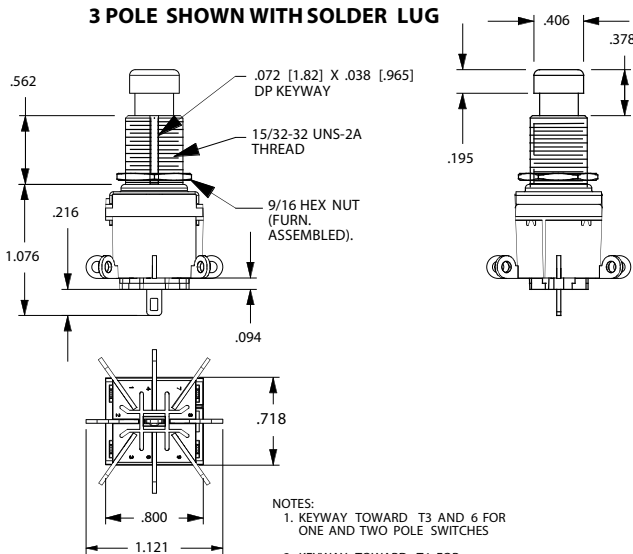
Notes:

1 For 1 and 2 pole only. 3 Pole switches use brass Pin

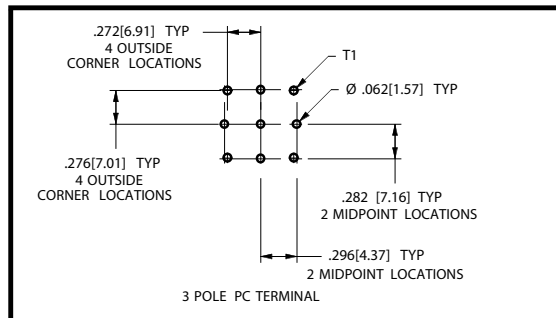
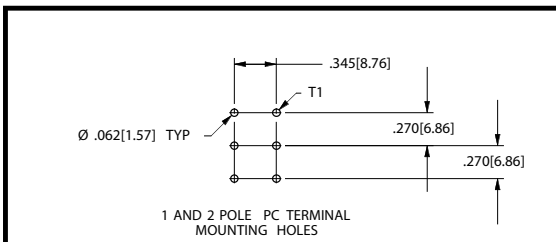
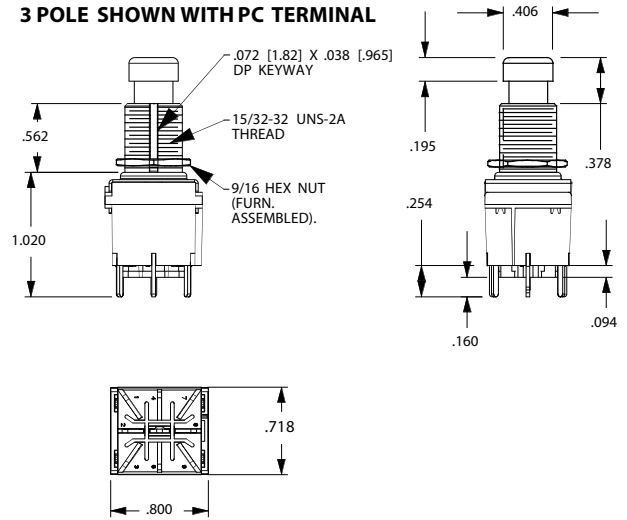
1 OR 2 POLE SHOWN WITH SOLDER LUG



3 POLE SHOWN WITH SOLDER LUG



3 POLE SHOWN WITH PC TERMINAL



110-Series

110-Series

PUSHBUTTON SWITCHES

The 110-Series provides a compact yet rugged solution to general purpose switch needs. Alternate action, metal construction and stiff (6-8 lb) actuation force have combined to make this switch a pillar in a variety of markets. This versatile switch is available in maintained and momentary circuits with a variety of termination and rating options.



Product Highlights:

- Ratings to 5A 250V, 10A 125V AC or DC
- Maintained or momentary circuitry
- On-Off, On-On and 2 circuit function options
- Choice of 4 different termination options

Typical Applications:

- Music Industry
- Audio/Visual
- Electronic Road Signs



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

Electrical Life

25,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

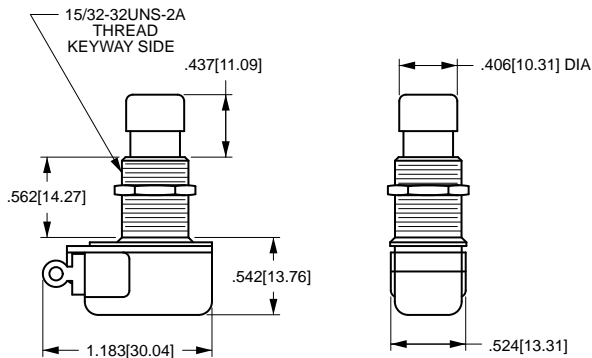
110-P

¹
Part Number

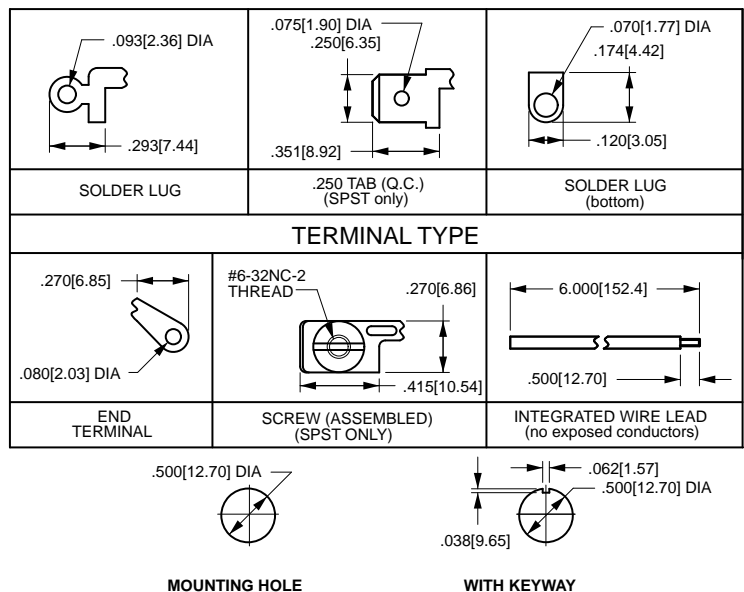
1 PART NUMBER: SERIES / ACTUATOR / CIRCUITRY / RATING / TERMINATION

	solder lug (end)	solder lug (bottom)	screw terminals	wire leads
Single Pole				
3A 250V, 6A 125V				
OFF-ON	110-P	110-BP	110-SP	111-16-P
OFF-(ON)	110-PM-OFF	110-PBM-OFF	110-SPM-OFF	111-PM-OFF
ON-(OFF)	110-PM-ON	110-PBM-ON	110-SPM-ON	111-PM-ON
5A 250V, 10A 125V, 1/4 HP 125V				
OFF-ON	160H-P	160H-BP	160H-SP	160H-AP
1A 250V, 3A 125V				
ON-ON	112-P	-	-	112-PA
ON-(ON)	112-PM	-	-	112-PAM
Double Pole				
1A 250V, 3A 125V				
OFF-ON	216-PP	-	-	216-PPA
OFF-(ON)	216-PM-OFF	-	-	216-PAM-OFF
ON-(OFF)	216-PM-ON	-	-	216-PAM-ON
ON-ON	316-PP	316-B-PP	-	316-PPA
ON-(ON)	316-PM	316-B-PM	-	316-PAM
1 ON - 1 OFF (2 circuit)	516-PP	-	-	516-PPA
1 (ON) - 1 (OFF) (2 circuit)	516-PM	-	-	516-PAM

Notes:
() Indicates momentary function.



NOTE:
KEYWAY
.072[1.82] X .038[.965] DP

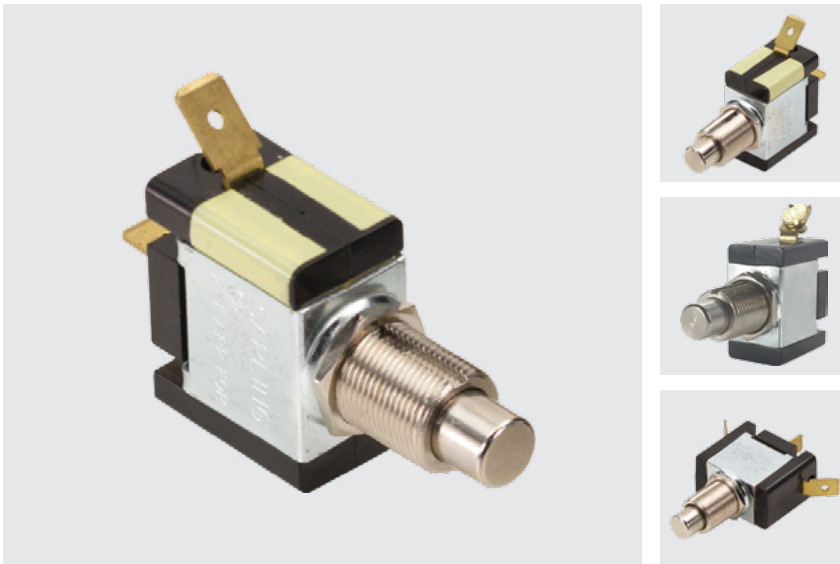


*Manufacturer reserves the right to change product specification without prior notice.

P-Series

PUSHBUTTON SWITCHES

These rugged pushbutton-type switches feature international approvals, ratings to 20A 125VAC and a heavy actuation force (3-5 lbs. typical) which makes this switch ideal for use as a “foot-pedal” switch. The metal bushing and plunger construction enables this alternate action switch to withstand the rigors of most any stringent pushbutton application.



