FIRVENA

EnOcean Signal Monitoring Tool

ST-01

868 MHz

User Manual V1.3

English

CONTENT

1 PACKAGE CONTENT

The package includes a power supply with manufacturer's instructions according to the market (EU or UK) with a USB-C cable, 4x AAA 1.5 V batteries (supplied only for ground transport), a USB-C flash drive, and an antenna.

THANK YOU

Thank you for purchasing our product! We believe in your satisfaction with the product that aligns with the company philosophy of the highest care and precision. In case of interesting ideas and concepts, please contact firvena@firvena.cz

www.firvena.com

2 TECHNICAL DATA

Category	Parameter	Value
Product	Product name	ST-01
	Product title	EnOcean Signal Monitoring Tool
Electrical data	Power supply options	• Internal 4x AAA batteries 1,5 V • Power adapter to socket 230 V (according to EU / UK type) with output voltage 5 V DC • External powerbank with USB-C output with LOW CURRENT MODE
	Power supply	5 V DC via USB-C
	Maximum consumption	0,5 A
EnOcean	Frequency	868 MHz
	Maximum number of devices in MONITOR mode	60
	Repeater	Yes
Antenna	Antenna connector	SMA
Service	Transmission mode	EEP F6, D5, A5,
USB	Power supply mode	LOW CURRENT MODE, 5 V DC
	Connector	USB-C
Operating conditions	IP Code	IP20
	Operating temperature	−10 °C to +40 °C
	Relative humidity	max. 80 %
Dimensions	Dimensions without antenna	80 x 171 x 30 mm (W x H x D)
Weight	Weight with antenna and internal battery	225 g
Box material	Plastic	ABS

Product conformity and certification	
RoHS	**ROHS Directive** The device is manufactured in accordance with the directive 2015/863/EU (RoHS 3) of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
CE	**EMC - Declaration of Conformity** The device is compliant with the directive 2014/53/EU, 2011/65/EU RoHS. Device working with frequency 868 MHz belongs to Class 1 radio equipment according to ERC/REC 70-03 in the range 863-870 MHz for SRD. Approvals tests ČSN EN IEC 62311 ED.2, ČSN EN 62368-1, ČSN ETSI EN 301 489-1, ČSN ETSI EN 301 489-3, ČSN ETSI EN 300 220-1, ČSN ETSI EN 300 220-2.
UK CA	**UK Conformity Assessed (UKCA)** The device is compliant with the British Legislation UK Conformity Assessed (UKCA) and meets all relevant requirements.
enocean	**EnOcean Technology** The device is fully compatible with the EnOcean radio protocol. Self-certified certification level.

3 SAFETY INFORMATION AND WARNINGS

The product meets general safety regulations. The IP 20 enclosure allows installation only in normal, dry areas.

Follow the safety regulations and instructions in the power supply manufacturer's manual.

Follow the safety instructions and applicable standards for the country and place of installation. The product may only be used in accordance wiith these instructions.

To avoid the risk of electric shock or fire, the maximum operating parameters of the product must not be exceeded.

Use only unmodified products.

STORAGE

The device must be stored in a temperature range 0-40° C and a relative humidity of up to 80 %, and non-condensing spaces. The products must not be exposed to shocks, harmful vapors, or gases.

REPAIRS

Products are repaired by the manufacturer. Products to be repaired are shipped in a package that ensures shock absorption and protects the products against damage during shipment.

WARRANTY

The product is warranted 24 months from the date of delivery that is mentioned on the delivery note. The manufacturer only guarantees properties and parameters that are explicitly described in the technical documentation. Claims, complaints and returns must be directed exclusively to the manufacturer. The complaint must contain the exact product identification, delivery note number and defects description. The manufacturer is not responsible for defects caused by improper storage, improper external connection, damages caused by external influences especially due to unacceptable size, incorrect adjustment, improper installation, incorrect operation or normal wear and tear.

PRODUCT DISPOSAL

The product does not belong to municipal waste. The product must be disposed to the separate waste collection with the possibility of recycling, according to local regulations and legislation. The product contains electronic components.

4 INTRODUCTION

4.1 Description

ST-01 is a device used to design sufficient EnOcean signal coverage in buildings.

The device captures messages from which the following can be determined:

- sender ID,
- message type,
- signal strength,
- information about messages forwarded by a repeater,
- and the time between messages being sent.

Individual messages can be saved in "Data logger" mode to a USB drive in *.CSV format and transferred to a PC for subsequent communication analysis.

The ST-01 also serves as a transmitter in "Transmitter" mode, which allows you to simulate transmission and test signal range using the selected cycle and EEP profile.

The device can be switched to repeater mode, which is used to find a suitable location for the repeater and to boost the signal.

