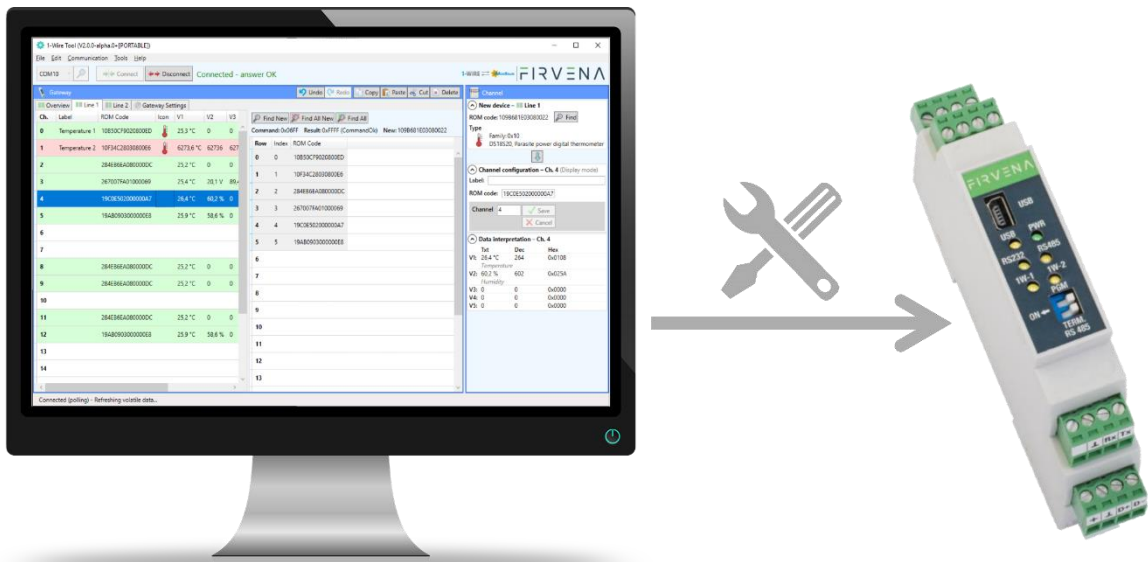# OneWire Tool User Manual

Introduction

The application OneWire Tool is a utility intended to be used for configuring the gateway 1-Wire / Modbus RTU. It helps you manage 1-Wire elements connected to the gateway and map them to the Modbus holding registers. The application is also a useful verification tool whereby you can evaluate whether your system works well. OneWire Tool reads and displays the data stored in the Modbus registers and allows to see the states and measured quantities of the connected 1-Wire elements.

This manual describes features of the OneWire Tool application. For a detailed description of the gateway and its Modbus interface, refer the gateway manual.

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1 Communication with Gateway

To communicate with the gateway, the application uses the COM port and Modbus RTU protocol. The application always behaves like a MASTER (sends queries) and the gateway like a SLAVE (responds to queries from the application).

The gateway has three communication ports: USB, RS485 and RS232 port. Although the USB port is designated for configuring the gateway, the RS485 and RS232 port can also be used thanks to a single communication interface.
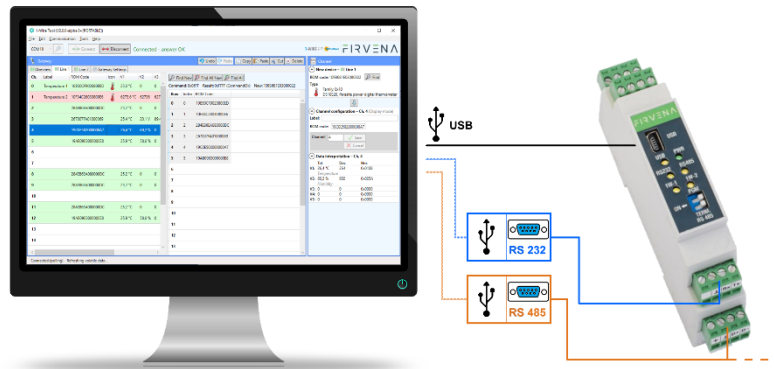

Fig. 1 Common connections

1.1 Driver

The USB interface is implemented using an integrated circuit from FTDI. Communication via the USB port needs a driver to be installed on your computer that causes the gateway appears as an additional COM port. The operating system usually performs the driver installation automatically when a gateway is first connected. Alternatively, the driver can be downloaded from the manufacturer's website and installed manually (*http://www.ftdichip.com/Drivers/VCP.htm*).

