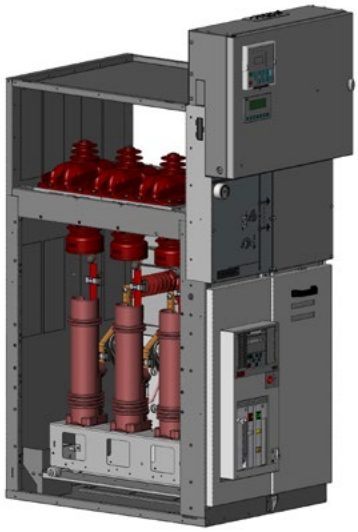
DISTRIBUTION SOLUTIONS

UniSec Digital

Operation and maintenance manual



Index

Safety

NOTE
This manual is an addition to the operation and maintenance manual for UniSec panels 1VFM200005. Personnel must be trained and have at least a basic knowledge of working with diagnostic and monitoring devices

Warnings provided in the interest of safety

- Strictly comply with the instructions provided in this manual.
- The apparatus must only be installed indoors, in conditions suitable for electrical equipment.
- Make sure that the installation, use and maintenance operations are performed by qualified personnel only.
- Fully comply with the applicable rules of law (IEC or local), the connection conditions required by the local utility companies and the pertinent occupational safety provisions.
- All work on the apparatus must be performed in accordance with the corresponding instructions in the manual.
- Consult the relevant manual for instructions on how to use the circuit-breaker.
- Consult the relevant manual for instructions on how to use the concentrator.

Qualified personnel

All installation, commissioning, operation and maintenance work must be performed by qualified personnel with adequate knowledge of the apparatus. During maintenance work, strictly comply with the regulations in force in the country in which the apparatus is installed.
Maintenance operations must be performed to the highest standards of workmanship by trained personnel who are fully familiar with the characteristics of the apparatus, in compliance with all the pertinent IEC safety regulations, the regulations provided for by other technical bodies and further instructions of primary importance. You are strongly advised to engage the services of ABB assistance personnel for maintenance and repair work.

Information of crucial importance

Pay particular attention to information in the manual highlighted by the following symbol:

This symbol is followed by four different indications signalling the sort of injuries or damage which could occur due to failure to comply with the instructions, including those concerning safety precautions

- **DANGER - highlights the more serious and immediate risks able to cause severe personal injuries and death**
- **WARNING - indicates risks or unsafe actions which could cause severe personal injuries or death.**
- **CAUTION - indicates risks or unsafe actions which could cause less severe personal injuries or material damage**
- **NOTE - highlights important procedures or requirements which, in the case of non compliance, could result in material damage**

WARNING
Make sure that the specified electrical data are not exceeded in the conditions is which the apparatus is used. Keep the manuals in an accessible place where they can be consulted by all the personnel involved in the apparatus installation, use and maintenance operations. The utility provider's personnel are responsible for all issues concerning occupational safety and correct use of the apparatus

WARNING
Always comply with the instructions in the manual and the regulations governing good engineering practice (GEP)! Dangerous voltages can cause severe injuries or death. Disconnect the supply source, then earth all live parts before performing any work on the apparatus. Comply with the safety regulations in force in the place of installation

NOTE
This manual is an addition to the operation and maintenance manual for UniSec panels 1VFM200005. Personnel must be trained and have at least a basic knowledge of working with monitoring and diagnostic devices.

Contacts

Please contact our area assistance center for any queries concerning this manual.
Consult the back cover of this manual for details about the contact people.

Introduction

General aspects

UniSec is an air-insulated switchgear for indoor use, designed for the secondary distribution of medium voltage. UniSec switchgear is the result of on-going innovation and the desire to meet the requirements of a constantly evolving market.
This new series of switchgears offers a broad range of technical solutions built to last over time.
Safety, reliability, ease of use, simple installation and environmental sustainability are the key features that guided the development of this switchgear.
UniSec assemblies are created by positioning standard units side by side in a coordinated way.
The switchgear is manufactured and tested in the production facility
.

Operation and maintenance manual

This manual contains instructions on how to replace the sensors in the UniSec Digital version and the main indications concerning the user interface.

Regulations and specifications

CEI EN/IEC standards	Title
IEC EN 62271-200	High voltage switchgear and controlgear Part 200: Metal-enclosed factory-built assemblies for rated voltages above 1 kV and up to and including 52 kV
IEC EN 62271-1	High voltage switchgear and controlgear Part 1: Common specifications
IEC EN 62271-202	High voltage switchgear and controlgear Part 202: Factory-built high/low voltage substations
IEC EN 61869-2	Instrument transformers Part 2: Additional requirements for current transformers
IEC EN 61869-3	Instrument transformers Part 3: Additional requirements for inductive voltage transformers
IEC EN 62271-100	High voltage switchgear and controlgear Part 100: Alternating current circuit-breakers
IEC EN 62271-102	High voltage switchgear and controlgear Part 102: Alternating current dirconnectors and earthing switches
IEC EN 62271-105	High voltage switchgear and controlgear Part 105: Switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV
IEC EN 62271-103	High voltage switchgear and controlgear Part 103: Switches and switch-disconnectors for rated voltages above 1 kV up to and including 52 kV
CEI EN 60529	Protection classes of enclosures (IP code)
CEI EN 62271-206	High voltage switchgear and controlgear Part 206: Voltage presence indicating systems for rated voltages above 1 kV up to and including 52 kV
CEI EN 60071-2	Insulation co-ordination Part 2: Application guide
CEI EN 62271-106	High voltage switchgear and controlgear Part 106: Alternating current contactors, contactor-based controllers and motor-starters
IEC TS 62271-210:2013	High voltage switchgear and controlgear- Part 210: Seismic qualification for gas-insulated switchgear assemblies for rated voltages above 1 kV up to and including 52 kV
IEC TS 62271-304:2008	High voltage switchgear and controlgear- Part 304: Design classes for indoor enclosed switchgear and controlgear for rated voltages above 1 kV up to and including 52 kV to be used in severe climatic conditions

Table 1. Norme IEC

Introduction

Operating conditions

Normal operating conditions
The switchgear is designed for indoor use in normal operating conditions, as indicated in the respective IEC regulations (see table 1). Differences with respect to the normal operating conditions specified in the IEC standards (IEC 62271-1) must be defined separately with the manufacturer.

Ambient temperature	**° C**
Maximum value	+ 40
Max. mean value in 24 hours	+ 35
Min. mean value in 24 hours	- 5 (1)
Recommended minimum value	+ 5
Altitude above sea level	**m**
Maximum value	1000
Humidity conditions	**%**
Relative humidity mean value (24 hours)	≤ 95
Relative humidity mean value (1 month)	≤ 90
Pollution	
The ambient air must not be excessively polluted by dust, smoke, corrosive and/or inflammable gases, vapours or salinity	

(1) Consult ABB for –25°C operating temperatures and –40°C storage temperatures

Table 2. Operating conditions

Special operating conditions
The effects of the reduction in the dielectric strength of the insulating air must be considered at altitudes exceeding 1000 m (consult standard IEC 61271-1).IEC 61271-1 standards). Environmental temperature rises must be compensated when the busbars, branches and components are designed, otherwise the current carrying capacity will be limited.

DANGER

Condensation could form if the switchgear is in service where the humidity level is high and/or there are considerable temperature variations. However, the formation of condensation must be an exception to the rule in the normal operating conditions of indoor switchgear. Adequate preventive measures must be taken along with the manufacturer (e.g. installation of electric heaters) to prevent condensation from forming and, consequently, corrosion or other adverse effects. The operating system of the heaters depends on the relative design, while the specifications must be taken from the order documents

1. Technical data

1.1 Electrical Specifications

Rated voltage Ur	kV	12	17.5	24
Impulse withstand voltage Up	kV			
Common value		75	95	125
Between open contacts		85	110	145
Test voltage at power-frequency Ud	kV			
Common value		28	38	50
Between open contacts		32	45	60
Rated frequency	Hz	50/60	50/60	50/60
Rated current Ir	A			
Busbar		630/800/1250 (1) (4)	630/800/1250 (1)	630/1250 (1) (3)
Feeder		630/800/1250 (1) (4)	630/800/1250 (1)	630/1250 (1) (3)
Admissible rated short-time withstand current	kA			
Main circuit		16/20 (1)/25 (2)	16/20 (1)/25 (2)	16/20 (1)
Earthing circuit		16/20 (1)/25 (2)	16/20 (1)/25 (2)	16/20 (1)
Rated short-circuit duration	s	2/3	3	3
Rated peak current	kA	40/50/63	40/50/63	40 (3) /50 (1)
Protection degree (IP code)				
For enclosure		IP3X	IP3X	IP3X
For segregations		IP2X	IP2X	IP2X
For operating mechanism		IP3X	IP3X	IP3X
Mechanical strength of switch-disconnector	Cycles			
Closed/open		5000	5000	5000
Open/earthed		1000	1000	1000
SF_6 gas in switch-disconnector	Bar			
Rated filling pressure		1,4	1,4	1,4
Minimum operating pressure		1,3	1,3	1,3
Quantity of SF_6 gas	Kg	0,25	0,25	0,25

(1) Consult ABB for 21 kA/52.5 kAp
(2) For LSC2B classified units
(3) For Hysec 16 kA (1s) 40 kAp
(4) 25 kA 2s for LSC2A classified units

NOTE
Consult the manuals of the respective apparatuses for the specifications of any additional equipment, e.g. relays and circuit-breakers

1.2 Internal arc withstand classification

The internal arc withstand value is defined as follows:

Current	Accessible sides	Arcing time
12,5 kA	AFL	1 s
16 kA	AF	1 s
16 kA	AFLR	1 s
21 kA	AFLR	1 s
25 kA (1) (2)	AFLR	1 s

(1) Only for units with withdrawable circuit-breakers up to 17.5 kV
(2) Only LSC2A 750 mm H2000
Table 3. Internal arc withstand classification

NOTE
UniSec switchgear must be installed indoors, in conditions suitable for electrical equipment.
This means that access must be restricted to authorized personnel only

2. General information about UniSec Digital

The UniSec Digital monitoring system can be configured with the following components:

- Concentrator MDC4-M
- Wireless temperature sensors
- Environmental sensor (optional)
- Gas pressure sensor (optional)