Depending on the method of use, the device can be powered by:

- four internal 1.5 V AAA batteries,
- a power bank with a USB-C output,
- or a 230 V power adapter.

4.2 Power Supply

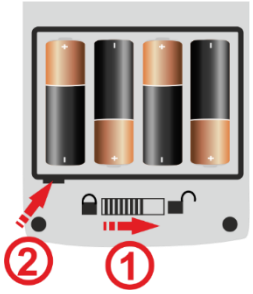
The device offers three power supply options, which can be selected according to the method of use.

4.2.1 AAA battery 1,5 V

This power supply requires 4 internal 1.5 V AAA batteries, which are inserted into the rear of the device.

Procedure:

- open the cover lock using the sliding mechanism,
- open the battery compartment by gently pressing the opening,
- insert the batteries according to the polarity indicated inside the compartment (see figure).



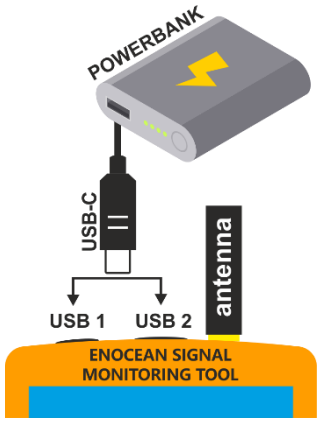
This option ensures sufficient mobility, but is affected by battery capacity and, compared to other methods, is also the shortest in terms of time. Activating the "Data logger" mode and backlighting the display further reduces this time.

The operating time at full capacity of alkaline batteries and without display backlighting is approximately 12-17 hours.

Note: For ground transport, batteries are included in the delivery. For air transport, AAA 1.5 V batteries are not included in the delivery.

4.2.2 Powerbank with USB-C output

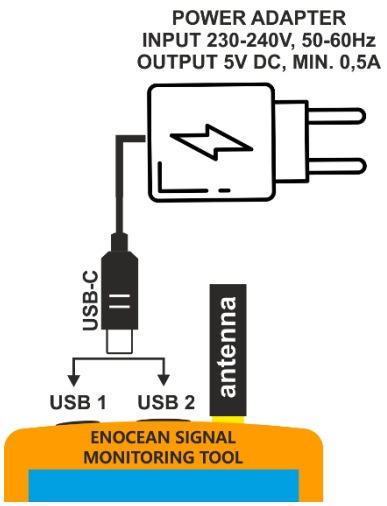
The device can also be powered via an external power bank with a USB-C output. This method ensures sufficient mobility and allows for longer use than AAA batteries. It is therefore most often used for the "Data logger" mode due to the longer storage of communications for subsequent analysis.



Note: The power connector can be inserted into USB-C position 1 or position 2.

The ST-01 device supports power supply via a power bank only in LOW CURRENT MODE in order to save power bank capacity. FAST CHARGING MODE is not supported in the standard mode of the ST-01 device. The only exception is BOOTLOADER mode for firmware updates, where both power modes are supported. These modes can usually be switched on the power bank by holding down the button for a longer period of time or by pressing it several times, depending on the type of power bank and whether it supports this function.

Before using this power supply method, please check that your power bank supports LOW CURRENT MODE.



4.2.3 Power adapter for 230 V

This option is suitable for long-term "Data logger" mode. The disadvantage is its lack of mobility.

Please, follow the instructions provided in the manufacturer's instruction leaflet for the power adapter. Incorrect handling may result in electric shock in the area of the socket and the adapter.

The power connector can be plugged into USB-C position 1 or 2. This mode does not allow charging of internal 1.5 V AAA batteries.

Note: The power adapter is always included in the delivery depending on the market (EU or UK).

4.3 Signal strenght

Signal strength is one of the most important values when working with EnOcean devices. The signal value depends on distance and environmental conditions:

- inside a building – estimated range of 20–30 m (depending on the building's construction),
- in open space – range of up to 300 m.

If the signal is weak, it can be amplified using a separate repeater (e.g., EO-RP). EnOcean technology allows a message to be transmitted a maximum of two times via a repeater to prevent network overload. Example: a maximum of two repeaters can be used between the transmitter (e.g., temperature sensor) and the gateway. Devices powered from the mains, e.g., actuators, often have an integrated repeater function. The same applies to all FIRVENA gateways, which have an integrated repeater.

For a rough idea, you can use the following signal ranges as a guide:

Value (dBm)	Signal quality	Value description
≥ -70 dBm	excellent	**Optimal value** – the best conditions for reliable communication.
-71 to -81 dBm	good	**Sufficient value** – signal is stable and communication runs well.
- 82 to -90 dBm	weak	**Limit value** – frequent signal loss**,** risk of data loss, we recommend strengthening the signal.
≤ -91 dBm	bad	**Insufficient value** – unreliable communication**,** necessary to strengthen the signal.

