

ABB General description

Arc Guard System

Arc monitor

Current sensing unit



Function

The purpose of the arc guard system is to quickly disconnect the energy source if an arcing fault should occur. The watchful eye of the arc monitor detects any large increase in light intensity. The detector transfers light from the arc through a state-of-the-art solid state electronics package. Within an interval of one to two milliseconds, the detector sends a trip signal to the disconnecting upstream circuit breaker located in the switchgear, bypassing delays caused by the selective features of relaying schemes. This protects your equipment and personnel.

Current sensing unit

The detectors can also be sensitive to other forms of intense light, such as camera flashes, lightning, direct sunlight, switching arcs in circuit breakers and other large apparatus. By combining the arc monitor with a current sensing unit set just over the normal operating level, a current dependent condition is introduced which prevents triggering from irrelevant light sources. This prevents nuisance tripping the switchgear and causing an unintentional power outage.

Insensitivity to interference

A switchgear environment is often subjected to extreme electromagnetic interference, especially during an arcing fault. High currents in the busbars and cables, switching arcs in contactors and circuit breakers generate fields that interfere with communication between

relays and meters. Fiber optic cables eliminate the risk of electromagnetic interference. All communication between the detectors, arc monitor and the current sensing unit are through fiber optics. Fiber optic signal transmission makes the systems immune to interference.

System security

The arc guard system is a product that seldom (or never!) has to take action, but which must then always operate with absolute dependability. Its performance should be checked after installation and subsequently at certain intervals, e.g. once a year. The design of the system makes it easy to check. The procedure is described in the instructions provided with the equipment.

Approvals

- Underwriters Laboratories
File #E155370
- Factory Mutual system
Reference FMRC J.I. 1B1A4.AF
- Lloyds Register of Shipping
Cert. #97/00189
- Det Norske Veritas
Cert. #A-6702
- Germanischer Lloyd
Cert. #99.342-97
- CE Marked
- Earthquake tested according to ANSI / IEEE
C37.98 – 1987
- Y2K compliant
- US Coast Guard ①
- American Bureau of Shipping ①

① Certificate number pending. Call factory for more information.

General description

Arc monitor with detectors

Introduction

The two units of the Arc Guard System™, arc monitor, and the current sensing unit are each built into a light-alloy enclosure provided with a hinged door.

Communication between the units and between arc monitor and detectors is through optical cables.

Optical fiber cables

The optical fiber cables cannot be cut or joined and they must be run in smooth curves during installation. Optical fiber cables and detectors with optical fiber cables are available in certain standard lengths, see page 2. Greater lengths than these can be quoted on request.

Detectors

Each detector consists of a lens arrangement for collecting light. An optical fiber cable is connected to the lens. The detector monitors a large space angle. The polar diagram should be regarded as three-dimensional since the detector is sensitive to light from all directions, with the exception of a small area behind the detector.

Factory testing has shown that arc light reflected between metallic surfaces is also sufficient to cause tripping. However, we do recommend one detector per each enclosed switchgear compartment.

The detectors are connected to the arc monitor by means of plug-in sleeve terminals.

A maximum of nine detectors can be connected to an arc monitor. If more detectors are required, up to twelve units may be connected in parallel.

Arc monitor

- Available for AC and DC power
- Photodiodes are used for sensing light.
- The two output stages are triacs triggered via a pulse transformer. In this way, detectors and output stage are electrically isolated from other electronic equipment.
- The arc monitor has two separate relay outputs. Each relay has one change-over (Form C) contact function. Relay K1 is used for EXTERNAL TRIP indication and relay K2 is used for POWER ON indication.
- A switch is included for selection of automatic relay resetting (after approximately 200 ms) or manual resetting of relay K1.
- A digital display, visible through the window in the door, is lighted when the triac outputs are activated and shows which detector has caused tripping. The display and relay are

reset using a pushbutton accessible from the outside. The arc monitor can trip even if it is not reset.

- Terminals are provided for connection of the arc monitor's own power supply and for connections to the circuit-breaker trip coil. There are units for plug-in connection of optical fiber cables from the detectors and for communication with any current sensing unit.
- The power consumption of the unit is approximately 6 watts. Energy is stored in the unit for operation up to 200ms should the supply voltage fail, which is sufficient to activate the output even if voltage disappears in conjunction with the short circuit for which the arc monitor operates.

