

**LEAK DETECTION DEVICE
FOR PRE-INSULATED PIPES**MSD equipment
Model: MSD8970EV4**MSD8970E**

230VAC / 15W



■ Detection of short circuits between the fluid-carrying pipe and signal wire

■ Detection of breaks in signal wires

■ Detection of leaks in pre-insulated pipes

SYSTEM DESCRIPTION

Since pre-insulated pipelines are equipped with signal wires along their entire length, it is possible to place the pipeline under continuous remote monitoring. Each pre-insulated pipeline must be included in a stationary continuous remote monitoring system to promptly detect faults and prevent the spread of fluid through the insulation material.

The MSD8970E leak detector is an electronic instrument designed for permanent leak detection and verification of the installation and connection of signal wires in pre-insulated heating pipelines. The device is designed for stationary installation, connecting to the signal wires and fluid-carrying pipe while continuously monitoring three alarm conditions:

- Leak detection in pre-insulated pipelines,
- Break detection in signal wires,
- Short circuit detection between the fluid-carrying pipe and signal wire

The system simultaneously and independently checks all signal measurement circuits up to 5000 meters. The device has an integrated memory that can store measurements for all channels on pre-insulated pipelines and also measure the ambient temperature.

Based on the project and the length of the security measurement circuits in the leak detection system, internal calibration and threshold setting are performed before installing the device. This calibration increases the accuracy and efficiency of the system.

If one of the three alarm states is detected, the device displays the type of alarm on the screen along with information about which pipe is affected. The device operates by measuring moisture in the insulation network, using conductivity measurement of the fluid with pulse measurement to eliminate parasitic effects such as polarization capacitance and electrochemical reactions.

TECHNICAL SPECIFICATIONS

Maximum monitoring wire length per channel:	Maximum: 6000 m
Power supply:	230VAC / Max: 15W
Certifications:	IP certification, EMC certification
Number of alarm signal relays	1 x 24VDC/2A
Number of AUX inputs:	3
Internal fuse:	400mA 250V - 5x20mm T-type
Operating temperature:	-25 do 60°C

The device can connect to all types of pre-insulated pipeline systems, with specific designations for each:

- S1, S2 POTIS (Pressure) – Connection to the supply pipe,
- S1, S2 POVRAT (Return) – Connection to the return pipe,
- S1, S2 T.P.V – Connection to the TPV pipe,

The device has one relay digital output (NO/NC) for alarm signaling, designed for connection to a PLC controller, which will signal an ALARM on SCADA systems.

There are three AUX relay inputs for connecting sensors that detect alarm conditions and notify the system by triggering an alarm.

Examples of connected sensors:

- Moisture sensor – Detects water or moisture at a specific location. When conditions change, it activates an alarm, notifying the system of a potential leak or flooding.
- Magnetic contact sensor – Installed on substation doors or windows. When opened, the magnetic contact is interrupted, triggering an alarm for potential break-in or unauthorized access.

These are just a few examples. A wide range of sensors can be used depending on the system's alarm needs.

ROLES OF DEVICE COMPONENTS

The main circuit board is housed in a plastic enclosure with a transparent hinged cover. Below the cover, there is a control panel with a built-in display that shows the system status. The panel contains two LED indicators signaling power presence and alarm status.

- LED Indicators:

- Green LED (POWER): Lights up when power is present, indicating that the system is operational.

- Red LED (ALARM): Activates when an alarm condition occurs, displaying the type of alarm on the LCD screen, alerting the user to a system issue.

- LCD display:

- The display continuously monitors the system. If an alarm condition occurs, it shows the alarm type and provides information about which pipeline section or channel is affected. If the system is functioning normally, an "OK" indicator appears next to each channel, confirming that everything is in order.

- Alarm Status Legends on the LCD Display:

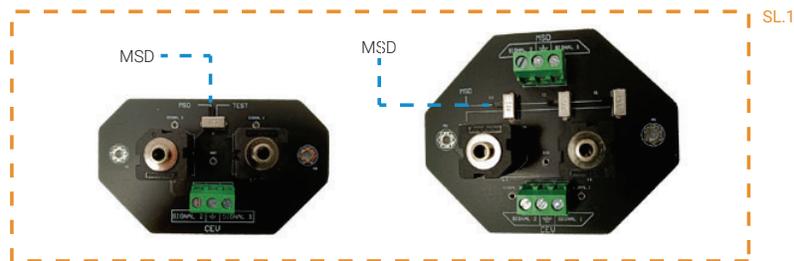
1. **KS** - Short circuit
2. **PR** - Break in signal wire
3. **VL** - Moisture detection

- Reset button - Located beneath the protective plate of the MSD8970E housing. In case of unexpected external disturbances, pressing this button resets the system's status display and initiates a new measurement cycle for the entire pipeline.