Note: To maintain signal reliability, we recommend adding **a reserve of at least –6 dBm** to the values mentioned, for example due to interference caused by people or other elements in the environment.

4.4 Keyboard functions

The keyboard has several buttons divided into upper and lower sections.

Lower section:

Navigation cross with OK confirmation button in the middle.

Upper section:

Button ON/OFF the device. (The button must be held down for 4 seconds.)

Button ON/OFF the lighting.

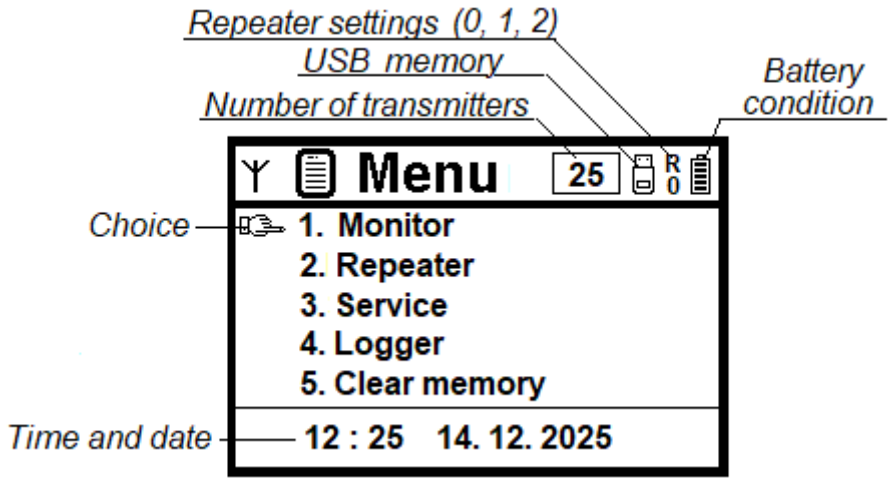
Button Main menu.

4.5 Main menu

You can access the main menu after turning on the device or by pressing the "MENU" button.

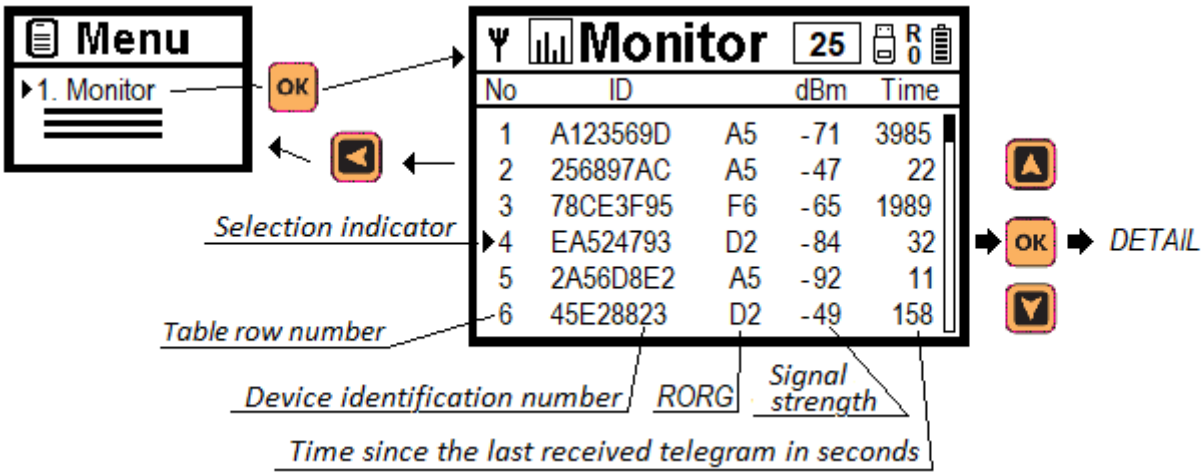
Immediately after switching on the device, EEP telegrams are received in the EnOcean network. The received data is used to gradually compile a table of information about transmitters in the vicinity.

The table can record up to 60 different devices.



5 MONITOR SECTION

Select Monitor from the main menu and press OK. This section allows you to list up to 60 received devices. The data is continuously updated with each received telegram.

