Arc Guard System™ – TVOC-2
Installation and maintenance guide

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Installation and maintenance guide, Arc Guard System, TVOC-2

This is the installation and maintenance guide for Arc Guard System, TVOC-2.

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Data subject to change without notice.

This document has been carefully checked. If the user neverthelass detects any errors, he or she is kindly asked to notify us as soon as possible.

The data contained in this manual is intended solely for the product description and is not to be deemed to be a statement of guaranteed properties. In the interests of our customers, we constantly seek to ensure that our products are developed to the latest technological standards.
As a result, there may be some differences between the Arc Monitor and the information in this manual.

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Chapter 1: About Arc Guard System

Introduction

Arc Guard System™ TVOC-2 quickly detects an arc and trips the incoming circuit-breaker. Using light as the main condition, Arc Guard System™ trips instantaneously. Thanks to this key functional advantage, it overrides all other protections and delays, which is crucial when reaction times need to be mesured in milliseconds. The Arc Guard System consists of the Arc Monitor and optical sensor used for detection of the arc. For some special applications, an additional current sensing unit can be added. This a measure to prevent unintentional tripping from strong light, for example, the sun.

The basic function acts in three phases:

- **Detection** is light passing through an optical sensor.
- **Recognition** is the Arc Monitor determining the intensity of light.
- **Action** is the trip contact closing.

Chapter 2: Safety

Introduction

This chapter describes the safety principles and procedures to be used when working with the Arc Guard System or the Arc Monitor.

It does not cover how to design for safety nor how to install safety related equipment.

The chapter first presents applicable safety standards.

Finally the chapter finishes with information about how to work in safety manner.

Applicable safety standards

Safety standards

This product was developed, designed and certified with regard to improved reliability and integrity by using safety principles and structures according to IEC 61508, SIL2.

The Arc Monitor has improved safety to fulfill the safety standards specified in the following directives:

Directive:	Description:
2006/95/EC	Low voltage equipment
2004/108/EC	Electromagnetic compatibility

Notice

This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

- Environment A relates to low-voltage non public or industrial networks, locations and installations including highly disturbing sources.

- Environment B relates to low-voltage public networks such as domestic, commercial and light industrial locations, installations. Highly disturbing sources such as arc welders are not covered by this environment.

To ensure safety and quality the Arc Monitor has been tested according to the following standards:

Standard:	Description:
IEC/61508 SIL 2	Functional safety of electrical programmable electronic safety-related systems
IEC/EN 60947-1	Low voltage switchgear and contractor - General
IEC/EN 60947-5-1	Low voltage switchgear and contractor - Control circuit devices and switching elements
IEC/EN 61010-1	Safety requirements for electrical equipment
IEC 61000-6-2 (2005)	Electromagnetic compatibility (EMC)- Immunity for industrial environments
IEC 61000-6-4 (2006)	Electromagnetic compatibility (EMC) - Emission standard for industrial environments
IEC 61326-1 (2005) IEC 61326-3-1	Electrical equipment for measurement and control Electrical equipment, control and laboratory use (EMC)
IEC TS 61000-6-5	Electromagnetic compatibility - immunity power stations and substation environments

Safety signs

General

This section specifies all dangers that may arise from performing the work detailed in the manual.

Warning!

The Warning symbol warns that an accident will or may occur if the instructions are not followed.

Warning!

Make sure that the supply voltage has been switched off before connecting!

Working with high voltage is potentially lethal. Persons subjected to high voltage may suffer cardiac arrest, burn injuries, or other severe injuries. To avoid these hazards, do not proceed working before removing the power to the Arc Guard System.

Arc Guard System and Arc Monitor are designed to protect people and installation equipment. Install your system components and Arc Monitor before supplying power.

DIP switches are used to activate Current Sensing Unit (CSU), auto reset and assigning trip contacts. Changing DIP switch can cause consequences with the Arc Guard System.

Make sure you understand the consequences of changing DIP switches.

See more information regarding DIP switches the chapter “DIP switches” on page - 39

Note!

The note symbol alerts to important facts and conditions.

Work in safety manner

Safety manner

Safe working methods must be used to prevent injuries. The safety equipment must not be disengaged, bypassed or in any other way modified so that the safety effect ceases.

Handling the Arc Monitor

The Arc Monitor may only be used for the purposes mentioned in this manual. The Arc Monitor was developed, manufactured, tested and documented in accordance with applicable safety standards. If you follow the instructions regarding safety and use as described in this manual, the product will, in the normal case, neither cause personal injury nor damage to machinery and equipment.

To avoid malfunctions or damage through improper handling, follow these instructions during transportation, installation and maintenance:

- Transport with care. Do not drop, throw, or give the Arc Monitor a strong shock. It can cause breakage or failure.
- Handle with care. Do not drop, throw, or give the Arc Monitor a strong shock. It can cause breakage or failure.
- The Arc Monitor is installed by authorized personnel only.
- This manual is a part of the Arc Monitor and should always be accessible to personnel working with this product.
- Read and understand the manual throughly before performing any installation or commissioning.
- Excessive amounts of dust on the optical detectors can lead to a degradation of detection. When regular inspections are made, it is recommended also to inspect the detectors. Clean with dry cloth if needed.
- CSU is constantly sending light to the CSU input at the Arc Monitor during normal conditions (for safety and reliability reasons). The light might decrease over time and should be checked every year by a manual diagnostic test. See more information in chapter Maintenance and in HMI functions.
- A log is kept that indicates if the light level had decreased below a certain level. If so, the CSU should be replaced within the next 6 months.
- The safety of the system will not be affected if the CSU is not replaced. However, when the light level becomes too low then the Arc Monitor will recognize this as a high current situation. And then the system functions as if there was a no current condition, that is, trip on light at optical detectors only.
- Configuration is done with DIP switches, settings of parameters and controlling of configuration is done in the HMI.

Storage

Storage in original package requires a temperature range of between, -25C° to +70C° (-13F to + 158F) and a humidity maximum 95%.

Limitation of liability

The safety information in this manual must not be considered as a guarantee from ABB that the equipment cannot cause accidents or injury, even if all the safety instructions have been observed.

Chapter 3: Arc Monitor functions

Introduction

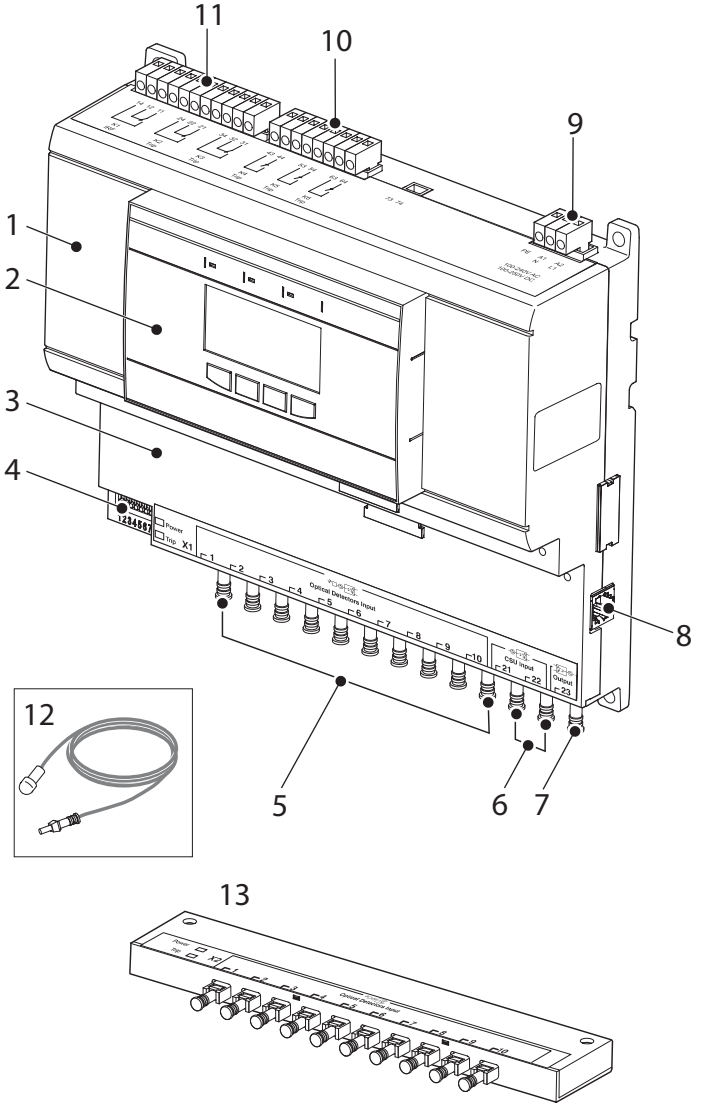
This chapter describes the functions available in the Arc Monitor.

The chapter is divided in two parts:

- Overview of the Arc Monitor.
- Functions of the Arc Monitor.

Overview of Arc Monitor

The Arc Monitor consists of:



1,	Arc Monitor	**8**	HMI external connection
2	Human Machine Interface, HMI	**9**	Power supply
3	Extension module plug in area	**10**	Solid state tripping contacts
4	DIP switch	**11**	Signal relays
5	Detector inputs	**12**	Detector (not included with the Arc Monitor)
6	Current Sensing Unit, CSU, inputs	**13**	Extension (option)
7	Current Sensing Unit, CSU, output		

1: Arc Monitor

The Arc Monitor is the heart in the system and handles signalling and detection. The HMI handles conditions, errors, and more. The system can be configured to trip selected breakers, depending on which sensor detects light. The DIP-switches that take care of this function also handle settings like auto-reset and Current Sensing Units. Energy is stored in the Arc Monitor for operation up to 0.2 s if the supply voltage fails. This is sufficient to close the tripping contacts even during a short time of power loss.

2: Human Machine Interface, HMI

The Human Machine Interface is used for all communication with the user and also to confirm any changes. It can be mounted both on the product and on the cabinet door. This is preferred to be able to get information about trips without opening the cabinet after a trip.The HMI has a non-erasable memory which holds trip logs and error logs even after power loss including a time stamp.

The Arc Monitor can handle a second HMI module.

4: DIP switch

The DIP switch is a physical switch on the Arc Monitors front.

DIP switches are used to activate the CSU, auto reset and assigning trip contacts.

5: Detector Inputs

Detector inputs are used to connect the detectors to the Arc Monitor.

6: Current Sensing Unit input

The Current Sensing Unit (CSU) is an accessory needed only in those few specific applications where strong light is expected on a regular basis. Current Sensing Units are connected with an optical fibre using light as signal for normal current. If the connection is removed by accident, the system ignores the CSU and will react only on an arc flash.

Note!

DIP Switch 1 or/and 2 must be configured if the CSU is in use.

