Eurosens Dominator BT

Setup Guide

v2.00

eurosens Dominator BT

SETUP GUIDE

Table of contents

1. General information

The Eurosens Configurator software is designed for setting up, monitoring and troubleshooting fuel level sensors (FLS) Eurosens Dominator BT manufactured by Mechatronics.

To set up the sensor we will need:

- smartphone running Android OS version not lower than 9.0;
- Smartphone support for Bluetooth version 4.2 and higher.

A more powerful signal can be obtained if the sensor is installed so that the antenna pattern is directed towards the tracker (Fig. 1.1).

Fig. 1.1

2. Installing the Eurosens Configurator app

2.1 Downloading the app from Play Market

1) Install the Eurosens configurator app by downloading it from Play Market
2) During application installation:
- provide the application with all the requested information permissions (Fig. 2.1);
- turn on the Bluetooth module;
- turn on geolocation.
3) Launch the application.
4) Follow the program instructions.

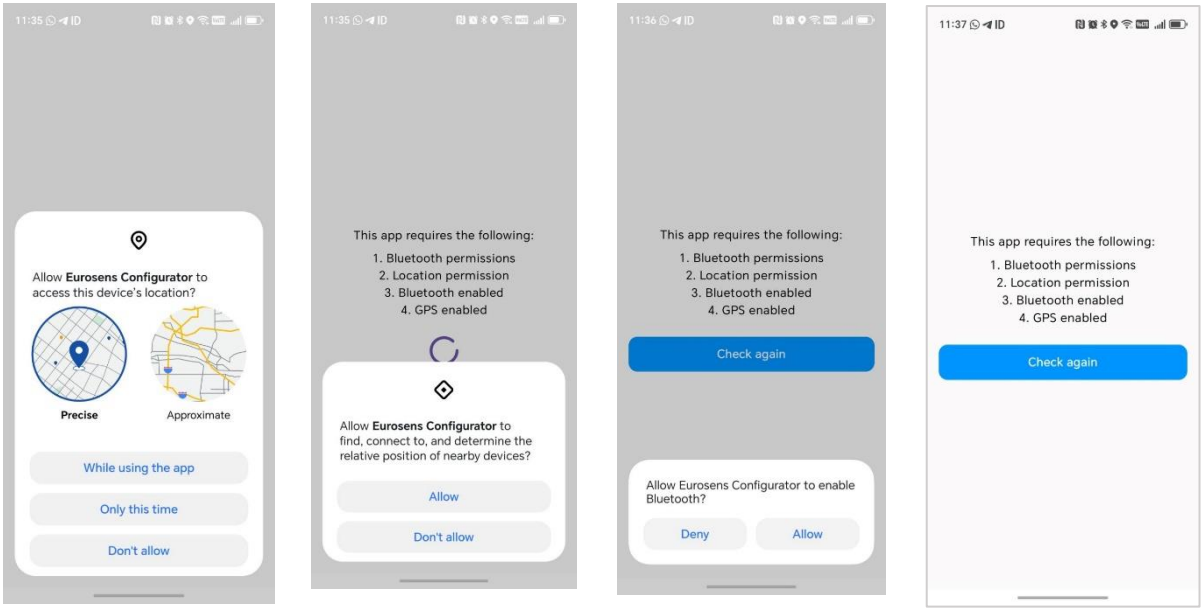


Fig. 2.1

3. Working with the Dominator BT sensor

3.1 Activating the sensor

To configure the sensor, you need to activate it.

Place the magnetic key (included in the delivery kit) on the sensor in the specified area (Fig. 3.1) and hold it for about 2-3 seconds.

There is no need to hold the key constantly.

Activation of the sensor is only required the first time you connect it after purchasing it (wake it from sleep mode). Next activation is no longer required. The sensor will always be ready for connection!

Fig. 3.1

3.2 Connecting to the sensor Dominator BT

Launch the Eurosens Configurator app. On the start page, select the "Sensor Configuration" tab (Fig. 3.2).

Then, from the list of suggested sensor types, select “Dominator BT” (Fig. 3.3), after which a list of found devices will be displayed on the screen (Fig. 3.4).