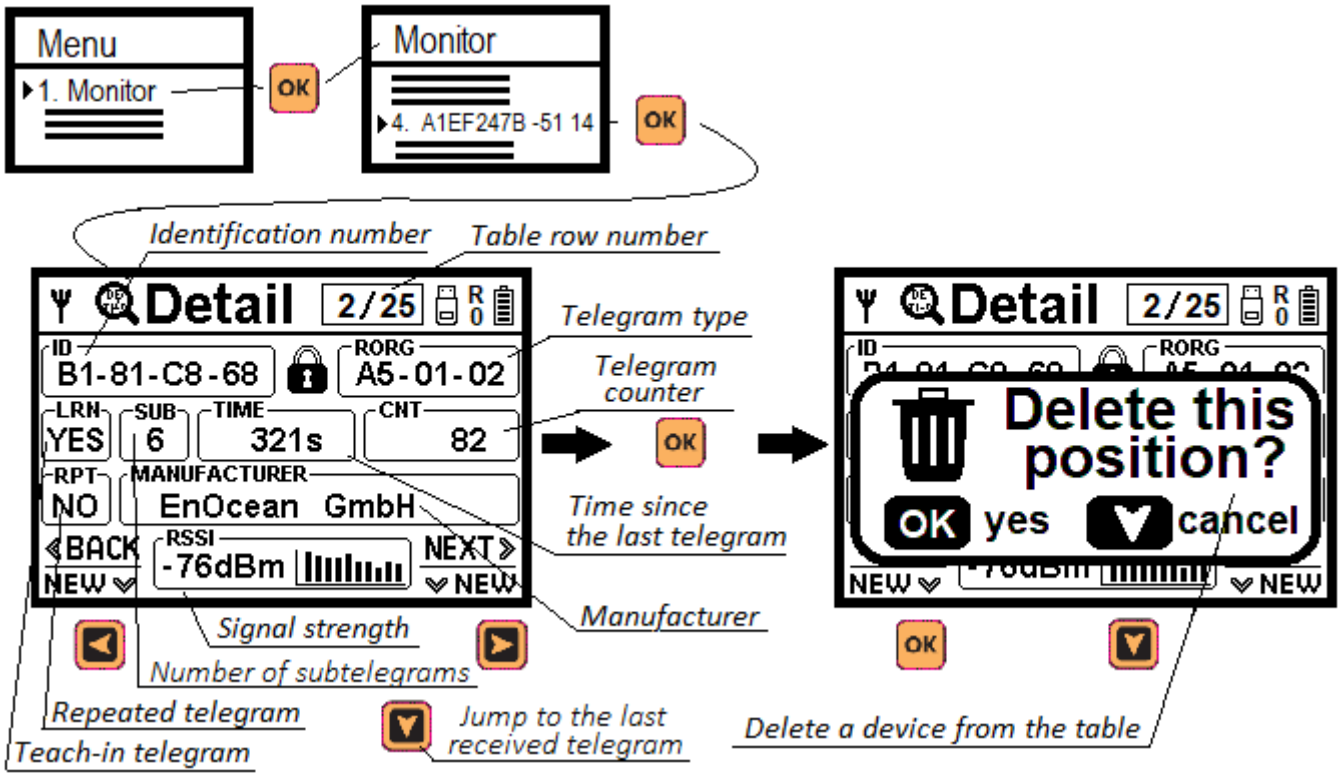


Control settings:

- The selection indicator is on the left. The indicator and entire lines can be moved using the up and down arrows.
- Press the OK button to display a detailed description of the selected device.
- The "left" arrow returns you to the "Main menu."

5.1 Detail

Use the left and right arrows to scroll between devices in the detailed view. Press OK to display the menu for deleting the selected device from the list. Use the down arrow to exit the menu. Press OK to remove the device from the table. After deletion, all devices with a higher index will move down one row so that the table remains without gaps. Press MENU to exit the DETAIL menu.



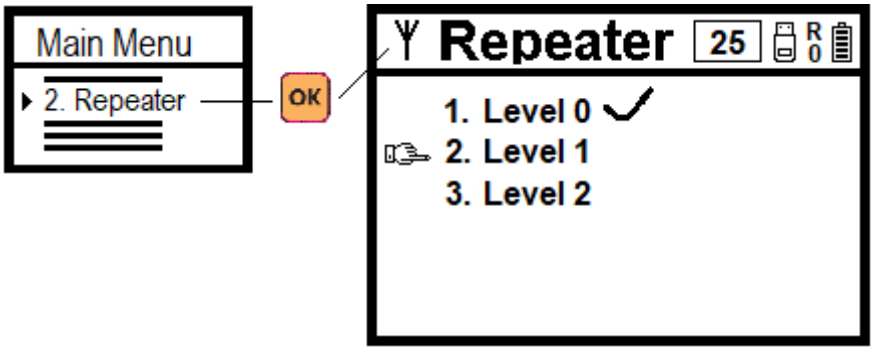
6 REPEATER SECTION

Select Repeater from the main menu and press OK to enter the internal repeater settings. This function is used to find a suitable location for the repeater.

Available levels:

- **Level 0** – the repeater is off.
- **Level 1** – the repeater forwards only original messages; each message is repeated only once.
- **Level 2** – the repeater forwards all valid messages.

