

# CIRCUIT BREAKERS

## What are Circuit Protection Devices and how do they work?

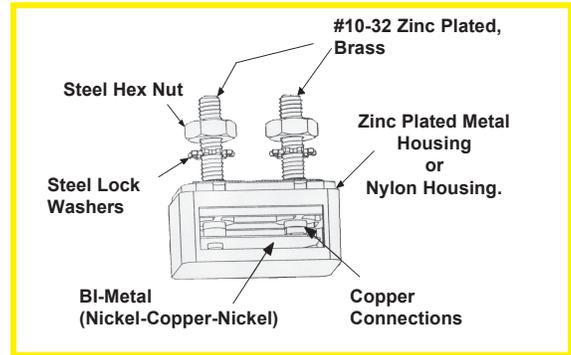
Circuit Protection Devices are manufactured for use in multiple power strips, boats, recreational vehicles, battery charges, welding equipment, portable generators, agricultural equipment, trucks, passenger and school buses and off-road construction equipment.

### GENERAL OPERATING PRINCIPLES

Circuit Protectors are single pole thermal type devices. Basic construction consists of two terminals, one terminal with a composite alloy reed to which a precious metal contact has been attached, and the second terminal with a precious metal contact. When a circuit protector is assembled and in the operational mode, the precious metal contacts rest against each other. Current flow is from one terminal through the composite alloy reed to the contacts and out the second terminal. In general, the size, material composition and the way the reed is processed during manufacturing, coupled with the type of contacts and terminals, determines the current rating of the device. Under normal conditions, circuit protectors are designed to handle 100% of rated current on a continuous basis. When the current rating is exceeded heat will be generated and the composite alloy reed will bend up, separating the contacts. The speed at which this process occurs is dependent on two main variables, the amount of current in excess of rating and temperature. The method in which the breaker is reset depends on the types of breakers used.

### Automatic Reset

Type 1 will cycle continuously during an over-current condition. The composite alloy material will bend and separate the contacts when an over current situation occurs and return to the run mode as it cools. This process will continue until the source of the over-current is removed or corrected.



### Modified Reset

Type 2 Unlike the auto reset design, Type 2 has an additional resistive component built into it which raises the ambient temperature within the circuit protector. This limits the number of cycles (less than 10) by not allowing the composite alloy to cool and reset the circuit. The circuit will remain open with less than 1.0 amp current flow as long as the voltage is applied.

### Manual Reset

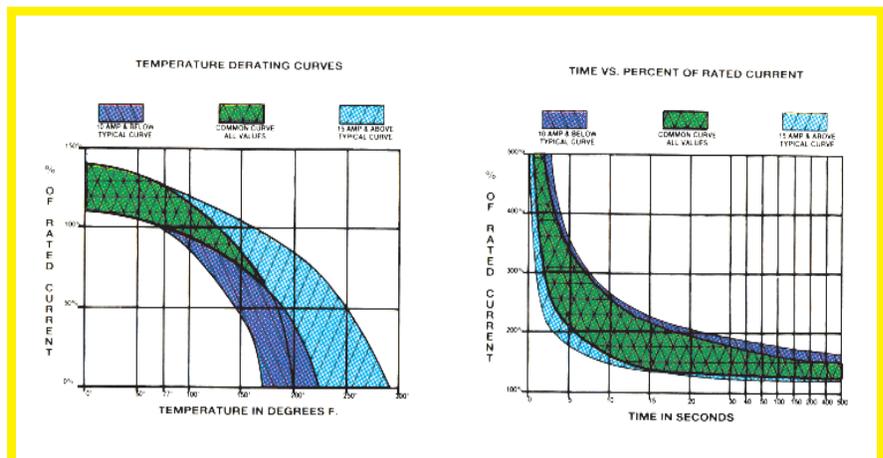
Type 3 circuit protector introduces a non-current carrying object between the contacts when they open. To reset the contacts, an external button or lever must be activated to return to normal operation.