Product Highlights:

- ♦ Rugged metal clad construction ideal for foot pedal applications
- ♦ Ratings to 20A 125VAC
- ♦ UL, CSA and TUV approvals
- ♦ Maintained On-Off or On-ON circuitry

Typical Applications:

- ♦ Vacuum Cleaners



Dielectric Strength

UL/CSA: 1000 - live to dead metal parts & opposite polarity
 TUV: 4000V - live to dead metal parts; 1250V - opposite polarity across open contacts

Electrical Life

50,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

0°F to 85°F (32°C to 85°C)

PA341

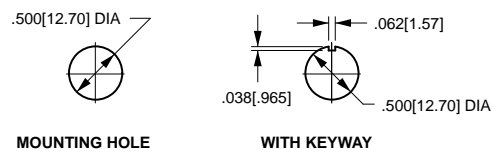
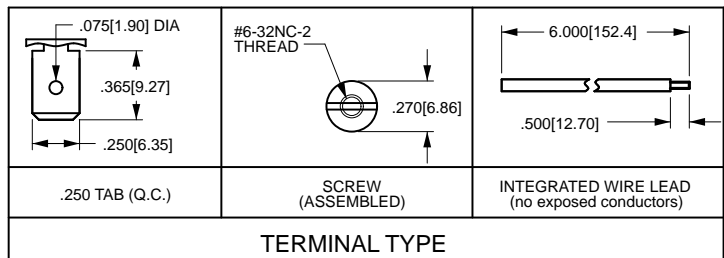
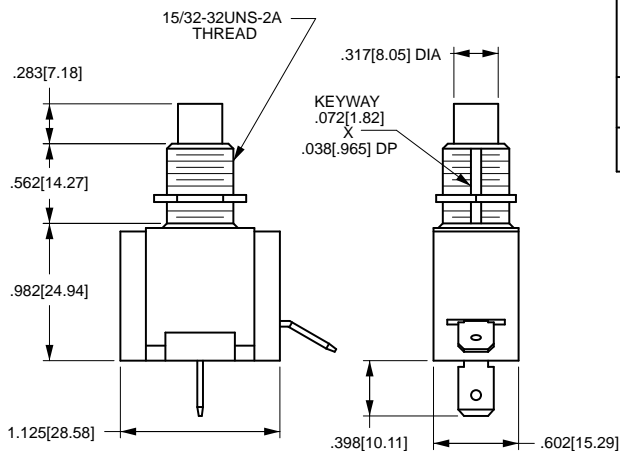
¹
Part Number

1 PART NUMBER: SERIES / ACTUATOR / CIRCUITRY / RATING / TERMINATION

	.250 Tab	Screw Terms.	Wire Leads
10A 250VAC, 15A 125VAC, 3/4 HP 120-240 VAC ¹	PA341	PA344	PA345
On-Off	PB341	PB344	PB345
On-On			
10A 250VAC, 20A 125VAC, 1 1/2 HP 120-240 VAC ¹	PA301	PA304	PA305
On-Off	PB301	PB304	PB305
On-On			
10A 250VAC, 15A 125VAC, 10(6)a 250 VACu, T85 ²	PA951	PA954	PA955
On-Off			

Notes:

- 1 Additional ratings available. Consult factory.
- 2 UL, CSA & TUV approved.



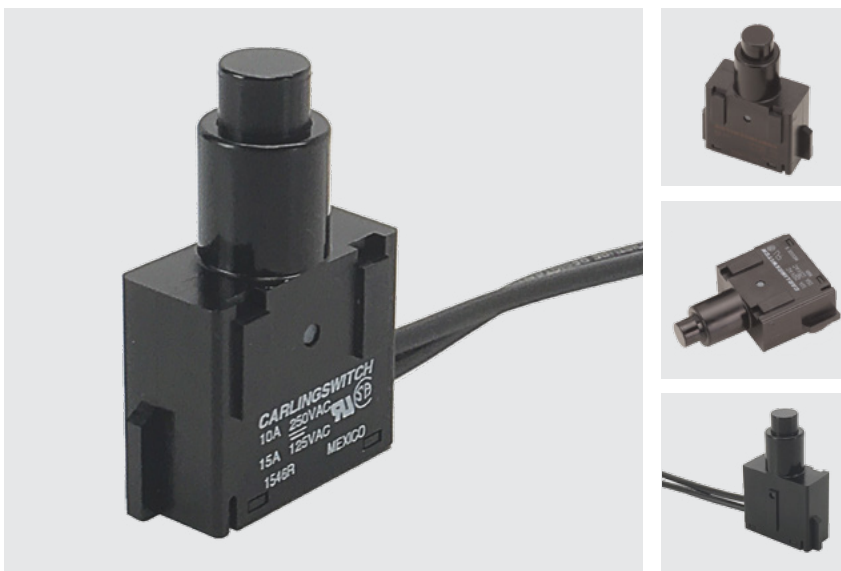
*Manufacturer reserves the right to change product specification without prior notice.

PP-Series

PP-Series

PUSHBUTTON SWITCHES

The PP-Series plastic pushbutton switches are heavy duty, single pole switches with wire leads. They are alternate action, available in single throw construction, with AC ratings up to 15 amps. Both bushing and bracket are made out of nylon. These high current switches are popular within the Appliance market.



Product Highlights:

- ♦ Ratings to 15A 125VAC
- ♦ All nylon construction
- ♦ Stiff actuation force suitable for foot pedal applications
- ♦ Integrated wire lead termination

Typical Applications:

- ♦ Vacuum Cleaners



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts & opposite polarity

Electrical Life

50,000 cycles

Mechanical Life

100,000 cycles

Operating Temperature

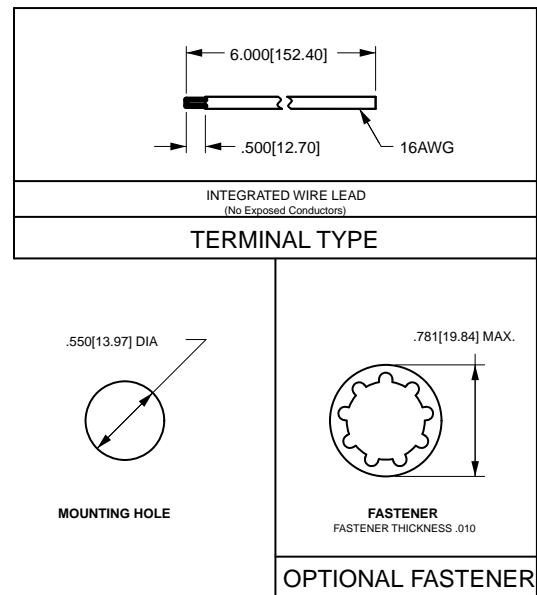
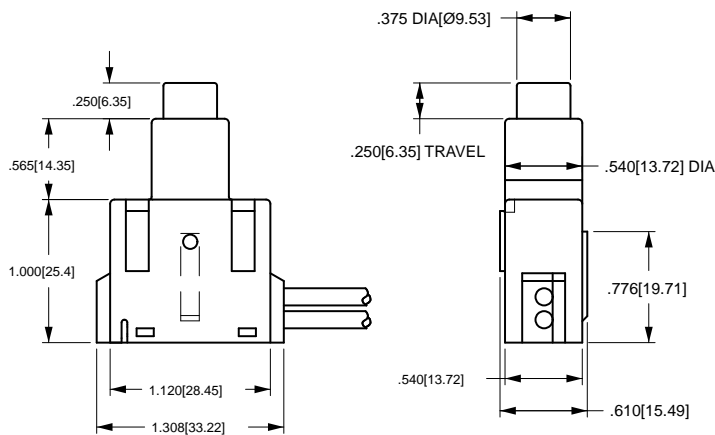
32°F to 185°F (0°C to 85°C)

PPA525-AC

¹
Part Number

1 PART NUMBER: SERIES / ACTUATOR / CIRCUITRY / RATING / TERMINATION

10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC On-Off	Wire Leads PPA525-AC
10A 250VAC, 15A 125VAC On-Off	PAA515-AC



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

R135-Series

ROTARY SWITCHES

The R135 and R135A-Series rotary switches are single pole, single throw “L” rated up to 3A, feature an ON-OFF repeating action, and are available with a nylon actuating knob; nylon snap-in bracket or nickel-plated brass bushing. These switches are typically used to control lighting functions.



Product Highlights:

- ◆ 3A 125VAC “L” rating to control lighting
- ◆ Off-On repeating action circuitry
- ◆ Integrated wire lead termination
- ◆ Bushing or snap in mounting styles

Typical Applications:

- ◆ Appliance
- ◆ HVAC



Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

Mechanical Life

100,000 cycles

Electrical Life

100,000 cycles

Operating Temperature

32°F to 185°F (0°C to 85°C)

R135-A - BL

¹ Base Part Number

² Knob Color

1 BASE PART NUMBER: SERIES / CIRCUITRY / RATING / TERMINATION

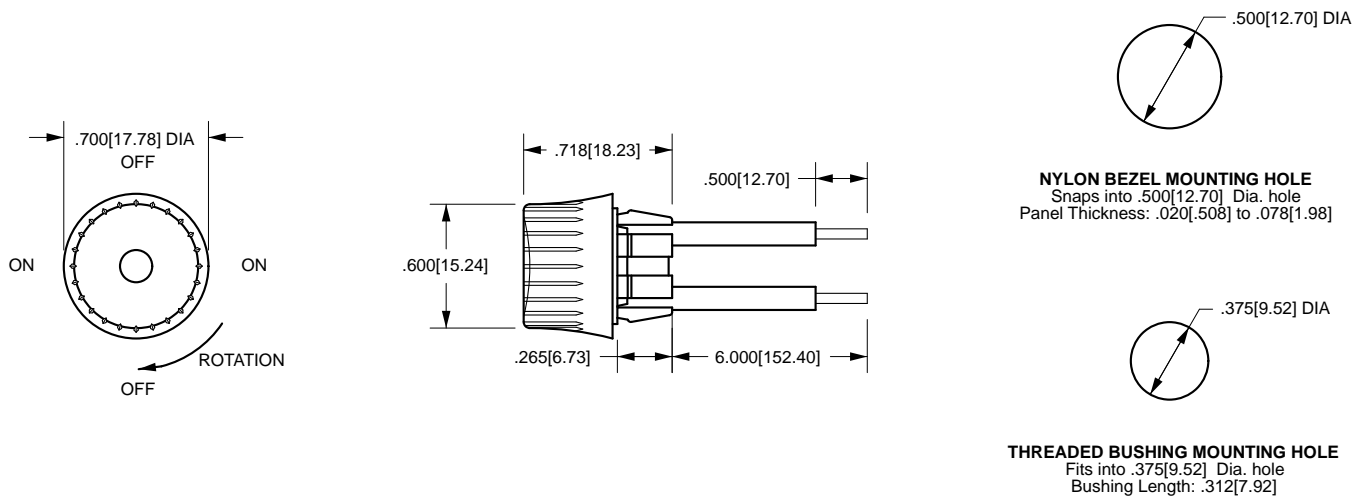
1.5A 250 VAC; 3A 125 VAC L; 5A 12 VDC	Wire Leads
OFF-ON repeating	.375 threaded bushing R135
OFF-ON repeating	nylon snap-in bezel R135-A

2 KNOB COLOR ¹

BL	Black
WH	White

Notes:
Standard Wire Leads are 6" long, stripped 1/2" black. If different length required, please specify at the end of the part number. ex. R135-A-BL/20". Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. Burr on bottom. Test cut hole in actual material.