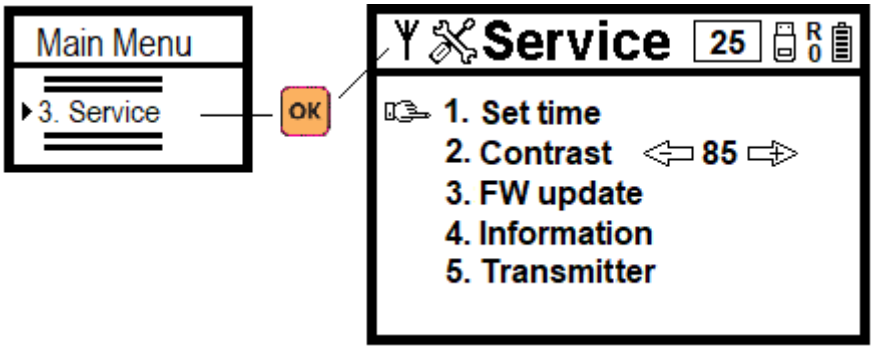
Use the up and down arrows to make your selection and confirm with OK. Writing to the module takes a few seconds. The icon in the upper right corner shows the current repeater settings.



7 SERVICE SECTION

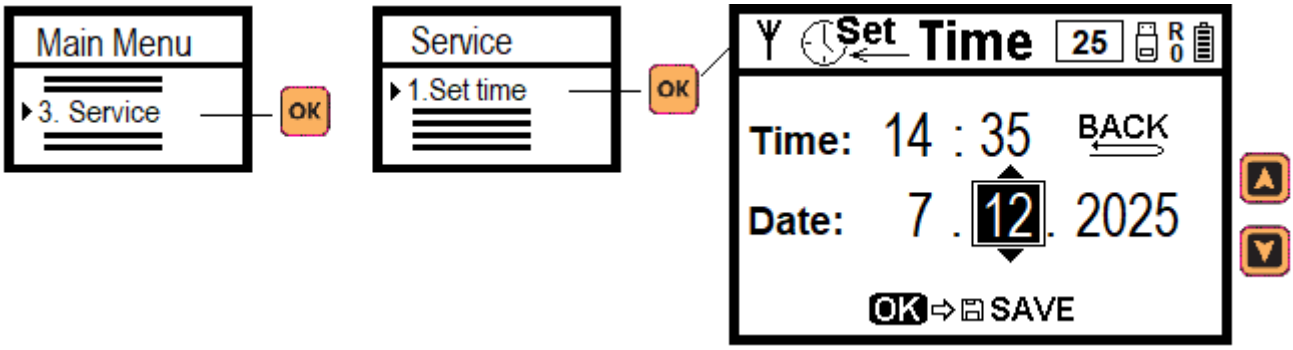
Select Service from the main menu and press OK. This section allows you to:

- set the date and time,
- adjust the display contrast,
- update the program,
- display device information,
- send telegrams.



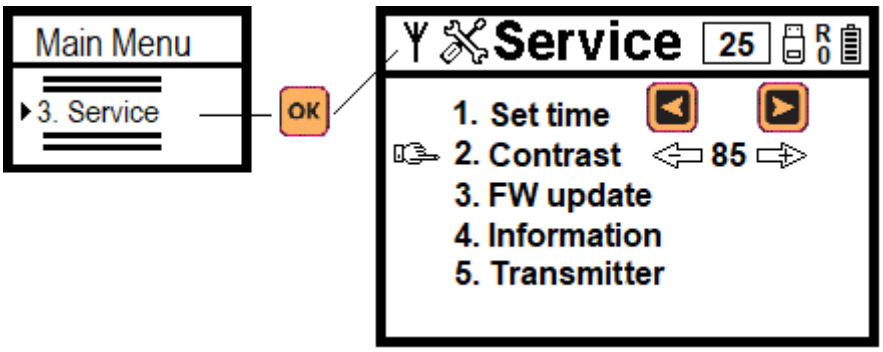
7.1 Date and time settings

In the Set time submenu, use the left and right arrows to select the time or date value you want to change. The selected value is highlighted by a rectangle. Use the up and down arrows to make changes and confirm by pressing OK.



7.2 Display contrast settings

In the Contrast submenu, select the contrast value using the left and right arrows. The contrast value is saved automatically and does not need to be confirmed with the OK button. The contrast value range is between 60 and 130.



