HRI-R40N

Insulation Monitoring Device for Hospitals

User Manual

contrel elettronica s.r.l.

Safety Information

IMPORTANT INFORMATION
Please review these instructions thoroughly and inspect the equipment carefully to familiarize yourself with the device before attempting installation, operation, or maintenance. Throughout this document and on the equipment itself, you may encounter special notices highlighting potential hazards or providing additional information to clarify or simplify procedures.

IMPORTANT NOTICE
Only qualified personnel should install, operate, service, or maintain electrical equipment. Contrel elettronica accepts no liability for any outcomes resulting from the use of this material.
A qualified person is defined as an individual who possesses the necessary skills and knowledge regarding the construction, operation, and installation of electrical equipment, as well as proper safety training to identify and mitigate potential hazards.

Safety Measures

Specific Hazards Associated with Insulation Monitoring Devices (IMDs)
For most electrical and electronic equipment, the primary source of electrical hazards is the device's power supply. Disconnecting the power supply effectively eliminates this risk.
However, this is not the case for insulation monitoring devices (IMDs), which are connected to the system through an injection wire.
Therefore, it is essential to disconnect this injection connection before performing any maintenance or work on the device.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate Personal Protective Equipment (PPE) and follow safe electrical work practices. See local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on or in the equipment.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Assume communications and I/O wiring are hazardous live until determined otherwise.
- Do not exceed the maximum ratings of this device.
- Disconnect all the device's input and output wires before performing dielectric (hi-pot) or Megger testing.
- Never shunt an external fuse or circuit breaker.
- Ensure that your ungrounded system has a compatible insulation monitoring device.

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

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 device case.
- Do not attempt to repair any components of the device.

Failure to follow these instructions can result in equipment damage.

Presentation

Using IT Systems to Improve Power System Availability

Ensuring service continuity is a critical operational requirement for power systems, alongside protecting both people and property. Applications and standards can vary by country, but the ungrounded IT system is generally the most reliable approach to maintaining service continuity. Even after an initial insulation fault, the system can continue operating safely without endangering people or equipment. However, the faulty circuit must be located and repaired before a second fault occurs. This fault tolerance improves maintenance operations, allowing them to be performed safely and without pressure.

IT Systems in Medical Facilities

In Group 2 medical facilities, an ungrounded medical IT system must be used to supply circuits. These circuits power medical equipment, life support systems, surgical systems, and other devices within the patient environment. Because facility categorization varies between and within countries, it's challenging to provide an exhaustive list of Group 2 facilities. Here are some common examples:

- Anaesthesia room
- Operating room
- Pre-operative room
- Surgical dressings room
- Post-operative recovery room
- Intensive care unit
- Angiography room
- Neonatal intensive care unit

Monitoring Insulation Resistance (R)

According to IEC 364, IEC 61557-8, and IEC 60364-7-710, the installation must remain ungrounded when using the IT system. With a single ground or earth fault, the fault current remains low, and service interruption is unnecessary. However, to prevent potential hazards from a second fault that could cause the circuit breaker to trip, an insulation monitoring device (IMD) is required. This device must activate an audible and/or visual alarm to indicate the first fault. By continuously monitoring insulation resistance, you can proactively maintain system quality and safety.

HRI-R40N Functions

The HRI-R40N are digital insulation monitoring devices (IMDs) for low-voltage IT systems with an isolated neutral. Designed for specific IT networks in hospitals, these devices monitor system insulation and alert operators to any insulation faults.
They operate by applying a low-frequency AC voltage between the system and earth and then calculating insulation resistance based on the returned current.

Key Functions:

- Display of insulation resistance (R)
- Detection of insulation faults with a configurable threshold
- Detection of lost connections

Additional HRI-R40N:

- Modbus RS-485 communication
- Trend graph history logging
- Transformer monitoring:
    - Display of load current
    - Configurable alarm threshold
    - Temperature alarm (PT100 probe)

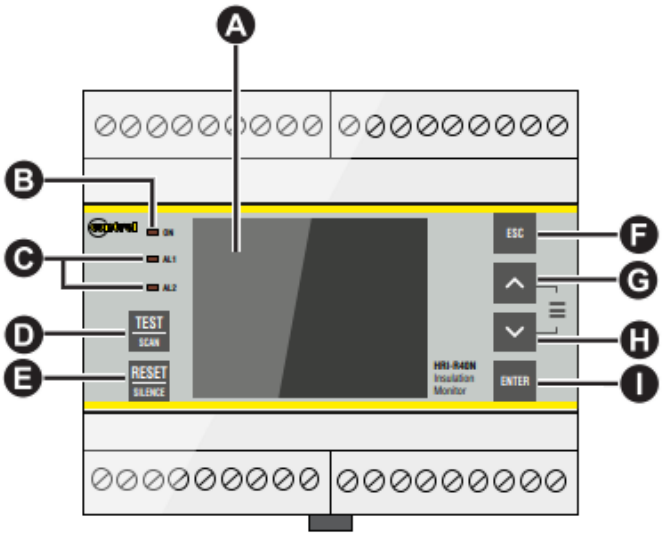
Optional Function:

The HRI-R40N monitors system insulation resistance by injecting a signal into the circuit. This method is compatible with all types of power systems, including AC, DC, mixed configurations.
The HRI-R40N connects to system channels via fault location sensors and uses the injected signal to assess the insulation resistance of each individual circuit.
When the resistance of one or more monitored channels drops below a predefined threshold, the device issues an alert and identifies the faulty channels. Additionally, it provides real-time local resistance measurements for each channel, enabling more accurate monitoring and supporting predictive maintenance strategies.
The device offers the following features:

- Fault location up to 6 channels
- Overview screen showing the insulation condition of all monitored channels
- Supports both automatic and manual fault location scan
- Configurable thresholds for insulation fault location (alarm and warning levels)
- Enable the filter for 3rd or 21st harmonic components

Physical Description

Description
The various features of the HRI-R40N are shown in the diagram below:



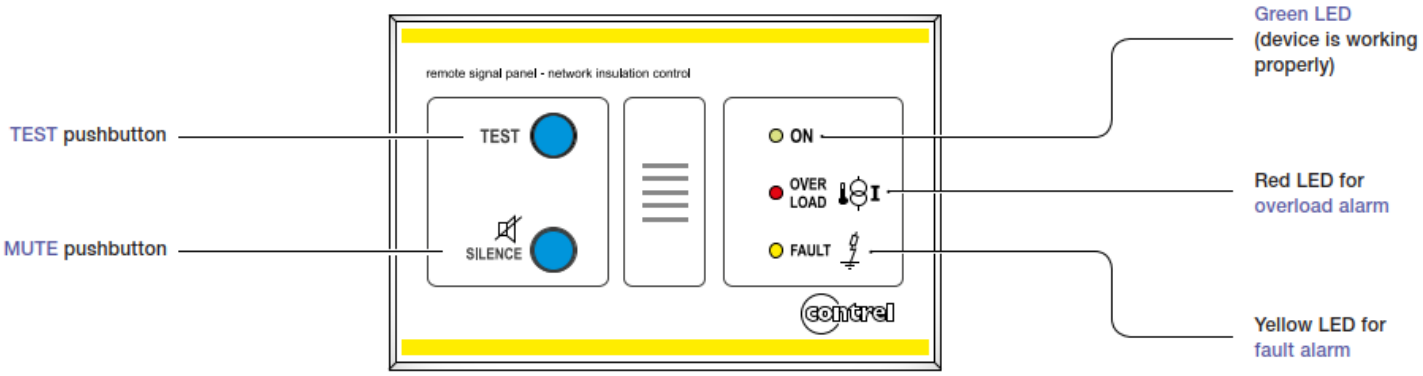
A	Display
B	LED ON: presence of auxiliary supply
C	Alarm LED
D	Pushbutton for testing the insulation monitoring system (daily test in accordance with standard IEC 60364-7-710)
E	Silence the insulation alarm
F	Cancellation or navigation key among the visualization pages
G	Up
H	Down
I	Confirmation or navigation key among the visualization pages
G+H	Display the main menu

HRI-R40N Accessory

Overview
The HPR1 (Remote Panel) is a remote user interface designed specifically for operating rooms. It connects to monitoring systems that oversee electrical installations in hospital environments.
Installed in the surgical suite, the HPR1 provides real-time status information, allowing medical staff to quickly determine whether the electrical installation is functioning properly or if a fault has occurred. It displays:

- Insulation faults affecting the electrical equipment in the operating suite
- Electrical faults triggered by a protective circuit breaker trip or a current transformer overload

Description



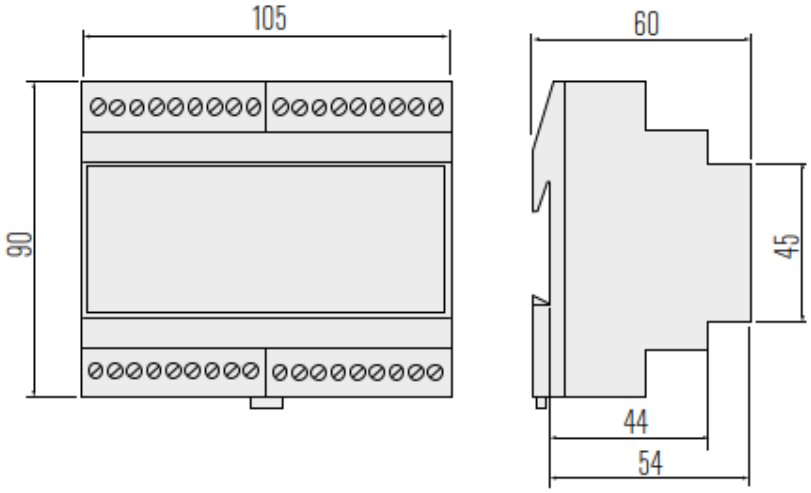
TEST	Pushbutton for testing the insulation monitoring system (daily test in accordance with standard IEC 60364-7-710)
SILENCE	Pushbutton for stopping the audible alarm in the event of an insulation fault or electrical fault.
ON	Green LED: Indicates that the installation is operating correctly
OVERLOAD	Red LED: Visual signal indicating an electrical fault (transformer overloaded or overheating or circuit breaker fault trip)
FAULT	Visual signal indicating an insulation fault

Mounting
Installation in a universal 3-module flush-mounted box type E503, in horizontal or vertical position

Connection
The HPR1 is connected to the communication terminal block of HRI-R40N.

Installation

Dimensions (mm)



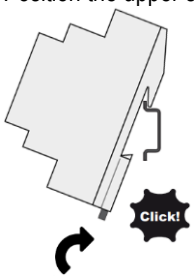
DIN Rail Mounting and Dismantling

Overview

The HRI-R40N can be installed on a DIN rail. Once installed, it must remain in an upright position.
When mounting or removing the device from the DIN rail, you can either leave the terminal blocks connected and/or wired, or you can remove them and keep them nearby for convenience.

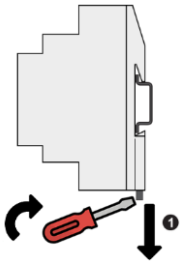
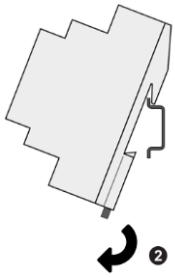
DIN Rail Mounting

To install the HRI-R40N on a DIN rail, proceed as follows:

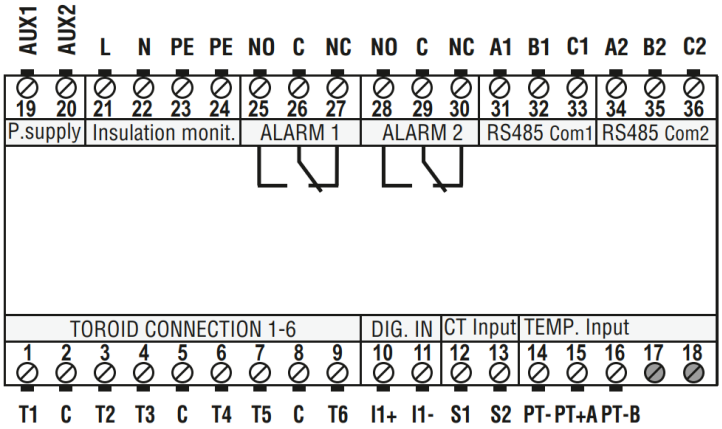
Step	Action
1	Position the upper slot on the rear of the HRI-R40N on the DIN rail. Lift the device up to free it from the DIN rail. 

