Prevent-iON® Detection Technology

R-LEAK-LOC

User manual for the leak detection and localization detector: specifications, mounting, setup over the base unit, AX-USB-RJ45 and Modbus RTU, calibration, relay configuration and the Modbus register table.

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INFRASENSING

Contents

1. Introduction

The R-LEAK-LOC detector is a high-precision, industrial-grade solution engineered specifically for mission-critical facilities—including data centers, power rooms, and utility spaces—where undiscovered liquid breaches can lead to catastrophic hardware failure or operational downtime. It is designed to operate completely independently, requiring no proprietary base unit or central controller to detect water and trigger alerts.

Unlike standard, binary flood detectors that simply report the presence of liquid, the R-LEAK-LOC detector tracks exactly where along its cable water has been detected. It has the ability to determine if the water origin is from actual leak or condensation, while simultaneously monitor temperature via an integrated probe. It features reusable sensing cables that are resistant to corrosion and abrasion, approved for installation in both ordinary and hazardous areas.

The R-LEAK-LOC detector mitigates this risk by delivering actionable, localized alerts before water can compromise the Balance of System (BOS) or battery racks.

2. All about R-LEAK-LOC Detector

2.2. Detector Metrics

Water detection trigger	Up to 30 seconds
Drying time	Cable dries and resets within 15 seconds of removal from standing water
Accuracy	±0.3 m (±30 cm)
Temperature accuracy	±0.48 °C (0.86 °F)
Relative humidity	±1.8 %RH
Contact temperature accuracy	±0.3 °C (0.54 °F)
Contact temperature range	-50 °C to 200 °C (-58 °F to 392 °F)
Standard cleaning method	Wipe with clean damp cloth
Cable tensile strength	66.14 lbs/30 kg
Data output	Leak Status, Leak Location, Temperature, Humidity

2.3. Technical Specification

Relay output	2 (Normally Open/Normally Close)
Relay switching current and voltage	Max. 12 VDC / 250 VAC, max. 2 A / 0.5 A
Input voltage	12-24 VDC ±10%
Detector power usage	250-405 mW
Protocol	Modbus RTU over RS485 Integration with Base Unit over RJ45 (serial data)

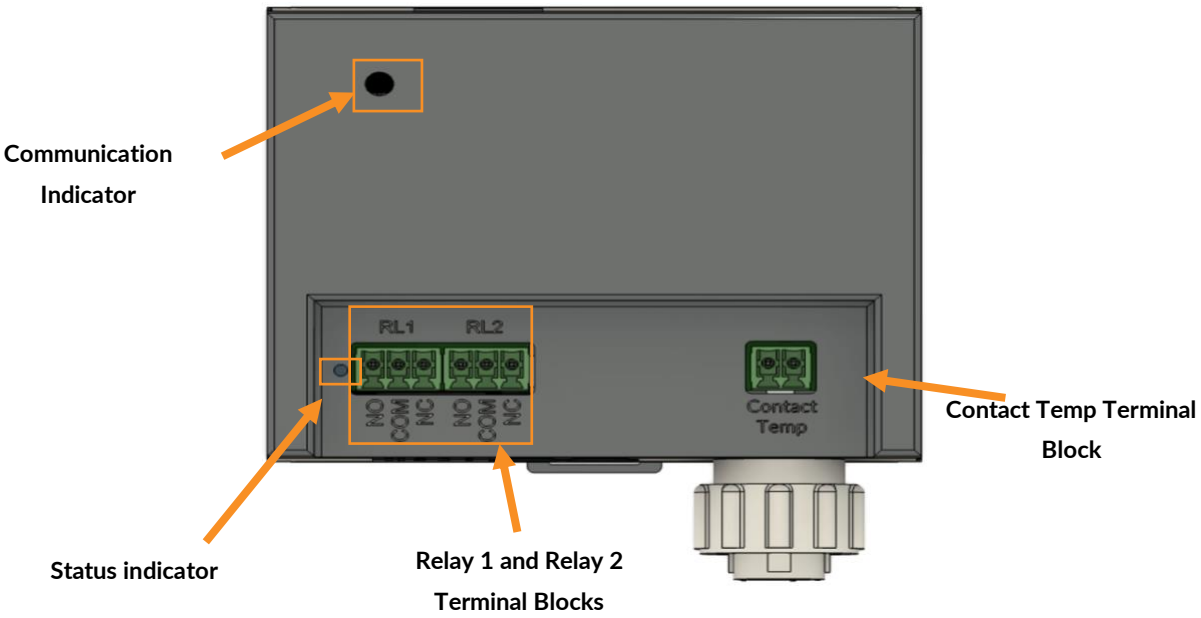
2.4. Environmental Specifications

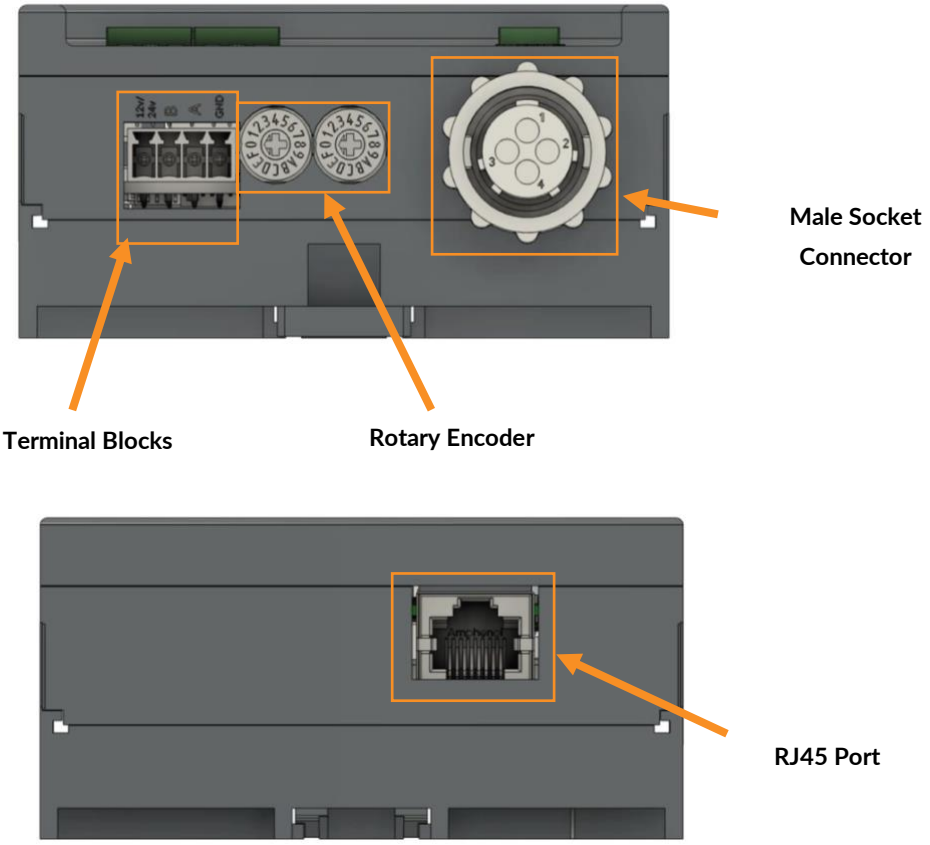
Operating temperature range	0 °C to + 75 °C (32 °F to +167 °F)

