Vigilohm IM10, Vigilohm IM20

Insulation Monitoring Device
User's Guide

09/2015

Schneider Electric

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All pertinent state, regional, and local safety regulations must be observed when installing and using this
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manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must
be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in
injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Important Information

NOTICE

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 documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this 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 follow 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.

⚠ 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 only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This guide is intended for use by designers, installers, and maintenance technicians of ungrounded (IT) electrical distribution systems with insulation monitoring devices (IMDs).

Validity Note

Vigilohm IM10 and IM20 are used to check the insulation of ungrounded distribution systems in industrial and naval contexts as well as in infrastructures. They are suitable for small and mid-sized power systems (C < 60 µF for IM10 and C < 150 µF for IM20) without an automatic fault locator.

Related Documents

Title of Documentation	Reference Number
Instruction Sheet: Vigilohm IM10 Insulation Monitoring Device	BBV35440
Instruction Sheet: Vigilohm IM20 Insulation Monitoring Device	BBV35475
Vigilohm Catalog	PLSED310020EN PLSED310020FR
The IT earthing system: a solution to improve industrial electrical network availability - Application guide	PLSED110006EN
Système de liaison à la terre IT - Une solution pour améliorer la disponibilité des réseaux électriques dans l'industrie - Guide d'application	PLSED110006FR
System earthings in LV Les schémas des liaisons à la terre en BT (régimes du neutre)	Cahier technique n° 172
The IT system earthing (unearthed neutral) in LV Le schéma IT (à neutre isolé) des liaisons à la terre en BT	Cahier technique n° 178

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Chapter 1
Presentation

What Is in This Chapter?

This chapter contains the following topics:

Presentation

Using the IT System to Improve the Availability of Power Systems

Continuity of service is an essential operational requirement for power systems, as is ensuring the protection of people and property. There are many applications which vary from country to country. Apart from mandatory situations (hospitals, the navy), the IT system is typically used in instances where the unavailability of power could result in lost production or incur significant downtime costs. Other potential applications are when there is a need to minimize the risk of fire and explosion. Lastly, this system is chosen in certain cases because it can facilitate preventive and corrective maintenance operations.

The "ungrounded" (IT) system is the best option for ensuring continuity of service. Even after an initial insulation fault has occurred, the installation can continue to operate without hazard to people and equipment. However, the faulty circuit must be detected and repaired before a second fault occurs. As the IT system can tolerate an initial fault, maintenance operations can be improved and carried out safely and without any pressure.

Monitoring Insulation Resistance (R)

The IEC 364 and IEC 61557-8 standards clearly state that, with the IT system, the installation must either be ungrounded or must be grounded using a sufficiently high level of impedance.

In the event of only one ground or earth fault, the fault current is very low and interruption is unnecessary. However, given that a second fault could potentially cause the circuit breaker to trip, an insulation monitoring device has to be installed to indicate an initial fault. This device must trigger an audible and/or a visual signal.

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

Monitoring the Leakage Capacitance (C)

Under the IEC 60364-4-41 standard, the following conditions must be met to ensure protection from indirect contact in an AC power system:

$$R_A \times I_d \leq 50 \ V$$

Where:

- R_A is the sum of the resistance values in Ω for the ground connection.
- I_d is the fault current, in A, in the event of an initial dead short.
- 50 V is the maximum acceptable voltage for indirect contacts.

For the three-phase, ungrounded AC power system, the indirect contact I_d is $I_d = 2\pi \times F \times C \times V$

Where:

- C is the earth leakage capacitance of the AC power system.

- F is the AC power system frequency.

- V is the phase to neutral voltage.

The following condition must therefore be met to ensure protection against indirect contact:

$$2\pi \times F \times V \times C \times R_A \leq 50 \ V$$

Thus, it is necessary to have a good level of grounding resistance and to monitor C, as I_d is dependent on the impedance of C ($I_d = U / Z_c$).

One solution is to display the value of C so you can check that it is below the limit. It is also important to avoid a situation whereby an industrial site is dependent on a single insulation transformer, particularly as a result of grounding schemes being shared by different applications (islanding). Sample limit: 70 µF for a 440 V power system, 40 µF for a 690 V power system.

For more information, see *Cahier Technique n°178*.

Working of VigilohmIM10 and IM20

Vigilohm IM10 and IM20 are digital insulation monitoring devices (IMD) for low-voltage ungrounded (IT) power systems (Umax = 480 Vac Ph-Ph or Umax = 345 Vdc). They monitor the insulation of a power system and notify any insulation faults as soon as they occur.

Vigilohm IM10 and IM20 apply low-frequency AC voltage between the power system and the ground. The insulation is then assessed on the basis of the resulting current. This technique is used for all power system types - AC, DC, combined, rectified, with a variable speed drive, etc.

Vigilohm IM10 and IM20 offer the following features:
- Insulation resistance display (R)
- Detection of insulation faults in accordance with a configurable threshold

Vigilohm IM20 offers these additional features:
- Leakage capacitance display (C) with associated impedance (Zc)
- Communication via the ModbusRS-485 protocol
- Injection inhibition via logic input
- Insulation fault log

Selection Guide

Function	Vigilohm IM10	Vigilohm IM20
Measurement and display of IT system insulation resistance	√	√
Measurement and display of leakage capacitance (C)	–	√
Calculation of impedance Zc associated with C	–	√
Time-tagged insulation fault log	–	√
Communication via Modbus RS-485	–	√
Injection inhibition input	–	√
High-voltage adapter compatibility	–	√

Physical Description

Physical Description

Vigilohm IM10 and IM20 feature 3 and 5 terminal blocks respectively (markers A to E). The various elements of Vigilohm devices are shown in the diagram below:
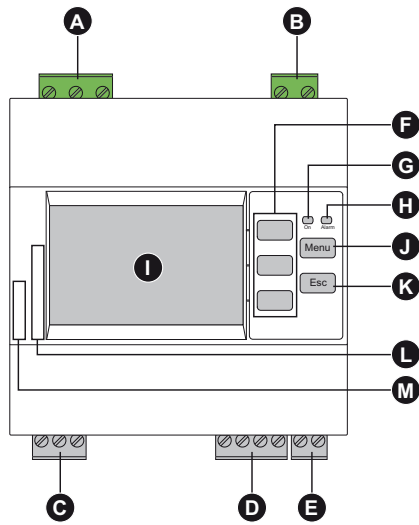
A   Injection connection terminal block
B   Vigilohm auxiliary power supply connection terminal block
C   Insulation alarm relay connection terminal block
D   Modbus communication connection terminal block (Vigilohm IM20)
E   Injection inhibition input terminal block (Vigilohm IM20)
F   Contextual menu buttons
G   Operating indicator light
H   Insulation alarm indicator light
I   Display
J   **Menu** button to go to the main menu
K   Back button to return to the previous menu or cancel a parameter entry
L   Vigilohm serial number
M   Vigilohm product catalog number (IMD-IM10 or IMD-IM20)

Accessories

Presentation

The following accessories are sometimes required when installing Vigilohm IM10 and IM20:
- A Cardew C surge limiter
- ZX impedance

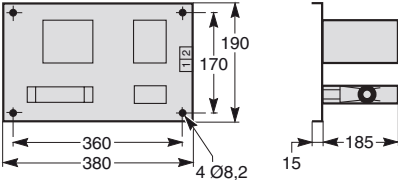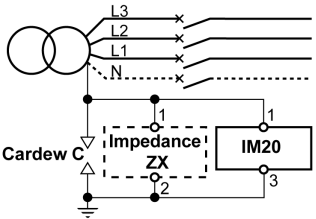Below is a list of accessories for Vigilohm devices:

Accessory	Vigilohm IM10	Vigilohm IM20	Catalog number
Cardew C "250 V" surge limiter	√	√	50170
Cardew C "440 V" surge limiter	√	√	50171
Cardew C "660 V" surge limiter	–	√[1]	50172
Cardew C "1000 V" surge limiter	–	√[1]	50183
Cardew C base	√[2]	√[2]	50169
ZX impedance (limiting impedance)	√	√	50159
Adaptateur haute tension (HT) IM20-1700	–	√	IMD-IM20-1700
(1) Compatible with Vigilohm IM20 used with a IM20-1700 high voltage adapter.			
(2) Compatible with all Cardew C catalog numbers			

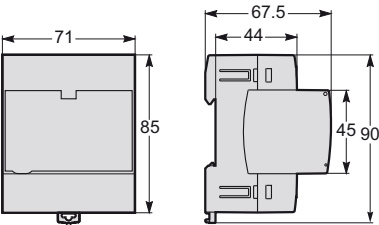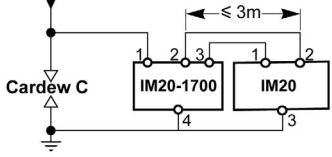**NOTE:** For all information regarding mobile fault locating accessories, please refer to the relevant section .