To read more about the CSU configuration; See the chapter "One (1) CSU connected" on page - 44

7: Current Sensing Unit output

This output is used to pass the CSU signal forward to another Arc Monitor.

8: External HMI connection

HMI can be mounted separately or a second module can be connected (option).

Note!

Only use the included three meter (118 inch) cable for communication.

To learn more about the HMI functions; See the chapter "Human Machine Interface, functions" on page - 61.

10: Solid state tripping contacts

The three solid state trip contacts, K4, K5 and K6 are used to trip the circuit breakers.This will stop the energy from feeding the arc.

At normal condition:

- K4 Open, no arc detected
- K5 Open, no arc detected
- K6 Open, no arc detected

11: Signal Relays

The Internal Relay Fault (IRF), K1 indicates the system status. At normal condition the K1 is energized and signals that no diagnostics error is detected on the Arc Guard System.

The two trip signal relays, K2 and K3 are used to signal when a trip occurs. The relays can be used to activate an alarm or to pass the trip information to a supervised system.

The signal relays are called K2 and K3.

- K2 de-energized, no arc detected
- K3 de-energized, no arc detected

If the system is configured for manual reset, K2 and K3 are energized until the user is resets them on the Human Machine Interface (HMI) in the trip notification window. If the system is configured for auto reset, K2 and K3 are energized until the arc disappears.

12: Detectors

The detectors are used to detect the intensive light from an arc and transfer it to the Arc Guard System. The detectors are using fibre-optics and are guaranteed that they will react on the correct light intensity. For this reason, the cables are not to be modified in any way.

13: Extension

The extension module is used to expand the system from the original 10 sensors with additional sensors. One extension can hold up to 10 sensors. The Arc Monitor can hold up to 2 extensions making it possible to mount up to 30 detectors.The standard extension is used for detector up to 30 meter length.

Note!

A separate version of the extension module is available which is intended only for 60 meter detectors.

Chapter 4: Installation

Introduction

This chapter describes how to install the Arc Monitor and set up the system.

Also in this chapter are examples in placing detectors and general information concerning the products.

Installation of Arc Monitor is performed in steps. After finishing one step you proceed to the next one. The sequence is mandatory.

Note!

The Arc Monitor has 10 detector inputs. If your system needs more inputs then you will need to use additional extension modules.

Installation procedure

Installation procedure consists of the following five steps:

1. Getting started
2. Mounting
3. Connecting electrical connections
4. Configuration
5. Controlling

Prerequisites

Warning!

The reader should have knowledge and follow the applicable safety laws and standards as well as local safety instructions.

Tools required

To mount the Arc Monitor the following tools are required:

- Screwdriver, 2.5 x 0.6 mm (0.98 x 0.23 inch)
- Phillips screwdriver 4.3/2
- Drill 5 mm (0.196 inch), in case of wall mounting.

Mounting and connecting the Arc Monitor to the system

This is a summarize of the complete procedure in mounting and connecting the Arc Monitor.

Warning!

Make sure that supply voltage is switched off before mounting and connecting the Arc Monitor!

To mount and connect the Arc Monitor do the following steps:

1. Mount the Arc Monitor
2. Mount and connect external HMI (option). See page 26
3. Connect extensions X2, X3 (option). See page 33
4. Place and mount the optical detectors. This installation guide contains examples for placing the detectors and information how to mount. See page 27
5. Connect optical detectors to the Arc Monitor and extensions (option).
6. Connect optical cables (option) from current sensing units, CSU to lower right hand side of base unit (X1:21-22). See page 34
7. Connect optical cable (option) to output for additional Arc Monitor (X1:23)
8. Connect electrical connections. See page 36
9. Configure the system by setting the DIP switches. See page 39
10. Supply the system with power.
11. Go through Start-Up sequence in Human Machine Interface, HMI. See page 47
12. Controlling the detectors and the system. See page 51

Getting started

Introduction

This chapter describes instructions how to receive and check the Arc Monitor. Do the following steps:

Receiving and checking

1. Turn the package with the correct side up.
2. Remove the transport casing.
3. Visually inspect the Arc Monitor.
4. Check that all items are included, according to the delivery document.

List of contents

Check the contents in this package as follow:

- Arc Monitor
- Connection cable 3 meter (118 inch) for external Human Machine Interface, HMI
- Plastic nut for mounting external HMI
- Sealing for mounting external HMI
- Label for covering HMI contact on Arc Monitor, (only if external HMI is used)
- User manual on CD
- Quick installation guide

Note!

This package is a basic start kit. If you need more according for your system needs then contact your local supplier.

Intermediate storage

Until the Arc Monitor is mounted it should be stored in its original package.

Mounting

Introduction

This chapter describes the procedure to mount and connect the Arc Monitor.

The procedure is divided into following components:

- Arc Monitor
- Human Machine Interface, HMI
- Detectors
- Extension
- Current Sensing Unit, CSU

Placing Arc Monitor

The Arc Monitor can be mounted anywhere in the switchgear, for example in the breaker cubicle or in a separate control cabinet.

Mounting Arc Monitor

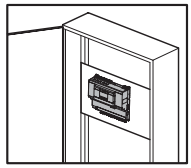
This section describes how to mount the Arc Monitor at its location.

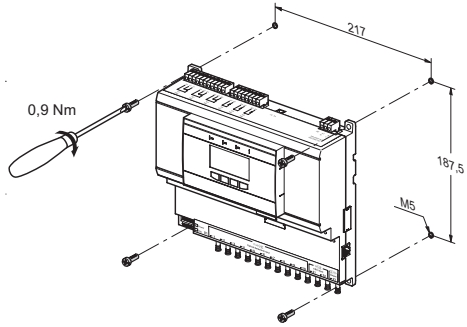
The Arc Monitor can be mounted on:

- A wall
- DIN Rail

Mounting on wall

Follow the steps below to mount the Arc Monitor on the wall:

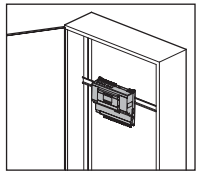


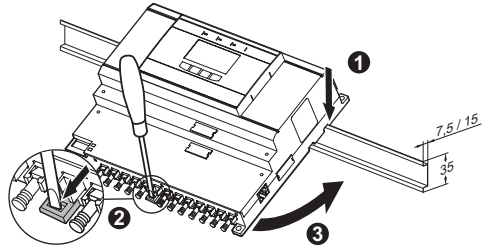


1. Predrill holes in wall to fit screws 5M. See figure above for dimensions.
2. Place the Arc Monitor on the wall.
3. Screw in each corner of the monitor.
4. Use a torque wrench and torque the screws to 0,9 Nm.

Mounting on a DIN rail

Follow this procedure to mount the Arc Monitor on a DIN rail:





1. Hook the Arc Monitor to the DIN rail.
2. Pull the barrier down, between detector 5 and 6.
3. Snap the Arc Monitor on to the rail then release the barrier.

Mounting the HMI

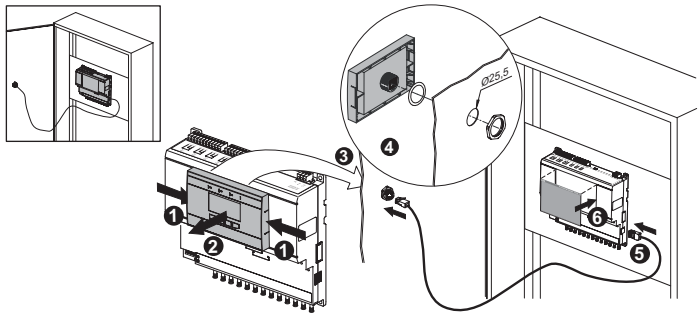
The HMI can be mounted separately from the Arc Monitor or an extra HMI can be added to the Arc Monitor and mounted sparately.

Mounting the HMI on door

Follow this procedure to mount the HMI module, separately on the door.

Warning!

Make sure that supply voltage is switched off!



Before mounting:

1. drill a 25 mm (1 inch) hole through the door.

Note!

It is important to use the cable which is included in the package!

To mount the HMI on a door do the following steps:

2. Remove the HMI module from the Arc Monitor by pressing on both sides on HMI and at the same time,
3. Pull straight out from the Arc Monitor.
4. Add the sealing on the HMI.
   - Mount the HMI on front door.
   - Insert the back side of module into the door hole.
   - Tighten the plastic nut by hand. Make sure the HMI is fixed to the door.
5. Connect the communication cable between the HMI module back side and Arc Monitor right hand side.
6. Attach the label to cover HMI module hole on the Arc Monitor front if needed.

Mounting the Optical detector

This section is about optical detectors and the mounting is described using examples:

- Where to positioning the detectors.
- How the detectors are mounted on busbars system.

This section also describes how to connect the detectors to the Arc Monitor.

Decide where to position the detectors on the basis of knowledge of your own system. The main issue is to cover all components that might suffer from an arc.

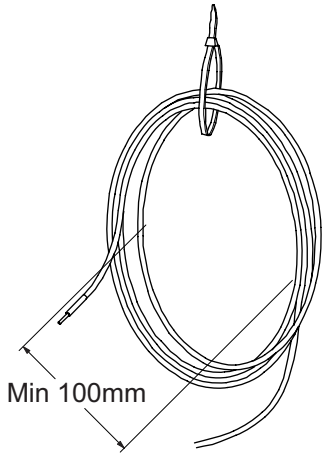
Warning!

Make sure that supply voltage is switched off!

Note!

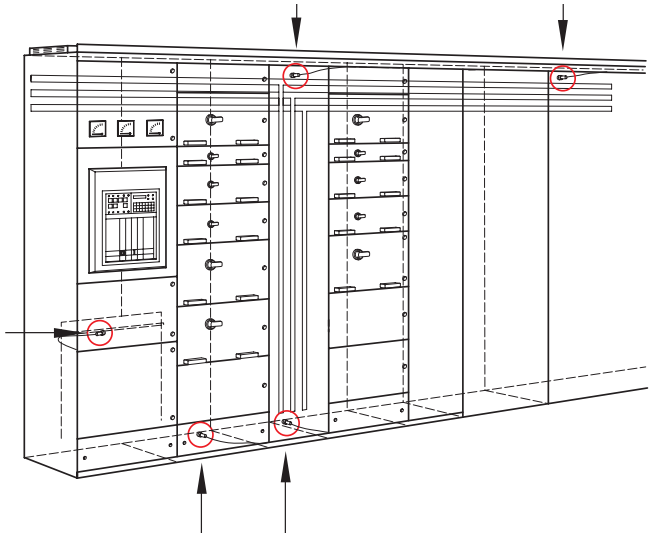
Excess plastic fibre cable should be wound up and kept as a ring with a diameter of at least 100 mm (4 inches).