2.5. Physical Specifications

Detector enclosure	Plastic industrial grade enclosure
Detector cable	200 m (656.17 ft) detecting cable. Custom cable lengths of 5 m (16.40 ft) or 20 m (65.62 ft) are available on request (sold separately).
Mounting option	DIN rail
Dimensions	90 mm (3.54”) x 95 mm (3.74”) x 45 mm (1.77”)
Weight	139.3 g (0.307 lbs)

2.6. Exterior Features





2.7. Indicators

The LED status indicator (beside relays) displays the device's real-time operating state. Color-coded lights and flashing patterns allow users to quickly identify power status, network connectivity, and active error conditions.

LED STATUS	
Green	Operational
RED Blinking	Cable missing
RED permanent	Leak detected
Orange	Calibration not complete
Orange blinking	Calibration active
Green blinking	Manual Mode

2.8. Rapid Detection and Reset

- Fast Trigger: Secures a water detection trigger up to 30 seconds after contact.
- Quick Recovery: The specialized cable dries and automatically resets within 15 seconds of being removed from standing water.
- Continuous Readiness: The fast reset time ensures the system is immediately ready to detect subsequent events without requiring manual recalibration or cable replacement.

3. System Architecture

The R-LEAK-LOC detector is designed around a high-precision, multi-layered system architecture engineered to provide continuous, real-time liquid leak detection and pinpoint localization.

Using advanced algorithms, the detector continuously monitors the electrical properties of the connected sensing cable. Upon detecting a change in impedance, it calculates the exact distance along the cable run to determine the precise location of the leak. The detector also runs continuous background diagnostics, allowing the system to immediately distinguish between a genuine leak event and condensation.

For broader facility integration, the R-LEAK-LOC is equipped with onboard dry-contact relays to directly trigger local alarms, strobes, or emergency shut-off valves. Additionally, integrated communication protocols—such as Modbus RTU—allow the detector to seamlessly stream precise location coordinates, system health metrics, and alarm logs directly to your Building Management System (BMS) or Network Management System (NMS).

4. Setup & Implementation

4.2. Preparation

Prior to initiating the installation procedure, it is crucial to ensure that you have all the essential materials and devices readily available.

- Devices Needed
  - R-LEAK-LOC

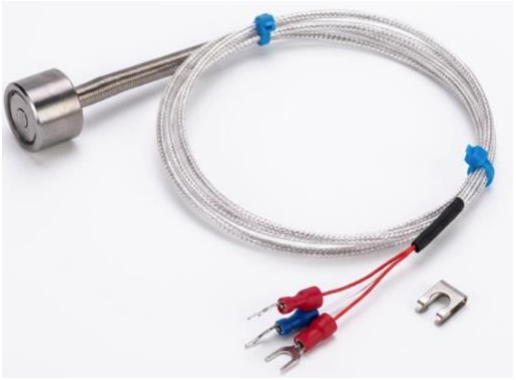
  - Sensing Cable

    Known sensing cable that detects water leak upon contact to the cable.

  - End Terminator

Important Note:
This should be connected at the end of the sensing cable in order for it to be operational. If this is not connected, detector will fault.

- PT100 Temperature Probe
  External temperature probe that is connected at its dedicated terminal block on detector. This temperature probe is magnetic and therefore can be attached to metal surfaces for monitoring.

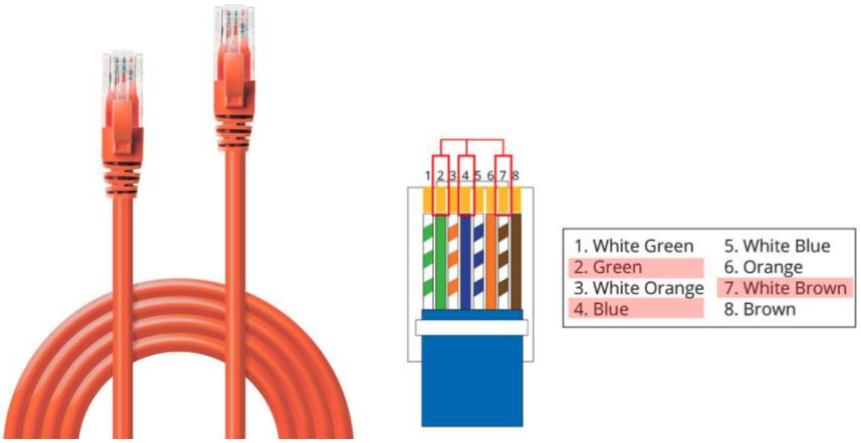


- Tools Needed
  - BASE-Unit

To power on the R-LEAK-LOC detector, it can be connected to InfraSensing BASE-unit via its Ethernet port.

- Modified RJ45 Cables

  R-LEAK-LOC can be connected to our BASE unit to power it on. There is a need to connect it via RJ45 cables.



