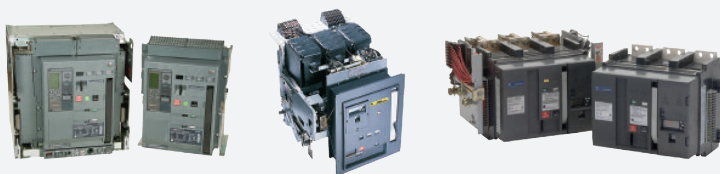


TECHNICAL NOTE

EntelliGuard TU Trip Unit

Don't compromise arc flash protection for system reliability

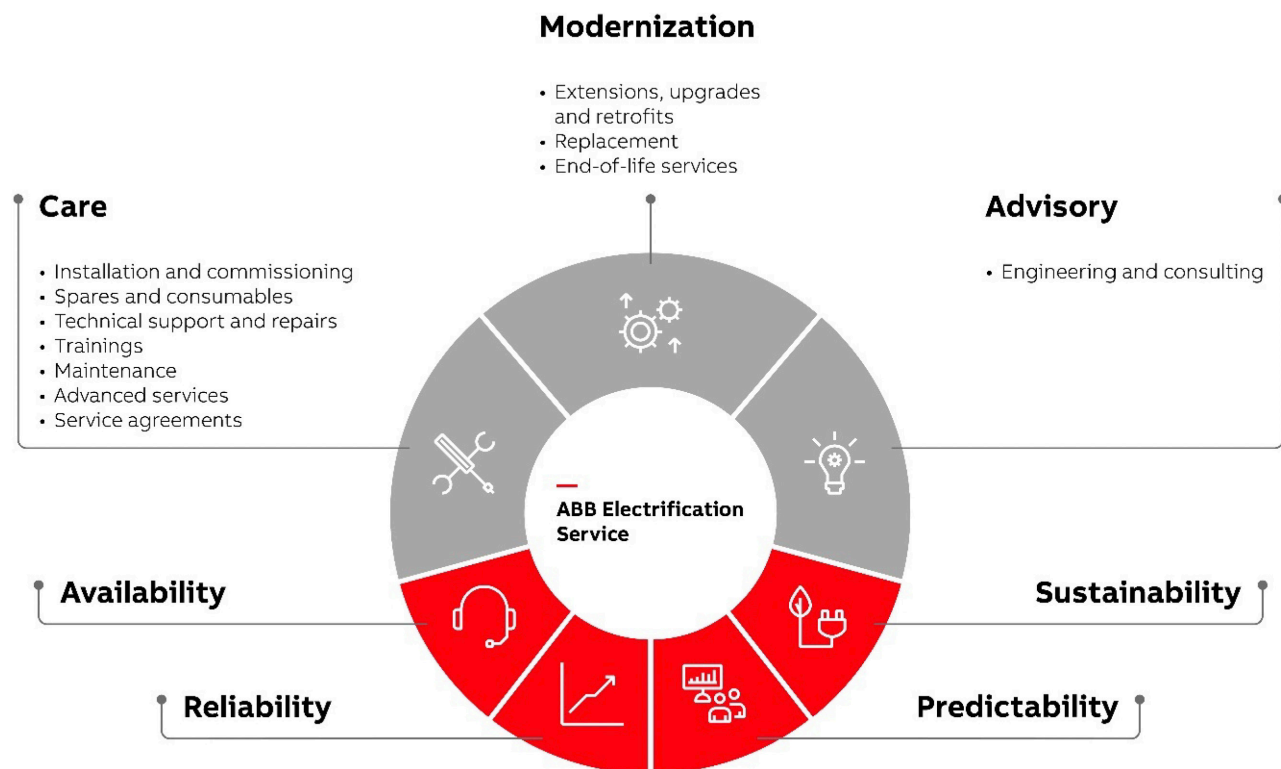
GE legacy product documentation



In 2018 ABB acquired GE Industrial Solutions. EntelliGuard TU Trip Unit is now serviced and maintained by ABB.

If you need spare parts or your installed equipment has aged and requires modernization or replacement – ABB is your first point of contact (look for contact details on the last page). ABB provides comprehensive maintenance, diagnostics, and repair services for medium voltage and low voltage electrical apparatus.