Cardew C Surge Limiter

Function	Cardew C is used if the insulation monitoring device is connected to the secondary connection of an MV/LV transformer (according to the rules and conventions that apply in the various countries). It protects the low-voltage (LV) installation against overvoltage hazards. It is connected to the secondary connection of the transformer. Cardew C can be used on the following systems: • U < 1000 Vac • U < 300 Vdc

Selection Table	**Un: nominal phase-to-phase voltage of the AC power system**		**Ui: arcing voltage**	**Type of Cardew C**
	Neutral available	Neutral not available		
	U ≤ 380 V	U ≤ 220 V	400 V < Ui ≤ 750 V	"250 V"
	380 V < U ≤ 660 V	220 V < U ≤ 380 V	700 V < Ui ≤ 1100 V	"440 V"
	660 V < U ≤ 1000 V	380 V < U ≤ 660 V	1100 V < Ui ≤ 1600 V	"660 V"
	1000 V < U ≤ 1560 V	660 V < U ≤ 1000 V	1600 V < Ui ≤ 2400 V	"1000 V"

Dimensions	
Mounting	• Cardew C mounted directly on busbars • Mounting with plate-mounted base
Connection	

ZX Limiting Impedance

Function	ZX limiting impedance enables you to create an installation with a high-impedance grounded neutral system (1500 Ω to 50 Hz). ZX limiting impedance can be used on the following systems: ● Umax = 480 Vac ● Umax = 345 Vdc
Dimensions	mm
Mounting	On mounting plate
Connection	

High voltage adapter for Vigilohm IM20

Function	The high voltage adapter (catalog number IMD-IM20-1700) can be used to connect a Vigilohm IM20 device to voltage systems exceeding 480 Va L-L (connection with 400 V cable).
Dimensions	mm
Mounting	On DIN rail
Connection	 (1) Injection in phase (2) Injection in neutral

Chapter 2
Installation

What Is in This Chapter?

This chapter contains the following topics:

Safety Measures

Specific Hazard Associated with Insulation Monitoring Devices (IMDs)

In the case of almost all electric and electronic devices, the device's power supply is the root cause of electrical hazards. The hazard can be eliminated by disconnecting the power supply.

This is not the case with insulation monitoring devices, which are connected to the system via the injection wire.

Consequently, this connection must be broken before carrying out any kind of work on the product.

⚡ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Before carrying out work of any kind, disconnect the Vigilohm from the monitored system by disconnecting the injection wire at terminal 1. Disconnect all the power supplies running to the Vigilohm and the equipment on which it is installed.
- Always use a correctly calibrated voltage tester to check that the injection wire and power supply have been properly disconnected.

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


Other Safety Measures

Carefully read through the safety measures described below. You are always required to implement them fully before attempting to install, repair, or service electrical equipment.

⚡ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions.
- This equipment may only be installed by qualified electricians who have read all the relevant information.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested and tagged. Pay particular attention to the design of the power system. Consider all power supply sources, particularly the potential for backfeed.
- Before closing protective covers and doors, carefully inspect the work area to ensure that no tools or objects have been left inside the equipment.
- Take care when removing or replacing panels. Take special care to ensure that they do not come into contact with live busbars. To minimize the risk of injuries, do not tamper with the panels.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Failure to follow basic installation procedures can lead to personal injury as well as damage to electrical equipment or other property.
- NEVER shunt an external fuse/circuit breaker.
- The Vigilohm must be installed in a suitable electrical cabinet.

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

Dimensions

Vigilohm Dimensions
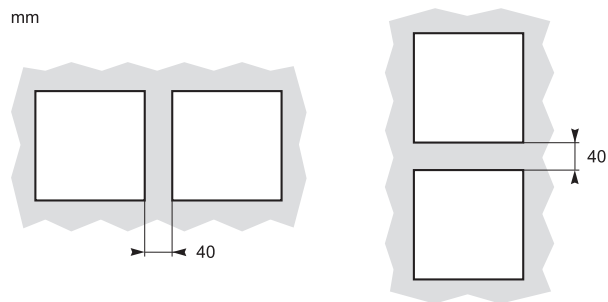
mm
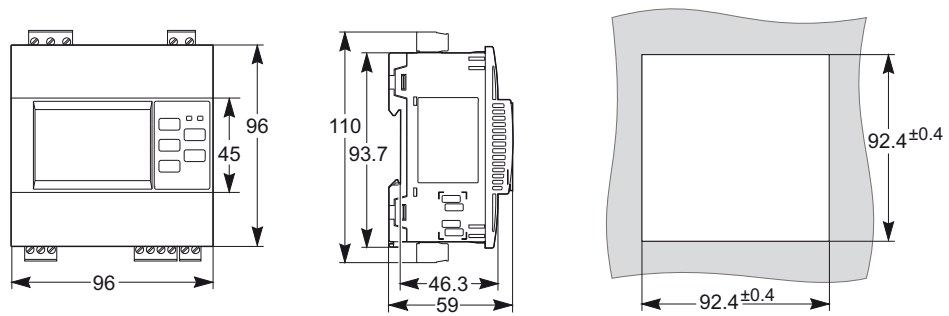
⚠ CAUTION
CUTTING HAZARD
Trim the edges of the cut-out plates to remove any jagged edges.
Failure to follow these instructions can result in injury or equipment damage.

Constraints for Flush-mounting

Observe the correct distances between devices.

mm

Flush-mounting and Dismantling

Presentation

Vigilohm can be attached to any flat, rigid vertical support using the 3 spring clips supplied. The device must not be tilted following installation.

To free up useful space for control gear, you can fix Vigilohm on the front panel of the floor-standing or wall-mounted enclosure.

Installing on a Support

Before fixing Vigilohm, check the following:
● The mounting plate must have a thickness of 0.8 to 3.2 mm.
● A square measuring 92 x 92mm must be cut out from the plate so the device can be installed.
● No terminal blocks must be connected to the unit.

To install Vigilohm, proceed as follows:

Step	Action
1	Insert Vigilohm in the cut-out in the mounting plate by tilting the device forward slightly.
2	Depending on the thickness of the mounting plate, clip the 3 spring clips into the fixing slots on the device as follows: <table><tr><th>Mounting Plate Thickness</th><th>Fixing Slots to Be Used</th></tr><tr><td>0.8 mm ≤ X ≤ 2 mm</td><td>image</td></tr><tr><td>2 mm < X ≤ 3.2 mm</td><td>image</td></tr></table>
3	Wire up and insert the terminal blocks as shown in the relevant wiring diagram *(see page 21)* and as appropriate for the type of device concerned (Vigilohm IM10 or IM20) *(see page 12)*.

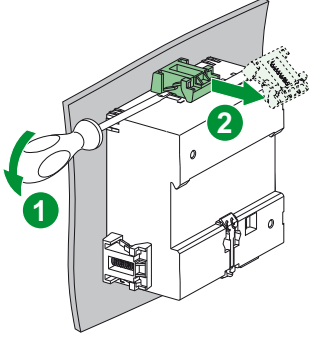|	Mounting Plate Thickness	Fixing Slots to Be Used
	0.8 mm ≤ X ≤ 2 mm	
	2 mm < X ≤ 3.2 mm	

Removing the Mounting Plate

To remove Vigilohm from a mounting plate, proceed as follows:

Step	Action
1	Disconnect the terminal blocks from Vigilohm.
2	For each of the 3 spring clips: insert the blade of a screwdriver between the spring clip and the device. Then use the screwdriver as a lever to release the spring clip.
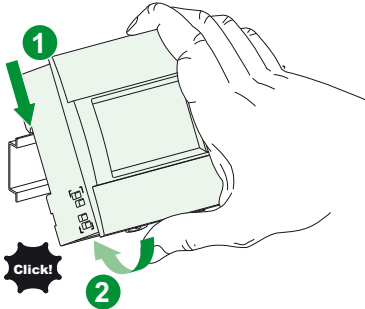
DIN Rail Mounting and Dismantling

Presentation

You can install Vigilohm on a DIN rail. The device must not be tilted following installation.
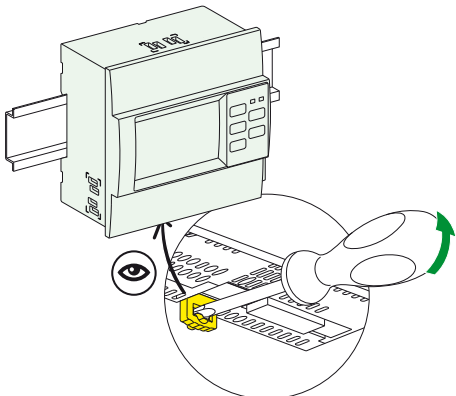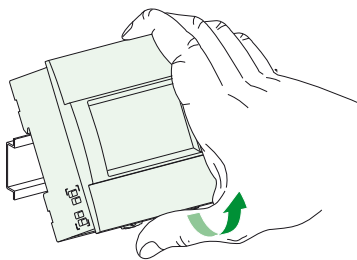
Mounting on DIN Rail

To install Vigilohm on a rail, proceed as follows:DIN

Step	Action
1	Position the 2 upper slots on the rear of Vigilohm on the DIN rail.
2	Press the device against the DIN rail until the locking mechanism engages. The device is fixed to the rail.

Removing from a DIN Rail

To remove Vigilohm from a DIN rail, proceed as follows:

Step	Action
1	Using a flat screwdriver (≤ 6.5 mm), push down the locking mechanism to release the device.
2	Lift the device up to free it from the DIN rail.

Connection

Connection Diagram

The diagram below illustrates how to connect Vigilohm to a single-phase or three-phase 3- or 4 wire power system.