Fig. 3.2

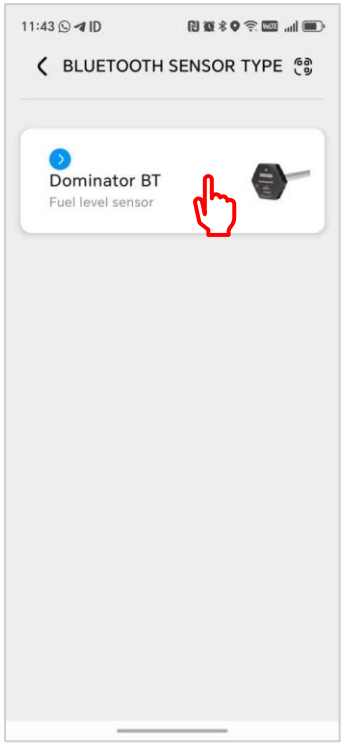


Fig. 3.3

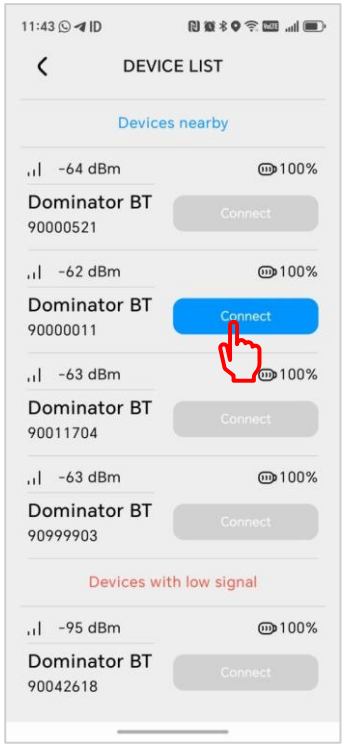


Fig. 3.4

Now you can connect to the sensor by clicking the "Connect" button. For all active sensors, the button will be blue (Fig. 3.4).

If the button is grey, it means the sensor is not active and you need to activate the service connection using the magnet key.

3.3 Setting a password to connect to the sensor

By default, the sensor doesn't have a password. If you want to restrict access to the sensor, set a password.

After connecting to the sensor, in the main menu, click on the “Additional features” button (Fig. 3.5).

A tab will open where you can set a password (Fig. 3.6).

Set a password and click the "Set password" button.

For subsequent connections to the sensor, the system will require you to enter a password (Fig. 3.7).

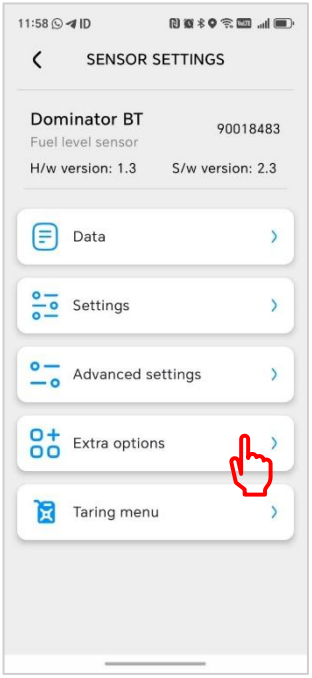


Fig. 3.5

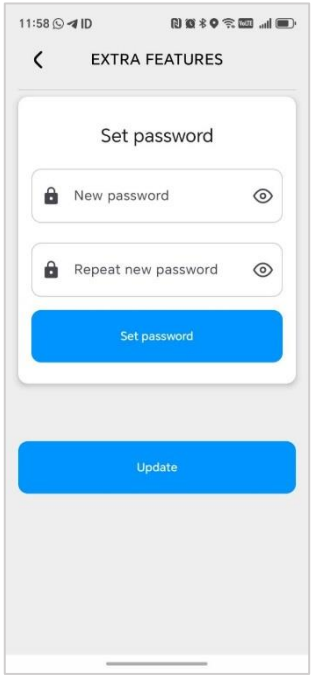


Fig. 3.6

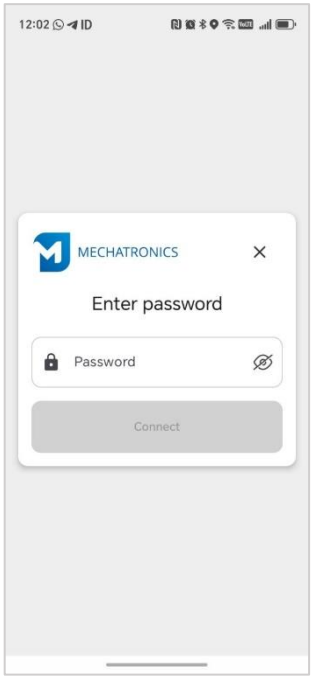


Fig. 3.7

Password protection is strongly recommended because this Android app doesn't require any registration before use. Protect your sensors from unauthorized use.

3.4 How to change the password

After connecting to the sensor, in the main menu, click on the "Additional features" button (Fig. 3.5).

A tab will open where you can delete the set password or change it to a new one (Fig. 3.8).

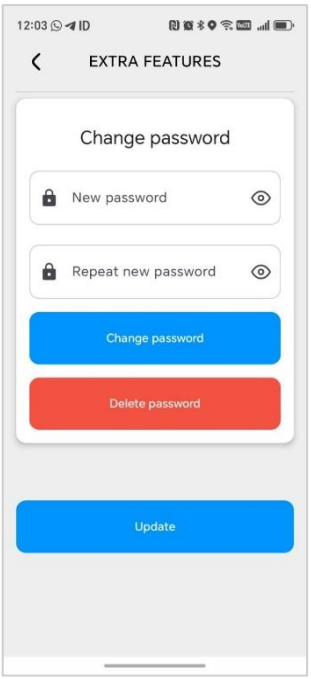


Fig. 3.8

To delete the current password, click the "Delete password" button.

