Vigilohm MFLK1

Mobile Fault Locator

User manual

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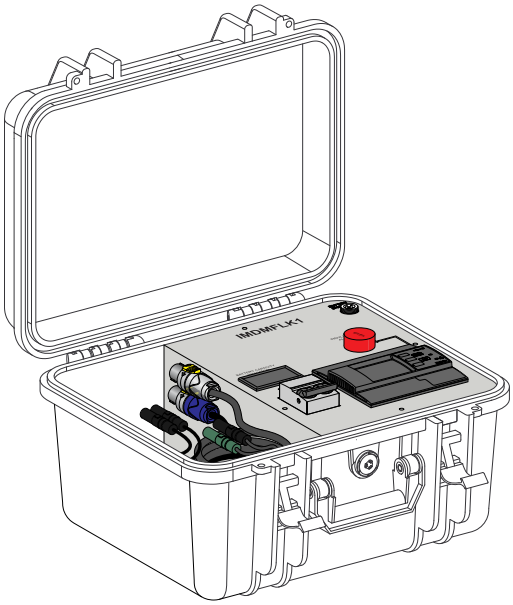
06/2024



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Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that accompany this symbol to avoid possible injury or death.

⚠⚠DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please note

Electrical equipment should be installed, operated, serviced, and maintained in restricted access locations only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this equipment. A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

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Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate Personal Protective Equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or other local standards.
- Assume communications and I/O wiring are hazardous live until determined otherwise.
- Do not exceed the maximum ratings of this device.
- Never shunt an external fuse or circuit breaker.
- Battery is not user replaceable. MFLK1 should not be opened by user, once opened warranty is void. User should contact Schneider customer care for any issues.
- Ensure that your ungrounded system has a compatible insulation monitoring device.
- Ensure that your ungrounded system voltage is less than 230 V.

Failure to follow these instructions will result in death or serious injury.

NOTE: See IEC 60950-1, Annex W for more information on communications and I/O wiring connected to multiple devices. See IEC 60364-4-41 for more information on protection against electrical shock.

⚠WARNING

UNINTENDED OPERATION

Do not use this device for critical control or protection of persons, animals, property or equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

EQUIPMENT DAMAGE

- Do not open the front panel.
- Do not attempt to repair any components of the device.

Failure to follow these instructions can result in equipment damage.

Overview

About this manual

This manual discusses features of the Vigilohm Mobile Fault Locator (MFLK1) and provides installation and configuration instructions.

This manual is intended for use by designers, panel builders, installers, system integrators, and maintenance technicians who are related with ungrounded electrical distribution systems featuring insulation monitoring devices (IMDs) with fault locating devices.

Throughout the manual, the term “device” refers to the insulation fault locator device of MFLK1. Throughout the manual, the term “IMD” refers to IM400, IM400L, IM400C. All differences between the models, such as a feature specific to one model, are indicated with the appropriate model number or description.

This manual assumes you have an understanding of insulation monitoring and locating and are familiar with the equipment and power system in which your device is installed.

This manual does not provide instructions on how to incorporate device data or perform device configuration using energy management systems or software.

Please contact your local Schneider Electric representative to learn what additional training opportunities are available for your devices.

The most up-to-date documentation about your device is available for download from www.se.com.

Related documents

Document	Number
Instruction Sheet: Vigilohm MFLK1	NNZ92823
Vigilohm Catalog	PLSED310020EN
The IT earthing system: a solution to improve industrial electrical network availability - Application guide	PLSED110006EN
System earthings in LV (The schematics of earth links in LV (neutral modes) Cahier technique n° 172)	CT172
The IT system earthing (unearthed neutral) in LV (The IT scheme (in isolated neutral) of the links to the earth in LV Cahier technique n° 178)	CT178

Introduction

Ungrounded power system overview

Ungrounded power system is an earthing system, which increases continuity of service of power systems and protection of people and property even in case of earth fault.

This system must be monitored with specific device to meet specific applications, such as hospital, naval applications, heavy industries, railways, nuclear power plants and other critical ones, where safety and continuity of service must be ensured even in case of earth fault. Lastly, this system is chosen in certain cases because it can facilitate preventive and corrective maintenance operations.

The system transformer’s neutral is isolated from earth, or connected through a specific impedance, while the electrical load frames are earthed. So, in case a first fault occurs, there is no loop for shorting current to flow, allowing the system to continue to operate normally without hazard to people and equipment. However, the faulty circuit must be detected and repaired before a second fault occurs. Because this system can tolerate an initial fault, maintenance operations have to be conducted as soon as possible to prevent the system trip in case a second earth fault occurs.

Insulation resistance (R) monitoring

Ungrounded power system require insulation monitoring to generate alarm in case of earth fault.

The installation must either be ungrounded or must be grounded through the specific ZX impedence (Commercial Reference: 50159).

In the event of only one earth fault, the fault current is very low, the system remains ON. However, given that a second fault could potentially cause the circuit breaker to trip, an IMD, IM400, has to be installed to indicate the initial fault. To complement IM400, the IFL12 (Insulation Fault Locator) permanently locate which feeder is faulty. If some feeders are not equipped with IFL12, this Mobile Fault Locator 1 channel (MFLK1) locate the fault. This device triggers an audible and a visual signal.

By constantly monitoring the insulation resistance, you can keep track of the system quality, which is a form of preventive maintenance.

Usage of IMDMFLK1

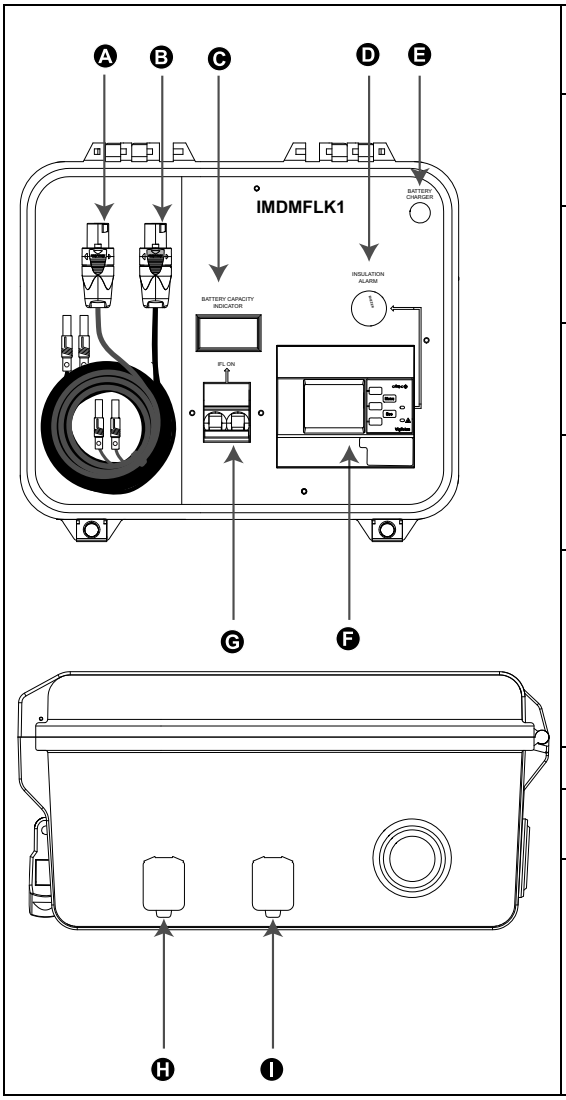
Locating a permanent earth fault in the network request:

1. IMDIM400 monitors the full network. In case another IMD monitors it.
    a. Disconnect its injection cables from the network.
    b. Connect IM400 to monitor the network.

Use the Mobile Fault Locator (MFLK1) is a device made of insulation fault locator, in built battery, and cables for low-voltage ungrounded power systems.

Once IM400 is properly monitoring the network, just calibrate the MFLK1, then monitor each feeder individually. See detailed procedure below and IMDMFLK1 instruction sheet for more detailed information.

Hardware overview



A	CT probe connector: To connect the MFLK1 to the appropriate open core toroid.[1]
B	Voltage input probe connector: (If required) To connect the MFLK1 with the system voltage, between line and earth.[1]
C	Battery charge level: Displays the available battery capacity (Alternatively in percentage and in Volts).
D	Red LED and buzzer: When the MFLK1 detects insulation fault, LED turns ON and the buzzer is activated.
E	Power connector: To charge the MFLK1.Use CE/IEC certified charger having output ratings 24 V DC, 1 A.
F	Fault locator display: Displays • the % of the calibrated signal if voltage input is not connected to the system. • insulation resistance and capacitance if IFL12 is set and wired accordingly.
G	Power ON/OFF switch
H	CT connector with cap: To connect the MFLK1 to the CT probe.
I	Voltage input connector with cap: (If required) To connect the MFL to the Voltage Input Probe.

Device commercial reference

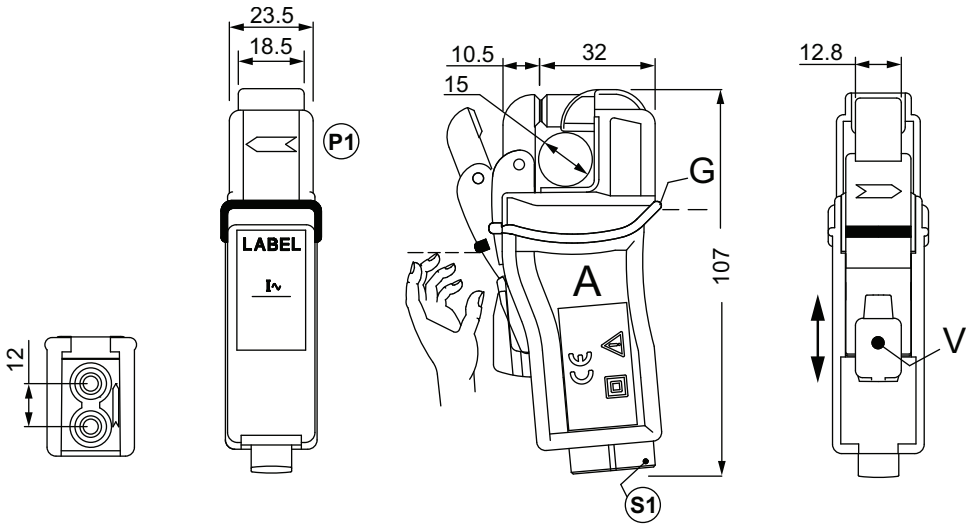
Model	Commercial reference
MFLK1	IMDMFLK1

1. Cable assemblies provided with the kit are tested as per IEC-61010-031.

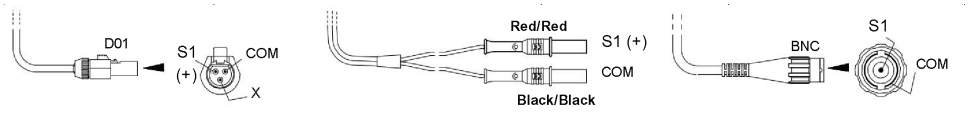
Accessories - Current Probes

M3 Probe

An **INTERNAL** system against short circuits releases the **FRONT** opening from cumbersome and vulnerable protection jaws.



All dimensions are in mm



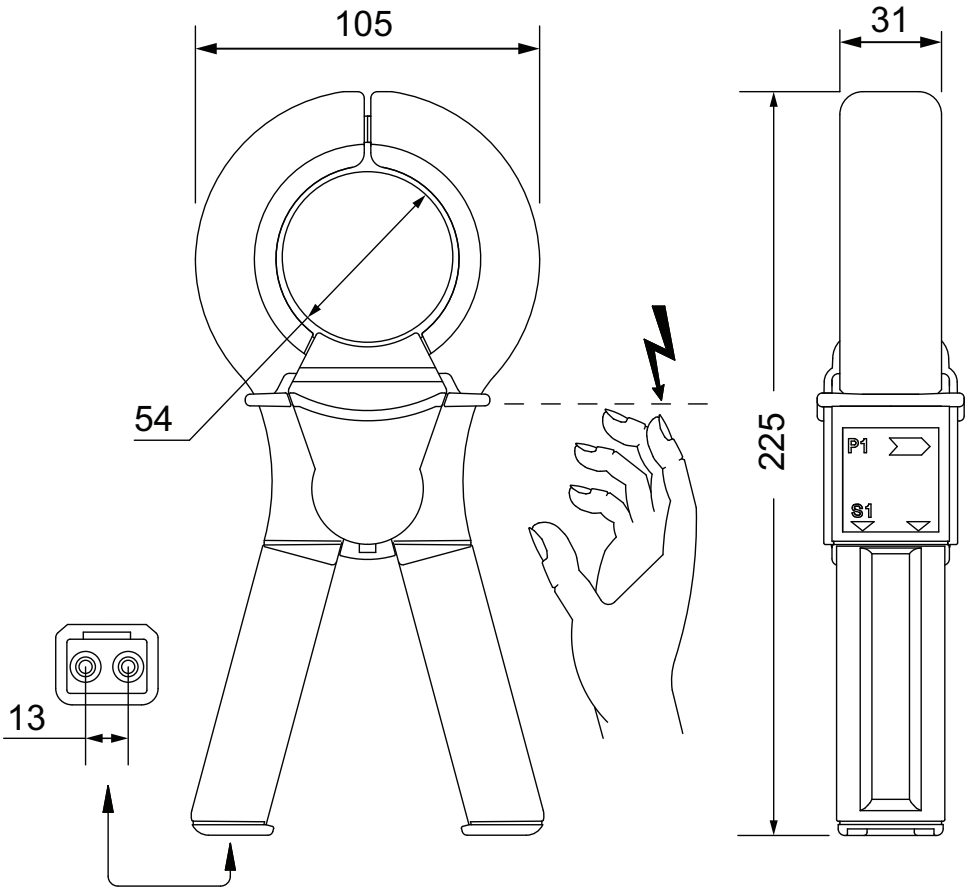
CONNECTION OPTIONS:

Shielded cable and plug D01 (3 or 4 pins), length 2m.	Two-wire cord and ø 4 mm safety plugs (Red and Black), length 2m.	Coaxial cable and BNC plug insulated, length 2 m

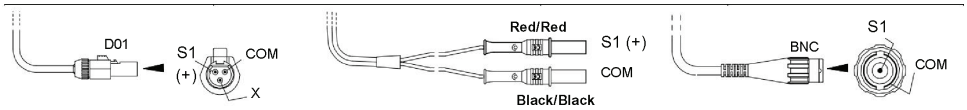
SM Probe

This series is equipped with the SIAC Internal Anti-Short Circuit System Designed to meet EN IEC 61010-2-0-32 or EN 61010-2-032 safety standards.

This second **INTERNAL** safety releases the **FRONT** opening from the cumbersome and vulnerable protective jaws.



All dimensions are in mm



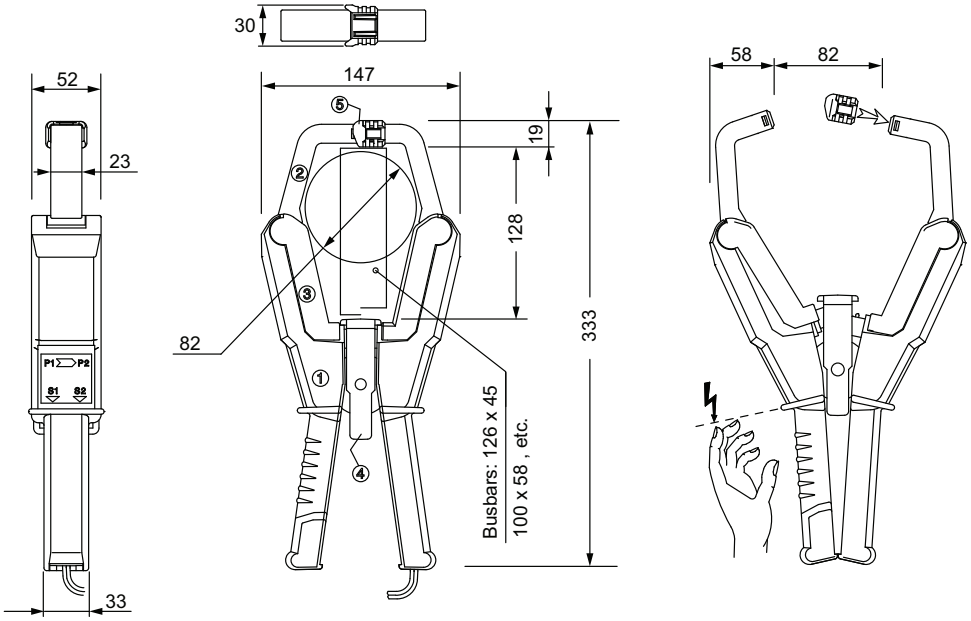
CONNECTION OPTIONS:

Shielded cable and plug D01 (3 or 4 pins), length 2m.	Two-wire cord and ø 4 mm safety plugs (Red and Black), length 2m.	Coaxial cable and BNC plug insulated, length 2 m

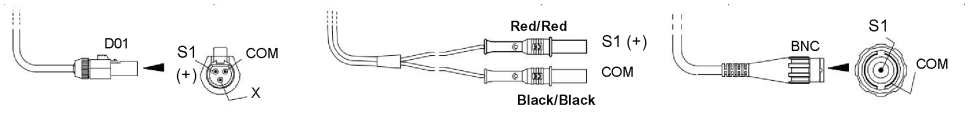
P32 Probe

The module (intensity) of the current, from ± 0.5% to ± 3% of the value read and on the phase from ± 30’ to ±10° depending on the transformation ratios the load of the playback device, the frequency (45 Hz to 5 kHz).

Overloads: 1.2 permanent Ipn and 2 Ipn, 5mn/hour for an ambient of 20°C.



All dimensions are in mm



CONNECTION OPTIONS:

Shielded cable and plug D01 (3 or 4 pins), length 2m.	Two-wire cord and ø 4 mm safety plugs (Red and Black), length 2m.	Coaxial cable and BNC plug insulated, length 2 m

Specifications for Current Probes

Probes	NORMAL USE CONDITIONS	Degree of Protection	Weight
M3	On conductors located inside a building, maximum altitude of 2000m, at a temperature between -10°C and +50°C, at a maximum relative humidity varying from 80% for 31°C to 40% for 50°C.	IP20	110g

SM	On conductors under dangerous voltage, located inside a building, maximum altitude of 2000 m, at a temperature between -10°C and +50°C, at a maximum relative humidity varying from 80 % for 31°C to 40% for 50°C.	IP20	–
P32	On conductors under dangerous voltage, located inside a building, maximum altitude of 2000 m, at a temperature between -10°C and +50°C, at a maximum relative humidity varying from 80 % for 31°C to 40% for 50°C.	IP20	–

Supplemental information

This document is intended to be used in conjunction with the instruction sheet that comes in the box with your device and accessories.

See your device's instruction sheet for information related to installation.

See your product's catalog pages at www.se.com for information about your device, its options and accessories.