The plastic fibre cables are not to be bent in a loop with a radius of less than 10 mm (0.4 inches) occasionally and 45 mm (1.8 inches) for a long period of time.

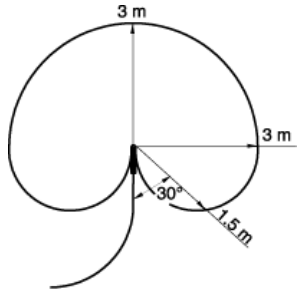


Example 1, positioning Optical detector in a switch gear

The most common positioning of the detector involves the horizontal and vertical bus bar system and the breaker cubicle. If possible, supervise each cubicle. Avoid placing the detector so that it sees normal light from the breaker. See the example below about where to positioning the detectors.



The sensor can detect arcs within a three meter (118 inch) distance.



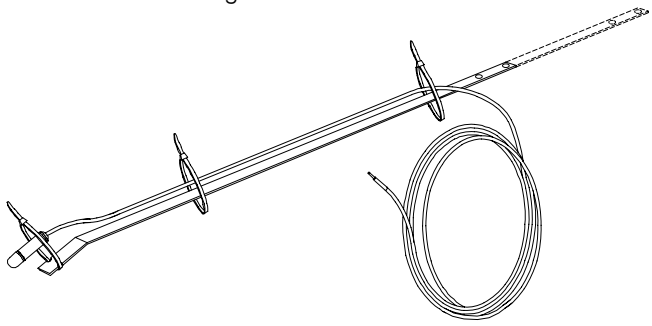
Example 2, Mounting Optical detector in an apertures cubicle

A single detector is able to monitor the busbars in both the apparatus cubicle and the respective cable.

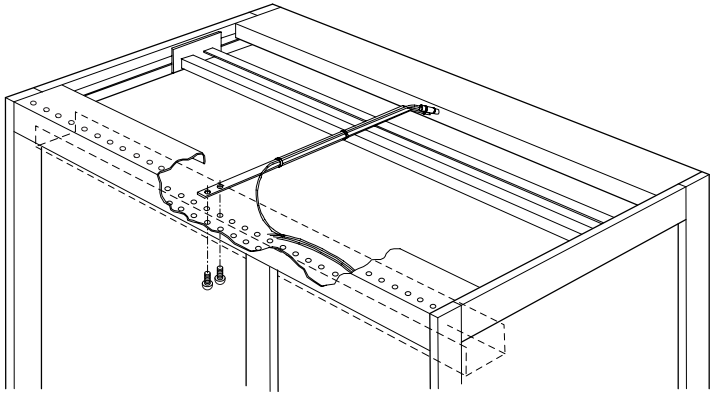
This is an example about how to mount optical detectors with the mounting kit.

Do the following steps to mount the detector on a busbar.

1. Attach the detector to the mounting bracket (1SFA663 006 R100x) before it is attached to the cubicle.
2. The bend of mounting bracket should point downwards.
3. Attach the detector to the upper side of the bracket. See figure below.
4. Use a 2.5 mm (0.1 inch) wide cable strap.
5. Place the strap on the rear groove of the detector head and around the notches in the mounting bracket.



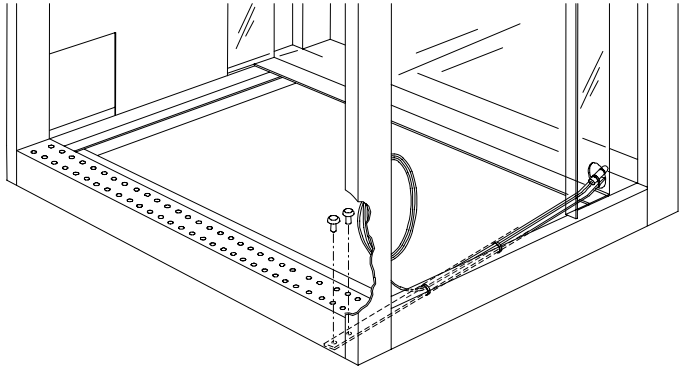
6. Attach the detector bracket onto the cubicle frame. See the figure below.
7. The hole in the mounting bracket is for M5 thread rolling screws or 5.5 self tapping screws.



Example 3, Mounting in a circuit breaker cubicle

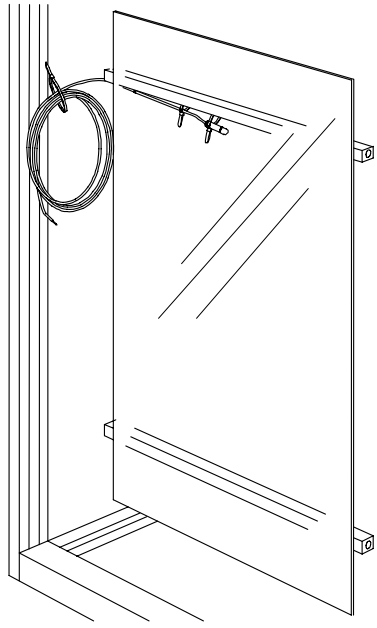
In a circuit-breaker cubicle there is a risk of detecting breaking arcs unintentionally, if the detector is placed above the busbars. In such a cubicle it is better to place the detector at the bottom, see the figure below.

- Use the same mounting bracket as for top mounting but the bend is turned upwards and the detector placed on the upper side.
- Drill a hole 20 mm (0.79 inches) in front of the busbars, where the detector can be located.



If many cables are connected to the terminals on the lower side of the circuit-breaker, the arc monitoring should have with an additional detector located just behind the front protective sheet, see the figure below.

- Attach the detector directly to the bottom side of the bracket of the protective cover with a cable strap.

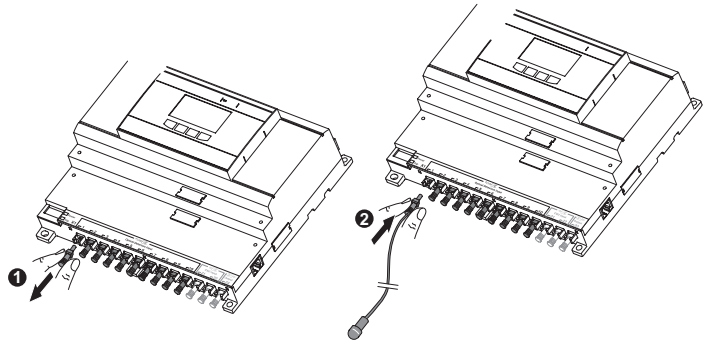


Connecting optical detectors

Follow this steps below to connect the optical detectors to the Arc Monitor.

Warning!

Make sure that supply voltage is switched off!



1. Remove the protection plug.

Note!

Only remove protection plug from connection to use. Protection plugs are needed to protect the detector inputs from dust and light.

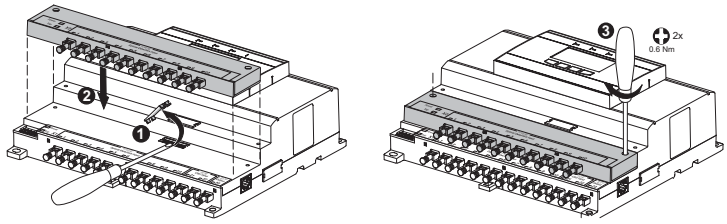
2. Connect optical detectors to lower side of arc monitor. Detector inputs are X1:1-10 (for Extension 1, X2:1-10 and Extension 2, X3:1-10)

Connecting extension module (option)

Follow this steps to connect extension module to the Arc Monitor:

Warning!

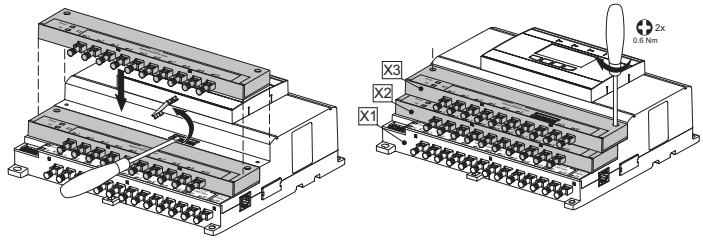
Make sure that supply voltage is switched off!



1. Remove the protection part.
2. Mount the extension module into the contact of the Arc Monitor.
3. Secure the extension module using screwdriver torque 0.6 NM.

To connect second extension module:

1. Remove the protection part from the second extension module.
2. Mount the extension module into the contact of the Arc Monitor.
3. Secure the extension module using screwdriver torque 0.6 NM.
4. Cover the X2 text with label X3 which comes with the addtional extension module.



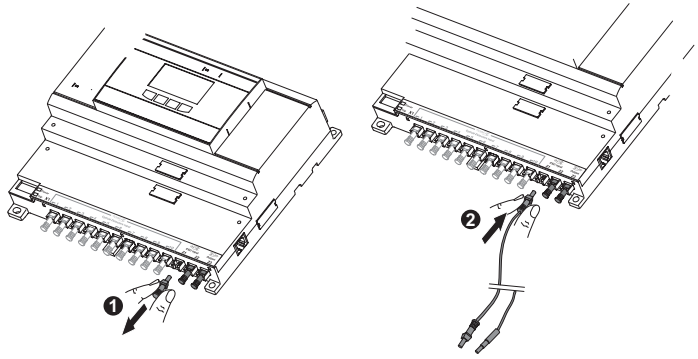
Connecting CSU cable

Follow this steps to connect CSU cable to the Arc Monitor:

Warning!

Make sure that supply voltage is switched off!

Follow this steps to connect CSU cable:



1. Remove the protection plug.
2. Connect current sensing cable to lower side right side of Arc Monitor by pressing.

Current sensing units (CSU) inputs are X1: 21, 22.

Current sensing units (CSU) outputs are X1: 23.

Note!

Before the system is ready to use, a DIP switch configurations are needed.

For more information, see the chapter “Configurations” on page - 39.

Electrical connections

Introduction

This chapter describes how to connect the electrical connections to the Arc Monitor and to the Arc Guard System.

Warning!

Make sure that supply voltage is switched off!

Connecting HMI

To read about connecting HMI; See the chapter “Mounting the HMI on door” on page - 26.

Connecting optical detector

To read about connecting optical detector ; See the chapter “Connecting optical detectors” on page - 32.

Connecting extension module (option)

To read about connecting extension modules; See the chapter “Connecting extension module (option)” on page - 33.