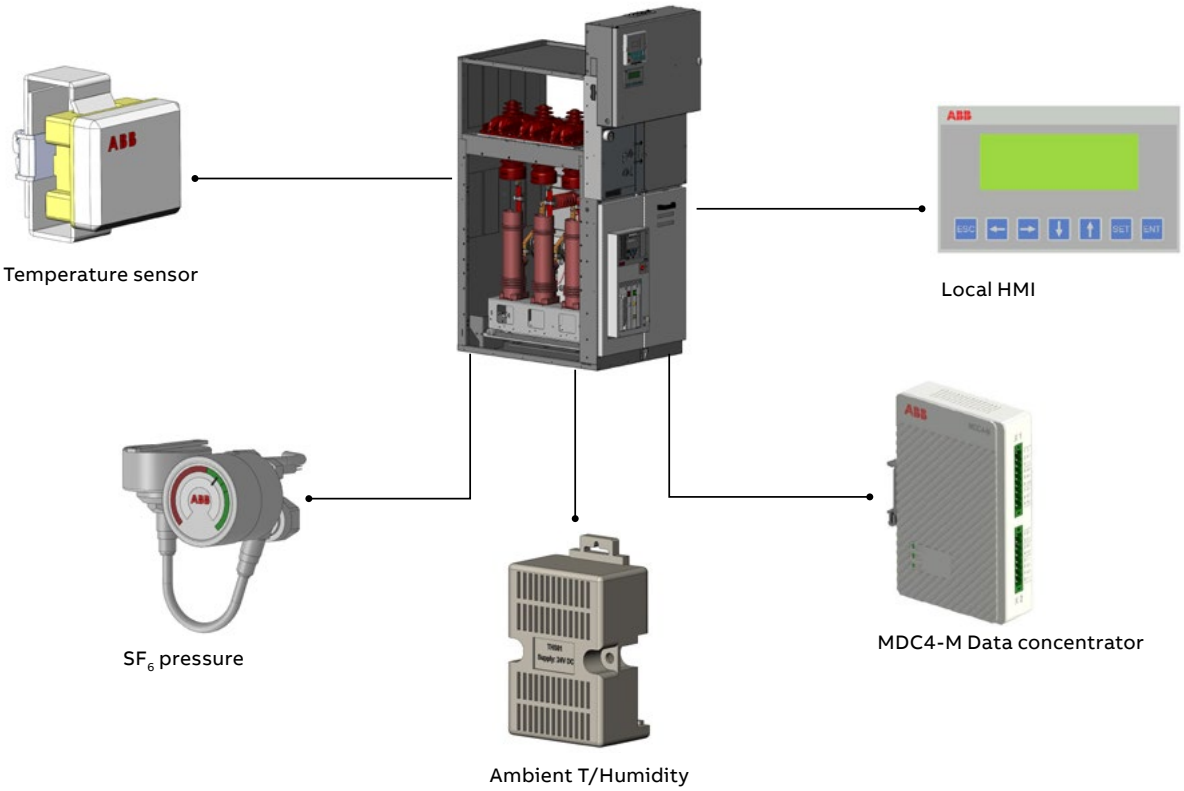
Each sensor is connected via cable or in the wireless mode (in the case of temperature sensors) to the concentrator, which collects all the data measured and transmits them to the user via LHMI module or mobile APP.
Typically, 3 wireless sensors are installed in the main circuit of the digital units (cable connection monitoring), but up to 9 can be installed if monitoring relating to circuit-breakers and busbars is required.

The sensors installed in the switchgear enable the following operating parameters to be monitored:

- Temperature of the main circuit (the monitoring points depend on how the switchgear has been configured)
- Temperature and humidity levels in the cable compartment
- ressure of gas in GSec/HySec apparatuses

NOTE

- **A current in the main circuit of at least 10A is required to activate wireless temperature sensors.**
- **The sensors in the monitoring system do not need to be calibrated**



2.1 Maintenance intervals

We recommend carrying out maintenance at the following intervals:

Activity	Interval (years)
Inspection	5(1)
Maintenance	5(1)
Repair	Based on need

(1) In more complex operating conditions, it is recommended to appropriately reduce these intervals

2.2 Inspection

- For UniSec Digital units, the same inspection instructions indicated in paragraph 4.3 of the UniSec 1VFM200005 manual remain valid.
- For the UniSec Digital monitoring system, it is necessary to check the correct communication between the MDC4-M concentrator and all the sensors connected to it.
  If the value “0” is shown in the LHMI module or in the mobile APP, it means that the sensor is faulty or not connected correctly.

In this case it is necessary to check that the wiring is carried out according to the wiring diagram, if it is still not possible to display the measurement correctly, contact ABB.

2.3 Assistance

For UniSec Digital units, the same assistance instructions indicated in paragraph 4.4 of the UniSec 1VFM200005 manual remain valid.

2.4 Repair and replacement

- Based on statistical information and the characteristics of the wireless temperature sensors, it is recommended to replace these sensors every 15 years.
- For UniSec Digital units, the same repair instructions indicated in paragraph 4.5 of the UniSec 1VFM200005 manual remain valid.
- If a component of the monitoring system needs to be replaced, refer to paragraphs 5.6 and 7.

2.5 Measurements transmitted to the LHMI module

The LHMI module allows the parameters measured by the sensors installed in the unit to be monitored. Use the “Up” and “Down” arrows to change screens.

The viewable screens are illustrated and described below.

Health diagnosis screen
This screen shows the general condition of the system by indicating its “health status, which can be:

- **Good**: f all the parameters are within the specified limits
- **Bad**: If at least one parameter is not within the specified limits

The parameter beyond the specified limits appears in the “Diagnosis” line:

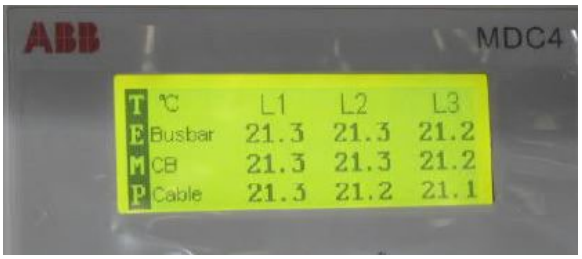
- **Good**: If all the parameters are within the specified limits
- **Temp abnormal**: In the case of temperature imbalance between the phases
- **Gas abnormal**: If the pressure exceeds the limits
- **Temp & Gas abnormal**: If the temperature and gas exceed the limits

“Maxim Temp” indicates the maximum temperature value measured by the wireless temperature sensor in the main circuit.

- **Real time Temp**: This screen displays the absolute temperature measurements in the “Busbar, CB and Cable” points of the main circuit for each of the three phases L1, L2 and L3.

WARNING
There is one LHMI module configuration for all the units. Consequently, value “0” may appear in some units in the row where the temperature sensors are not mounted

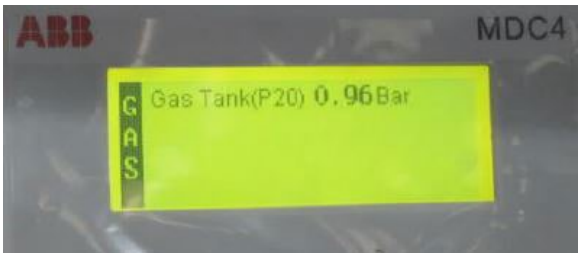
Consult the single-line diagram of the switchgear to find the positions of the sensors that transmit temperature values to the LHMI module.



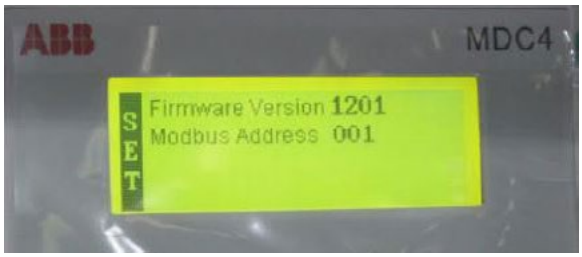
- **Ambient parameters**: The temperature and humidity values measured by the ambient sensor are displayed in this screen.

Consult the single-line diagram of the switchgear to find out where the ambient sensor is installed.

- **Gas tank pressure screen**: The pressure value of the gas-insulated disconnector is displayed in this screen.



- **System setting screen**: This screen displays the firmware version of the monitor and the modbus communication address.



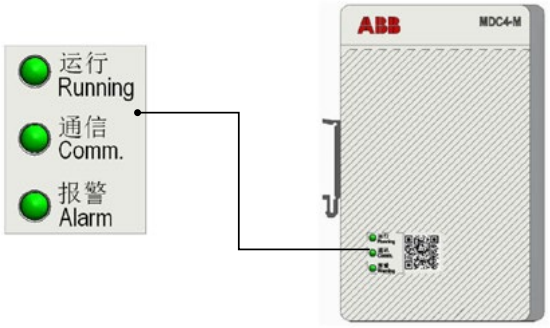
NOTE
Consult manual 2NGA000492 for further details about use of the LHMI module 2NGA000492

2.6 Alarms and corrective

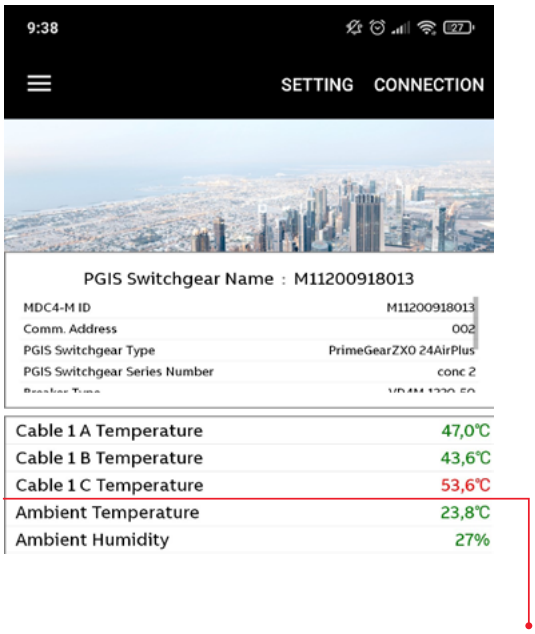
Concentrator MDC4-M is configured by ABB with warning and alarm thresholds for the temperature measurements of the main circuit and for gas pressure measurement.
Using the mobile App, the LHMI module or the leds on the concentrator, you can check whether the values measured in real time exceed the alarm thresholds.

NOTE
The threshold values are defined on the basis of the characteristics of the components installed and the tests performed to ensure the apparatus functions correctly.
Contact ABB to define warning and alarm thresholds for particular service conditions.

Once one of the thresholds is exceeded, the concentrator displays an alarm signal via the “Alarm” led on the front of the concentrator while the parameter that has exceeded the threshold is specified in the LHMI module.



The measurement that exceeds the threshold also appears in red in the mobile APP.
The example below shows a screen on the mobile APP where one of the parameters is in the alarm state:



In this case, the temperature value in the “cable 1 c” position exceeds the threshold value and therefore appears in red

Similarly, the measurement that exceeds the warning threshold is shown in yellow in the mobile APP.