¹ Custom colors available. Consult factory.



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

700/800-Series

ROTARY SWITCHES

The 700 and 800-Series are single pole multi-position, general purpose rotary switches. These switches feature a nylon actuator in a metal clad construction along with a self-cleaning silver plated contact design. The 700 and 800-Series are typically used in applications requiring multi-position speed controls, such as electric fans.



Product Highlights:

- ◆ Ratings to 3A 250VAC, 6A 125VAC
- ◆ Up to 8 available detent positions
- ◆ Double “D” bushing mount
- ◆ Sturdy metal clad construction

Typical Applications:

- ◆ Small Appliance
- ◆ Industrial Control
- ◆ Marine



Dielectric Strength

UL/CSA: 1000V (minimum)

Base Material

Steel/Zinc Plate

Insulation Resistance

100 Megohms (minimum)

Actuator Material

Brass/Nickel Plate

700-1A - **BL**

¹
Base Part Number

²
Knob Color

1 BASE PART NUMBER: SERIES / POLES / CIRCUITRY ¹ / RATING / TERMINATION ²

2A 250VAC; 4A 125VAC; 1A 125V

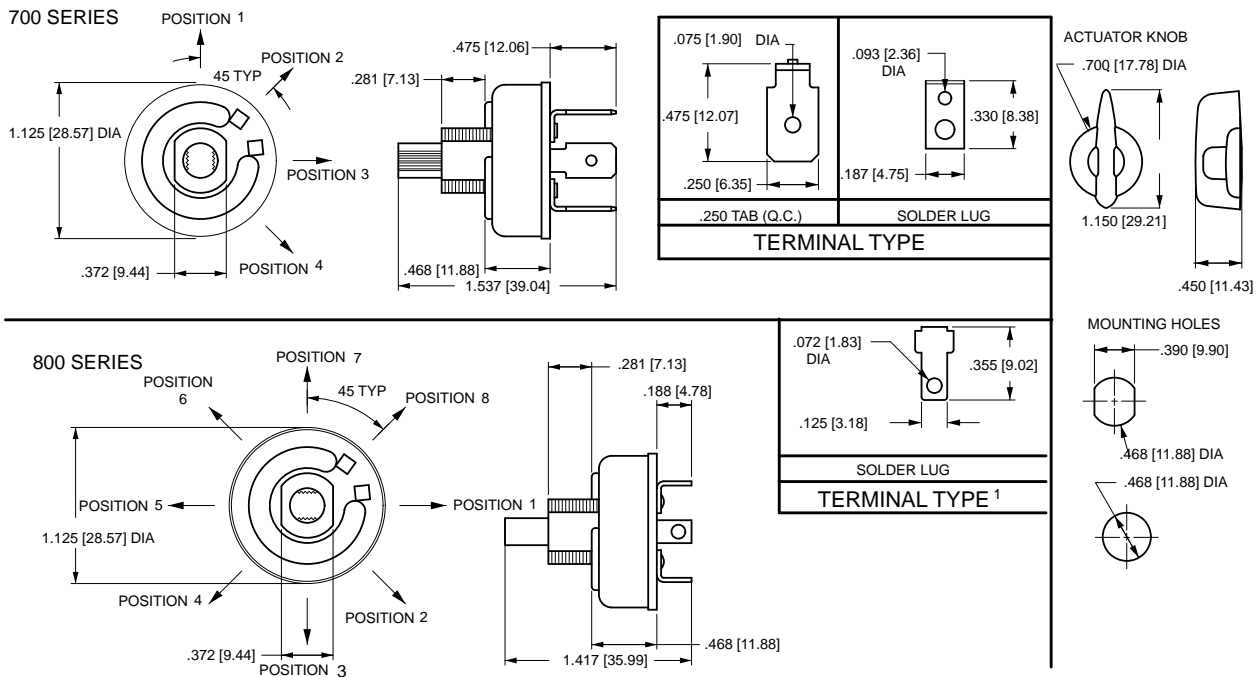
Solder Lugs	.250 Tabs	Position 1	Position 2	Position 3	Position 4	
-	700-A	OFF	ON	ON	ON	
700-1	700-1A	OFF	ON	-	-	
700-2	700-2A	OFF	ON	ON	ON	repeating 8 positions
700-3	700-3A	OFF	ON	ON	OFF	
700-4	700-4A	OFF	ON	ON	-	
700-5	700-5A	OFF	ON	OFF	-	
700-6	700-6A	-	ON	OFF	ON	
700-7	700-7A	-	ON	ON	-	
700-8	700-8A	-	ON	ON	ON	
700-9	700-9A	OFF	ON	OFF	ON	

3A 250VAC; 6A 125VAC

Switch Positions	OFF Position	
800-2	2 positions	1st position
800-3	3 positions	2nd position
800-4	4 positions	3rd position
800-5	5 positions	4th position
800-6	6 positions	5th position
800-7	7 positions	6th position
800-8	8 positions	7th position
		8th position

2 ACTUATOR COLOR
BL Black

- Notes:
 1 700-2 and 700-2A feature 8 detent positions.
 2 800-Series terminal is a combination solder lug and quick connect.



- Notes:
 1. Terminal is combination solder lug and quick connect.


















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

Terminology

Agency data	UL File #E7560 CSA File # LR9280
Single Pole (SP)	A switch device that opens, closes or changes connection of a single conductor in an electrical circuit.
Double Pole (DP)	A switch device that opens, closes or changes connection of two conductors in an electrical circuit.
Single Throw (ST)	A switch that opens, closes or completes a circuit at only one of the extreme positions of its actuator.
Double Throw (DT)	A switch that opens, closes or completes a circuit at both extreme positions of its actuator.
Normally Open (NO)	A momentary switch where one or more circuits are open when the switch actuator is at rest (the normal position.)
Normally Closed (NC)	A momentary switch where one or more circuits are closed when the switch actuator is at rest (the normal position.)
Power Rating	A switches current handling capability measured in amperes, horsepower, lamp loads or combinations thereof, in conjunction with applicable voltage levels.
L Rating	Denotes the ability of a switch to handle the initial high inrush of a Tungsten Filament Lamp on AC voltage only.
T Rating	Denotes the ability of a switch to handle the initial high inrush of a tungsten filament lamp on AC or DC voltage.
Typical European Rating	16 resistive load amperage (4) motor load amperage A amperage 250V voltage ~ AC T85 max. operating temp. in centigrade μ micro-gap (<3mm) approved
Microgap (μ)	European marking required for contact separation of less than 3mm. Switches with microgap (μ) approval are not acceptable as the safety disconnect of equipment from the main power source. The equipment requires an additional means for safe disconnection from the main power source such as a cord and plug.
Bulb Life	Neon 25,000 hours Incandescent 25,000+ hours LED 100,000 hours
Lamp Characteristics	Neon (120-240V) .002A Current Draw Incandescent 6V .20A Current Draw 12-14V .08A Current Draw 18V .04A Current Draw 24-28V .04A Current Draw

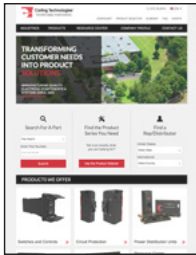
Agency Approvals

These marks are granted by national certification bodies for use on products which comply with their specifications.

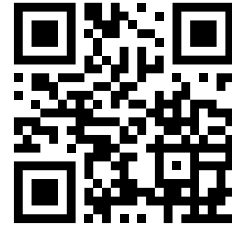
Agency	Country	Mark
UL	USA	
UL	Canada	
UL	USA & Canada	
BEAB	United Kingdom	
CSA	Canada	
VDE	Germany	
TUV	Germany	
SEMKO	Sweden	
NEMKO	Norway	
KEMA	Netherlands	
DEMKO	Denmark	
UTE(USE)	France	
SEV	Switzerland	
OVE	Austria	
IMQ	Italy	
CCC	China	
FIMKO	Finland	

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

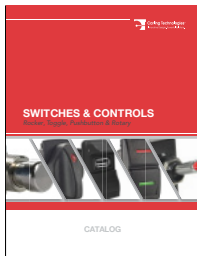
www.carlingtech.com



Watch Company Profile Video



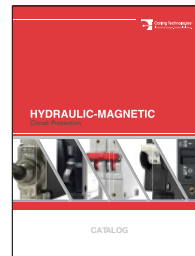
Switches & Controls



catalog

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

Hydraulic-Magnetic



catalog

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

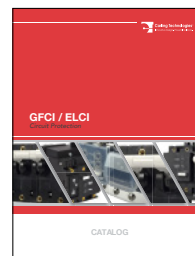
Thermal



catalog

Complete line and ordering details for all thermal circuit breakers.

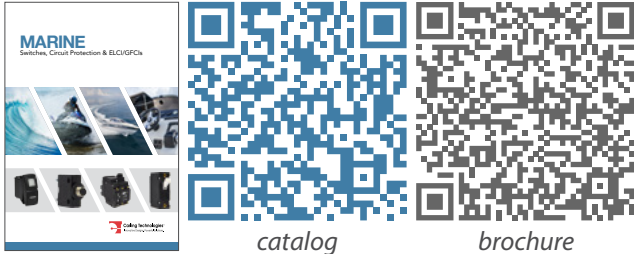
GFCI / ELCI



catalog

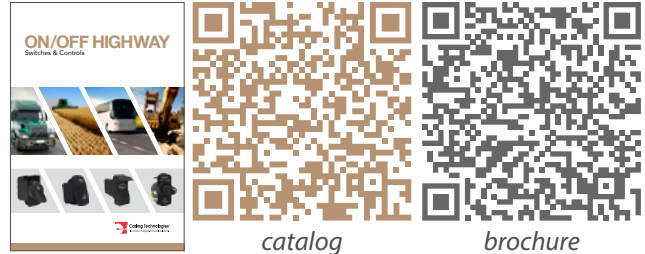
Complete line and ordering details for all GFCIs/ELCIs.