- AX-USB-RJ45

  If detector is to be accessed via Prevent-ION Mobile application, there is a need to utilized InfraSensing AX-USB-RJ45. This app requires a compatible android phone.

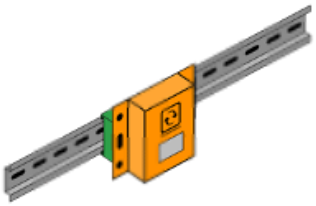
- If accessed via Modbus RTU, there is a need for a USB-Serial adapter. It requires Modbus RTU software and 24V power supply to the detector.

- Things to check
  - Ensure that there is no visible damage on any of the devices
  - Check the functionality of all network cables and ensure that they are free from any defects that could affect the quality of results.
  - Prepare the location or area where you intend to place or install the devices.

Adhering to these guidelines will contribute to a successful and trouble-free installation process.

4.3. Mounting Guidelines

Our sensors offer flexible mounting solutions, providing you with various options for installation:



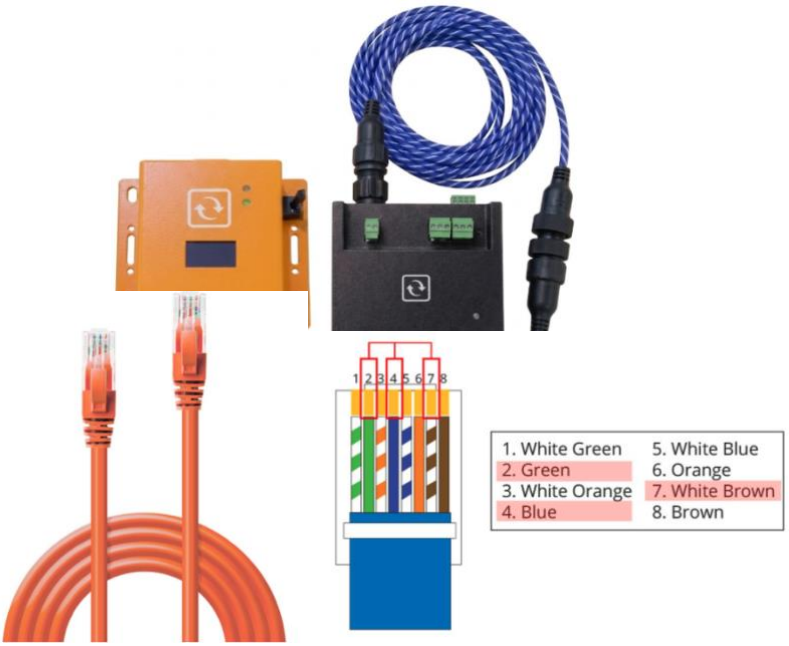
DIN Rail: Ideal for secure, space efficient mounting with compatible enclosures or control panels.

4.4. Setting-Up

4.4.1. **Connecting to the Base Unit**

The R-LEAK-LOC can receive power from the base unit via an RJ45 cable. However, the base unit functions strictly as a power source; sensor data and readings cannot be viewed or accessed through the base unit's web interface. For data monitoring, use the RS485 interface or Companion App.

Connect the external sensor probe to the **designated** port at the bottom of the Base Unit using an RJ45-to-RJ45 cable.



Important Note:
When connecting the R-LEAK-LOC to both 24V power source and the Base unit, it is essential to use a modified RJ45 cable to prevent the device from receiving power from the Base unit.

4.4.2. **Starting up using AX-USB-RJ45**

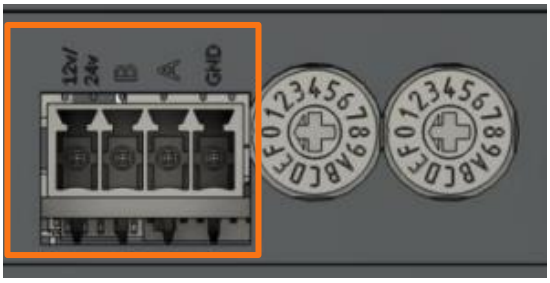
The AX-USB-RJ45 communication adapter enables field operation by allowing the R-LEAK-LOC sensor to draw electrical power directly from a connected mobile device, eliminating the need for an external power supply or dedicated power adapter during on-site procedures.

When the sensor is connected to a compatible mobile device using the AX-USB-RJ45 adapter, the phone or tablet provides the necessary direct current to initialize, boot, and run the sensor's internal circuitry. This setup allows technicians to perform quick inspections, field calibrations, and status checks without requiring a local 12–24V DC power rail or base unit connection.

Important Note:
To ensure successful power delivery, the mobile device and its connecting USB cable must support **USB On-The-Go (OTG) / reverse charging** functionality. This capability allows the mobile device to act as a power host, transmitting the required power through the AX-USB-RJ45 adapter to energize the R-LEAK-LOC sensor.

4.4.3. **Starting up via Modbus Terminal Blocks**

The R-LEAK-LOC is a standalone sensor that can be powered via a direct current (DC) supply, accommodating voltages from 12V to 24V.



Terminal Block – This block comprises terminals for various connections :

- Terminal 1: 12 to 24V DC power input (+ polarity)
- Terminal 4: Ground (GND) (- polarity)

A **12V DC power source** is highly recommended for optimal performance and reliable operation of the R-LEAK-LOC sensor.

To set up the Slave ID address please refer to the image below. Please note that there is a pointer which corresponds to the value that it is set to.

Value A	Value B	Hex	→	SLAVE ID

Example:

1	2	Hex	→	12

Important Note:
The combination of **0 and 0** or **F and F** is not functional. Please ensure these configurations are avoided to maintain proper operations.

By default, the rotary switch is set to Hexadecimal (Hex). However, it can be manually converted to Decimal, depending on your preference or system requirements.