The operating system assigns a unique COM port during the installation. If more than one gateway is used on the computer, each gateway has different port assigned because the port is assigned to a particular FTDI chip. The COM port can be changed in the Device Manager.

For the RS485 and RS232 port, a USB-to-serial converter is usually needed. If this is the case, the driver and virtual COM port is related to the converter and does not depend on the connected gateway.

1.2 Communication Settings

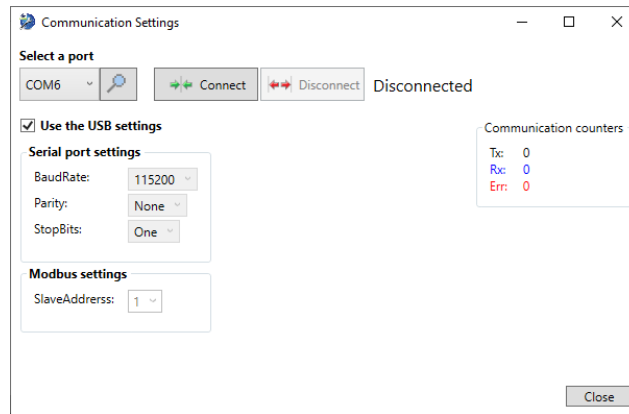Complete communication settings are available through the *Communication/Communication Settings* menu item (F11).

Fig. 2 Communication settings overview

1.2.1 USB

Only the COM port must be selected, the remaining settings are fixed for the USB port.
To start communicating with a gateway:

1. Connect the gateway through USB port to your computer
2. Select the COM port
3. Tick the checkbox "*Use the USB settings*"
4. Press "*Connect*" (F3)

If everything is all right, the message *"Connected – answer OK"* is shown.
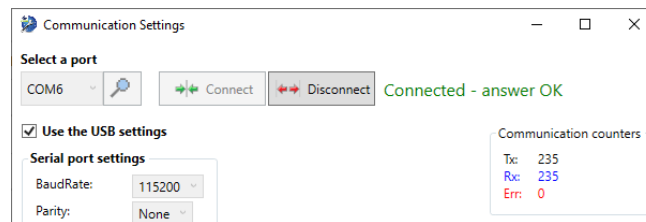
Fig. 3 Communication works properly

Otherwise, if communication does not work properly, a red-highlighted error message is shown. Check the communication settings and physical connection and try again.

Fig. 4 Communication error

Note: *If there are many COM ports available on the computer, the following procedure can be used to determine the right one:*

1. *Connect the gateway to the computer (or disconnect if it has been already connected)*
2. *Using the F5 key update the list of available ports*
3. *Check out what COM port appears in the list (or disappears)*

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1.2.2 RS485 and RS232

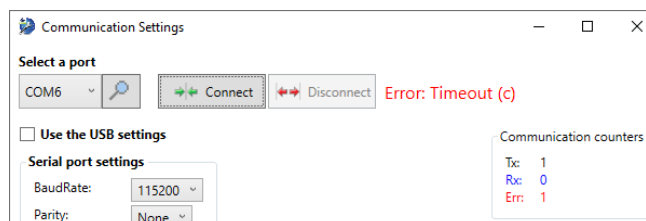The COM port is not associated with the gateway, rather it is associated with a device that is used to access a serial network that is the gateway connected to (e.g. a USB-to-serial converter). Compared to the USB connection, it is also necessary to set parameters of the serial network (*Serial port settings*) and the address of the gateway within the network (*Modbus settings – SlaveAddress*).

To start communicating with a gateway:

1. Connect the gateway through RS485 port or RS232 to your computer
2. Select the COM port
3. Uncheck the checkbox "*Use the USB settings*" to enable further settings
4. Perform the enabled communication settings
5. Press "*Connect*" (F3)

1.3 Getting the Data

The application gets the data automatically when communication is running. First, the configuration registers are read then the application switches to the state where the volatile registers are being looped. The division into the configuration and volatile registers is discussed in the following table. The range corresponds to addresses that are actually read by the application.

Tab. 1 Configuration versus volatile registers

Configuration data – it is supposed only the MASTER can change this data Loaded after the *"Connect"* command executed, then if necessary.		
Area Name	**Range**	**Description**
Values	0…399	Rom codes off the assigned elements
Labels	10000…13999	Descriptions of channels
Volatile data – this data may change without the participation of MASTER Being updated periodically after configuration reading done.		
Values	0…399	Actual data of the assigned elements
ServiceRegisters	1000…1069	Data and settings concerning the gateway itself
FoundRomCodes	1100…1299	The result of bulk searches

2 Description of the User Interface

In one point of view, the application can be thought as an editor of gateway configuration. This configuration can be stored either in the memory of a gateway or in a file. This chapter introduces the main parts of the user interface.