To change your old password, enter a new password and click the "Change Password" button.

4. Sensor settings

4.1 Current sensor readings

After connecting to the sensor, you will be taken to the main menu (Fig. 4.1). The "Data" tab will display the current sensor readings (Fig. 4.2).

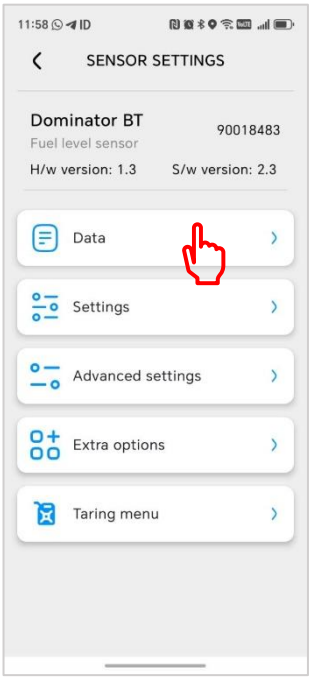


Fig. 4.1

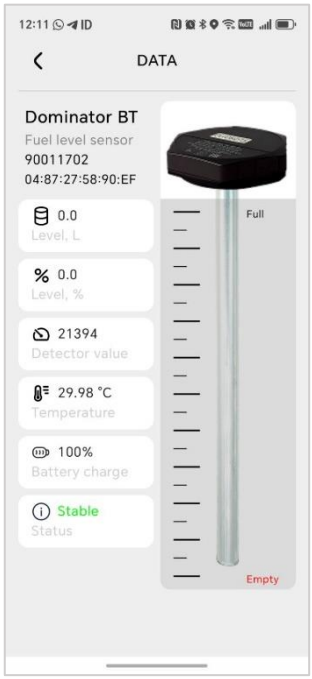


Fig. 4.2

The following information is available:

- Sensor type
- Serial number
- MAC address
- Fuel level in liters
- Fuel level in percent
- Current value of the detector
- Temperature

- Battery charge level
- Detector stability state

4.2 Basic settings

To set the basic settings, go to the "Settings" tab (Fig. 4.3).

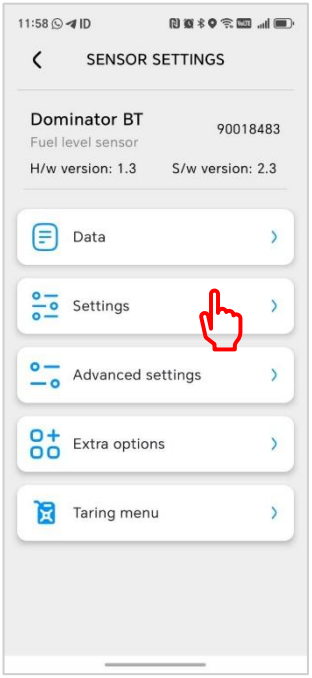


Fig. 4.3

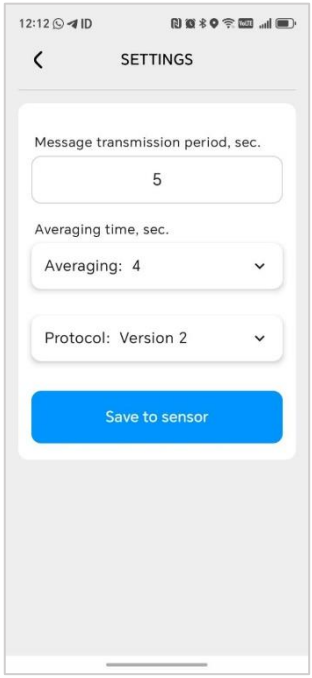


Fig. 4.4

In the window that opens (Fig. 4.4) you can set the following operating parameters of the sensor:

- **Message transmission period**- the period in seconds between messages to the monitoring system. The recommended value is 5 seconds. (Decreasing the period reduces the sensor's battery life.)
- **Averaging time**- must be set from the range of values 4, 8, 16, 32, 64, 128 sec. These values reduce the computing load and increase the battery life of the sensor.

- **Protocol**– switching the protocol version (2 is recommended). Protocol version 2 additionally supports the transmission of fuel level sensor status.

  After setting all the settings, click the “Save to sensor” button.

