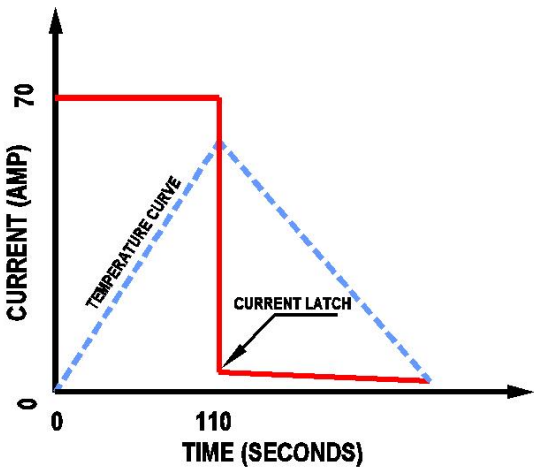
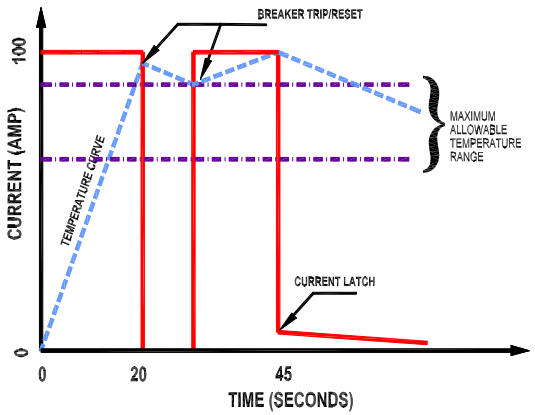
DutySafe® Breaker, P/N 12VDS50
50 Amp Rating,
Tested at 70 Amps

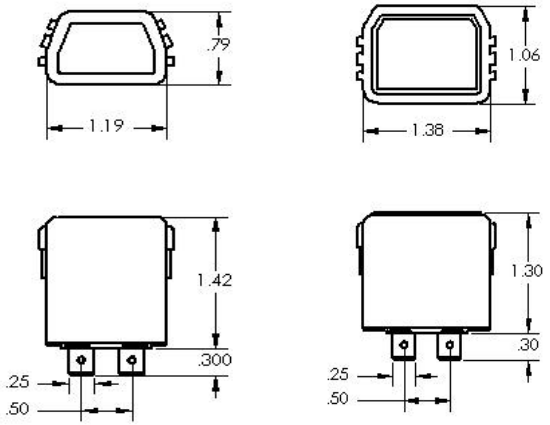


DutySafe® Breaker, P/N 12VDS50
50 Amp Rating,
Tested at 100 Amps

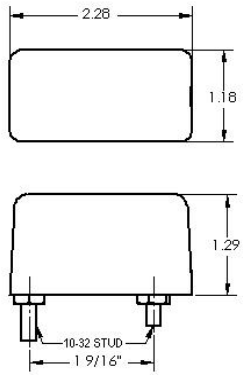


Dimensions & Terminal Options

Quick Disconnect -



10-32 Threaded Stud -



Available Ratings -

Quick Disconnects:
5A, 15A, & 30A

Threaded Stud:
50A

Additional Ratings Available Upon Request.

SHALLCO

Telephone: 800– 876-3135

308 Components Drive
Smithfield, NC 27577

Contact: Mike Francis
E-mail: mfrancis@shallco.com

Fax: (919) 934-3298
E-mail: shallco@shallco.com
Website: www.shallco.com

DUTYSAFE® BREAKER

PATENT 7,113,381 & PATENT 7,145,759

Complies with SAE J553

DC CIRCUIT PROTECTION
TECHNICAL GUIDE

Duty cycle protection for low voltage, high current DC motors.

SHALLCO

Terms:

Bi-metal auto-reset breaker-

A circuit breaker that consists of a bi-metal element and a pair of contacts. The bi-metal changes shape when heated breaking the contacts. Snap action is accomplished by forming the bi-metal into a shape that inverts as a reaction to reaching a design temperature. Once the circuit opens, the contact element begins to cool and returns (snaps) back to it's closed position.

Used widely in low voltage motor control circuits and for duty cycle protection in rugged devices that can withstand current surges well above the rating of the breaker.

Note: The breaker trip curve is based on a time/temperature relationship . The breakers are normally marked with a current rating. The rating is a "never trip" rating, making the design purpose of these type breakers, fault protection.

Positive Temperature Coefficient Resistors, (PTC)-

A semiconductor that changes resistance at a set temperature. These devices once heated to a "trip" temperature allow a residual flow of current that holds them in a tripped state until the fault is cleared. They are becoming widely used in motor protection. In circuits, the PTC is not dependant on a time/temperature relationship and will trip immediately when the trip temperature is reached. Holding the circuit at a safe low level of current flow, under fault conditions, combined with self healing and returning to the low initial resistance state makes this an ideal circuit protector.