NOTE: Terminals 11 to 16 are not available on Vigilohm IM10.
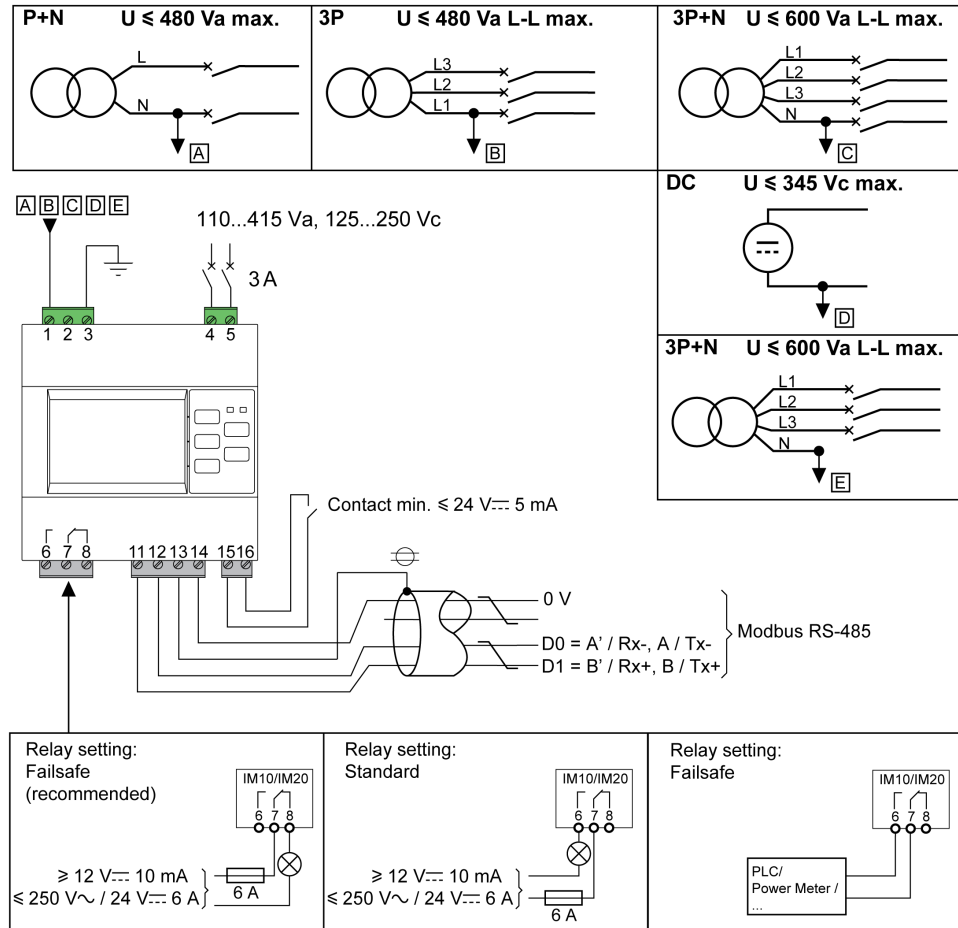
The relay operating mode (fail-safe or standard) is controlled via the HMI of the Vigilohm (IM10/IM20) device or by means of Modbus communication (Vigilohm IM20).

Connection Characteristics

All the terminals of Vigilohm IM10 and IM20 have identical characteristics.

The table below shows the characteristics of the cables that can be used to connect the terminals:

Stripped Length	Cable c.s.a.	Tightening Torque	Type of Screwdriver
7 mm	0.2...2.5 mm²	0.8 N•m	Flat, 3 mm

Typical Applications

Presentation

This section presents 3 insulation monitoring applications for an ungrounded (IT) island:

● One with Vigilohm IM10
● One with Vigilohm IM10 where the insulation alarm is sent to a supervisor
● One with a networked Vigilohm IM20

Monitoring the Insulation of an IT with Vigilohm IM10

An IT island is a subsystem involving the use of a transformer whose neutral is not connected to ground.

The insulation is monitored by Vigilohm IM10 having the following characteristics:

● It is generally powered by the system that it monitors.
● It is connected to neutral (or to one phase) and ground.
● Its only setting is the fault threshold level.
● It has a single relay output to a light or a buzzer.
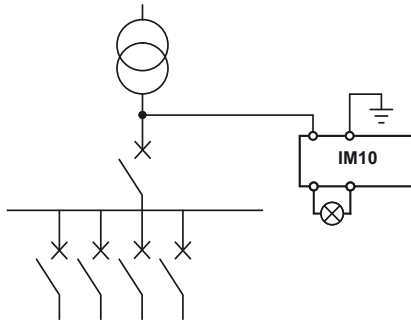
Monitoring the Insulation of an IT Island Using Vigilohm IM10 Where the Alarm is Sent to a Supervisor

The insulation is monitored by Vigilohm IM10 whose alarm output is connected to an available input on a networked device (Power Meter or (PLC) for example). This device is itself connected to a supervisor via a communication network.

The restriction as far as this architecture is concerned is the fact that only the fault information is available to the supervisor.
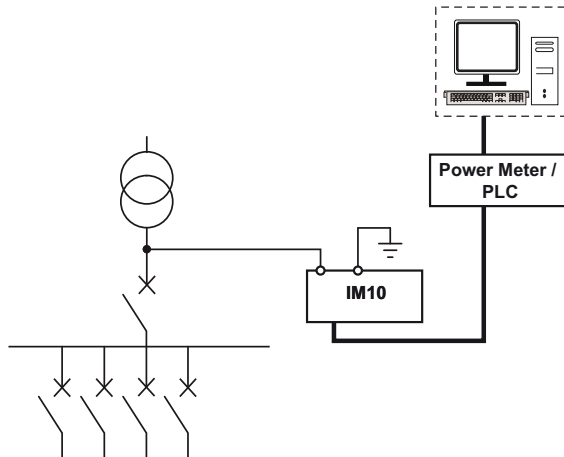
Monitoring the Insulation of an IT Island with a Networked Vigilohm IM20 Device

When the Vigilohm IM20 monitoring device is linked to the supervisor via a Modbus connection, the following actions are supported:

- Display:
  - The product status
  - The state of the insulation alarm (active, inactive, acknowledged)
  - Details of the last 30 time-tagged events
  - The values for R and C in order to create tables or curves for monitoring these values over variable periods

- Configure the product remotely. All the settings can be accessed remotely, with the exception of the Modbus parameters.
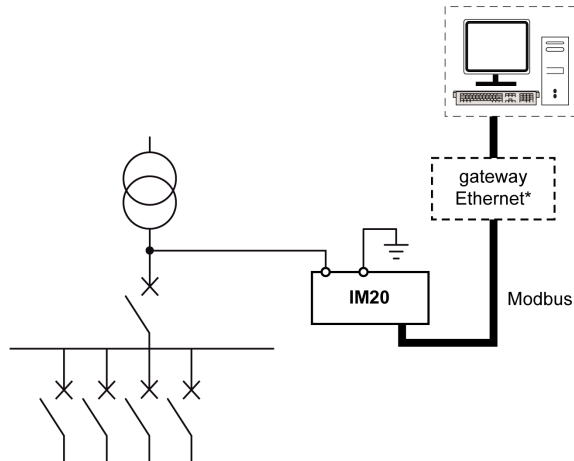
* The architecture option that involves going via an Ethernet gateway enables you to make use of an existing Ethernet network.

Chapter 3
Functions

What Is in This Chapter?

This chapter contains the following topics:

R and C Measurement

Insulation Measurements

VigilohmIM10 and IM20 are designed to monitor the IT system insulation and continuously measure R, which is the insulation resistance (kΩ).

Vigilohm IM20 also measures C, which is the leakage capacitance to the distribution system (µF), and calculates the impedance Zc (kΩ) associated with C.

General Information on R Measurement Accuracy

When measuring the insulation resistance R, a high degree of accuracy is not required because the aim is merely to detect a fault and to anticipate an abnormal drop in the insulation value.
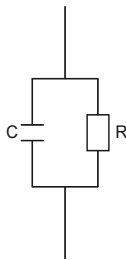
In practice, the level of accuracy remains good across the normal usage range Although it deteriorates outside of this range, there is no impact as far as the user is concerned.

Physical Limits of R and C

The diagram below shows the insulation resistance R and the leakage capacitance C of the power system.

Possible Scenarios in Practice

The following situations may occur on an installation. The gray arrows represent the preferred route for the IMD injection signal.

R and C value	R Weak (in the event of a fault)	Medium C, medium R	R and C high
equivalent circuit diagram			
Impact on measurements	Most of the injection signal goes into R. Throughout the duration of the insulation fault, the R measurement is inaccurate. Measuring C is difficult, particularly if C is weak.	The injection signal is shared between R and C. R and C can be measured correctly.	The injection signal that goes into R is weak. It becomes difficult to measure R and is completely impossible in the case of very high C values. C is measured correctly.
Significance of R	Significant measurement for the installation.	Significant measurement for the installation.	Obtaining an accurate measurement of R is not important, as the system is sound.
Significance of C	Obtaining a measurement of C is of no significance when there is an insulation fault.	Significant measurement for the installation.	Significant measurement for the installation. An excessively high C value corresponds to the maximum limits of an IT system. Above 60 µF (150 µF with filtering of 160 seconds), the product is outside of its operating range and fails.