Marine



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

On-Off Highway



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

Renewable Energy



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

Military



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

Telecom/Datacom



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

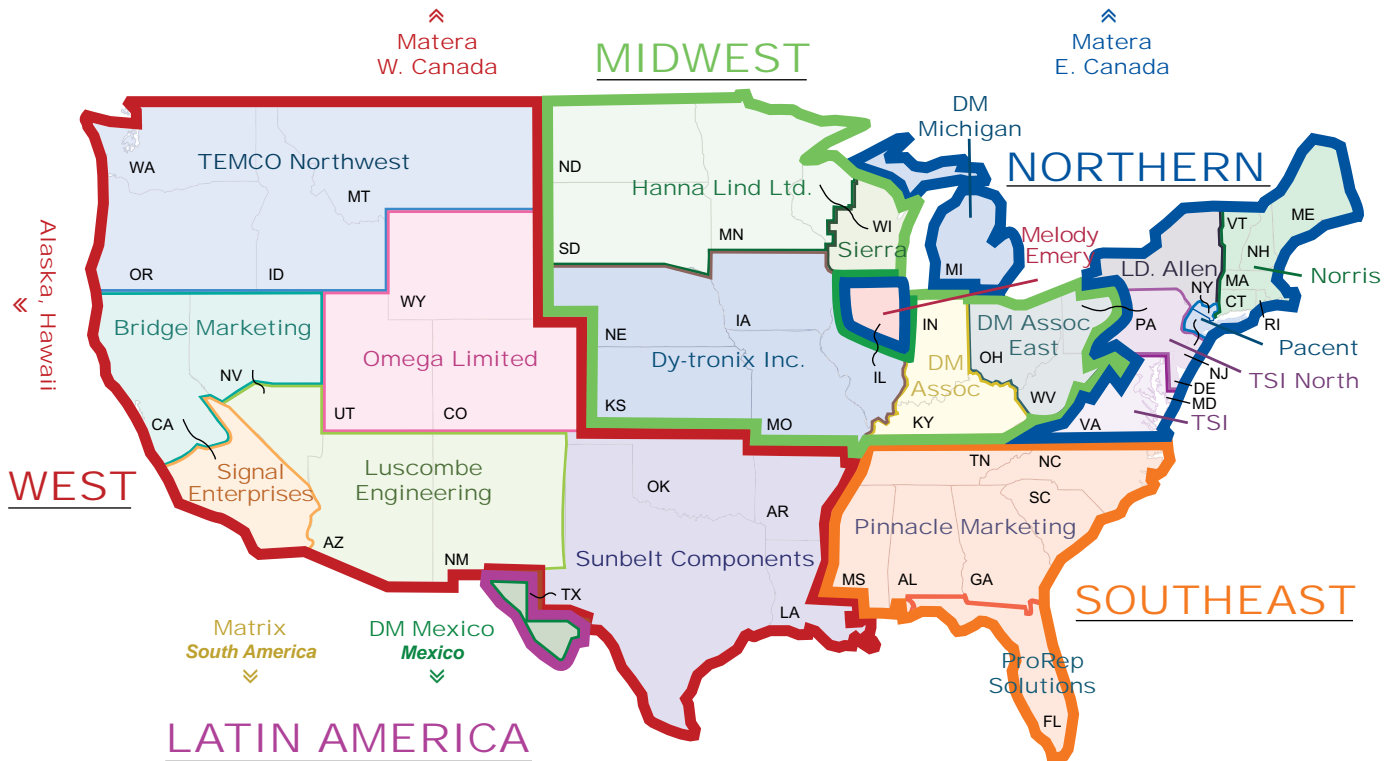
Industrial Automation



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

Authorized Sales Representatives

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



About Carling

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

To view all of Carling’s environmental, quality, health & safety certifications please visit www.carlingtech.com/environmental-certifications

Worldwide Headquarters

Carling Technologies, Inc.
60 Johnson Avenue, Plainville, CT 06062-1177
Phone: 860.793.9281 Fax: 860.793.9231
Email: sales@carlingtech.com www.carlingtech.com

Northern Region Sales Office: nrsm@carlingtech.com
Southeast Region Sales Office: sersm@carlingtech.com
Midwest Region Sales Office: mrrsm@carlingtech.com
West Region Sales Office: wrsm@carlingtech.com
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Asia-Pacific Headquarters

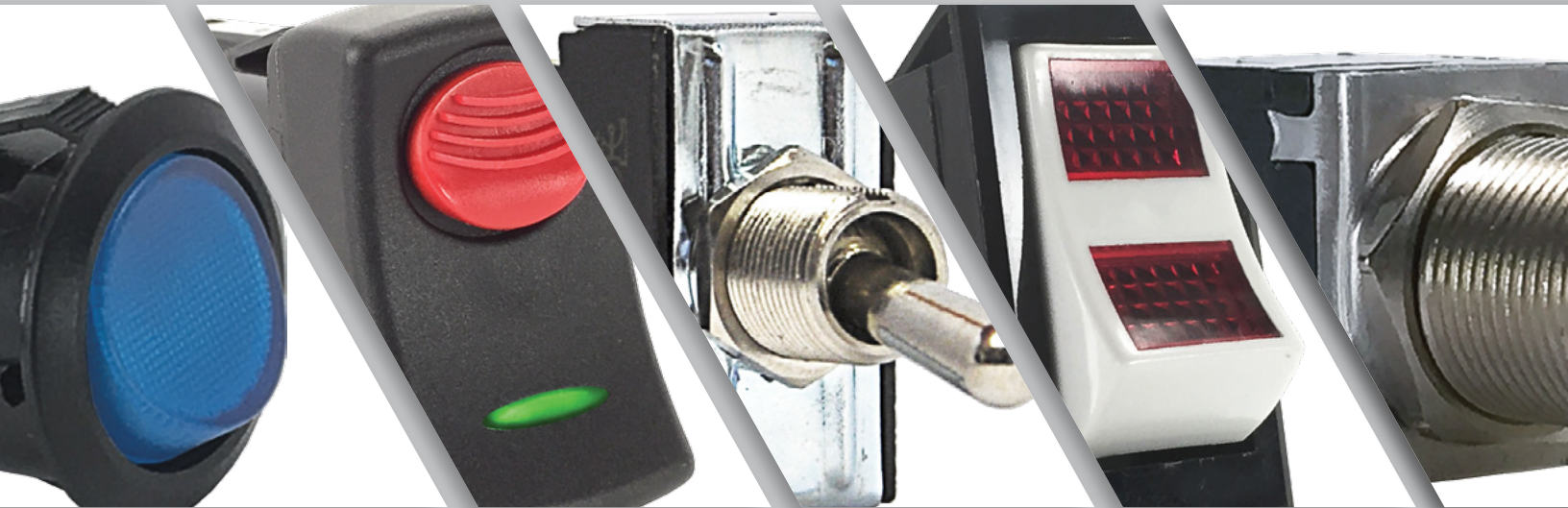
Carling Technologies, Asia-Pacific Ltd.,
Kowloon, Hong Kong
Phone: Int + 852-2737-2277 Fax: Int + 852-2736-9332
Email: sales@carlingtech.com.hk

Shenzhen, China: shenzhen@carlingtech.com
Shanghai, China: shanghai@carlingtech.com
Pune, India: india@carlingtech.com
Kaohsiung, Taiwan: taiwan@carlingtech.com
Yokohama, Japan: japan@carlingtech.com

Europe | Middle East | Africa Headquarters

Carling Technologies LTD
4 Airport Business Park, Exeter Airport,
Clyst Honiton, Exeter, Devon, EX5 2UL, UK
Phone: Int + 44 1392.364422 Fax: Int + 44 1392.364477
Email: ltd.sales@carlingtech.com

Germany: gmbh@carlingtech.com
France: sas@carlingtech.com





Carling Technologies™
Innovative Designs. Powerful Solutions.

THERMAL

Circuit Protection



CATALOG

FOUNDED IN 1920



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

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



SWITCHES & CONTROLS

- Rocker
- Toggle
- Pushbutton
- Rotary

CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

MULTIPLEXED POWER SYSTEMS

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

STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Military



Renewable Energy

GLOBAL LOCATIONS:

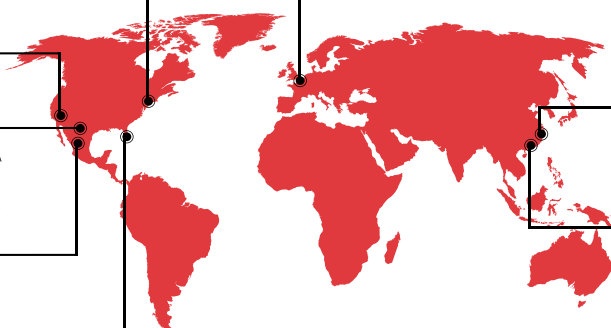
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World Headquarters
Plainville, CT, USA
ISO9001:2008
ISO/TS16949:2009

Maretron
Phoenix, AZ, USA

Carling Technologies
Brownsville, TX, USA
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ISO9001:2008
ISO/TS16949:2009

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ISO9001:2008
ISO/TS16949:2009

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Exeter, UK
ISO9001:2008
ISO/TS16949:2009

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ISO/TS16949:2009

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WORLDWIDE NUMBERS:

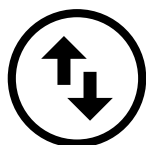


2200+
EMPLOYEES

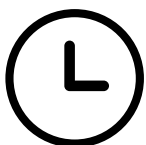


150+
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Integration



Reliable &
On-Time Delivery



Excellent
Customer Service



Innovative &
Eco-Friendly Products



70+
DISTRIBUTORS



50+
REP FIRMS

Table of Contents

Selector Guide	2
C1005B-Series	3
Lighted Rocker Thermal Circuit Protection, Ratings up to 16A AC/DC	
CTB-Series	5
Panel Mount Rocker Thermal Circuit Protection, Ratings up to 15A AC/DC	
CMB-Series	7
Pushbutton Thermal Circuit Protection, Ratings up to 20A AC/DC	
CLB-Series	9
Pushbutton Thermal Circuit Protection, Ratings up to 60A AC/DC	
CMBA/CLBA-Series	11
Auto-Reset Thermal Circuit Protection, Ratings up to 40A AC/DC	

Thermal Circuit Protectors

This catalog features Carling Technologies' current line of thermal circuit protectors, from 3 to 60 amps, which offer reliable, cost effective circuit protection. 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.

