

AKD20 Low Voltage Switchgear

By
Maurice D'Mello, P.Eng. – Specification Engineer, GE

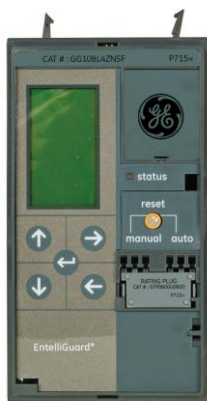
Do you or have you evaluated the severity of an arc flash hazard and the probability of its occurrence? Is damage to your equipment due to high arc flash incident energy resulting in a longer downtime? Or do you use protective and preventive control measures to identify and minimize the damage and risk? Are you building unnecessary redundancies in your system because of lack of real time feedback about the health of your system? These are some of the questions that must be answered when you develop an effective Program for your installation. GE's AKD20 Low Voltage Switchgear has unique and innovative features, which by design, greatly reduces the arc flash incident energy (severity) and the likelihood (probability) of its occurrence. These features give you the required protective and preventive control measures and forms as an integral part of the design of the switchgear.

Overview

GE's AKD20 low voltage switchgear uses the EntelliGuard® TU trip unit's unique and innovative protection as the backbone of the system. The EntelliGuard® G circuit breaker's reliability and ease of use rounds off the package.

If you have a situation where you need to find a balance between incident energy and uptime, then GE has a unique and innovative solution to achieve low arc flash incident energy and complete selectivity (uptime) up to the interrupting rating of the switchgear – at the same time, all the time! The EntelliGuard® TU trip unit does not require you to compromise between arc flash protection and uptime on new and existing low voltage switchgear installations.

EntelliGuard TU Trip Unit



GE's EntelliGuard TU trip unit is the only trip unit in the market that provides the following two unique and innovative features that are essential for achieving arc flash protection and uptime at the same time, all the time;

1. **Zone Selective Interlocking (ZSI) on Instantaneous.**
 - a. Selectivity is achieved between the downstream and upstream circuit breakers in single and double-ended systems in the Short Time, Instantaneous and Ground fault regions of the TCC.
 - b. Since ZSI is active in the instantaneous region the instantaneous protection is always ON, the circuit breaker closest to the fault will clear the fault within 3 cycles

thereby reducing the arc flash incident energy to a very low value, much lower than the suggested values in CSA Z462/NFPA70E. This reduction in incident energy feature is enabled all the time – 24/7.

2. **Waveform recognition** enables the trip unit to be fully selective with remote downstream current limiting devices (MCCB, MCP or fuse) without any control/communication connection between the two devices.
 - a. MCPs and/or circuit breakers in remote MCCs and panelboards can be fully selective with the circuit breakers in the switchgear that are feeding the MCCs or panelboards.
 - b. As both these circuit breakers always have the instantaneous protection ON, the arc flash incident energy at the MCCs or panelboards will be much lower than the suggested values in CSA Z462/NFPA70E.
3. **Data Acquisition.**
 - a. 8 cycles of waveform capture with a record of the sequence of events is available for download. This permits analysis of the cause of the fault from a remote location.
 - b. THD analysis is also available and can be used to reduce potential problems caused by harmonics in your system.
4. **Reduced Energy Let-Thru (RELT)** will further reduce the arc flash incident energy by up to 20% and is normally enabled when maintenance must be carried out on energized downstream equipment at close quarters.

EntelliGuard G Circuit Breaker

GE's EntelliGuard G circuit breakers have the following features that are essential for achieving arc flash protection, uptime and reliability at the same time, all the time:



1. **Plug & Play Accessories.**

- a. Closing coil, shunt trip, under-voltage trip and a fourth slot for either a second shunt trip or second under-voltage trip can be plugged in from the front of the circuit breaker and are pre-wired for immediate use.
- b. Each of the accessories can be fitted with a status contact that will indicate if that accessory operated. This feedback can be included as backup protection in your safety program.
- c. Dual shunt trips (A & B circuits) and breaker failure

protection are some of the additional steps you can take to reduce the severity of an arc flash.

2. **Remote operation.**

- a. Opening and closing circuit breakers via Modbus or Profibus complete with status information and a 'Ready To Close' signal that checks 5 different permissive functions is available on the EntelliGuard G circuit breaker.
- b. In lieu of using a remote control panel that requires extensive wiring between the switchgear and this panel, circuit breaker operation with positive feedback to confirm the completion of the operation can be done by communication from a panel that is outside the arc flash boundary.

- c. Minimal wiring that is required between the two increases reliability.
- 3. **Extended instantaneous protection range.**
 - a. Up to 30 times the rating plug value on most circuit breakers will ensure the inrush currents from ultra higher efficiency motors and transformers will not cause a nuisance trip.
 - b. This extended protection range can overcome some critical selectivity issues.

AKD20 Low Voltage Switchgear

While the EntelliGuard TU trip unit and the EntelliGuard G circuit breaker will reduce the incident energy of an arc flash with state-of-the-art protection and fast operating times, GE's AKD20 low voltage switchgear completes the package by reducing the risk of an arc flash hazard with the following features built into the design:



1. **Closed door racking** combined with remote racking will reduce the risk of injury to the operator at the time when the risk is potentially the highest.
2. **Insulated and Isolated buses** with joint covers drastically reduce the probability of an arc flash.
3. **Complete segregation.**
 - a. The circuit breakers are in grounded steel-barrier compartments with automatic safety shutters and closed door racking greatly. This increases safety.
 - b. Control switches, fuses and pilot lights are in a separate, easily accessible metal instrument panel above each circuit breaker.
4. **No ventilation openings on circuit breaker doors** ensures that if an arc flash did occur, the by-products of the arc will be restricted from exiting the front of the switchgear to cause injury to the operator.
5. **Lock-Out/Tag-Out** procedures are crucial in any operating program. These are easy to perform with the features built into the AKD20 LV switchgear.
 - a. Circuit breaker doors are interlocked to prevent them from being opened when the circuit breaker is in connected position.
 - b. Draw out rails on the substructure can be padlocked to prevent a circuit breaker from being racked in when downstream circuits are being maintained.
 - c. Safety shutters can be locked in the closed position to prevent accidental access to energized parts when the circuit breaker is removed from the switchgear.
 - d. Circuit breakers can be padlocked in the open position to prevent them from being switched ON.

GE's AKD20 LV switchgear has many more features built into the design so that you can reliably achieve arc flash protection and uptime at the same time, all the time! A PPE

does not have to be your primary tool because the inherent design features of the AKD20 LV switchgear make it easier to have an effective system.