



# 2024

## FUEL LEVEL SENSOR NIKOLIN BLE



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**Instructions for setup and  
connection**

01.01.2024

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# 1 Goal and purpose

The goal and purpose of the BLE Fuel Level Sensor (hereinafter referred to as BLE FLS) Setup and Connection Work Instructions include the following aspects:

1. Ensuring correct connection and configuration: the manual contains step-by-step instructions that help users to correctly connect and configure the software (hereinafter referred to as software) for correct operation of the BLE FLS.
2. Improved performance: proper software customization allows for optimal sensor performance, resulting in more efficient and accurate measurements.
3. Reduced error rate: clear and detailed instructions help minimize the risk of errors in connection and software configuration, which in turn reduces the likelihood of malfunctions.
4. Unification of processes: the work instruction standardizes the software configuration process, which allows different users to perform the work in the same way, regardless of their experience and qualifications.

Thus, the work instruction for setting up and connecting the BLE FLS software is an important document that ensures correct and safe operation of the equipment.



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## 2 Connection to BLE FLS

Before trimming the BLE FLS to the required height for installation in the tank, it is necessary to connect to the sensor via the mobile app to check its functionality.

To connect to the BLE FLS via a mobile device, you need to enable Bluetooth and location on your phone. Bluetooth on the sensor is already enabled.

After that, open the «RFL» application pre-installed on the mobile device, as shown in Figure 1.

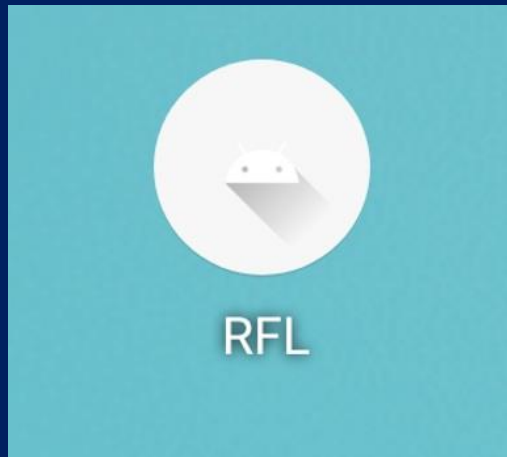


Figure 1 - Application on mobile device «RFL»

In the «RFL» application find the BLE FLS by its name and connect to it by pressing «CONNECT» according to figure 2. The sensor name is taken from the BLE FLS housing.



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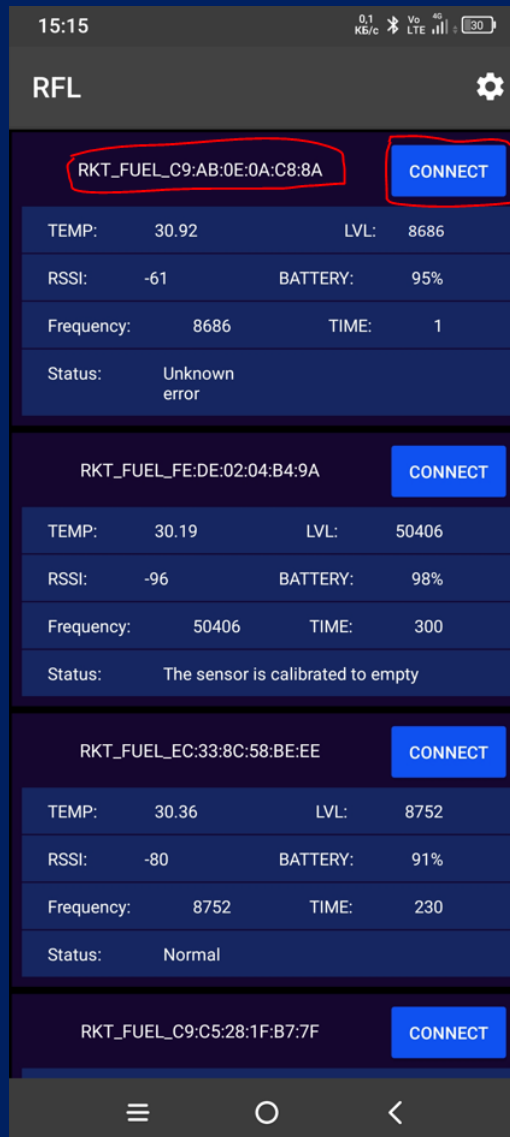


Figure 2 - Connecting to the BLE FLS

If the BLE FLS is correct and it is possible to connect to it, the «RFL» application will open the sensor configuration window according to Figure 3.



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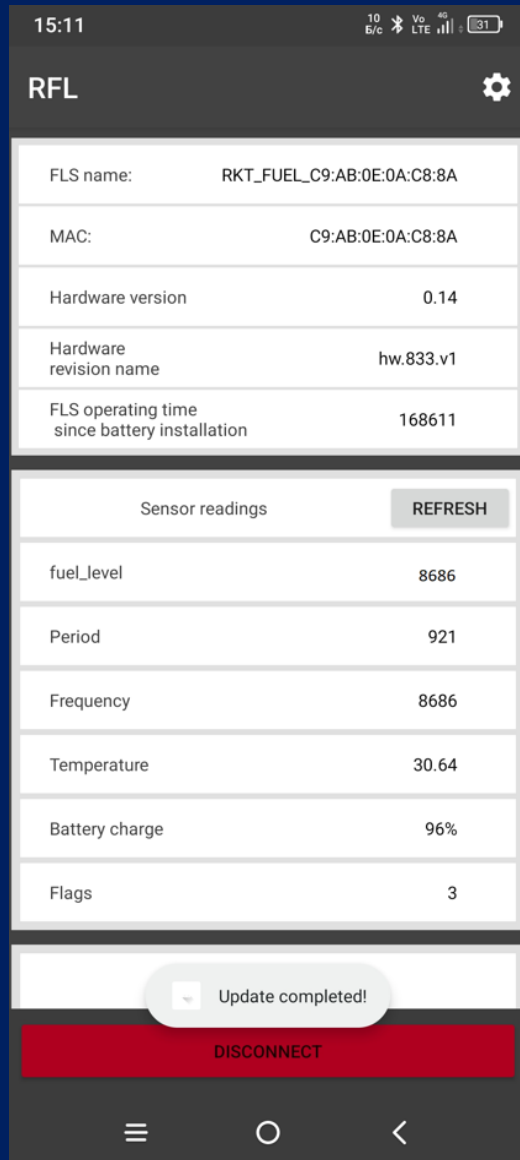


Figure 3 - BLE FLS setup window

After making sure the sensor is good and responding you can trim the «BLE FLS» to the desired tank height.



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### 3 Software customizations

Once the BLE FLS has been trimmed to the correct height for installation in the tank, the BLE FLS must be initially set up.

#### 3.1 Initial setup

The initial setup is to calibrate the BLE FLS to full and empty. To do this, in the mobile application «RFL» find the column «Calibration» and click on «AUTOMATIC CALIBRATION», according to Figure 4.

