



Brochure

# Arc Guard System™ – TVOC-2

## A protection device for reliable safety

# Arc Guard System™ – TVOC-2

A reliable, simple and flexible solution for your business safety.



TVOC-2 showing the possibility to put HMI (Human Machine Interface) mounted on a panel-door.

**A next generation of ABB's Arc Guard System™ TVOC has now been released on the market, replacing the old generation that served as a benchmark for the past 35 years. With TVOC-2, we set an entirely new standard.**

As reliable and simple as the previous Arc Guard System™, TVOC-2 is now introduced with additional and improved features and functions. To meet the demands of our customers and end-users, it focuses on reliability, flexibility and simplicity.

Furthermore, with its functional safety (SIL 2) design, when regular maintenance is performed (refer to installation manual for details), TVOC-2 is approved for today's applications as well as tomorrow's industry needs.

## Reliability

- Certified according to functional safety (SIL 2) standard
- Over 35 years of experience in Arc Guard Systems
- Pre-calibrated optical sensors

## Flexibility

- HMI can be mounted on the panel-door
- Expand with up to 30 optical sensors
- Configure the system according to various needs

## Simplicity

- User-friendly start-up menu
- DIN-Rail or wall-mounted
- Easy to expand as the switchgear grows

# Why Arc Protection?

Arc Guard System™, reduces the negative consequences of an arc accident.

Every day throughout the world, hundreds of people face serious injuries or death due to arc accidents. What's more, this is not restricted to countries with low safety standards. According to public data, one person dies each day in North America due to arc flash accidents. Several more are injured.

In any plant, the risk of arc accidents can be reduced by the design of systems (mechanical and electrical) and the routines for working with electric equipment. The importance of safety has led ABB to develop 'arc-proof' switchgears, where the mechanical design as well as the choice of electrical components reduces both the risk of an arc accident and its consequences.

Unfortunately, these measures are most often not sufficient for two reasons; (1) Most accidents happen with the switchgear door open, which reduces the effects of mechanical protection, (2) Breaker protection is based on over-current only and often includes time delays.

Reducing the consequences of arc faults is all about time (see chart). This is why the ABB TVOC-2 (Arc Guard System™) reacts in just a couple of milli-seconds, thereby over-ruling standard protection time delays when tripping breakers.

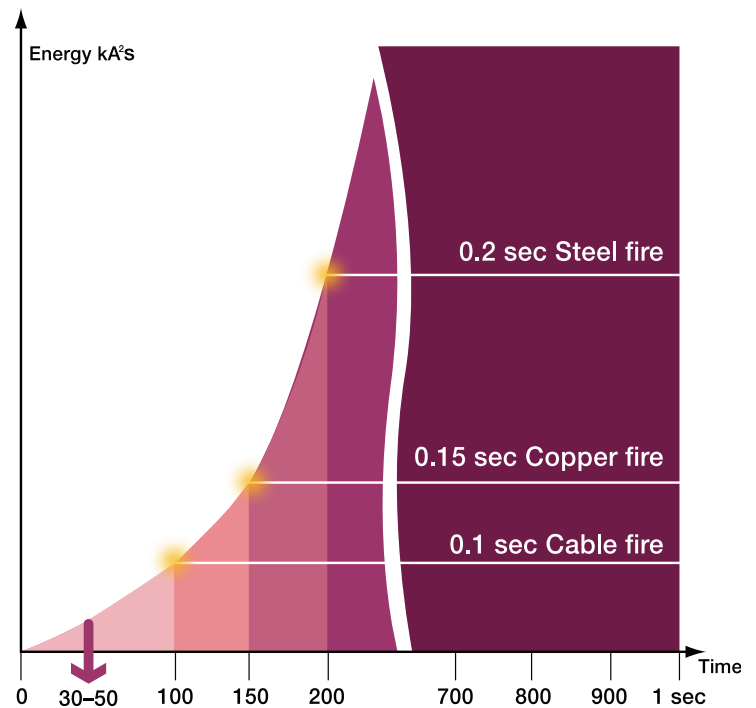
Safety is becoming more and more important. As legal and regulatory requirements increase, old equipment soon becomes out-of-date. Arc Guard System™ can help increase equipment safety and thereby prolong its life-cycle.

