Instruction Manual

for

UniPOS Loop Diagnostic Tool

Version: 0.6.2.3

I. Introduction.

This document outlines the hardware and software aspects of the Loop Diagnostic Tool. This tool is designed to identify hardware issues in addressable fire loops using UniPOS fire detectors and peripheral devices. It helps locate and resolve short circuits, loop breaks, and communication failures. The tool can be connected to existing loops or used for testing on a bench setup. It simulates various conditions and power modes, assisting installers in ensuring high-quality and reliable fire protection systems. The tool is compatible with FS7000M and FS7000-1MC panels.

II. Terminology

Polling – The continuous process of sequentially communicating with modules or loop devices.

Loop – A two-wire circuit (positive and negative) that begins at the "A" side of the loop controller and ends at the "B" side. It supplies power and communication to connected devices.

LC/ loop controller - A module used to connect the loops with. A **loop controller** has capacity for 2 loops.

Diagnostic Loop Controller – A module used for loop diagnostics. It provides power, communication, and troubleshooting functions. Hardware-wise, it is identical to a standard loop controller, but it features the specialized diagnostic software.

PSU – The power supply unit connected with the **diagnostic loop controller.**

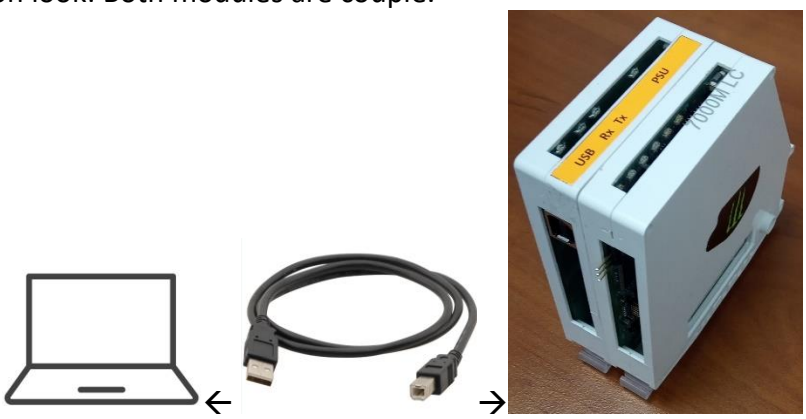
III. Hardware setup.

The hardware consists of two modules:

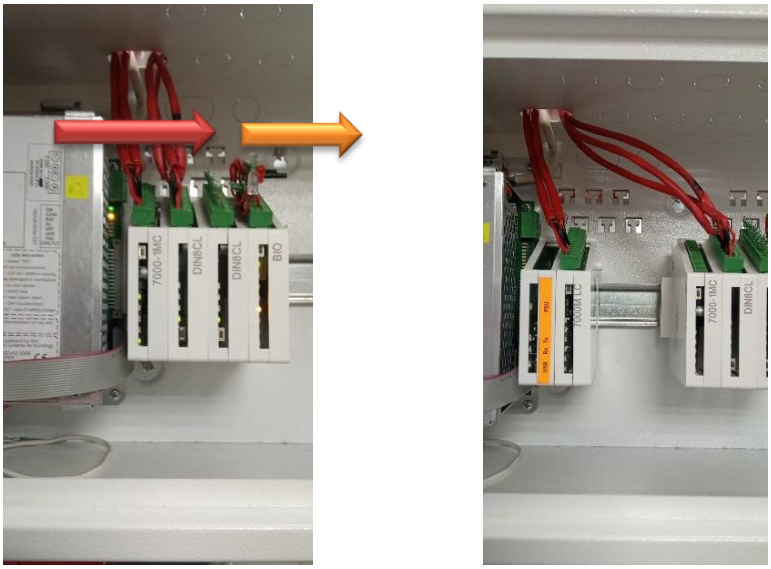
- **DinCommunicator**
- **Diagnostic Loop Controller** (with extended command set firmware)

The device connects to a PC or laptop using a standard USB A-to-B printer cable.

1) Common look: Both modules are couple.