4.3 Additional settings

In the “Additional settings” tab (Fig. 4.5, Fig. 4.6) you can set these parameters:

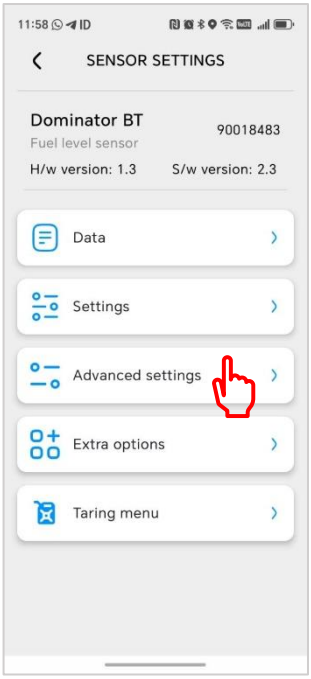


Fig. 4.5

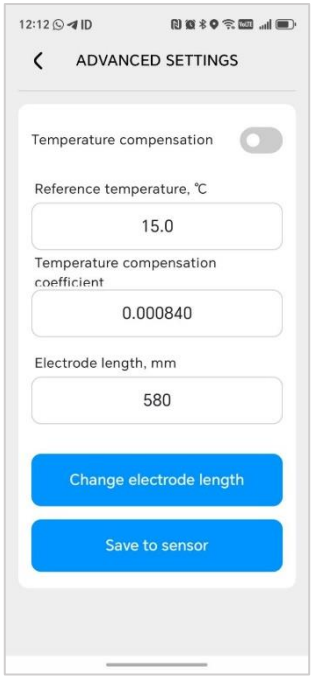


Fig. 4.6

- **Thermal compensation**– by selecting this item you can enable the correction of measured fuel volume according to temperature.
- **Reference temperature** – fuel volume will be recalculated to same the value to which the volume of fuel with the current temperature will be converted.
- **Temperature compensation coefficient** (default value – for diesel fuel).
- **Electrode length**.

You can change the length of the electrode by pressing the button "**Change the length of the electrode**» (Fig. 4.7). A dialog box will open where you can enter the desired length. After entering the value, click the "**Save**» (Fig. 4.8).

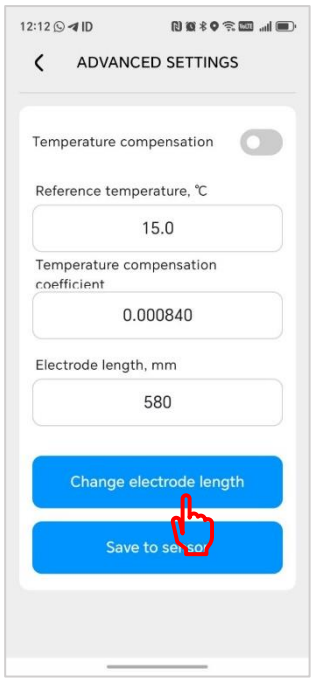


Fig. 4.7

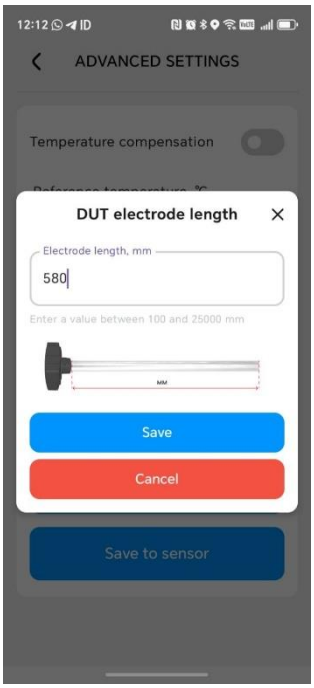


Fig. 4.8

After setting all the settings, click the “Save to sensor” button.

5. Calibration of the sensor

5.1 General information

To proceed to sensor calibration, click on the “Calibration Menu” button in the main menu (Fig. 5.1).

In the tab that opens, select the “Calibration” item (Fig. 5.2).

If you have not yet set the electrode length in the settings, then when you first enter the calibration, you will need to enter the electrode length (Fig. 5.3).

Next, you need to select the file in which the calibration table will be saved (Fig. 5.4).