2.1 Main Window Overview

1. Communication control – basic control of communication with the gateway.
2. Application status – shows the state that the application is currently in.
3. Gateway – an editor of gateway configuration (see chapter 2.3).
4. New device – searching of 1-Wire elements connected to the gateway (see chapter 2.4.1).
5. Channel configuration – an editor of the selected channel (see chapter 2.4.2).
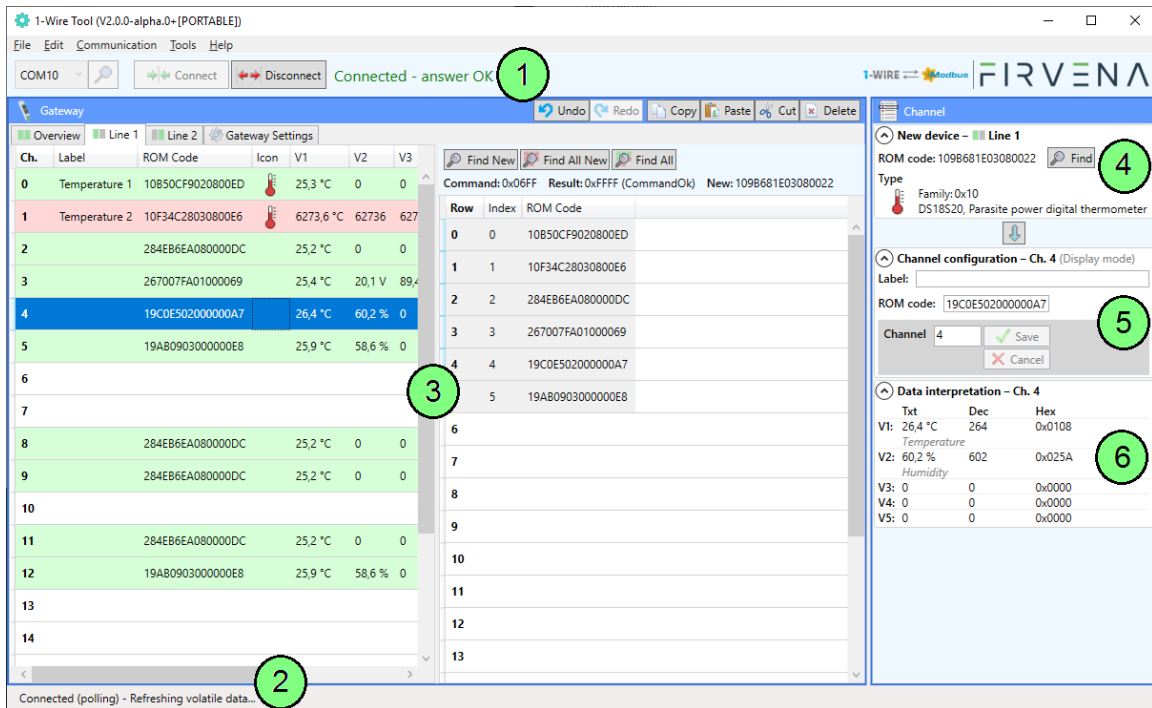6. Data interpretation – displays the value registers of the selected channel (see chapter 2.4.3).

Fig. 5 Main window overview

Note: *The main window can operate under two modes – online and offline. The online mode occurs when there is a gateway connected. In the online mode, overall configuration changes made by the editor are written directly to the gateway, the volatile data (e.g. V1…V5, New device, etc.) is available and new elements can be found and assigned. In the offline mode, it works only as a configuration file editor.*

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2.2 Menu Options

2.2.1 File

Tab. 2 Menu – File options

Item	Meaning
New	Creates an empty, unsaved configuration file and opens it in another window.
Open	Opens an existing configuration file. Then the file can be written to the connected gateway or shown in another window.
Open in Editor	Opens an existing configuration file directly in another window.
Save	Saves changes to the open configuration file.
Save As	Saves the open configuration file as another file.
Close	Forces the application to close.