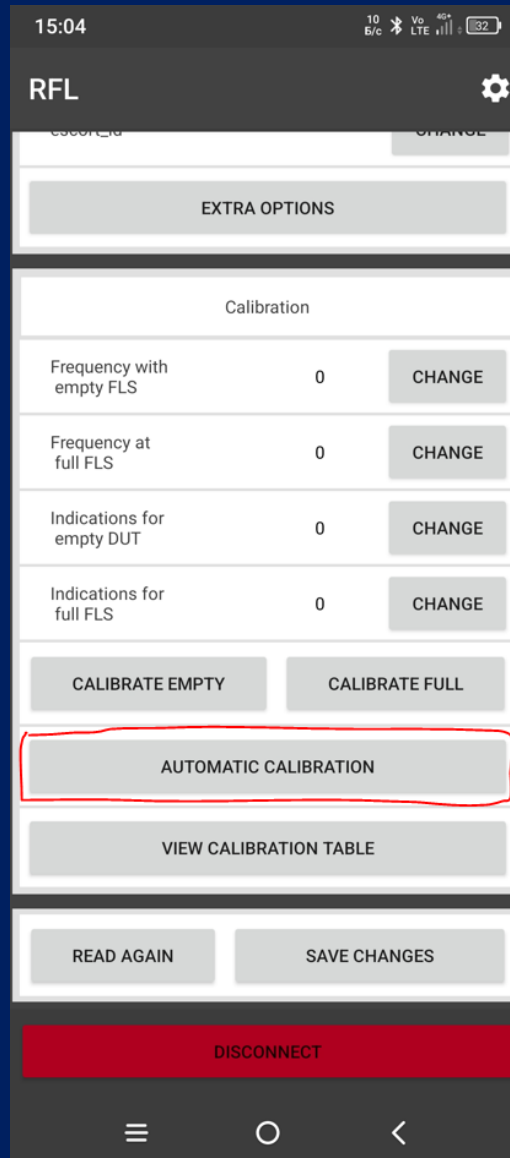


Figure 4 - Automatic BLE FLS calibration



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After pressing the button, a window will appear, in which it is necessary to enter the sensor readings at maximum fuel level, according to Figure 5. Enter the value «1023» and press «OK».

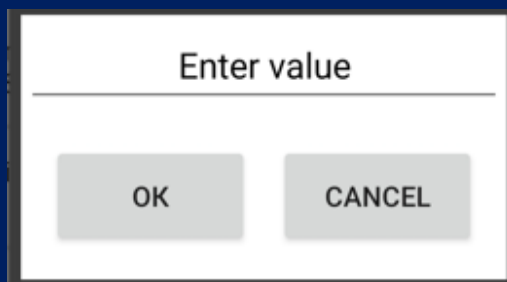


Figure 5 - Entering the sensor reading at maximum fuel level

Then click on «SAVE CHANGES», as shown in Figure 6.

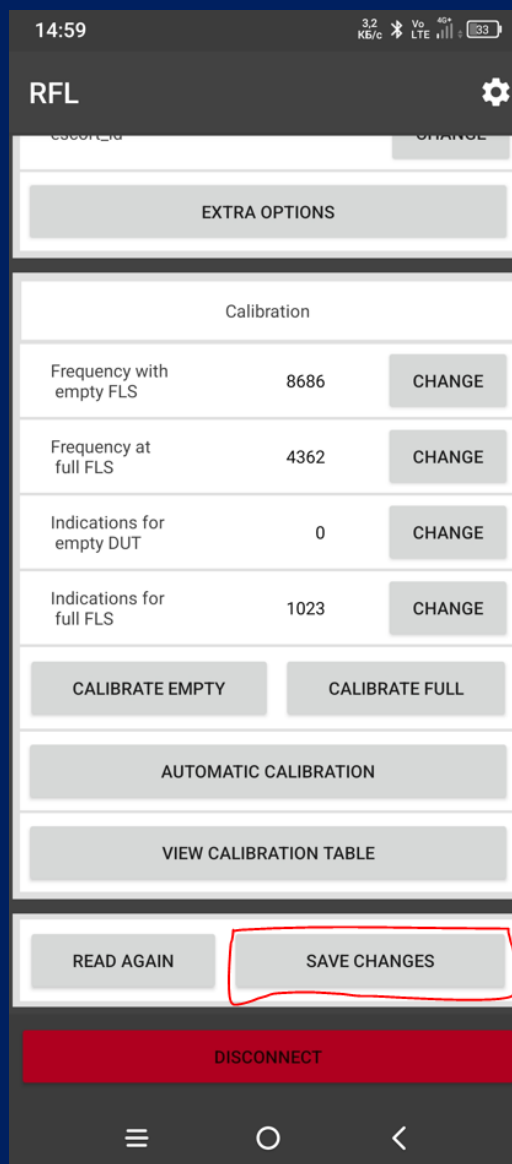


Figure 6 - Saving the automatic calibration



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The next step is to cover the hole on the body of the BLE FLS with duct tape and pour fuel into the sensor tube until it is full. Then, in the mobile application, open the «Sensor readings» column and press «REFRESH», as shown in Figure 7.

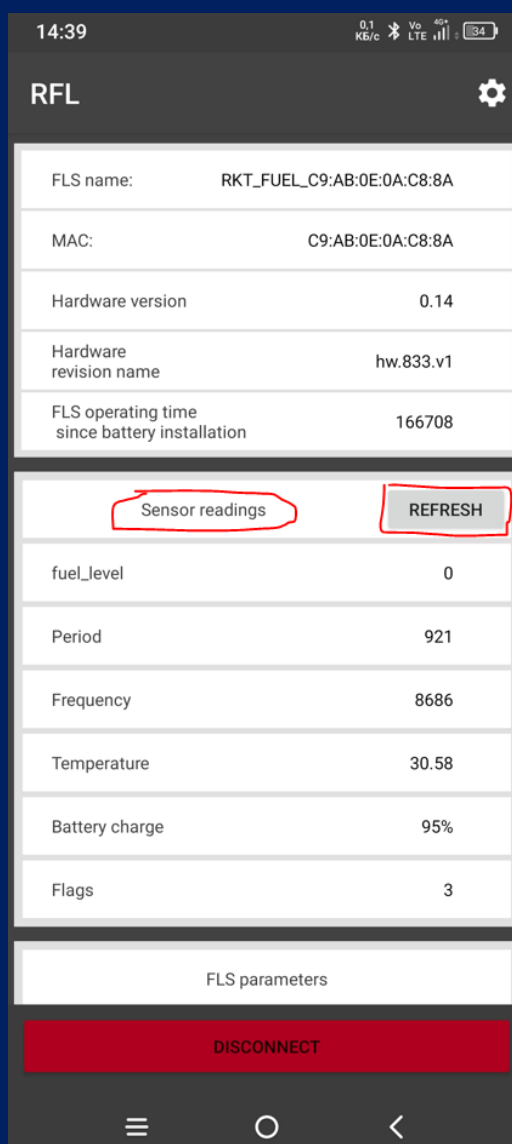


Figure 7 - Updating sensor readings

After updating in the column «Sensor readings» it is necessary to take the value from the position «Frequency», according to Figure 8, and then manually enter the value in the column «Calibration» in the position «Frequency at full FLS».



