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Product | **Insulation Fault Locator**

Application | Low Voltage networks,  
ungrounded (IT networks)  
AC, DC and AC/DC

Document: | Product Technical Specification

Object: | This document describes the general rules to guarantee the  
maximum level of safety and performances for an Insulation  
Monitor

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## General

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The present specification applies to Insulation Fault Locator (IFL) for AC (50-60Hz), DC or ACDC,

- The IFL shall monitor power electrical system or control electrical system
- The IFL shall permanently monitor simultaneously up to 12 feeders in terms of insulation between the feeder being monitored and the ground
- The IFL shall measure insulation resistance and leakage capacitance between every feeder and the ground
- The IFL shall report that no insulation fault is detected through a global Insulation OK LED or No Alarm LED and through an 8 languages LCD
- The IFL shall trigger an alarm (output relay toggle, global Alarm LED, faulty feeder display on a LCD and through Modbus RS485) in case an insulation fault is detected on one or more of the feeders, including symmetrical and asymmetrical faults.
- The alarm threshold of the IFL shall be settable individually for each feeder
- The IFL shall detect and report a transient insulation fault (on a LCD for the individual feeder information and global Alarm LED)
- The IFL shall detect and report a toroid connection loss (on a LCD for the individual feeder information and global Alarm LED)
- The IFL shall provide timestamped event log
- The IFL shall provide insulation resistance and leakage capacitance trending
- The IFL shall be compliant with its associated range of Insulation Monitors (IM)
- The IFL shall have a dedicated commissioning procedure

## Glossary

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Acknowledgement	Is the fact to reset the alarm relay output and thus to stop reporting an insulation alarm while the isolation fault is still present.
Alarm threshold	Is the value of the resistance set in the IFL to trigger the alarm,
IFL	Insulation fault Locator
IT Network	Electrical network in which the active parts are isolated from ground
Insulation	Equivalent resistance of all the Equipment Under Control (EUC) between the active part and the earth
Insulation fault	Is the detection of an insulation resistance value below the set threshold.
Insulation alarm	Is the fact to report / trigger an alarm due to an insulation fault.
Transient	Insulation fault which disappears before the alarm is acknowledged

## Compliance to Standards

Reference	Title	Comment
IEC 61557-1	Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements	
IEC 61557-9	Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment for insulation fault location in IT systems	
IEC 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements.	
IEC 60364-4-41	Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock	
IEC 61000-4-1	Electromagnetic compatibility (EMC) Testing and measurement techniques	EMC immunity
IEC 60068-2	Environmental testing	Climatic withstand
NF C 15-100	Safety in Industrial Control Equipment Low Voltage Electrical Installations	Standard applicable in France

## Certificates of conformity

Reference	Title	Comment
CE		
EAC		
DNV		Marine Certificate
ISO9001		Quality Management Systems
RoHS	Reduction of Hazardous Substances	Environmental

## IFL Functional requirements

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### Safety

The IFL shall be

- cased into a plastic moulded box
- IP54 on the front per IEC 60529
- IP20 on the rear per IEC 60529
- equipped with withdrawable connectors for each of its connections (toroids, power supply, alarm relay and Modbus RS485 communication)
- equipped with an output relay to trigger an alarm in case of insulation fault per IEC61557-9
- offering a user triggered test function

### Monitoring

The IFL shall

- be compliant with any of its associated Insulation Monitors
- be autonomous to make its measurements, no wiring shall be required between the IFL device and the Insulation Monitor
- monitor up to 12 feeders of an AC, DC or ACDC IT/ungrounded electrical Low Voltage network
- be compliant with its associated current sensors
- monitor simultaneously the insulation to ground of each of the 12 feeders
- measure insulation resistance and leakage capacitance between every feeder and the ground in the range 200 $\Omega$  to 250k  $\Omega$  and 1 $\mu$ F to 15 $\mu$ F.
- to better adapt to its application, the IFL shall have settable filters. Short: 5 seconds, Medium: 40seconds or Long: 400seconds;
- IFL response time per IEC 61557-9 test condition shall be: < 5 seconds