2.2.2 Edit

Tab. 3 Menu – Edit options

Item	Meaning
Undo	Undoes the last change made to the gateway configuration.
Redo	Undoes the last undo action.
Copy	Copies the selected channels to the clipboard.
Paste	Writes the copied channels, if there are any. The writing starts at the first selected channel of the current selection.
Cut	Copies and deletes the selected channels.
Delete	Deletes the selected channels.

2.2.3 Communication

Tab. 4 Menu – Communication options

Item		Meaning
	Connect	Starts communicating with the gateway. (Enters the online editor mode)
	Disconnect	Stops communicating with the gateway. (Leaves the online editor mode)
	Communication Settings	Settings of communication between the application and gateway.

2.2.4 Tools

Tab. 5 Menu – Tools options

Item		Meaning
	Firmware Loader	Opens a firmware update utility. (see chapter 4)
	Clear Gateway	Deletes all channels.

2.2.5 Help

Tab. 6 Menu – Help options

Item		Meaning
	View Help	The manual.
	About	Information about the application.
	View Changelog	Brief information about differences between the current and recent versions.

2.3 Gateway Window

This window, together with the *Channel* window, can be considered an editor of gateway configuration. It is used to display and edit the configuration stored either in the connected gateway or in the open file. This chapter explains the meaning of individual parts.

2.3.1 Overview Tab

This view allows to manage both Line1 and Line2 channels. The configuration and volatile data are merged in a datagrid. The individual columns are listed and further described in the table below. The configuration registers can be changed by editing the corresponding field in the datagrid, as seen in the *"Editable"* column. The table also shows which registers each column is related to.

Tab. 7 Overview tab – the meaning of columns (n is a channel number from 0 to 39)

| Header	Description	Editable	Holding Registers
Ch.	Channel number	✘	n
Label	A description up to 40 characters, without diacritics	✔	10000…10099 + 100n
ROM Code	The ROM code of the assigned element *(Format: hexadecimal)*	✔	0…3 + 10n
Icon	A pictogram representing the family	✘	
V1…V5	The last data available *(Format: decimal number or interpretation string)*	✘	4…8 + 10n
Status	Channel status *(Format: both decimal number and string)*	✘	9 + 10n
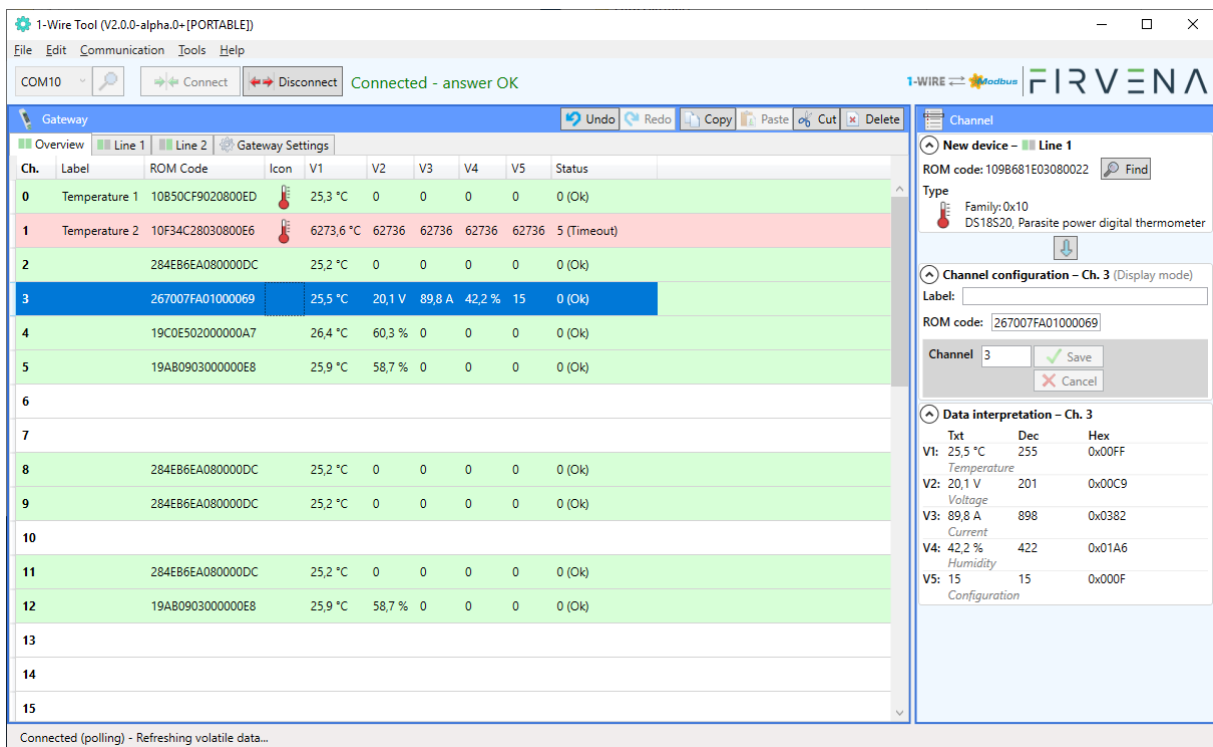
Fig. 6 Overview Tab