4.4.4. Default Modbus Connection Setting

As a standalone device below are the default thresholds and configurations

Baud Rate	1200
Data Bits	8
Parity	None
Stop Bit	1

4.5. Accessing via Prevent-iON App

We can also configure R-LEAK-LOC via the Prevent-iON application. This is a straight through approach making it easily accessible for users. Make sure that you have already completed the setup in section **4.3.2 Starting up using AX-USB-RJ45.**

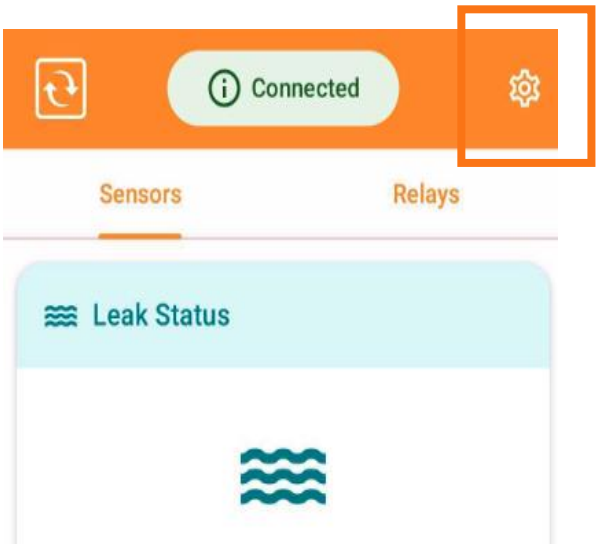
4.5.1. Calibration Procedure

Connect the R-LEAK-LOC sensor directly to any compatible Android device using the AX-USB-RJ45 communication adapter. This enables convenient on-site configuration, diagnostics, and real-time data monitoring directly from your mobile device.

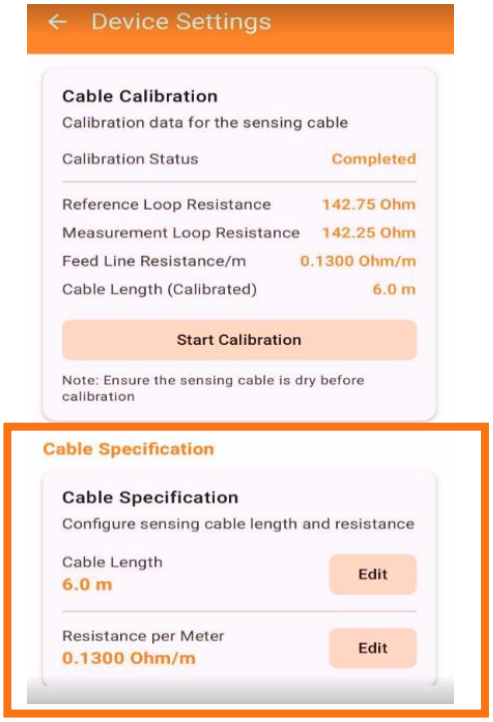
1. Upon connection of the R-LEAK-LOC through AX-USB-RJ45, you will get a popup to choose which app to run. Select Prevent-iON app and click “Just once”.

2. The app will launch and you will need to click on the “Connect” button.

3. Wait for the status to change to “Connected”, after that click on the settings icon on the upper right of your screen.



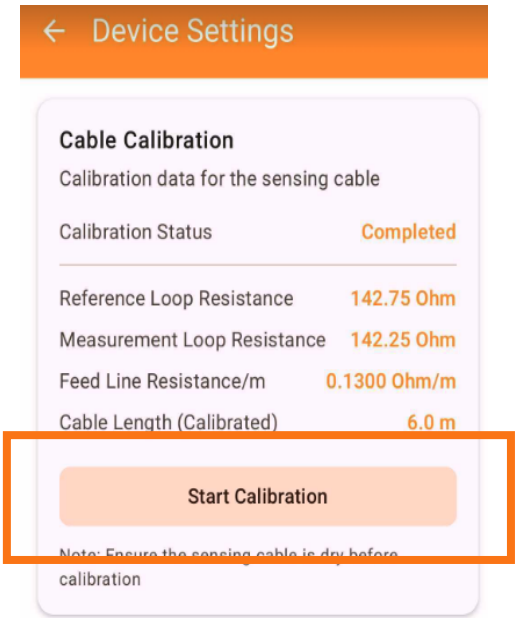
4. Scroll down to be able to see “Cable Specification” Tab. Enter the total known length of the connected sensing cable. Configure resistance: Input the cable resistance per meter



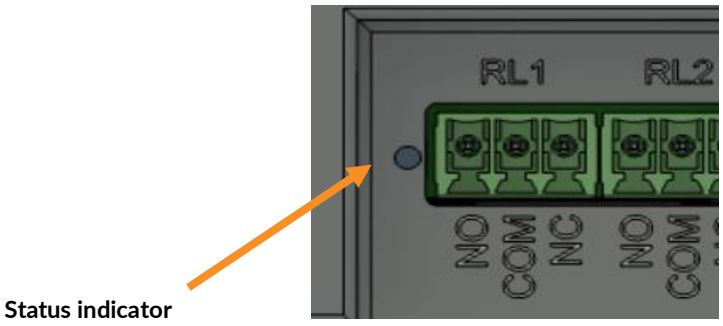
Important Note:

If you are using standard InfraSensing cable, use the default resistance value of 0.13 ohms/meter.

5. Proceed to “Cable Calibration” Tab to initiate Calibration: Navigate to Cable Calibration in the system interface and click Start Calibration.

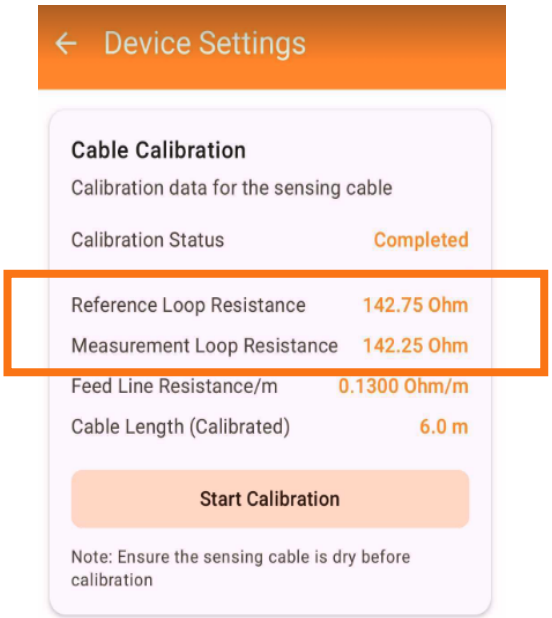


6. Check if the LED status indicator of the R-LEAK-LOC is blinking orange, it signifies that it is currently calibrating.