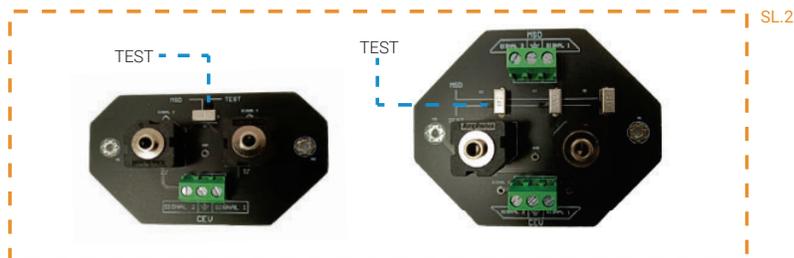
MEASUREMENT MODULE FUNCTIONS

The measurement module is installed at the beginning and end of the pre-insulated pipeline. It is used for easier control measurements with a TDR portable device, eliminating the need to disconnect the pre-insulated pipes from the system.

Continuous Monitoring Mode (MSD8970E connected): The switches (S1, S2, S3) must be set to the MSD position, as shown in Diagram SL.1.



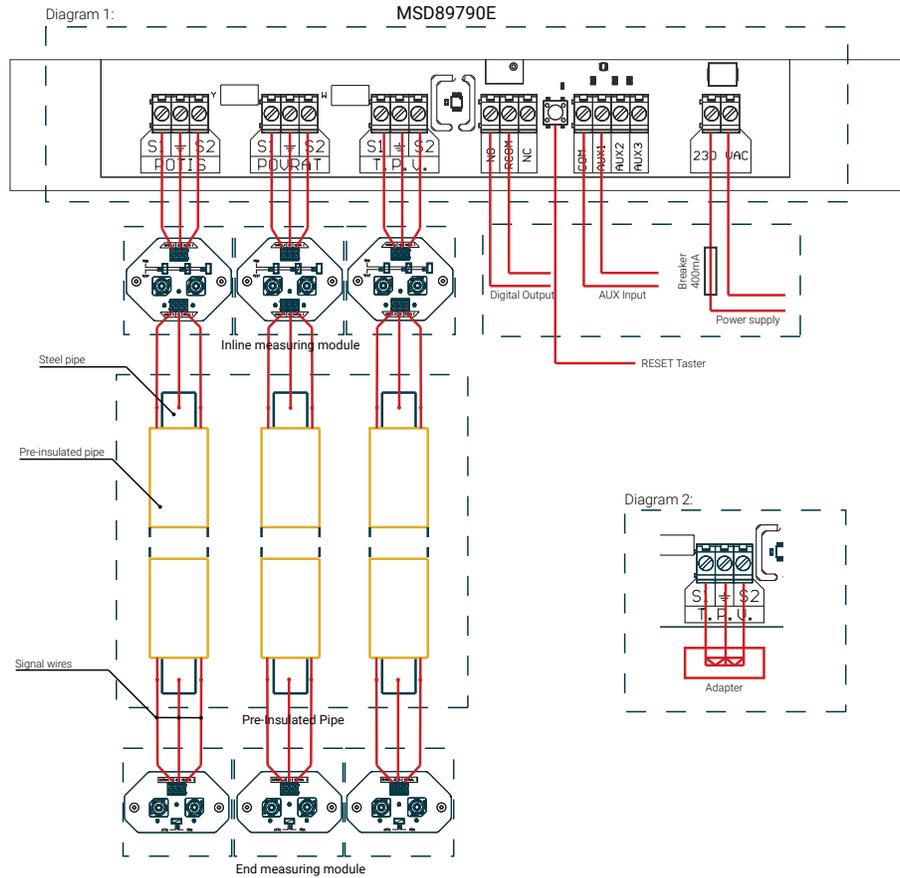
Test Mode (Portable Measurement Device connected): The switches (S1, S2, S3) must be set to the TEST position (Diagram SL.2).



The measurement device is connected to the test connector (J1 or J2) using a 3.5mm cable with a 220Ω impedance connector (Diagram SL.3). During this mode, all control wires in the pre-insulated pipes are disconnected from the system, allowing accurate measurements between test points.