Typical Applications Include:

- Household Appliances
- Transportation
- Marine
- Power Strips
- Medical Equipment
- Audio Visual Equipment
- Power Supplies
- Exercise Equipment



	 <i>C1005B-Series</i>	 <i>CTB-Series</i>	 <i>CMB-Series</i>	 <i>CLB-Series</i>	 <i>CMBA/CLBA-Series</i>
Number of Poles	single	single	single	single	single
Actuator Style	rocker, lighted rocker	rocker	pushbutton	pushbutton	n/a
Max Current & Voltage Ratings	7 to 16A, 125-250VAC, 32VDC	3 to 15A, 125-250VAC, 50VDC	3 to 20A, 125-250VAC, 32 VDC	3 to 60A, 125-250VAC, 32 VDC	3 to 40A, 125-250VAC, 32 VDC
Max Interrupting Capacity	1000A	1000A	2500A@32VDC	2500A@32VDC	2500A@32VDC
Available Circuits	series trip manual reset	series trip manual reset	series trip manual reset	series trip manual reset	series trip auto reset
Terminal Options	.250" tab, solder lug	.250" tab	.250" tab, .250" tab with 90° bend, screw terminal, screw terminal with 90° bend	.250" tab, .250" tab with 90° bend, screw terminal, screw terminal with 90° bend	.250" tab, .250" tab with 90° bend
Mounting Method	front panel snap-in	front panel snap-in	threaded bushing, front panel snap-in	threaded bushing, front panel snap-in	plug-in
Operating Temperature	-10°C to 65°C	-10°C to 60°C	-10°C to 60°C	-10°C to 60°C	-10°C to 60°C
Agency Approvals	UL, CUL, TUV	UL, CUL, VDE, CE	UL, CUL, CSA, TUV, CE, UL 1500 / ISO 8846 for ignition protection / marine	UL, CUL, CSA, TUV, CE, UL 1500 / ISO 8846 for ignition protection / marine	UL, CUL, TUV, UL 1500 / ISO 8846 for ignition protection / marine

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

C1005B-Series

THERMAL CIRCUIT PROTECTORS

The C1005B-Series offers the functionality of a switch and circuit breaker in a single compact package, which fits an industry standard .550 x 1.125 mounting hole. This combo device eliminates the need for both a switch and thermal circuit protector on customer panels. By using only this multipurpose product, wiring and assembly costs are greatly reduced, while at the same time, valuable panel real estate is saved.

The C1005B-Series is available lighted or unlighted, in a variety of colors, with solder lug or .250 tabs. Current ratings range from 7-16 amps@125 and 250 VAC and up to 32 VDC.

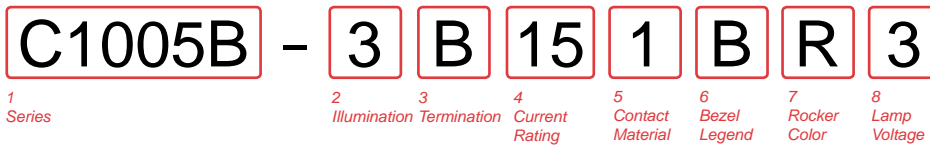


Product Highlights:

- ♦ .550 X 1.125 mounting (14mm x 28.6mm)
- ♦ Ratings from 7-16A
- ♦ Standard Reset/Off Legend
- ♦ Curved Rocker & Angular Bezel
- ♦ .250 Tabs or Solder Lug Terminations
- ♦ 65°C Max Operating Temperature
- ♦ 1000 AIC Interrupting Capacity
- ♦ 1500 VAC Dielectric Strength
- ♦ 100M ohms @500VDC Insulation Resistance
- ♦ Compact Space-Saving Envelope
- ♦ UL1077, UL1363, IEC 60934

Typical Applications:

- ♦ Household Appliances
- ♦ Commercial Appliances
- ♦ Transportation
- ♦ Marine
- ♦ Telecommunications
- ♦ Power Strips
- ♦ Audio-visual Equipment
- ♦ Medical equipment
- ♦ Power supplies
- ♦ Generators



1 SERIES
C1005B

2 ILLUMINATION
 2 Non-Lighted
 3 Lighted

3 TERMINATION
 A Solder Lug
 B .250 Tab

4 CURRENT RATING (AMPERES)

07	7 amps	12	12 amps
08	8 amps	13	13 amps
09	9 amps	14	14 amps
10	10 amps	15	15 amps
11	11 amps	16	16 amps

5 CONTACT MATERIAL 1
 1 Silver Cad Oxide (switch), Silver plated copper (breaker)

6 BEZEL LEGEND IMPRINT
 B Black Bezel with white legend
 W White Bezel with black legend
 C Gray Bezel with black legend

7 ROCKER COLOR
 R Red
 G Green
 U Blue
 T Clear
 Note: RESET OFF Legend is standard.

8 LAMP VOLTAGE
 3 Neon Lamp 125/250 VAC
 9 Non-lighted

Notes:
 1. Silver cad oxide switch and breaker contacts are available as a special order. Specify 3 for selection 5

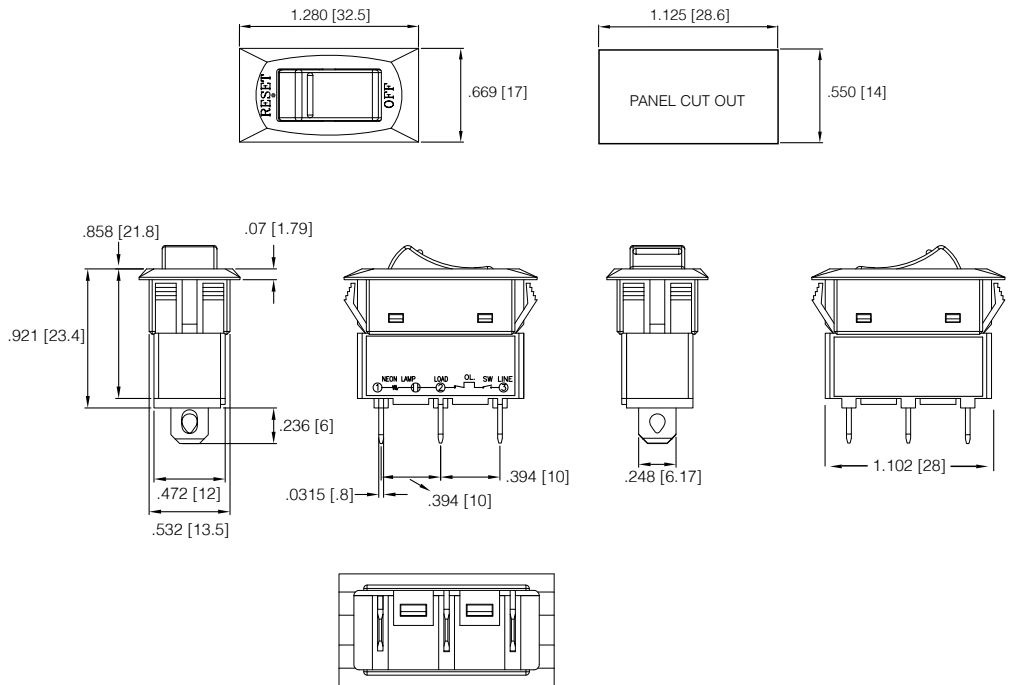
Time Delay

Overload	Trip Time
100%	No Trip
150%	Trip in 1 hr
200%	5 - 35 sec.
300%	1 - 10 sec.
400%	.45 - 5.5 sec.
600%	.1 - 20 sec.

Correction Factor ¹	
0 °C	x 0.67
10 °C	x 0.72
15 °C	x 0.83
18 °C	x 0.87
25 °C	x 1.00
32 °C	x 1.05
40 °C	x 1.18
50 °C	x 1.33
60 °C	x 1.67

Notes:
 1. To adjust the breaker ratings for ambient temperature multiply the breaker rating by the factor. (ex: 5 amp rating at 0°C: 5 x .67 = 3.3 amp. Select 3 amp rating.)
 2500 amps @ 32 VDC only.
 AIC rating is 1000 amps for AC applications.

Dimensional Specifications: in. [mm]



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

CTB

CTB-Series

THERMAL CIRCUIT PROTECTORS

The CTB-Series is a compact, single pole, rocker actuated family of thermal circuit breakers designed to protect equipment. Utilizing simple, precision design with few moving parts, these breakers offer cost effective, extremely reliable circuit protection with high resistance against shock and vibration. Electrical ratings range from 3 to 15 amps at 125, 250VAC or 50VDC. This breaker resets with the push of a finger and features a snap in mounting style, utilizing a 16mm dia. round Double D mounting hole.



Product Highlights:

- ◆ Ratings from 3-15A, 125, 250VAC, 50VDC
- ◆ .250 Tabs
- ◆ 60°C Max Operating Temperature
- ◆ 1000 AIC Interrupting Capacity
- ◆ 100M ohms Insulation Resistance
- ◆ UL, cUL, VDE, CE

Applications:

- ◆ Household Appliances
- ◆ Transportation
- ◆ Marine
- ◆ Power Strips
- ◆ Medical Equipment
- ◆ Audio Visual Equipment
- ◆ Power Supplies
- ◆ Exercise Equipment
- ◆ **ROHS Compliant**

CTB - **B** - **B** - **05** - **B**

1 Series 2 Bezel Color 3 Rocker Color 4 Rating 5 Panel Thickness

1 SERIES
CTB

2 BEZEL COLOR 1
B Black

3 ROCKER COLOR 1
B Black

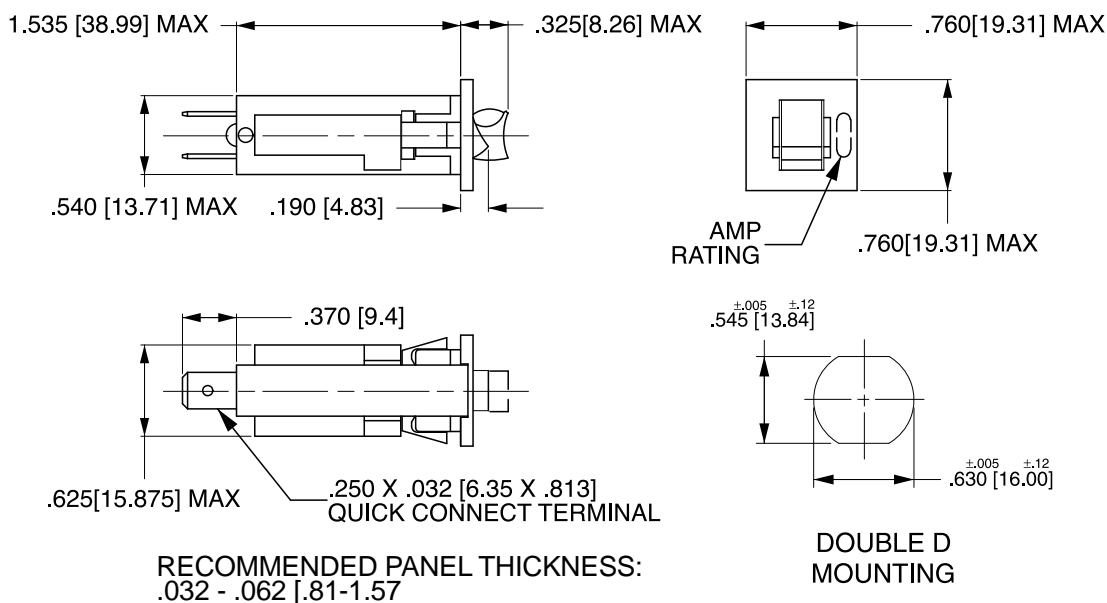
4 RATING

03	3 amp	08	8 amp	14	14 amp
04	4 amp	09	9 amp	15	15 amp
05	5 amp	10	10 amp		
06	6 amp	12	12 amp		
07	7 amp	13	13 amp		

5 PANEL THICKNESS
blank fits standard thickness of .032 - .062
B fits .070 - .110 panel thickness

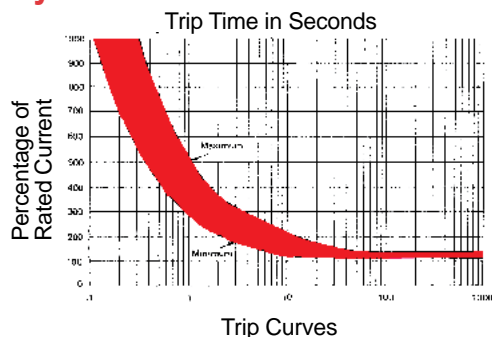
Notes:
1. Additional colors available. Consult factory.