DutySafe® Breaker-

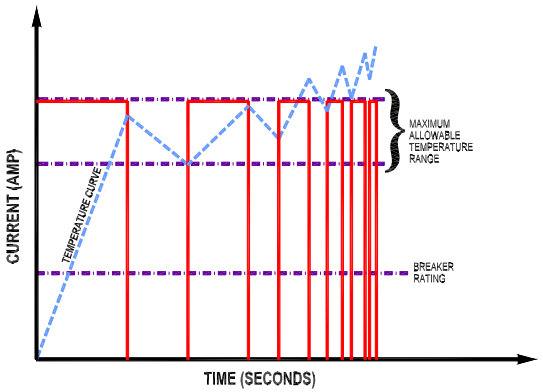
A combination of a bi-metal breaker and PTC's (in parallel) and in series with the breaker. Combines two time/temperature devices into a package designed to protect motors, switches and wiring (a motorized system) from faults while allowing use within a designed duty cycle. The package is heat resistant and designed to contain heat generated by the PTC's in a tripped state in a safe environment. The package also serves to control the cooling cycles for added protection.

Auto-reset breakers and PTC's have a current over time relationship to temperature. If used alone this relationship may not work in all possible situations of product use. If the breaker or the PTC is used alone the current over time relationship to temperature can result in a long time periods at dangerous temperatures. If the single device is specified to control the long time period at lower current , the functionality of the motorized system is reduced. This leads us to discuss "duty cycle"

Duty Cycle-

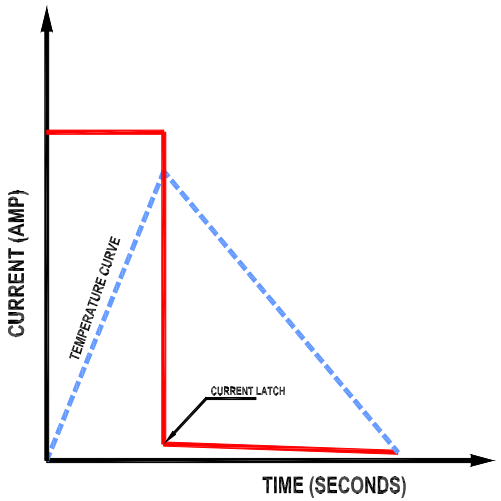
The traditional definition is; the proportion of time a system is actually working. It is expressed as a percentage. A 10% duty cycle is a minute of use within a ten minute time period. Another type of duty cycle is proportional work. This is harder to express but an example can be made. A sprinter can become a long distance runner by changing the ratio of work over time. Another way to approach the same problem would be to allow the sprinter to sprint over the distance but adding breaks for cooling. This is the way most duty cycles actually work because the actual time needed applied to the actual load controls the real world duty cycle of many machines. This is where design considerations and real world use of a product meet!

Typical Current/Time = Temperature curve for an auto-reset thermal breaker when exceeding the designed duty cycle.



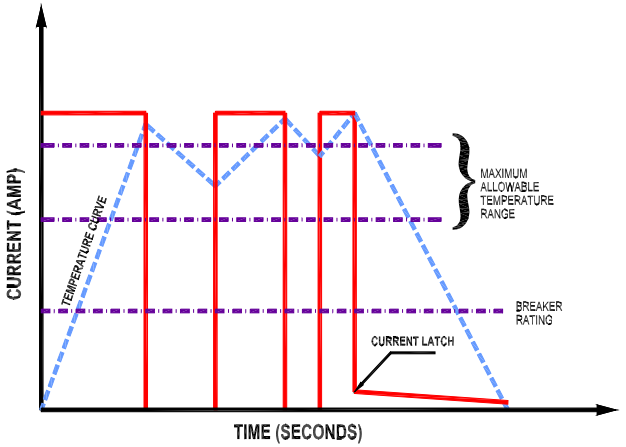
Each peak in the temperature curve represents a breaker trip. Each valley in the temperature curve represents a re-make of the breaker. Under a constant current (above the rating of the breaker) the temperature of the system stair-steps it's way to failure.

Typical Current/Time = Temperature curve for a PTC when exceeding the design duty cycle.



Using a PTC alone limits the time of use at peak temperatures. It also latches the circuit off until the circuit is opened and cooled. The cooling cycle is longer than bi-metal breakers simply because it's construction is almost completely non-conductive. It's very good system protection but prevents short term non-destructive product use above it's rating (duty cycle).

Typical Current/Time = Temperature curve for a Duty-Safe® Breaker when exceeding the design duty cycle.



Combines both curves with design intent to keep the functionality of a product, while also preventing thermal damage. In this illustration the first two peaks are breaker trips, the third is a PTC trip. The short recovery time of the breaker trips allow for function while the long cooling cycle of the PTC trip protects the product. In cases where the current is right at, or slightly over the breaker rating, the PTC will be the only protecting device. Breaker trips will only occur when the current is well above the breaker rating. This means that both ends of the problem are covered with protection. Very high current by breaker trips + PTC (if the current remains constant)—or—Long use of lower current where the breaker will not trip.

DutySafe® Breaker, P/N 12VDS50
50 Amp Rating,
Tested at 50 Amps