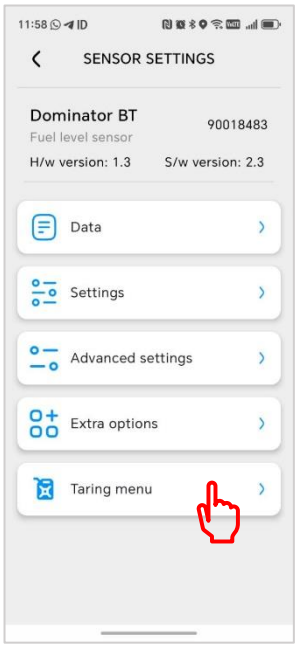


Fig. 5.1

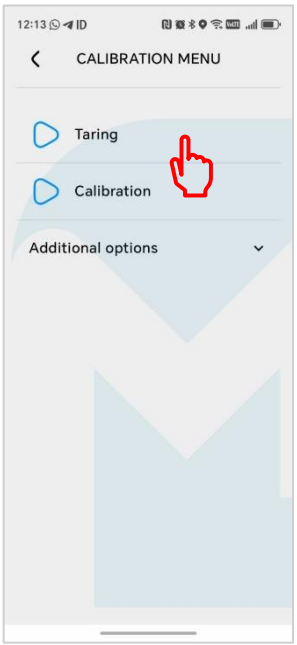


Fig. 5.2

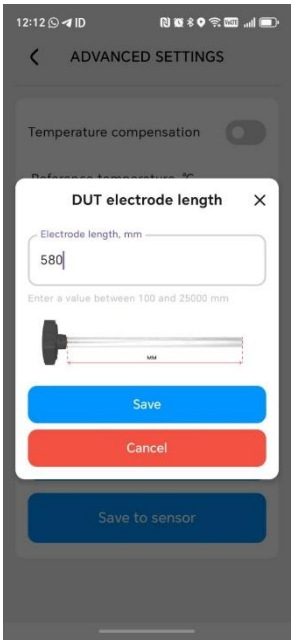


Fig. 5.3

Fig. 5.4

After setting the electrode length and selecting the file in which the table will be saved, you can proceed to calibration (Fig. 5.5).

Fig. 5.5

The page contains information about the sensor (serial number, MAC address, current detector reading, temperature, detector status), and a calibration table.

Before working with the table, enter the portion you are going to add(Fig. 5.6). The value can be changed before each addition of a new row to the table.

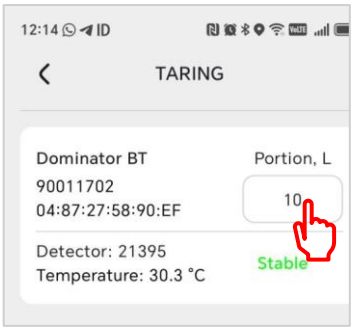


Fig. 5.6

Rows in the calibration table can be deleted, added and edited.
To delete, you need to click on the cross at the end of the line (Fig. 5.7)

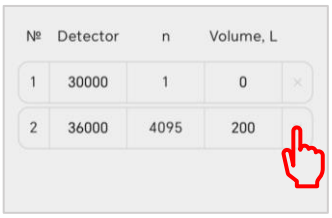


Fig. 5.7

To edit a line, click on the desired field and it will go into input mode (Fig. 5.8).

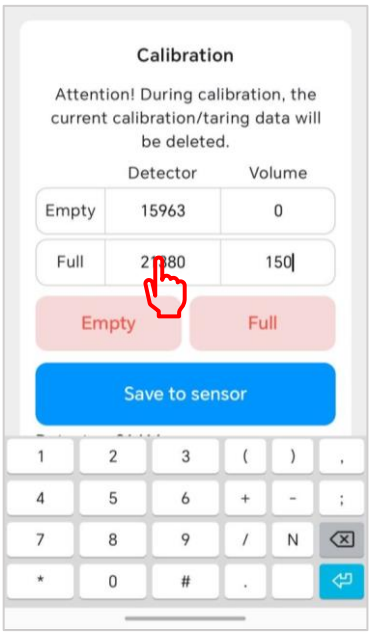


Fig. 5.8

To add a row, you need to click on the “+” button below the table (Fig. 5.9).

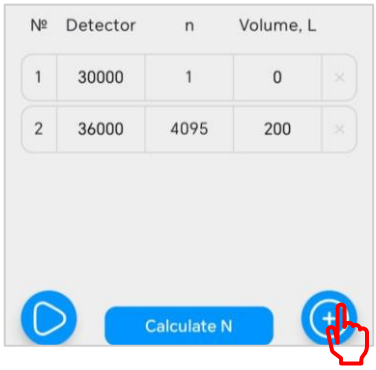


Fig. 5.9

5.2 Calibration

To start the calibration process, click on the button below the table (Fig. 5.10).

If there are two rows in an already saved table, the app will ask whether “Empty-Full Calibration” have been done before (Fig. 5.11).

If you answer Yes – app will show also N value, calculated in the range 1…4095. This value can be used on server side. So, to obtain result of tank calibration in form of N-Value/Liters – calibrate Empty/Full and answer Yes to this prompt.

But you can do tank calibration without prior sensor calibration as well – but N-values column you will get only after finishing the tank calibration.