You can download updated documentation from www.se.com or contact your local Schneider Electric representative for the latest information about your product.

Commissioning

The MFLK1 can be commissioned in two ways depending on the voltage input connection with the system.

It is dependent on the following two criteria:

- When voltage input is connected to the system
- When voltage input is not connected to the system

When voltage input is not connected to the system, perform the following steps:

1. Configuring IMD and MFLK1, page 15
2. MFLK1 is not connected to the system voltage: Calibrating the MFLK1 and locating the fault, page 15

When voltage input is connected to the system, perform the following steps:

1. Configuring IMD and MFLK1, page 15
2. MFLK1 is connected to the system voltage: Locating the fault, page 16

Configuring IMD and MFLK1

Whenever a fault is identified by the IM400 or XGR device, perform the following:

1. Unlock and open the MFLK1.
2. Turn ON the power switch.

   Check the available battery capacity displayed in **Battery Display**.
3. If IMD monitors the system, it has to be set in **Power C** or **Control C** mode. **Photovolt** mode is not compatible.
   a. MFLK1 setting:
      - **MENU > Settings > Network > Inj.Device** must be set to **IM400**
      - **MENU > Settings > Network > App.** must be set to same as IMD.
4. If XGR monitors the system:
   a. MFLK1 setting: **MENU > Settings > Network > Inj.Device** must be set to **XGR**.

NOTE: See the IM400 or XGR User Manual for more information on modifying parameters.

MFLK1 is not connected to the system voltage: Calibrating the MFLK1 and locating the fault

MFLK1 set as **Locating Signal : OFF**. MFLK1 must be calibrated as closely as possible from the injection terminal of the IM400 or XGR.

1. Open the CT connector cap.

2.

NOTICE

EQUIPMENT DAMAGE

- Ensure that CT probe cable is connected to the CT connector.
- Ensure that voltage input cable is connected to the voltage input connector.

Failure to follow these instructions can result in equipment damage.

Connect the CT probe to its specific cable and quarter turn the CT probe connector.

3. Clamp the CT probe as closely as possible to the injection terminal of the IM400 or XGR.
4. Press the **Calibration** button.

   The **Launch Calibration?** message displays.
5. Press the **Confirm** button.

   The calibration begins and then displays the percentage of current, which is the reference for all other measurements downstream.
6. **NOTE:** Fault will be located by checking the relative current flow in percentage.
   Clamp the CT probe to the first level of feeders.
   - If the percentage of the current is very low compared to others, then there is no fault in this feeder, continue to check the next downstream feeders.
   - If the percentage of the current is high low compared to others, then there is fault in this feeder, should be disconnected and repaired.

MFLK1 is connected to the system voltage: Locating the fault

Fault will be located by checking the insulation resistance.

1. Open the voltage connector cap.
2.

NOTICE

EQUIPMENT DAMAGE

- Ensure that CT probe cable is connected to the CT connector.
- Ensure that voltage input cable is connected to the voltage input connector.

Failure to follow these instructions can result in equipment damage.

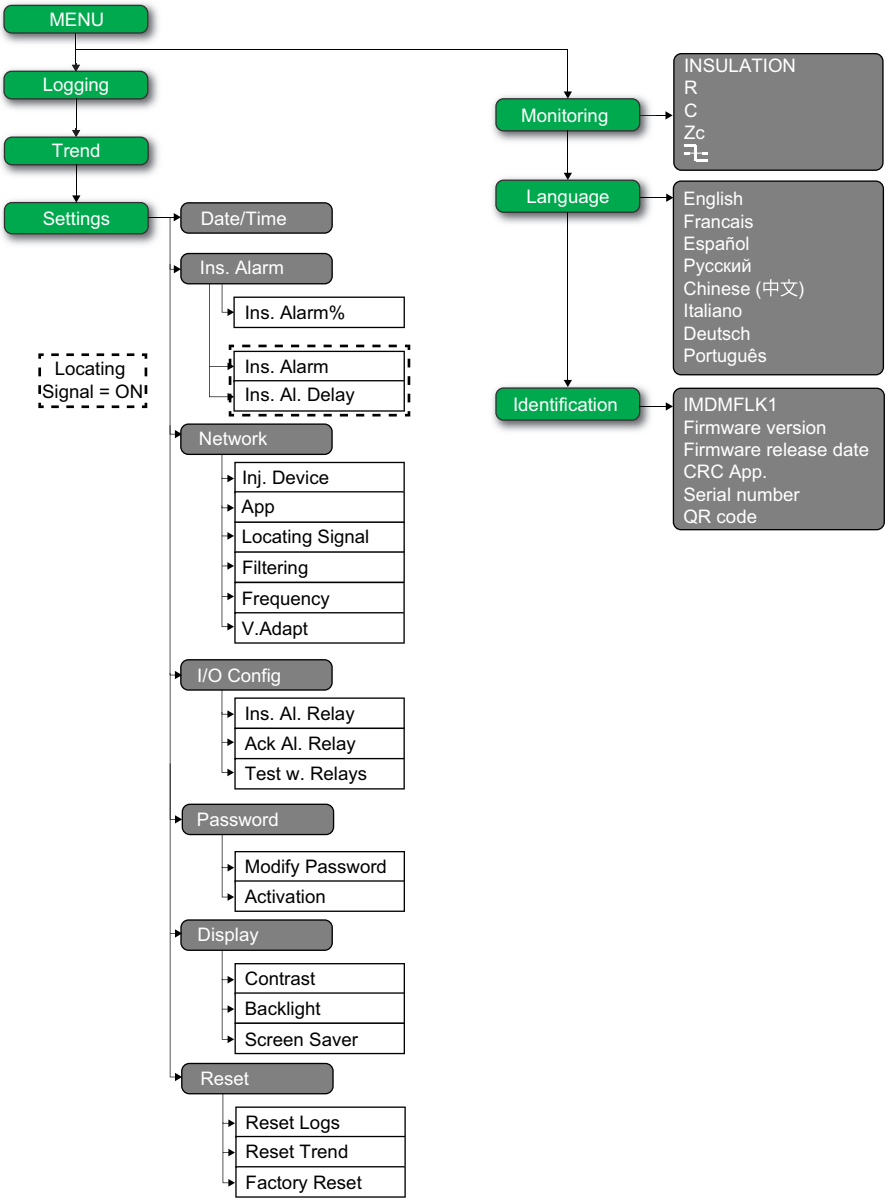
Connect the MFLK1 to the network, using the provided specific cable to the voltage quarter turn connector of the MFLK1 on one end, and to earth then Phase 1, 2 or 3 on the other end.