7.3 Firmware upgrade

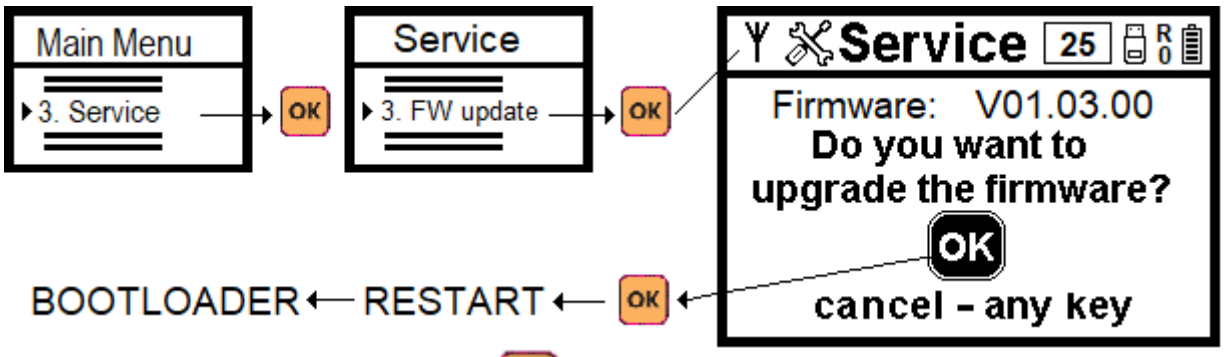
Download the latest firmware version from the website: www.firvena.cz → SUPPORT/DOWNLOADS/ST-01/FIRMWARE

The FW update submenu will display the current firmware version with the option to upgrade. Insert a USB drive with the new firmware and confirm the upgrade. The device will prompt you to turn it off and on again to complete the update.

Important notes:

- When updating the firmware, we recommend powering the ST-01 device using a power bank or power adapter. If the capacity of the internal AAA batteries is low, the device may not be able to detect the USB drive.
- The device supports FAT32 USB drives, not NTFS. (Tip: You can change the file system when formatting the USB drive in Windows.)
- The firmware file must be unzipped and saved directly to the root directory of the USB drive (e.g., D:\firmwXX.bin), not to a folder.
- The upgrade section (bootloader) is accessible even if the main firmware is damaged or there are problems with startup. This section runs independently of the user firmware. All you need to do is have the USB drive with the firmware connected when you turn on the device.

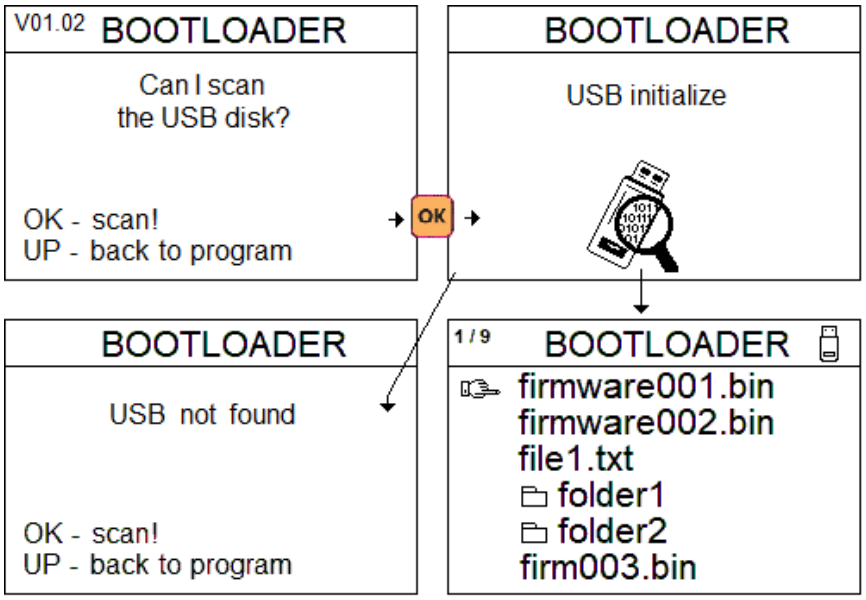
You will enter the firmware update mode via the MENU/SERVICE/FW update.