2.3.2 Line 1 and Line 2 Tab

These views are separate editors for Line1 (channels 0 to 19) and Line2 (channels 20 to 39) that provide an advanced interface for searching and adding 1-Wire elements. See the chapter 3 for information about adding elements.

2.3.3 Gateway Settings Tab

This view visualizes the so-called service registers (registers 1000 to 1099), these are the registers concerning the settings and state information of the gateway itself.
Overview (Fig. 7):

1. An editor of the configurable service registers
2. A listing of all service registers

The changes made in the editor must be confirmed with the *"Save"* button to store the new values. To restore the default values, use *"Restore Defaults"* –> *"Save"*.
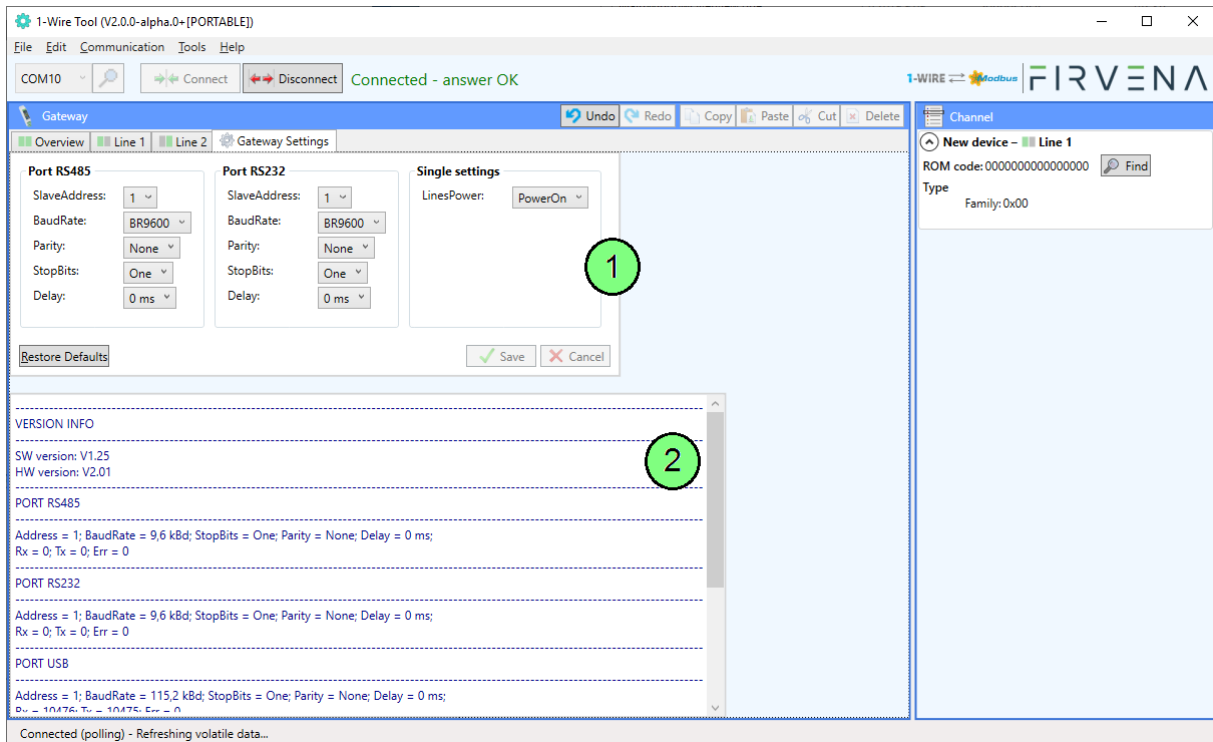