3. Clamp the CT probe to the first downstream feeder.
   - If the resistance is higher than the defined threshold, then there is no fault. Check the next downstream feeder.
   - If the resistance is close to the IMD resistance value displayed, then there is fault in this feeder, should be disconnected and repaired.

Configuring

MFLK1 menu

Using the device's display, you can navigate through the different menus to perform basic setup on your device.



IFL parameter modification using the display

To modify the values, you must be thoroughly familiar with the interface menu structure and general navigation principles.

For more information about how the menus are structured, see MFLK1 menu, page 17.

To modify the value of a parameter, follow either of these two methods:

- Select an item (value plus unit) in a list.
- Modify a numerical value, digit by digit and character value.

For the following parameters, the numerical value can be modified:

- Date
- Time
- Password
- Modbus address

Selecting a value in a list

To select a value in a list, use the up and down menu buttons to scroll through the parameter values until you reach the desired value, then press  to confirm the new parameter value.

Modifying a numerical value

The numerical value of a parameter is made up of digits and the one on the far right is selected by default. To modify a numerical value, use the menu buttons as follows:

-  to modify the selected digit.
-  to select the digit to the left of the one that is currently selected, or to loop back to the digit on the right.
-  to confirm the new parameter value.

Modifying a character value

The character value of a parameter is made up of character and the one on the far left is selected by default. To modify a character value, use the menu buttons as follows:

-  to modify the selected character.
-  to select the character to the right of the one that is currently selected, or to loop back to the character on the left.
-  to confirm the new parameter value.

Saving a parameter

After you have confirmed the modified parameter, one of following two actions occur:

- If the parameter has been saved correctly, the screen displays **Saved** and then returns to the previous display.
- If the parameter has not been saved correctly, the screen displays **Error** and the editing screen remains active. A value is deemed to be out of range when it is classed as forbidden or when there are several interdependent parameters.

Canceling an entry

To cancel the current parameter entry, press the **Esc** button. The previous screen is displayed.

General configuration

Date/Time

The date/time must be set:

- On first power up.
- Whenever factory reset is performed.
- Whenever the power supply is interrupted.
- When switching between summer and winter time and vice versa.

If the auxiliary power supply is interrupted, the device retains the date and time setting from immediately before the interruption. The device uses the date and time parameter to time-tag the system insulation faults recorded. The date is displayed in the format: dd/mm/yyyy. The time is displayed using the 24-hour clock in the format: hh/mm.

After commissioning, the clock icon flashes on the **Summary** screen to indicate that the clock needs to be set. To set the date and time, see IFL parameter modification using the display, page 17.

Password

You can set a password to limit access to configuration of the device parameters to authorized personnel only.

When a password is set, the information displayed on the device can be viewed but the parameter values cannot be edited. By default, the password protection is not activated. The default password is **0000**. You can set a 4-digit password from **0000** to **9999**.

To activate the password, navigate to **Menu > Settings > Password > Activation** and select **ON**.

To modify the password, navigate to **Menu > Settings > Password > Modify Password** and edit the new password. To modify the parameter value, see IFL parameter modification using the display, page 17.

Language

The device supports 8 languages for HMI display.

The list of languages supported by the device HMI are as follows:

- English (Default)
- French
- Spanish
- Russian
- Chinese
- Italian
- German
- Portuguese

To set the language, navigate to **Menu > Language**. To modify the parameter value, see IFL parameter modification using the display, page 17.

Identification

You can view the information about the device on the **Identification** screen.

The **Identification** screen displays the following information:

- Commercial reference
- Firmware version
- Firmware release date
- CRC App
- Serial number
- QR code

  NOTE: Scan the QR code to view the Vigilohm products webpage.

To view the **Identification** screen, navigate to **Menu > Identification**.

Display

You can set the contrast and backlight and enable screen saver for the display.

You can access the device display parameters by selecting **Menu > Settings > Display**.

The display parameters and its allowed and default values are as follows:

Parameter	Default value	Allowed values
Contrast	**50 %**	**10 %** to **100 %**
Backlight	**100 %**	**10 %** to **100 %**
Screen Saver	**OFF**	• **ON** If you select this value, the display turns OFF after 5 minutes of inactivity. If you press any button or on any fault, the display turns ON. • **OFF**

To modify the parameter value, see IFL parameter modification using the display, page 17.

Network configuration

You can configure the electrical network parameters to suit the electrical applications you want to monitor.

You can access the device network parameters by selecting **Menu > Settings > Network**.

The network parameters are:

- **Inj. Device**
- **App**
- **Locating Signal**
- **Filtering**
- **Frequency**
- **V.Adapt**

To modify the parameter value, see IFL parameter modification using the display, page 17.

Injection Device(Inj. Device)

The device supports IM400 series and XGR injection devices. You can select the required injection device of the network, so the device can measure the relative current flow or the insulation resistance (when locating signal is available).

Two values are available for this parameter:

- **IM400**
- **XGR**

Application (App)

The device is designed and tested to be compliant with different applications, which can be monitored. The device is compliant with the following applications:

- Power circuits: industrial or marine applications that contain power loads and power electronics such as speed drives, inverters, or rectifiers.
- Control circuits: auxiliary control circuits used to drive power systems. These circuits contain sensitive loads such as PLCs, IOs, or sensors.
-

Accordingly, set appropriately:

Parameter Value	Application
Power C. (Default)	Power circuits
Control C.	Control circuits

NOTE: Ensure that the selected parameter value is same as IMD network parameter value. For example, if you select **Power C.** in the device, make sure that in IMD, the **App** value is also set to **Power C.**. If the values are not same, the device might not work as expected.

Locating Signal

You can set the locating signal parameter as per the monitored application.

The allowed values for this parameter are **Yes** and **No**. The default value is **No**, meaning the MFLK1 is not connected to the system's voltage, then the device measures and displays the relative current flow.

When locating signal is available, set the parameter value to **Yes** so the device measures and displays the insulation resistance and capacitance.

Filtering

You can set the filtering parameter as per the monitored application.

Value	Response time	Advised Usage
5s	5 seconds	Use in maintenance mode. Diagnose fast variation of the insulation resistance and leakage capacitance. Use in the following cases: • Detecting short time transient insulation faults. • When manually locating insulation faults by opening circuit breakers.
40s (Default)	40 seconds	Use in operation mode. To monitor insulation of typical installations.
400s	400 seconds	Use in operation mode. To monitor insulation of highly disturbed installations and/or installations with high leakage capacitance.