Connecting Current Sensing Unit (option)

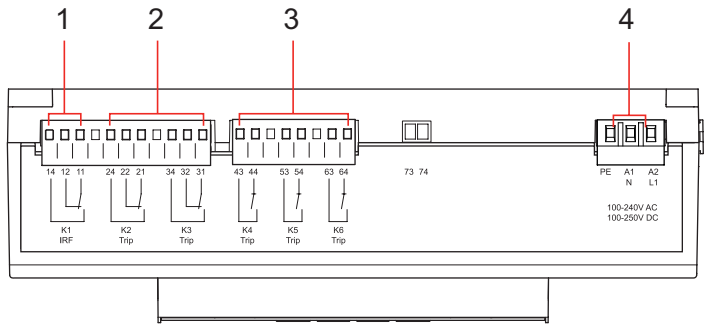
To read about connecting Current Sensing Unit ; See the chapter “Connecting CSU cable” on page - 34.

Electrical connections

Electrical connections are:

1. Internal Relay Fault, (IRF, K1)
2 Trip Signal relays, (K2, K3)
3 Trip contact, (K4, K5, K6)
4 Power supply

They are situated on top of the Arc Monitor. See the figure below.



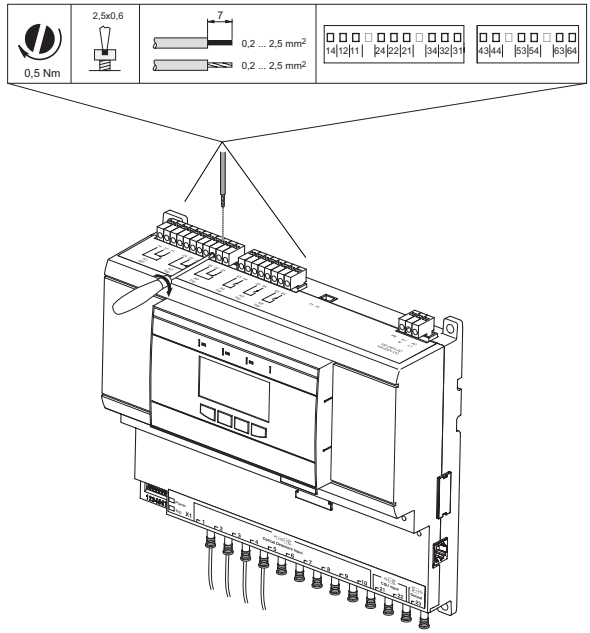
Connecting the Arc Monitor

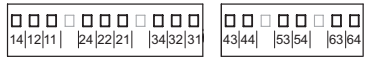
Warning!

Make sure that supply voltage has been switched off!

First connect the trip signal relays and trip contacts. Follow the steps below:

1. Connect wires for Internal Relay Fault, IRF, trip signal relays (K2, K3) and trip contacts (K4, K5, K6).
2. Use a torque of 0.5 NM
3. Use a screwdriver 2.5 x 0.6 mm (0.98 x 0.23 inches)
4. Cabel area 0.2 - 2.5 mm² (0.078 x 0.98 inches²).



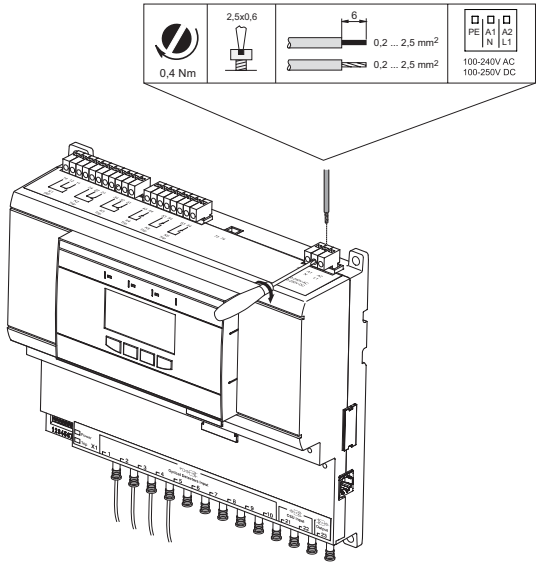


1. Connect cable for IRF, K1 to terminal number, 14,12,11.
2. Connect cable for K2 to terminal number 24, 22, 21.
3. Connect cable for K3 to terminal number 34, 32, 31.
4. Connect cable for K4 to terminal number 43, 44.
5. Connect cable for K5 to terminal number 53, 54.
6. Connect cable for K6 to terminal number 63, 64.

Connect Power Supply.

To connect the power supply do the following steps:

1. Connect wires for power supply, use a torque of 0.4 NM.
2. Use screwdriver 2.5 x 0.6 mm (0.98 x 0.23 inches).
3. Cabel area 0.2 - 2.5 mm^2 (0.078 x 0.98 $inch^2$).
4. Connect the cable for the power supply. 100-240V AC/ 100-250V DC.



Configurations

Introduction

Arc Monitor can be configured to trip selected breakers depending on which optical detector or CSU is connected. This configuration is done with a DIP switch.

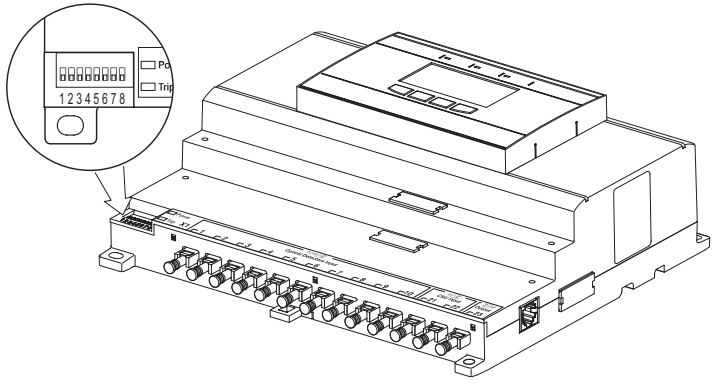
Warning!

Make sure that supply voltage is switched off!

DIP switches

The DIP switches are located on the front left hand on the Arc Monitor. There are 8 DIP switches. Only DIP switches 1, 2, 3, 4 and 6 are activated.

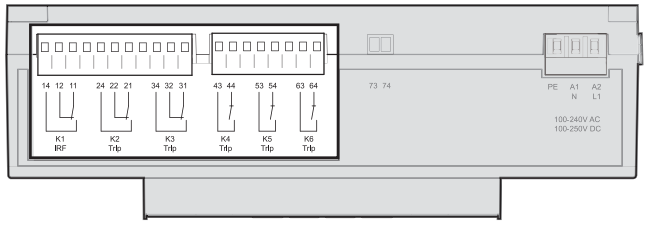
As default all DIP switches are set to position 0.



Breaker trip

The trip contacts are located on top of the Arc Monitor.

Se figure below.



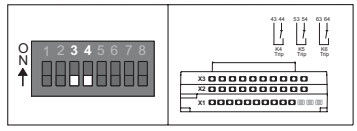
DIP switches 3 and 4 configure trip contacts, K4, K5 and K6.

All detectors , X1, X2 and X3, operate the trip signal relays K2 and K3.

Adjust the DIP switches to achive the desired breaker configuration K4, K5, K6.

DIP switches 3 and 4 to position 0

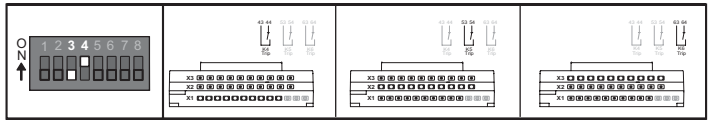
DIP switches 3 and 4 in position 0 is the default state (factory settings).



- Any detector on X1, X2 or X3 operates trip contacts, K4, K5 and K6.

DIP switch 3 in position 0, DIP switch 4 to posti-otion ON

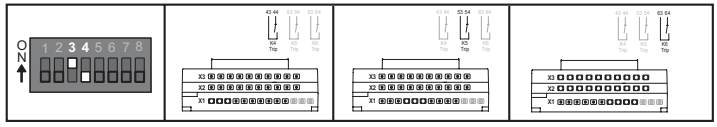
Set DIP switch 3 to position 0 and DIP switch 4 to position ON.



- Detectors X1 operate trip contact K4.
- Detectors X2 operate trip contact K5.
- Detectors X3 operate trip contact K6.

DIP switch 3 to position ON and DIP switch 4 to position 0.

Set DIP switch 3 to position ON and DIP switch 4 to position 0.

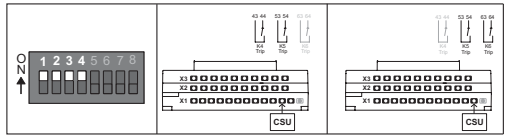


- Detectors X1: 1-3 operate trip contact K4.
- Detectors X1: 4-6 operate trip contact K5.
- Detectors X1: 7-10 and all detectors on X2 and X3, operate trip contact K6.

DIP switches 1, 2, 3 and 4 to position ON

Set DIP switches 1, 2, 3 and 4 to position ON. In this configuration two CSU are connected.

See more information the chapter “Two (2) CSU connected” on page - 44

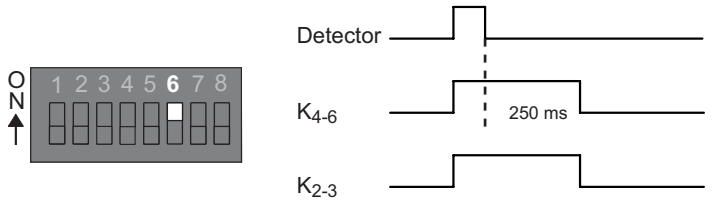


- Any detector with combination of over current condition in CSU 21, operates trip contacts K4 and K5.
- Any detector with combination of over current condition in CSU 22, operates trip contacts K5 and K6.

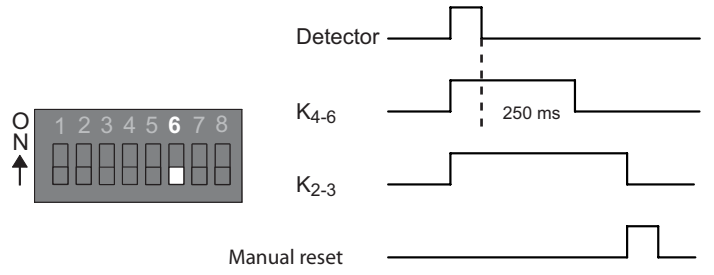
Manual/Auto reset configuration

The signal relays K2 and K3 can be configurated to react as trip contacts (auto reset) or to be de-energized by manual reset on the HMI.

Configuration Auto reset, set DIP switch 6 to position ON.