Accuracy Zones

The chart below represents the accuracy zones of Vigilohm in the following conditions:
- 25°C (77°F)
- 40% relative humidity
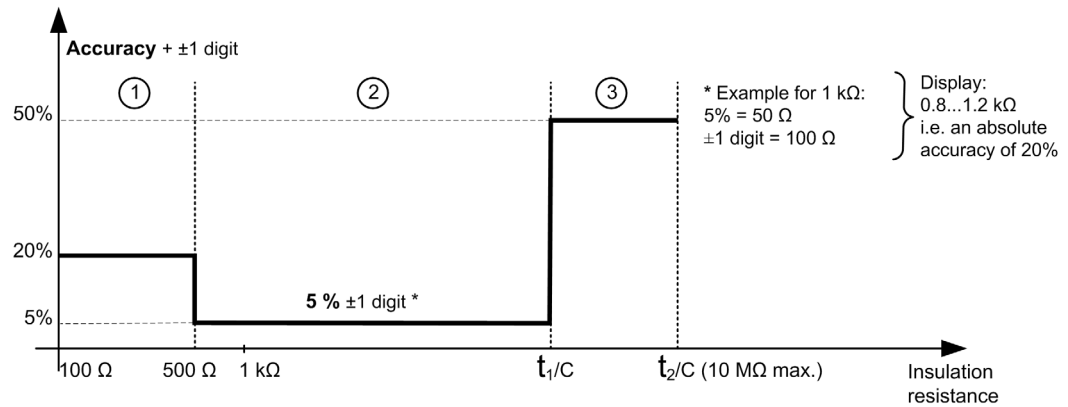
(1) Level of R is weak (in the event of fault).
(2) Levels of R and C are medium.
(3) Levels of R and C are high.

- With **filtering of 4 s**
  - $\tau_1 = 1$
  - $\tau_2 = 4$

- With **filtering 40 s or 160 s**
  - $\tau_1 = 2$
  - $\tau_2 = 10$

Accuracy Zone Limit

In practice, the accuracy zone limit is linked to the product of R (MΩ) x C (µF). The limit for Vigilohm is dependent on the type of filtering selected:
- With **filtering of 4 s**, $\tau_2 = R_{max}$ x C = 4
- With **filtering of 40 s or 160 s**, $\tau_2 = R_{max}$ x C = 10

Example with filtering of 4 s:

$\tau_1 = 1$	$\tau_2 = 4$
If C = 1 µF: τ_1/C = 1 MΩ	If C = 1 µF: τ_2/C = 4 MΩ
If C = 10 µF: τ_1/C = 100 kΩ	If C = 10 µF: τ_2/C = 400 kΩ

Example with filtering of 40 s or 160 s:

$\tau_1 = 2$	$\tau_2 = 10$
If C = 1 µF: τ_1/C = 2 MΩ	If C = 1 µF: τ_2/C = 10 MΩ
If C = 10 µF: τ_1/C = 200 kΩ	If C = 10 µF: τ_2/C = 1 MΩ

Monitoring Power System Insulation

Functional Description

Vigilohm monitors the IT power system insulation in kΩ in accordance with the following timing diagram:
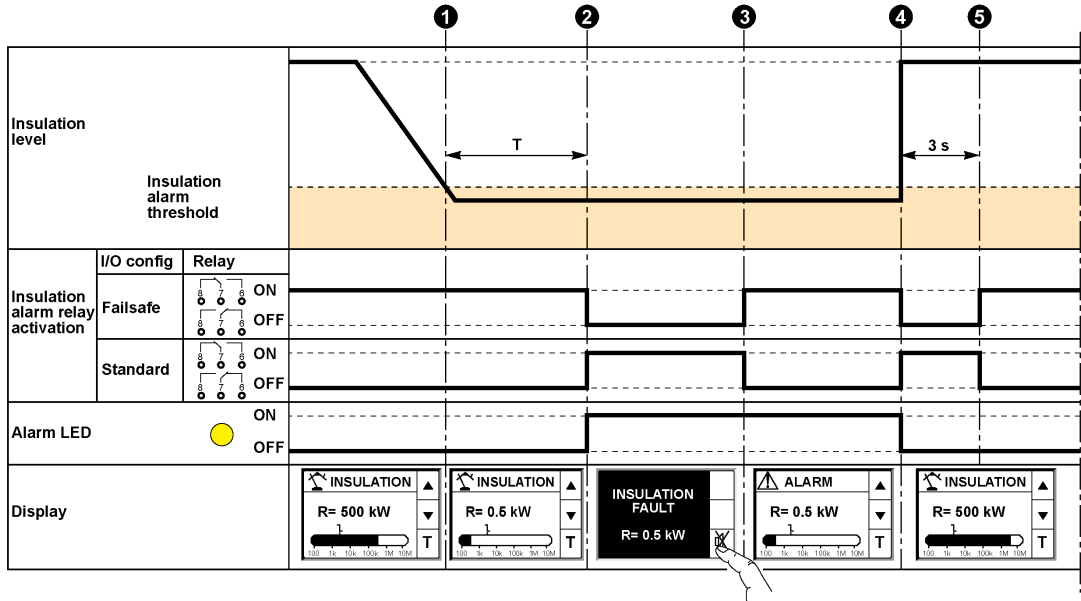
❶ An insulation fault is detected in the power system.

❷ Once T has elapsed (alarm time delay), Vigilohm switches to the insulation alarm status. The insulation alarm relay changes over and the alarm LED lights up.

❸ You must acknowledge the insulation alarm by pressing the ⌧ button. The insulation alarm relay reverts to its initial status.

❹ When the insulation fault has been corrected, the insulation alarm relay changes over for 3 s to confirm that the user has located the insulation fault (by opening circuit breakers in order to find the insulation fault, for example).

❺ Vigilohm reverts to normal status.

When Vigilohm is in the insulation alarm state and the user does not acknowledge the insulation alarm, the insulation fault is transient.

Status Information

The display and the 2 two-color indicator lights on Vigilohm indicate the device's current status.

LEDs		Description
ON	**Alarm**	
⊗	⊗	Vigilohm powered off
🟢 flashes slowly	⊗	Vigilohm powered on, no insulation fault detected
🟢 flashes slowly	⚪	Vigilohm powered on, prev. alarm detected
🟢 flashes slowly	🟡	Vigilohm powered on, insulation fault detected
🟢 flashes slowly	⊗ flashes	Vigilohm powered on, transient insulation fault detected
🔴	⊗	Vigilohm powered on but malfunctioning

Prev. Alarm and Alarm Thresholds

You can set the prev. alarm and insulation alarm thresholds as follows:

Threshold	Setting Range	Default Value
Prev. alarm	1 kΩ...1 MΩ	Inactive
Insulation alarm	0.5...500 kΩ	1 kΩ

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

The prev. alarm threshold must always be higher than the insulation alarm threshold.

Prev. Alarm and Insulation Alarm Threshold Hysteresis

When the insulation value measured is close to the set threshold, fluctuations in the measurements may trigger transient, inappropriate insulation alarms (the reading fluctuates around the threshold).

A hysteresis device is used to limit this instability:
● When the insulation value measured decreases and falls below the setting threshold, the insulation alarm or prev. alarm is triggered or the countdown is started if an insulation alarm time delay has been set.
● When the insulation value measured increases and goes beyond 1.2 times the setting threshold (i.e. the setting threshold+20%), the insulation alarm or prev. alarm is deactivated.

The diagrams below describe these behaviors:
● Insulation monitoring device without hysteresis:
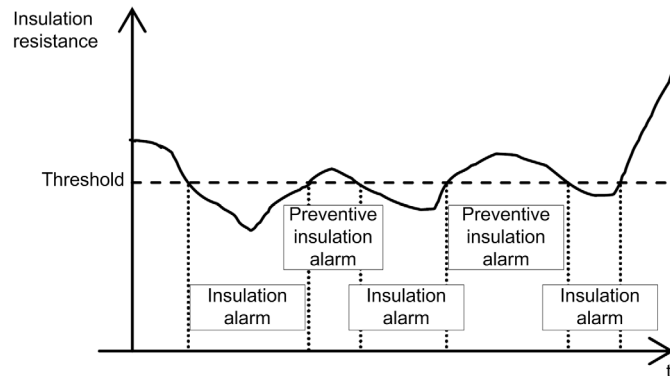
● Vigilohm with 20% hysteresis:
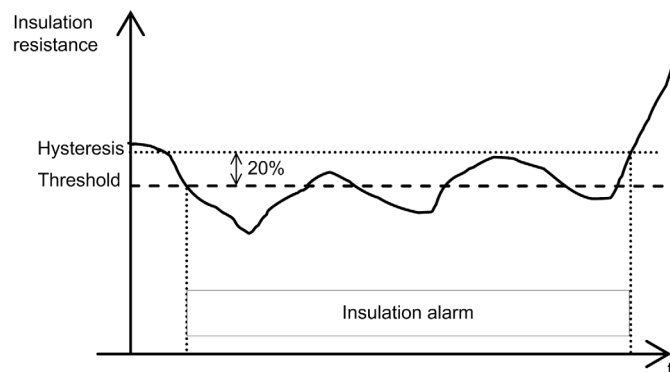
Filtering (Measurement Quality)

On a system, the measurement varies continuously depending on the following:
- Number of loads
- Type of loads
- Load switching
- Size of the system (effect of C)

To prevent the display from fluctuating and to avoid inappropriate alarms, the measurements are filtered for 4 s, 40 s or 160 s.