Removal from a DIN rail

To remove the HRI-R40N from a DIN rail, proceed as follows:

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

Terminals connection

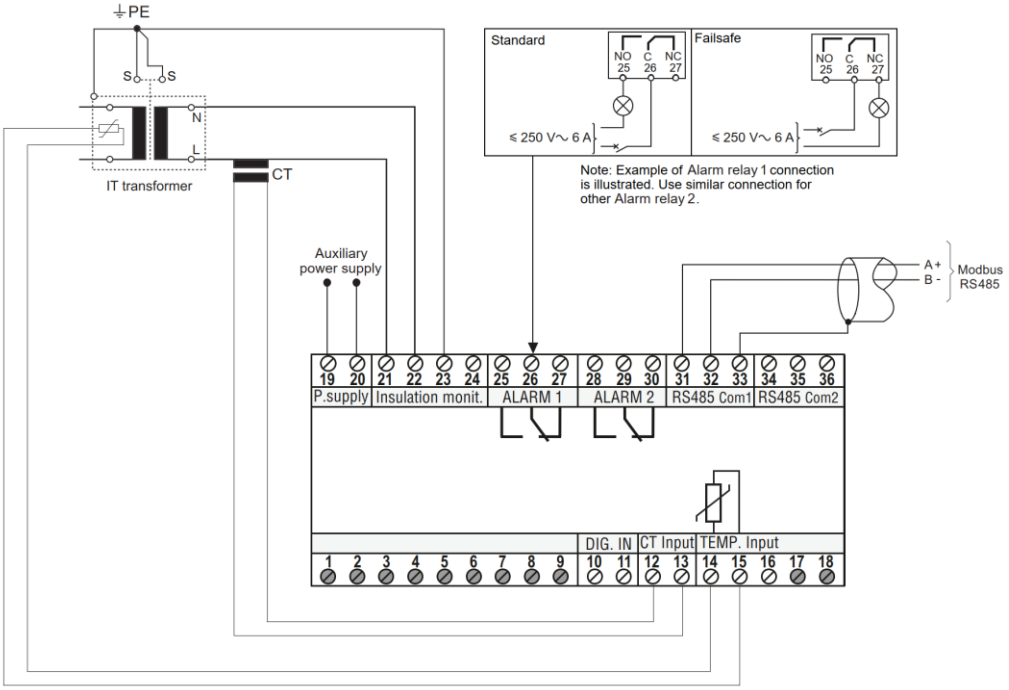


N°	Description	N°	Description
1 *	Fault locator sensor (T1)	**19**	Auxiliary power supply
2 *	Common T1, T2	**20**	Auxiliary power supply
3 *	Fault locator sensor (T2)	**21**	Connection to the IT system to be monitored (L)
4 *	Fault locator sensor (T3)	**22**	Connection to the IT system to be monitored (N)
5 *	Common T3, T4	**23**	Connection to the IT system to be monitored (PE)
6 *	Fault locator sensor (T4)	**24**	Connection to the IT system to be monitored (PE)
7 *	Fault locator sensor (T5)	**25**	Output relay ALARM1 (NO)
8 *	Common T5, T6	**26**	Output relay ALARM1 (COMMON)
9 *	Fault locator sensor (T6)	**27**	Output relay ALARM1 (NC)
10 **	External input (+)	**28**	Output relay ALARM2 (NO)
11 **	External input (-)	**29**	Output relay ALARM2 (COMMON)
12	S1 for CT input to measure insulation transformer current	**30**	Output relay ALARM2 (NC)
13	S2 for CT input to measure insulation transformer current	**31**	Modbus communication terminal +A COM1
14	Connection to temperature sensor (PT -)	**32**	Modbus communication terminal -B COM1
15	Connection to temperature sensor (PT +A)	**33**	Modbus communication terminal C COM1
16	Connection to temperature sensor (PT -B)	**34**	Modbus communication terminal +A COM2
17	Not used	**35**	Modbus communication terminal -B COM2
18	Not used	**36**	Modbus communication terminal C COM2

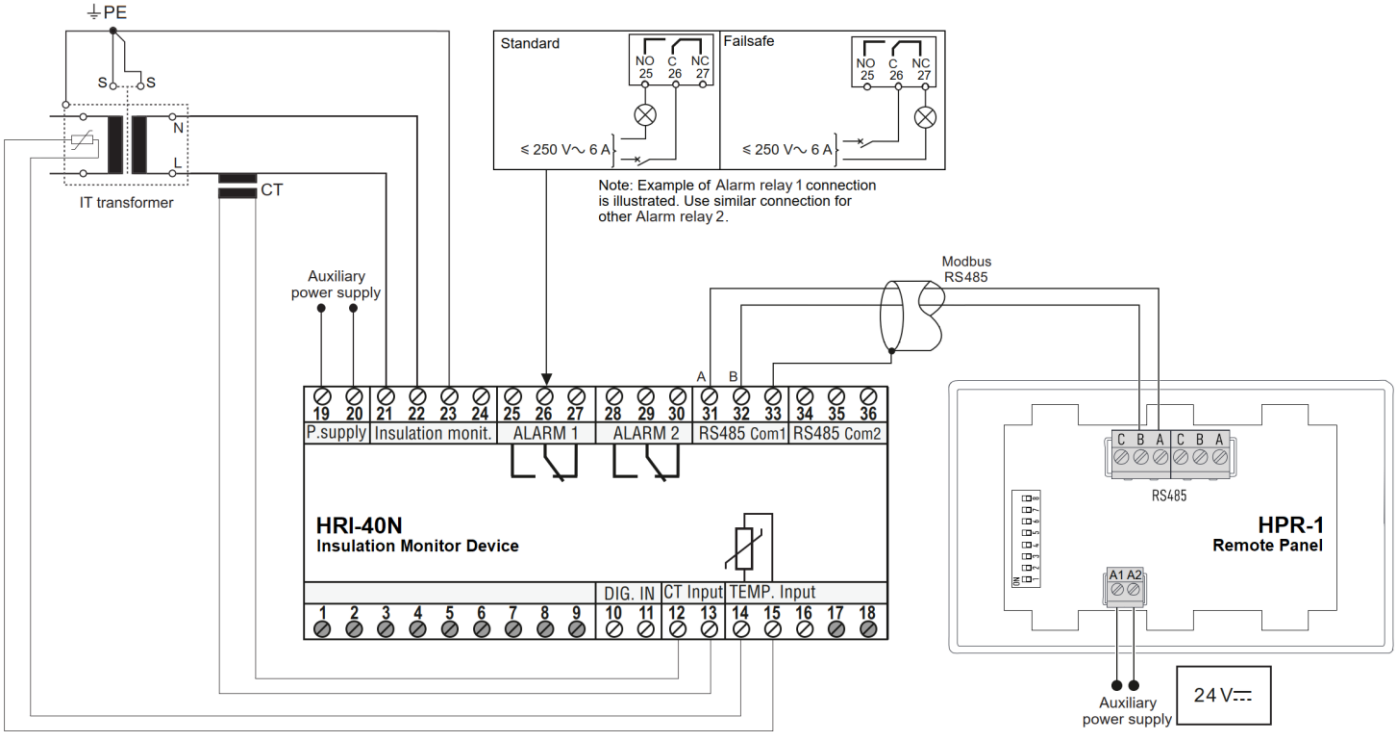
* These terminals are used only if the Insultation Fault Locator input option is available
** The input can be configured as TEST, RESET or Insulation Fault Locator scan end.