NOTE
Consult user manual 2NGA000492 of concentrator MDC4-M for further details

To find out which parameter has exceeded its threshold, check the “health diagnosis” screen or mobile APP and proceed as described below:

- If the alarm is due to temperature imbalance between the phases, maintenance must be planned to find out the reason for the imbalance and restore the circuit to its normal operating conditions
- Comply with the instructions in manual 1VFM200005 if a low or high pressure alarm occurs in GSec/HySec devices:
  - The apparatus must be taken out of service in no-load conditions
  - Identify and resolve the fault
  - Restore the pressure to its rated value and put the apparatus back into service
- In the event of a warning, it means that the parameter is outside the nominal values and is approaching the alarm threshold. In this case it is necessary to monitor the parameter to prevent it from exceeding the alarm threshold and to intervene during the next scheduled maintenance intervention to identify the cause of the anomaly.

NOTE
Consult the UniSec operation and maintenance manual for further details about maintenance operations

WARNING
If one or more of the temperature values in the “Real time Temp” screen exceeds 115°C, maintenance must be planned to find out the reason for the high temperature value and restore the circuit to its normal operating conditions

WARNING
The switchgear has been designed for use in normal operating conditions at up to 95% relative humidity for 24 hours and up to 90% for one month. Should the humidity value in the “ambient parameters” screen exceed these values, the useful life of the switchgear could become rapidly reduced

3. General information about the MDC4-M concentrator

3.1 Overview

MDC4-M is part of ABB's monitoring and diagnostic concentrator family. It collects data from intelligent sensors that are installed in related equipment, stores / integrates / analyzes the data on different levels depending on requirements, and manages local communication / reporting to external systems, or finally transfer the data toward the ABB AbilityTM local or cloud-base solutions to enable a variety of different digital services.

It is the key carrier to realize the primary and secondary equipment intelligence.
MDC4-M currently supports the digital solution on Apparatus, PAIS, PGIS and SGIS, more detail is introduced in the related product's digital solution .

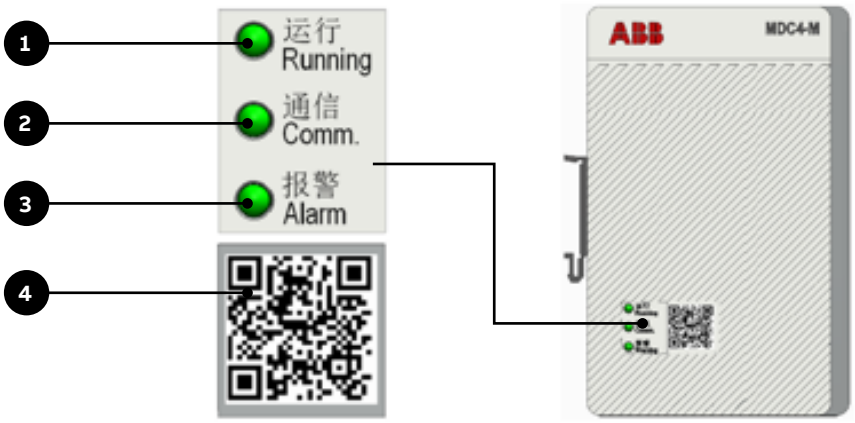
Monitoring and diagnostic solutions setup and customer value

MDC4-M digital solutions application

3.2 Physical Interfaces

Front side

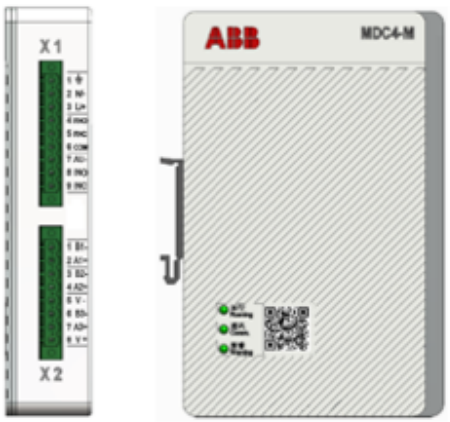
Front panel with LED and QR Label



Name	Position	LED state	Description
Running LED Indicator	1	OFF	Auxiliary supply voltage in disconnected
		Flasching	Normal operation
Comm. LED Indicator	2	ON	Without TR wireless communication
		Flashing	TR wireless communication
Alarm LED Indicator	3	OFF	No Allarm presents
		ON	Alarm enabled
WIFI QR Label	4		WIFI ID to setup communication with MDC4-M

Terminals X1 e X2

Terminals definition

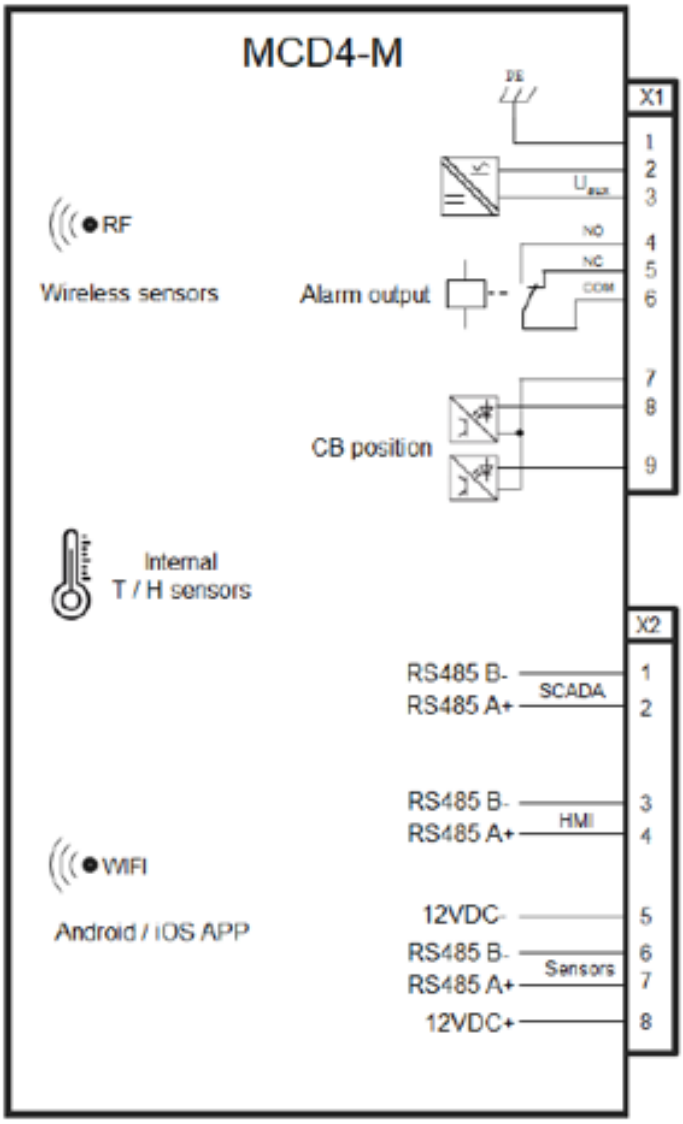


Name	Terminal	Function		
Earthing	X1-1	Earthing		
Power supply	X1-2	L/+	Ac and DC input, 110 ~ 220 V AC/ DC	
	X1-3	N/-		
Alarm output	X1-4	Normal open terminal		
	X1-5	Normal close terminal		
	X1-6	Common terminal		
CB position	X1-7	Common negative terminal		
	X1-8	Binary input of CB normal open auxiliary switch		
	X1-9	Binary input of CB normal close auxiliary switch		
RS485 Port 1	X2-1	B-	Slave	SCADA communication
	X2-2	A+		
RS485 Port 2	X2-3	B-	Slave	LHMI communication or SCADA communication
	X2-4	A+		
Aux power out -	X2-5	-12 VDC. Aux power supply for LHMI and sensors		
RS485 Port 3	X2-6	B-	Master	Sensor communication
	X2-7	A+		
Aux power out +	X2-8	+ 12 VDC, Aux power supply for LHMI and sensors		

3. General information about the MDC4-M concentrator

3.3 Terminals diagram

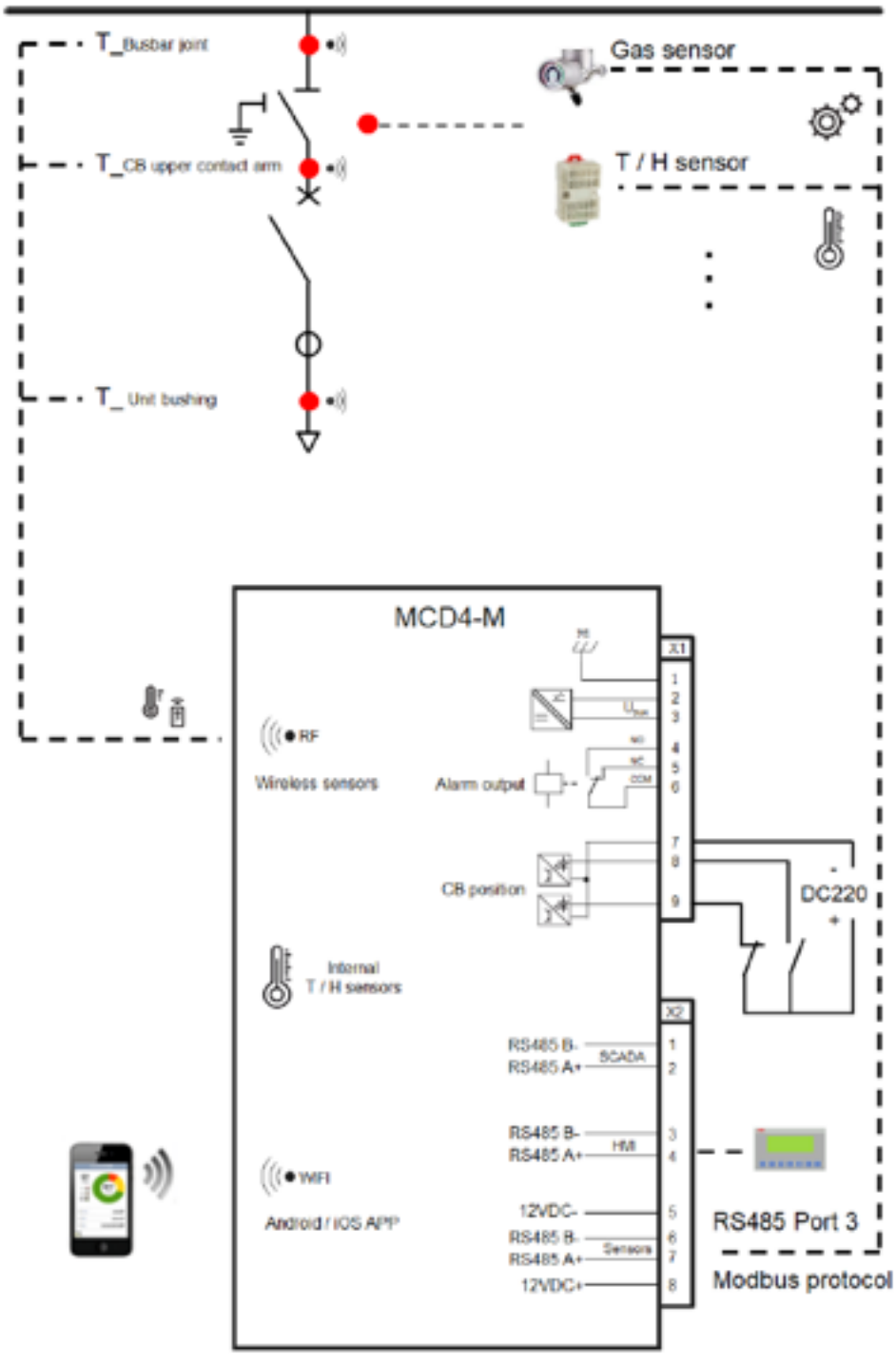
Terminals diagram



3.4 SAIS application

In the following the general scheme of the SAIS (secondary air insulated switchgear) application is reported. For more information refer to paragraph 2.