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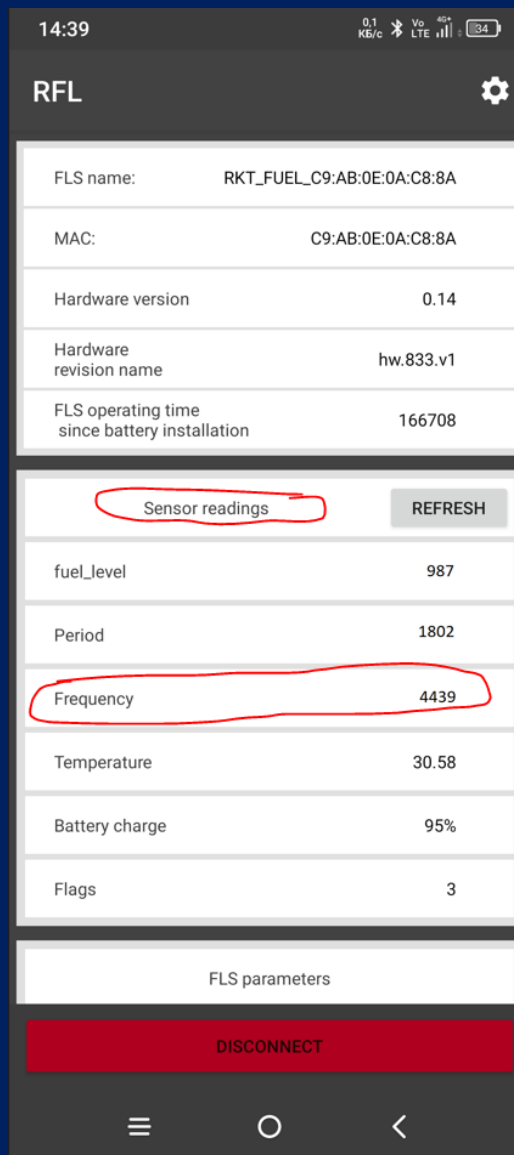


Figure 8 - Frequency readings with full FLS

Note - if after clicking on «REFRESH» the data do not change, then you should click on «DISCONNECT» and in the start window of the program find the sensor and take frequency readings, according to Figure 9. The data update frequency is five seconds, which can also be observed in the application window.



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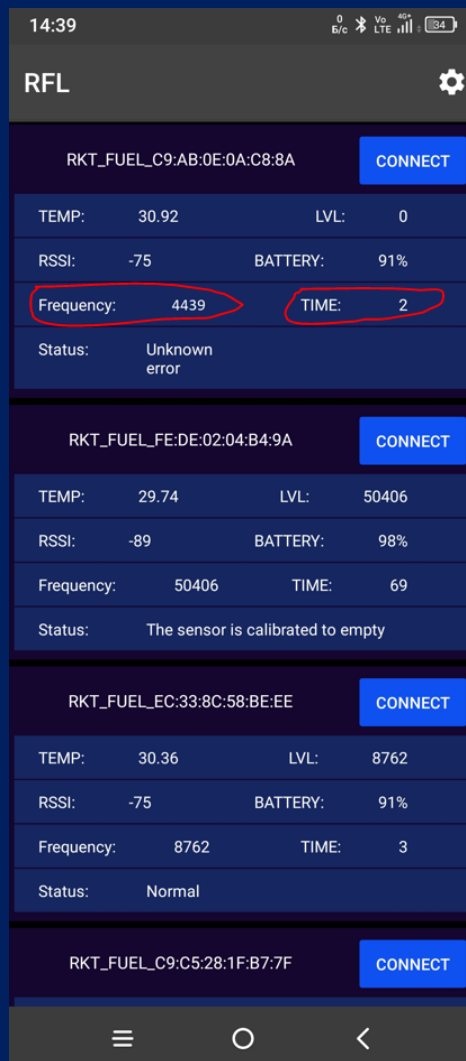


Figure 9 - Reading of frequency readings at full FLS in the start window of the mobile application «RFL»

After the data has been updated, click on «CONNECT» and go to the sensor settings. Go to the «Calibration» column, to the position «Frequency at full FLS» and press «CHANGE». A window will appear, where it is necessary to enter the frequency value that we have obtained, according to Figure 10.

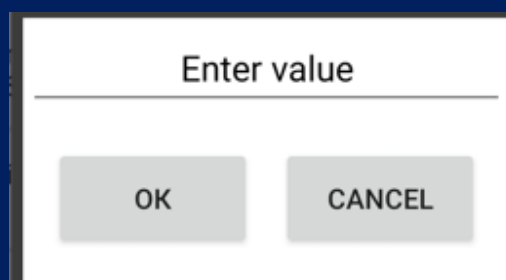


Figure 10 - Entering frequency value at full FLS

In our case, it is the number «4439», enter it and click «OK» and then click «SAVE CHANGES»..



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The next step is to completely drain the fuel from the sensor. Then open the «Sensor readings» column in the mobile application and press «Refresh».

After updating in the column «Sensor readings» it is necessary to take the value from the position «Frequency», according to Figure 11, and then manually enter the value in the column «Calibration» in the position «Frequency with empty FLS».

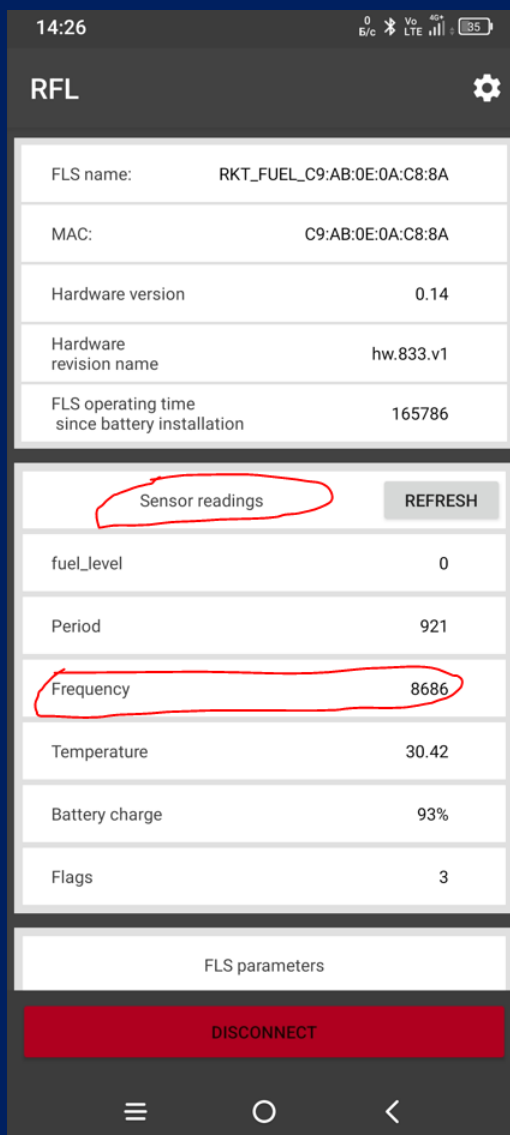


Figure 11 - Frequency readings with empty FLS

Note - if after clicking on «REFRESH», the data do not change, then click on «DISCONNECT» and in the start window of the program find the sensor and take frequency readings, according to Figure 12.