Connection

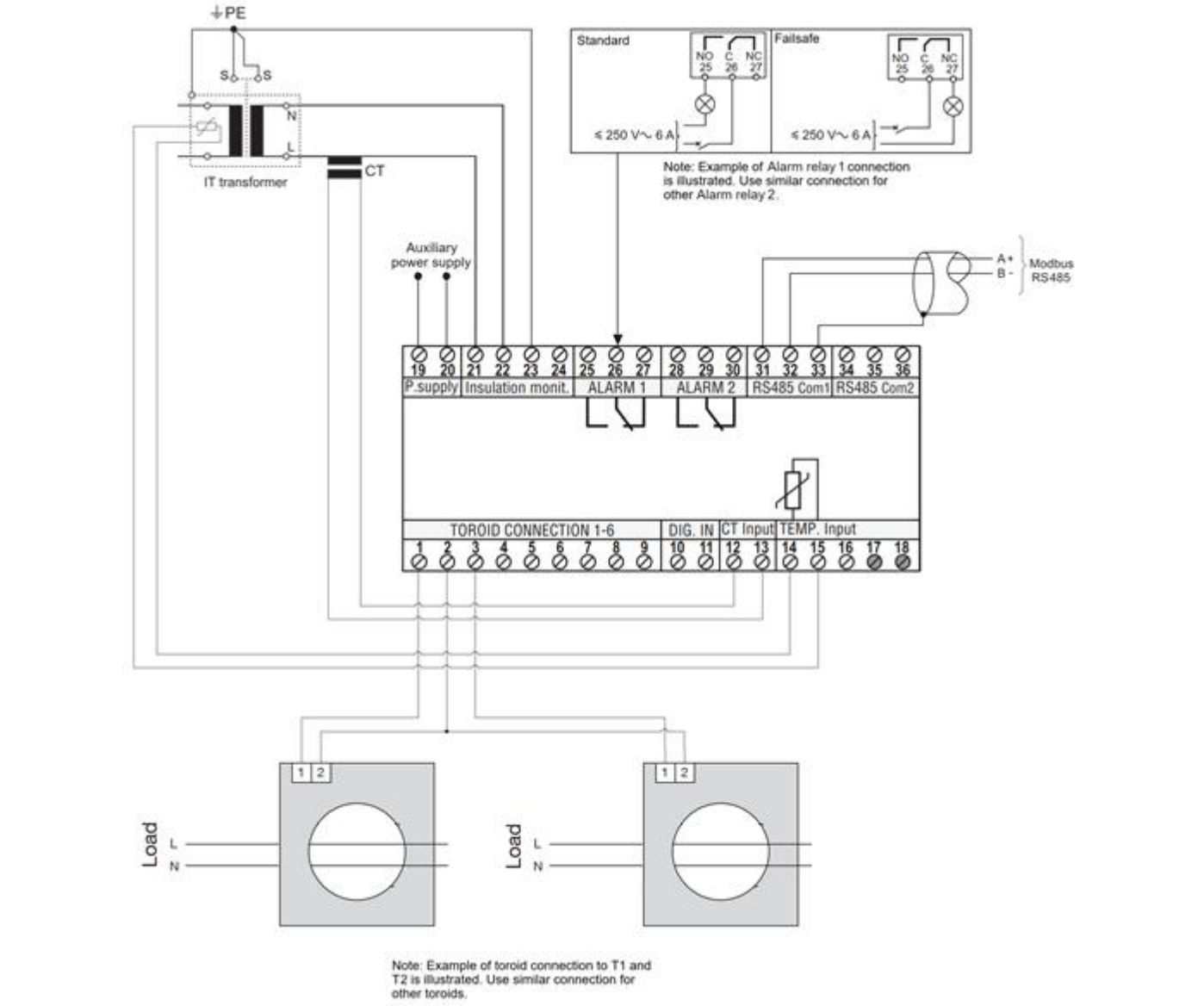
Connection Diagram



Architecture with HRI-R40N and HPR-1 (Hospital Remote Panel)



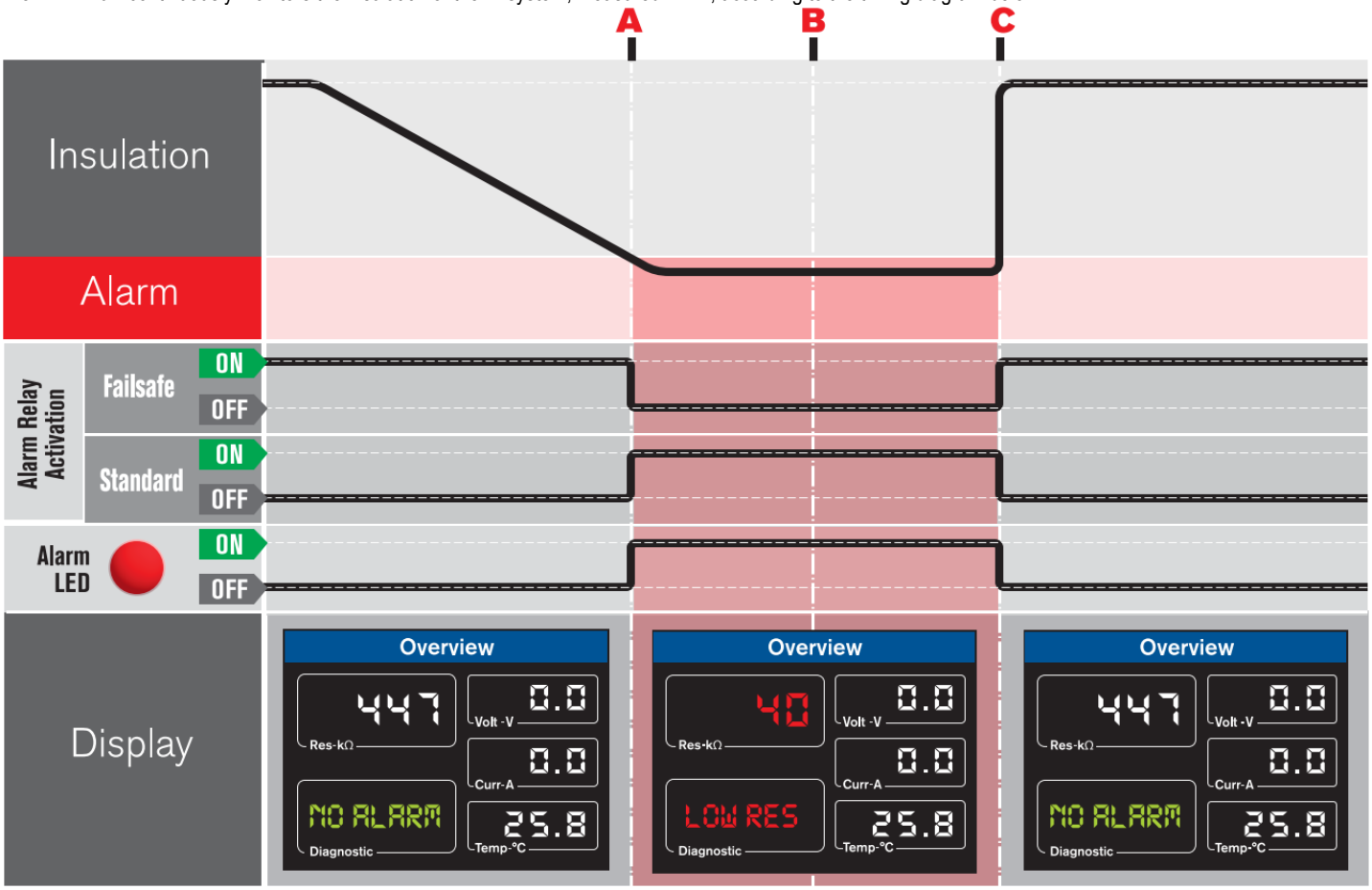
Architecture with HRI-R40N with internal Faul Locator Sensors.