UniSec digital application as example



4. Ambient sensor replacement

4.1 LHMI Operation

In UniSec application, the LHMI to be connected to MDC4-M is OP320, which provides the following display and setting.

- Healthy diagnosis.
- Temperature characteristic.
- Apparatus characteristic (Internal pressure).
- Environment characteristic.
- Setting

LHMI Interface

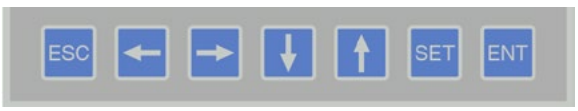
OP320 LHMI interface

The LHMI contains the following elements:
- Display
- Buttons
- Buzzer
- Communication port

LHMI has a STN LCD with yellow-green backlight, display area 192*64, support for Simplified Chinese and English display, the contrast can be adjusted through the Potentiometer on LHMI housing.

Keypad
The LHMI keypad contains push-buttons which are used to navigate in different views or menus, to read the monitoring and diagnose data, or set the system communication address and temperature alarm value.

OP320 LHMI Keypad



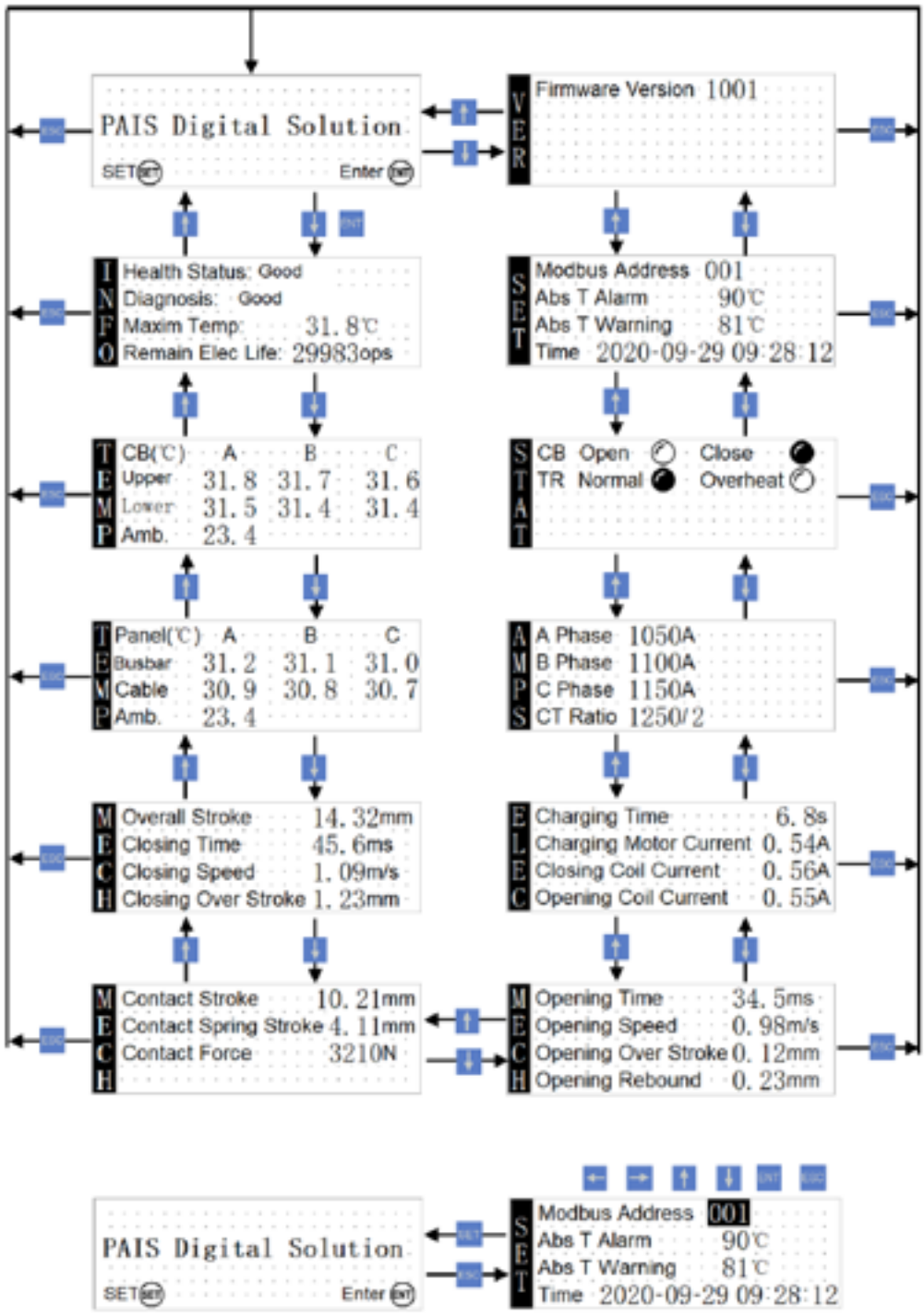
Pulsanti OP320

Name		Function
ESC	ESC	• Back to original page
←	Left	• Changing the active data, press ti modify the left data bits, the modified digit flashes
→	Right	• Changing the active data, press ti modify the right data bits, the modified digit flashes
↑	Up	• Flip the screen to the previous page • When setting the data, modify the bit digit plus 1, increments range: 0 → 9 → 0
↓	Down	• Flip the screen to the next page • When setting the data, modify the bit digit minus 1, decreasing range: 9 → 0 → 9
SET	Set	• Press to start modifying the value, value area display with anti-color, the modified bit digit flasches • Null operation if not data setting in current page • Before press the [ENT] key, press [SET] key, the current modify operation was canceled and continue to modify the next data
ENT	Enter	• Confirming a new value of a setting parameter and continue to modify the next value • Exit from setting status when the final parameter is set

Using the LHMI

Below is reported an example of the navigation between the different pages.

OP320 LHMI Navigation



4. MDC4-M Operation and Commissioning

4.2 Commissioning

Mobile APP download and installation
ABB engineering service personnel and users can install special mobile application to view local data and set related parameters. Mobile APP is used together with MDC4-M intelligent monitoring unit which iOS and Android are supported. Please scan the QR code below to get the application.

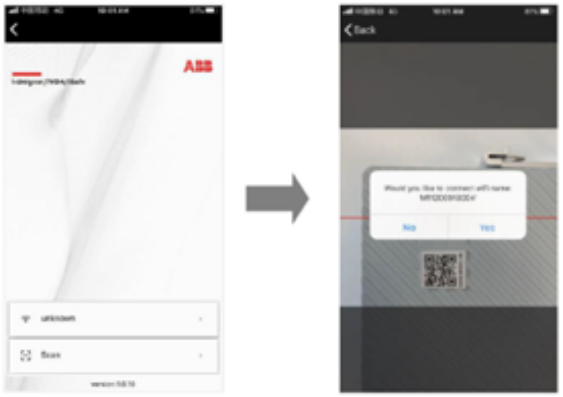
Mobile APP download

Android and iOS App download addresses

First-time installation or reinstallation, it may indicate "Untrusted Enterprise Developer", Please select trusting programs provided by "ABB (China) Limited" in equipment management under general page in setting menu.

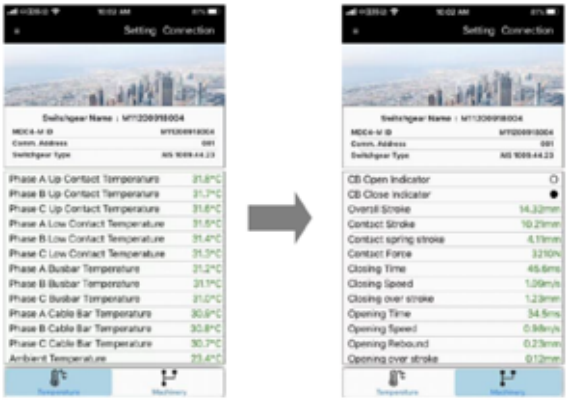
Mobile APP installation

User Login and Equipment Connection
First enable WiFi on the phone, then open the mobile APP, click "Scan" to scan the QR code on MDC4-M frontpanel, tolog into the data monitoring interface automatically.



Mobile APP login

Data Monitoring Interface
The data monitoring interface is divided into two tabs: "Temperature" and "Mechanical". When the value is displayed in green, it indicates that the value is in the normal range; and if the data value is displayed in red, it indicates that the parameter is out of the normal range.



Data monitoring interface

To connect next MDC4-M, click "Connect" on the upper right of interface.

Parameter Settings

Click "Set" on the upper right of the interface to set the related parameters e.g.,circuit breaker parameters, switchgear parameters and language information.

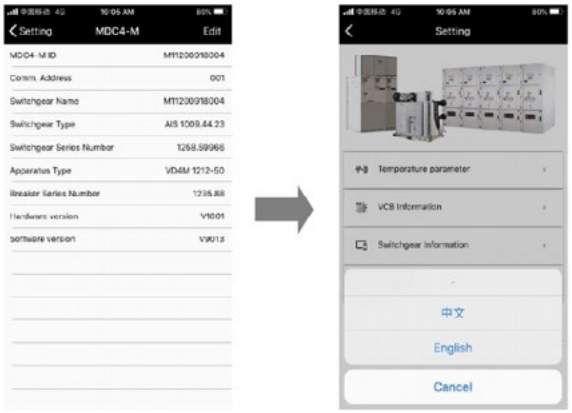
Temperature measurement parameter setting
Click "Temperature Measurement Parameters" to enter the temperature setting interface. This option is used to set the frequency band (from 1 to 60), the reverse phase sequence of the switchgear (A-B-C or C-B-A) and the over-temperature alarm threshold (from 20°C to 115°C). Please click "Save" and "Update" in sequence after setting.

