ARCON® 3G

3rd Generation of Internal Arc-Fault Mitigation System

Powering Business Worldwide

Arc flash - advanced safety for switchgear systems

An arc flash in a low voltage switchboard can be catastrophic in terms of safety of people, and to the ongoing continuity of your business. Eaton provides a wide range of products and services that can minimize the risk of an arc flash in your business. Understanding the risk of arc flash events in your switchgear assemblies is the first step to protect your people and your business.

Arc flash protection

It has been estimated that the average cost of downtime resulting from an arc flash is 50,000 Euro per day. The replacement of switchgear assemblies can take several weeks, resulting in lost revenues, additional costs and damage to reputation. People unlucky enough to be in the vicinity of an arc flash are at risk of serious injury or even death!

Even switchboards that meet the requirements of the International Electrotechnical Commission's IEC 61439 standard remain vulnerable to arc flashes. Low voltage switchboards play a decisive role in supplying electrical power. However even if the equipment is planned, built and tested to meet the standard, they are frequently modified and added to over time. As the use of power changes over time within a commercial or industrial building, the risk of an arc flash can also increase. Human errors of personnel working on the switchgear, condensation, lack of maintenance or even small rodents and insects can trigger an arc flash.

Eaton offers a comprehensive range of solutions to help businesses reduce the risk of injury and costly damage caused by an arc flash.

Personnel protection

Errors when working on live switchboard installations can be fatal.

The statistics of the employers' liability insurance association for the precision engineering and electrical industry in Germany shows **that 2 out of every 3 accidents occur on the switchboard when opened.**

For this reason, Eaton carried out fundamental research in collaboration with the Technical University of Illmenau and came to the conclusion that "genuine personnel protection" could only be achieved with exceptionally fast protection systems.

With **a total arc mitigation time of less than 2 ms** ARCON® therefore offers an unprecedent level of personnel protection.

Assembly protection

Low-voltage switchgear and controlgear assemblies are put out of operation for several weeks due to the effects of an arc fault.

If a redundant power supply is not available, this also results in unwanted production downtimes. Only an effective assembly protection can provide a solution here, so that the effects of the arc fault can be minimized and an immediate restoration of service is possible.

Using ARCON® restricts the effects of the arc fault to its footprints. After the cause of the fault has been rectified and the quenching device has been exchanged, the system can be made ready for operation in the shortest possible time in order to ensure the required availability.

Preventing Damage, Ensuring Service Continuity

The effects of an arc fault are very similar to those of an explosion. This ranges from the risk of death and injury to persons, extensive damage to switchboard systems, to several weeks of downtime or even the exchange of the damaged switchboard system. In the worst case, the production downtime can even lead to bankruptcy as customers have found other suppliers during this period. In today's competitive environment availability is a very important factor for which suitable protective measures must be implemented.

The main applications to date for ARCON® have been data centers, tunnel supply systems and power supply systems for continuous manufacturing processes in the chemical or oil & gas industry.

Reduce the risk of an arc flash in your business

For power-critical commercial and industrial buildings such as process plants, offices, hospitals and factories, a continuous supply of electrical power is essential.

The provision of reliable power in such buildings is reliant upon the low-voltage distribution switchboards that lie at the heart of the electrical installation. Demands placed upon these switchboards, particularly as operations and infrastructures expand over time, leave them vulnerable to arc flashes.

Despite these palpable dangers, electrical switchboards are easy to overlook in a safety analysis of commercial building infrastructure. The equipment is generally tucked out of sight and the prevailing view is that switchgear is absolutely safe as long as it conforms to the requirements of the IEC 61439 standard.