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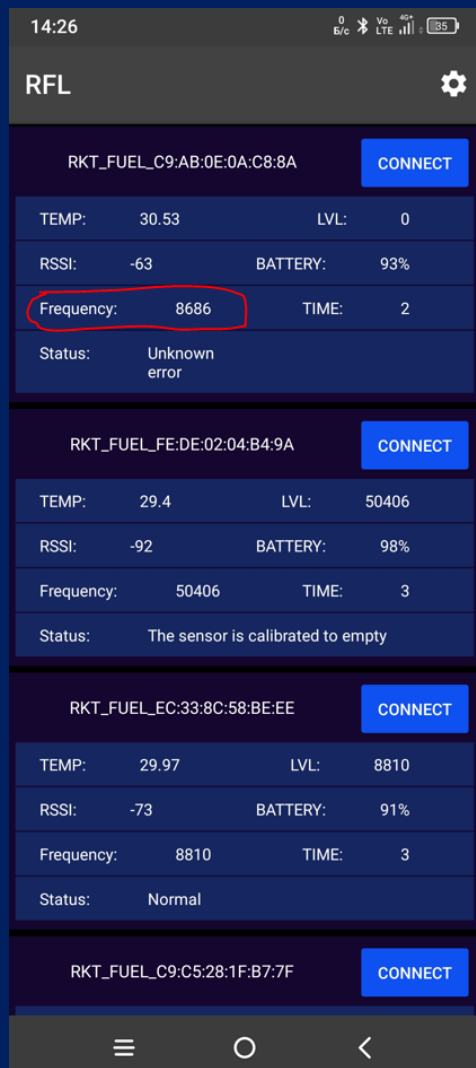


Figure 12 - Reading of frequency readings with an empty FLS in the start window of the «RFL» mobile application

After the data has been updated, click on «CONNECT» and go to the sensor settings. Go to the «Calibration» column, to the position «Frequency at empty FLS» and press «CHANGE». A window will appear, where it is necessary to enter the frequency value that we received, according to Figure 13.

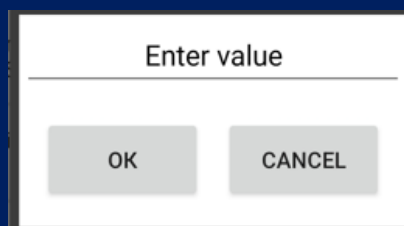


Figure 13 - Entering the frequency value when the FLS is empty.

In our case, it is the number «8695», enter it and click «OK» and then click «SAVE CHANGES».



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## 3.2 Calibrating the sensor

After having calibrated the BLE FLS for empty and full, it is necessary to install it in the tank. After installing the sensor, it is necessary to drain all fuel from the tank, if any.

After that we start calibrating the BLE remote control. To do this, feed fuel into the tank in equal portions and record the level values. It is necessary to record the values in excel table, indicating the number of liters in the tank and the corresponding level value from the mobile application «RFL».

Knowing the approximate amount of fuel in the tank, it is necessary to divide this value in liters by a number from 20 to 30 to get the amount of fuel supplied in one portion. So, we feed fuel into the tank and record its level value at each portion and enter the obtained data into the table.

After the calibration is completed, in the «RFL» application in the «FLS parameters» column, check the «Escort emulation» box, as shown in Figure 14.



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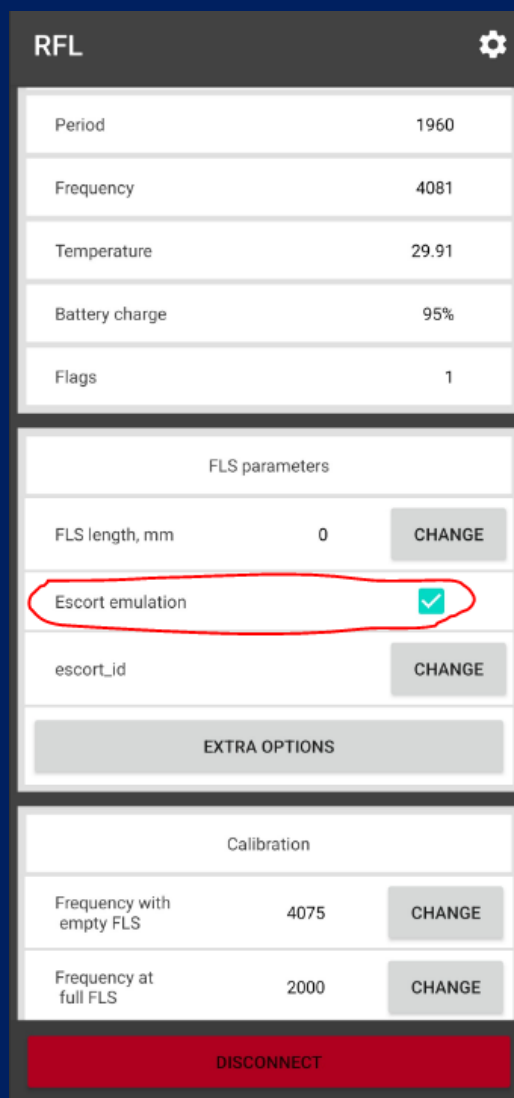


Figure 14 - Setting emulation «escort»

Then click on «CHANGE» against «escort\_id» and in the window that appears specify «1» and click on «OK», if one BLE FLS is used, according to Figure 15. In case two or more sensors will be used, set an individual «escort\_id» for each sensor, starting from one and ascending.