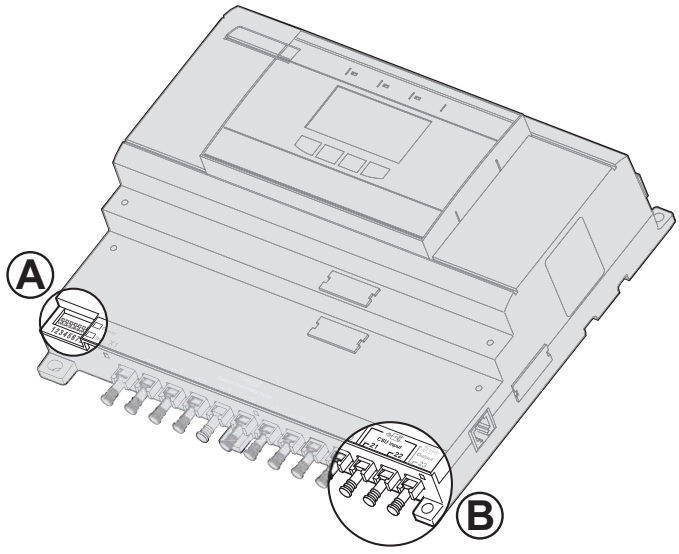


Configuration Manual reset, set DIP switch 6 to position 0.



Current Sensing Unit(option)

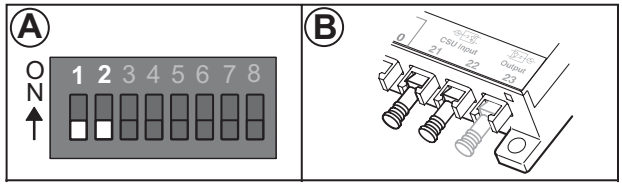
DIP switch (A) 1 and 2 configure the CSU input (B) 21, 22 to the Arc Monitor.



No CSU connected

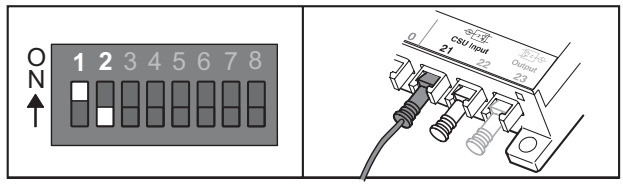
When there is no CSU connected to the Arc Monitor then set the DIP switch 1 and 2 to position 0.

DIP switch 1 and 2 in position 0 is the default state (factory settings).



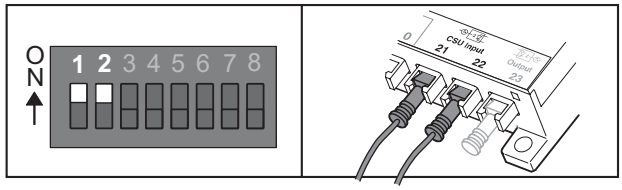
One (1) CSU connected

If there is one (1) CSU connected to the CSU input X1, 21 then set the DIP switch 1 to position ON.



Two (2) CSU connected

If there are two (2) CSUs connected to the CSU input 21 and 22 then set the DIP switch 1 and 2 to position ON.



Note!

The CSU cable is connected before configuration is made.

For more information how to connect CSU cables, see the chapter “Connecting CSU cable” on page - 34.

Power on to the Arc Monitor

Warning!

Working with high voltage is potentially lethal.

Before switching the power supply on follow the steps below:

1. Check your installation.
2. Check that electrical connections are orderly connected.
3. Check that the configuration is set for your system.
4. Make sure the supply voltage is suitable (100-240V AC/DC 50/60Hz).
5. Make sure you do not leave any working tools in the switching gear.

When the Arc Monitor is connected to supply voltage, then it is on.

Checking power on Arc Monitor

When the Arc Monitor is on check the following :

- Green LEDs "Power" on left side of detector inputs is lit.
- Green LED "Power" on HMI is lit.
- HMI is showing text.

Add/Remove module from the Arc Monitor or changing configuration

Warning!

Make sure that supply voltage is switched off!

To add/remove a module to the system do the steps below:

1. Remove power to the Arc Monitor.
2. Physically add/remove a module to the Arc Monitor.
3. Ensure DIP Switches are set correctly.
4. Power on.
5. Follow Start-Up sequence.

The Arc Monitor requires configuration of the system and its modules to work.

The Human Machine Interface, HMI automatically guide the user through a Start-Up Sequence.

Note!

For more information concerning Start-Up Sequence, See the chapter “Settings” on page - 47.

Settings

Introduction

This chapter describes the five mandatory steps to succeed in setting the system. All settings are done in the Human Machine Interface, HMI. Settings are made only with the power on.

Start-Up Sequence

Installation of the Arc Monitor requires configuration of the system and its modules to work. This start-up is mandatory. The same start-up occurs when operating the Arc Monitor for the first time and when adding/removing modules for the Arc Monitor. The Human Machine Interface (HMI) automatically go through the different configuration steps. To do the Start-Up sequence follow the steps below:

1. Set language of the system menu
2. Set time and date
3. Confirm connected modules
4. Check DIP Switches
5. Final confirmation

Note!

The system will not require the Start-Up sequence in the event of a power loss.

Step 1: Setting menu language

This is the first step to make the system work after installing the Arc Monitor. Use this procedure to choose the language of the system menu during start-up.

In the Start-Up menu do the following:

1. Mark the language to use and press OK.
2. Confirm by pressing YES.

Available languages

Languages available in the system are:

- english (us/uk)

Step 2: Setting time

This is the second step to make the system work after installing the Arc Monitor. Use this procedure to set the time and date in the system.

In window, 3.4 Set Time do the following:

1. Scroll to correct hour, press OK.
2. Scroll to correct minutes, press OK.
3. Scroll to correct day, press OK.
4. Scroll to correct month, press OK.
5. Scroll to correct year, press OK.

Step 3: Confirming connected modules

This is the third step to make the system work after installing the Arc Monitor. Use this procedure to confirm connected modules during start up.

In window, 3.1.1 View connected do the following:

1. Check the list of modules and if all modules are included, press Yes.
2. If all modules not are included, press No. See next step 3, below.

Warning!

Make sure that supply voltage is switched off!

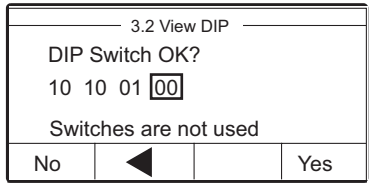
3. Remove the power and check the connections to the modules.
4. Power on.
5. Start-Up sequence will start again with step 1, page 47, Setting menu language.

Step 4: Checking DIP Switches

This is the fourth step to make the system work after installing the Arc Monitor. Use this procedure to check the DIP switches.

In window, 3.2 View DIP Switch do the steps below:

1. Check the DIP Switch and scroll with right arrow to next switch.
2. Check through all DIP switches menus.
3. The last switch menu, 3.2 View DIP display,



4. DIP Switch OK? If all DIP Switches are OK, press Yes.
5. If some of the DIP switches are not OK, Press NO. See next step 6, below.

Warning!

Make sure that supply voltage is switched off!

6. Remove power and check the DIP switch.
7. Power on.
8. Start-Up sequence will start again with step 1, page 47, Setting menu language.

Step 5: Final confirmation

This is the fifth step to make the system work after installing the Arc monitor. Use this procedure to confirm that all Start-Up settings are done.

In the Start-up menu do the steps below:

1. Press OK. All settings done. The system is now ready to run accordingly and will return to Start window.
2. Check that the green LEDs "Power" on left side of extension modules on Arc Monitor is lit.
3. Check that the Green LED "Power" on HMI is lit.
4. Check that HMI is showing text.

Note!

After completed Start-Up Sequence at the first time installation the complete sytem needs checking.

This includes checking that the detectors and HMI works as intended.

For more information how to check the detectors and HMI, See the chapter "Controlling" on page - 51.

Controlling

Introduction

Note!

Do the test after installation and before the Arc Monitor is used!

This test is done for each installed detector and the Arc Monitor.The test will check that the detectors react to a simulated arc and the HMI will display a notification window showing which detector and which circuit breaker is tripped. The breaker that is connected to the Arc Monitor should trip.

Use a camera flash to simulate an arc. At normally sensitivity the Arc Monitor will react to the flash.

Note!

Flash specifications to simulate an arc, 16 (m) guide no. 21 DIN/100 ASA.

Testing the installation

Repeat the following steps to check all installed detectors separately:

1. Simulate an arc by using a camera flash.
2. Set the camera flash to approximately 0.5 ms.
3. Place the camera flash at a distance between 1.5 -2 meters (60-80 inches) from the detector.
4. Make sure no object is standing in the way.
5. Point the camera flash towards the detector.
6. Press the flash test button.

Do the following steps to check the Arc Monitor:

1. Check the HMI display.
2. If the detector reacts correctly and causes a trip then it should show on the HMI display as a notification window.
3. The notification window shows, Trip has Occurred, which detector, which trip contact, at what time and date.
4. The breaker that is connected to the Arc Monitor should trip, depending on the configuration.
5. At the notification window, If manual reset is configured, press Reset. If auto reset is configured, press Menu

Chapter 5: Maintenance

Introduction

The Arc Guard System requires maintenance once every year.

The yearly maintenance includes checking detectors, The Arc Monitor and the light from CSU (option).

Maintenance

To check the detectors and the Arc Monitor repeat the following steps:

1. Simulate an arc by using a camera flash.
2. Set the camera flash to approximately 0.5 ms.
3. Place the camera flash at a distance between 1.5 -2 meters (60-80 inches) from the detector.
4. Make sure no object is standing in the way.
5. Point the camera flash towards the detector.
6. Press the flash test button.

Do the following steps to check the Arc Monitor:

1. Check the HMI display.
2. If the detector reacts correctly and causes a trip then it should show on the HMI display as a notification window.
3. The notification window shows, Trip has Occurred, which detector, which trip contact, at what time and date.
4. The breaker that is connected to the Arc Monitor should trip, depending on the configuration.
5. At the notification window, If manual reset is configured, press Reset. If auto reset is configured, press Menu.

Note!

In order to prevent a shut-down of the whole switchgear during the maintenance process, replace the breakers which are connected to the Arc Monitor with test breakers. This can be done by replacing the terminal to K4, K5, K6 with the test breakers.

Do remember to replace the test breakers with terminal breaker K4, K5, K6 after testing!

The maintenance procedure to check the detectors and Arc Monitor is the same as for a Start-Up of the system for the first time.

Note!

See in chapter Installation, “Controlling” on page - 51

To check the light from Current Sensing Unit, CSU.

Perform a manual diagnostic via the HMI to check if the light from CSU is degenerating. This will show as a notification window in HMI with an Error code.

Note!

See “2.2 Perform Diagnostics” on page - 68, about how to perform a manual diagnostics.

See “List of error codes” on page - 57, about error codes.

Chapter 6: Trouble shooting

Introduction

This chapter describes how to handle errors in the system and what measures to take. That includes the handling error log, list of error codes and how to contact ABB.