Fig. 7 Gateway Settings Tab

2.4 Channel Window

2.4.1 New Device

This box allows to search and assign 1-Wire elements one by one (see chapter 3.1). The ROM code found can be used in the *"Channel configuration"* box to configure the selected channel.
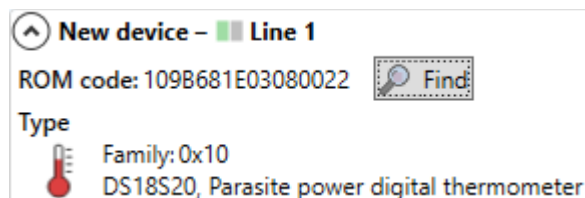

Fig. 8 New device

2.4.2 Channel Configuration

This box serves as a channel editor. There are two states:
1. **Display mode**: Configuration of the currently selected channel is shown.
2. **Editor mode**: Appears when there is an unsaved change made to the content of the box. It happens either by editing the content or when a ROM code was found. The display is locked, and channel selection only affects the channel number where the content is to be saved.
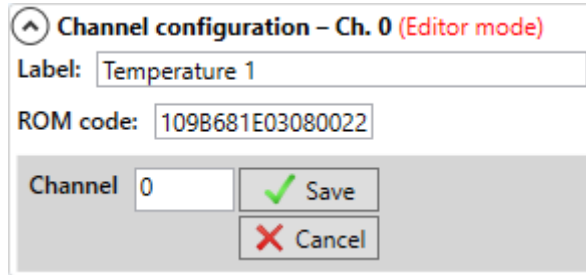

Fig. 9 Channel configuration – having unsaved changes

2.4.3 Data Interpretation

Displays the value registers of the selected channel in three formats: interpretation string, decimal number and hexadecimal number. A description explaining each value is also shown. *"None"* means that the register is not used.

Fig. 10 Data interpretation

The value descriptions are also available through tooltips in the datagrids.

Fig. 11 The tooltip explaining a value

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3 Assigning Elements

The assignment of a 1-Wire element to a channel consist in storing its ROM code in the appropriate Modbus registers. This can be done through the application. If we know the ROM code, the element can be simply assigned to the desired channel by filling in the ROM code field. Otherwise, the ROM codes of unassigned 1-Wire elements that are connected to the gateway can be obtained by search commands. The second option is further explained in the following chapters.

3.1 One by One

Let's have a temperature sensor we want to assign to the channel 0 (Line 1). The procedure is as follows:

1. Connect the sensor to the Line 1.
2. Select the channel number 0.
3. Click the *"Find"* button.
4. Add a short label to distinguish the sensor from others.
5. Click "Save" to confirm changes.
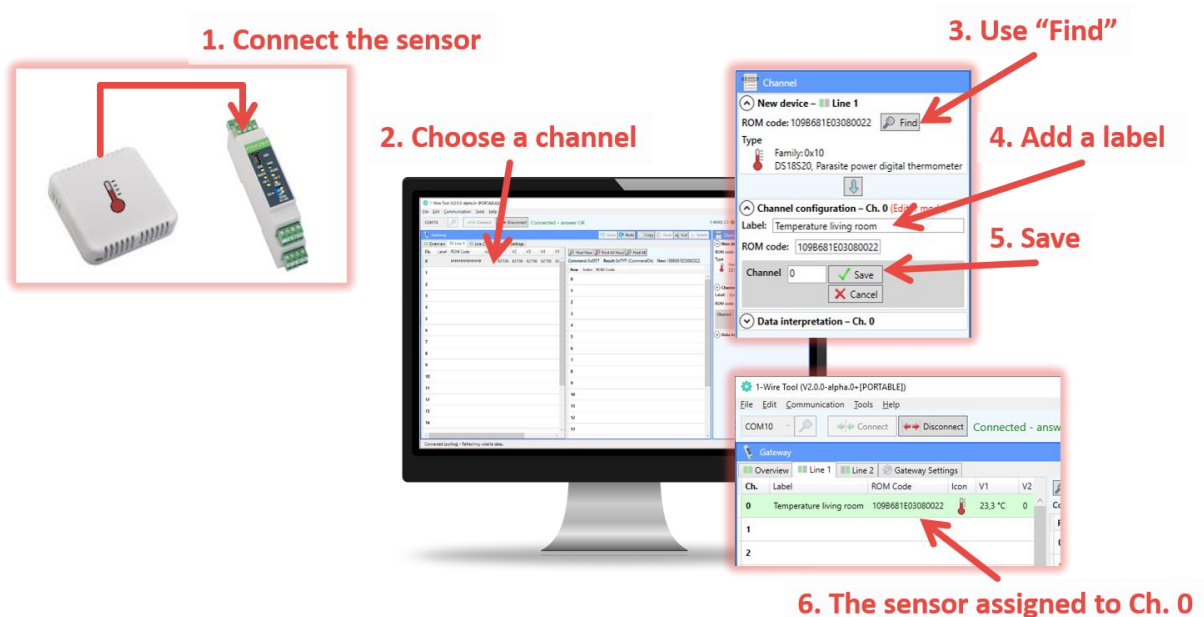6. Now the sensor is assigned to the channel 0 and its data is available through the Modbus interface.