Tripping of several breakers

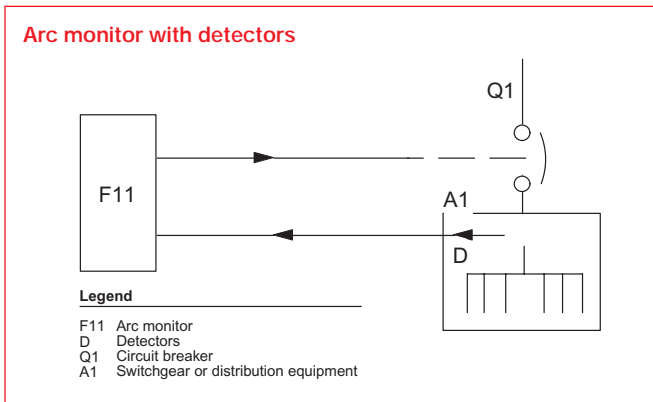
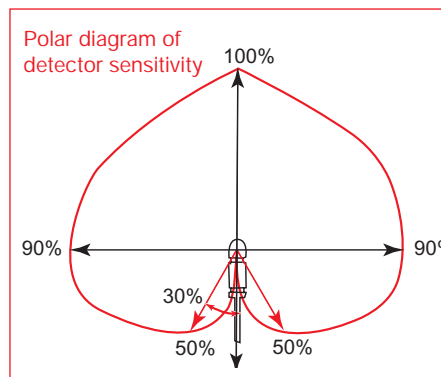
For tripping several breakers an additional relay is often required. This must be as fast as possible so as not to delay tripping and thus make damage worse.

For DC supply, ABB's relay type RXMS (Cat. No. RK 216 263-...) with 4 ms pickup time is suitable. Where a greater load capacity is required this relay can be connected in parallel with relay type RXMH (Cat. No. RK 223 067-...).

The current to the intermediate relay must be interrupted since the triacs of the arc monitor have no breaking capacity for DC. This can be done by having a pushbutton or time-lag relay break the circuit or by connecting the signal relay contact K1 of the arc monitor in parallel with the triacs. Then activate automatic reset inside arc monitor (DIP-switch S1.2).



Arc monitor



General description

Current sensing unit

Description

- Has terminals for a number of different supply voltages.
- Connects to current transformers located at suitable positions in the busbar system of the installation to be monitored.
- The unit incorporates a selector switch and potentiometer for testing and checking purposes.
- Power consumption is approximately 11 W.
- Optical signal transmission
- If several current sensing units are needed, these can be connected in series using optical cables.
- LEDs indicate when the current exceeds approximately 70% and 100% of the set value.

Connection to current transformers

The unit is to be connected to current transformers with a rated secondary current of 1, 2 or 5 A .

Note that current transformers for relay protection are to be used since these do not saturate as quickly as ordinary current transformers. To minimize the operating time, the current transformers should not saturate until twice the set current has been reached.

The unit can be either 1, 2 or 3-phase connected (to one, two or three current transformers). However, in three-phase systems single-phase connection should be avoided. Even though arcs generally spread to all three phases, valuable time may be lost before the current rises to the trip value if the arc is struck in one of the phases in which the current is not sensed by the unit.

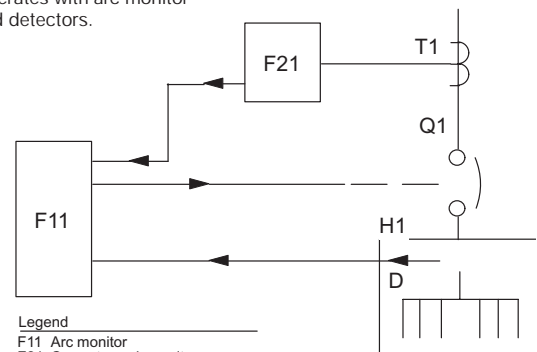
The unit imposes insignificant load on the current transformers, approximately 0.7 VA, so current transformers that are also applied for other purposes can often be used.



Current sensing unit

Current sensing unit

Operates with arc monitor and detectors.



Legend

- F11 Arc monitor
- F21 Current sensing unit
- T1 Current transformers, 3 CTs
- Q1 Circuit breaker
- H1 Switchgear or equipment
- D Detectors