1 Arc Flash Relay

Arc Flash Detection (AFD)

1.2 Description

Microprocessor-based relay that utilizes optical sensors to limit arc-fault damage by detecting the light from an arc flash and rapidly tripping two circuit breakers.

1.3 Optical Sensors

Optical sensors and adjustable trip level reduce the chance of nuisance tripping by setting a threshold for ambient light. Optical sensors shall collect light over a wide angle and with high sensitivity.

1.3.1 Optical Sensors per Relay

AFR shall have the capability of receiving detection from four (4) photoelectric external point sensors or fiber sensors.

1.3.2 Optical Sensors per System

For systems that require more than four (4) sensors, AFR shall be capable of linking with other AFRs through digital inputs and outputs. System shall be capable of tripping a single or multiple circuit breakers in different locations.

1.3.3 Optical Sensor requirements

Each optical sensor, either Point or Fiber, shall be have the following characteristics:

Trip Level: 10 to 25 klux

Time Delay: 1 to 10 ms

Detection Zone: 180° x 2.5m for Point and 360° x 8m for Fiber or 360° x 18m for Fiber

Electrical Cable: Shielded 3-wire 0.5 mm² (#20 AWG)

Sensor Check: Built-in LED for visual feedback and alarm if sensor is unplugged, broken wire, or damaged. Indication shall be on AFR and Sensor.

Sensor Trip Indication: Sensor shall indicate which sensor detected an arcing condition and tripped relay. Indication shall be on AFR and Sensor.

1.4 Sensor Location

Coordinate with switchgear manufacturer to optimally mount 1 or 2 sensors per cubicle to cover all horizontal and vertical bus bars, breaker compartments, drawers, and anywhere that there is potential for an arc-fault.

1.6 Display

Front-panel and sensor LED's shall indicate sensor health and which sensor detected the arc fault.

1.7 Supply Voltage

AC: 100 to 240 VAC

DC: 24 to 48 VDC, 110 to 250 VDC

Operating Temperature: -45 to 70° C

1.8 Auxiliary Relay Contacts

Error Relay:

Form C (N.O. / N.C.), (5 A Resistive, 250Vac or 30Vdc)

Tripped Relay:

Form A (Normally Open) isolated contact
UL Rating: 100 mA, 50 Vac/Vdc

1.9 IGBT Response Time

Normal Operation: < 1 ms

On power-up, DC Supply: 2 - 4 ms

On power-up, AC Supply: 35 - 40 ms

1.10 Trip Coil Output (IGBT)

IGBT switch, 200 µs on time, 1-5 s pulsed (configurable, thermally protected). Configure trip coil to trip main circuit breaker as shown on control schematics. AFR Relay shall continuously monitor the health of the wires and trip coil and alarm if faulty.

One Form A (N.O.), (IGBT Switch)

1.11 Safety Features

Redundant internal trip circuit – Relay shall have a redundant internal trip circuit that is independent on the microprocessor or its software. Any failure in the primary path (microprocessor) will cause the unit to automatically switch to its redundant path in order to ensure arc flash protection even in case of microprocessor failure or during microprocessor initialization right after power up of the relay.

1.12 Software / Communications

Windows®-based PC Software shall be installed on relay and not on a PC. Upon plugging in a USB cable to relay, relay shall be identified as an external drive in Windows® Explorer. Configuration files and relay data (light and current) shall be viewed on a graph over time.

AFR shall have minimum Modbus® TCP communications.

1.13 Certifications

AFR shall have the following certifications: UL, CSA, and CE.

1.14 Manufacturer & Warranty

Littelfuse, or approved equal. AFR shall have a minimum of five (5) year warranty.