The **Filtering** parameter offers a choice between the following 3 modes:

Filtering	Description	Example of Use	Measurement Update Time When Monitoring the Insulation	Response Time Required to Detect an Insulation Fault
4 s	Optimizes the reponse time: • Manual fault location phase • Automatic location of a transient fault	To facilitate manual location of a fault by opening each of the circuit breakers in turn	0.8 s	4 s
40 s	Suitable for most applications	–	8 s	40 s
160 s	Suitable for highly demanding applications.	To be used for severely disrupted power supply systems or for photovoltaic applications.	32 s	160 s

The default value for the **Filtering** parameter is **40 s**.

Insulation Alarm Time Delay

It sometimes makes sense to delay the triggering of an alarm while certain machines are starting up, otherwise erroneous alarms could be triggered. To set the insulation alarm time delay, proceed as follows:

Setting	Setting Range	Default Value
Insulation alarm time delay	0 s...120 minutes	0 s

Insulation Alarm Relay

Depending on the insulation status, the insulation alarm relay may be activated or not according to the selected mode: failsafe (default mode) or standard.

The failsafe insulation alarm relay is activated in the following cases:
- Insulation fault has been detected.
- The product has failed.
- The auxiliary voltage of the power supply is accidentally lost.
- After the insulation fault disappears, the insulation alarm relay is activated for 3 seconds. This makes it easier to locate the fault when using the method that involves opening each of the circuit breakers in turn. Given that the circuit breakers may be located at some distance from Vigilohm, the audible signal allows you to identify and locate the fault from a distance.

Zc Impedance Display (Vigilohm IM20)

In order to calculate the Zc value, the frequency of the power system must be configured. The accepted values are DC (for a DC power system), 50 Hz, 60 Hz and 400 Hz. The default value is 50 Hz.

Operation in Power Systems Exceeding 480 Vac or 345 Vdc (Vigilohm IM20)

When used in a power system exceeding 480 Vac or 345 Vdc with a high voltage adapter (IM20-1700), parameter **Adapt. V.** must be set in **HV1700**. The default value is **Sans** (operation without an adapter and in a power system below 480 Vac or 345 Vdc).

Injection Inhibition Input (Vigilohm IM20)

Exclusion

The IMD injects a low frequency into the system. In a system with several incoming feeders, depending on the circuit breaker position, there must be no more than one IMD injecting into the system.

This injection exclusion is managed by the inhibition input of Vigilohm IM20, which is connected to the auxiliary contacts of the circuit breakers.

The injection inhibition input can be configured to use an NO contact (injection activated when the contact is open and injection deactivated when the contact is closed) or a NC contact (injection activated when the contact is closed and injection deactivated when the contact is open). The default value is NO.

Example of Exclusion with 2 Incoming Feeders

If	Then
• If D1 is closed and • D2 is open	Both Vigilohm IM20 devices are active: • Vigilohm IM20 No. 1 monitors the insulation of the system, • Vigilohm IM20 No.2 only monitors the insulation of the transformer 2 connection as far as D2.
• If D1 is open and • D2 is closed	Both Vigilohm IM20 devices are active: • Vigilohm IM20 No. 1 monitors the insulation of the transformer 1 connection as far as D1, • Vigilohm IM20 No.2 monitors the insulation of the system.
• If D1 is closed and • D2 is closed	• Vigilohm IM20 No.1 monitors the insulation of the system. • Vigilohm IM20 No.2 must be inhibited.

Example of Exclusion with 2 Incoming Feeders and One Coupling

If	Then
If the coupling is closed	The same applies as in the exclusion example above involving 2 incoming feeders.
● If the coupling is open and ● D1 is closed ● D2 is closed	Both Vigilohm IM20 devices are active: ● Vigilohm IM20 no.1 monitors the insulation of system 1, ● Vigilohm IM20 no.2 monitors the insulation of system 2.

Vigilohm IM20 no.2 must be inhibited when the following 3 conditions are met:
● D1 is closed.
● D2 is closed.
● The coupling is closed.

Example of Exclusion with Multiple Incoming Feeders and Couplings

By using a PLC, the wiring can be simplified and complex configurations can be considered.
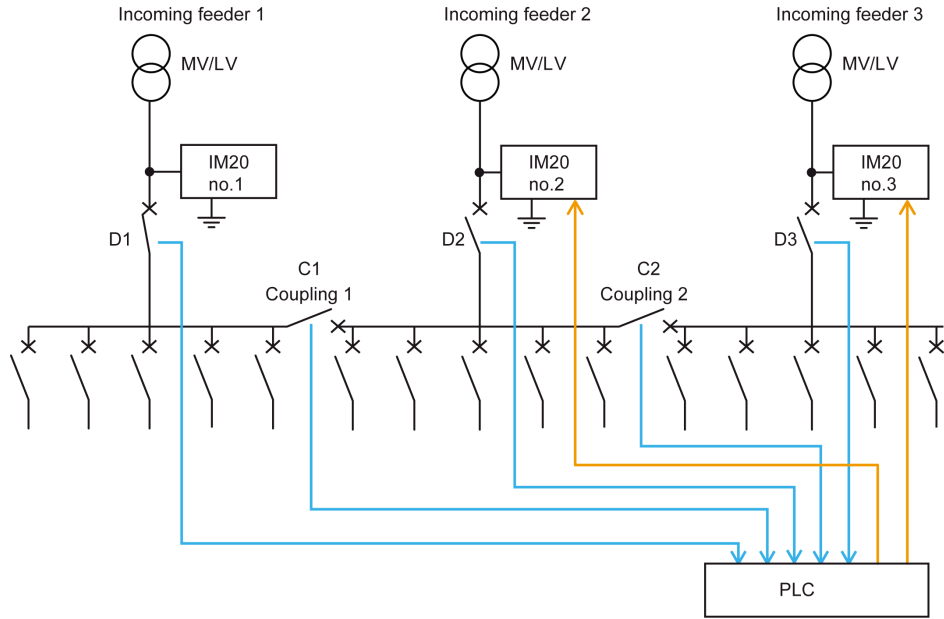
Truth table:

Possible Configurations					1 = Injection Inhibition		
D1	**D2**	**D3**	**C1**	**C2**	**IM20 no.1**	**IM20 no.2**	**IM20 no.3**
0	0	0	0	0	0[1]	0[1]	0[1]
0	0	0	0	1	0[1]	0[1]	0[1]
...							
0	1	1	1	1	0[1]	0[2]	1[3]
...							
1	1	1	1	1	0[2]	1[3]	1[3]
(1) Vigilohm IM20 monitors the transformer.							
(2) Vigilohm IM20 injects a signal into the system.							
(3) Vigilohm IM20 is excluded from the system (injection inhibited).							

Injection Inhibition Screen

When the injection inhibition function of the Vigilohm IM20 is activated, the screen below appears and replaces any system status screen that may be showing already (insulation measurement, insulation alarm or prev. alarm):

You can perform the following actions on this screen:
- Press the **Menu** button to go to the main menu.
- Press the arrow contextual menu buttons to view the settings screen.
- Press the **T** contextual menu button to run the self-test.

Self-test

Description

Vigilohm has a self-test function for testing:
- The product: indicator lights, internal electronics,
- The measuring chain and the insulation alarm relay.

Running the Self-Test

The test can be run/runs:
- Manually at any time by pressing the **T** contextual menu button on one of the system insulation monitoring screens.
- Automatically:
  - Whenever the device starts up (power-up or reset),
  - Every 5 hours (except when the device is in the insulation alarm status, regardless of whether the alarm is active, has been acknowledged, or is transient).

Indicator Light Sequence

During the verification sequence, the indicator lights light up in the following order:
- **Alarm** white
- **ON** red
- **Alarm** yellow
- **ON** green

Self-test OK

If the self-test is successful, the following screen appears for 3 seconds:

Then, one of the status screens is displayed automatically (power system insulation resistance measurement, insulation default alarm).

Self-test Not OK

If the self-test fails, the **Alarm** indicator light turns red and a message is displayed to indicate that the product is malfunctioning.

If this happens, briefly disconnect the auxiliary power supply of Vigilohm. If the fault persists, contact technical support.

Chapter 4
Human Machine Interface

Presentation

The Vigilohm features a sophisticated and intuitive human machine interface (HMI) with signaling LEDs, a graphic display, and contextual menu buttons for accessing the information required to operate the Vigilohm and make parameter settings.

What Is in This Chapter?