The ABB Electrification Service offering is comprised of services that will help you take care of the equipment, modernize it, and recommend the most appropriate business decisions to guarantee the availability, reliability and sustainability of critical assets to meet your evolving needs.



EntelliGuard TU Trip Unit

Selectivity and arc flash protection

System reliability and protection are key functions of any trip unit, and the EntelliGuard TU Trip Unit delivers exactly that, along with the flexibility to address an array of power distribution needs.

¹ ZSI and RELT may require harnessing

² Power Break I does not offer WFR and I-ZSI / T-ZSI.

Not all versions provide identical capabilities.

The EntelliGuard TU Trip Unit enables simultaneous arc flash mitigation, selectivity and selective coordination from medium voltage to a 20 A, 1-pole circuit breaker. Instantaneous protection is available at every step, even for lower level arcing faults when arc flash protection is most important.

Fast zone-based protection up to MV levels

- Selective instantaneous tripping from low voltage branch circuit breakers to medium voltage substation feeders.

Instantaneous Zone-Selective-Interlocking (I-ZSI)^{1,2}

- Sensitive and selective
- Instantaneous pickups from the medium voltage transformer feeder through low voltage secondary mains, ties and even down to medium sized molded case circuit breakers.

Threshold Zone-Selective-Interlocking (T-ZSI)^{1,2}

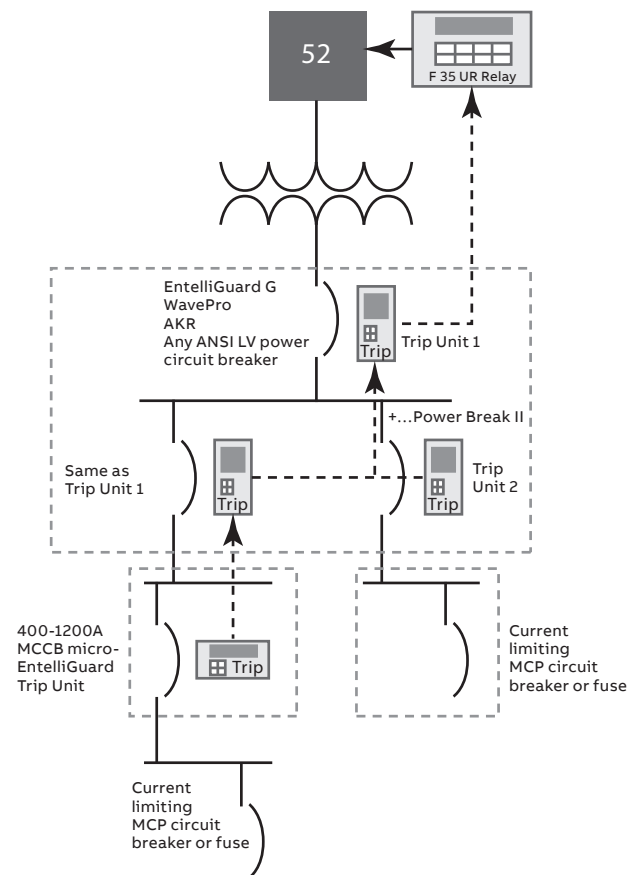
- Unique capability to interlock pickup threshold allows circuit breakers with identically set pickup currents to maintain selectivity and protect their zones without losing sensitivity as the system grows.

Instantaneous WaveForm Recognition (WFR)²

- Sensitive and selective instantaneous pickups above current limiting circuit breakers or fuses.

Instantaneous Reduced Energy Let-Through (RELT)¹ with Positive Feedback

Alternate instantaneous pickup can be used for even faster and more sensitive protection on a temporary basis, with a positive feedback signal that confirms the trip unit has received and reacted to the RELT enable command.



A system-wide solution

¹ 1400A class J TD fuse by Mersen, lower settings possible for lower fault current levels

Instantaneous Zone-Selective-Interlocking (I-ZSI) and Threshold Zone-Selective-Interlocking (T-ZSI) allow multiple layers of large circuit breakers above the feeders serving the current limiting branches to operate as a system to achieve the fastest possible protection at the most sensitive possible settings. With small overloads or large faults, each circuit breaker will only operate when needed and acts as backup only when necessary. The ZSI capability includes ground fault, short time and instantaneous for the fastest interlocked protection.