2) The original modules must be shifted to the right or removed. The original Base module must be disconnected or removed to make space for the diagnostic modules. Other modules can either be reinstalled or left unpowered. The DinCommunicator supports both RS-485 channels—those for DIN devices and those for interface devices.

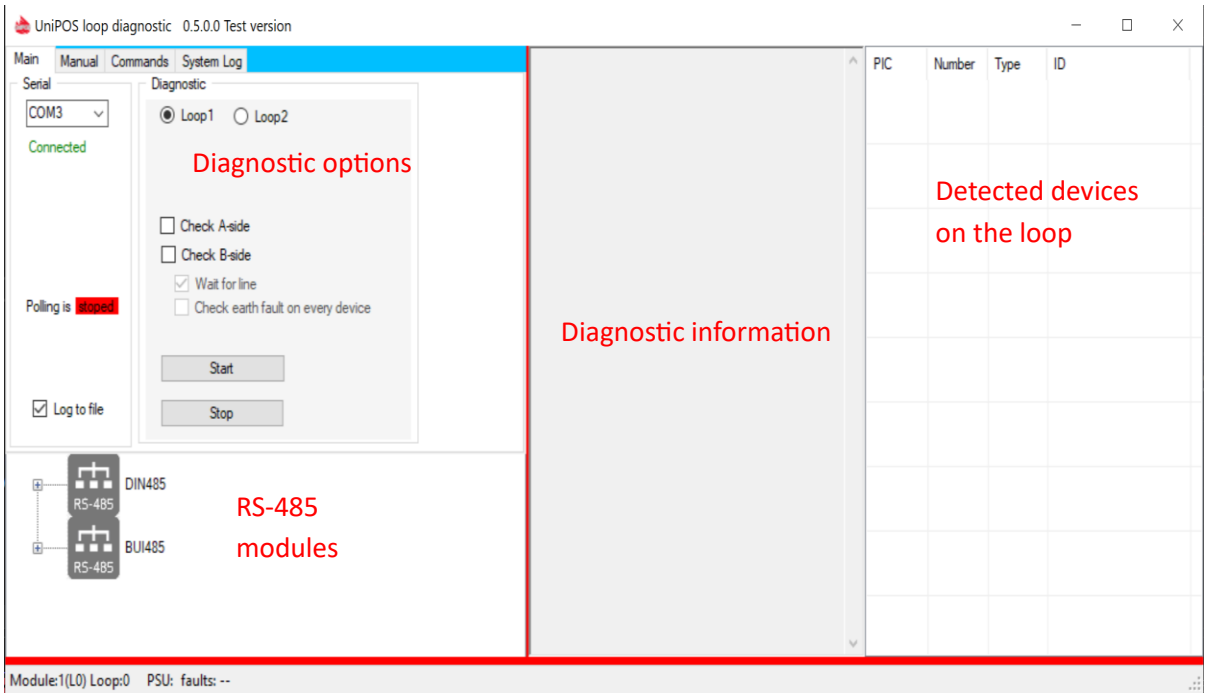


3) **The DinCommunicator module has four LEDs:**
   USB – Indicates that the USB cable is connected.
   Rx, Tx – Show receive and transmit communication activity.

IV. Software.

The loop diagnostic software, **ComHelper – Loop Diagnostic**, is developed and provided by UniPOS Ltd. It functions as a USB-to-RS-485 communicator through the **DinCommunicator** module.

1) **Overview**:



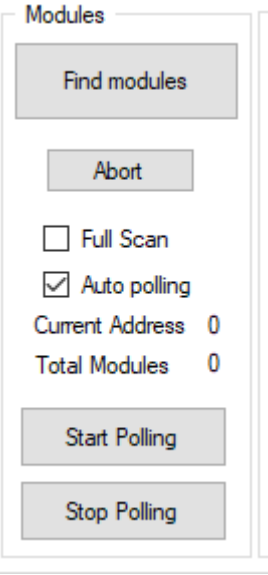
2) **Main Tab**:

- Allows the setting up of RS-485 communication between the PC and the DinCommunicator.
- The serial port number is retrieved from the Windows Device Manager.
- When connected, the red "Disconnected" label changes to green "Connected", indicating an active connection.
- Once connected, you may start the diagnostic with the desired functions.