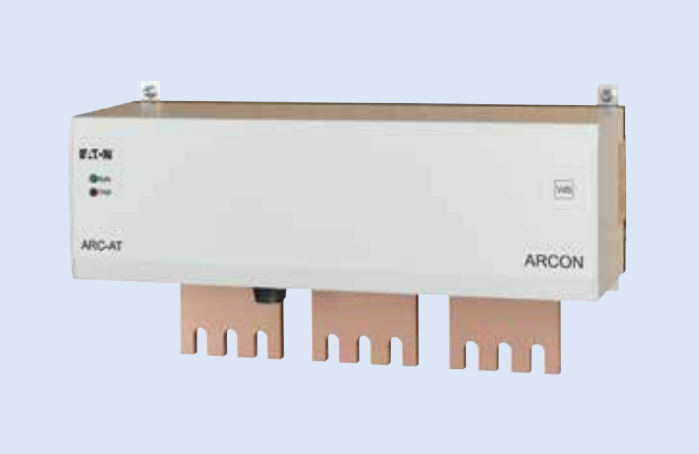
Controlling Arc Faults Safely

1. Detection

The arc fault is reliably detected by means of two separate tripping criteria. The arc fault produces an overcurrent which is detected by means of measuring current transformers. The second detection criterion is the extremely intense light emitted from an arc fault. This light is detected with fiber optic sensors. Some of this intense light emission enters the core of the fiber optic loop radially. Then this signal can be evaluated at the receiver side of the sensor. Any incorrect releases due to flashes or welding arcs are prevented by evaluating both signals together.

2. Evaluation

The analog sensor signals are converted to digital ones in so-called detection modules and then passed on to the central evaluation unit (master). For this an internal communication bus has been developed which has the principal task of transferring any triggering information at ultra-high speed. The detection modules are also fed with power via this line. Each module has an independent address over the interlink assigned to one busbar section, the so-called protection zone. For monitoring of two or more busbar sections, it is possible to build up complex arc protection systems via the “masterlink”.



3. Quenching

The arc quenching device ensures extremely fast mitigation times. A three-phase short-circuit is produced in less than 1 ms in order to remove energy from the arc fault. A pyrotechnically initiated actuator, as used in airbag systems, fires a copper bolt that penetrates an insulation plate to establish electrical contact.

4. Disconnection

The incoming circuit-breaker has the task of disconnecting the affected busbar section from the mains supply. This is initiated by the short-circuit release. Each incoming circuit-breaker on this busbar section is sent an additional disconnection command to the shunt release as a backup measure. Busbar sections that are not affected remain operational.

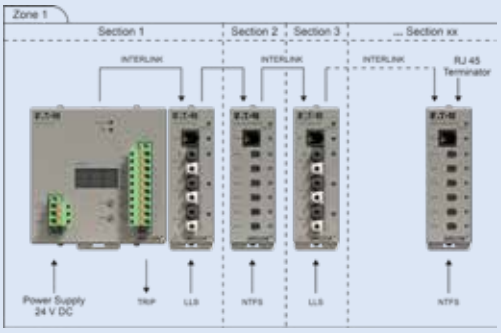
Eaton offers three different levels of arc fault protection / monitoring:

The ARCON® 3G protection system is designed as modular system, so that flexible use in different switchgear assemblies is ensured.

1.) ARCON® 3G simple arc protection system (only light criteria for arc fault monitoring especially to fulfill extensive personnel protection)

The ARCON® 3G simple arc protection system is based on the following modules:

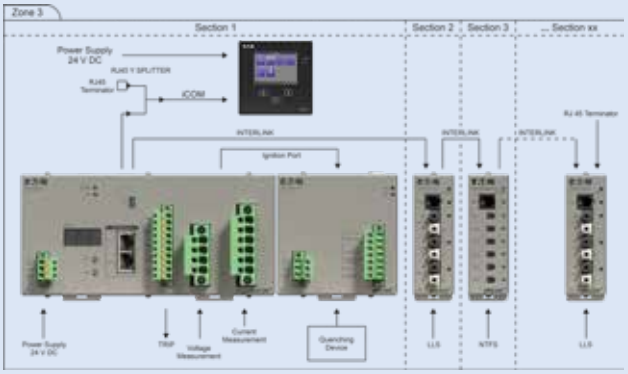
- ARC-LITE-3G Master LITE unit providing trip contacts & communication link to connected Line Sensor(s).
- ARC-DMOD-3SL up to 3 Line Sensors (ARC-SL) and 1 Mobile Light Sensor (ARC-NTFS-MLS) for detecting electrical arc per each module.
- ARC-DMOD-6NTFS up to 6 Point Sensors (ARC-NTFS-3M / ARC-NTFS-6M) and 1 Mobile Light Sensor (ARC-NTFS-MLS) for detecting electrical arc per each module.