Fig. 5.10

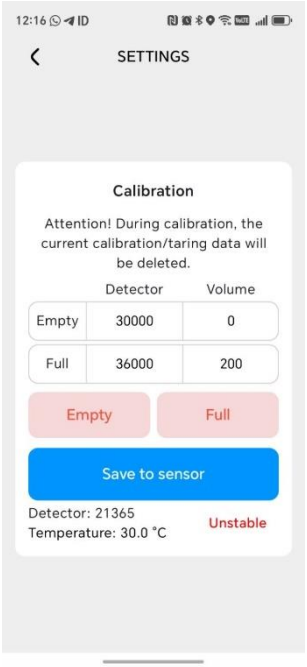


Fig. 5.11

Next, a notification will appear that the data from the current table will be deleted (Fig. 5.12). Click "Clear" and start taring.

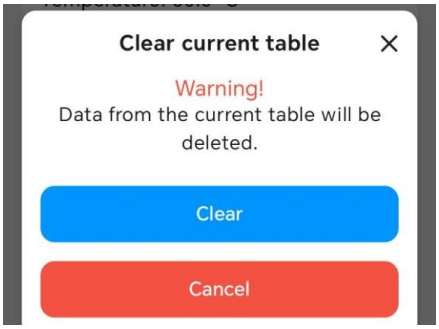


Fig. 5.12

A tank calibration table is used to obtain a linear relationship between the sensor's output signal and the actual fuel volume in the tank. It should consist of at least two lines: one for empty and one for full (calibration of an ideal rectangular tank). However, a tank calibration table typically consists of several lines to fully convey the tank's shape as a Height-Volume relationship.

When calibrating the tank, the following steps are performed:

1. Briefly immerse the sensor with its entire measuring section in fuel. Remove it and allow any remaining fuel to drain for several minutes.
2. Install the sensor in an empty tank.
3. Add the first entry, with a volume value of 0, by clicking the plus button.
4. Next, pour fuel into the tank in certain portions (it is more convenient to use portions in multiples of 5 or 10), wait until the detector readings are stable, and after each portion, add a line with the sensor value and the volume of fuel.
5. Repeat step 4 until the tank is completely full. You can change the volume in any of the lines if you need to change the serving size for any reason.
6. After completing the calibration, it is important not to forget to press the “Save to sensor” button (Fig. 5.13). You will be asked to change the averaging time (Fig. 5.14).
7. Save data to the sensor (Fig. 5.15).

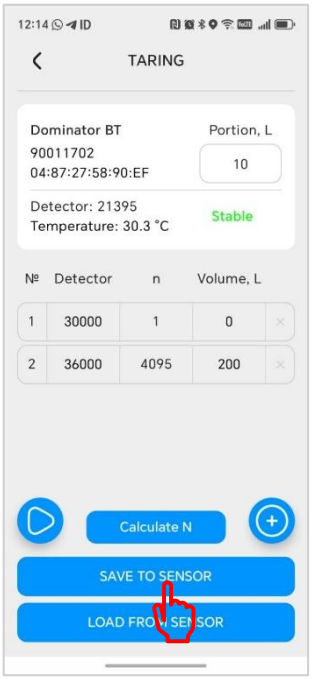


Fig. 5.13

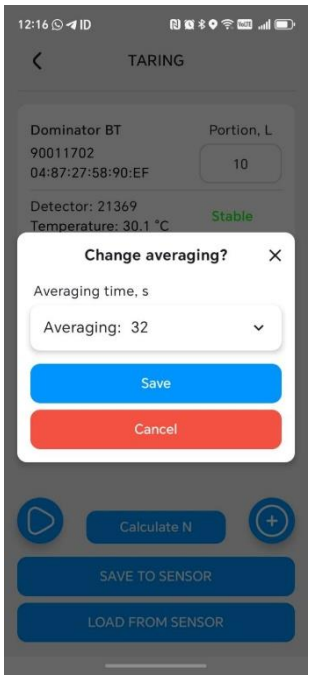


Fig. 5.14

Fig. 5.15

5.3 Calibration

Calibration is a special case of tank calibration. It differs in that only two points are specified—one for the empty tank and one for the full tank.

By clicking on the “Calibration” button in the “Calibration Menu” (Fig. 5.16), you will be taken to the sensor calibration page (Fig. 5.17).