3) **Manual Tab**:

- Provides buttons for manual searching for modules.
- Modules receive power from the fire panel's power supply and communicate via RS-485 → USB DinCommunicator.
- The first 10 modules on the DIN rail are searched using an infrared photodiode or a fixed address.
- The Diagnostic Loop Controller is programmed with a predefined address.
- Infrared auto-addressing is used for standard DIN rail modules.
- Modules on the BUI's RS-485 always have predefined addresses and are only pinged for availability.
- Once modules are discovered, an automatic polling process starts (if enabled), continuously communicating with the detected modules.
- The PSU data is used to detect earth faults, power and battery information, displayed on the **status bar** for reference, like this:

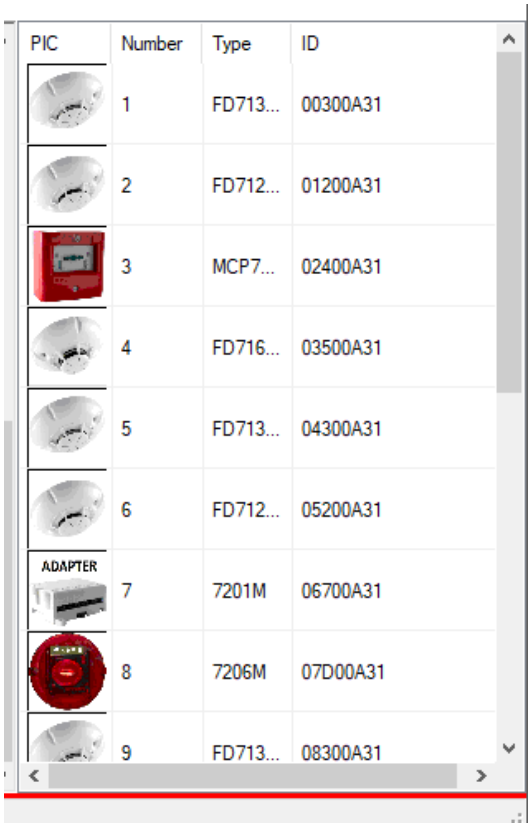
- Full Scan Option:
    - Enables searching for all available modules and establishing communication.
    - If the system includes a BUI module, it must be discovered using this option to prevent a "System Fault" error and continuous beeping.
    - Service messages are displayed on the BUI screen for all connected BUIs and remote BUIs.



- The PSU is not mandatory, but missing it may result in skipped diagnostic data.

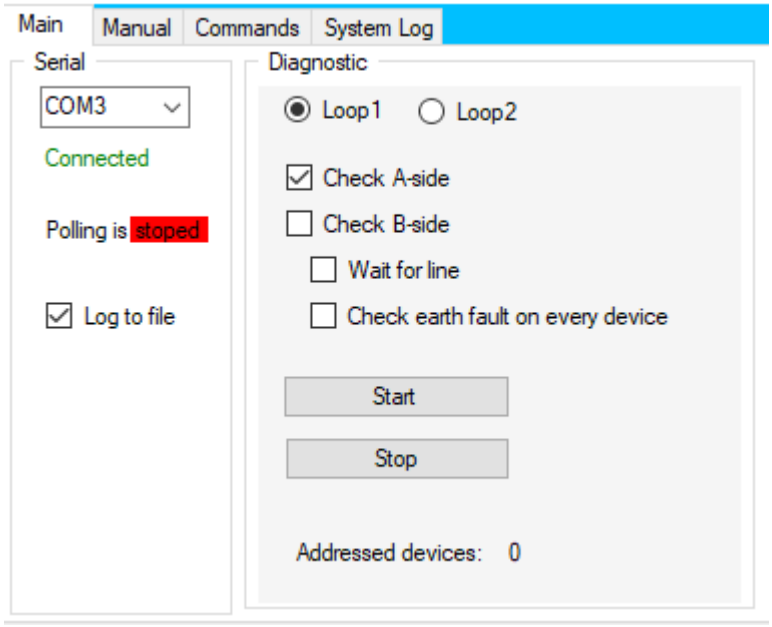
4) **Device view:**

Once the devices are addressed, their details can be viewed within the software interface, like this:

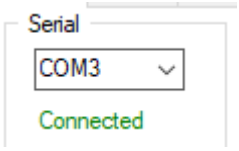


V. Simple Diagnostic and Analyzation

The diagnostic commands in the main tab allow you to identify problems such as loop breaks, short circuits, high impedance, missing devices, and more.



1) **Communication Ports.**
   First, select the appropriate communication port. If the communication is established, a green "Connected" label will appear next to it, as shown below:

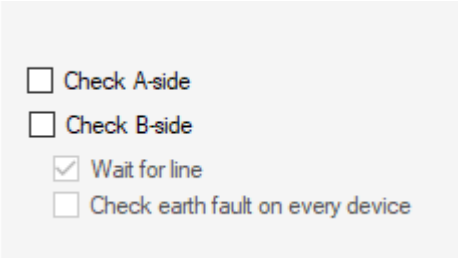


2) **Diagnostic Tool.**

   The following options are available for loop diagnostics:

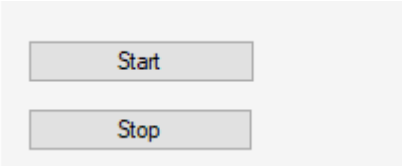
- **Radio Buttons**: Select which loop to diagnose:

- **Checkmarks**:



  - **"Check A-side"**: Perform a check on the A-side of the loop controller.
  - **"Check B-side"**: Perform a check on the B-side of the loop controller.
  - **"Wait for Line"**: This option will check if the line is broken. It may take up to 5 minutes, but if you're certain the line is broken, you can skip the wait by unchecking this option.
  - **"Check Earth Fault on Every Device"**: If enabled, the tool will check each device for earth faults during the addressing process.

Once you've selected the desired options, click the **Start** button to begin diagnostics on the loop controller.



The process includes:

1. **Module Search**: The tool will first search for modules connected to the communication port. If no module is found, verify the communication port and **DinCommunicator** connection.
2. **Earth Fault Check**: The diagnostic tool will check for earth faults on the battery.
3. **Line Check**: If the line check option is enabled, it will check for broken lines.
4. **Addressing Devices**: The loop controller will start addressing devices on the loop. If issues such as power shortages or broken lines are detected, the tool will provide information about the devices and indicate where the problem occurred.

- **Successful Addressing**: Devices will be listed on the right tab of the tool, where you can manually turn their LEDs on or off.
- **Power Shortage**: If a power shortage occurs during addressing, the loop controller may stop addressing, power off, and then restart. Devices detecting the power shortage will blink rapidly with red lights. Check the device connections and resolve the power issue before continuing.
- **Line Break**: If a line is broken, the loop controller will halt addressing. You will need to manually determine where the break occurred by observing the LED status of the devices, and then fix the issue.

3) Stopping the Diagnostic

- If you wish to stop the diagnostic early, click the **Stop** button, which will power off the loop controller.