2.) ARCON® 3G extended arc protection system (light & current criteria for full personnel and assembly protection)

The ARCON® 3G extended arc protection system is based on the following modules:

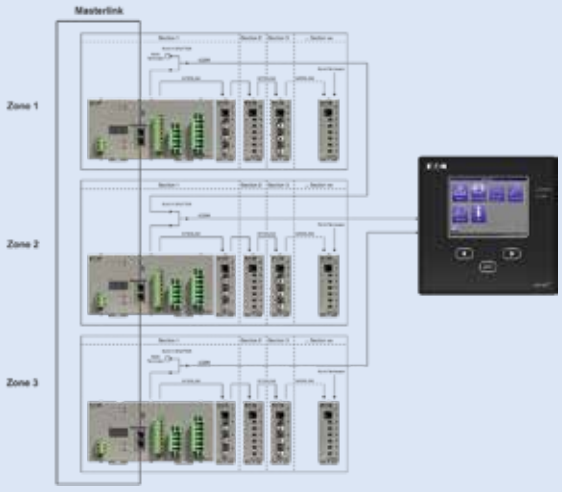
- ARC-MAIN-3G Master MAIN unit providing current measurement for additional tripping criteria (di/dt), voltage measurement, HMI, trip contacts & communication link to connected modules
- ARC-DMOD-3SL Module for electrical arc detection via line sensor (ARC-SL)
- ARC-DMOD-6NTFS Module for electrical arc detection via point sensor (ARC-NTFS)
- ARC-MAIN-HMI Human Machine Interface to display and control the Master MAIN
- ARC-TMOD-1QD Tripping module for external quenching device operation (ARC-AT)
- Arc Protection Parameter Tool (APPT) allows easy system configuration and adaptation to each individual application



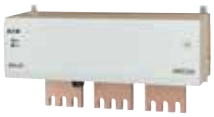
3.) ARCON® 3G complex arc protection system (up to 8 extended systems communicating over Masterlink/iCOM)

To realize ARCON® 3G complex arc protection system same modules have to be used as for extended arc protection system.

- ARC-MAIN-3G Master MAIN unit providing current measurement for additional tripping criteria (di/dt), voltage measurement, HMI, trip contacts & communication link to connected modules
- ARC-DMOD-3SL Module for electrical arc detection via line sensor (ARC-SL)
- ARC-DMOD-6NTFS Module for electrical arc detection via point sensor (ARC-NTFS)
- ARC-MAIN-HMI Human Machine Interface to display and control the Master MAIN
- ARC-TMOD-1QD Tripping module for external quenching device (ARC-AT)
- Arc Protection Parameter Tool (APPT) allows easy system configuration and adaptation to each individual application
- Up to 8 Master MAIN units (ARC-MAIN-3G) are able to communicate with just 1 user interface (ARC-MAIN-HMI) via internal bus iCOM (for sharing any criteria between those units, please establish the Masterlink connection too)