WIRING DIAGRAM – THREE-PIPE AND TWO-PIPE SYSTEM



In Diagram 1, the connection method for the three-pipe system is shown.

In the case of a two-pipe system, an "Adapter" is placed on the third channel to simulate uninterrupted operation on that channel, as shown in Diagram 2.

SAFETY MEASURES

This device is not intended for use by persons (including children) with limited physical, mental, or visual abilities, or by individuals who lack the necessary experience and/or knowledge, unless they are supervised by a person responsible for their safety and instructed on how to use the device.

The installation and commissioning of the device may only be carried out by a person holding a certificate issued by the device manufacturer.

During any intervention or work on the pipeline to which the pre-insulated pipe leak detection device is connected, all device inputs, including the power supply, must be disconnected for safety reasons.



INSTALLATION, COMMISSIONING, AND MAINTENANCE OF THE DEVICE

PREPARATION FOR INSTALLATION

Before mounting the MSD8970E device on the wall, ensure the following:

- Make sure you have the appropriate tools for drilling and installation.
- Check whether all required parts and accessories (screws, wall anchors, brackets) are included in the package.
- Select a suitable mounting location on the wall that is close to the necessary power and signal cable connections.

Selecting the Mounting Location

- Choose a dry location protected from direct exposure to weather conditions.
- Ensure that the location is easily accessible for maintenance and inspection.

Marking the Drill Holes

- Position the device at the desired location on the wall.
- Using a pencil, mark the positions of the mounting holes through the mounting slots on the device or bracket.

Drilling and Mounting

- Using a drill, make holes at the marked positions.
- The recommended hole depth is approximately 5-6 cm, depending on the size of the wall anchors and screws.
- Insert the wall anchors into the drilled holes.
- Ensure that the wall anchors are firmly secured in the wall.
- Align the device or bracket with the wall anchors.
- Secure the device or bracket to the wall using screws.
- Use a spirit level to ensure that the device is mounted evenly.

Connecting the Device

- Before connecting the device, ensure that there is no electrical power in the connection line.
- Connect the signal wires according to the wiring diagram (three-pipe or two-pipe system).
- Connect the power supply (230VAC) by bringing in two conductors (Phase and Neutral) and attaching them to the designated power connector on the PCB.

Functionality Check

- After installation, turn on the device and check the LED indicators and LCD display.
- Ensure that the device is functioning correctly before completing the installation process.
- If the green indicator LED is on and the channels are correctly displayed, the device has been successfully connected.
- If the green LED is not illuminated or channel readings appear incorrect, review the connection process and verify the wiring.

Final Notes

- Ensure that all connections are secure and stable.
- Check for any loose wires or faulty connections.
- After installation and wiring, the device is ready for operation. Follow all safety precautions during installation and handling to ensure system security and efficiency.

Safety Measures During Installation

- Wear protective gloves and goggles during drilling, installation, and wiring.
- Check for existing electrical installations in the wall before drilling to prevent damage.
- Ensure that the device is mounted in a location where it will not be exposed to mechanical impacts or vibrations.

INSTALLATION NOTICE

THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY DAMAGES OR INJURIES RESULTING FROM IMPROPER INSTALLATION OF THE DEVICE BY THE USER. IT IS RECOMMENDED THAT INSTALLATION BE CARRIED OUT BY QUALIFIED PERSONNEL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.



CONNECTION, COMMISSIONING, AND MAINTENANCE OF THE DEVICE

ADDITIONAL EXTERNAL PROTECTION OF THE DEVICE

When installing and connecting the MSD8970E device, it is important to provide additional protection for both the device and the users. It is recommended to use an external switch or an automatic circuit breaker to allow quick and safe power disconnection in case of intervention or device servicing.

- External switch: Allows manual power disconnection of the device, which is useful during installation, maintenance, and emergency situations.
- Automatic circuit breaker: Ensures automatic power disconnection in case of overload or short circuit, protecting the device and the installation from damage.

Overcurrent Protection Devices in the Installation:

To protect the device and the installation from overcurrent, it is recommended to use external protective devices such as automatic circuit breakers. These devices respond to excessive current or short circuits by cutting off the power supply and preventing damage.

- Automatic circuit breaker (6 to 16A, C class): In this case, it is recommended to use an automatic circuit breaker rated between 6 and 16A, C class. This breaker is designed to react to current loads that exceed the specified limit, automatically disconnecting the power supply and preventing potential hazards.