The instantaneous WaveForm Recognition algorithm allows a feeder circuit breaker (above a panel or motor control center that has current limiting fuses or circuit breakers) to be set very sensitive and still offer selectivity while providing instantaneous protection where you need it. The setting is not dependent on a complex coordination study; it simply depends on the device with which you are trying to be selective. For example, the setting required for the following devices is:

- 15-150 A current limiting MCP $\geq 9,600$ A
- 250 A current limiting circuit breaker $\geq 11,200$ A
- 400 A class J fuse¹ $\geq 15,000$ A

Selectivity up to 100 kA is possible regardless of the size or type of circuit breaker the trip unit is installed in — whether it's the EntelliGuard G ANSI low voltage power circuit breaker, EntelliGuard G insulated case circuit breaker, Power Break II insulated case circuit breaker, or many other legacy GE and other manufacturers' low voltage power circuit breakers.

Reduced Energy Let-Through instantaneous (maintenance switch) with positive feedback provides more arc flash protection flexibility and assurance. It enables an even faster trip with a separate threshold as low as 1.5 times the sensor size that can be locally or remotely enabled. This "positive feedback" lets you know it is on when you need it and off when you don't.

Extended range Instantaneous allows low voltage circuit breakers to set instantaneous pickups as high as 30 times the circuit breaker's continuous setting. This allows 400 A circuit breakers to be set as high as 12,000 A, if required, to achieve selectivity above similar sized devices.

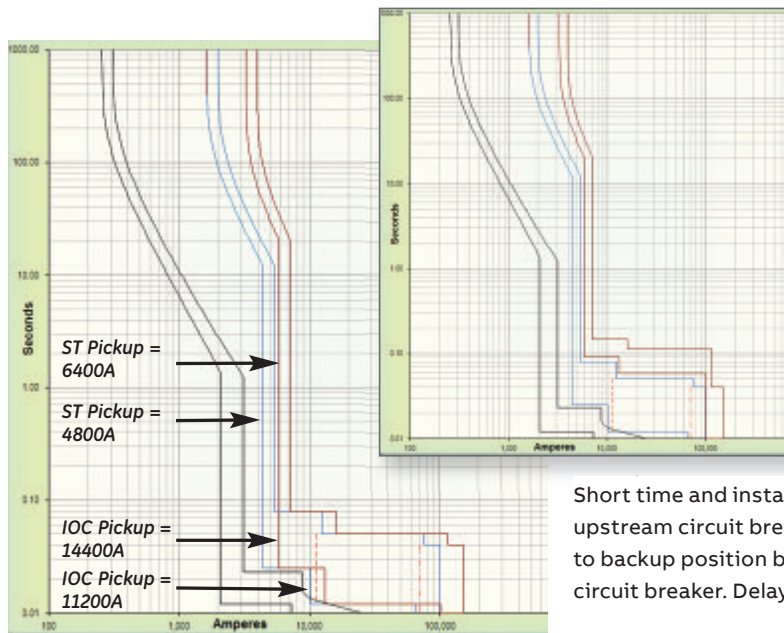
Ultra flexible time current curves and Zone-Selective-interlocking provide the protection engineer with selectivity options. Multiple slopes for short time, multiple shapes for ground fault protection, half-cycle resolution in short-time delay bands, and the ability to Zone Interlock among all of them as needed optimize selectivity and protection regardless of system needs without sacrificing more protection time than necessary.

This is important because to have good arc flash protection, you need your circuit breaker to trip as fast as possible. To do that, it must be sensitive to lower magnitude arcing faults while still allowing the system to sustain loads reliably 24/7. This is how to best protect personnel from arc flash and equipment from faults while not hosting unnecessary trips.