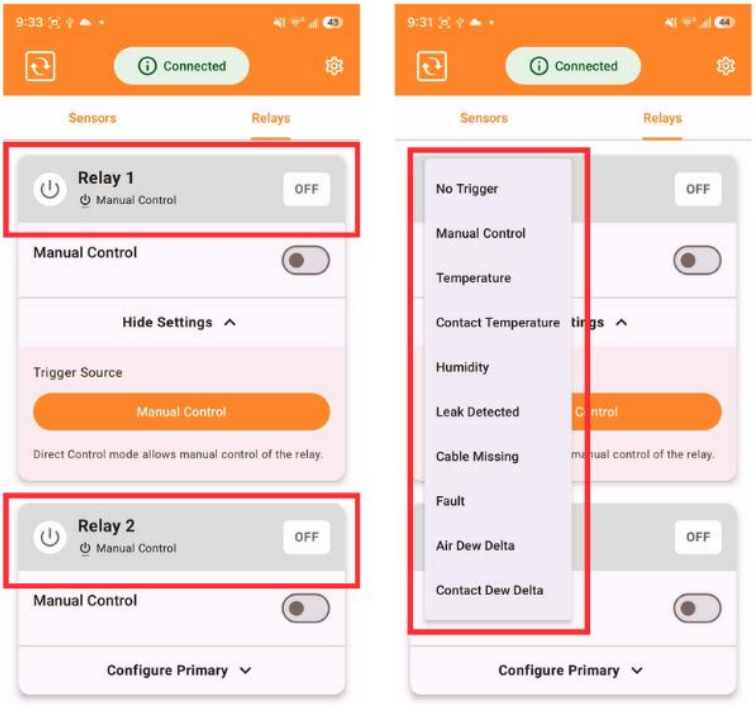
7. Wait for the calibration process to complete. Steady Green LED from the R-LEAK-LOC LED indicates calibration is finished and operational.

8. Check that the reference loop resistance is similar of value to the measurement loop resistance. Matching values confirm the system is calibrated correctly.



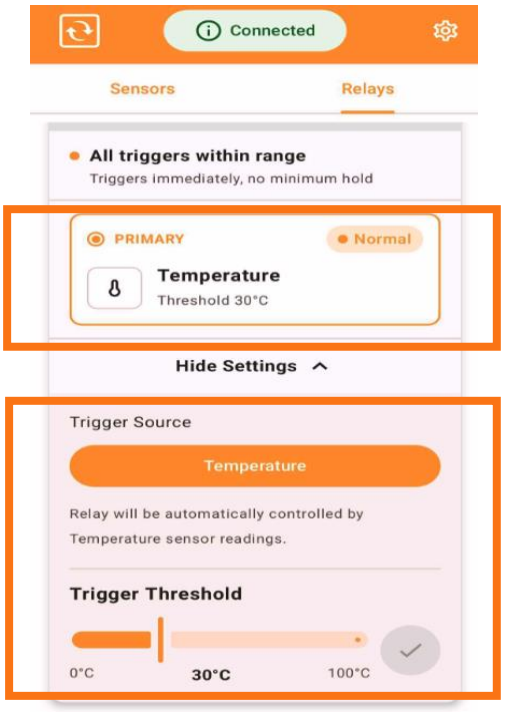
4.5.2. **Configuring R-LEAK-LOC Relays**

1. Using the Prevent-ion app, under the home page, relays tab, you may configure the relay in which how it is triggered. There are multiple options of what trigger source should be applied for relay to be triggered. By default, there is no trigger source given. Setting Trigger sources can be seen by clicking “Configure Primary” then choosing “Trigger Source”. There multiple options can be seen.



2. Assign specific threshold values to establish relay activation setpoints The system supports multiple trigger source options to initiate functions. Available triggers include:
   - Manual Control
   - Temperature
   - External Temperature (via PT100)
   - Humidity
   - Leak Detected
   - Cable Missing
   - Sensor Fault
   - Internal Delta Dew
   - External Delta Dew (via PT100)

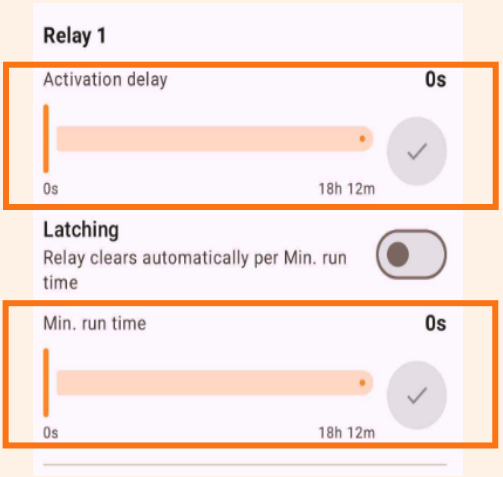
Threshold configuration is available for the following trigger sources: Temperature, External Temperature (PT100), Humidity, Internal Delta Dew, and External Delta Dew (PT100).



Important Note:
Real parameters such as **activation delay** and **minimum run time** can also be configured under **Device Settings**.

The activation delay defines the time buffer between a source reaching its threshold and the subsequent relay triggering.

The minimum run time sets the duration for which the relay remains energized once triggered, with an option for indefinite operation.