Using a 6 to 16A, C class automatic circuit breaker ensures:

- Protection against overcurrent: The breaker will cut off the power if the current exceeds the rated value, thereby protecting the device and the installation.
- Increased safety: Prevents cable and equipment overheating, reducing the risk of fire or damage.
- Ease of use: Automatic circuit breakers can be easily reset after activation, allowing quick and simple restoration of the device's operation.

PROTECTIVE SYMBOLS ON THE LABEL AND THEIR MEANINGS

IP65

IP65: This symbol indicates that the device is completely protected against dust and resistant to water jets from any direction.



Double insulation: The double insulation symbol signifies that the device has additional insulation, providing protection against electric shock and eliminating the need for grounding.

TA: -10°C - 50°C

Temperature range: The temperature marking of -10°C to 50°C indicates that the device can safely operate within this temperature range.

DEVICE CLEANING

General Notes:

- The device is housed in an enclosure with an IP65 rating, meaning it is protected from dust and water jets from all directions. However, to keep the device in optimal condition and ensure the display is always visible, it is important to follow the cleaning instructions below.

Recommended Materials:

- Soft cloth (microfiber or similar)
- Mild soap or gentle cleaning solution
- Clean water
- Rubber gloves (recommended)

Cleaning Steps:

1. Power Off:

Before starting the cleaning process, make sure to turn off the device and unplug it to avoid any risk of electric shock.

2. Prepare Cleaning Solution:

Prepare a mild soap solution or a gentle cleaning agent that will not damage the device surface. Avoid using harsh chemicals that could corrode the enclosure or screen.

3. Cleaning the Enclosure:

Dampen the soft cloth with the prepared cleaning solution, then wring it out so that it is damp but not wet. Gently wipe the exterior of the device, paying attention to remove any dirt or residue that may have accumulated.

4. Cleaning the Screen:

Clean the protective glass over the screen gently, using a cloth dampened with clean water to remove any soap residue.

5. Wiping and Drying:

After cleaning, use a second dry, clean soft cloth to wipe the device and remove any remaining moisture. Ensure that there is no residual moisture, especially around the seams and connectors.

6. Inspection and Reconnection:

Before reconnecting the device to the power supply, check that it is completely dry and free of any moisture. Once you are sure the device is dry, you may reconnect it to power and continue using it.

Note:

The device should not be opened or cleaned internally unless performed by authorized service personnel. Unauthorized opening may result in voiding the warranty and damaging the device.



SERVICE PERSONNEL INSTRUCTIONS NOTE ON DEVICE USAGE

Specific Risks Associated with the Product that May Affect Service Personnel:

- **Electrical Risks:**
The device contains live components. There is a risk of electric shock when handling or servicing the device.
- **Mechanical Risks:**
When opening the device or handling its parts, there is a risk of injury to fingers or other body parts due to sharp edges or moving parts.
- **Thermal Risks:**
While the device is operating, certain parts may become hot. There is a risk of burns when handling these parts.

Protective Measures for These Risks:

- **Electrical Risks:**
Before handling the device, always disconnect it from the power supply and ensure there is no voltage on the electrical components. Use appropriate protective equipment such as insulating gloves and tools.
- **Mechanical Risks:**
Use appropriate tools and protective techniques when handling parts of the device to avoid injury.
- **Thermal Risks:**
Avoid direct contact with hot parts of the device. Use appropriate protective gloves or tools for handling hot components.

Safety Check After Repair:

- **Electrical Safety Check:**
Before reconnecting the device to the power supply, check all electrical connections and components to ensure there is no damage or loose connections.
- **Functionality Check:**
After repair, test the device's functionality to ensure the repair was successful and the device is working properly.
- **Physical Safety Check:**
Ensure that all parts of the device are correctly positioned and that there is no damage that could cause safety issues during use.

DEVICE USAGE NOTE:

The MSD8970E Device is Intended Solely for Leak Detection in Pre-insulated Pipes and Associated Systems. If the device is used in a manner not specified in the provided instructions or specifications, it may be damaged or its functionality may be compromised.

Users are required to follow the manufacturer's instructions for installation, use, and maintenance to ensure safety and optimal performance. If the device is used in a manner not approved by the manufacturer, the protection it offers may be compromised, which could result in unforeseen situations or loss of functionality.

Before each use, users should familiarize themselves with all relevant instructions and specifications provided by the manufacturer to ensure proper operation of the device and the safety of all users. Any modification or unauthorized intervention on the device may lead to the loss of warranty and potentially hazardous situations.

If there are any doubts or questions regarding the proper use of the device, users should contact the manufacturer or authorized service for additional information and support.