Arc Guard System™ will not prevent the accident from happening – but it will significantly reduce the damage caused.

## The four main reasons to invest in an ArcGuard System™

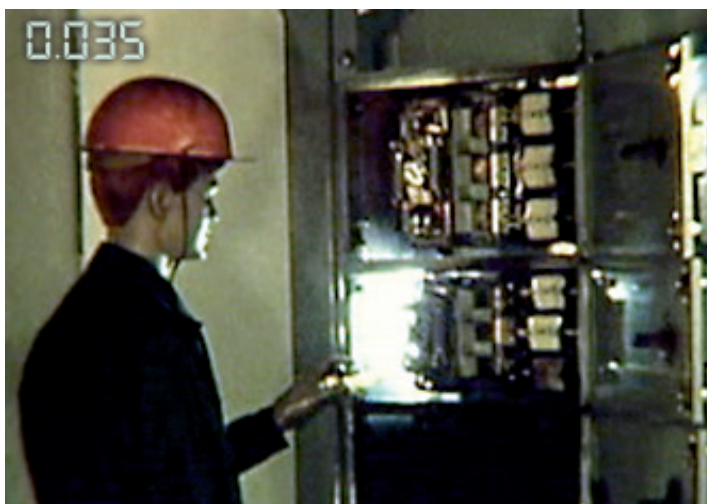
1. Save lives
2. Save equipment
3. Minimize downtime
4. Increase switchgear life

Save money



Total breaking time = ABB ArcGuard System™ + Breaker

Pictures from test with TVOC



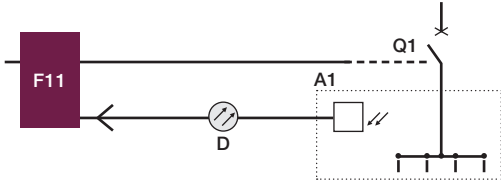
With ArcGuard System™



Without protection

# Arc Guard System™

## Basic principle – how it works



F11 Arc Monitor, Q1 Circuit breaker, A1 Switchgear, D Detector

1. Detectors sense the arc flash inside the equipment.
2. Optical fiber transfers the arc flash light to the arc monitor unit.
3. Monitor sends a trip signal to the circuit breaker.



## Accidents – when and why

### The most common reasons for arc flash accidents

1. Human errors
2. Mechanical faults
3. Bad connections
4. Pollution
5. Animals

### When do arc flash accidents occur

- |      |   |
|------|---|
| 25 % | without operator                        |
| 10 % | with operator in front of a closed door |
| 65 % | with operator working in the switchgear |

**In just one second, enough power can be generated from an arc flash to damage switchgear and result in an injury or fatality. Arc flash accidents occur for several reasons.**

In the majority of incidents, work on the electric equipment is ongoing and the panel-door is open. Human error, therefore, is the most common reason for accidents. For safety reasons, some switchgears are built to be ‘arc-proof’ by containing the arc inside and/or using cell separation. But when the door is open, a fast and separate arc protection device is needed to maintain the safety level.

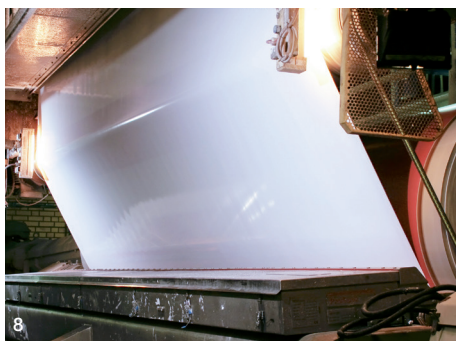
Other reasons for arc faults include various mechanical faults, pollution and dust, or animals getting inside equipment.

For plant efficiency or power availability reasons, power distribution systems often include a required selectivity, which in many cases means a delay on breakers’ tripping for high currents. In contrast, Arc Guard System™ (together with breakers) over-rides protection delays at arc fault. This provides the fastest possible breaking and minimizes potential injury to humans and damage to equipment.