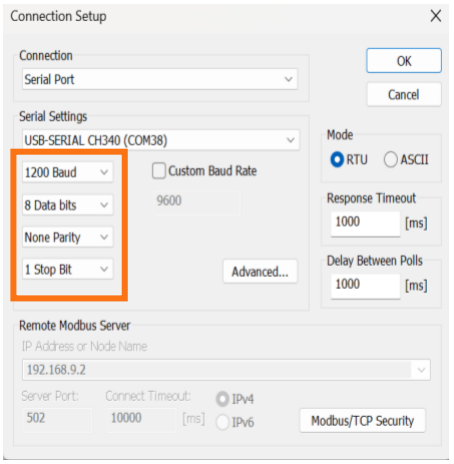


4.6. Accessing via Modbus RTU

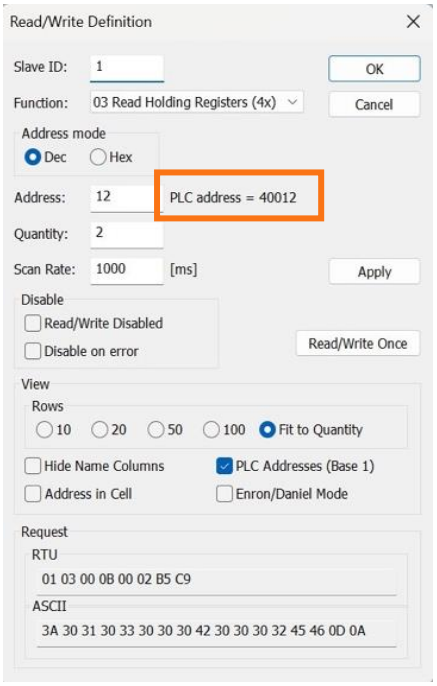
4.6.1. **Calibration Procedure**

For demonstration purposes, Modbus poll application will be used in succeeding steps.

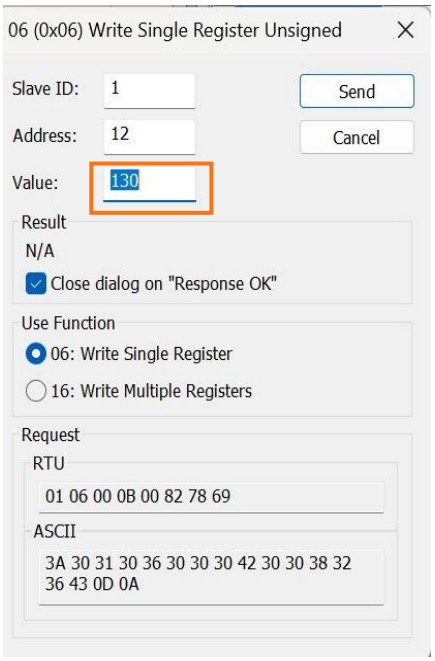
1. Launch your known Modbus RTU software on your computer.
2. Navigate to the Connection menu > select Connect, and configure the appropriate communication parameters show in **Section 4.3.4** before clicking OK to establish the active Modbus connection.

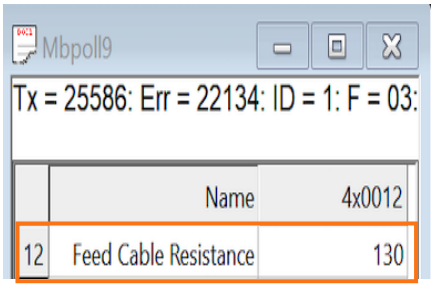


3. Configure the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to the Feed Cable Resistance. In this case, start at address 40012 with a quantity of 2. Press OK after making sure that all other parameters are correct.



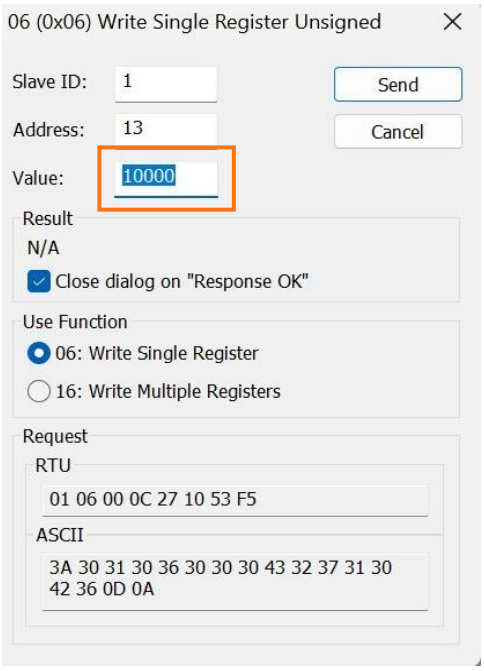
4. Edit the cell in your modbus application and set the default value to 130. Note that value should be in milli-ohms.

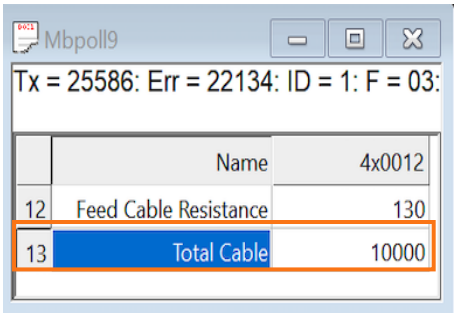




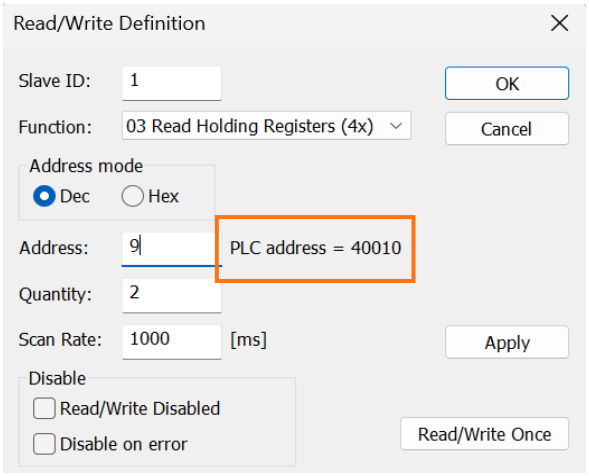
Important Note:
By default, known sensing cable has a value of 130 milliohms or 0.13 ohms

5. Repeat the process used for register 40012 to access Modbus register 40013, and write the total cable length in centimeters.