Requirements

Trouble shooting should be done by authorized personnel who are familiar with the Arc Guard System, the setup as well as the environment where it is located.

Troubleshooting

Trouble shooting should take into consideration:

- History, including events just before an arc
- Situation, circumstances when an arc occurred
- Environment, temperature, vibrations, power supply, electrical/magnetic disturbances
- How an arc is indicated and nature of its occurrence
- The different Arc Guard System modules and all connections

Handling Error log

This section presents diagnostics and describes how to handle the error log. It includes view logs and error codes.

Diagnostics

The Arc Guard Systems is often operated without any personnel present. The error logging function is a way to store information about past events for future reference in order to facilitate trouble shooting. Performing diagnostics is a check on the system status and its error events.

Error event

An error event indicates an error in the system. Example of error events is:

- Overcurrent for a long time period.
- Optical detectors that detect light for a long time period.
- DIP switch is changed physically while Arc Monitor is powered.

- HMI display has lost contact and can not communicate with Arc Monitor.

Error Log

During diagnostics the error events are logged in the Error Log. In the Error Log the error events are represented by error messages. Each message includes a code that gives information about the specific occurred event and the time stamp it occurred.

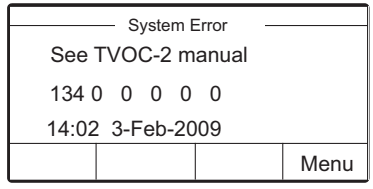
The log is a circular buffer. It stores nine error events. The oldest will be over-written.

Error indication

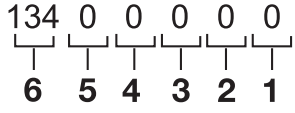
When a system error occurs the HMI displays a notification window.

The window displays are:

- System Error
- See TVOC-2 manual
- Error code
- Time and Date



The error codes are written in 6 columns. Every column can show a number between 0 -255



See List of error codes,“List of error codes” on page - 57

Attending errors

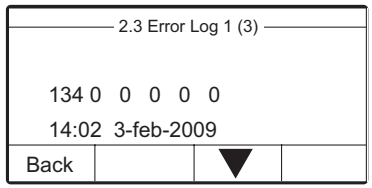
The error will exist until it is attended to and proper measures are taken.

Then, when the Arc Monitor runs a diagnostics the error will disappear.

Viewing error log

To view the Error Log do the steps below:

1. From the Start window, press Menu.
2. In the Menu, select 2. Diagnostics and press OK.
3. Select 2.3 Error Log and press OK.
4. The Error Log window displays Error code, Time, and Date.



5. Scroll forward/backward in the Error Log.
6. Press Back to return to window 2. Diagnostics.
7. Press Back to return to Start window.

List of error codes

The error codes and description of the codes are discussed in the following list:

Note!

This is not a complete error code list!

This list only shows some of the most simple error codes in which the user may be able to take actions on their own.

Error code	Description	Recommended actions
0 0 0 2 0 0	DIP switch settings are changed during run-time.	1) Set settings back as it was before, after a while the System Error pop-up window will disappear and the IRF will be energized again.

Error code	Description	Recommended actions
0 72 0 0 0 0	CSU21: 1)Optional cable is damaged. 2)Overcurrent longer than 10s. 3) Detector input damage at Arc Monitor. 4) LED at CSU is damaged.	Check that optional cable from CSU is not damaged or crushed. Check current level setting if setting is too low, then CSU is indicating overcurrent too long time period. Increase level and see that you get light from CSU, if no light from CSU then LED at CSU is damaged. If none of this then detector input at Arc Monitor is corrupt.
0 80 0 0 0 0	CSU22: 1)Optional cable is damaged 2)Overcurrent longer than 10s 3) Detector input damage at Arc Monitor 4) CSU LED damage	See Error code 0 8 0 0 0 0.
2 0 0 0 0 0	CSU21: Degenerated LED at CSU. The CSU LED degeneration will only be tested by a manual Diagnostic Test (2.2 Perform Diagnostics) made from HMI. CSU LED degeneration will not be tested by periodically diagnostics.	CSU should be replaced due to degenerated LED at CSU.
4 0 0 0 0 0	CSU22: Degenerated LED at CSU. Diagnostic test will only be triggered by a manual Diagnostic Test made from HMI.	
8 0 0 0 0 0	Lost contact with HMI.	
32 0 0 0 0 0	Long light detection.	A light detector has detected light during more than 10s. Can the light detector have been damaged or is there constantly light leaking into the cabinet.

Error code	Description	Recommended actions
0 1 0 0 0 0	X3 present, is not the correct module. Extension module can have been switched. Wrong ID of Extension module, X2 and X3 can have been switched.	Check if the Extension module can have switched places.
0 2 0 0 0 0	No contact with X3, module can have dropped off.	Check the Extension module.
0 0 2 0 0 0	X2 present, not correct module. Extension modules can be switched.	Check if the Extension module can have switched places.
0 0 4 0 0 0	No contact with X2, module can have dropped off.	Check the extension module, X2

ABB support

Introduction

If you have problem with your Arc Guard System, contact ABB for support.

Contact information

ABB AB

Cewe Control

SE-721 61 VÄSTERÅS, Sweden

Telephone +46 21 32 07 00

Telefax +46 21 12 60 00

www. abb.com/lowvoltage

Providing information

To get faster support when contacting ABB support it is beneficial to be prepared to answer the following questions:

- Description of how the error occured.
- Which Arc Guard System modules are used, setup and configuration.
- Readings on LEDs and display.
- Output signals.
- What is the general situation.
- Application, location, ambient conditions.
- What has happened, situation before error, any event that happened in connection with error.
- Have you done trouble shooting? What did you check?
- Which are your findings?

Note!

It is also important to know the serial number.

See label on Arc Monitor.

To get the Arc Monitors Revision Information, see chapter HMI functions, “2 Diagnostics” on page - 65

Chapter 7: Human Machine Interface, functions

Introduction

The Human Machine Interface, HMI is used for all communication with the user and also to confirm any changes.

If power is lost (max 48 hours) the Time and Date will be restored. After very long power interruptions the Time and Date are set to a default value and needed to be set by the user.

This chapter consists of the following sections:

- Overview HMI
- HMI functions
- HMI Menus

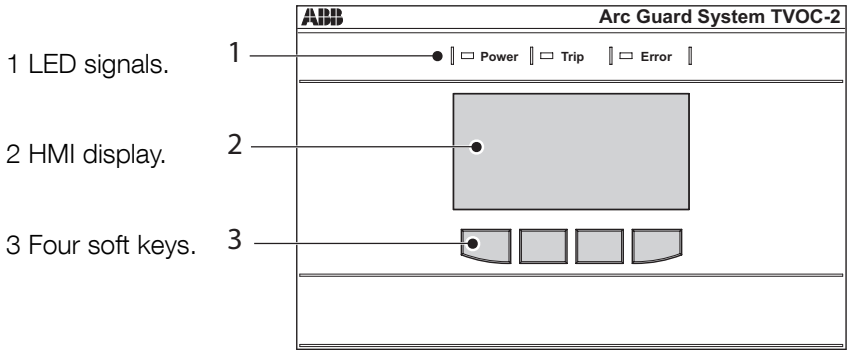
Prerequisites

Note!

The reader should have knowledge and act according to applicable safety laws and standards as well as local safety instructions.

Overview HMI module

The HMI module consists of:



1: LED signals

The three LED signals are used for visual signalling and they are:

- Power LED

- Green light in LED indicates that power is on.

- No light in LED signals no power to HMI.

- Trip LED

- Red light indicates Trip.

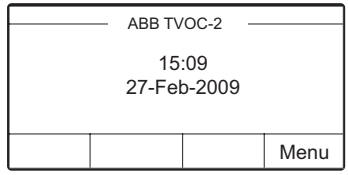
- Error LED

- No light in LED indicates that no error is detected in the Arc Guard system.

- Red light in LED signals that error is detected in the system and the Internal Relay Fault (IRF), K1 is not energized.

2: HMI Display

HMI display Start window, Name of Arc Guard System, Time and Date.



The bottom of display shows the tasks assigned to the four soft keys.

3: Soft keys

The four soft keys are used to navigate in the menu. Each key is assigned a task, displayed in the window.

HMI menu structure

The menu is structured in five head categories. Each category is divided into subcategories. Some subcategories have sub-sub categories. All categories are numbered accordingly to the structure.

Menu and languages

The Arc Monitor includes a menu shown in the display. You choose language for the menu. During start-up you are prompted to choose language, but at any time you can change the language.

Languages available in the system menu are:

- English (us/uk)

HMI start menu

The Start menu display following head categories.

1 Trip Log
2 Diagnostics
3 Configuration
4 Language
5 Set Time and Date

1 Trip Log

When the optical detectors detect arcs, the Arc Monitor reacts. The system will trip the trip contacts according to the configuration on the DIP switches.

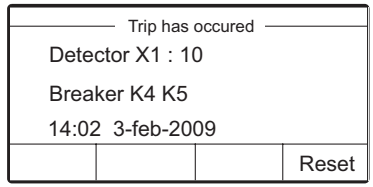
Arc Monitor is designed to save information about an arc in the Trip Log.

The Trip Log can store seven trips in a circular buffer, the oldest will be over-written.

This section describes how to handle the Trip Log.

Trip notification window

When a trip occurs a notification window will be displayed on the display.



The notification window display the following:

- Which detector reacted.
- Which trip contact tripped.
- Time and Date the arc occurred.

To reset the Trip Signal Relays, K2 and K3 do the following steps:

1 In the notification window press Reset.
2 The notification window disappears and the system returns to Start window.
3 The trip is stored in the Trip Log.

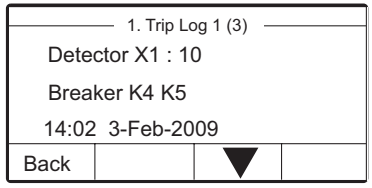
Note!

If Auto reset of K2 and K3 is configured at the DIP switches, the notification window will appear at a trip but there is no need to reset. Then press Menu to return to Start window.

Checking the trip log

To check the Trip Log from the Start Menu do the following steps:

1 Select 1. Trip Log
2 Press OK
3 The Trip Log window displays:
   - Trip Log 1 (3), one of three in the trip log list
   - Which detector(s) detects an arc
   - Which breaker tripped
   - Time and Date of event



Three detectors can be listed in the same window.

4 Press Back to return to Start window.
5 Scroll down with key arrow to see earlier trip events.

2 Diagnostics

The Arc Guard System does automatic periodical control of the system.