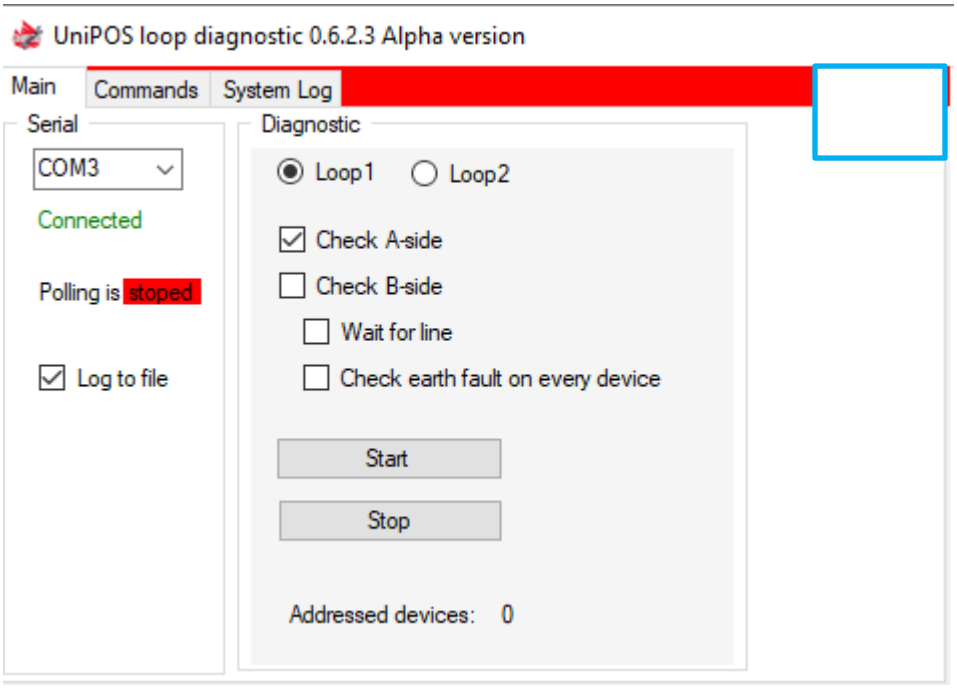
4) Viewing Detailed Logs

- To view more detailed logs of the diagnostic process, you can access the **System Log** window.

VI. Advanced Diagnostic and Analyzation.

For diagnostic purposes, a set of commands is available to control the diagnostic loop controller and determine how the loop functions and addresses attached devices. While the tool is mostly used in cases of broken or unstable loops, it can also detect issues in properly functioning loops. Understanding the loop's behavior and interpreting diagnostic messages will help locate issues such as loop breaks, short circuits, high impedance, missing devices, and more.

To unlock these functionalities, you must click in the blue highlighted area in the main tab a few times. After that the manual tab will be unlocked:



1) Loop States.

Each loop can be in one of the following six states:

i. **Power Off** – No power on Side A or Side B.

ii. **Autoaddressing** – The system is searching for devices on the loop. Most diagnostic messages are generated during this process. After completing, the loop moves to **state iv**.

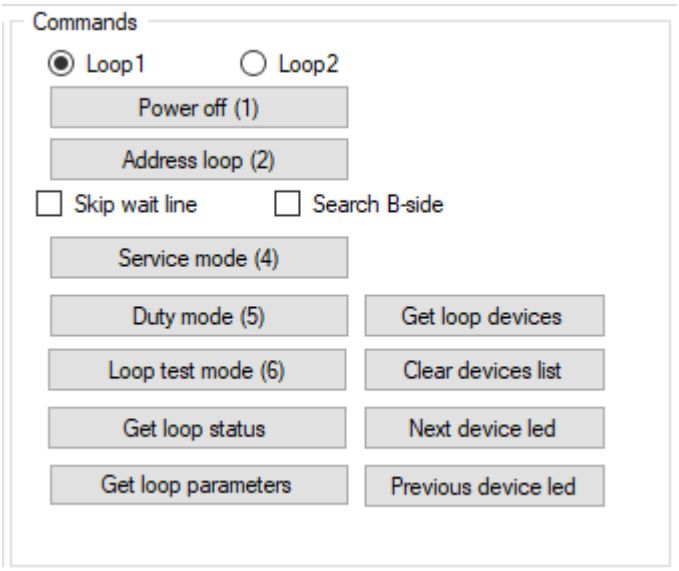
iii. **Test Mode** – Not used by the diagnostic tool.

iv. **Service Mode** – This state occurs when autoaddressing successfully finishes. Devices are powered and addressed but not communicating.

v. **Duty Mode** – Can only be entered from **state iv**. Devices are powered, addressed, and communicating. This state is only available if the loop is in normal condition.

vi. **Test Mode** (Diagnostic Loop Controller Only) – The loop is powered from both sides, but devices are not addressed and no communication occurs. This mode is exclusive to the diagnostic loop controller; a standard loop controller does not support this state.