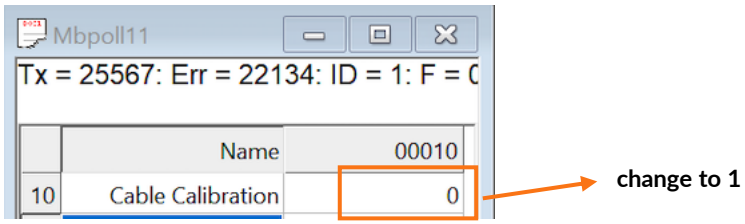




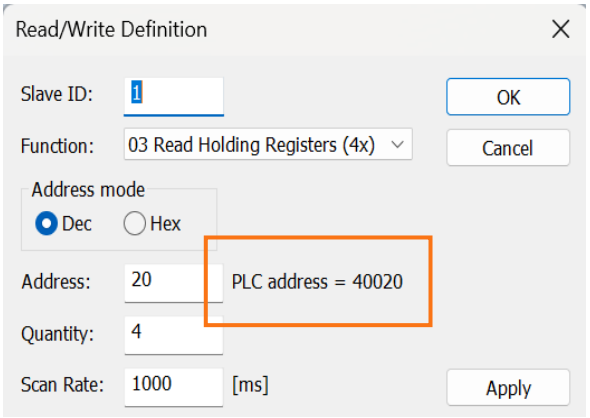
6. Configure the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to the Feed Cable Resistance. In this case, start at address 40010 with a quantity of 1. Press OK after making sure that all other parameters are correct.



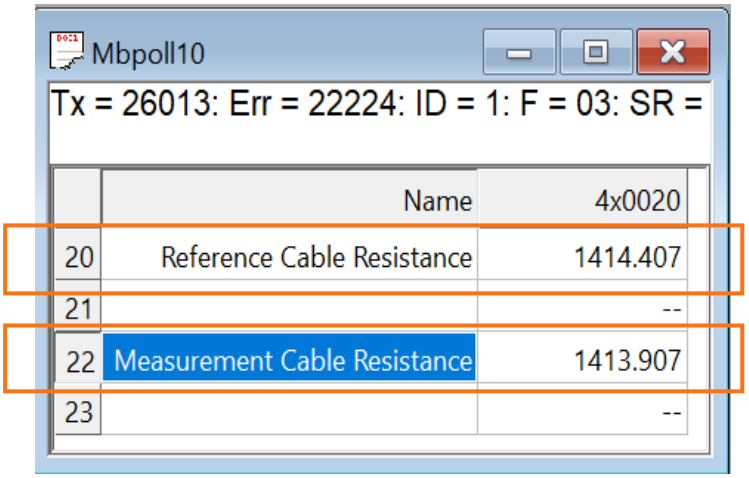
7. Access the register 40010 and change its value to 1 to trigger the automated cable calibration routine. Observe the LED indicator locates beside the relays, which will blink orange throughout the calibration sequence until it solidifies and returns to green, signifying that the physical calibration process is complete.



8. Configure the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to the Feed Cable Resistance. In this case, start at address 40010 with a quantity of 2. Press OK after making sure that all other parameters are correct.



9. Confirm that the calibration was successful by reading registers 40020 and 40022, ensuring that both registers yield similar/close values for the calculated and measured cable loop resistance, respectively.



1.1.1.Default Relay State

The default relay state refers to the initial or resting position of a relay when no external power or signal is applied. This state is typically either normally open (NO) or normally closed (NC), indicating whether the relay allows or interrupts the electrical circuit by default. The relays are set to Normally Open (NO) by default.

However, users can customize or adjust the relay state to suit the specific application needs. A power cycle is required after applying any changes or updates. This can be configured via modbus registers 40035 and 40036.

Relay Status	Value
Normally Open	00
Normally Close	01

4.6.2. **Relay Delay**

Relay delay is the intentional time interval between the activation signal and the actual switching action of the relay. This can be configured via modbus registers 40040 and 40041.

4.6.3. **Relay minimum Running Time**

Relay minimum running time refers to the minimum duration the relay remains active starting from the moment it is triggered. This can be configured via modbus registers 40045 and 40046.

Explanation	Value
Once the threshold is reached, the relay will continue to operate until it is manually turned off.	-1
After the threshold is reached, the relay will turn off immediately once the conditions return to normal.	00
The relay will activate once the threshold is reached and will continue running for a minimum of XX seconds. For example, if you set the running time to 30 seconds but the conditions have not returned to normal, the relay will keep running until the conditions normalize.	XX seconds

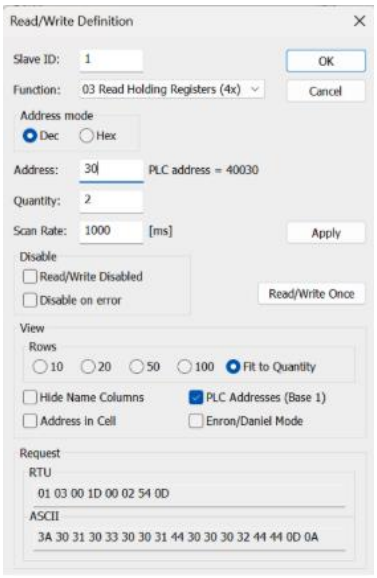
4.6.4. **Relay Threshold**

The R-LEAK-LOC relays threshold can be placed on the modbus. It depends on the trigger source that was applied in the modbus register 40025 and 40026. For the following trigger sources, a range of 0-100 units can be set in which: Internal Temperature, PT100 Temperature, Humidity.

As a sample application, here are the following steps to set trigger threshold for a trigger source of internal temperature set on Relay 1.

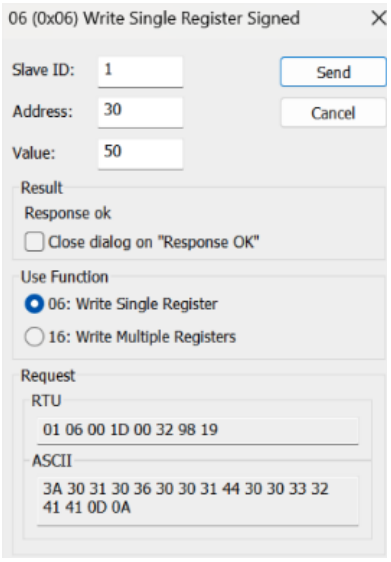
1. Locate the Modbus register for the Relay Trigger Threshold as well as the data for the metric you wish to assign. (Modbus address is provided below)
    a. Relay A – Trigger Threshold: 40030
    b. Relay B – Trigger Threshold: 40031

2. Configure the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to Relay A both trigger source. In this case, start at address 40030 with a quantity of 2.



