



## More Information About Safety

### Injury

Arc flash energy is the greatest danger to switchgear operators. An arc flash explosion produces heat otherwise found only on the sun's surface; molten metal, shrapnel moving up to 700 mph, and heat and pressure waves of debilitating force. In the U.S., there are an estimated 5-10 arc flash energy incidents daily, and may account for just under 10% of the estimated 6,000 work related fatalities nationwide. Those who survive often face extensive hospitalization and rehab. On top of this, there may be legal costs.

The magnitude of the effects of arc flash incident energy can be correlated to device clearing times under fault conditions (refer to IEEE 1584 and NFPA 70E) and to distance away from the event.

The more distance between the operator and the point of the fault or arc flash event, the lower the risk of serious injury. In other words, move the operator outside the flash protection boundary.

Entellisys offers two control options to move the operator outside the flash protection boundary: two, optional human machine interfaces (HMIs) let you operate the switchgear, open breakers, and enjoy full visibility into the power distribution network and the system – outside the flash protection boundary.

The "near-gear" HMI can be placed up to 250 feet away from the gear; the remote HMI can be placed on your desktop PC or a laptop.

Facing a moving breaker is extremely dangerous and commonly occurs during maintenance for planned or unplanned outages. Entellisys' REMOTE RACKING DEVICE reduces or eliminates this risk. Operators can rack a breaker out or in without directly facing the breaker while it's moving.

Being close to switchgear is inherently dangerous, whether for operators or visitors. Entellisys' Reduced Energy Let-Thru Mode mitigates risk of incidents by letting you turn on and set instantaneous to lowest pick up.

Entellisys also addresses worker and equipment protection with these measures:

- Fuses for fastest possible clearing of highest magnitude faults (Optional)
- Adjustable instantaneous trips all the time (Optional)
- Selective times bands as fast as 1.5 cycles (Standard feature)
- Zone-based protection to ensure fast selective tripping under a broad range of fault conditions (Optional)
- Fully insulated and isolated bus, compartmentalized circuit breakers, between section barriers (Optional)

These capabilities are designed to reduce the probability of fault initiation, reduce the time to clear a fault, increase the probability that the fault will be cleared, and/or increase the distance between personnel and the arcing fault.

### Equipment Damage and Downtime

Equipment damage is usually correlated with the time needed to clear an internal equipment fault, especially an arcing fault.

- Entellisys is particularly good at offering fast protection against these kinds of faults without sacrificing selectivity. This is based on fast and selective zone-based protection: a combination of 87B, ZSI and set back-ups.
  - Entellisys' ZBP can trip a circuit breaker in less than two cycles, clear in less than 5.5 almost regardless of fault magnitude, for faults below a main CB's FLA to the full, short-circuit rating of the equipment.
- Speed can be further enhanced by using instantaneous trips all the time or during times when fault probability may be considered higher: e.g., during switching or maintenance.

Also, fuses can be added to obtain the fastest possible clearing times for the highest fault magnitudes.

Entellisys also incorporates layers of components redundancy to provide back up protection in case an electronic component or subsystem is not operational.

And Entellisys also provides back up protection algorithms ensuring quick back up of ties by mains, feeders by ties and mains, etc. in case the mechanical device fails to clear a fault for any reason.

Entellisys also provides insulated and isolated bus as well as fully compartmentalized devices and sections, minimizing the probability of internal faults and minimizing the effect of faults if they do happen.

Entellisys' capabilities translate to faster protection and better protected equipment that should minimize damage and downtime for the electrical power distribution system.