Functions

System Insulation Monitoring

Functional Description
The HRI-R40N continuously monitors the insulation of the IT system, measured in kΩ, according to the timing diagram below:



A. An insulation fault is detected in the system, causing the HRI-R40N to enter alarm mode. The alarm relay is activated and the alarm LED lights up.
B. The user acknowledges the alarm by pressing the SILENCE button. The connected remote panel stops emitting the audible alarm.
C. Once the insulation fault is cleared, the alarm LED turns off. The HRI-R40N returns to normal operation either automatically or manually by pressing the RESET button, depending on the configuration.

If the HRI-R40N is in alarm status and the user does not acknowledge the alarm, it indicates that the insulation fault is transient.

Status Information

The display and the two red LEDs on the HRI-R40N indicate the current status of the device.

LEDs		Description
ON	Alarm	
●	●	HRI-R40N powered off
●	●	HRI-R40N powered on, no insulation fault detected
●	●	HRI-R40N powered on, insulation fault detected

Insulation Alarm Threshold

- **Adjustable range:** 50 to 500 kΩ
- **Default setting:** 50 kΩ

Upon power-up, the device automatically restores the last saved alarm threshold value.

Alarm Relay
The activation of the alarm relay depends on the insulation status and the selected operating mode: **standard** (default) or **failsafe**.

In **failsafe mode**, the alarm relay is triggered in the following situations:

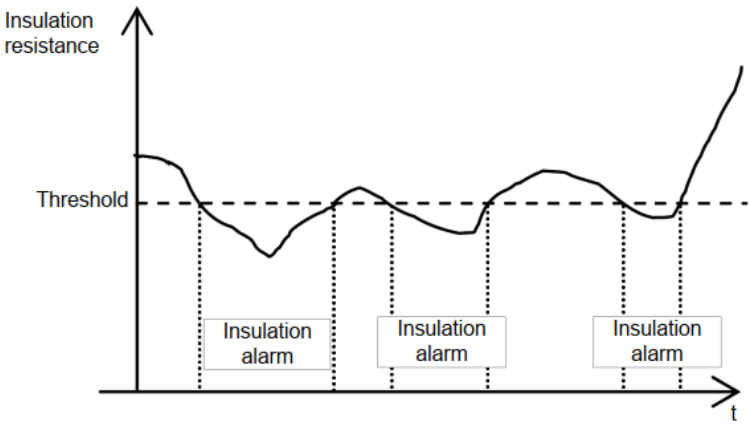
- An insulation fault is detected
- The device malfunctions
- The device is not receiving power

Insulation Alarm Threshold Hysteresis
A hysteresis is applied to reduce false insulation alarms caused by fluctuations in the measured value near the threshold.
The hysteresis logic operates as follows:

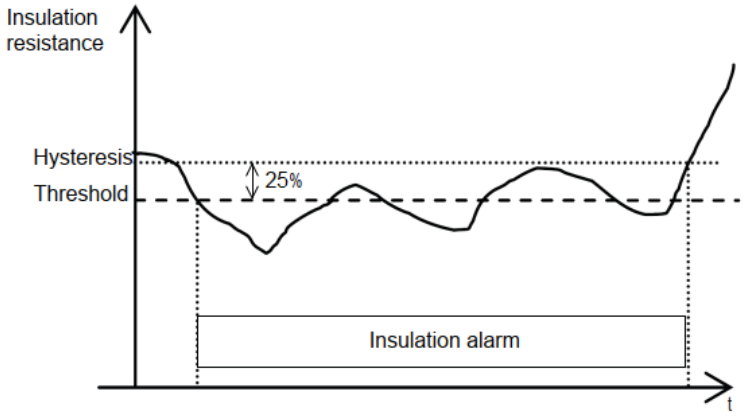
- When the measured insulation value decreases and drops below the set threshold, the insulation alarm is activated, or a countdown begins if an insulation alarm delay has been configured.

The following diagrams show the behaviors:

- Without hysteresis:



- With hysteresis:



Transformer Monitoring

Overview
The IT system contributes to ensuring optimal power availability. However, in the event of a transformer overload or short circuit, parts of the system may still be affected. The consequences of a short circuit are mitigated through appropriate selectivity (discrimination).

Overload Monitoring
Standards require that transformer overload and temperature rise be monitored in IT systems.
With the **HRI-R40N**, this monitoring function is integrated to facilitate operation and implementation.
To prevent system-wide shutdown due to overload, the transformer's load current is continuously measured, displayed of load, and compared with a predefined alarm threshold.

Since excessive temperature typically results from sustained overload, direct temperature monitoring is less critical. A **PT100 temperature probe sensor** is generally sufficient for this purpose.