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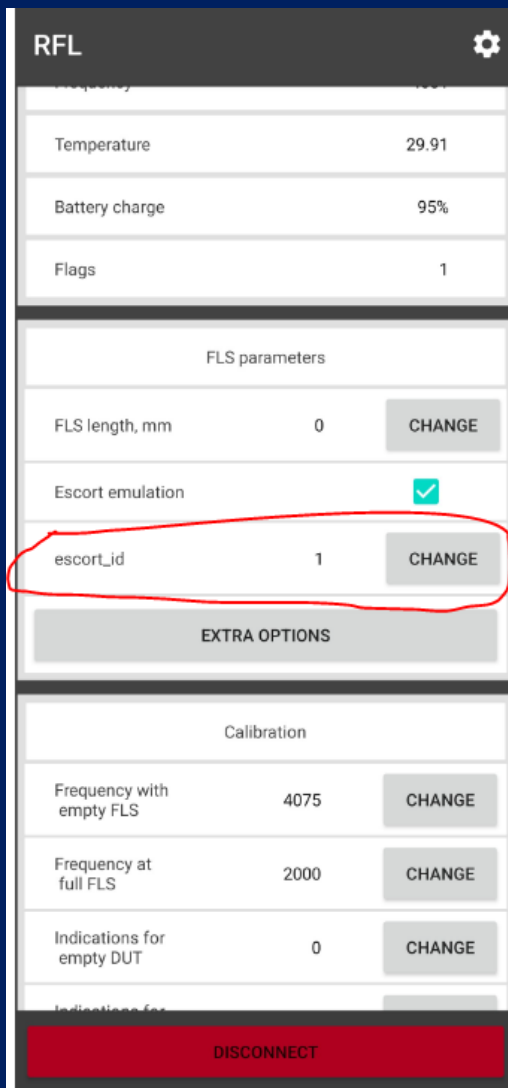


Figure 15 - Setting escort\_id

Then click on «EXTRA OPTIONS» and in the window that appears in the column «Data averaging» enter the value «50», according to Figure 16.



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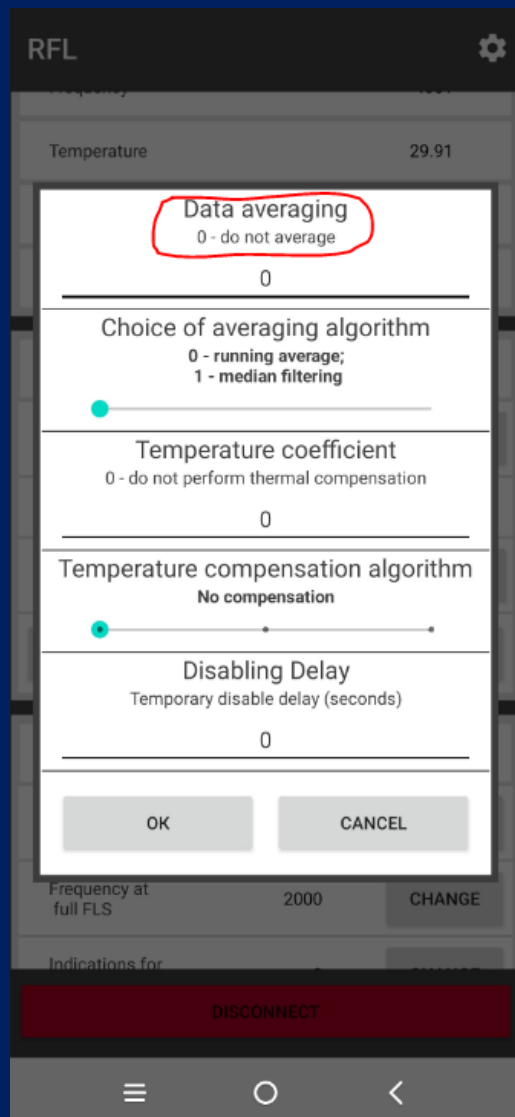


Figure 16 - Entering data averaging

After entering, press «OK» and press «SAVE CHANGES». Then press «DISCONNECT» and you will see the «BLE FLS» configured in green, as shown in Figure 17.



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Figure 17 - Configured BLE FLS

Then it is necessary to connect the BLE FLS to the tracker and write the table with calibration values into it.



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## 4 Connecting the BLE FLS to the tracker

In order to connect the BLE FLS to the tracker, you must first turn on the laptop with the «NTC Configurator» software installed, according to Figure 18, and connect the cable from the laptop to the tracker.

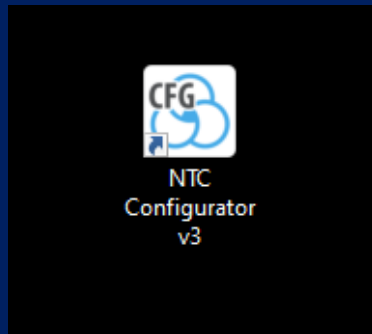


Figure 18 - NTC Configurator laptop software

Open the software on the laptop and check the tracker device type and its IMEI. Data from the tracker case and data from «NTC Configurator» software should match, according to Figure 19.

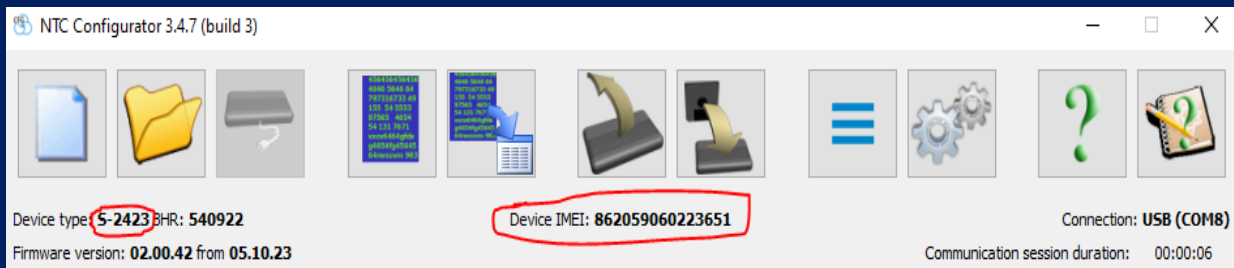


Figure 19 - Starting the «NTC Configurator» software

Open «Read device configuration», according to Figure 20.

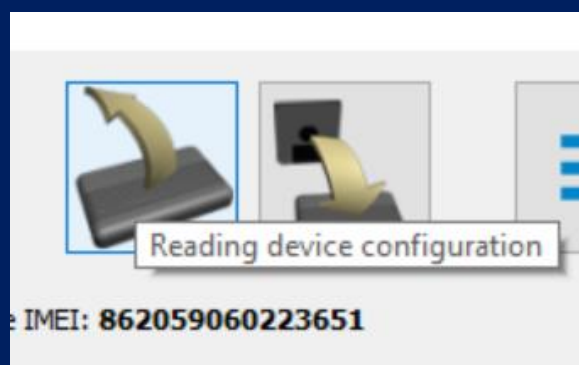


Figure 20 – Reading device configuration

In the window that appears, click the «Bluetooth» tab, as shown in Figure 21.