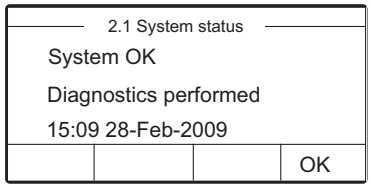
Diagnostics menu consists of three subcategories:

- 2.1 System Status
- 2.2 Perform Diagnostics
- 2.3 Error Log

2.1 System Status

The system status displays the status of the system after a diagnos is made. The window displays the following:

- System OK
- Diagnostics performed
- Time and Date



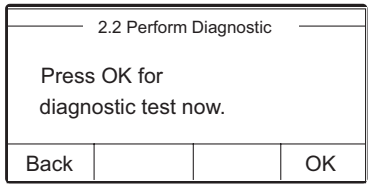
2.2 Perform Diagnostics

In addition to the systems automatic diagnostic, it is the possible to do a manual one. To perform a manual diagnostic do the following steps:

1 From Start window, press Menu

2 Select 2. Diagnostics and press OK

3 In the 2. Diagnostics menu, select 2.2 Perform Diagnostics

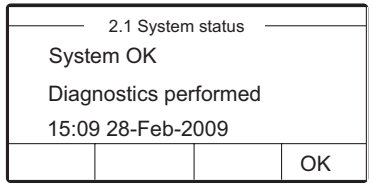


4 Press OK for diagnostic test now

5 The window displays Performing diagnostics tests...

If the system is OK, the window will display:

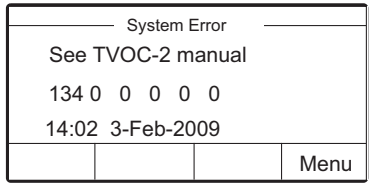
- 2.1 System status.
- System OK.
- Diagnostics performed.
- Time and Date.



6 Press OK to return to Start window.

If the system is not OK, a notification window appears displaying following:

- System Error
- See TVOC-2 manual.
- Error code.
- Time and Date.



1 Press Menu to return to Start window.

2 The error is stored in the Error Log.

Note!

See chapter Troubleshooting, “Error Log” on page - 56 for information regarding Error Log.

2.3 Error Log

In the Error Log are the nine latest system error events stored, the oldest will be overwritten.

Note!

See chapter Troubleshooting“Error Log” on page - 56 for more information about system errors.

3 Configuration

Configuration consists of three subcategories as follows:

3.1 View Modules.

3.2 View DIP switches.

3.3 Revision Information.

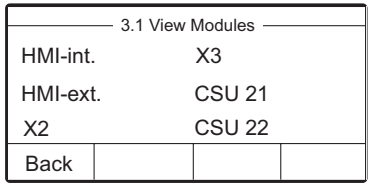
3.1 View Modules

View Modules displays which modules are connected to the Arc Monitor. To see the View Modules do the following steps:

1 From Start window, press Menu.

2 Select 3. Configuration, press OK.

3 Select 3.1 View Modules, press OK.

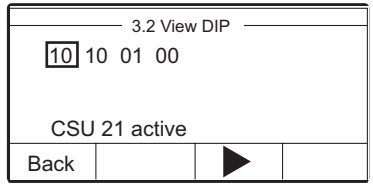


This figure shows the window, 3.1 View Modules, with the modules connected to the Arc Monitor.

3.2 View DIP switches

3.2 View DIP switches display information how the configuration are made to the DIP switches. To see the View DIP switches do the following steps:

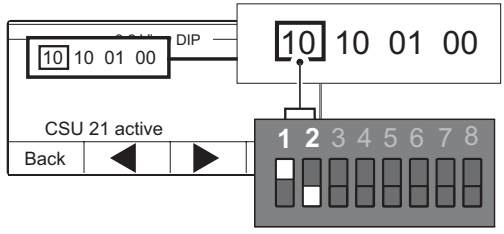
1 From Start window, press Menu.
2 Select 3. Configuration, press OK.
3 Select 3.2 View DIP Switch, press OK.



The 3.2 View DIP menu displays:

- 3.2 View DIP.
- DIP switches settings.
- Status line.

The figure below is an example which describes how to read the DIP switches settings in HMI.



The eight numbers reflect the 8 DIP switches.

The two first numbers 1 0, in line are the CSU connections on the DIP switch.

Number 1 in number 10 shows that the setting is ON.

This example shows that the CSU connection 21 is connected. CSU 22 is not in use.

4 Press arrow to scroll forward/backward, see all DIP switches.

5 Press Back to return to 3. Configuration.
6 Press Back to return to Start window.

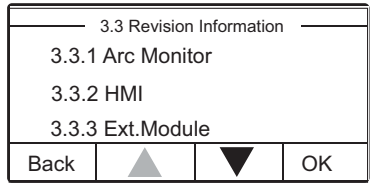
3.3 Revision information

Revision Information displays connected modules to the Arc Guard System and latest revision of each module. This includes, software, hardware, and ID number.

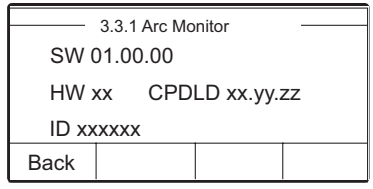
This information is required when contacting ABB for support.

To view revision information about the module follow the steps below:

1 From Start window, press Menu.
2 Select 3. Configuration, press OK.
3 Select 3.3 Revision information, press OK.
4 The 3.3 Revision information displays connected modules.



5 To view Revision Information.
6 Select chosen module, press OK.
7 The 3.3.1 the module, display:
- 3.3.1 Arc Monitor (in this case)
- The modules software
- The modules hardware
- The modules ID number



4 Language

If you understand the current menu language, follow the steps to set the language of the system menu:

In the Main menu:

1 Select 4 Language, press OK.

2 Select the language to use, press OK.

Confirm with Yes.

Note!

If you do not understand the menu language, use factory reset.

5 Set Time and Date

Use this procedure to set the time and date in the system.

In the Set Time menu do the steps below:

1 Scroll to correct hour, press OK.

2 Scroll to correct minutes, press OK.

3 Scroll to correct day, press OK.

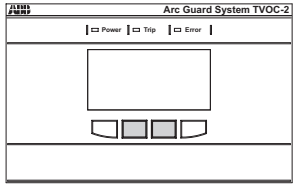
4 Scroll to correct month, press OK.

5 Scroll to correct year, press OK to return to Start window.

Factory reset

Making the factory reset will force the HMI to start the Start-Up sequence.

Press and hold the 2 soft keys in the middle for more then 10 s.



This will force the HMI to start the Start-Up sequence.

Chapter 8: Technical data

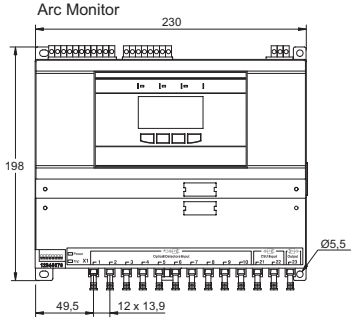
Common technical data				
Overvoltage category	III			
pollution degreee	3			
Power supply				
Rated operation voltage Ue	100 -250 V DC 100-240 V AC 50-60 HZ			
Rared insulation voltage Ui	250 V with reinforced insulation			
Rated impulse withstand voltage Uimp	4 kV			
Output contacts				
Contact rated voltage with reinforced insulation between different contacts				
Terminals	Description	Ui	Ue	Uimp
11, 12, 13	IRF signal	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
21, 22, 23	Signal relay	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
31, 32, 34	Signal relay	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
43, 44	Trip contact	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
53, 54	Trip contact	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
63, 64	Trip contact	250 V	250 V AC 50-60 HZ, 250 V DC	4 kV
73, 74	50 V	50 V DC	0.5 kV	
Environmental specifications				
Permissible ambient temperature in operation	- 25 to + 55 °C			
Permissible ambient temperature in transportation and storage	- 25 to + 70°C			
Humidity	Maximum 95%			
Altitude	2000 meter above sea level			
Degree of protection	IP20 Arc Monitor IP54 HMI front side			
Safety parameters for application according to IEC61508				
Life time	10 years			
PFD	3.49×10^{-03}			

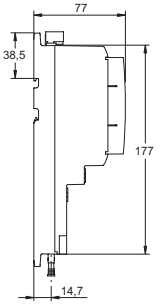
Optical inputs and outputs Optical detectors	10 inputs (without extensions)		
Current signal from CSU	2 inputs X21, X22 (optical)		
Forward current signal to another Arc Monitor	1 output: X1.23 (optical)		
Trip contacts (K4, K5, K6) Solid state contacts	3 NO solid state type IGBT		
Rated voltage 250 V AC/DC	250 V AC/DC		
Make and carry for 0.2 s	30 A		
Make and carry for 1 s 0.15% duty ration	10 A		
Breaking capacity	250 V	1.5 A	AC - 15
	250 V	1 A	DC - 13
	110 V	3 A	DC - 13
	48 V	3A	DC - 13
	Reinforced insulation between separate contacts.		
	Voltage drop 5 V 30 A, 3 V 3 A, 2 V 10 mA Off state current < 1 mA at 250 V Min. recommended load current 10 mA		
Signal relay (K2, K3) Manual or auto resetable	2 CO gold-plated contacts		
Rated voltage	250 V AC/DC		
Continous carry I_{th}	5 A		
Make and carry for 0,2 s	30 A		
Make and carry for 3 s 10% duty ratio	15 A		
Breaking capacity	250 V	3 A	AC - 15
	250 V	0,3 A	DC - 13
	110 V	0,6 A	DC - 13
	48 V	2 A	DC - 13
	Reinforced insulation between separate contacts		
	I_{th} = 5 A Min switching load: 1 mA at 5 V DC with contacts not used for switching current > 0.5 A if inductive/capacitive load before.		
Internal Relay Fault (IRF, K1) Self supervision alarm relay	1 CO gold-plated contact		
Rated voltage	250 V AC/DC		
Continious carry I_{th}	5 A		
Make and carry for 3 s	8 A		
Breaking capacity	250 V	1,5 A	AC - 15
	250 V	0,15 A	DC - 13
	110 V	0,3 A	DC - 13
	48 V	0,5 A	DC - 13
	Reinforced insulation between separate contacts.		
	I_{th} = 5 A Min switching load: 1 mA at 5 V DC with contacts not used for switching current > 0.5 A if inductive/capacitive load before.		

