URC Utility Relay Company

QUICK-TRIP®

ARC FLASH REDUCTION SYSTEM FOR AC-PRO-II® TRIP UNITS

Can dramatically reduce arc flash potential for times when work must be performed on energized equipment.

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

Reducing Arc Flash Potential Isn't Always Easy

Until now, options for reducing potential arc flash during normal maintenance 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 Options & Components

The AC-PRO-II® QUICK-TRIP® system can be implemented using the following options & components:

Option 1

- An AC-PRO-II® trip unit
  and
- A QT-DISPLAY-II™ (coming soon), mounting hardware, and cable

Option 2

- An AC-PRO-II® trip unit
  and
- A QT2-Switch, mounting hardware, and cable

QT-Display-II™ (coming soon)

QT2-Switch

QT-Display-II™ Features (preliminary pre-release information)

- ❑ Integral QUICK-TRIP® switch (lockable) and LED
- ❑ Extends ALL AC-PRO-II® information to the cubicle door
- ❑ OLED display for easy viewing
- ❑ Smart buttons for navigating screens & information
- ❑ Includes "QUICK-TRIP® ON" LED, "SELF-TEST" LED, "PICK-UP" LED, COMM LED, & Trip Occurred LED
- ❑ Ethernet and RS-485 communications
- ❑ 2 alarm relays
- ❑ USB Port for: InfoPro-AC® Software and SAFE-T-TRIP®
- ❑ Remote QUICK-TRIP® switch and remote QUICK-TRIP® indication terminals
- ❑ Versatile control power inputs accepts: 120VAC, 125VDC, 24VDC
- ❑ QUICK-TRIP® settings are only active when the switch is in the ON position (during maintenance)

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ISO 9001 2008

NETA CORPORATE ALLIANCE PARTNER

System Operation and Settings

The QUICK-TRIP® system is activated by a padlockable switch. When enabled, two additional settings are activated in the AC-PRO-II® 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 reduced fault-clearing time without opening the 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 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 due to many phase-to-phase faults often starting as phase-to-ground faults.

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 50 kA)
- D = Distance from the electrode in inches (for distances 18 in and greater)
- t = Arc duration in seconds

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:

$$E_I = 1038.7 \times D^{-1.4738} \times t \times (.0093 \times F^2 - .3453 \times F + 5.9675)$$

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

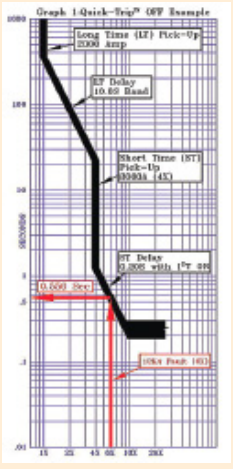
The Incident Energy Level determines the hazard risk category shown in the table to the right which further determines the PPE requirements for personnel working on the affected electrical equipment.

INCIDENT ENERGY LEVEL (E_I)	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

Practical Example

A technician needs to rack out a feeder breaker for maintenance. He or she is the minimum 18” away from any potential arc fash 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, clearing the fault in the feeder breaker cubicle. The two graphs illustrate the dramatic impact that the arc-clearing time has on the incident energy levels. Given that **F = 12kA and D = 18 in.**

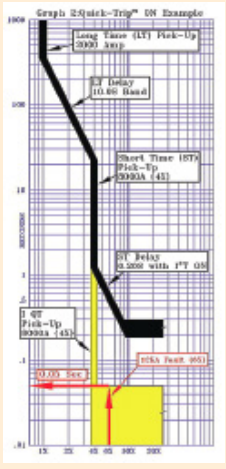
QUICK-TRIP Off



Graph 1: QUICK-TRIP® is 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 .2 seconds with I^2T ON). The resulting arc duration will be t = .556
- ❑ The resulting incident energy is E_I= 25.8022
- ❑ **The hazard risk category is a 4**

QUICK-TRIP On



Graph 2: QUICK-TRIP® is ON & shows the trip time characteristics of the main breaker

- ❑ The AC-PRO® will now cause the main breaker to clear the 12kA fault in .05 seconds (based on the QT-Instantaneous PICK-UP setting of 8000 amps). The resulting arc duration will be t = .05
- ❑ The resulting incident energy is E_I = 2.3203
- ❑ **The hazard risk category is a 1**