This chapter contains the following topics:

Vigilohm IM10 Menu Structure

Vigilohm IM10 Menu Structure

```
MENU

  Monitoring  ◄──►   INSULATION
                     R = ... kΩ

                      SETUP SUMMARY
                     Ins. Alarm: ...  kΩ
                     Ins. Al. Delay: ... s
                     Setting: ...s

  Settings    ◄──►  Ins. Alarm  ◄──►  Ins. Alarm
                                      Ins. Al. Delay
                                      Prev. Alarm
                                      Disconnect. Inj.

                    Filtering   ◄──►  Setting: 4 s /40 s /160 s

                    I/O Config  ◄──►  Relay

                    Password    ◄──►  Activation
                                      Password

                    Display     ◄──►  Contrast
                                      Backlight

  Language    ◄──►  English
                    Français
                    Русский
                    中文
                    Español
                    Italiano
                    Deutsch
                    Português

  Identification ◄──►  IMD-IM10
                       Firmware Version
                       Serial No.
                       QR Code (Smartphone)
```

Vigilohm IM20 Menu Structure

Vigilohm IM20 Menu Structure

```
MENU

  Monitoring  ◄►   INSULATION
                   R = ... kΩ

                   IMPEDANCE
                   C = … µF
                   Zc = ... kΩ

                   SETUP SUMMARY
                   Ins. Alarm: ...  kΩ
                   Ins. Al. Delay: ... s
                   Setting: ...s

  Logging

  Settings    ◄►   Date/Time

                   Ins. Alarm     ◄►   Ins. Alarm
                                       Ins. Al. Delay
                                       Prev. Alarm
                                       Disconnect. Inj.

                   Filtering      ◄►   Setting:  4 s /40 s /160 s

                   Network        ◄►   Frequency
                                       V. Adapt.

                   I/O Config     ◄►   Relay
                                       Inhibit. Input

                   Modbus         ◄►   Auto Config
                                       Address

                   Password       ◄►   Activation
                                       Password

                   Display        ◄►   Contrast
                                       Backlight

  Language    ◄►   English
                   Français
                   Русский
                   中文
                   Español
                   Italiano
                   Deutsch
                   Português

  Identification ◄► IMD-IM20
                    Version
                    Serial No.
                    QR Code (Smartphone)
```
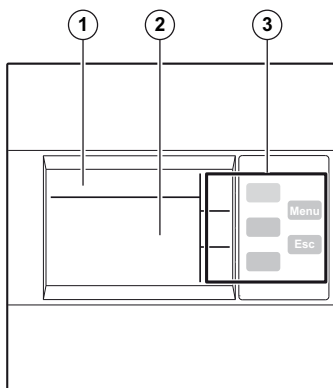
Navigating in the Interface

Presentation

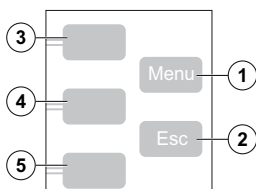The diagram below illustrates the various elements used for operating Vigilohm.

1   Screen identification area containing a menu icon, and the name of the menu or the parameter.
2   Information area displaying information specific to the screen (measurement, insulation alarm, settings)
3   Navigation buttons

Navigation Buttons

The navigation buttons enable quick and intuitive navigation:

Legend	Button	Icon	Description
1	**Menu**	–	Displays the level 1 menu (**Menu**).
2	**Esc**	–	Takes you back to the previous level.
3	Contextual menu button 3	▲	To scroll up the display or move to the previous item in a list.
		🕐	To access the date and time setting. If the clock icon flashes, it means that the Date/Time parameter needs to be set.
		✚	To increase a numerical value.
4	Contextual menu button 2	▼	To scroll down the display or move to the next item in a list.
		←	To move one digit to the left within a numerical value. If the digit on the far left is already selected, pressing the button loops you back to the digit on the right.
		→	To move one digit to the right within a numerical value.
5	Contextual menu button 1	OK	To validate the selected item.
		T	To run the self-test manually.
		↵	To go to a menu or submenu, or to edit a parameter.
		🔕	To acknowledge the insulation alarm.

Information Icons

The following table describes the icons provided for information in the information area of the LCD display. They provide information such as the selected menu or the insulation alarm status.

| Icon	Description
	Main menu
	• Identification of the system resistance in the absence of an insulation fault • Measurement parameters menu
	Fault log menu (Vigilohm IM20)
	Setting parameters menu
	Interface language selection menu
	Product identification
	Indication of a prev. alarm or insulation fault alarm

Status Screens

Presentation

The default screen shows the insulation resistance value of the system. It is automatically replaced by a screen that notifies an insulation fault.

The screens for indicating an insulating fault flash.

System Insulation Resistance Measurement (R)

Vigilohm displays the insulation resistance measurement for the system by default.
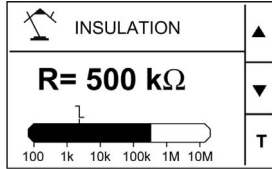
Insulation alarm detected: insulation fault message

The screen below is displayed when the insulation value falls below the insulation alarm threshold:

There are 2 possible scenarios:

- Acknowledge the insulation alarm by pressing the ⊠ contextual menu button.
- If you do not acknowledge the insulation alarm and the system insulation returns to a value above the insulation alarm threshold, this results in a transient insulation fault.

Insulation Alarm Acknowledged

The screen below is displayed when you have acknowledged the insulation alarm:
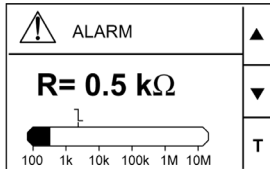
Prev. Alarm Activated

The screen below is displayed when the prev. alarm has been activated:
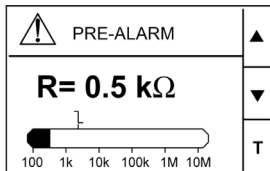
Transient Fault Message

The screen below is displayed when a transient fault has occurred:

Acknowledge the transient fault by pressing the **OK** contextual menu button.

Modifying Parameters

Presentation

To modify any of 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, please refer to the section that relates specifically to your Vigilohm model:

- IM10 *(see page 38)*
- IM20 *(see page 39)*

To modify the value of a parameter, follow either of the 2 methods described below:

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

The parameters listed below are the only ones where the numerical value can be modified:

- Date
- Time
- Insulation alarm triggering time delay
- Password
- Modbus address (Vigilohm IM20)

Selecting the Value in a List

To select a value in a list, use the ▼ or ▲ contextual menu buttons to scroll through the parameter values until you reach the desired value; then press **OK** to confirm the new parameter value.

Modifying the 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 contextual menu buttons as described below:

- ✚ 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.
- **OK** to confirm the new parameter value.

Saving a Parameter

After you have confirmed the modified parameter, one of following 2 actions will be performed:

- If the parameter has been saved correctly, the screen displays **Saved** and then automatically reverts to the previous display.
- If the parameter has not been saved correctly, the screen displays **Out Of Range** 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, for example.

Aborting an Entry

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

Clock (Vigilohm IM20)

Description

The time must be set:
● Whenever the power supply is interrupted
● When switching from winter to summer time

If the auxiliary power supply is interrupted, the Vigilohm IM20 retains the date and time setting from immediately before the interruption.

The Vigilohm IM20 uses the date and time parameter to time-tag the system insulation faults recorded.

Icon

When the Vigilohm IM20 is powered up, the clock icon flashes on the system monitoring screens to indicate that the clock needs to be set.

Setting

To set the date and time, please refer to the procedure for modifying a numerical value .

Date/Time Format

The date is displayed in the format: dd/mm/yyyy.

The time is displayed using the 24-hour clock in the format: hh/mm.

Insulation Fault Log (Vigilohm IM20)

Description

Vigilohm IM20 records the details of the 30 most recent insulation fault events that have triggered one of the 2 statuses below:
- prev. alarm
- insulation alarm

Event 1 is the one that was recorded most recently and event 30 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 facilitated.

Fault Event Screen

The diagram below shows the display elements of an insulation fault event:
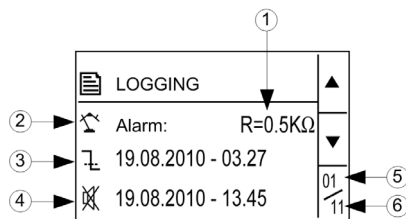
Legend	Description
1	Insulation fault value recorded
2	Type of insulation fault recorded: insulation alarm, prev. alarm, transient insulation alarm
3	Timestamp of the appearance of the insulation alarm, prev. alarm or transient insulation alarm
4	Timestamp of the disappearance of the event: • ⊠ Insulation alarm acknowledgement • ⌐Г Disappearance of the prev. alarm or the transient insulation alarm
5	Rank of the event displayed
6	Total number of events recorded

Chapter 5
Communication via Modbus RS-485 (Vigilohm IM20)

What Is in This Chapter?

This chapter contains the following topics:

Configuration of the RS-485 Communication Port

Communication Parameters

Before initiating any communication processes, configure the Modbus communication port via the HMI (**Settings → Modbus** menu) on Vigilohm IM20:

Parameters	Authorized Values	Default Value
Baud rate	● 4800 Baud ● 9600 Baud ● 19 200 Baud ● 38 400 Baud	19 200 Baud
Parity	● Even ● Odd ● None	Even
Address	1...247	1

Notification of Communication Activity

In the Modbus parameter settings screen, the **ON** green indicator light shows the activity status on Modbus RS-485 as follows:

If	Then
If the indicator light is flashing	Communication on the bus is active.
If the indicator light is off	The communication between the master and slave is not active.

NOTE: The indicator light flashes with each valid Modbus frame even though Vigilohm is not concerned directly.