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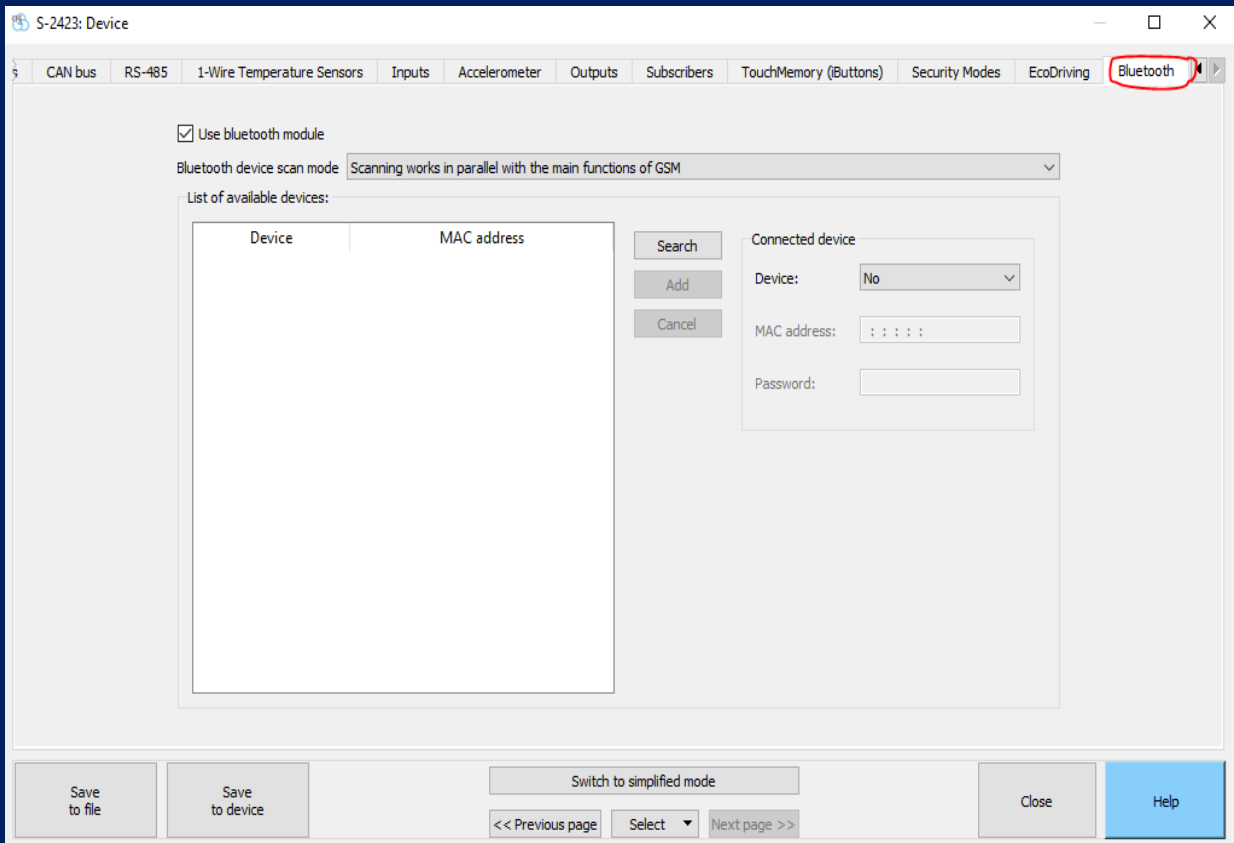


Figure 21 - The «Bluetooth» tab

Then find «Connected device» in the «Device» type, select «Sensors» and click on «Search» as shown in Figure 22.

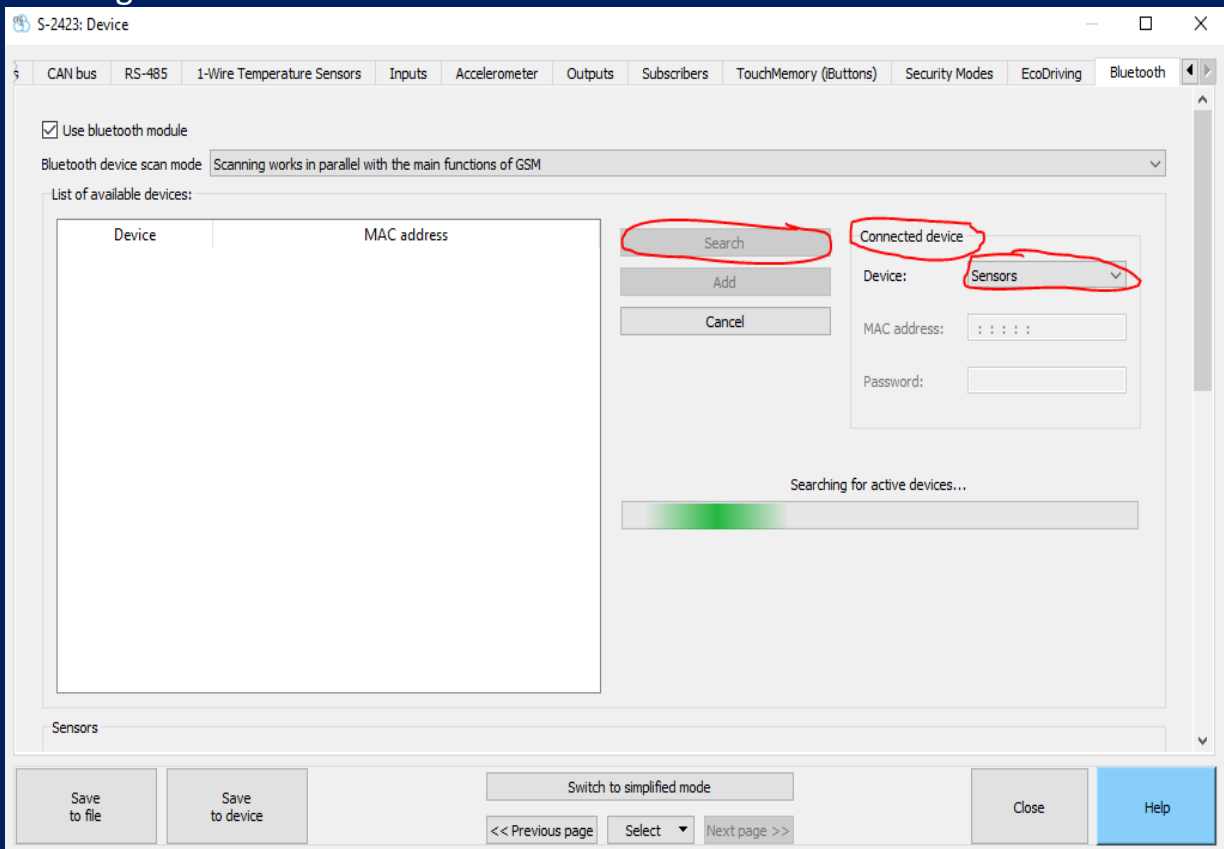


Figure 22 - Searching for BLE FLS



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When the search is completed, we will observe devices in the vicinity with «Bluetooth» enabled. Among the list of available devices find our BLE FLS by name and MAC-address. Select the BLE remote control to be connected to the tracker and click «Add» as shown in Figure 23.