Dimensional Specifications: in. [mm]



Notes:
All dimensions are in inches [millimeters]. Tolerance ±.005 [.127] unless otherwise specified. Breaker must hold 100% of rated current and must trip at 150% and above, within the time limits shown in curve. Trip times specified at 25° ambient with no preloading.

Time Delay



Correction Factor 1	
0 °C	x 0.67
10 °C	x 0.72
15 °C	x 0.83
18 °C	x 0.87
25 °C	x 1.00
32 °C	x 1.05
40 °C	x 1.18
50 °C	x 1.33
60 °C	x 1.67

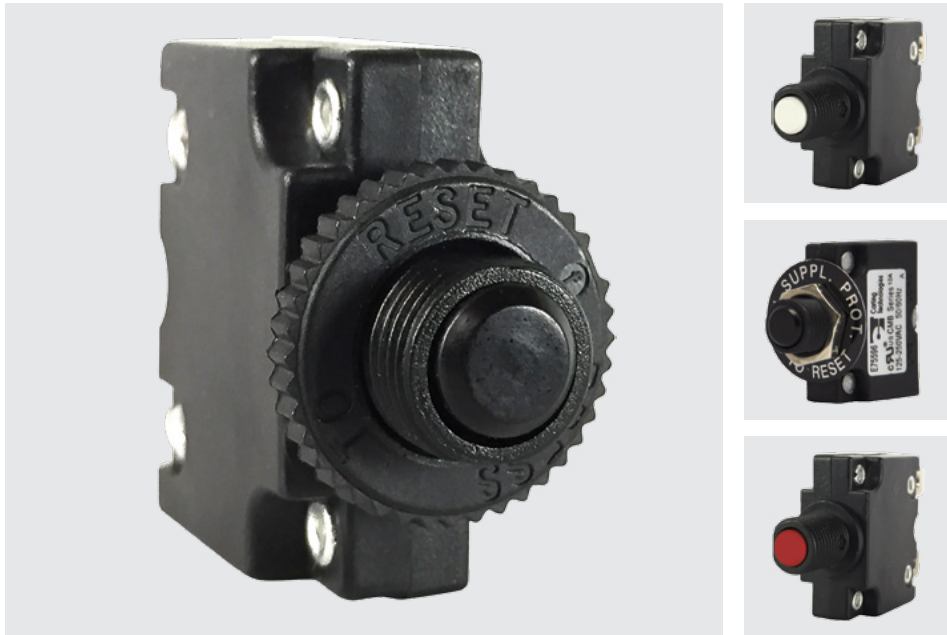
*Manufacturer reserves the right to change product specification without prior notice.

CMB

CMB-Series

THERMAL CIRCUIT PROTECTORS

The CMB-Series is a compact, single pole, push-to-reset family of thermal circuit breakers designed to protect equipment. Utilizing simple, precision design with few moving parts, these breakers offer cost effective, extremely reliable circuit protection with high resistance against shock and vibration.



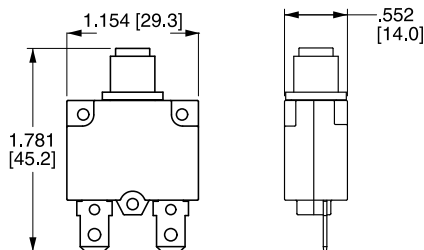
Product Highlights:

- ◆ Ratings from 3-20A, 125, 250VAC, 32VDC
- ◆ 2500 VAC/1 minute
- ◆ 60°C Max Operating Temperature
- ◆ 2500A @ 32VDC Interrupting Capacity
- ◆ 100M ohms Insulation Resistance
- ◆ Voltage drop <0.25 V
- ◆ UL, CUL, CSA, TUV, CE
- ◆ UL1500/ISO8846 for ignition protection/marine

Applications:

- ◆ Household Appliances
- ◆ Transportation
- ◆ Marine
- ◆ Power Strips
- ◆ Medical Equipment
- ◆ Audio Visual Equipment
- ◆ Power Supplies
- ◆ **ROHS Compliant**

Dimensional Specifications: in. [mm]



CMB - 10 3 - 11 C 3 N - B - A /10

1 Series 2 Rating 3 Voltage 4 Mounting Hole 5 Bushing Type 6 Mounting Nut 7 Indicator Plate 8 Button 9 Terminal 10 Button Marking

1 SERIES
CMB

3 VOLTAGE
3 125-250VAC / 32 VDC

2 RATING

10	10 amp
03	3 amp
12	12 amp
04	4 amp
13	13 amp
05	5 amp
14	14 amp
06	6 amp
15	15 amp
07	7 amp
16	16 amp
08	8 amp
20	20 amp

4 MOUNTING HOLE

11	1	M11
12	2	M12
00	3	Snap In Style
27	9	3/8" 27 UNS
28	12	3/8" 27 UNS (double flatted)

5 BUSHING

PLASTIC

C	4	Type C
D	4	Type D
E	5	Type E
G	8	Type G
H	6	Type H
K	13	Type K

METAL

J	8	Type J
---	---	--------

6 MOUNTING NUT 7

N	None	
1	Type 1	
2	Type 2	
3	11	Type 3
4	Type 4	
5	Type 5	
6	14	Type 6
7	Type 7	
8	9	Type 8

NOTE: Type 5 is clear hex boot. Type 8 is black hex boot (available for bushings G, J & K only); Type 3 nut includes molded in "PRESS TO RESET" marking.

7 INDICATOR PLATE 7

N	None
A	Embossed Legend
B	Silver Printing on Black

All indicator plates are marked "Suppl. Prot. press to reset".

Notes: All dimensions are in.[mm]. Tolerance ± 0.05 [1.27] unless otherwise specified.

1	Used with bushing C or D only.	9	Available with G, J or K bushing only.
2	Used with H bushing only.	10	Amp rating must match button marking (ex: 20 will be marked on the button of CMB-203-27G3N-W-A/20)
3	Used with bushing E only.	11	Includes molded in "PRESS TO RESET" marking.
4	Used with M11 mounting hole only.	12	Available with K bushing only.
5	Used with mounting hole 00 only.	13	Available with mounting hole 28 only.
6	Used with M12 mounting hole only.	14	Thickness is 3.0 mm, .118 in.
7	All hardware available separately. Consult factory.		
8	Available with mounting hole 27 only.		

8 BUTTON

B	Black	R	Red	W	White
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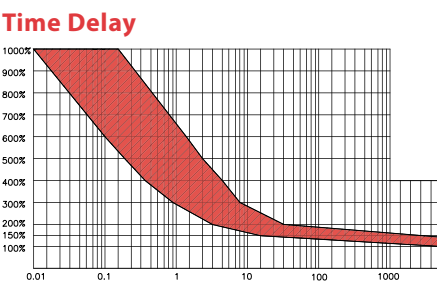
9 TERMINAL

A	Type A	F	Type F
B	Type B	G	Type G
C	Type C	H	Type H
D	Type D	J	Type J
E	Type E		

F,G,H,J TERMINALS ARE 8-32 UNC

10 BUTTON MARKING (IF BLANK, NO MARKING.)¹⁰ Button Marking Orientation: line load

03	3 amp	05	5 amp	07	7 amp	10	10 amp	13	13 amp	15	15 amp	20	20 amp
04	4 amp	06	6 amp	08	8 amp	12	12 amp	14	14 amp	16	16 amp		



Derating Factor		Derating Factor		Overload	Trip Time
-10 °C	x 1.70	30 °C	x 0.90	100%	No Trip
-5 °C	x 1.60	35 °C	x 0.85	150%	Trip in 1 hr
0 °C	x 1.50	40 °C	x 0.80	200%	4.0 ~ 40 sec.
5 °C	x 1.40	45 °C	x 0.75	300%	0.9 ~ 8.0 sec.
10 °C	x 1.30	50 °C	x 0.70	400%	.42 ~ 5.0 sec.
15 °C	x 1.20	55 °C	x 0.65	500%	.25 ~ 3.0 sec.
20 °C	x 1.10	60 °C	x 0.60	600%	.01 ~ 1.8 sec.
25 °C	x 1.00				

Notes:
Breaker must hold 100% of rated current and must trip at 150% and above, within the time limits shown in curve. Trip times specified at 25° ambient with no preloading.