Range Overview

Product	Description	Version	Type	Article no.
Master LITE 	Electronic evaluation unit Master LITE is suitable as a simple, active arc fault monitoring system based on light detection only for detecting internal faults in a switchgear assembly, control of the assigned circuit breaker via shunt release actuation; - Display of system status via internal Display and LEDs - Up to 31 light detection modules can be connected - 3x high-speed (< 1 ms) trip relay outputs (16 A / 250 V AC/DC) - 1x trip alarm and watchdog output relay for remote status indication - Easy mounting on DIN-rail profile (TS35) - No parameter setting required - Supply voltage 24 V DC		ARC-LITE-3G	193889
Master MAIN 	Electronic evaluation unit Master MAIN for use as an active arc fault protection system based on light and current detection for detecting internal faults in a switchgear assembly to fulfill extensive "personnel and assembly protection"; - Display of system status via internal Display / LEDs and HMI - Up to 31 light detection modules can be connected - 3x high-speed (< 1 ms) trip relay outputs (16 A / 250 V AC/DC) - 1x trip alarm and watchdog output relay for remote status indication - 1x connection of tripping module to operate external quenching device - Total arc mitigation time ≤ 2 ms - Easy mounting on DIN-rail profile (TS35) - Parameter and system configuration via software (APPT) - Additional measurement of Voltage, Power, Frequency for displaying the values - Supply voltage 24 V DC		ARC-MAIN-3G	193890
Detection Modules 	Electronic detection module for up to 3 fiber optic line sensors or up to 6 electronic point sensors and 1 mobile light sensor, connection via INTERLINK (max. 100 m) to the respective master unit; - Display of triggered channel via LEDs when light detected by sensor - Easy mounting on DIN-rail profile (TS35) - Supply via internal bus connection		ARC-DMOD-3SL ARC-DMOD-6NTFS	193892 193895
Tripping Module 	Electronic tripping module for generating the ignition voltage / current for the pressure elements in the arc quenching device (AQD), both ignition circuits are permanently monitored for wire faults; - Display of RUN and TRIP mode via LEDs (aligned with AQD) - Easy mounting on DIN-rail profile (TS35) - Pre-assembled connection cable (3 m) to AQD included - Supply voltage 24 V DC		ARC-TMOD-1QD	193893
Arc Quenching Device 	The arc fault is quenched by a 3-phase short-circuit device directly at the main busbar close to the main incomer. Total arc mitigation time of ≤ 2 ms means interval of time between the ignition of the internal arc-fault and the complete extinction of the same. - Display of RUN and TRIP mode via LEDs (aligned with tripping module) - Rated impulse-withstand voltage Uimp: 8 kV - Rated operational voltage: 690 V AC - Rated short-time withstand current Icw: 85 kA / 1 s, 105 kA / 0.5 s, 150 kA / 0.2 s	UNIVERSAL installation	ARC-AT-T/3G	300936
Display Module 	Electronic display and control unit for parameterization and status indication for connection to the electronic evaluation unit Master MAIN; - Input via 5.8" resistive touchscreen display and 3 function keys - Panel mounted device, protection degree IP55 (front) - Supply voltage 24 V DC - 1 display can serve up to 8 master modules		ARC-MAIN-HMI	193891
Fiber Optic Line Sensor 	Special light sensor for detecting the light emitted by an arc fault. Blue protective hose for increased filter effect and reduced sensitivity to interfering light. Temperature stability up to max. 125°C for the active sensing area. - Outstanding tripping response - Best performance criteria for line sensor installations against nuisance tripping - Continuous self-supervision of the sensor loop via monitoring signal - Total length of the sensor minus 5 m means the active sensing area	10 m 11 m 12 m 13 m 15 m 17 m 20 m 25 m	ARC-SL10/BL ARC-SL11/BL ARC-SL12/BL ARC-SL13/BL ARC-SL15/BL ARC-SL17/BL ARC-SL20/BL ARC-SL25/BL	179679 179680 179681 179682 179683 179684 179685 179686
Point Sensor and Mobile Light Sensor 	Intelligent point sensor for detecting the light emitted by an arc fault. Due to a precise algorithm the sensor can distinguish between different light sources. As an example, it won't trip when there is some blow-out gas caused by a circuit breaker during standard switching operation. Moreover it's non-sensitive against other interfering lights like sun light, artificial lighting, photo flash, torch light, etc. - Nuisance Tripping Free Sensor with SPE plug for permanent use (3 m / 6 m) - Nuisance Tripping Free Sensor with RJ9 plug for temporary use (5 m) (extended protection during service/maintenance of energized assemblies)	3 m 6 m 5 m	ARC-NTFS-3M ARC-NTFS-6M ARC-NTFS-MLS	300939 300940 300941
Communication Cables 	Specified connection cables for INTERLINK, IGNITION PORT, iCOM and MASTERLINK communication based on RJ45 connector system and Ethernet cabling Cat.6A (class EA). - Max. transmission distance via ... INTERLINK communication line: 100 m ... IGNITION PORT communication line: 10 m ... iCOM communication line: 100 m ... MASTERLINK communication line: 100 m	0.5 m 1 m 2 m 3 m 5 m 7.5 m 10 m 15 m 20 m	ARC-CC00 ARC-CC01 ARC-CC02 ARC-CC03 ARC-CC05 ARC-CC07 ARC-CC10 ARC-CC15 ARC-CC20	286390 286391 286392 170488 286393 170489 286394 286395 268396

Eaton's electrical business is a global leader with deep regional application expertise in power distribution and circuit protection; power quality, backup power and energy storage; control and automation; life safety and security; structural solutions; and harsh and hazardous environment solutions. Through end-to-end services, channel and an integrated digital platform & insights Eaton is powering what matters across industries and around the world, helping customers solve their most critical electrical power management challenges.

For more information, visit **Eaton.com.**

To contact us please visit **Eaton.com/contacts**

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