# Arc Guard System™

## Where can it be used?



1 Cruise ship | 2 Oil rig | 3 Chemical industry | 4 Train | 5 Hospital | 6 Steel industry | 7 Wind power | 8 Papermill | 9 Substations

**Arc Guard can be used almost anywhere there's a need to detect strong light.**

However, its functions and features were developed for one main application: a safety device to detect arc faults in low and medium-voltage switchgear. This includes both new installations and old switchgear in need of prolonged life. Switchgears are found in all process industries as well as power utilities, commercial buildings, hospitals, ships, and many more locations.

Other applications include for example:

- Alerting when a synchronous motor needs service
- Preventing fire caused by dust in DC converters in trains
- Protecting manufacturing processes for explosives or combustibles

# TVOC-2 Reliability

## Ready now – Approved for the future

**TVOC-2 is designed with its main focus on reliability. Every aspect is covered. This includes sensors being pre-calibrated at the factory as well as major features such as the self-monitoring system.**

To ensure that we have not left a single part to chance, TVOC-2 is designed according to the functional safety (SIL 2) concept.

This compliance means that the product is designed so that a fault in a component will not result in a safety function failure. For example, certain capacitors have a redundant copy if the first one breaks. The system also monitors itself and lets you know if anything seems wrong. Many of the added functions are handled by a microprocessor, but importantly, none of the safety functions. Both you and your business can feel safe with TVOC-2.

### Functional Safety for the future

The new EU machinery directive (2006/42/EC) requires that the machine builder eliminate risks throughout the foreseeable life-time of the machine, including its misuse.

Harmonized standards provide tools for verifying that these requirements are met. Functional safety is a tool not only used to ensure safety, but reliability as well. Using TVOC-2, which is SIL 2-certified according to IEC 61508 and IEC 62061 ensures that the diagnostic coverage meets the safety level demands. This corresponds to performance level d according to EN ISO 13849-1

Arc Guard System™ clears an arc within an extremely short time, which reduces the energy in the arc so that personal injury and equipment damage are kept to a minimum.

Using TVOC-2 means that you can meet the highest safety requirements! For example, NFPA70E, a US standard for the safe installation of electrical wiring and equipment, states: “a flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the Flash Protection Boundary and the personal protective equipment that people within the Flash Protection Boundary shall use.” With Arc Guard System™, these calculations will show that the energy from an arc flash is decreased to an extent that reduces the need for additional protection. Note that the requirements for functional safety ensure the reliability of the figures used in these analyses.



Arc Guard System™ – TVOC-2 installed in an ABB Low Voltage Switchgear

**FUNCTIONAL  
SAFETY**  
[SIL2]

# TVOC-2 Flexibility and Simplicity

## The TVOC-2 design makes your selection easy



TVOC-2 mounted on DIN-rail

### Flexibility

TVOC-2 is built as a flexible unit that fits into a wide range of switchgear and system sizes. Our goal is to provide you with a system you actually need.

The standard configuration includes 10 detectors to cover the need for a normal-sized switchgear. If your system grows or requires additional sensors, just extend the product to include up to 30 detectors by simply adding two extension modules on the main unit.

You can mount TVOC-2 on either a DIN-rail or directly on a panel wall. Furthermore, the HMI that shows you the system info and setup can be placed either on the product itself or on the door. If required, it can even be mounted on both.

To fit your application, we have added functionality to trip up to 3 breakers. If required, various selectivity can be applied depending on which sensor has triggered.



Human Machine Interface

### Simplicity

One of the most important aspects of designing the TVOC-2 has been to make it simple for our customers and end-users. This is important not only to make the system design and installation easy and simple, but also to minimize the risk of errors.

We have designed TVOC-2 as one single unit (even if you choose to extend it with additional sensors) and with a minimum number of parts. At installation, all in/outputs, sensors and settings are accessible from the front to give a good clear overview that minimizes the risk of mistake.

The HMI menu has a user-friendly interface that guides you through installation. Here you can, for example, check the trip log to see which sensor was triggered at what time. Even better, since it can be placed on the door, you can do this without opening the switchgear.

And as your system grows with your business, TVOC-2 grows with you. You have complete flexibility, from expanding the number of sensor modules to simply adding other components to the system – all done in minutes.

# Contact us

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