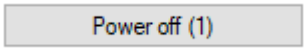
2) Loop Commands.



Radio Buttons: Select the loop you want to work with. Both loops can be used simultaneously, but extra caution is needed when sending commands to avoid erratic loop behavior:

Command Buttons:

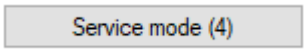
- **Turn Loop Off**: Disables the selected loop and clears any addressed devices in the diagnostic loop.



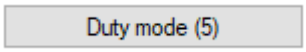
- **Start Autoaddressing**: Initiates the autoaddressing mode, where most diagnostic information is generated. This mode can only be entered from **state i** (Power Off).

- **Addressing Mode**: Used for troubleshooting. If the loop check is negative, enabling **"Skip wait line"** forces the loop controller to address devices up to the first issue, by skipping the initial line wholeness check. If **"Search B-side"** is checked, autoaddressing will start from **side B**. This can help identify devices on side B and count the total number of available devices.

- **Service Mode**: Devices are powered and addressed, but there is no communication. This mode can only be entered from **Duty Mode** or after successful autoaddressing.



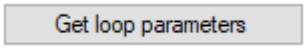
- **Duty Mode**: After successful loop addressing, this mode begins device polling (different from module polling).



- **Test Mode**: The loop is powered from both sides but is neither addressed nor communicating. This mode can only be entered from **state 1** (Power Off).

- **Read Loop State**: Displays the current state of the selected loop and the number of addressed devices.

- **Read Resistance and Current**: Applicable only in **state 4** (Service Mode). Displays the loop's resistance and current.



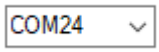
- **Read Devices List**: Retrieves a list of devices from the loop controller to the software.

- **Clear Devices List**: Clears the devices from the software list (does not affect the loop controller).

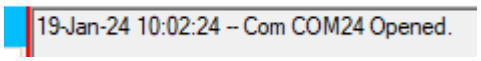
VII. Examples: step-by-step.

Scenario 1 – Everything is Working Correctly

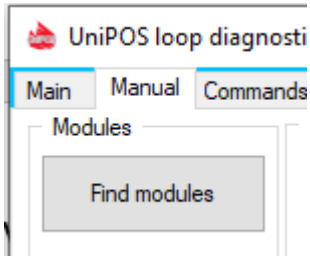
1. **Select the Serial Port**
   - Open the software, select the correct serial port.

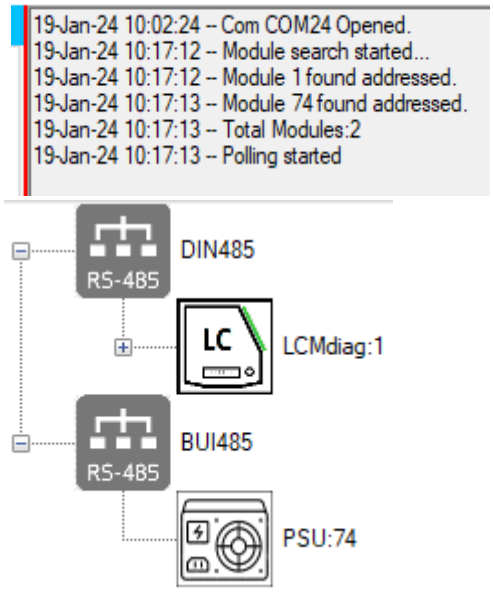
   - If the serial port is available, it will open successfully and display a message connected.

2. **Find Modules**
   - Navigate to the **"Manual"** tab and press **"Find Modules"**.

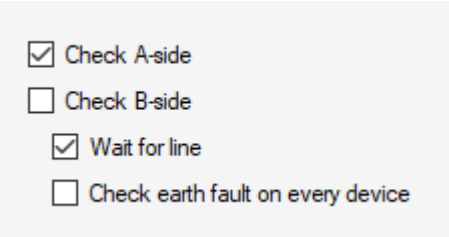
   - When the search completes, all detected modules will be listed in the print window and displayed in the module tree.