Table of Modbus Functions (Vigilom IM20)

Modbus Functions

Function Code		Function Name
Decimal	**Hexadecimal**	
3	0x03	Read Holding Registers[1]
4	0x04	Read Input Registers[1]
6	0x06	Write Single Register
8	0x08	Diagnostic Modbus
16	0x10	Write Multiple Registers
43 / 14	0x2B / 0E	Read Device Identification
43 / 15	0x2B / 0F	Get Date/Time
43 / 16	0x2B / 10	Set Date/Time
(1) The Read Holding and Read Input registers are identical		

The read device identification request is as follows:

Number	Type	Value
0	VendorName	Schneider Electric
1	ProductCode	IM20
2	MajorMinorRevision	vX.Y.Z
3	VendorURL	www.schneider-electric.com
4	ProductName	Insulation Monitoring Device
5	ModelName	IMD-IM20

The product answers any types of requests (basic, regular, extended).

Modbus Registers Table

Table Format

Register tables have the following columns:

Modbus Register Address		RW	Unit	Type	Range	Description
dec	hex					

- **Modbus register address**: address of the register coded in the Modbus frame, in decimal (dec) and hexadecimal (hex) formats.
- **RW** : read only (R) or read/write (R/W) register.
- **Unit**: unit in which the information is expressed.
- **Type**: coding data type.
- **Range**: permitted values for this variable, usually a subset of what the format allows.
- **Description**: provides information about the register and the values applied.

System Status

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
102...103	65...66	R	–	Uint16	Coded version X.Y.Z	Firmware version X.Y.Z: • X represents the primary revision number, which is coded in the most significant byte of register 102. • Y represents the secondary revision number, which is coded in the least significant byte of register 102. • Z represents the quality revision number, which is coded in register 103.
105	69	R/W	–	Uint16	• 0...99 • –	• Year (from 2000 to 2099) in least significant byte • Most significant byte reserved
106	6A	R/W	–	Uint16	• 1...12 • 1...31	• Month in most significant byte • Day in least significant byte
107	6B	R/W	–	Uint16	• 1...23 • 0...59	• Hours in most significant byte • Minutes in least significant byte
108	6C	R/W	ms	Uint16	0...59999	Milliseconds

109	6D	R	–	Uint16	–	• Most significant byte = Error code
						• Least significant byte = Product status
						  ○ 0x00 - Normal operation
						  ○ 0x01 - Self-test
						  ○ 0x02 - Insulation fault
						  ○ 0x03 - Wiring connection lost
						  ○ 0x04 - Over limit capacitance
						  ○ 0x05 - Product malfunctioning

Monitoring

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
1000	3E8	R	Ohm	Float32	–	Resistance. The value NaN (Not a Number) 0xFFC00000 is returned during the self-test.
1002	3EA	R	nF	Float32	–	Capacitance. The value NaN (Not a Number) 0xFFC00000 is returned during the self-test.
1008	3F0	R	–	Uint16	• 0 = Injection activated • 1 = Injection deactivated	I/O wiring: injection inhibition input

Insulation Alarm Status

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
1100	44C	R	–	Uint16	• 0 = No alarm • 1 = Insulation alarm active • 2 = Prev. alarm active • 4 = Transient insulation alarm active • 8 = Insulation alarm acknowledged	Insulation alarm

Commands

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
2000	7D0	W	–	Uint16	• 0xA456 = run self-test	Run the self-test of the product without testing the relay (same as the seft-test cycle).

Settings

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
3000	BB8	R/W	–	Uint16	• 0 = Normally open • 1 = Normally closed	Configuration of the injection inhibition input. Default value: 0 (normally open).
3001	BB9	R/W	–	Uint16	• 1 = Standard connection • 2 = Failsafe	Logical command of the insulation alarm relay. Default value: 2 (failsafe).
3002	BBA	R/W	Ohm	Uint32	500 Ω...500 kΩ	Insulation alarm threshold. Default value: 1 kΩ.
3004	BBC	R/W	Ohm	Uint32	• 1 kΩ...1 MΩ • 0xFFFFFFFF = OFF	Prev. alarm threshold. OFF is used to deactivate the prev. alarm. Default value: 0xFFFFFFFF (deactivated).
3007	BBF	R/W	s	Uint16	0...7200	Insulation alarm time delay. Default value: 0.
3008	BC0	R/W	s	Uint16	• 4 s • 40 s • 160 s	System filtering. Default value : 40 s.
3009	BC1	R/W	Hz	Uint16	• 50 • 60 • 400 • 0 (for DC system)	Power system frequency. Default value: 50 Hz.
3014	BC6	R/W	–	Uint16	0000...9999	Password. Default value : 0000.
3015	BC7	R/W	–	Uint16	• 0 = Deactivated • 1 = Activated	Password protection. Default value: 0 (deactivated).

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
3016	BC8	R/W	–	Uint16	● 0 = English ● 1 = Français ● 2 = Русский ● 3 = 中文 ● 4 = Español ● 5 = Italiano ● 6 = Deutsch ● 7 = Português	Interface language. Default value: 0 (English).
3017	BC9	R/W	%	Uint16	0...100	Screen contrast. Default value: 50.
3018	BCA	R/W	%	Uint16	10...100	Screen brightness. Default value: 100.
3019	BCB	R/W	–	Uint16	● 0 = None ● 1 = HV1700	High voltage adapter. Default value: 0 (no adapter).

Log

Modbus Register Address		R/W	Unit	Type	Range	Description
dec	hex					
4000	FA0	R	–	Uint16	1...60	Number of event records
4001	FA1	R	–	Uint16	–	Most recent record number
4002-4013	FA2-FAD	R	–	Record	–	Record 1
4014-4025	FAE-FB9	R	–	Record	–	Record 2
...						
4710-4721	1266-1271	R	–	Record	–	Record 60

Each event is stored using 2 records:
● A "primary" record, which is created when the insulation alarm or prevention insulation alarm occurs. This contains the insulation value.
● A "secondary" record, which is created when the insulation alarm or prevention insulation alarm disappears. This contains the type of event (acknowledged insulation alarm, transient insulation alarm, prevention insulation alarm).

The 2 records are logged consecutively.

Description of an Event Record in the Log

Register	Unit	Type	Range	Description
Word 1	–	Uint16	1…65535	Event record number
Word 2 Word 3 Word 4 Word 5	–	Uint64	–	Time tagging of event (using the same code as for the product date/time)
Word 6 Word 7	–	Uint32	● 0...1 ● 0x40, 0x10 ● 1000, 1100	Record identifier: ● Word 6, most significant byte: information for primary/secondary record. This field takes the value 1 for the primary record and value 0 for the secondary record. ● Word 6, least significant byte: type of data stored in the **Value** field. ● Word 7: address of the Modbus register that is the source of the data in the **Value** field.
Word 8 Word 9 Word 10 Word 11	–	Uint64	–	Depending on the type of record (primary or secondary): ● Insulation resistance value (in Ohm) when the event occurred (coded in Float32 in the last 2 registers). ● Insulation alarm type (coded in Uint16 in the last register).
Word 12	–	Uint16	1...65534	Primary/secondary record identifier for the event: ● In the case of a primary record for an event, this identifier is an odd integer; numbering starts at 1 and the number is incremented by 2 for each new event. ● In the case of a secondary record for an event, this identifier is equal to the primary record identifier plus 1.

Example of an event

The next 2 records relate to an insulation alarm that occurred on October 1, 2010 at 12:00 pm and acknowledged at 12:29 pm.

Record number: 1

Modbus Register Address		Unit	Type	Value	Description
dec	hex				
4002	FA2	–	Uint16	1	Record number
4003	FA3	–	Uint64	● 10 ● 0 ● 10 ● 1 ● 12 ● 0 ● 0	Date when insulation alarm occurred (October 1, 2010, 12:00 pm)
4007	FA7	–	Uint32	● 1 ● 0x40 ● 1000	Record identifier: ● Primary record plus secondary record ● Float32 value (insulation resistance) ● Value of register 1000 (register for insulation resistance monitoring)
4009	FA9	Ohm	Uint64	10000	Insulation resistance value at the time of the insulation alarm
4013	FAD	–	Uint16	1	Secondary record identifier for the event

Record number: 2

Modbus Register Address		Unit	Type	Value	Description
dec	hex				
4014	FAE	–	Uint16	2	Record number
4015	FAF	–	Uint64	● 10 ● 0 ● 10 ● 1 ● 12 ● 29 ● 0	Date when insulation alarm disappeared (October 1, 2010, 12:29 pm)
4019	FB3	–	Uint32	● 1 ● 0x10 ● 1100	Record identifier: ● Secondary record ● Uint16 value (alarm acknowledged) ● 1100 register value (insulation alarm status register).
4021	FB5	–	Uint64	8	Value of insulation alarm register at the time of insulation alarm acknowledgement
4025	FB9	–	Uint16	2	Secondary record identifier for the event

Chapter 6
Commissioning, Maintenance, and Troubleshooting

Commissioning

Safety Precautions

The following safety precautions must be thoroughly implemented before attempting to repair electrical equipment or carry out maintenance. Carefully read and follow the safety precautions described below.

⚡ ⚠ **DANGER**
RISK OF ELECTROCUTION, ARCING OR BURNS
• Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions. See, for example, standard NFPA 70E when carrying out work in the USA.   • Only qualified personnel should maintain this equipment. Such work should be performed only after reading all the installation instructions.   • Turn off all power supplying this equipment before working on or inside it.   • NEVER work alone.   • Beware of potential hazards and wear personal protective equipment.
Failure to follow these instructions will result in death or serious injury.