### HMI

The IFL shall

- be equipped with a “product status LED” indicating
  - through a flashing green that the product is powered and able to perform its function
  - through a solid red that an internal product failure was detected
- be equipped with a “No alarm LED” indicating through a solid green that no insulation fault was detected on any of the 12 feeders
- be equipped with a “Alarm LED” indicating
  - through a solid yellow that an insulation fault is reported on at least one channel,
  - indicating through a flashing yellow that a transient fault was reported on at least one channel
- be equipped with an 8 languages LCD and a 5 pushbuttons keyboard
  - supporting Chinese, English, French, German, Italian, Portuguese, Russian, Spanish
  - reporting individual feeder status (no insulation fault, insulation fault, transient insulation fault, toroid disconnected)
  - reporting individual feeder insulation resistance and leakage capacitance to ground
  - allowing to execute the commissioning procedure
  - allowing to set the alarming thresholds, filtering time and alarm delay
  - allowing to set the Modbus RS485 communication parameters
  - allowing to set and display logical name individual name for each feeder
  - acknowledge alarms and transient alarms
  - allowing review of event log and insulation trending
  - allowing reset to factory setting, reset of event logs and reset of trending
  - supporting password protection access
- be equipped with a “communication status LED” indicating
  - through a flashing yellow that the Modbus RS485 is active

### Communication

The IFL shall allow the following settings

- be equipped with a Modbus RS485 serial communication port

### **Event log**

The IFL shall provide timestamped event log to ease maintenance operations:

- logging last alarming & transient alarming events
- accessible through the 8 languages HMI
- accessible through the Modbus RS485 serial communication
- providing clear event function

### **Trending**

The IFL shall provide timestamped measurement data log for insulation trending and capacitance trending for ease preventive maintenance:

- logging data covering the last hour, last day, last week, last month and last year
- accessible through the 8 languages HMI
- accessible through the Modbus RS485 serial communication
- providing clear trending data function

### **Settings**

The IFL shall allow the following settings

- Configure the Electrical system parameters (type and frequency)
- choice of a threshold individual to each of the 12 feeders in the range 200 $\Omega$  to 200k $\Omega$
- configure filtering time between 5s, 40s and 400s
- Modbus RS485 parameters

### **Accuracy**

The IFL shall provide  $\leq 10\%$  accuracy.

### **Alarming**

The IFL shall trigger its Alarm output relay in the following cases

- Insulation fault detection,
- Internal product failure detected by the internal self-test
- Loss of toroid connection

Alarm relay shall be

- Changeover electromechanical relay
- 6A / 250V
- 1A / 48VDC
- 3mA minimum load

### **Power Supply (IFL12LMC & IFL12LMCT)**

The IFL shall be compliant with power supplies

- 24-48VDC
- 10W max with all option modules

### **Power Supply (IFL12MC & IFL12MCT)**

The IFL shall be compliant with power supplies

- 100-440VACDC
- 50-60Hz
- 26VA max with all option modules

### **Installation**

The IFL shall be

- door mounted or DIN mounted
- equipped with removable connectors to interface each of its input/output to the electrical network
- connectors for toroids connection shall be equipped with a common point for two toroids.
- operating under temperature
  - Operation  $-25^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  per IEC 60721-3, Class 3K6
  - Storage  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  per IEC 60721-3, Class 1K5

### **Standard Environment (IFL12MC & IFL12LMC)**

The IFL shall:

- Sustain a relative humidity  $\leq 92\%$

### **Harsh Environment (IFL12MCT & IFL12LMCT)**

The IFL shall:

- Be conformal coated
- Sustain a relative humidity  $\leq 95\%$

### **Commissioning Procedure**

The IFL shall provide a dedicated commissioning procedure

- to auto-detect the connected toroids
- to check the correct installation of the toroids

## **Operations & Maintenance**

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- No specific maintenance planning shall be requested

## **Environment**

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- Production site organisation shall be non-polluting and certified to comply with ISO 9002 and ISO 14001 standards.
- IFL shall be designed per Eco-design complying with ISO 14062 Especially materials shall be of halogen free type
- IFLs shall be designed for easy disassembly and recycling at end of life, and complies with environmental directives RoHS and WEEE.

## **End**

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