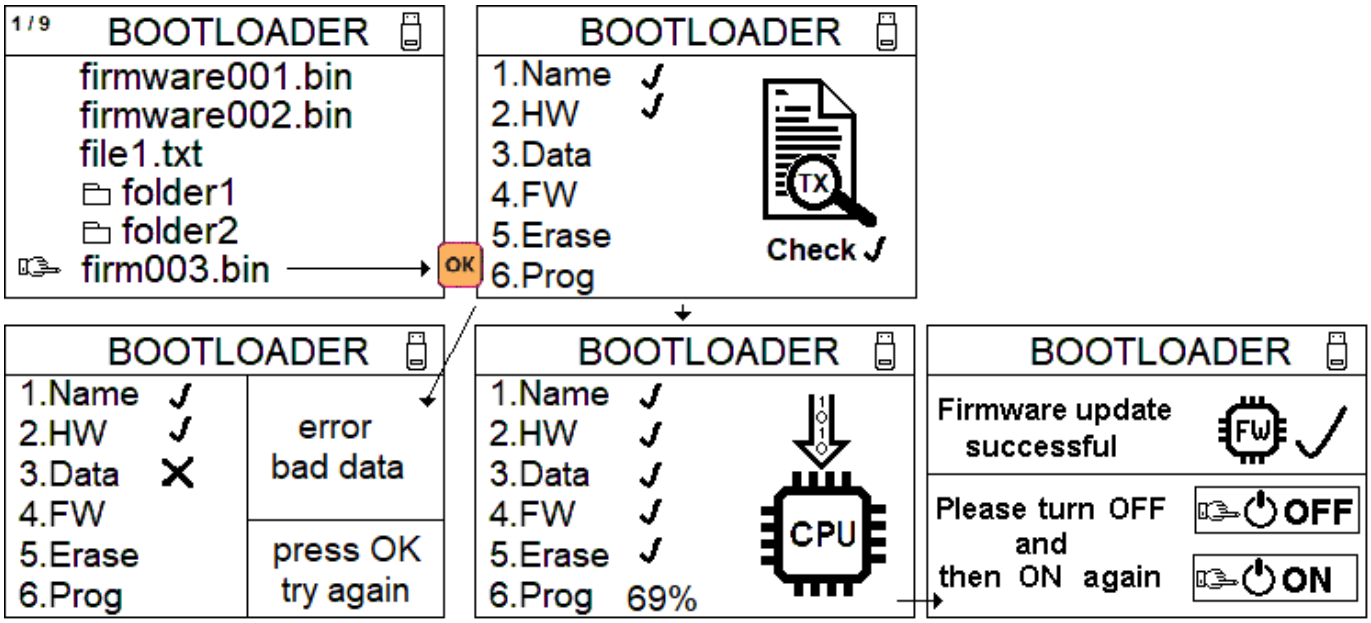
Note: To return to the normal menu, press 

To upload new firmware, connect a USB drive to USB1 or USB2 with the appropriate file. The bootloader will prompt you to check the USB drive:

- press OK to start the check (takes a few seconds),
- if the USB drive is read correctly, the root directory with files will be displayed,
- if the USB is not found or an error occurs (e.g., it is not FAT32), you will be offered the option to repeat the read or exit the bootloader.



The next step is to select the file with the new program. Use the up and down arrows to select the file with the new firmware. Confirm your selection by pressing OK.

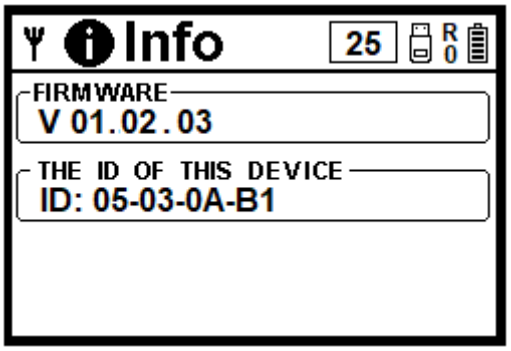


Checking and completing the firmware upgrade:

To ensure the process runs smoothly, the firmware is checked several times before the upgrade (version verification, damage check). Follow the instructions displayed on the screen; the entire process takes a few seconds. The new firmware is activated after restarting the device. If the firmware is not running properly, the device will automatically return to the bootloader.

7.4 Device information

The Information submenu displays information about the unique ID of the device in the EnOcean network and the current firmware version running on the device.

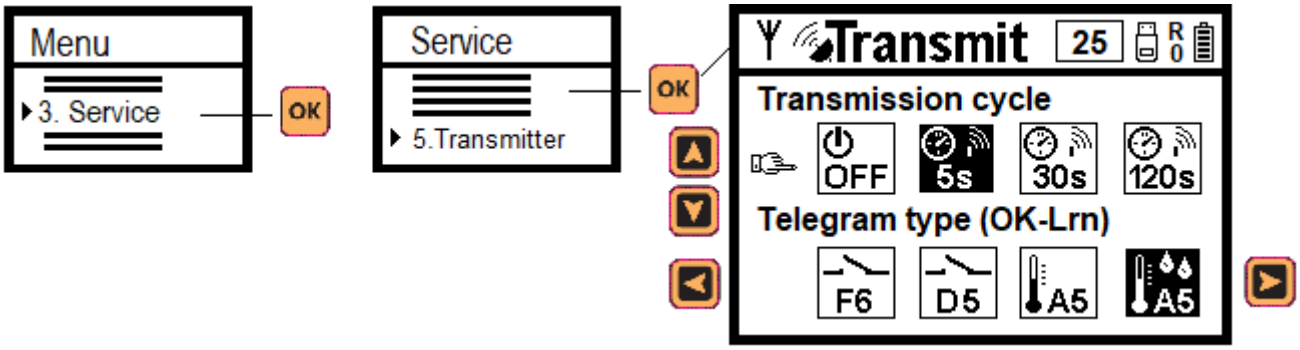


7.5 Transmitter

In the Transmitter submenu, you can select one of four basic telegram types and the delay time between repeated transmissions. After selecting the telegram type and pressing OK, the telegram is sent in teach-in format.