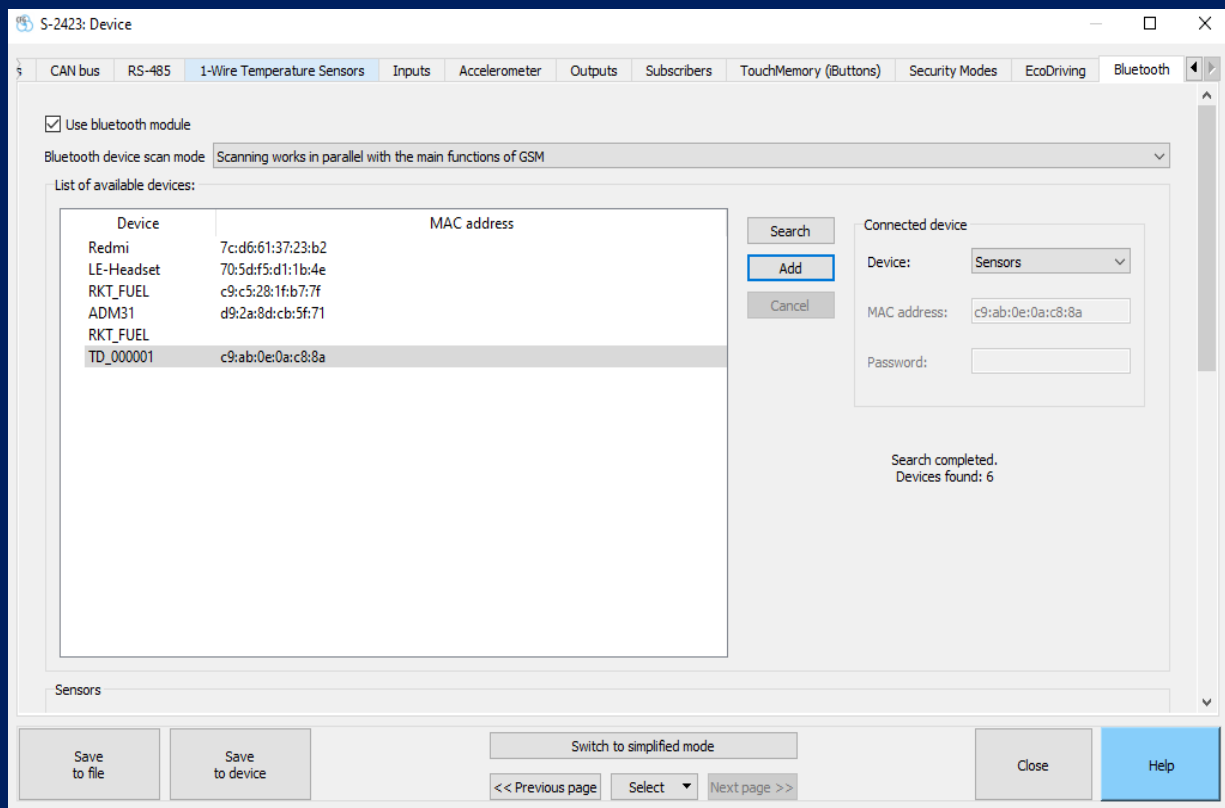


Figure 23 - Adding a BLE FLS

In the «Bluetooth» tab, go down to the «Sensors» column and in the «Sensor 1» item configure BLE FLS, according to Figure 24.

First, select «Fuel level sensor» in the «Sensor TYPE» field and enter the MAC address in the «MAC address» field. Then in the additional settings set «ESCORT TD» and «Fuel level sensor 1» for the fields «Fuel level sensor type» and «Transfer as» respectively.



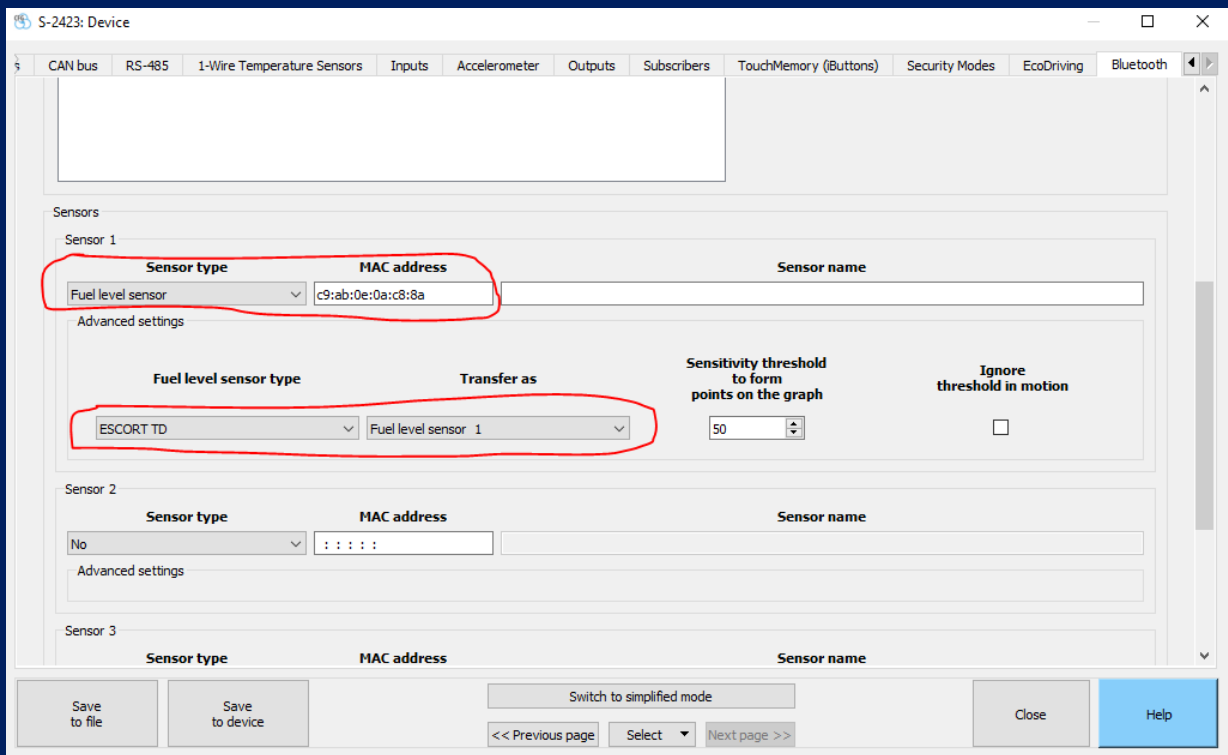
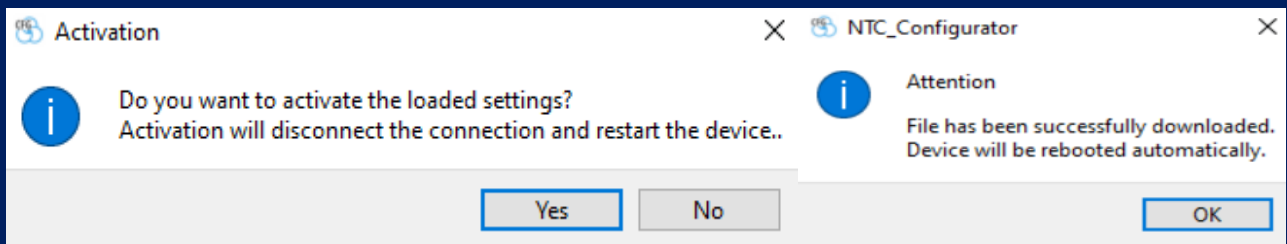