Temperature measurement parameter setting

The "Advanced Settings" on the upper right of the interface is to change the ID of the temperature measurement module, the settingis generally operated by ABB field service engineers. If change required, please contact ABB.

The frequency bandhas been set up in manufacture. It is not recommended to modify it without authorization, otherwise it may lead to the failure of communication.

Switchgear parameter and APP language settings
The information of the switchgear can be viewed by clicking "Switchgear Settings". Name, model, factory number and Modbus address can be set through "Edit" on the upper right. And please do not set same Modbus addresses fortwo different switchgears. After setting, click "Save" and "Update" to complete the setting.

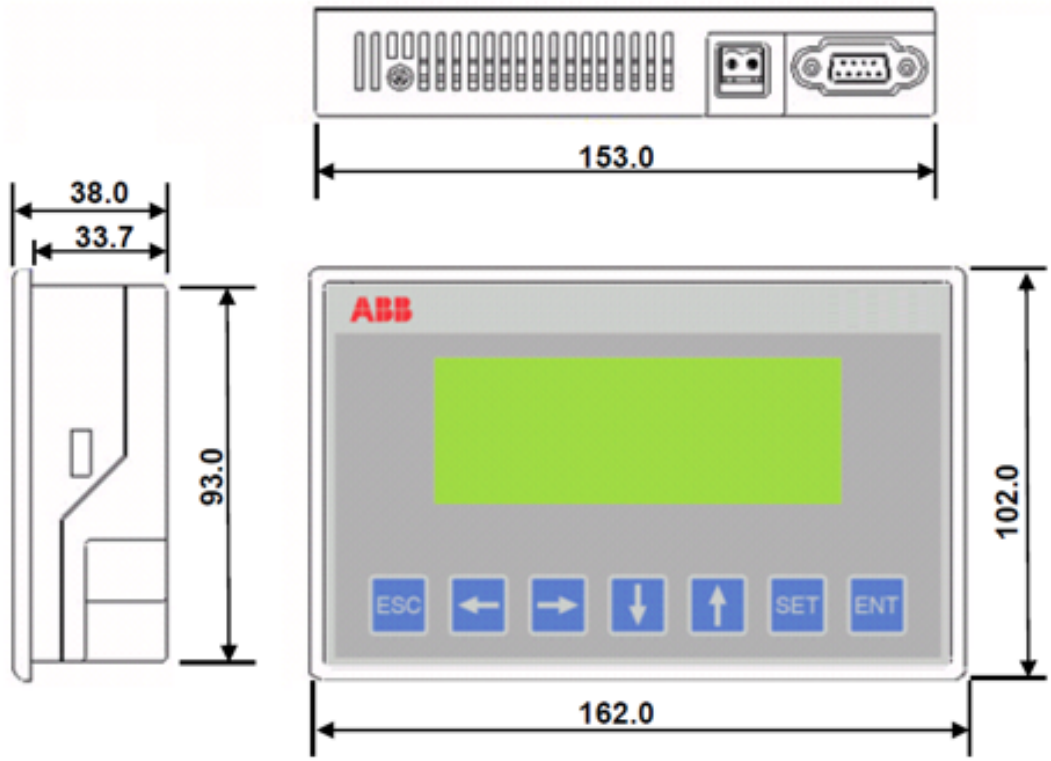


Switchgear parameter setting

5. System technical data

5.1 OP320 LHMI

LHMI dimensions



Dimensions

Description		Value
LHMI	Width	162 mm
	Height	102 mm
	Depth	38 mm
	Weight	0,4 kg
Installation	Panel cut-out	154 (L) x 94 (W) mm, depth behind the panel 34 mm

Environmental tests

Description	Value
Operating temperature range	0...50 °C, non-condensing
Transport and storage temperature range	-20...60 °C
Enviroment humidity	20...85%, non-condensing
Vibration tests	10...25 Hz, X, Y, Z, direction, 30 minutes 2G
EMC	Voltage noise: 1000Vp-p, pulse width 1µS, 1 min.
Enviroment required	no corrosive gases

Electric data

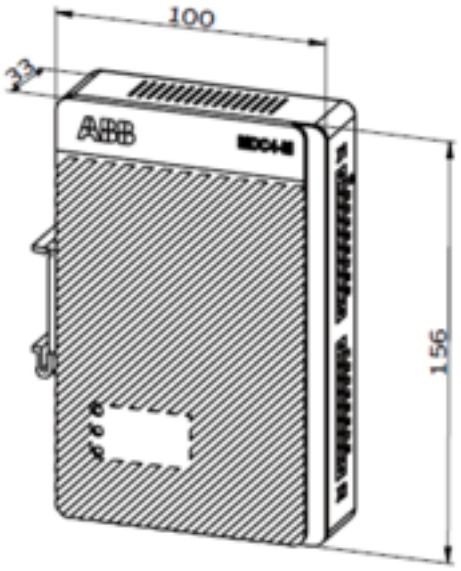
Description	Value
Voltage input	12...24 VDC
Power consumption	< 4W
Instantaneous Power off allowance	< 20ms
High voltage test	AC 1000V ~ 10MA 1 minute (signal to ground)
Isolation resistance	DC 500V ~ about 10M Ω (signal to ground)

Degree of IP

Description	Value
Front side	IP 65

5.2 MDC4-M

MDC4-Mdimensions



Dimensions

Description		Value
MDC-M	Width	100 mm
	Height	156 mm
	Depth	33 mm
	Weight	0,3 kg
Installation	Guide rail	35 mm

Environmental conditions

Description	Value
Operating temperature range	-20...70 °C
Enviroment humidity	20...85%, non-condensing
Atmospheric pressure	86...106 kPa
Altitude	Up to 2000 m(1)
Transport and storage temperature range	-40...85 °C
Overvoltage category	III
Pollution degree	2
Ip grade	IP 20

1) For higher altitude application, please contact ABB.

Power supply

Description	Value
Voltage input	12...24 VDC
Power consumption	12W max
Withstand voltage level (50Hz, 1 min)	2 kV
Output power supply	DC 12V ±10%, 3W
Controlling capacity of output auxiliary contact	5A, 30V DC

Environmental tests

Description	Type test value	Reference
High-temperature operation	+70 °C 96 H	IEC 60068-2-2 GB/T 7261-2016
Low-temperature operation	-20 °C 96 H	IEC 60068-2-1 GB/T 7261-2016
Steady humidity-heat	Test for 48 H at +40 °C and 93% humidity	IEC 60068-2-78 GB/T 7261-2016
Alternating humidity-heat test	Tfora maof est for 48h at a maximum temperature of +55 °C	IEC 60068-2-30 GB/T 7261-2016

5. System technical data

Electromagnetic compatibility tests

Description	Type test value	Reference
1MHz/100 kHz burst disturbance test: • Communication • Other ports	 Common mide 1kV Common mode 2.5 k Differential mode 1.5 kV	 GB/T 17626.18-2016 Grade III (IEC 61000-4-18: 2011)
3 MHz/10 MHz/30 MHz burst disturbance test: • Communication • Other ports	 Common mode 1 kV Common mode 2 kV	 IEC 61000-4-18: 2011
Electrostatic discharge test: • Air discharge	 ±15 kV	GB/T 17626.2-2018 Grade IV (IEC 61000-4-2: 2008)
Radio frequency interference Tests	10V/m, f=80...2700	GB/T 17626.3-2016 Grade III (IEC 61000-4-3: 2010)
Fast transient disturbance tests: • Power Supply ports • Other ports	 4 kV 2 kV	 GB/T 17626.4-2018 Grade IV (IEC 61000-4-4: 2012)
Surge immunity test: • Communication • Other ports	 2 kV, line to earth 4 kV, line to earth 2 kV, line to line	 GB/T 17626.5-2018 Grade IV (IEC 61000-4-5:2005)
Conducted emission immunity test for RF field induction	10 V (ms) 180 kHz ~ 80MHz	GB/T 17626.6-2017 Grade III (IEC 61000-4-6: 2013)
Power frequency magnetic field: • Continuous • Short term	 100 A/m , 60s 1000 A/m, 3s	 GB/T 17626.8-2006 Grade V (IEC 61000-4-8: 2001)
Pulse magnetid field immunity	1000 A/m	GB/T 17626.9-2011 Grade V (IEC 61000-4-9: 2007)
Magnetic field immunity test of damped oscillation wave	100 A/m, 2s Frequency 100 kHz, 1 Mhz	GB/T 17626.10-2017 Grade V (IEC 61000-4-10: 2001)
Immunity test of voltage sag, short-term interruption and voltage change on DC input power port	40% UT/100 ms 0% UT/50 ms	(IEC 61000-4-11: 2004) GB/T 17626.29-2006
	80% UT/1000 ms 120% UT/1000ms	(IEC 61000-4-29: 2000)
Ripple immunity test on DC input power port	10% UT, 100Hz, 10 min	GB/T 17626.17-2005 Grade III (IEC 61000-4-17: 2002)
Conducted emission limit test • 0.15...0.50 MHz • 0.5...30 MHz	 <79 dB (μV) quasi-peak value <66 dB (μV) average value <73 dB (μV) quasi-peak value <60 dB (μV) average value	 GB/T 14598.16-2002 (IEC 60255-25: 2000)
Radiated emission limit test: • 30...230 MHz • 230...1000 MHz	 <40 dB (μV/m) quasi-peak value, measured at 10 meters <47 dB (μV/m) quasi-peak value, measured at 10 meters	 GB/T 14598.16-2002 (IEC 60255-25: 2000)
Immunity to common mode conducted disturbances	10V Continuous 100V Short duration	IEC 61000-4-16: 2015

Mechanical tests

Description	Reference	Requirement
Vibration response	IEC 60255-21-1: 1988 IEC 60068-2-6: 2007	Class 1
Vibration endurance	IEC 60255-21-1: 1988 IEC 60068-2-6: 2007	Class 1
Shock response	IEC 60255-21-2: 1988 IEC 60068-2-27: 2008	Class 1
Shock witstand	IEC 60255-21-2: 1988 IEC 60068-2-27: 2008	Class 1
Bump	IEC 60255-21-2: 1988 IEC 60068-2-29: 1987	Class 1

Product safety

Description	Reference
LV directive	2014/35/Eu
Standard	EN 61010 (2010)

EMC compliance

Description	Value
EMC directive	2014/30/EU
Standard	EN 301 489-1 V2.2.3
	EN 301 489-17 V3.1.1
	EN 55032:2015 +A11:2020
	EN 55035:2017
	EN 61000-3-2:2019
	EN 61000-3-3:2013+A1:2019

Radio equipment conformance

Description	Reference
RE directive	2014/53/EU
Standard	EN 300 328 V2.2.2 EN 62311:2008

5.3 Serial communication parameters

- MDC4-M-M: Modbus Slave.
- Transmission mode: Modbus RTU.
- Physical interface: Two-wireRS-485.
- Transmission Type: Asynchronous serial communication, Byte unit.
- Serial link: TIA/EIA 485-A.
- Baud rate: 9600bps, Frozen.
- Data format: 10bits: 1start bit, 8 data bits, 1stop bits, no parity bits.
- Address: Slave address 0-247 (1 = default, 0 = broadcast address), can be set through local HMI.