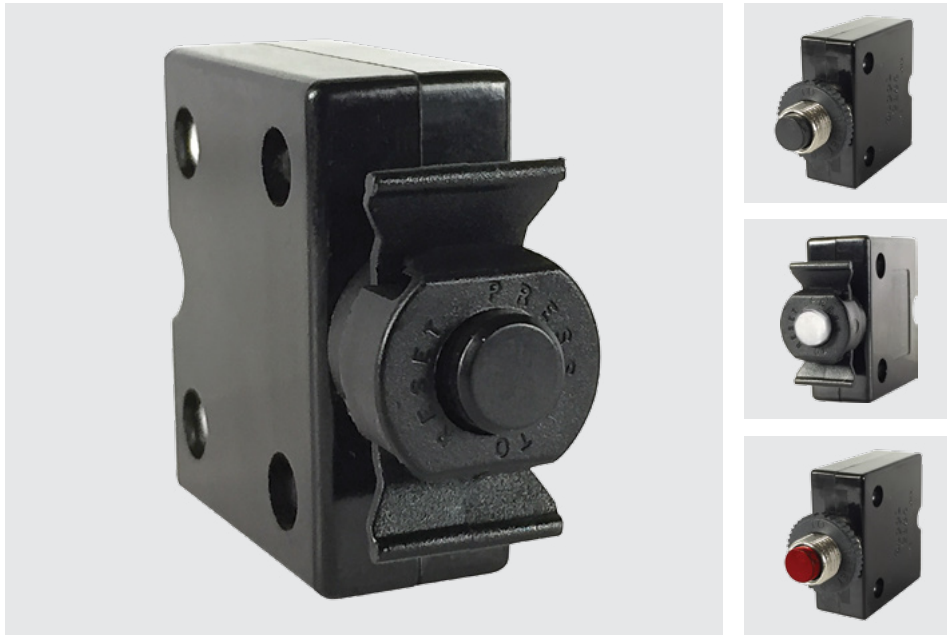
1 To adjust the breaker rating for ambient temperature multiply the breaker rating by the factor. (ex: 5 amp rating at 0°C: 5 x .67 = 3.3 amp. Select 3 amp rating.)

CLB

CLB-Series

THERMAL CIRCUIT PROTECTORS

The CLB-Series is a compact, single pole, push-to-reset family of thermal circuit breakers designed to protect equipment. Utilizing simple, precision design with few moving parts, these breakers offer cost effective, extremely reliable circuit protection with high resistance against shock and vibration.



Product Highlights:

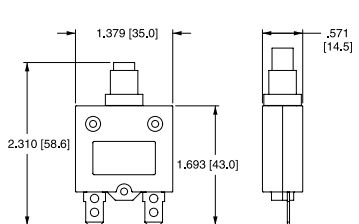
- ◆ Ratings from 3-60A, 125, 250VAC, 32VDC
- ◆ 2500 VAC/1 minute
- ◆ 60°C Max Operating Temperature
- ◆ 2500A @ 32VDC Interrupting Capacity
- ◆ 100M ohms Insulation Resistance
- ◆ Voltage drop <0.25 V
- ◆ UL, CUL, CSA, TUV, CE
- ◆ UL1500/ISO8846 for ignition protection/marine

Applications:

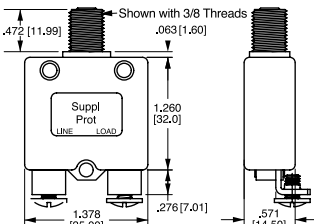
- ◆ Household Appliances
- ◆ Transportation
- ◆ Marine
- ◆ Power Strips
- ◆ Medical Equipment
- ◆ Audio Visual Equipment
- ◆ Power Supplies
- ◆ **ROHS Compliant**

Dimensional Specifications: in. [mm]

3-40A Construction



50 & 60A Construction



CLB - 10 3 - 12 C 3 N - B - A / 10

1 Series 2 Rating 3 Voltage 4 Mounting Hole 5 Bushing Type 6 Mounting Nut 7 Indicator Plate 8 Button 9 Terminal 10 Button Marking

1 SERIES
CLB

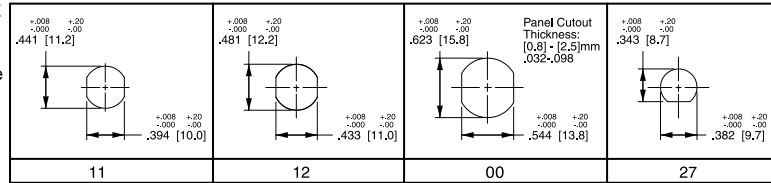
3 VOLTAGE
3 125-250VAC/ 32 VDC

2 RATING

03	3 amp	15	15 amp
04	4 amp	18	18 amp
05	5 amp	20	20 amp
06	6 amp	25	25 amp
07	7 amp	30	30 amp
08	8 amp	35	35 amp
10	10 amp	40	40 amp
12	12 amp	50 ¹²	50 amp
13	13 amp	60 ¹²	60 amp

4 MOUNTING HOLE

11	1	M11
12	2	M12
00	3	Snap In Style
27	4	3/8" 27 UNS



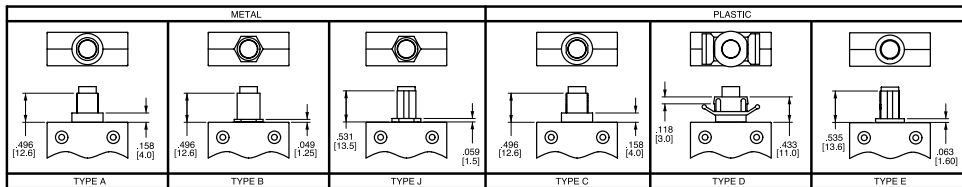
5 BUSHING

METAL

- A⁶ Type A
- B⁶ Type B
- J⁸ Type J

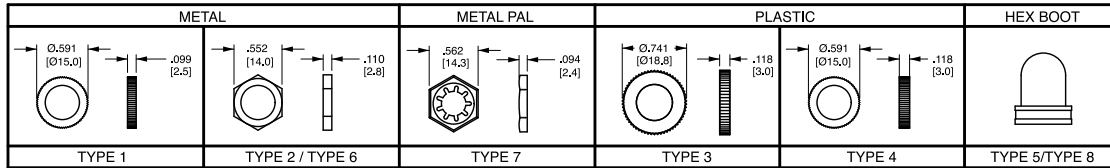
PLASTIC

- C⁵ Type C
- D⁷ Type D
- E⁸ Type E



6 MOUNTING NUT 9

- N None
- 1 Type 1
- 2 Type 2
- 3 Type 3
- 4 Type 4
- 5 Type 5
- 6, 4, 14 Type 6
- 7, 4 Type 7
- 8, 4 Type 8

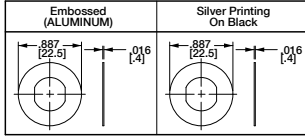


NOTE: Type 5 is clear hex boot. Type 8 is black hex boot (available for bushings E & J only); Type 3 nut includes molded in "PRESS TO RESET" marking.

7 INDICATOR PLATE 9

- N None
- A Embossed
- B Silver Printing on Black

All indicator plates are marked "Suppl. Prot. press to reset".



Notes: All dimensions are in [mm]. Tolerance ±.005 [0.127] unless otherwise specified.

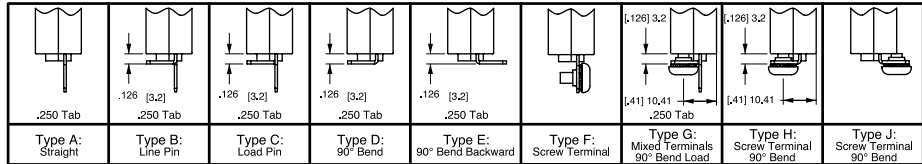
- 1 Used with bushing A or B only.
- 2 Used with bushing C only.
- 3 Used with bushing D only.
- 4 Used with bushing E & J only.
- 5 Used with M12 mounting hole only.
- 6 Used with M11 mounting hole only.
- 7 Used with mounting hole 00 only.
- 8 Used with 27 mounting hole only.
- 9 All hardware available separately. Consult factory.
- 10 > 35 amp ratings must use solder joint to connect wire to non-screw type terminals.
- 11 Terminals are .040 [1.0] thickness for ratings > 35, & .315 [8] thickness is for ratings < 35 amps.
- 12 Available only with 10-24 unc. screw terms. (select type F, G, H, J only) UL, CUL only.
- 13 Amp rating must match button marking (ex: "20" will be marked on the button of the breaker)
- 14 Thickness is 3.0 mm, .118 in.
- 15 Screw terminals are 8-32 UNC

8 BUTTON

- B Black
- R Red
- W White

9 TERMINAL 10,11,15

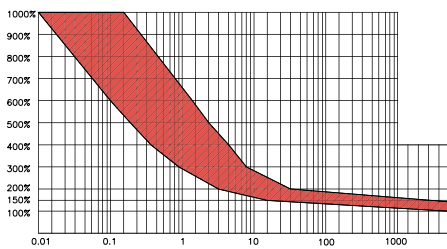
- A Type A
- B Type B
- C Type C
- D Type D
- E Type E
- F Type F
- G Type G
- H Type H
- J Type J



10 BUTTON MARKING (IF BLANK, NO MARKING.)¹³ Button Marking Orientation: line load

03	3 amp	06	6 amp	10	10 amp	15	15 amp	25	25 amp	40	40 amp
04	4 amp	07	7 amp	12	12 amp	18	18 amp	30	30 amp	50	50 amp
05	5 amp	08	8 amp	13	13 amp	20	20 amp	35	35 amp	60	60 amp

Time Delay



Derating Factor	
-10 °C	x 1.70
-5 °C	x 1.60
0 °C	x 1.50
5 °C	x 1.40
10 °C	x 1.30
15 °C	x 1.20
20 °C	x 1.10
25 °C	x 1.00

Derating Factor	
30 °C	x 0.90
35 °C	x 0.85
40 °C	x 0.80
45 °C	x 0.75
50 °C	x 0.70
55 °C	x 0.65
60 °C	x 0.60

Overload	Trip Time
100%	No Trip
150%	Trip in 1 hr
200%	4.0 ~ 40 sec.
300%	0.9 ~ 8.0 sec.
400%	.42 ~ 5.0 sec.
500%	.25 ~ 3.0 sec.
600%	.01 ~ 1.8 sec.

Notes:

- Breaker must hold 100% of rated current and must trip at 150% and above, within the time limits shown in curve.
- Trip times specified at 25° ambient with no preloading.
- To adjust the breaker rating for ambient temperature multiply the breaker rating by the factor. (ex: 5 amp rating at 0°C: 5 x .67 = 3.3 amp. Select 3 amp rating.)

CMBA/CLBA-Series

THERMAL CIRCUIT PROTECTORS

The CMBA/CLBA-Series features automatic cycling and resetting thermal protection capabilities with the same performance as its traditional push-to-reset counterparts.