LEDs		**Description**
ON	**Alarm**	
⚫	⚫	HRI-R40N powered off
🟢	⚫	HRI-R40N powered on, no overload or temperature fault detected
🟢	🔴	HRI-R40N powered on, overload or temperature fault detected

Self-test

Description

The HRI-R40N has a self-test function for testing:

- The measurement system and the alarm relay

Running the Self-test

The test can be run:

- Manually at any time by pressing the TEST pushbutton on one of the system insulation monitoring screens

Sequence of Self-test

During the verification sequence, the following steps are performed:

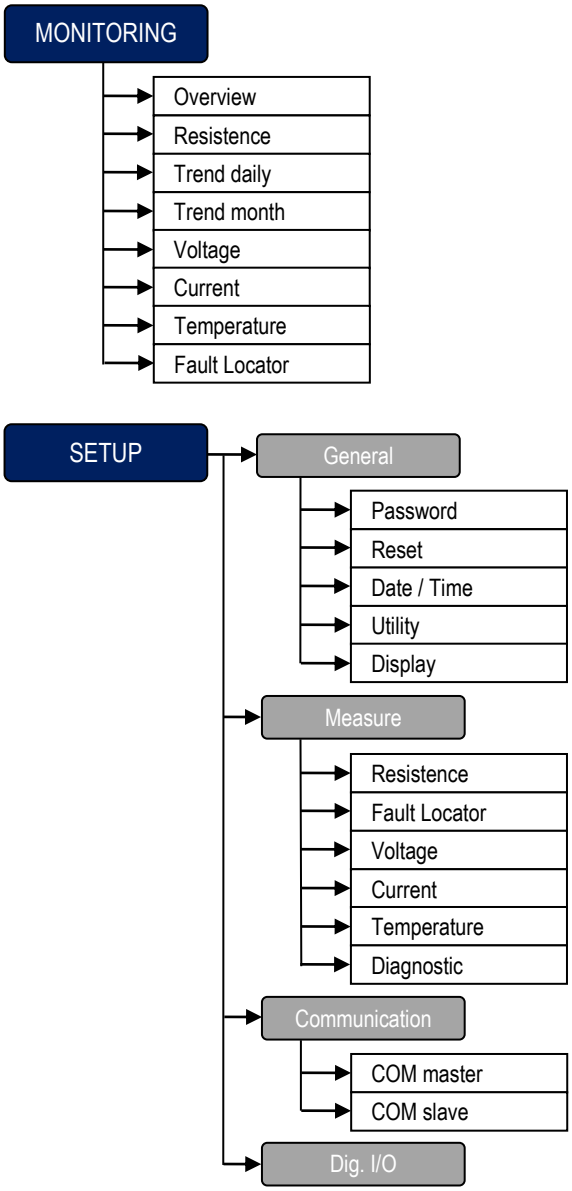
- Simulation of low insulation
- Activation of the alarm relay
- **ON** alarm LEDs
- The screen TEST appears on the display for the entire duration of the sequence

Human Machine Interface

Overview

The HRI-R40N is equipped with an advanced and user-friendly human-machine interface (HMI), which includes status LEDs, a graphical display, and menu pushbuttons. These features provide easy access to operational information and allow users to configure device parameters efficiently.

HRI-R40N Menu Structure



Navigating the Interface

Navigation Buttons

The navigation buttons provide efficient and user-friendly control for browsing menus and settings.

Legend	Menu	Description
1	**ESC**	Takes you back to the previous level
2	▲	For scrolling up the display or moving to the previous item in a list
3	▼	For scrolling down the display or moving to the next item in a list
4	**ENTER**	For accessing a menu or sub-menu, or for editing a parameter
☰	▲ and ▼	Displays the main menu
5	**TEST | SCAN**	For executing the manual test
6	**RESET | SILENCE**	For acknowledging alarms

Parameters table

Below are listed all the programming parameters. For each parameter are indicated the setting range, the factory default, as well as a description of the function.

GENERAL menu

PASSWORD		UoM	Default	Range
1	Level 1 (viewing)	-	0	0 (OFF)-999999999
2	Level 2 (setup)	-	0	0 (OFF)-999999999
3	Validity	min	5	1-60

NOTE: Password Recovery. If you forget your password, contact technical support.

1 - When the password is defined, value to be specified to allow the user to scroll the pages.

2 - When the password is defined, value to be specified to get user configuration access.

3 - Setting the minutes for which the password enables the protected functions.

RESET		Range
1	Global	All device parameters are resetted to factory default value.
2	Setup to default	All setup parameters are resetted to factory default value.
3	MIN-MAX	Reset of MAX and MIN peaks of all readings.
4	All log	Clears the log memory (both events and measurements log).
5	ON / OFF events	Clears the power supply switch ON/OFF events.

DATE AND TIME

The HRI-R40N manages the date and time, that is used for the storage events and for time-related functions. The HRI-R40N is equipped with a module with RTC (real-time clock), then the time and date are kept updated even without auxiliary power supply, for a maximum of about 1 week.

UTILITY		Default	Range
1	Language	English	English Italiano
2	Theme	Blue-Black	Blue-Black Red-Black Yellow-Black Grey-Black

DISPLAY		UoM	Default	Range
1	Brightness	-	15	1-15
2	Default page return	-	NO	NO-YES
3	Stand-by	-	YES	NO-YES
4	Stand-by time	min	10	1-60

1 - Set up the level of brightness display.
2 - If set to NO the display will remains in the page where the user left it. If set to a time delay, after that time the display page goes back to page set as default.
4 - Set up the time after that the display will switch off. The lifetime of the graphical display depends on its brightness and stand-by time. It is highly recommended to limit the brightness level of the display in order to ensure a longer lifetime of the device.

MEASURE menu

RESISTANCE		UoM	Default	Range
1	Measurement average level	-	2	1…5
2	Alarm	-	ON	**Menu item is locked**
3	Alarm reset	-	Manual	**Menu item is locked**
4	Alarm threshold	kΩ	50	50…500
5	Alarm delay	s	0	0…10
6	Alarm hysteresis	%	25	25…100
7	Alarm on Relay	-	YES	YES-NO
8	Warning	-	OFF	OFF-ON
9	Warning reset	-	Manual	Automatic-Manual
10	Warning threshold	kΩ	100	50…1000
11	Warning delay	s	0	0…10
12	Warning hysteresis	%	25	25…100
13	Warning on Relay	-	NO	YES-NO

1 - Defines how the insulation resistance measurement is processed: **Level 1** prioritizes speed, applying minimal averaging to deliver faster results. This setting is suitable for quick diagnostics where time is critical and high precision is not essential. **Level 5** applies the highest degree of averaging, providing more accurate and stable readings by reducing the influence of noise or transient fluctuations. This setting is recommended when precision is critical and measurement time is less of a concern.
2 - Insulation alarm always enabled: This setting is permanently enabled and cannot be modified by the user.
3 - The insulation alarm reset is always manual and cannot be changed by the user.
4 - Defines the resistance value below which the insulation alarm is triggered.
5 - This parameter defines the verification time before confirming the presence of an insulation alarm.
6 - Setting the hysteresis value for the resistance alarm. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
7 - Enables or disables the relay output activation when the insulation resistance drops below the alarm threshold.
8 - Enables or disables the warning indication when predefined conditions are met.
9 - Defines how the warning indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.
10 - Defines the resistance value below which the insulation warning is triggered. This allows early detection of potential insulation degradation before the alarm threshold is reached.
11 - This parameter defines the verification time, in seconds, before confirming the presence of an insulation warning.
12 - Setting the hysteresis value for the resistance warning. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
13 - Enables or disables the relay output activation when the insulation resistance drops below the warning threshold.