Figure 24 - Setting BLE FLS in the «Sensors» column

After configuring the BLE FLS, click «Save to device» and in the first window that appears click «Yes» and in the second window click «OK», according to Figure 25.



After loading the settings go to the «Protocol settings» tab and open «Fuel level sensor RS-485/BT». In the window that appears, at the intersection of the line «Sensor 1» and the column «Level and temperature» check the boxes according to Figure 26. When the configuration is completed, click on «Save to device».



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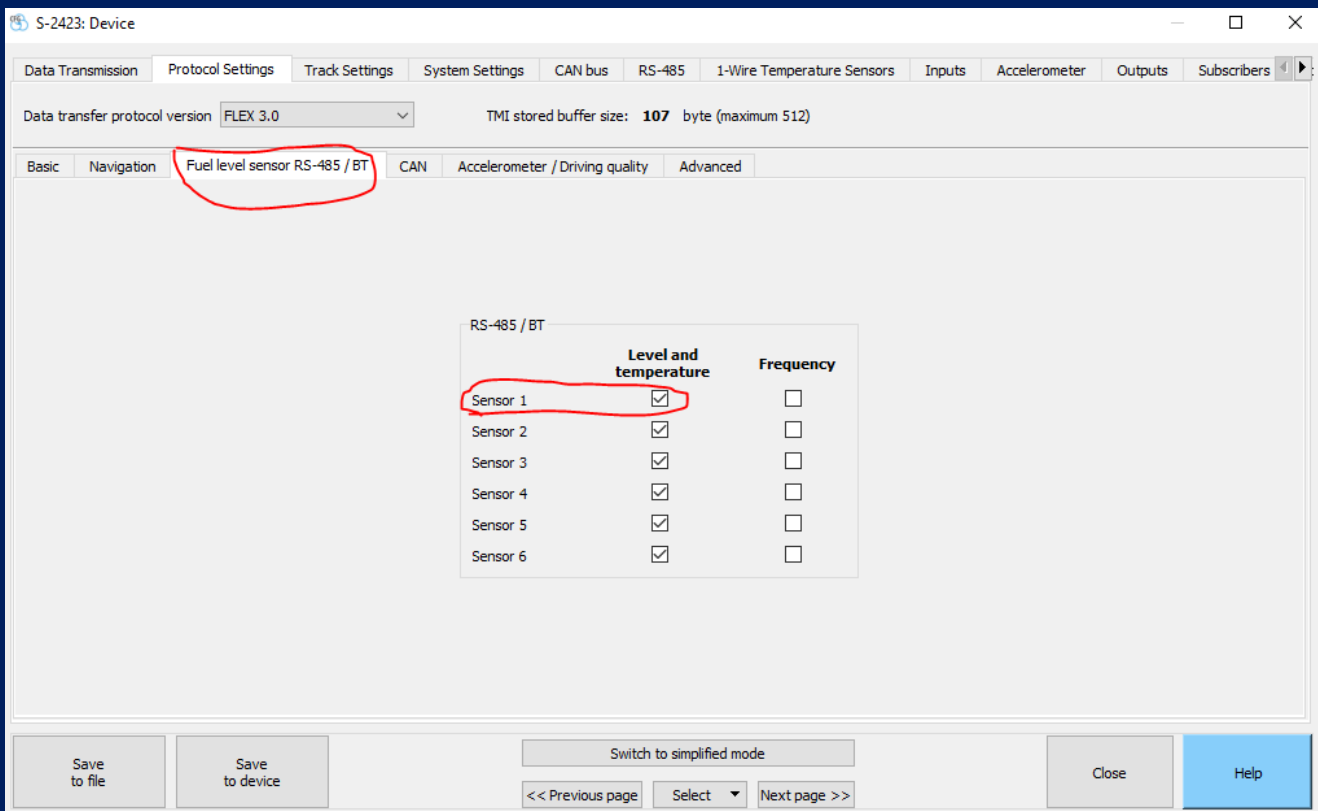


Figure 26 - Configuring the display of BLE FLS parameters

The next step is to open "Telemetry" in the program "NTC Configurator", according to Figure 27.

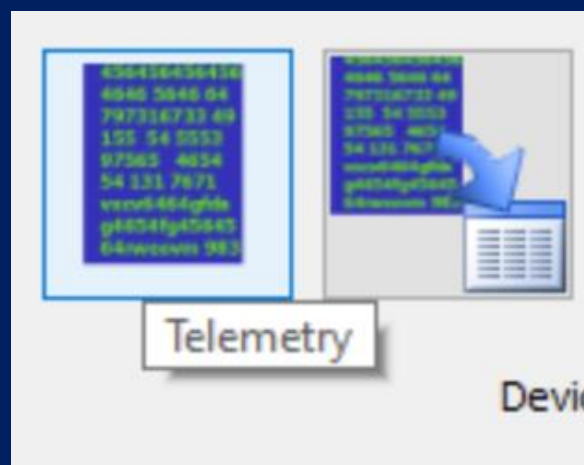


Figure 27 – Telemetry

In the window that appears, open the «Fuel level sensors» tab, where you can observe fuel level and temperature readings, according to Figure 28.



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Telemetry / S-2423 / 540922 / 02.00.42 / 862059060223651

Event  
 Record No. **4722** Time and date: **10:46:47.0000 16.07.2024 (UTC +3)** Operating mode: **Surveillance**  
 Type: **40962 Request for the object's current state**

Operating mode selection

Basic | Input/output interfaces | Accelerometer/Driving Quality | **Fuel level sensors** | CAN | Advanced

RS-485 / BT

	Fuel level	Temperature	Frequency
Fuel level sensor 1	0	34	n/a
Fuel level sensor 2	65530	0	n/a
Fuel level sensor 3	65530	0	n/a
Fuel level sensor 4	65530	0	n/a
Fuel level sensor 5	65530	0	n/a
Fuel level sensor 6	65531	0	n/a

Main packet:     
 TM keys packet:   
 RFID packet:   
 Timezone: 3 h

Figure 28 - Checking BLE FLS operation



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