3. Make sure to set the data format to “Unsigned” and assign a name to the register.

4. To apply a value for trigger threshold, double-click on the value (please see image below). A “write” section will appear – update the “value” to what is desired value to trigger relay. As an example, it is set to 50 which corresponds to 50 degrees celsius on internal temperature.



5. Click Send to apply the changes. After a few seconds, the value will update to 50 on the modbus register with a “Response OK”, indicating that Relay A's trigger threshold is now set to the 50 degrees celsius from internal temperature.

4.6.5. **Modbus Table**

MODBUS REGISTER ADDRESS	DESCRIPTION	REGISTER TYPE	DATA TYPE	INFORMATION		
30001	Fault Status	Read-Only	u16	Decimal	Binary	Status
				1	b0	Leak detected
				2	b1	ADC Error
				4	b2	Relay Error
				8	b3	Temperature and Humidity Error
				16	b4	Cable Missing
				32	b5	Calibration Requested
				64	b6	Water Leak Error
				128	b7	PT100 Error
				256	b8	PT100 Cable Issue
30002 to 30003	Leak Location	Read-Only	32-bit Float (Little Endian | Byte Swap	In Centimeters		
30006 to 30007	Temperature	Read-Only	32-bit Float (Little Endian | Byte Swap	In Celsius		
30008 to 30009	Humidity	Read-Only	32-bit Float (Little Endian | Byte Swap	In % RH		
30010 to 30011	External PT100 Temperature	Read-Only	32-bit Float (Little Endian | Byte Swap	In Celsius		

30020	Sensor Status	Read-Only	u16	Decimal	Binary	Status
				1	b0	Operational
				2	b1	Leak Detected
				4	b2	Cable Missing
				8	b3	Incorrect Calibration
				16	b4	Error
30021	Calibration Result	Read-Only	u16	Decimal	Binary	Status
				1	b0	Inactive
				2	b1	Active
				4	b2	Performed OK
				8	b3	Performed NOK
30036 to 30037	Internal Dew Point Temperature	Read-Only	32-bit Float (Little Endian | Byte Swap	in Celsius		
30038 to 30039	External PT100 Dew Point Temperature	Read-Only	32-bit Float (Little Endian | Byte Swap	in Celsius		
30040 to 30041	Dew Point Temperature Difference	Read-Only	32-bit Float (Little Endian | Byte Swap	Difference between internal temperature and dew point calculations; In Celsius		
30042 to 30043	External PT100 Temperature Difference	Read-Only	32-bit Float (Little Endian | Byte Swap	Difference between external PT100 temperature and dew point calculations; In Celsius		
40001	Modbus Address	Read-Only	u8			
40002	Parity Bits	Read-Write	u8	0 = None, 1 = Odd, 2 = Even		

40003	Baudrate	Read-Write	u8	0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400
40004	Stop Bits	Read-Write	u8	0 = 1.5, 1 = 1, 2 = 2
40010	Cable Calibration	Write only	u8	Write 1 to run calibration
40011	Sensor Calibration	Write only	u8	Same value upon calibration as 40012
40012	Feed Cable Resistance	Read-Write		Cable resistance per meter in milliohms
40013	Cable Length	Read-Write		Cable length in centimeters
40020 to 40021	Reference Cable Resistance	Read Only	32-bit Float (Little Endian | Byte Swap	Calculated cable resistance
40022 to 40023	Measurement Cable Resistance	Read Only	32-bit Float (Little Endian | Byte Swap	Measured cable resistance
40025	Relay 1 Trigger Source	Read-Write	u8	0 – No trigger 1 - Manual control 2 – Temperature 3 – Temperature external 4 – Humidity 5 – Leak detected 6 – Cable missing 7 – Fault 8 – Air Dew Delta 9 – Contact Dew Delta
40026	Relay 2 Trigger Source	Read-Write	u8	0 – No trigger 1 - Manual control 2 – Temperature 3 – Temperature external 4 – Humidity 5 – Leak detected 6 – Cable missing 7 – Fault

				8 – Air Dew Delta 9 – Contact Dew Delta
40030	Relay 1 Trigger Threshold	Read-Write	u8	This is where you set the value to trigger the relay based on the detector you chose on address 40025
40031	Relay 2 Trigger Threshold	Read-Write	u8	This is where you set the value to trigger the relay based on the detector you chose on address 40026
40035	Relay 1 - Default Value	Read-Write	u8	0 = Normally Open, 1 = Normally Close
40036	Relay 2 - Default Value	Read-Write	u8	0 = Normally Open, 1 = Normally Close
40040	Relay 1 Delay	Read-Write	u16	In Seconds
40041	Relay 2 Delay	Read-Write	u16	In Seconds
40045	Relay 1 Min. Running Time	Read-Write	int16	In seconds; -1 No end 00 – right away
40046	Relay 2 Min. Running Time	Read-Write	int16	In seconds; -1 No end 00 – right away
40050	Temperature Unit	Read-Write	bool	1 - Farenheit 0 - Celsius

MODBUS REGISTER ADDRESS	DESCRIPTION	REGISTER TYPE	INFORMATION
1	Relay A	Read-Write	Relay A Status (Optional Trigger to test Relay ON/OFF)
2	Relay B	Read-Write	Relay B Status (Optional Trigger to test Relay ON/OFF)

Important Note:

To apply changes to the Modbus connection settings, please refer to the following. Note that these changes are only applicable to the following Modbus register addresses (40002, 40003, 40004, 40035, and 40036).

If you customize the **Parity, Baud Rate, Stop Bits, or Relay Default State**, a reboot is required for the changes to take effect.

5. Document Control

VERSION	DATE	CHANGE
2	28 August 2026	Layout rebuilt to IS-HS-001 from templates/document. Content, wording, order and section numbering carried verbatim from version 1; house cover, legal line and this document control section added.
1	24 August 2026	Initial issue.