WARNING

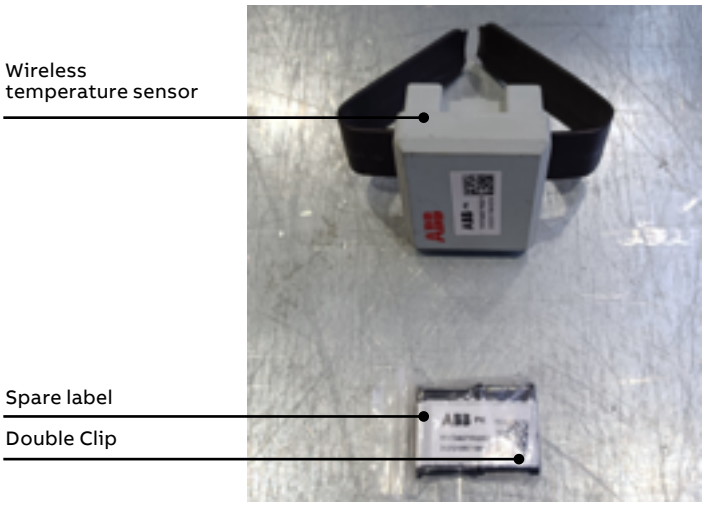
The following operations require access to the cable compartment. Before entering, make sure the switch and disconnector (if any) are in open position. Check that the cables are de-energized and that the grounding disconnector is closed. Prevent any feeding from the cables.
For operations requiring low voltage compartment maintenance, make sure the cell is de-energized before entering.

NOTE

- **Please refer to the operation and maintenance manual 1VFM200005 for information on tightening torques.**
- **For maintenance activities, use the tools given in par 4.1 of operation and maintenance manual 1VFM200005**
- **For electrical applications, refer to the wiring diagram included with the switchboard**
- **For electrical applications, check after installation that electrical wires are not in contact with moving part**s
- **Le seguenti operazioni possono essere svolte solo dopo aver eseguito un training di livello L2 per manutentori di equipaggiamento in sito. Contattare ABB per ulteriori informazioni.**

6. Wireless sensor replacement

Kit contents:
- 1. Wireless temperature sensor
- 2. Spare label for sensor mapping
- 3. Spare closing clip
-



WARNING
In case it is necessary to replace the sensors on the busbars, make sure that the busbar compartment is disconnected before performing any operation.

NOTE
To properly replace a temperature sensor with a new one, the sensor code associated with the concentrator must be updated. If the associated code is not updated, even if the sensor is powered on, the system cannot provide the temperature measurement.

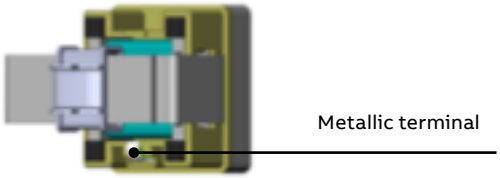
Software updating can only be done by an ABB operator with the dedicated software.

a) Remove the faulty sensor from the main circuit by opening the clip that closes the strap.

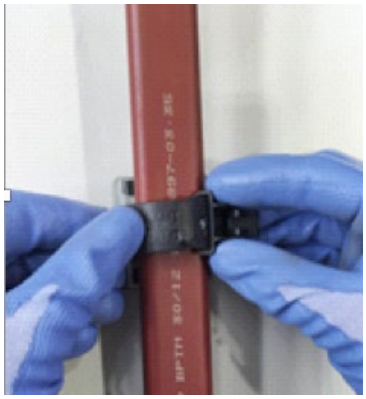
b) Communicate to ABB the identification code printed on the label of the faulty sensor so that the version can be identified.

c) New sensor installation:
Mount the sensor on the main circuit respecting the following directions.

NOTE
The contact tab should be placed directly on the sheath or on the copper busbar. Avoid the tab being located at screws or holes.



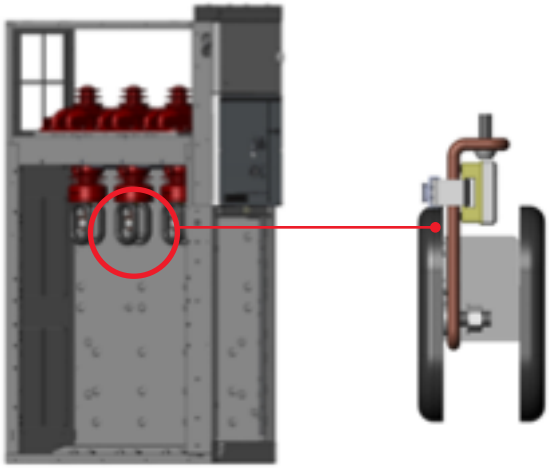
- **Place the new sensor on the main circuit in the same position as the old one.**
- **Close the strap around the bar and make sure the sensor is well in contact with the bar and cannot move**
- **In the case of two bars per phase, wrap the sensor strap around both bars**



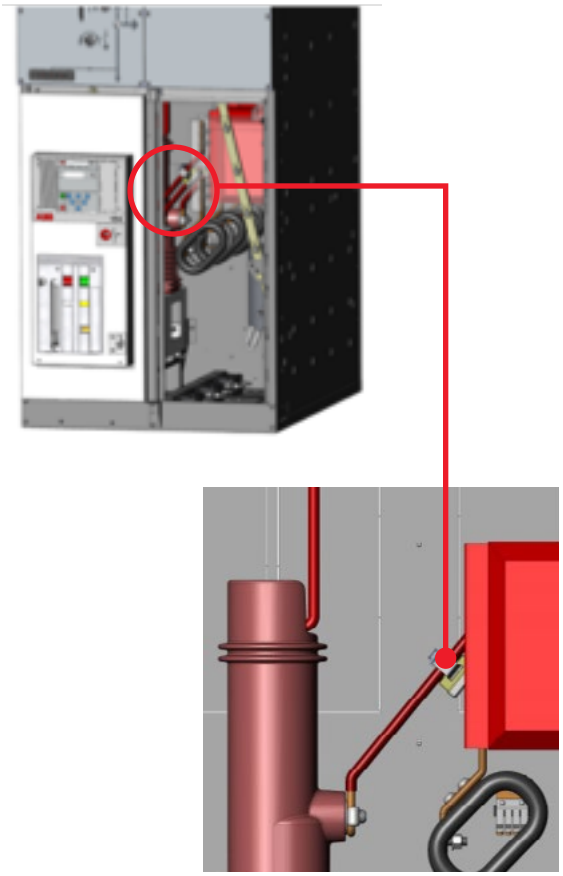
WARNING
Sensor replacement should be done by keeping the same position of the old sensor in the main circuit. Incorrect mounting can cause problems with the dielectric seal of the main circuit.

d) Repeat the operation for all sensors to be replaced.

Example of mounting on cable attachment



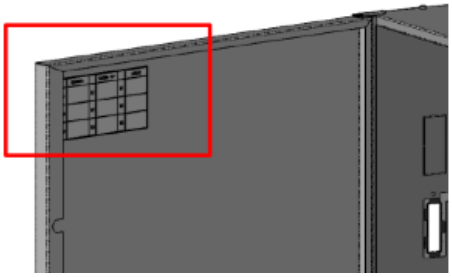
Example of mounting on cable connection with TA



e) Once the temperature sensors are mounted, their operation can be checked.

- Restore the operating condition of the compartment where you operated according to the UniSec Operating Manual 1VFM200005.
- Supply the circuit where the sensors are mounted with a current of at least 10A AC and verify that the temperature measurement is shown on the app or LHMI module.

f) Attach the spare label of the new sensor inside the low voltage door, in the box corresponding to the position of the sensor.



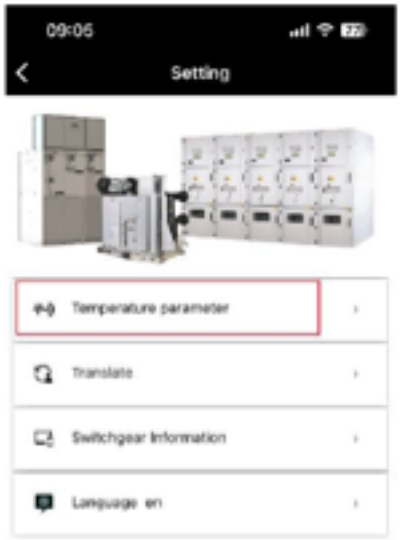
6. Wireless sensor replacement

6.2 Changing the sensor identification code in the MDC4-M concentrator

Connect the smartphone to the MDC4-M concentrator with local Wi-fi, following the instructions in section 4.2

1. Identify the ID code of the new sensor by reading it from the label on the sensor or from the table behind the LV door of the panel.
   Please note: The ID code is obtained by excluding the first two digits of the SN. For example, the sensor ID code shown in the following photo is: 212111041010.

2. In the mobile APP, go to "Settings" and click on "temperature parameters".



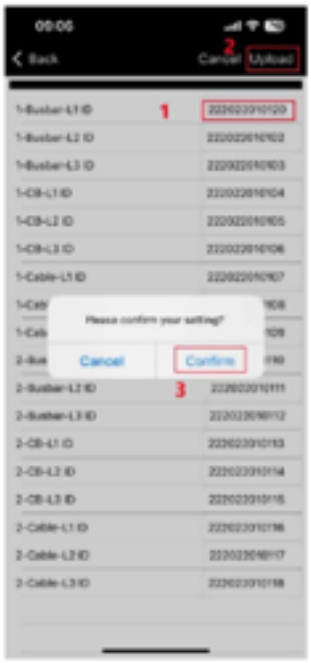
3. Click on "sensor ID".

4. Click on "advanced settings".

5. Enter the following password: **111111.**

6. Select the code of the failed sensor and replace it with the new code.

7. Click "Upload" to upload the new code and confirm the change.



8. The message confirming the change made is shown.

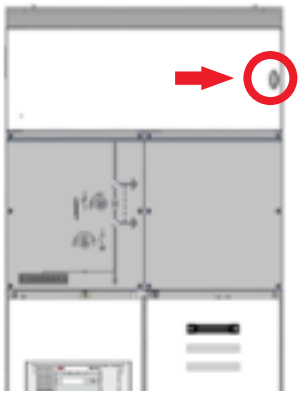
Having completed entering the new codes into the mobile APP, return the panel to service and verify that the temperature measurements are reported correctly to the user interfaces.