Fig. 12 Adding elements one by one

3.2 Multiple at Once

Let's have six unassigned sensors we want to add to the Line 2. The procedure is as follows:

1. Connect the sensors to the Line 2.
2. Click the *"Find All New"* button (use of the command 0x06FF).
3. Select and copy found ROM codes.
4. Select the starting channel and paste the copied ROM codes.
5. Now the sensors are assigned and can be accessed through the Modbus interface.
6. Add short labels to distinguish the sensors.

Note: *An assigned element can be identified:*

a) *by disconnecting it – the row turns red which indicates an error*
b) *by changing its state – e.g. temperature sensor can be warmed up.*
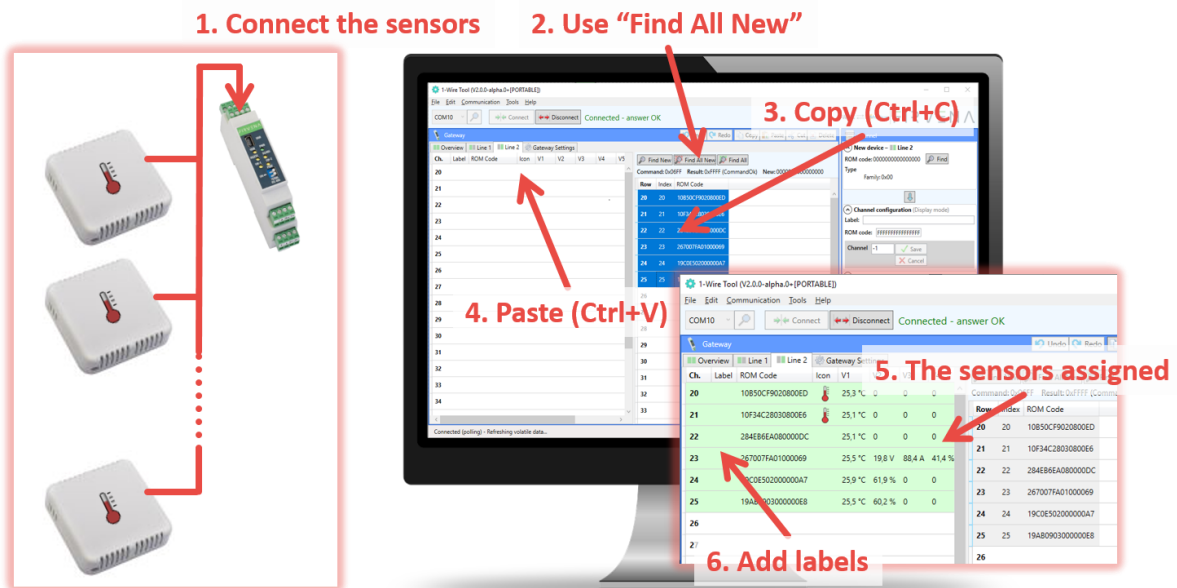

Fig. 13 Adding multiple elements at once

4 Firmware Update

To update the firmware:

1. Connect the gateway through USB, RS485 or RS232 port to the computer; perform communication settings if necessary and from the menu bar select *"Tools/Firmware Loader"*.
2. In the window shown, select the firmware file (Fig. 14 – 3).
3. By the *"Program Memory"* button start downloading of the firmware (Fig. 14 – 5).
4. After downloading finished, the gateway must be reprogrammed. This procedure may depend on the HW or FW version – see Automatic / Manual reprogramming below.
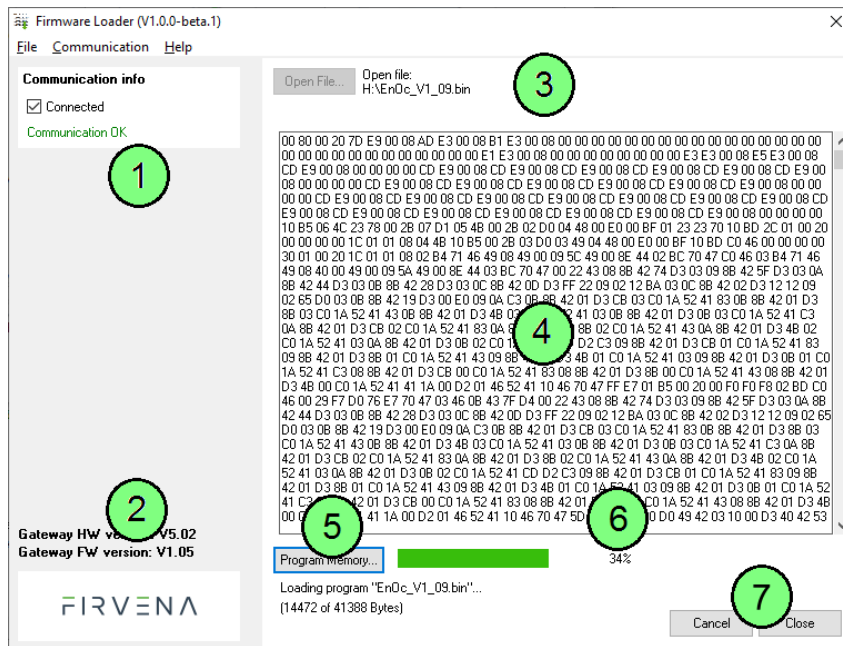5. Check firmware version (Fig. 14 – 2).

Fig. 14 Firmware Loader – main window overview

Automatic reprogramming

When the firmware is downloaded, the gateway is forced to reboot by the application and the communication is lost. Then, within a few seconds, reprogramming should perform. Wait until the communication is renewed and the result code is returned (Fig. 15).
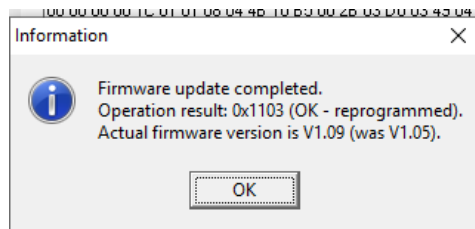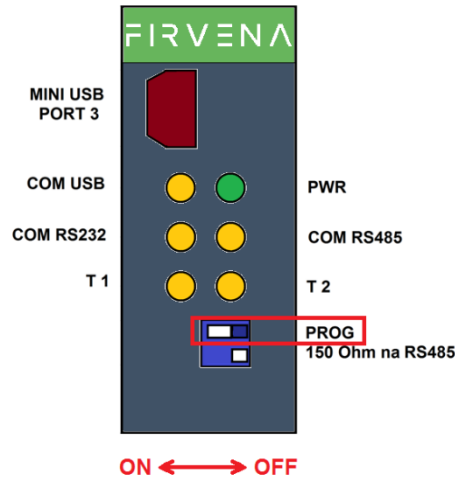

Fig. 15 Firmware update result box
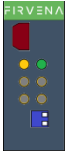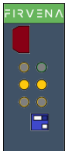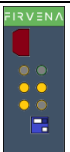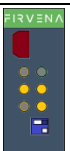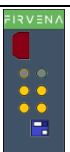
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Manual reprogramming

Some previous HW or FW versions require a manual reprogramming procedure. This is indicated by a prompt shown after the firmware is downloaded. Follow these steps:

1. Set the switch *"PROG"* to *ON*

2. Power off the gateway
3. Power on again
4. Watch the LED indication on the front panel

Tab. 8 LED indication during manual reprogramming

	Normal turning on (without reprogramming)
	Entering the programming mode
	Reprogramming failed (CRC does not match, the new program is incomplete or there is not a new program in the memory)
	Programs are the same (probably already programmed)
	Reprogramming successful

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5 Backup of Gateway Configuration

The configuration of the gateway can be exported to a file for later recovery or other purposes.
To back up the configuration:

1. Connect the gateway and let the configuration to be loaded.
2. Use the Save command (*Ctrl+S* or *File/Save*).
3. Define the file path and name in the dialog shown.
4. Confirm *"Save"*.

To restore the configuration:

1. Connect the gateway and check if the communication works properly.
2. Use the Open command (*Ctrl+O* or *File/Open*).
3. Select a file and confirm *"Open"* in the dialog shown.
4. A prompt dialog is shown, select *"Yes"* to confirm the gateway configuration is to be overwritten.

Note: *Select "No" if you only wish to open the file, it will be shown in a new window.*

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Revision history

Tab. 9 Document revision history

Date	Version	Modifications made
2019-10-08	2.0	Initial release