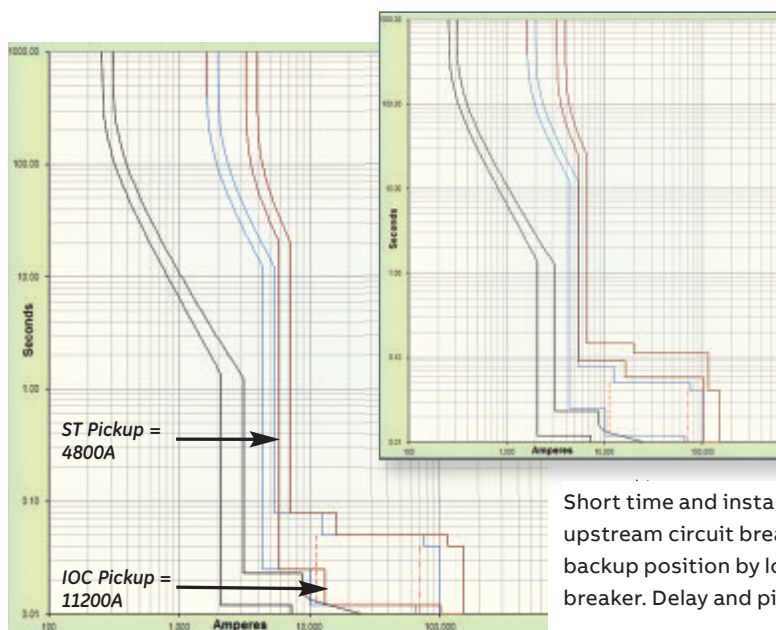
The EntelliGuard family of trip units, protective relays and molded case circuit breakers helps deliver both safety and selectivity, at the same time, all the time!

Simultaneous selectivity and arc flash protection

The time-current curve for large main (3200 A), medium feeder (1600A) and small branch circuit breaker (250 A) shows selective instantaneous set below typical arcing current for an industrial system. Selectivity between feeder and branch is provided by WFR instantaneous. The first set of curves below demonstrates ST and I-ZSI. The second set adds T-ZSI.



Short time and instantaneous in upstream circuit breaker shifted to backup position by lower tier circuit breaker. Delay shift only.



Short time and instantaneous in upstream circuit breaker shifted to backup position by lower tier circuit breaker. Delay and pickup shift.

The EntelliGuard family of trip units

Available for multiple types of legacy GE and other manufacturers' circuit breakers

** Note: Some options require 24VDC additional hardware to enable Metering, Relaying, RELT, ZSI, and Modbus to be added to the circuit breaker, equipment cubicle and equipment sections.

Standard features for exceptional flexibility

- Highly flexible time current settings
 - up to 22 long time delays
 - up to 22 fuse-shaped long time delays
 - up to 14 Short Time Delay bands
 - Three short time slopes (I²T)
- Selective instantaneous algorithm
- Ammeter
- Large backlit LCD screen**
- Circuit breaker status indication
- Universal rating plugs – smaller plug inventory required
- Status and event log (10 events)
- Date and time event stamping**
- LED health status indicator**
- Free set-up software
- Discrete I/O**
- Thermal memory, battery back-up
- Common interface across all versions
- Mechanism self-timing

Optional full-function metering

- Current (Amps, kAmps)
- Voltage (Ph-Ph, Ph-N)
- Energy (kWh, MWh, GWh)
- Real power (kW, MW)
- Total power (kVA, MVA)
- Frequency (Hz)
- Demand (avg. kW, MW) and peak demand

Options

- Internal/external ground fault trip or alarm with four curves to select from (I²T, I⁴T, special selective GF curve and definite time slope)**
- Switchable ground fault trip / alarm (password protected and UL Listed)
- Modbus RTU communications** (Profibus also available for EntelliGuard G)
- Waveform capture for harmonic analysis
- Full-function metering**
- Protective relaying** (see list of functions below)
- Zone-Selective-Interlocking for GF, ST, Instantaneous (I-ZSI)**
- Threshold Zone-Selective-Interlocking for ST and Instantaneous (T-ZSI)**
- Built-in Zone-Selective-Interlocking test capability
- RELT – Reduced Energy Let Through**
- RELT and ground fault alarm harness kits
- Test Set GTUTK20
- Digital test kit software

Optional protective relaying functions

- Undervoltage
- Overvoltage
- Voltage unbalance
- Current unbalance
- Power reversal
- Power direction setup

Benefits

- Wide application: Fits all existing large legacy GE circuit breakers globally
- Multi-standard application: Passes and exceeds UL, ANSI, NEMA and IEC standards
- Reduced spare parts: Universal spare trip unit fits any EntelliGuard G circuit breaker
- Reduced spare parts: Universal trip plugs work with any sensor ratings
- Exceptional setting flexibility: More curves, shorter delays, greater adjustability



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