3. **Start Polling (can be skipped)**
   - If polling is enabled in the **"Manual"**, the system will automatically start the RS-485 push-pull communication between the master and slave modules. You can make sure of that by looking at the **Diagnostic Loop Controller** and notice a blinking yellow LED.
   - Polling is essential for data transfer and ensures proper communication.

4. Send the Autoaddressing Command

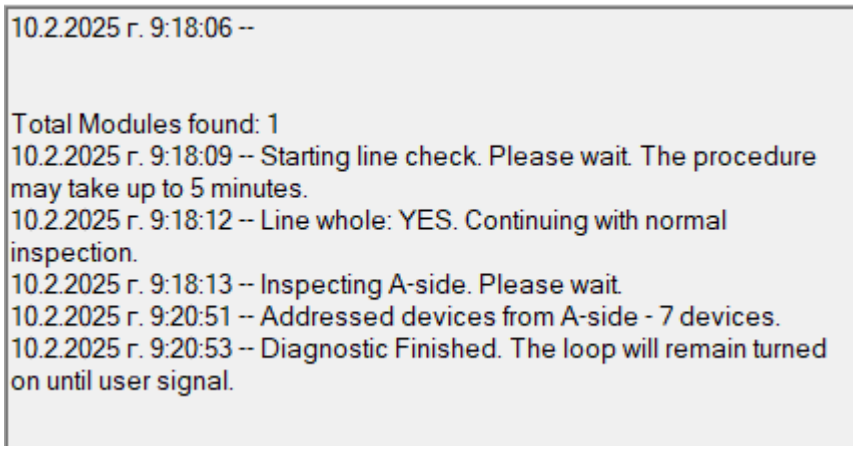
- Navigate to the **“Main”** tab of the software
- Select these options:



- Press the button **“Start”** after selecting the loop (“Loop1” for the first loop, “Loop2” for the second loop).

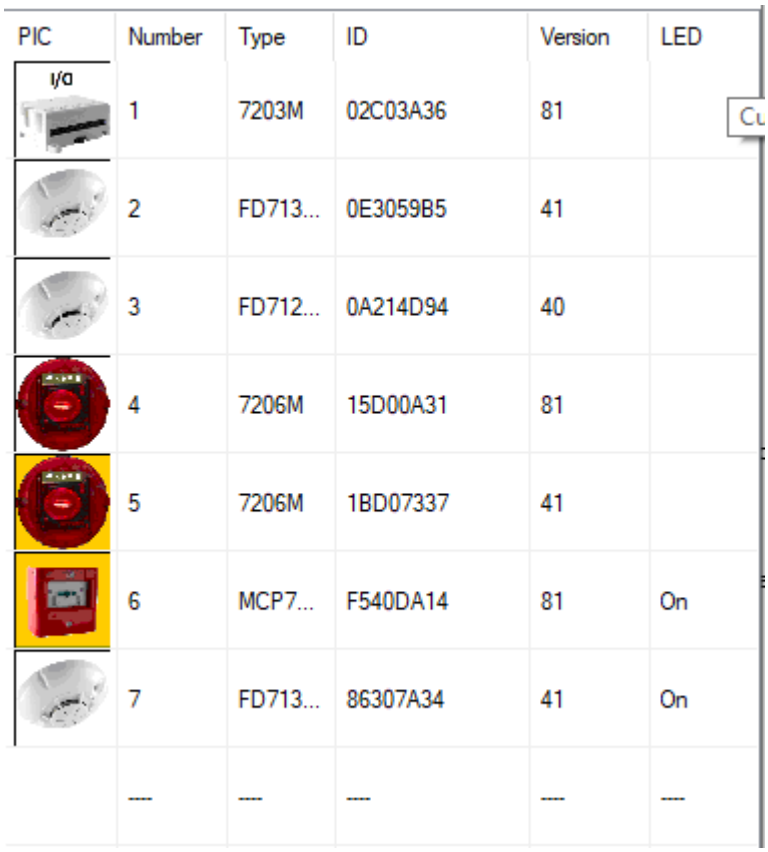
5. System response

The diagnostic tool will check the loop integrity and display messages like:



6. Final Steps

- When the search finishes, a summary of discovered devices will be displayed.