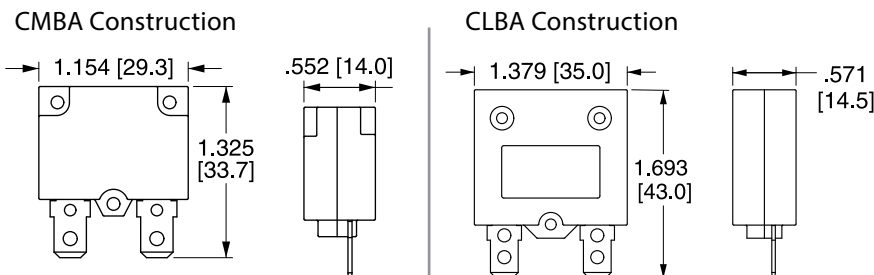
Product Highlights:

- ♦ CMBA: 3-20A, 125, 250VAC, 32VDC
- ♦ CLBA: 3-40A, 125, 250VAC, 32VDC
- ♦ 2500 VAC/1 minute
- ♦ 60°C Max Operating Temperature
- ♦ 2500A @ 32VDC Interrupting Capacity
- ♦ 100M ohms Insulation Resistance
- ♦ Voltage drop <0.25 V
- ♦ UL, cUL, TUV

Applications:

- ♦ Household Appliances
- ♦ Transportation
- ♦ Power Strips
- ♦ Medical Equipment
- ♦ Audio Visual Equipment
- ♦ Power Supplies
- ♦ **ROHS Compliant**

Dimensional Specifications: in. [mm]



CMBA - 10 3 - NN F N N - B - A

1 Series 2 Rating 3 Voltage 4 Mounting 5 Bushing 6 Mounting Nut 7 Indicator Plate 8 Button Color 9 Terminal 10 Plug Marking

1 SERIES
CMBA

2 RATING 2

03 3 amp	10 10 amp
04 4 amp	12 12 amp
05 5 amp	13 13 amp
06 6 amp	15 15 amp
07 7 amp	18 18 amp
08 8 amp	20 20 amp

3 VOLTAGE
3 125-250VAC/ 32 VDC

4 MOUNTING
NN Plug In

5 BUSHING
F None

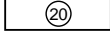
6 MOUNTING NUT
N N/A

7 INDICATOR PLATE
N N/A

8 BUTTON COLOR
B Flush Black



10 BUTTON MARKING 1 (IF BLANK, NO MARKING)

Plug Marking Orientation: line  load

03 3 amp	07 7 amp	13 13 amp
04 4 amp	08 8 amp	15 15 amp
05 5 amp	10 10 amp	18 18 amp
06 6 amp	12 12 amp	20 20 amp

CLBA - 10 3 - NN F N N - B - A

1 Series 2 Rating 3 Voltage 4 Mounting 5 Bushing 6 Mounting Nut 7 Indicator Plate 8 Button Color 9 Terminal 10 Plug Marking

1 SERIES
CLBA

2 RATING 2

03 3 amp	13 13 amp
04 4 amp	15 15 amp
05 5 amp	18 18 amp
06 6 amp	20 20 amp
07 7 amp	25 25 amp
08 8 amp	30 30 amp
10 10 amp	35 35 amp
12 12 amp	40 40 amp

3 VOLTAGE
3 125-250VAC/ 32 VDC

4 MOUNTING
NN Plug In

5 BUSHING
F None

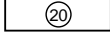
6 MOUNTING NUT
N N/A

7 INDICATOR PLATE
N N/A

8 BUTTON COLOR
B Flush Black



10 BUTTON MARKING 1 (IF BLANK, NO MARKING)

Plug Marking Orientation: line  load

03 3 amp	07 7 amp	13 13 amp	25 25 amp
04 4 amp	08 8 amp	15 15 amp	30 30 amp
05 5 amp	10 10 amp	18 18 amp	35 35 amp
06 6 amp	12 12 amp	20 20 amp	40 40 amp

Notes:
1 Amp rating must match plug marking. (ex: "20" will be marked on the plug of the breaker)
No marking is standard.
2 See CMB/CLB graph for time delay information.

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

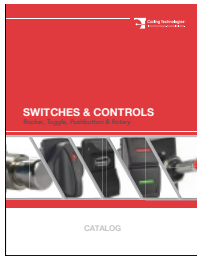
www.carlingtech.com



Watch Company Profile Video



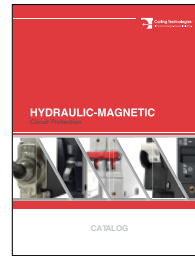
Switches & Controls



catalog

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

Hydraulic-Magnetic



catalog

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

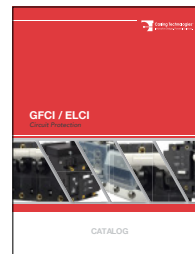
Thermal



catalog

Complete line and ordering details for all thermal circuit breakers.

GFCI / ELCI



catalog

Complete line and ordering details for all GFCIs/ELCIs.

Marine



catalog

brochure

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

On-Off Highway

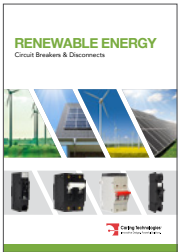


catalog

brochure

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

Renewable Energy

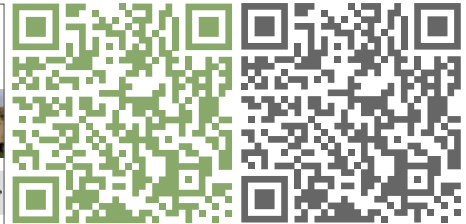
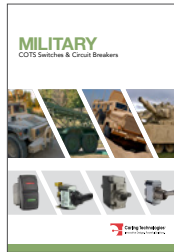


catalog

brochure

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

Military



catalog

brochure

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

Telecom/Datacom

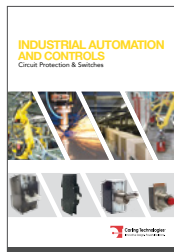


catalog

brochure

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

Industrial Automation

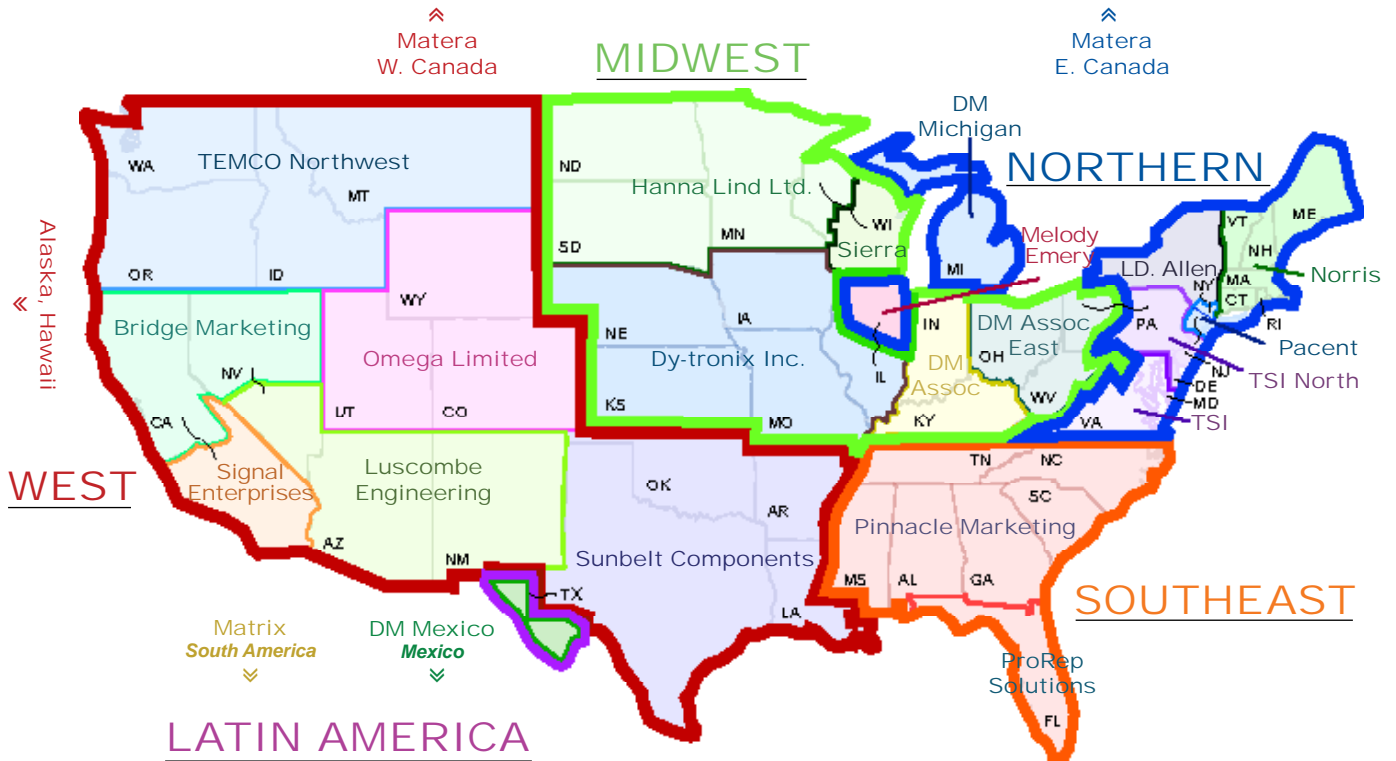


brochure

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

Authorized Sales Representatives

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



About Carling

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

To view all of Carling’s environmental, quality, health & safety certifications please visit www.carlingtech.com/environmental-certifications

Worldwide Headquarters

Carling Technologies, Inc.
60 Johnson Avenue, Plainville, CT 06062-1177
Phone: 860.793.9281 Fax: 860.793.9231
Email: sales@carlingtech.com www.carlingtech.com

Northern Region Sales Office: nrsm@carlingtech.com
Southeast Region Sales Office: sersm@carlingtech.com
Midwest Region Sales Office: mrsm@carlingtech.com
West Region Sales Office: wrsm@carlingtech.com
Latin America Sales Office: larsm@carlingtech.com

Asia-Pacific Headquarters

Carling Technologies, Asia-Pacific Ltd.,
Kowloon, Hong Kong
Phone: Int + 852-2737-2277 Fax: Int + 852-2736-9332
Email: sales@carlingtech.com.hk

Shenzhen, China: shenzhen@carlingtech.com
Shanghai, China: shanghai@carlingtech.com
Pune, India: india@carlingtech.com
Kaohsiung, Taiwan: taiwan@carlingtech.com
Yokohama, Japan: japan@carlingtech.com

Europe | Middle East | Africa Headquarters

Carling Technologies LTD
4 Airport Business Park, Exeter Airport,
Clyst Honiton, Exeter, Devon, EX5 2UL, UK
Phone: Int + 44 1392.364422 Fax: Int + 44 1392.364477
Email: ltd.sales@carlingtech.com

Germany: gmbh@carlingtech.com
France: sas@carlingtech.com