Frequency

You can set the rated frequency of the monitored application.

- **50 Hz** (by default)
- **60 Hz**
- **400 Hz**
- **DC**

Voltage adaptor (V. Adapt)

NOTE: Do not use this parameter.

Alarm configuration

You can configure the insulation alarm threshold and delay to suit to the electrical applications you want to monitor.

You can access the device alarm parameters by selecting **Menu > Settings > Ins. Alarm**.

By default, the alarm parameter is **Ins. Alarm%**, meaning the **Locating Signal** parameter is **OFF**.

When the **Locating Signal** network parameter is **ON**, then the alarm parameters are **Ins. Alarm** and **Ins. Al. Delay**.

To modify the parameter value, see IFL parameter modification using the display, page 17.

Relative insulation alarm threshold (Ins. Alarm%)

You can set the threshold value versus the calibration level.

The allowed values for this parameter are **50%**, **60%**, **70%**, **80%**, and **90%** of the calibrated signal. The default value is **50%**.

Insulation alarm (Ins. Alarm) thresholds

You can set the threshold value as per the level of insulation of the application you monitor.

The allowed values for this parameter are from **0.2 kΩ** to **200 kΩ**. The default value is **10 kΩ**.

When the device is powered up, it retrieves the last insulation alarm threshold values recorded.

An insulation alarm is cleared when the insulation level reaches 20% above the threshold.

Insulation alarm threshold hysteresis

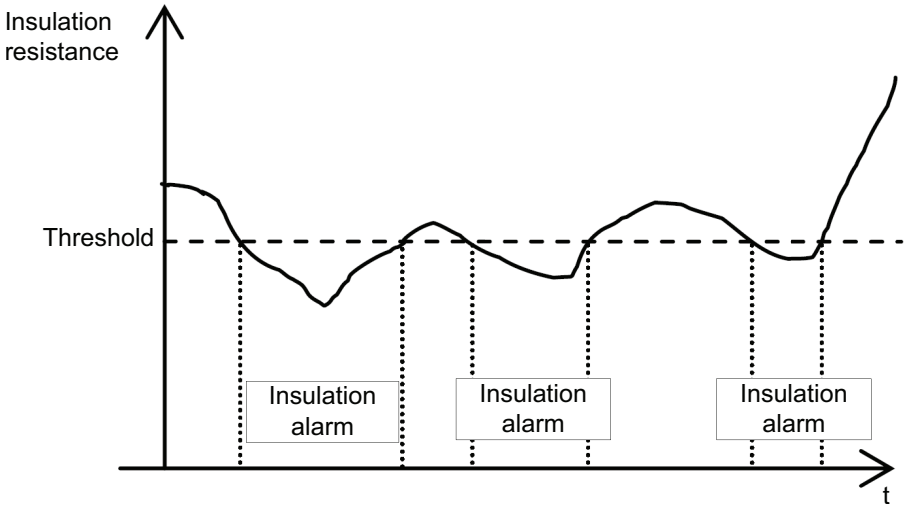
A hysteresis is applied to limit the error in the insulation alarm due to fluctuations in the measurement when approaching threshold value.

A hysteresis principle is applied:

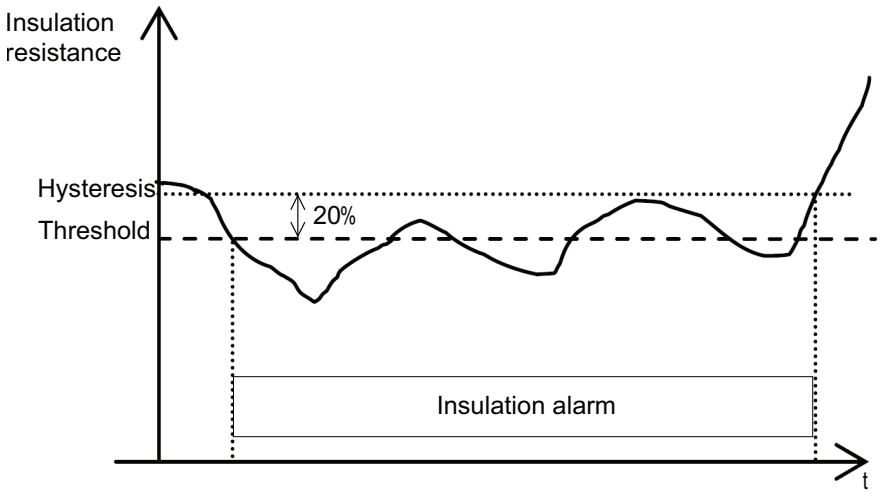
- When the insulation value measured decreases and falls below the setting threshold, the insulation alarm is triggered or the countdown is started if an insulation alarm time delay has been set.
- When the insulation value measured increases and exceeds 1.2 times the set threshold (i.e. the setting threshold +20%), the insulation alarm is deactivated and a "transient" fault is displayed through a black/white font flashing.

The following diagrams show the behaviors:

- Without hysteresis:



- With hysteresis:



Insulation alarm time delay (Ins. Al. Delay)

In some applications you might want to delay the triggering of an alarm while certain machines are starting up, otherwise erroneous alarms could be triggered. You can set the threshold delay to filter these erroneous alarms.

The threshold delay is time filter. This delay can be used in harsh electrical systems to avoid false insulation alarms. The device does not report insulation fault that do not remain for a duration longer than the delay set up.

The allowed values for this parameter are from **0 s** to **120 min**. The default value is **0 s**.

I/O configuration

You can configure the relay parameters to suit the type of relay output information.

You can access the device I/O parameters by selecting **Menu > Settings > I/O Config**.

The I/O parameters are **Ins. Al. Relay**, **Ack. Al. Relay**, and **Test w.Relays**.

To modify the parameter value, see IFL parameter modification using the display, page 17.

Insulation alarm relay (Ins. Al. Relay)

You can set the insulation alarm relay mode depending on the status of insulation.

The allowed values for this parameter are **FS** and **Std.**. The default value is **FS**.

When the insulation alarm relay is configured in failsafe (**FS**) mode:

- The insulation alarm relay is activated, that is, energized, in the following case:
  - No insulation fault is detected.
  - Transient fault is detected.
  - Insulation fault is detected and acknowledged (if **Menu > Settings > I/O Config > Ack. Al. Relay** is set to **ON**).