Settings and indications Connections for HMI on Arc Monitor	 1 output RJ45 male at front side 1 output RJ14 female at the right side)
Display on HMI	52 x 26 mm graphic LCD with LED backlight
Keyboard on HMI	Membrane buttons, 4 soft key
LED signal on HMI	Power, Trip, Error
LED signal on Arc Monitor and extension module	Power, Trip
configuration switches	8 - pole DIP switch on Arc Monitor front
Settings (HMI)	Time and display language
Configuration (DIP switches)	Manual or auto reset of K2 and K3 Use of CSU or not trip configuration
Display information	Trip log, connected modules, actual configuration self diagnostic test result and error log
Power supply Rated supply voltage,U_s	 100-240 V AC 50-60 Hz 100-250 V DC
U_s variation	AC - 20% - +10% DC - 25% - + 30%
Rated insulation voltage, U_s	250 V with reinforced insulation
Rated impulse withstand voltage U_s	4 kV
Main MCB/fuse	Max. 10 A char. C/fuse 10 A gG
Power cunsumption	5 W
Reaction time From light detection to trip contacts (K4, K5 ,K6)	 Approx. 1ms (depends on light intensity)
From light detection to trip signal relays (K2, K3)	< 10 ms
Current condition from input to output	<0,4 ms
Start-up time Trip possible	 < 15 ms from power on
Detector Maximum length	 30 m with AM and extension - E1 60 m with extension - E3
Service temperature range	- 25 to + 70 °C continous - 25 to + 85 °C short-time
Smallest permissible bending radius	45 mm after installation 10 mm on handling
Acceptable backlight intensity light without tripping	3000 Lux
Optical cable for connecting CSU to an Arc Monitor Maximum length	 30 m

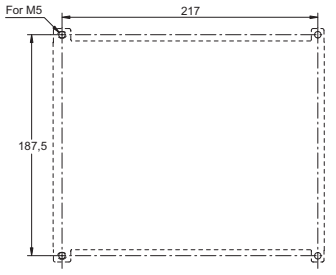
Dimensions

Arc Monitor

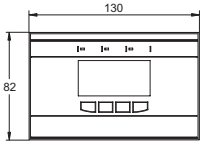


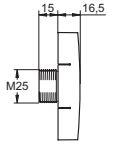


Drilling plan

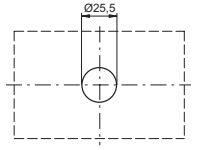


HMI

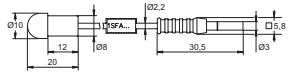




Drilling plan

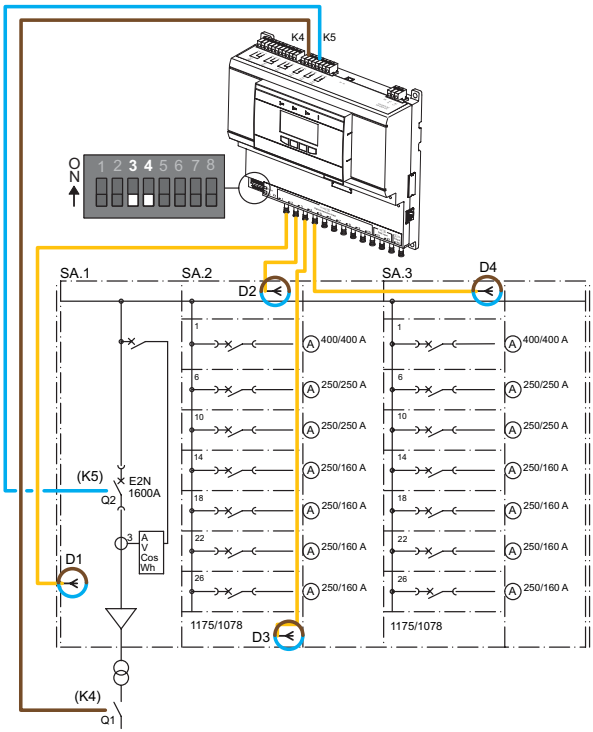


Detector with optical cable



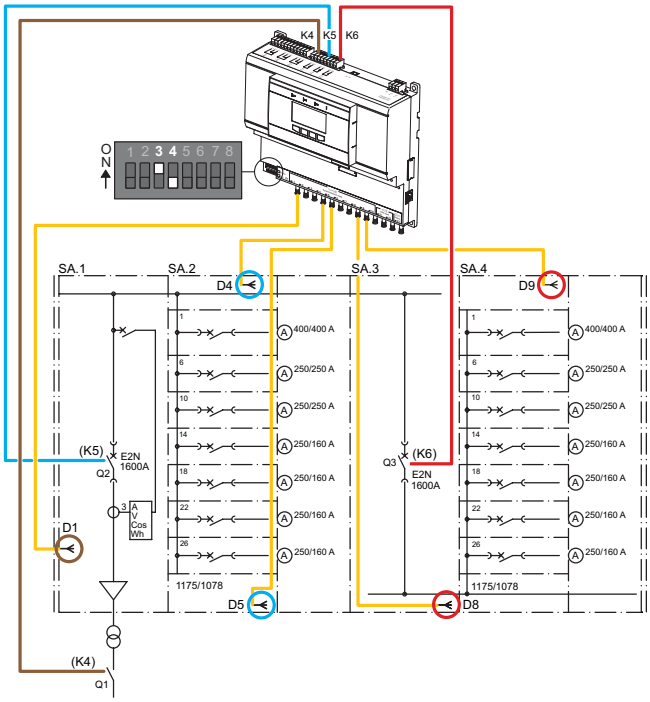
Applications, Diagrams

Example 1: Arc Guard System™ configured to trip all contacts in case of an arc.



SA...SA3	Switchgear
K4, K5	Solid state tripping contacts
Q1, Q2, Q3	Circuit-breaker
D1...D4	Detectors

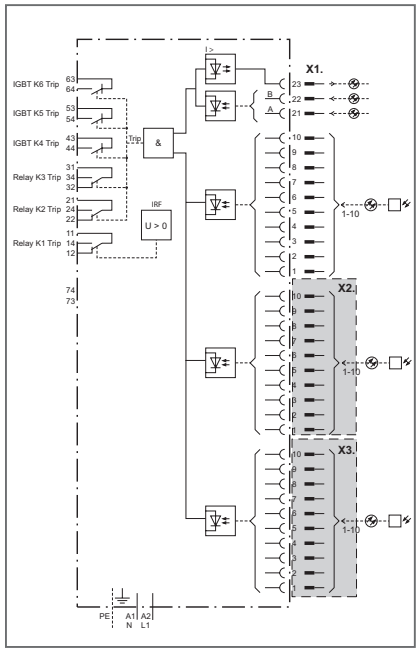
Example 2: Arc Guard system™ configuredto trip different trip contacts depending on where the arc occurs.



SA...SA4	Switchgear
K4, K5, K6	Solid state tripping contacts
Q1, Q2	Circuit breaker
Q3	Bus couplar
D1...D9	Detectors

Circuit diagrams

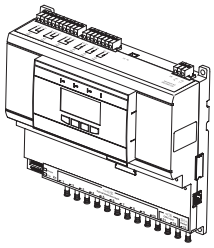
Arc Monitor



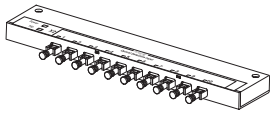
Terminals	
X1 1-10	Detector input
X2 1-10	Extra extension module detector input (option)
X3 1-10	Extra extension module detector input (option)
A1, A2	Power supply
PE	Power supply
43, 44	Solid-state trip contact
53, 54	Solid-state trip contact
63, 64	Solid-state trip contact
11,12, 13	Internal relay fault, IRF
21,22, 24	signal relays
31, 32, 34	signal relays

Chapter 9: Ordering list

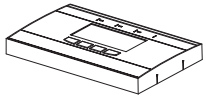
Arc Monitor



Extension



HMI



Detector

Description		Type	Order code
Arc Monitor Including one HMI and door mounting accessories		TVOC-2-240	1SFA664001R1001
Extension 10 optical inputs		TVOC- 2-E1	1SFA664002R1001
Extension 10 optical inputs for 60 meter detector cable		TVOC- 2- E3	1SFA664002R3001
HMI (Human Machine Interface) additional		TVOC-2-H1	1SFA664002R1005
Detectors			
Cable length	1 m	TVOC-2-DP1	1SFA664003R1010
Cable length	2 m	TVOC-2-DP2	1SFA664003R1020
Cable length	4 m	TVOC-2-DP4	1SFA664003R1040
Cable length	6 m	TVOC-2-DP6	1SFA664003R1060
Cable length	8 m	TVOC-2-DP8	1SFA664003R1080
Cable length	10 m	TVOC-2-DP10	1SFA664003R1100
Cable length	15 m	TVOC-2-DP15	1SFA664003R1150
Cable length	20 m	TVOC-2-DP20	1SFA664003R1200
Cable length	25 m	TVOC-2-DP25	1SFA664003R1250
Cable length	30 m	TVOC-2-DP30	1SFA664003R1300
Cable length	60 m	TVOC-2-DP60	1SFA664003R3600 '(3)
Remarks: (3) Only to be used with TVOC-2-E3			

Optical cable

Optical cable between TVOC-2 Arc Monitor and current sensing unit			
Cable length	0.5 m	TVOC-1TO2-OP05	1SFA664004R2005
Cable length	1 m	TVOC-1TO2-OP1	1SFA664004R2010
Cable length	2 m	TVOC-1TO2-OP2	1SFA664004R2020
Cable length	4 m	TVOC-1TO2-OP4	1SFA664004R2040
Cable length	6 m	TVOC-1TO2-OP6	1SFA664004R2060
Cable length	8 m	TVOC-1TO2-OP8	1SFA664004R2080
Cable length	10 m	TVOC-1TO2-OP10	1SFA664004R2100
Cable length	15 m	TVOC-1TO2-OP15	1SFA664004R2150
Cable length	20 m	TVOC-1TO2-OP20	1SFA664004R2200
Cable length	25 m	TVOC-1TO2-OP25	1SFA664004R2250
Cable length	30 m	TVOC-1TO2-OP30	1SFA664004R2300

Optical cable

Optical cable between two TVOC-2 Arc Monitors (transferring CSU signal)			
Cable length	0.5 m	TVOC-2-OP05	1SFA664004R1005
Cable length	1 m	TVOC-2-OP1	1SFA664004R1010
Cable length	2 m	TVOC-2-OP2	1SFA664004R1020
Cable length	4 m	TVOC-2-OP4	1SFA664004R1040
Cable length	6 m	TVOC-2-OP6	1SFA664004R1060
Cable length	8 m	TVOC-2-OP8	1SFA664004R1080
Cable length	10 m	TVOC-2-OP10	1SFA664004R1100
Cable length	15 m	TVOC-2-OP15	1SFA664004R1150
Cable length	20 m	TVOC-2-OP20	1SFA664004R1200
Cable length	25 m	TVOC-2-OP25	1SFA664004R1250
Cable length	30 m	TVOC-2-OP30	1SFA664004R1300

Index

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1SXU170170M0201, September 2013

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