7. Concentrator replacement

WARNING
Before replacing the concentrator, make sure the low voltage cell is de-energized.

NOTE
The concentrator must be configured considering the sensors in the cabinet. Contact ABB for configuration of the Concentrator.

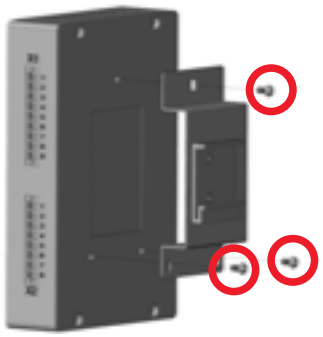
- Open the low voltage door.



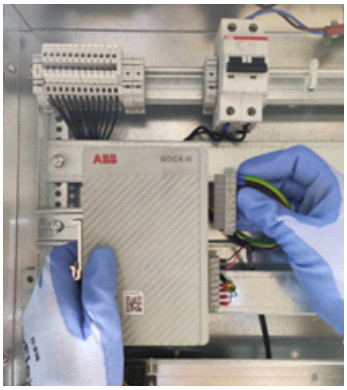
- Unscrew the retaining screws of both connectors
- Disconnect the connectors

- Press upward to detach the concentrator from the DIN rail.

- Detach the support plate from the back of the old concentrator and attach it to the new concentrator

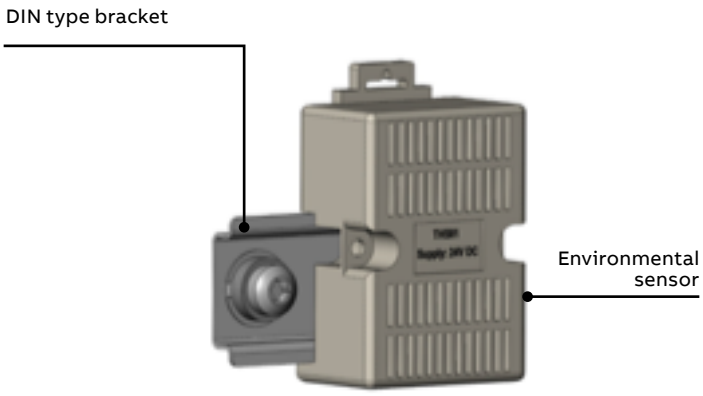


- Attach the new concentrator to the DIN rail.
- Reattach the connectors and screw them to the concentrator

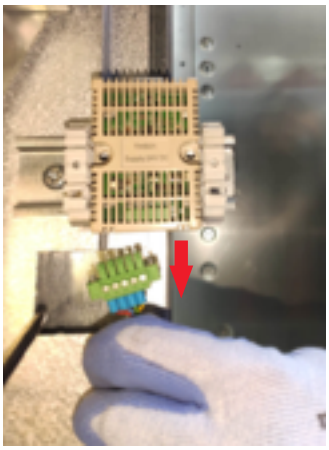


- Power the low voltage circuit
- Verify that the "Running" led is flashing and the "Comm" led is on.
- For more details on concentrator operation, see previous chapters or contact ABB.

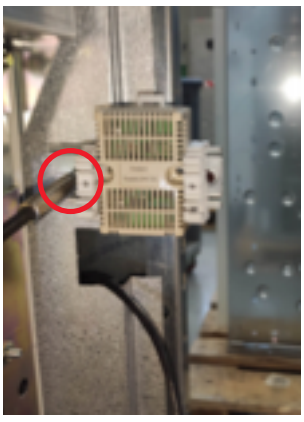
8. Environmental sensor replacement



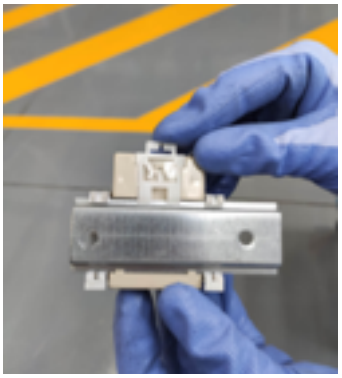
a) Dismantle the old sensor
- Disconnect the connector from the sensor



- Unscrew the DIN rail fixing screw.
- Detach the sensor.

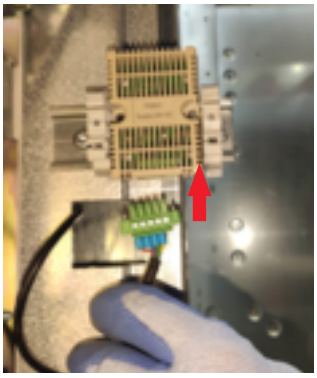


b) Mount the new sensor
- Fix the sensor on the DIN rail



- Attach the bracket to the carpentry

- Connect the connector to the sensor



- Verify that ambient temperature and humidity measurements are correctly reported by the interface devices

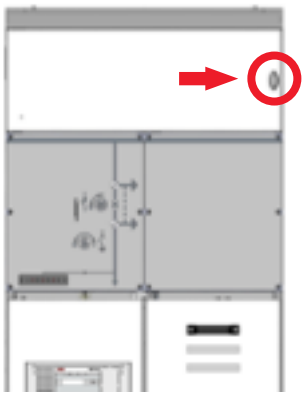
9. LHMI module replacement

NOTE

Depending on the configuration of the monitoring system, it is necessary to have a specific firmware version installed in the screen. Contact ABB to install the most suitable firmware version

a) Dismantling the old monitor

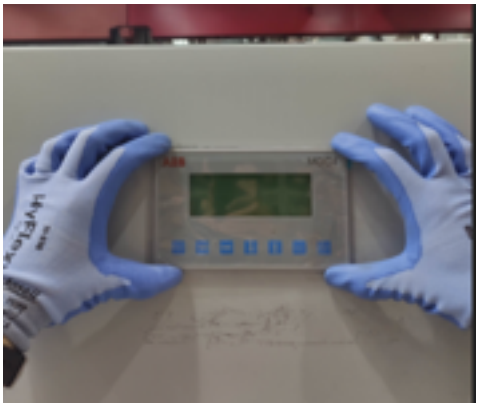
- Open the low voltage door



- Disconnect both power and signal connectors

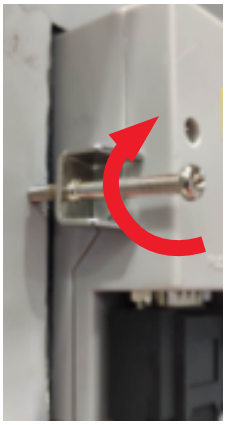
- Unscrew the side supports of the module

- Remove the old monitor from the door and insert the new monitor.



b) Mounting the new monitor

- Attach the side supports of the screen.



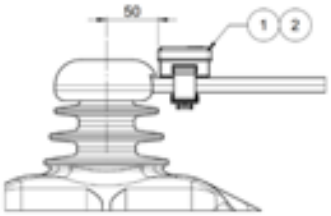
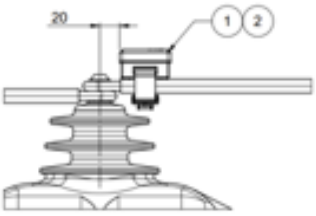
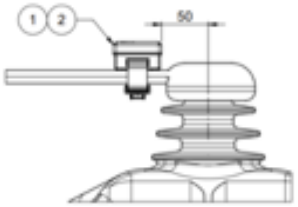
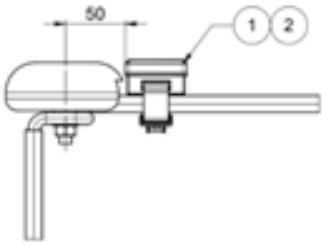
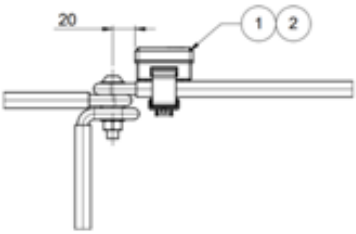
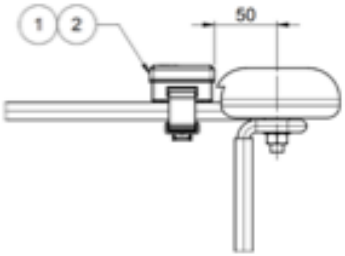
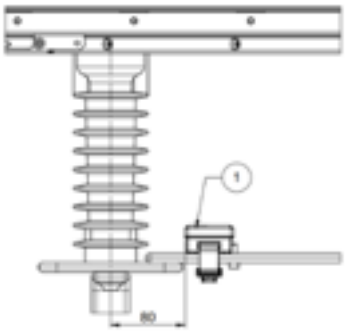
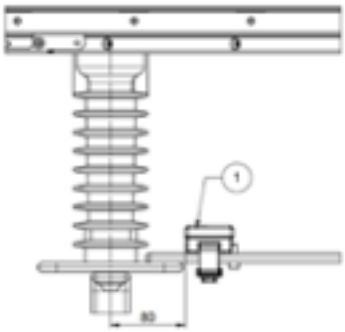
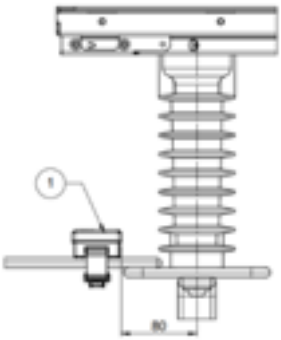
- Connect both power and signal connectors.

- Close the low voltage door.
- Power up the LHMI module and verify that sensor measurements are reported in the monitor.