Control settings:

- up/down arrows – line selection,
- left/right arrows – movement within a line and changing values,
- settings are canceled and the transmitter is turned off when the device is turned off,
- the transmitter ID in the telegram corresponds to the EnOn ID specified in the Information menu.



8 LOGGER SECTION

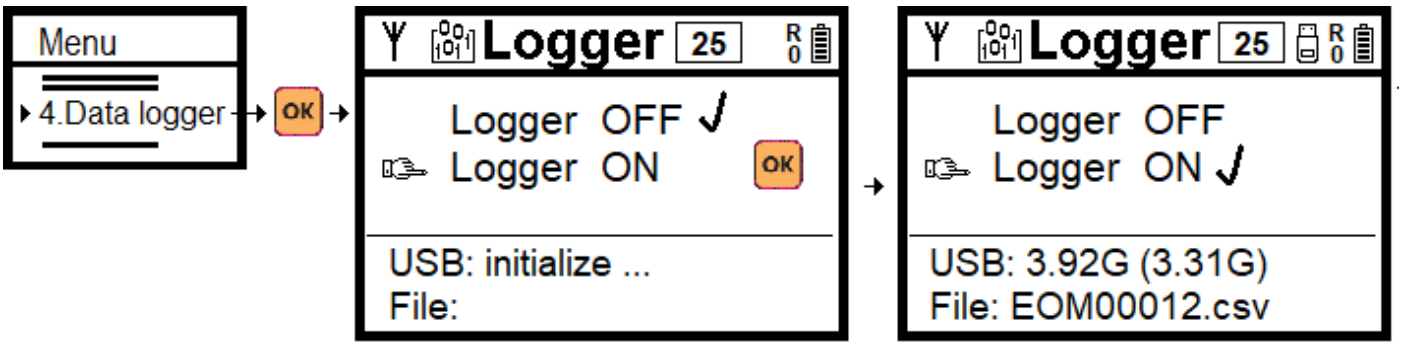
The Data logger section is used to record incoming EEP telegrams on a USB drive. Each telegram is sorted in the order of receipt and contains basic information such as transmitter ID, RORG, time of receipt.

Switching on and control:

- select 4. Data logger in the main menu,
- select Logger ON on the display to switch on or Logger OFF to switch off logging,
- if a USB drive is inserted, the device will verify its presence and create a new file.

Data logging:

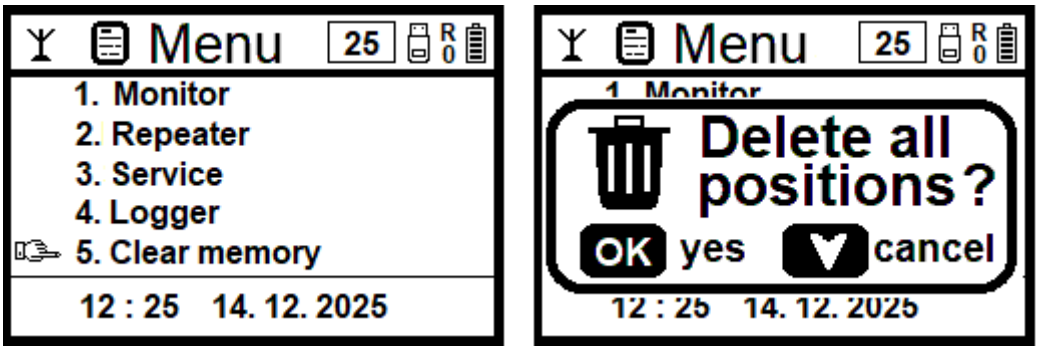
- the file is in .csv format, and its name begins with the letters EOM followed by a number that increments sequentially.
- data are always saved to the root directory of the USB drive.
- selection of a directory or an existing file is not possible – a new file is always created, and file name conflicts are checked.



9 CLEAR MEMORY SECTION

This section is used to delete received telegrams and manage memory. Received telegrams are sorted by transmitter ID, and a table of transmitters is created.

The table can be deleted row by row in the "Detail" menu using the down arrow. Another option is to delete the entire table using "Clear memory". Immediately after deletion, a new table is created in the order of incoming telegrams.



10 REVISION HISTORY

Date	Version	Description
2025-05-13	V1.0	Initial release
2025-08-28	V1.1	Functionality expansion
2025-11-27	V1.2	Menu and text appearance adjustments
2026-04-14	V1.3	Text editing