PIC	Number	Type	ID	Version	LED
I/O	1	7203M	02C03A36	81	
	2	FD713...	0E3059B5	41	
	3	FD712...	0A214D94	40	
	4	7206M	15D00A31	81	
	5	7206M	1BD07337	41	
	6	MCP7...	F540DA14	81	On
	7	FD713...	86307A34	41	On
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- The loop enters Service Mode, meaning devices are powered, addressed, and responsive to diagnostic commands.
- Perform a visual inspection by turning device LEDs ON/OFF to locate them on the loop by right clicking on a device.

Scenario 2 – The Loop Has Wiring Issues

1. **Perform steps 1 to 4 from the previous scenario.**

2. After waiting for the process to finish, you will get information about the addressing procedure like this:

```
Total Modules found: 1
10.2.2025 r. 9:38:06 -- Starting line check. Please wait. The procedure may take up to 5 minutes.
10.2.2025 r. 9:39:48 -- Line whole: NO. The line is disconnected or has power shortage. Continuing with inspection.
10.2.2025 r. 9:39:49 -- Inspecting A-side. Please wait.
10.2.2025 r. 9:39:58 -- Loop powered power shortage detected on the loop. Error ID:48
10.2.2025 r. 9:40:13 -- Autoaddressing failed due to power short on the line. Addressed 3 devices. Addressing again to last possible device. Please wait.
10.2.2025 r. 9:40:19 -- Second addressation to last device addressed 2 devices.
10.2.2025 r. 9:40:20 -- Diagnostic Finished. The loop will remain turned on until user signal.
```

   This means that the loop addressation failed due to a power shortage. A new addresation will start that will address only to the last possible device, before the power shortage. The last possible device will automatically turn it's LED on, so it can be easily found on the physical loop. The devices will ne shown after the second addressation:

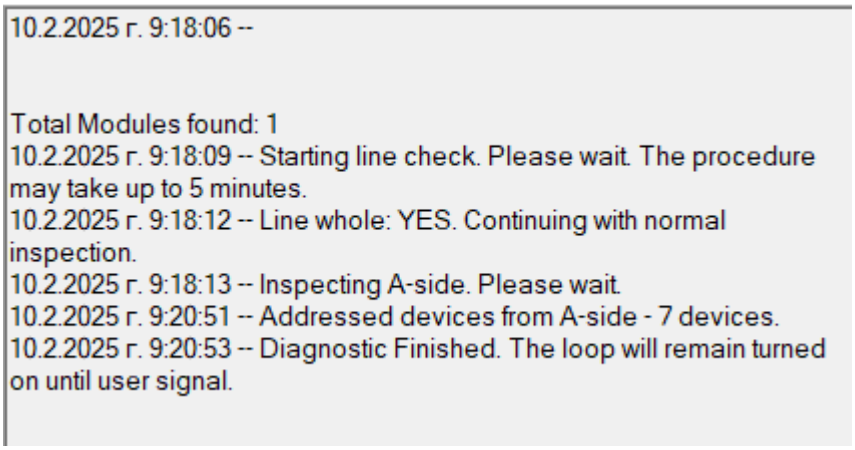
PIC	Number	Type	ID	Version	LED
I/O 	1	7203M	02C03A36	81	
	2	FD713...	0E3059B5	41	On
	----	----	----	----	----

3. **Analyze Device List**

   - As you can see, the LED of the last device in the loop is turned on. Locate this device and inspect the wiring between it, the next device, and the one after that

4. **Fix the problem and repeat**

   - After locating the problem. Press **“Stop”** and restart the procedure. The addresation will begin again, looking for problems on the loop. If no new problems are detected, the result should look something like this:



5. **Conclusion**

   - If all the expected devices on the loop are addressed and shown on the device list the diagnostic is finished.
   - Address both sides of the loop separately (A and B). To make sure there are no problems on both sides.