- The insulation alarm relay is deactivated, that is, de-energized, in the following cases:
  - Insulation fault is detected.
  - On first measurement after power cycle.
  - The product is inoperative (detected by auto-test).
  - The auxiliary power supply is lost.
  - When you trigger an auto-test with relays, the relay toggles for 3 seconds.
  - Insulation fault is detected and acknowledged (if **Menu > Settings > I/O Config > Ack. Al. Relay** is set to **OFF**).

When the insulation alarm relay is configured in standard (**Std.**) mode:

- The insulation alarm relay is activated, that is, energized, in the following cases:
  - Insulation fault is detected.
  - The product is inoperative (detected by auto-test).
  - When you trigger an auto-test with relays, the relay toggles for 3 seconds.
  - Insulation fault is detected and acknowledged (if **Menu > Settings > I/O Config > Ack. Al. Relay** is set to **OFF**).
- The insulation alarm relay is deactivated, that is, de-energized, in the following cases:
  - No insulation fault is detected.
  - On first measurement after power cycle.
  - When you trigger an auto-test with relays, the relay toggles for 3 seconds. See Test with relays (**Test w. Relays**), page 26 and Auto test overview, page 30 for more information.
  - Insulation fault is detected and acknowledged (if **Menu > Settings > I/O Config > Ack. Al. Relay** is set to **ON**).
  - The auxiliary power supply is lost.
  - Transient fault is detected.

Insulation alarm relay acknowledgement (Ack Al. Relay)

You can set the insulation alarm relay acknowledgment as per the usage of loads connected to the relay.

When the relays are connected to loads (for example, horns or lamps), it is advised to turn off these external signaling devices before the insulation level rises back to a level above the setup thresholds. This can be done by pressing the acknowledge button while in insulation alarm state.

In certain system configurations, it is required to prevent this type acknowledgement and only retrigger the relays when the insulation level rises above the setup thresholds. This is done by changing the corresponding parameter.

The allowed values for this parameter are **ON** and **OFF**. The default value is **ON**.

To set the acknowledge alarm relay ON, select **Menu > Settings > I/O Config > Ack Al. Relay > ON**.

To set the acknowledge alarm relay OFF, select **Menu > Settings > I/O Config > Ack Al. Relay > OFF**.

When the device detects an insulation fault, the insulation alarm relay is triggered.

- When the value is set to ON and on acknowledgement of the alarm, the relay returns to its initial position.
- When the value is set to OFF and on acknowledgement of the alarm, the relay does not return to its initial position.

Test with relays (Test w. Relays)

You can set a three-second toggle to the insulation alarm relay during a manually launched auto test. See Auto test overview, page 30 for information on auto test.

The allowed values for this parameter are **ON** and **OFF**. The default value is **ON**.

Operating

R and C measurements

Insulation measurements

The device monitors the insulation of ungrounded power system.

By default, the device measures and displays the relative current flow in percentage.

When locating signal is available, the device:

- measures and displays:
  - the insulation resistance R (Ω) continuously,
  - the insulation capacitance C, which is the leakage capacitance of the distribution system to ground (µF),
- calculates and displays the impedance Zc (kΩ) associated with C.

To view these values, navigate to **Menu > Monitoring**.

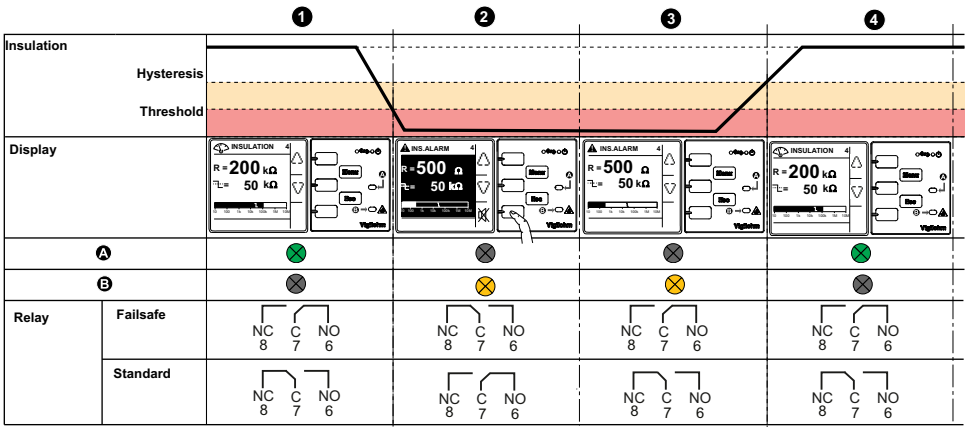
Effect of leakage capacitance and frequency disturbances on the measurement accuracy of R

The leakage capacitance (C) creates a leakage path for the measurement signal and reduces the level of the useful signal that flows through the insulation resistance (R).

IMD injects an adaptive multi-frequency measurement signal with low frequencies and includes high-performance integration algorithms. It makes the device compatible with large power systems that have a high value of leakage capacitance and this operates out of the frequency disturbance range. Because the device is compatible with IMD, the device operates correctly even with impact of leakage capacitance and frequency disturbances.

Monitoring system insulation

The device monitors the ungrounded power system insulation in resistance in accordance with the following timing diagram when the locating signal is available:



1	Network insulation is normal and no alarm
2	An insulation fault occurred. Active alarm is displayed. Press button to acknowledge the alarm. See Relay Mode, page 24 for more information on relay modes. See Relay Acknowledgement, page 25 for more information on relay acknowledgement.
3	An insulation fault occurred. Active alarm acknowledged.
4	The insulation fault is corrected. The alarm LED turns off. The device reverts to normal status.

Log

The device records the details of the 240 most recent fault events. You can access all the 240 logs through HMI. The fault events are triggered by insulation fault status.

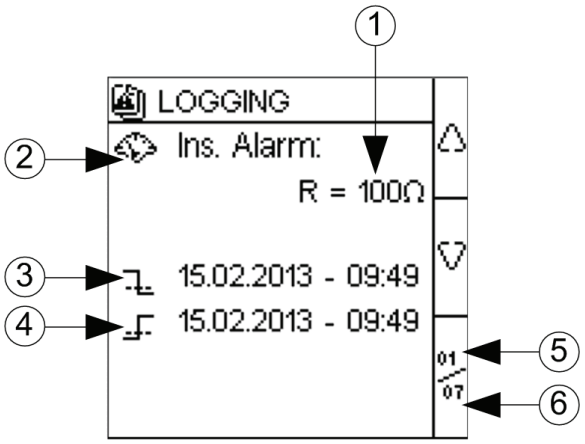
Event 1 is the event that was recorded most recently and event 240 is the oldest recorded event.