FAULT LOCATOR		UoM	Default	Range
1	Scan start	-	Manual	Automatic-Manual
2	Scan delay	s	2	30…300
3	Scan cycles	-	1	1…60
4	Noise filter	-	NO	NO – 3rd harmonic – 21st harmonic
5	Alarm THR visual	kΩ	50	50 – 100 – 200 – 300 – 400 – 500
6	Warning THR visual	kΩ	50	50 – 100 – 200 – 300 – 400 – 500
7	Line 1	-	Disable	Enable - Disable
8	Line 2	-	Disable	Enable - Disable
9	Line 3	-	Disable	Enable - Disable
10	Line 4	-	Disable	Enable - Disable
11	Line 5	-	Disable	Enable - Disable
12	Line 6	-	Disable	Enable - Disable

1 - Defines how the fault location scan is initiated. It can start automatically when a fault condition is detected or manually by the user.
2 - Sets the delay time (in seconds) between the detection of the fault condition and the start of the scanning process. This helps avoid unnecessary scans caused by transient disturbances.
3 - Determines how many scan cycles are performed during the fault location procedure. Multiple cycles can improve reliability of fault detection.
4 - Enables harmonic filtering to reduce electrical noise during fault detection. Filtering can be disabled or set to reject specific harmonics (e.g., 3rd or 21st harmonic) that may interfere with measurement accuracy.
5 - Sets the insulation resistance threshold (kΩ) at which a visual alarm indication is activated on the system display.
6 - Sets the insulation resistance threshold (kΩ) for a visual warning indication, typically signaling a pre-alarm condition before reaching the alarm level.
7…12 - Enables or disables fault monitoring for Line 1…6 within the fault locator system.

VOLTAGE		UoM	Default	Range
1	Network frequency	Hz	50	50-60
2	Alarm	-	OFF	OFF-HI/LO-HI-LO
3	Alarm reset	-	Manual	Automatic-Manual
4	Alarm HIGH threshold	mV	260000	10000…300000
5	Alarm LOW threshold	mV	200000	10000…300000
6	Alarm delay	s	0	0…10
7	Alarm hysteresis	%	5	5…100
8	Alarm on Relay	-	NO	YES-NO
9	Warning	-	OFF	OFF-HI/LO-HI-LO
10	Warning reset	-	Manual	Automatic-Manual
11	Warning HIGH threshold	mV	250000	10000…300000
12	Warning LOW threshold	mV	210000	10000…300000
13	Warning delay	s	0	0…10
14	Warning hysteresis	%	5	5…100
15	Warning on Relay	-	NO	YES-NO

These parameters are used to detect and prevent both overvoltage and undervoltage situations within the system.
1 - Defines the system's nominal operating frequency used as a reference for all frequency-related measurements.
2 - The activation of the overvoltage or undervoltage alarm can be configured as follows: OFF: Alarm disabled, HI/LO: Both High and Low Thresholds – Alarm triggered if either threshold is exceeded, HI: High Threshold Only – Alarm triggered only by overvoltage, LO: Low Threshold Only – Alarm triggered only by undervoltage
3 - Defines how the alarm voltage indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.
4 - This parameter sets the voltage level above which an overvoltage alarm is triggered.
5 - This parameter sets the voltage level below which an undervoltage alarm is triggered.
6 - This parameter defines the verification time, in seconds, before confirming the presence of an voltage warning. I
7 - Setting the hysteresis value for the voltage alarm. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
8 - Enables or disables the relay output activation in the event of an overvoltage/undervoltage alarm.
9 - The activation of the overvoltage or undervoltage warning can be configured as follows: OFF: Warning disabled, HI/LO: Both High and Low thresholds – Warning triggered if either threshold is exceeded, HI: High threshold only – Warning triggered only by overvoltage, LO: Low threshold only – Warning triggered only by undervoltage
10 - Defines how the warning voltage indication is cleared: either automatically when the condition is no longer present, or manually by user intervention
11 - This parameter sets the voltage level above which an overvoltage warning is triggered.
12 - This parameter sets the voltage level below which an undervoltage warning is triggered.
13 - This parameter defines the verification time, in seconds, before confirming the presence of an voltage warning.
14 - Setting the hysteresis value for the voltage warning. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
15 - Enables or disables the relay output activation in the event of an overvoltage/undervoltage warning.

CURRENT		UoM	Default	Range
1	Measure	-	OFF	OFF-ON
2	Alarm	-	ON	OFF-ON
3	Alarm reset	-	Manual	Automatic-Manual
4	Alarm threshold	mA	10000	100…20000
5	Alarm delay	s	0	0…10
6	Alarm hysteresis	%	5	5…100
7	Alarm on Relay	-	NO	YES-NO
8	Warning	-	OFF	OFF-ON
9	Warning reset	-	Manual	Automatic-Manual
10	Warning threshold	mA	8000	100…20000
11	Warning delay	s	0	0…10
12	Warning hysteresis	%	5	5…100
13	Warning on Relay	-	NO	YES-NO

These parameters are used to detect and prevent the transformer overload current fault.
1 - This parameter enables or disables the measurement. If set to ON, the transformer load current is continuously monitored.
2 - If set to ON, this enables alarm management in the event of transformer overcurrent.
3 - Defines how the alarm overcurrent indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.
4 - You can set the alarm threshold value according to the overload current level of the application being monitored.
5 - This parameter defines the verification time, in seconds, before confirming the presence of an overcurrent alarm.
6 - Setting the hysteresis value for the overload current alarm. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
7 - Enables or disables the relay output activation in the event of an overcurrent transformer alarm.
8 - If set to ON, this enables warning management in the event of transformer overcurrent.
9 - Defines how the warning overcurrent indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.
10 - You can set the warning threshold value according to the overload current level of the application being monitored.
11 - This parameter defines the verification time, in seconds, before confirming the presence of an overcurrent warning.
12 - Setting the hysteresis value for the overload current warning. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.
13 - Enables or disables the relay output activation in the event of an overcurrent transformer warning.