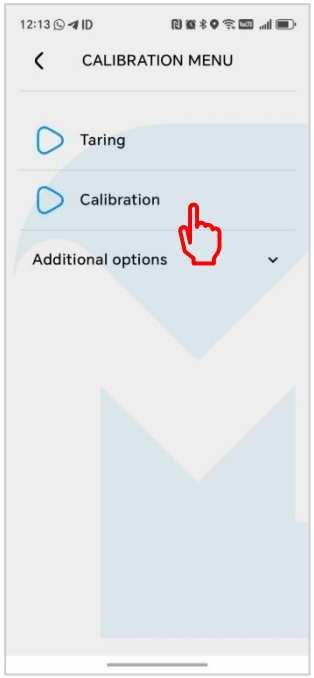


Fig. 5.16

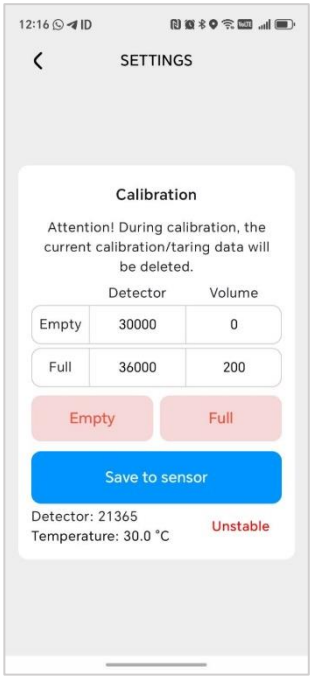


Fig. 5.17

To calibrate the sensor, perform the following steps:

1. Briefly immerse the sensor with its entire measuring section in fuel. Remove it and allow any remaining fuel to drain for several minutes.
2. Install the sensor in an empty tank or in a special pipe for calibration.
3. Wait for the detector to reach a stable value and then click the "Empty" button. The detector value will be entered into the line. The fuel volume should be zero (Fig. 5.18).
4. Fill the tank or pipe with fuel to the required level, corresponding to a full tank.
5. Enter the fuel volume in the second line and wait until the detector displays a stable value, then click the "Full" button. The line will display the full tank detector value (Fig. 5.19).

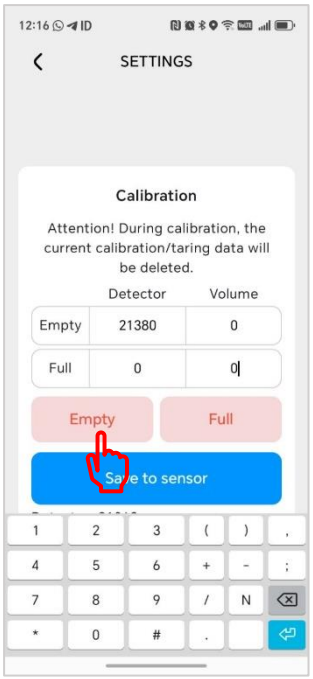


Fig. 5.18

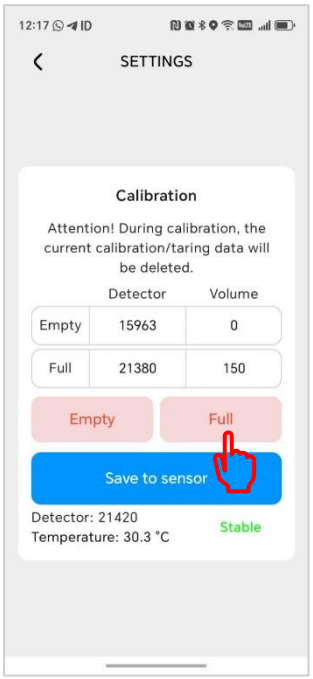


Fig. 5.19

6. Save the table by clicking on the "**Save to sensor**".

5.4 Loading a table from a file

You can load previously saved calibration tables from a file.

To do this, in the "Calibration Menu," expand "Additional Options." Click the "Load from File" button (Fig. 5.20).

Select the required file on your mobile device with the calibration table.

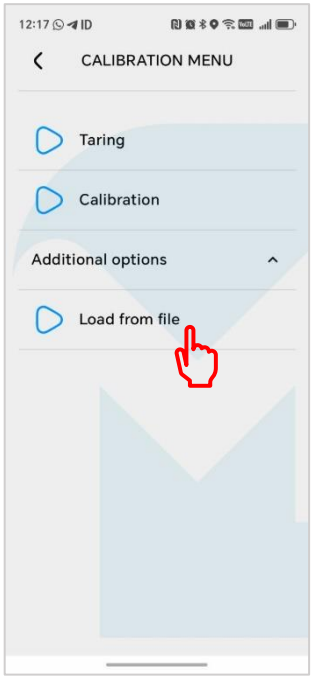


Fig. 5.20

5.5 Extending or cutting the electrode

If it becomes necessary to change the electrode length (for example, when reinstalling the sensor on another container or tank), you must change the current electrode length in the settings to the current one.