### Sizing A Circuit Protector

Temperature and percent of rated current will affect the performance characteristics of a thermal circuit breaker. These parameters should be taken into consideration when specifying which size and type device is needed for your application. All Pollak circuit protectors are designed to run continuously at 100% of rated current at 77°F. However, as a general rule you should size your breaker so that your continuous current is 75-80% of the rated current of your circuit protector. For example, if your application runs at a continuous 8 amps, you should choose a 10 amp breaker.

Another major factor to consider is the affect that temperature has on the rating of the circuit protector. As with all thermal devices, as temperatures change the continuous current rating of the circuit protector changes. As stated earlier, all Pollak circuit protectors are designed to run continuously at 100% or rated current at 77°F. The bottom chart shows the effect temperature has on the rated current for circuit protectors.

Notes: Circuit Breakers vs fuses		
	Circuit Breaker	Fuse
Resettable Cycles	Yes	No
Adjustable Ambient Compensation	Yes	No
Locate Anywhere (even under hood)	Yes	No
Permanent Mounting Capability	Yes	No



# Circuit Breakers - Type II

## Stud Terminal Type

### Non-Cycling - Modified Reset

Designed with an additional resistive component this style breaker remains open as long as power is available or until the load is removed.

- Non-Cycling-Modified Reset conforms to SAE spec J553C Type II for 12 VDC only
- Metal Housing with zinc plating
- 10-32 stud terminals. Battery terminal has yellow dichromate plating. Auxiliary terminal has zinc plating



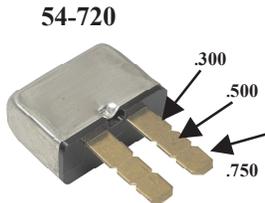
Stud Terminal Part #	Ampere Rating
54-221	20
54-231	30
54-241	40

## Plug-In Terminal Type

### Non-Cycling - Modified Reset

Designed with an additional resistive component this style breaker remains open as long as power is available or until the load is removed.

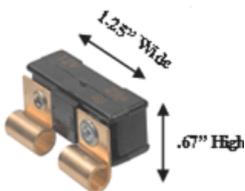
Special "snap-off" feature provides three lengths of .300, .500, or .750" (18 mm) H. Blades = .78" (19.9). Body = 1" (25.27 mm) L x .40" (10.03 mm) W x (.70mm) L



Blade Type Part #	Ampere Rating
54-705	5
54-710	10
54-715	15
54-720	20
54-725	25
54-730	30

## Glass Fuse Type

Fits in holders which accommodate 1/4" dia x 1-1/4" long glass fuses, Snap-In mounting in all 1-1/4" clips, 1.25" (31.75mm) W x .67" (17.05mm) H



Snap-In Type Part #	Ampere Rating
54-410	10
54-415	15
54-420	20
54-430	30
54-440	40

## NOTES: STUD TERMINALS VS .250QC BLADE TERMINALS

- **ACCESSIBILITY/VIBRATION** . . . If the circuit breaker is not easily accessible or subject to vibration then stud terminals/lock washers are preferred.
- **OFF-ROAD, CONSTRUCTION** . . . For Quick Connect applications (i.e.. Bus, RV, Conversions...) .250 quick connect terminals are preferred.

## Sealed Circuit Breakers (Type I)

- Designed for exposed applications (moisture, dust, oil).
- With and without mounting brackets.
- Supplied with 12" wire loop.

Ampere Rating	Sealed	Sealed with Bracket
20	54-920	54-921
30	54-930	54-931
40	54-940	54-941



## Plug-In Type

Fits in Mack and Navistar breaker blocks. (.250" Quick Connect Terminals).

Ampere Rating	Blade Terminals (Mack)	Blade Terminals (Navistar)
10	*	*
15	54-891PL	54-901PL
20	54-892PL	54-902PL
25	54-893PL	54-903PL
30	54-894PL	54-904PL