TEMPERATURE		UoM	Default	Range
1	Measure/Probe	-	OFF	OFF-PT100-PTC
2	Alarm	-	OFF	OFF-ON
3	Alarm reset	-	Manual	Automatic-Manual
4	Alarm threshold	°C	80	0…200
5	Alarm delay	s	0	0…10
6	Alarm hysteresis	%	5	5…100
7	Alarm on Relay	-	NO	YES-NO
8	Warning	-	OFF	OFF-ON
9	Warning reset	-	Manual	Automatic-Manual
10	Warning threshold	°C	60	0…200
11	Warning delay	s	0	0…10
12	Warning hysteresis	%	5	5…100
13	Warning on Relay	-	NO	YES-NO

These parameters are used to detect and prevent the transformer high temperature.

1 - This parameter enables or disables the measurement. It also allows you to select the type of sensor used for measurement: PT100 or PTC.

2 - If set to ON, this enables alarm management in the event of transformer high temperature.

3 - Defines how the alarm high temperature indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.

4 - You can set the alarm threshold value according to the high temperature level of the application being monitored.

5 - This parameter defines the verification time, in seconds, before confirming the presence of an high temperature alarm.

6 - Setting the hysteresis value for the transformer high temperature alarm. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.

7 - Enables or disables the relay output activation in the event of an high temperature alarm.

8 - If set to ON, this enables warning management in the event of transformer high temperature.

9 - Defines how the warning high temperature indication is cleared: either automatically when the condition is no longer present, or manually by user intervention.

10 - You can set the warning threshold value according to the high temperature of the transformer being monitored.

11 - This parameter defines the verification time, in seconds, before confirming the presence of an high temperature warning.

12 - Setting the hysteresis value for the transformer high temperature warning. Hysteresis is applied to reduce errors caused by measurement fluctuations near the threshold value.

13 - Enables or disables the relay output activation in the event of an high temperature warning.

DIAGNOSTIC		Default	Range
1	Link Fail	YES	YES-NO
2	No Voltage	YES	YES-NO
3	Remote Panel Link Fail	YES	YES-NO

1 - If set to YES, if the injection circuit of the HRI-R40N is interrupted, the display shows the message LINK FAIL on the Overview display.

2 - If set to YES, it checks that the system voltage does not drop below 200V. A voltage below this threshold could compromise proper operation. The display shows the message NO VOLT on the Overview display.

3 - If set to YES, it continuously monitors the RS-485 connection with the remote panel. In case of a problem, a warning is shown on the *Network* page within the *Info* menu.

COMMUNICATION menu

COM Master		Default	Range
1	Slave node	-	None Remote Panel HFL12

NOTE: this menu is divided into 8 sections, for connected slave1..8

1 - Set the Modbus node ID of the device connected to the HRI-R40N. It can be set to None, the Remote Panel or the Insulation Fault Locator.

COM Slave		UoM	Default	Range
1	Serial node	-	1	1-247
2	Serial speed	bps	38400	4800…115200
3	Stop bits	-	1	1-2
4	Data format	-	8 bit, no parity	8 bit, no parity 8bit, odd 8 bit, even
5	MIN response delay	ms	10	5…100

1 - Serial address (node number) for the communication protocol.

2 - Serial communication speed.

3 - Number of stop bits.

4 - Data format.

5 - Set the response delay period on RS-485 port.

Input / Output menu

IN / OUT		UoM	Default	Range
1	Mode Relay1	-	Alarm	Alarm-Fault scan
2	Failsafe Relay1	-	NO	YES-NO
3	Mode Relay2	-	Warning	Warning-Fault scan
4	Failsafe Relay2	-	NO	YES-NO
5	DI function	-	Test	Test-Reset-Scan end
6	PR silence (Remote Panel silence)	-	All	All-Single

1 - Set the mode that activates the relay n°1: either on alarm or at the start of a Insulation Fault Locator scan.
2 - If set to YES, positive safety is enabled on relay n°1. In this condition, the relay is normally energized, meaning its state changes from normally open to normally closed.
3 - Set the mode that activates the relay n°2: either on alarm or at the start of a Insulation Fault Locator scan.
4 - If set to YES, positive safety is enabled on relay n°2. In this condition, the relay is normally energized, meaning its state changes from normally open to normally closed.
5 - Digital input configuration: Remote Test, Remote Reset, or end of Fault Locator scan.
6 - Remote panel silencing mode setting:
All – pressing the Silence pushbutton on the HRI-R40N silences all connected remote panels.
Single – each remote panel must be silenced individually.

Technical characteristics

Type of Network to be Monitored		
AC (max phase-to-phase voltage)		≤ 230 VAC (+15%)
Frequency		50/60 Hz
Earthing layout		Medical IT network / unearthed system
Power Supply		
Voltage		230 VAC
Tolerance (%)		+/-15%
Frequency		50-60 Hz
Maximum consumption		12 VA
Recommended protection		2 A
Product Performance		
Insulation resistance range		Measurement from 25 kΩ to 1.1 MΩ Accuracy 5%
Adjustable alarm threshold		From 50 kΩ to 500 kΩ
Response time		≤ 5 s
Self-diagnostics		Manual via push button
Inputs	Transformer overheating	PT100 – Range: 0…200 °C
	Transformer overload	Range: 100 mA…50 A
Relay Output	Number of outputs	2
	Contact type	1 changeover contact (NO-C-NC)
	Contact rating	250 V / 6 A
	Operating mode	Fail-safe, standard
Communication Port		Protocol: Modbus RS485
Measurement voltage (peak)		20 V
Internal resistance		30 kΩ
Environmental Conditions		
Mounting		6 DIN modules
Protection rating		IP20 terminals IP40 enclosure
Weight		200g
Temperature resistance	Operating	−25 °C to +70 °C
	Storage	−30 °C to +80 °C
Maximum altitude		Up to 3000 m
Relative humidity		≤ 95%
Standards		
Product		IEC 61557-9
Safety		IEC 61010-1
EMC		• IEC 61326-2-4 • IEC 61326-3-1 • IEC 61000-6-2 • IEC 61000-6-4
Installation		IEC 60364-7-710

For further details please contact:

Contrel elettronica s.r.l.
Via San Fereolo, 9
I-26900 Lodi
Tel: +39 0371 30207 / 30761 / 35386

www.contrel.it