

**QUICK-TRIP®**

ARC FLASH REDUCTION SWITCH

**A Matter of Personnel Safety**

In recent years, more attention has been given to the potential hazard of arc flash energy to electrical personnel working on or near energized electrical equipment. Recent standards have been written, including NFPA 70E-2004 and IEEE 1584, which address these hazards. As a result many companies are adopting strict new PPE requirements and procedures for personnel working in high arc flash potential areas.

**Reducing Arc Flash Potential isn't always easy...**

Until now, options for reducing arc flash potential during normal maintenance periods in low voltage substations have been limited. A few of those include:

- De-energizing the substation during maintenance. Not always a feasible option.
- Lower the available fault current for the substation. May not be an option at all.
- Shorten the trip time of the upstream breaker during maintenance periods. Now made fast and easy with QUICK-TRIP.

**System Components**

The QUICK-TRIP system consists of the following components:

- An AC-PRO®\* trip unit with QUICK-TRIP capability.
- A QT-DISPLAY® with QUICK-TRIP capability, mounting hardware and cable.
- A Padlocking selector switch to turn the QUICK-TRIP feature ON or OFF.

Although all AC-PRO trip units have the Quick Trip capability, the system can only be activated through the selector switch that connects to the QT-DISPLAY. The QT-DISPLAY connects directly to the AC-PRO through a single modular shielded cable.

**NOTES:**

- \* Older AC-PRO trip units can be easily upgraded to include QUICK-TRIP capability. Contact URC for details.

**Call Toll Free: 888.289.2864**

For additional information visit our website:  
**www.utilityrelay.com**

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Phone: 440-708-1000 Fax: 440-708-1177

*Dramatically reduce arc flash potential for those times when you must work on energized equipment.*

**System Operation and Settings**

The QUICK-TRIP system is activated by means of a padlockable selector switch. When enabled, two additional settings are activated in the AC-PRO trip unit to provide enhanced protection:

- QT Instantaneous
- QT Ground Fault

These two individually programmable settings are designed to provide faster clearing times in the event of a fault.

Since arc flash potential is directly related to breaker clearing time, the addition of the QUICK-TRIP allows a method to reduce fault-clearing time without opening a cubicle door to reprogram the trip unit.

Reduced breaker clearing time can mean significantly reduced arc flash potentials on downstream electrical equipment.

QT Instantaneous: ranges from 150% to 1200% of the Long-Time Pick-Up setting and is adjustable in 100 amp steps.

QT Ground Fault: ranges from a minimum of 20% to 200% of the CT Rating with a maximum of 1200 amps and is adjustable in 10 amp steps. This setting is also selectable OFF.

This function essentially adds Ground Fault protection to the breaker. Although this function may not be desirable during normal operating conditions, it can provide a critical layer of protection during maintenance periods because many phase-to-phase faults often start as phase-to-ground faults.

**System Features**

The QUICK-TRIP system is as easy to use as it is to install, with the additional personnel safety features:

- Installation uses standard punches.
- Wires in minutes without cutting into existing wiring harness.
- QT settings are only active when the selector switch is in the ON position (during maintenance).
- System coordination is preserved when the selector switch is OFF (QUICK-TRIP OFF).
- Reduction in arc flash incident energy levels may permit lower PPE clothing for maintenance personnel.
- Padlocking switch can be incorporated into a lock-out tag-out procedure.
- QUICK-TRIP ON LED confirms operation.
- SELF-TEST LED verifies trip unit operation.
- PICK-UP LED indicates overcurrent situations.
- QUICK-TRIP settings can be reviewed on the external QT-DISPLAY.
- Last Trip Data and all settings can be reviewed on the QT-DISPLAY.
- 3-phase currents are displayed continuously on the QT-DISPLAY.
- The system is fully powered by the trip unit's CTs. No aux power or batteries.
- Extra contacts on the selector switch are available for external annunciation.

# QUICK-TRIP®

## ARC FLASH REDUCTION SWITCH

### Incident Energy of an Arc Flash (Cal/cm2)

The intensity of an arc is based on the following data:

**F** = Amount of available fault current in kA.  
(for the range of 15 to 50kA)

**D** = Distance from the electrode in Inches.  
(for distances 18 in. and greater)

**t** = Arc duration in Seconds.

The NFPA 70E provides an equation as one method of determining the amount of incident energy (heat) a person would receive if an arc flash were to occur in a cubic box, such as a circuit breaker cubicle:

$$E_i = 1038.7 \times D^{1.4732} \times t \times (.0093 \times F^2 - .3453 \times F + 5.9675)$$

$E_i$  = Incident Energy Level (cal/cm2) in a box not larger than 20 inches (much like a circuit breaker cubicle).

The Incident Energy Level determines the Hazard Risk Category shown in the table below which further determines the PPE requirements for personnel working on the affected electrical equipment.

Incident Energy Level (EI)	Hazard Risk Category
0 to <4 cal/cm2	1
4 to <8 cal/cm2	2
8 to <25 cal/cm2	3
25 to <40 cal/cm2	4
>40 cal/cm2	Dangerous

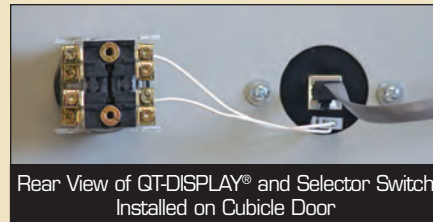
### Determining QUICK-TRIP settings

Because normal system coordination may be compromised when QUICK-TRIP is ON, the QT Instantaneous and QT Ground Fault settings must be determined by a qualified engineer to account for in-rush currents and normal running loads to prevent nuisance tripping.

*QUICK-TRIP system components stay with the cubicle! Swapping breakers is no problem*



AC-PRO Installed on a G.E. AK-2-25 Breaker



Rear View of QT-DISPLAY® and Selector Switch Installed on Cubicle Door

*Pre-assembled quick disconnect cables makes racking breakers in and out a snap*



### Practical Example

A technician needs to rack out a feeder breaker for maintenance. In so doing, he is the minimum 18" away from any potential arc flash source in the cubicle. As the breaker is being racked out, a 12,000 amp arcing fault occurs inside the cubicle. The 2000A main breaker sees the fault and trips, subsequently clearing the fault in the feeder breaker cubicle.

The two graphs below illustrate the dramatic impact that arc-clearing time has on incident energy levels.

Given that: **F = 12kA** and **D = 18 in.**

#### Graph 1:

QUICK-TRIP: **OFF** shows the trip time characteristics of the main breaker.

- ❑ The AC-PRO® will cause the main breaker to clear the 12kA fault in .556 seconds (based on a Short-Time Delay of .20 seconds with I2t ON). The resulting arc duration will be: **t = .556**
- ❑ The resulting incident energy is: **E<sub>i</sub> = 25.8022**
- ❑ The Hazard Risk Category is: **4**

#### Graph 2:

QUICK-TRIP: **ON** shows the trip time characteristics of the main breaker.

- ❑ The AC-PRO will now cause the main breaker to clear the 12kA fault .05 seconds (based on the Instantaneous QT or I QT Pick-Up setting of 8000 amps). The resulting arc duration will be: **t = .05**
- ❑ The resulting incident energy is: **E<sub>i</sub> = 2.3203**
- ❑ Hazard Risk Category reduced to: **1**