The oldest event is deleted when a new event occurs (the table is not reset).

By referring to this information, the performance of the distribution system can be improved and maintenance work is facilitated.

Insulation fault log display screen

You can the view the details of an insulation fault event by navigating to **Menu > Logging**.



1	Insulation fault value recorded
2	Type of fault recorded: Insulation fault **NOTE:** Only insulation fault is recorded as primary record.
3	Date and time when the fault appeared **NOTE:** This information is stored as primary record.
4	Date and time when the fault disappeared due to any one of the following event: • Insulation fault acknowledgement • Transient fault • Power failure while on active alarm. • Voltage signal unavailable while on active alarm. • Product or channel error while on active alarm. **NOTE:** This information is stored as secondary record.

5	Number of the event displayed
6	Total number of events recorded

Use the up and down arrows to scroll through the events.

Trends

The device records and displays the average of the system insulation in form of curves. The device displays curves as per the following durations:

- last hour (1 point every 2 minutes)
- last day (1 point per hour)

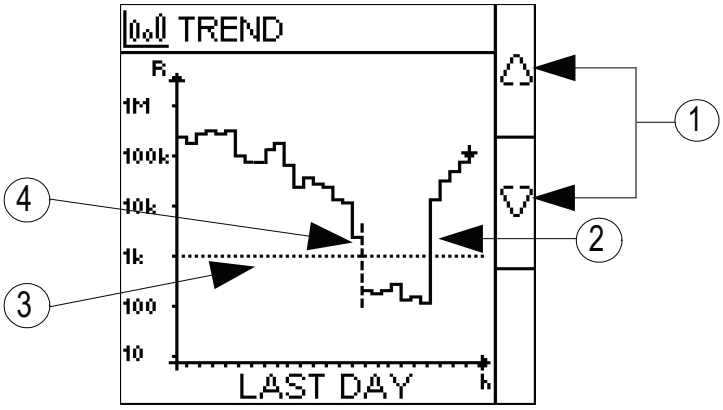
The chart scale automatically adjusts to the shown data to optimize the display accuracy.

The curves show a general trend how the system insulation evolves over time. They are calculated from averages related to shorter or longer durations depending on the charts. So charts may not show transient insulation faults when they are smoothed over time.

Trend screen

You can view the trends by navigating to **Menu > Trend**.

An example of Last Day trend page is as follows:



1	Up and down arrows: To view the pages of trend. The pages are Last hour, Last day, Last week, Last month, and Last year
2	Measured value of the insulation resistance
3	Existing value of the insulation alarm threshold
4	Vertical dotted line: indicates a power interruption (duration undefined)

Reset

You can reset logs and trends. Further, you can perform factory reset.

You can access the device reset parameters by selecting **Menu > Settings > Reset**.

The reset parameters are **Reset Logs**, **Reset Trend**, and **Factory Reset**.

On performing reset of logs or trends, the existing logs or trend information is erased but the settings parameter value remains unchanged. On performing

factory reset, the device restarts and the settings parameter values are reset to default.

The complete list of parameter settings, its default value, and allowed values are:

Parameter	Default Value	Allowed Values
Ins. Alarm	**10 kΩ**	**0.2...200 kΩ**
Ins. Al. Relay	**FS**	• **FS** • **Std.**
Modify Password	**0000**	**0000...9999**
Activation (Password)	**OFF**	• **ON** • **OFF**
Contrast	**50%**	**10...100%**
Backlight	**100%**	**10...100%**

Auto-test

Auto test overview

The device performs auto-test in background to detect any potential faults in its internal and external circuits.

The device's auto test function tests:

- The product: indicator lights, internal electronics.
- The measuring chain and the insulation alarm relay.

You can initiate auto test by pressing the **T** contextual menu button on the **Monitoring** screen. Auto test is disabled during insulation fault, transient fault, product error, or system error.

Auto test sequence

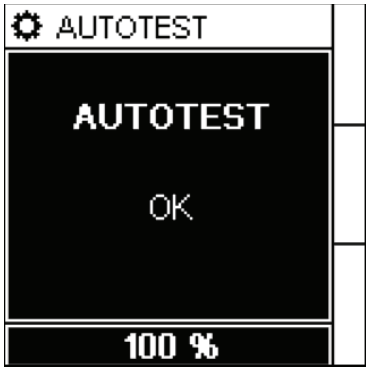
During auto test, the device's indicator lights illuminate and information is shown on the display.

The following LEDs turn ON in sequence and turn OFF after the predefined time:

1. Alarm Orange
2. No Alarm Green
3. Product Status Red
4. Product Status Green
5. Communication Orange

The relay toggles. See Test with relays, page 26 for information on performing auto test with relays.

- If the auto test is successful, the following screen appears for 3 seconds and a status screen is displayed:



- If the auto test fails, the **Product Status** LED turns ON and a message is displayed to indicate that the product is malfunctioning. Disconnect the auxiliary power supply of device and reconnect. If the fault persists, contact technical support.

Specifications

This section provides specifications for the device.

Battery Power

DC	24 V
Consumption	< 4 W
Continuous Usage	12 hours **NOTE:** Ensure to charge the battery once in 2 months when not in use.
Battery Charging	Input : 100...240 V AC, 50/60 Hz, 0.6 A Maximum Output : 29.4 V DC, 1 A

Monitored network (Maximum voltage)

AC	230 V (Voltage input connected to the system) 1000 V (Voltage input not connected to the system)
DC	230 V (Voltage input connected to the system) 1000 V (Voltage input not connected to the system)
Maximum leakage capacitance	15 µF

Electrical

Accuracy	As per IEC 61557–9

Mechanical

Weight	7 kg (15.43 lb)
Installation category	• 300 V, CAT III, Pollution degree 2

Environment

Operating temperature	-20 to +45 °C (-4 to +113 °F)
RH non-condensing	5...95%
Storage temperature	-20 to +60 °C (-4 to +140 °F)
Operating altitude	≤ 3000 m (9843 ft)
Pollution degree	2
Protection degree	IP40
Usage	For indoor and outdoor use

Standards

Product	IEC 61557-9
Safety	IEC/UL 61010-1
EMC	IEC 61326-2-4

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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