

---

# SURE TRIP

---

Meeting Your Circuit Breaker Needs Since 1985

## ARC FLASH PROTECTION

While concerns over Arc Flash injuries and deaths have been around for decades, in recent years new standards have been written to better protect personnel and equipment. Personnel safety is a concern for all industrial facilities and risks are present in almost every electrical environment. NFPA, NEC, OSHA, and IEEE have made major changes to their respective standards in regards to arc flash hazards. In an effort to help customers maintain compliance with these standards SURE TRIP introduced an 'Arc-Flash' option for its product lines in early 2005. In early models, the Arc Flash option included the ability to turn the Instantaneous Function On/Off with a Remote Switch. The RMS-2007 was introduced to give our customers more options for ARC FLASH. The ARC FLASH Pick-Up can now be set independently of the Instantaneous Function. It can also be defeated remotely, if needed, without affecting any other functions.

### Arc Flash

Arc Flash is described by NFPA 70E, as a "dangerous condition associated with the release of energy caused by an electrical arc." It is measured in terms of Incident Energy which is used to determine the level of Personnel Protection Equipment, or PPE, that is required to be worn by personnel working in proximity to the equipment.

The following formula can be used to determine the incident energy for an "Arc in a Cubic Box". This would be similar to a Circuit Breaker in a Cubicle.

$$E_{MB} = 1038.7 * D_A^{-1.4738} * t_A * [0.0093F^2 - 0.3453F + 5.9675]$$

Where:

$E_{MB}$  is Incident energy in cal/cm<sup>2</sup> in a 20in Cubic Box

$D_A$  is the distance from electrode in inches, 18" is generally used.

$t_A$  is the clearing time

F is the available short circuit current, from 16kA to 50kA.

Actual clearing time may vary depending on the type of Circuit Breaker and the condition of its mechanical and electrical parts. Lower pickup settings can also reduce the trip time of the SURE TRIP Logic thereby reducing the actual clearing time.

Using the above formula we can look at two situations and the effect of adding the protection of the instantaneous function of the SURE TRIP Logic. Using 20,000A as the available fault current, the standard distance of 18 inches, and a Sensor rating of 1200A,

#### **Example 1:**

With Inst. P-Up defeated.

Sh/T Delay = .5

Incident Energy is calculated to be 20.4

According to the chart below, this would yield a Hazard/Risk Category of 3.

#### **Example 2:**

With Arc Flash active (0.05 sec)

Sh/T Delay = .5

Incident Energy is calculated to be 2.04

According to the chart below, this would yield a Hazard/Risk Category of 1.

As indicated in the above examples, reducing the clearing times of a fault greatly reduces the incident energy generated. This significantly lowers the potential for injuries to personnel and damage to nearby equipment.

Hazard/Risk chart from the NFPA 70E Standard.

Category	Incident Energy (Cal/cm <sup>2</sup> )
1	0 - 4.000
2	4.001 - 8.000
3	8.001 - 25.00
4	25.01 - 40.00

---

# SURE TRIP

---

Meeting Your Circuit Breaker Needs Since 1985

## RMS-2007 WITH ARC FLASH PROTECTION REMOTE ACTIVATION

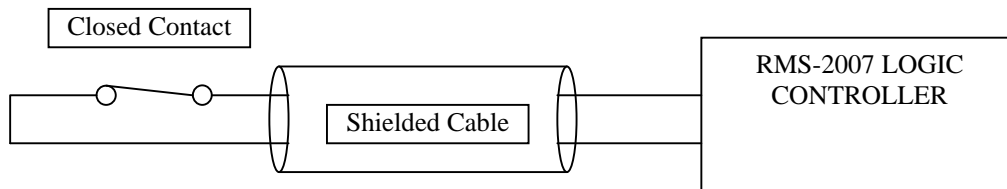
The following diagram shows the connection for the external wiring of the SURE TRIP Logic containing the ARC FLASH protection with Remote activation. A set of contacts can be utilized to enable or disable the ARC FLASH protection. The contacts can be from a switch or Normally Open relay contact.

The factory can supply a Switch, Switch Decal, and 10' Shielded Cable as required. The switch will be connected to a small terminal block located on the left hand side of the RMS-2007 using a 10' shielded cable. The length of shielded cable should be kept to a minimum. The length of wire connecting the switch to the logic should not exceed 10'.

If a more remote switch location is desired, the customer may mount an interposing relay near the logic. The relay would need to be powered from a source other than the RMS-2007 Logic. The N/O Contacts would then be wired to the Logic for activating the ARC FLASH Function. When the relay is on, ARC FLASH would be defeated. When the relay is off, the ARC FLASH protection would be active. Only the wire between the relay and the Logic would have to be Shielded Cable.

### Closed Contact

- With the contact closed, the ARC FLASH Function will be defeated.
- If the external wiring is broken or not connected, ARC FLASH protection will be active.



### Open Contact

- With the contact open, ARC FLASH protection will be enabled. The ARC FLASH Function will respond to any fault condition that exceeds the Pick-Up set-point.