Annex 1

Mounting temperature sensors on Busbar

Instructions for kit number: - 2RDA042329A9001 - 2RDA042329A9002 - 2RDA042329A9003 - 2RDA042329A9004 - 2RDA042329A9005

	Left End Unit	Left End Unit	Right End Unit
Fixed units			
			
Withdrawable Units			

Required component list:

Item	Description
1	Temperature sensor
2	Sensor support (where provided)

Temporary fixing of sensors for transport

Figure 1

Sensor probe placed near the main circuit connection

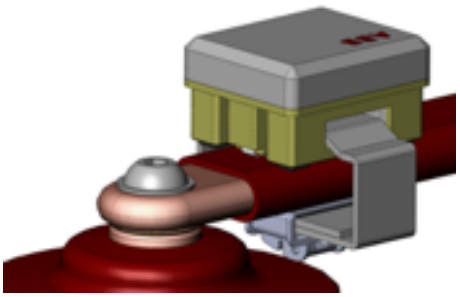


Figure 2

NOTE

Before performing any operation, please refer to the UniSec 1VFM200005 panel operation and maintenance manual

1. Remove the sensor from the temporary mounting (see fig.1) and mount it on the same phase bus.
2. IMPORTANT: The sensors are already synchronized with the concentrator, do not change the position of the sensor with respect to the phase with which it has been associated (see the positioning on the back of the LV cell)
3. It is always necessary to mount one sensor per phase
4. In case of sheathed bars, mount the sensor directly on the sheathing
5. In case of 1250A circuit where two busbars per phase are mounted, wrap the sensor strap around both busbars
6. The sensor probe should be placed near the bus bar connection (See fig.2)
7. See the following page for temperature sensor mounting details

Annex 1

Instructions for sensor fixing

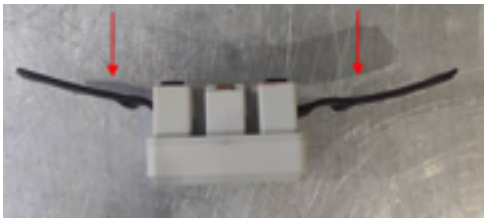
Depending on the size of the bar, consider the specific sequence given in the table.

Bar size	Sensor Code	Instruction
30x10	1YHT346071R0209 (support required)	Start from point 1
30x10 BPTM	1YHT346071R0209	Start from point 1
40x10	1YHT346071R0209	Start from point 3
2x40x10 (air gap 10)	1YHT346071R0234	Start from point 1
2x40x10 BPTM (air gap 10)	1YHT346071R0201	Start from point 1
40x10 BPTM	1YHT346071R0223	Start from point 3

NOTE

- **BPTM means that the insulating sheathing is applied on the busbar**
- **It is recommended to fix the sensor on the busbar before connecting the busbar to the main circuit**
- **The plastic holder for the sensor is needed only in the case of 30x10 bar without sheathing**

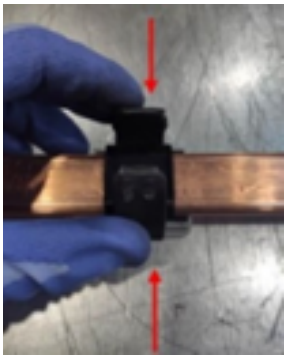
1. Flatten the strap and remove pre-existing creases



2. Bend the strap as much as possible around the sensor

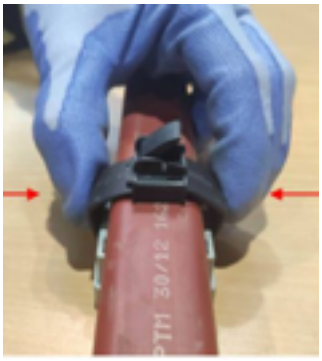
Only for application on 30x10 bars without sheathing: Before mounting the sensor, it is required to mount the plastic holder on the bus bar. Then mount the sensor measurement module on the opposite side from the plastic holder.

Fold the ends of the strap around the bar and plastic holder



3. Place the lower part of the sensor in contact with the bar and insert the end of the strap into the clip

4. Tighten the strap as much as possible around the bar and make sure the sensor does not move



5. Close the clip

Annex 2

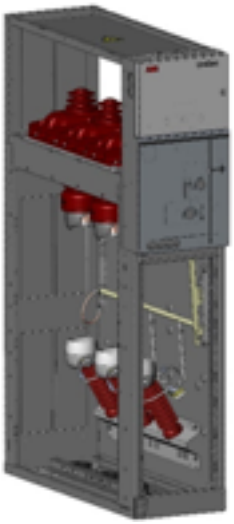
Sensor mounting for SFC unit on cable connection

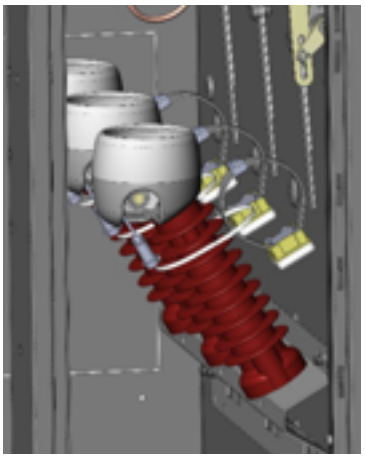
NOTE

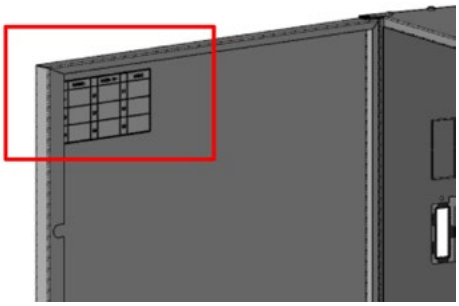
Before performing any operation, please refer to the UniSec 1VFM200005 panel operation and maintenance manual

Temporary fixing of sensors on transport insulators

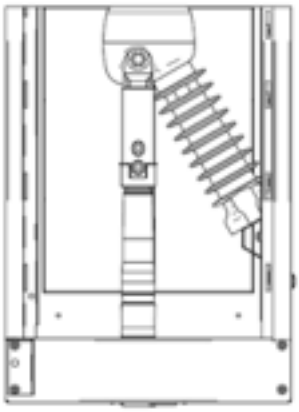
- Sensors are temporarily fixed on insulators mounted in hollow cell for transportation
- Mounting of the sensors on the main circuit must be completed when the MV cables are connected to the main circuit
- IMPORTANT: The sensors are already synchronized with the concentrator, do not change the position of the sensor with respect to the phase with which it has been associated (see the positioning on the back of the LV cell)
-



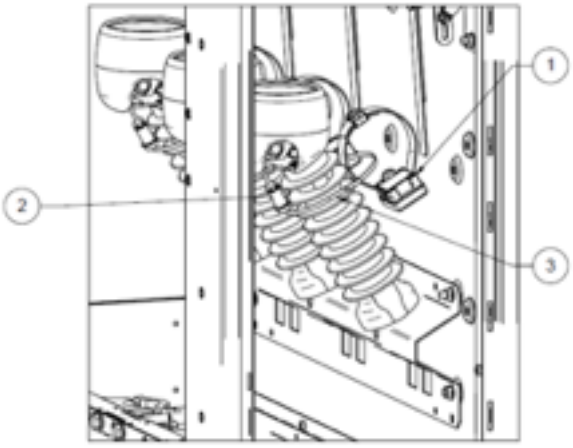




1. Connect the MV cables as shown in the UniSec 1VFM200004 installation manual.

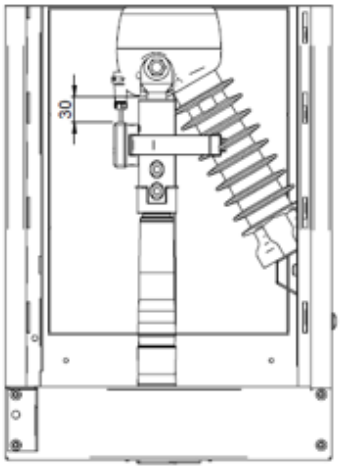


2. Remove the sensor from the transport position.

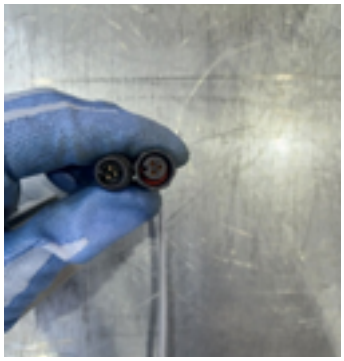


Item	Description
1	Sensor
2	Probe cable
3	Plastic band

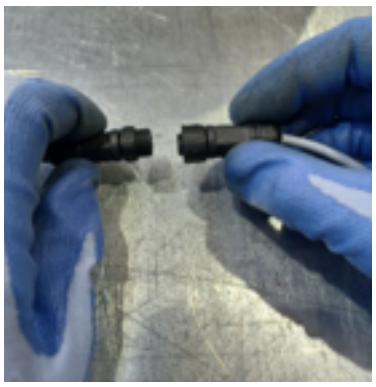
3. Fix the sensor on the lug of the MV cable
- Wrap the sensor strap around the lug and tighten it as much as possible.
- Close the strap clip
- Be careful to observe the configuration of the monitoring system as shown behind the LV door
- Be careful not to mount the sensor on top of any MT cable shielding

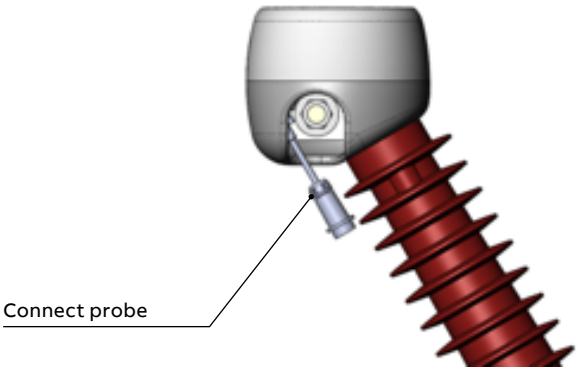


4. Connect the sensor connector to the probe connector that is already attached to the main circuit



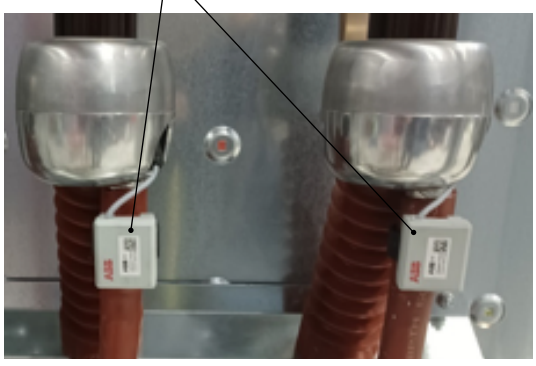
Connect the two ends by inserting the tooth into the keyway





5. Sensor end position
- Place the excess of cable inside the MT equalizer
- IMPORTANT: Make sure that the sensor connector does not approach adjacent phases to maintain main circuit isolation
- Repeat the procedure for the other two steps

Respect the isolation distance between phases



Glossary

MDC	Monitoring and diagnosticConcentrator
M&D	Monitoring and diagnostic
CB	Circuit breaker
CT	Current transformer
EMC	Electromagnetic compatibility
AVG	Average
IEC	International Electrotechnical Commission
LCD	Liquid crystal display
LED	Light-emitting diode
LHMI	LocalHuman-machine interface
TR	Temperature rise
SAIS	Secondary air insulated switchgear
MV	Medium Voltage

Note

Note

Note

For more information please contact:

More product information:
abb.com/mediumvoltage
Your contact center:
abb.com/contactcenters
More service information:
abb.com/service

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