NOTICE
RISK OF DAMAGE TO VIGILOHM
• Never open the Vigilohm unit.   • Do not attempt to repair any components belonging to the Vigilohm range, either in the unit or an accessory.
Failure to follow these instructions can result in equipment damage.

Disconnected Injection Detection

By default, the disconnected injection detection parameter is activated (parameter **Disconnect. Inj.** set to **ON**) in Vigilohm.

When installing and commissioning the unit and the electrical panel, before you plug the equipment to the electrical power system, set parameter **Disconnect. Inj.** to **OFF** to prevent the message **Wiring Connection Lost** from being displayed.

Depending on the demands of the electrical network or the application, during the final commissioning, you may need to reactivate the disconnected injection detection parameter (by selecting **Settings → Alarm → Disconnect. Inj.** set to **ON**). In this way, Vigilohm IM10 or IM20 monitors constantly during operation and reports any injection connection or wiring problem.

Maintenance and Troubleshooting

Safety Precautions

The following safety precautions must be thoroughly implemented before attempting to repair electrical equipment or carry out maintenance. Carefully read and follow the safety precautions described below.

⚡ ⚠ DANGER

RISK OF ELECTROCUTION, ARCING OR BURNS

- Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions. See, for example, standard NFPA 70E when carrying out work in the USA.
- Only qualified personnel should maintain this equipment. Such work should be performed only after reading all the installation instructions.
- Turn off all power supplying this equipment before working on or inside it.
- NEVER work alone.
- Beware of potential hazards and wear personal protective equipment.

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

NOTICE

RISK OF DAMAGE TO VIGILOHM

- Never open the Vigilohm unit.
- Do not attempt to repair any components belonging to the Vigilohm range, either the unit or an accessory.

Failure to follow these instructions can result in equipment damage.

ON light indicator

If the **ON** light indicator is red, there is an error in one of the following cases:
- Interruption of the injection circuit
- Self-test not OK
- Device fault
- Over limit capacitance (C > 60 µF (or > 150 µF with a high voltage adapter))

Interruption of the Injection Circuit

If the injection circuit of Vigilohm is interrupted, the display shows the message below and starts flashing:

Self-test

Vigilohm performs a series of self-tests on start-up, and then at regular intervals during operation, in order to detect any potential faults in its internal and external circuits. For more information on the self-test function, please refer to the relevant section .

Troubleshooting

The table below describes the potential problems and their probable causes. It also indicates the checks that can be carried out or provides possible solutions for each scenario. If you are still unable to resolve a problem after consulting the table, please contact your Schneider Electric regional sales representative for assistance.

Potential Problem	Probable Cause	Possible Solution
The device displays nothing when switched on.	No power supply to the device.	Check that the auxiliary power supply is present.
	The auxiliary power supply is not compliant.	Check the auxiliary voltage: U = 110...480 Vac.
The device notified an insulation fault, but your system shows no signs of abnormal behavior.	The insulation alarm threshold is not appropriate.	Check the value of the insulation alarm threshold. Modify the insulation alarm threshold as appropriate.
	The prev. alarm threshold for faults is not appropriate.	Check the value of the insulation alarm threshold. Modify the insulation alarm threshold as appropriate.
You deliberately created an insulation fault, but the device failed to detect it.	The resistance value used to simulate the fault is greater than the value of the insulation alarm threshold.	Use a resistance value that is lower than the insulation alarm threshold or modify the insulation alarm threshold.
	The fault is not detected between neutral and ground.	Start again ensuring you are between neutral and ground.
The **ON** indicator light is red and the display shows "**WIRING CONNECTION LOST**".	No electrical installation has been connected to the electrical panel when commissioning.	● Check the connection on the injection terminal block (terminals 1 and 3) and restart the self-test. ● Disable the function during commissioning.
	The injection wire or the ground wire for Vigilohm is cut.	
	Vigilohm considers an electrical power system with low capacitance and high resistance to be a disconnected injection.	
The **ON** indicator light is red and the display indicates that an error occurred during the self-test.	The Vigilohm device's injection circuit is cut off.	Briefly disconnect the auxiliary power supply to Vigilohm.
Although Vigilohm is being supplied with power, the **ON** indicator light does not light up.	Faulty indicator light.	Restart the self-test and check that the **ON** indicator light lights up briefly.
The **Alarm** indicator light does not light up in the event of a fault.	Faulty indicator light.	Restart the self-test and check that the **Alarm** indicator light lights up briefly.

Chapter 7
Specifications

Specifications

Type of System to Be Monitored

Characteristic		Value
AC or combined AC/DC IT[1] power systems	Phase-to-phase voltage with IM10 or IM20 connected to neutral	≤ 600 Vac max [1][2] or ≤ 1700 Vac [3]
	With IM10 or IM20 connected to phase	≤ 480 Vac max [1][2] or ≤ 1000 Vac [3]
	Frequency (AC power system)	45...440 Hz
DC or rectified IT power systems	–	< 345 Vdc max [1][2] or ≤ 1000 Vdc [3]
(1) When the insulation monitoring device is linked to a non-insulated variable speed drive, the DC value and not the AC value must be used as the limit. **(2)** Direct connection of the IM10 or IM20 device to the system to be monitored. **(3)** IM20 used with a high voltage adapter IM20-1700.		

Electrical Characteristics

Characteristic		Value
Range for insulation resistance readings		0.1 kΩ...10 MΩ
Range for capacitance readings (Vigilohm IM20)		0.1...60 µF
Fault notification	Number of thresholds	2 (password protected)
	Preventive	1 kΩ...1 MΩ
	Fault	0,5...500 kΩ
Insulation alarm threshold and prev. alarm hysteresis		• Setting threshold when triggered • Setting threshold+20% when released
Response time		Less than or equal to the **Filtering** setting: 4s / 40s / 160s
Device operating test		Self-testing and manual testing
Internal impedance	At 50 Hz	110 kΩ
Failsafe feature[1]		1 (standard)
Output contact	Number	1 (standard or failsafe)
	Type of contact	Changeover
	Breaking capacity	250 Vac	6 A
	Capacitance	12...24 Vdc	6 A
Injection inhibition input (voltage supplied by IM20)	Voltage	24 Vdc
	Current	5 mA
Circuit breaker position	Minimum load	5 mA
Notification time delay		0...7200s
Auxiliary power supply voltage	45-440 Hz	110-415 Vac ±15 %
	DC	125-250 Vdc ±15 %
Maximum device consumption		12 VA
Measurement voltage		75V peak
Measurement current		0.6 mA peak
Dielectric strength		4000 Vac/5500 Vdc
(1) Failsafe: the relay is deactivated either when a fault has occurred or if the auxiliary power supply voltage has disappeared accidentally.		

Mechanical Characteristics

Characteristic		Value
Weight		0.25 kg
Thermoplastic case	Mounting	Panel or DIN rail
Degree of protection	Front	IP52

Other Characteristics

Characteristic		Value
Temperature range	For operation	–25...+55 or +65°C [3]
	For storage	–40...+70°C
Climatic conditions[1]		IEC 60068
Use		Indoors
Altitude		Up to 2,000m
Degree of pollution		2
Maximum overvoltage		CAT III
Standards	Product	IEC 61557-8
	Safety	IEC 61010-1[2]
	Installation	IEC 60364-4-41

(1) The IMDs are suitable for use in all climates:
- Dampt, equipment not operating (IEC 60068-2-30).
- Damp heat, equipment operating (IEC 60068-2-56).
- Salt mist (IEC 60068-2-52).

(2) The rated operational voltage is 300 V L-N under the IEC 61010-1 standard.

(3) Limit +65 °C depending on the following conditions:
- Auxiliary power supply 230 V +15% maximum.
- Use of a high voltage adapter IM20-1700.

Electrical characteristics of the IM20-1700 high voltage adapter

Characteristic		Value
Dielectric strength		15.4 kV impulse
Measurement current		130 µA
Extraneous DC voltage Ufg		1150 Vdc
Internal impedance	50/60/400 Hz	320 KΩ
Internal resistance Ri of the measurement circuit		430 KΩ

Locating Faults Manually

Use a mobile fault locating kit (catalog number 50310), containing:
- 1 XGR locating signal generator
- 1 XRM locating signal receiver
- 3 tong-type current probes

For more information, please refer to the *Vigilohm* Catalog.

As the current injected by VigilohmIM10 or IM20 is insufficient for XRM, the 2.5 Hz XGR injector must be used when locating faults. Proceed as follows:
1. Connect XGR to neutral (if there isn't one, to phase) and to ground.
2. Use XRM to locate the fault: calibrated to 18, then indication depending on the fault current.

Ignore the measurement indicated by VigilohmIM10 or IM20, as XGR may interfere with it.

Glossary

I

Insulation Alarm

Alarm triggered when the insulation level of the monitored system falls below the set threshold.

P

Prev. Alarm

Alarm triggered when the insulation level of the monitored system falls below the threshold defined; this value cannot be lower than that of the insulation alarm threshold.

T

Transient Fault

Fault that occurs when the insulation alarm is triggered and then the insulation level of the monitored system goes back above the set threshold without the user's having acknowledged the insulation alarm.

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