To do this:

- Go from the main menu to "Additional settings" (Fig. 5.21)
- Click on the "Change Electrode Length" button (Fig. 5.22)
- In the window that appears, enter the current length (Fig. 5.23)
- Click the Save button

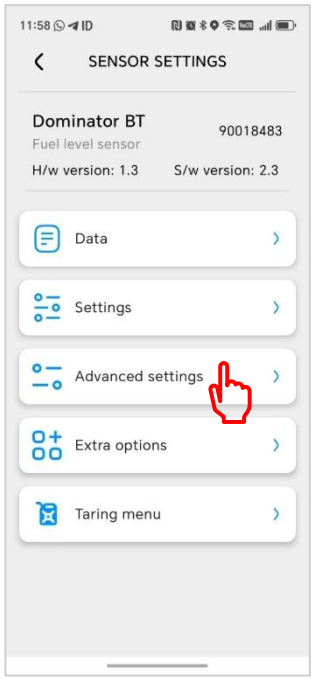


Fig. 5.21

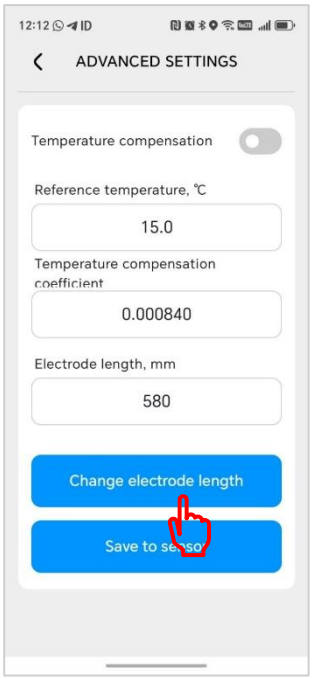


Fig. 5.22

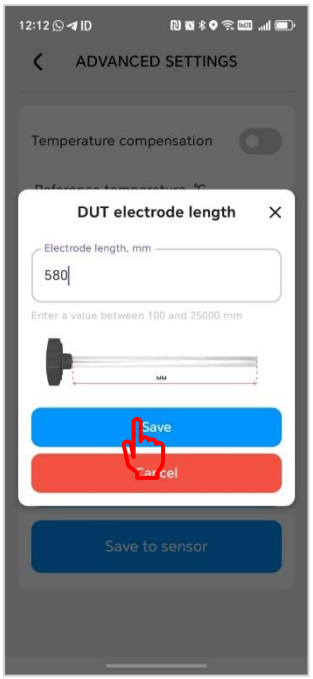


Fig. 5.23

6. Technical support contacts

 +375 (44) 556-08-54; +375 (44) 751-33-31

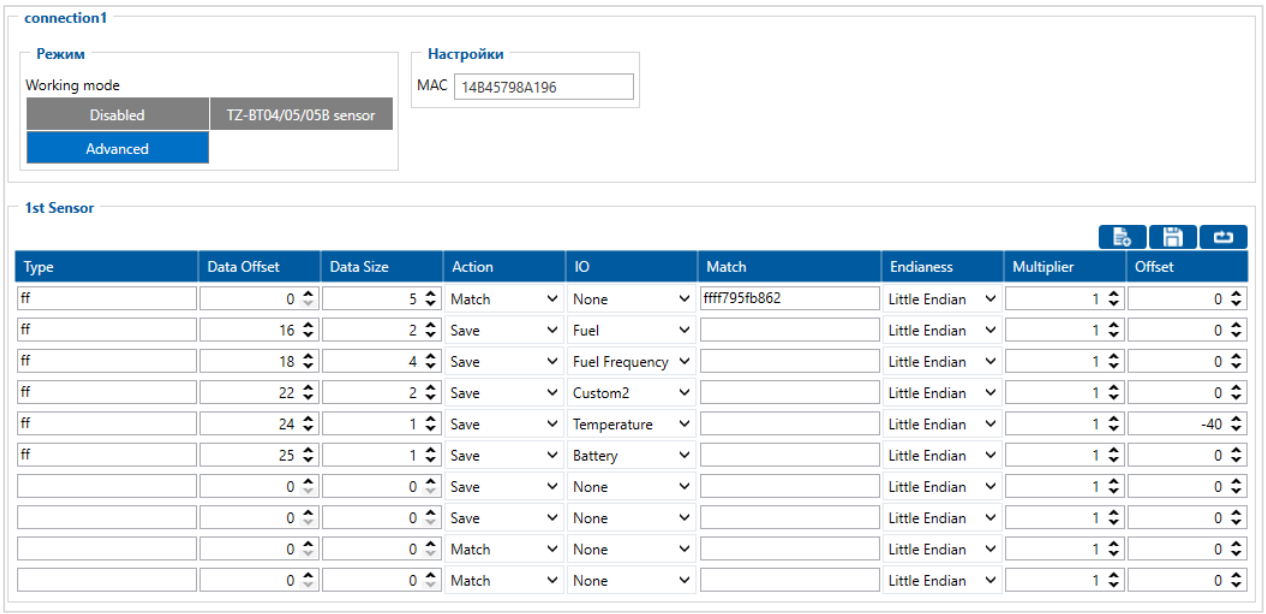
 support@mechatronics.by

Appendix 1.Connecting Dominator BT to a GPS terminal (using the example of Teltonika FMB 900)

After configuring the sensor in the configurator, you need to configure the monitoring device. In our example, we'll use the Teltonika FMB 900 tracker.

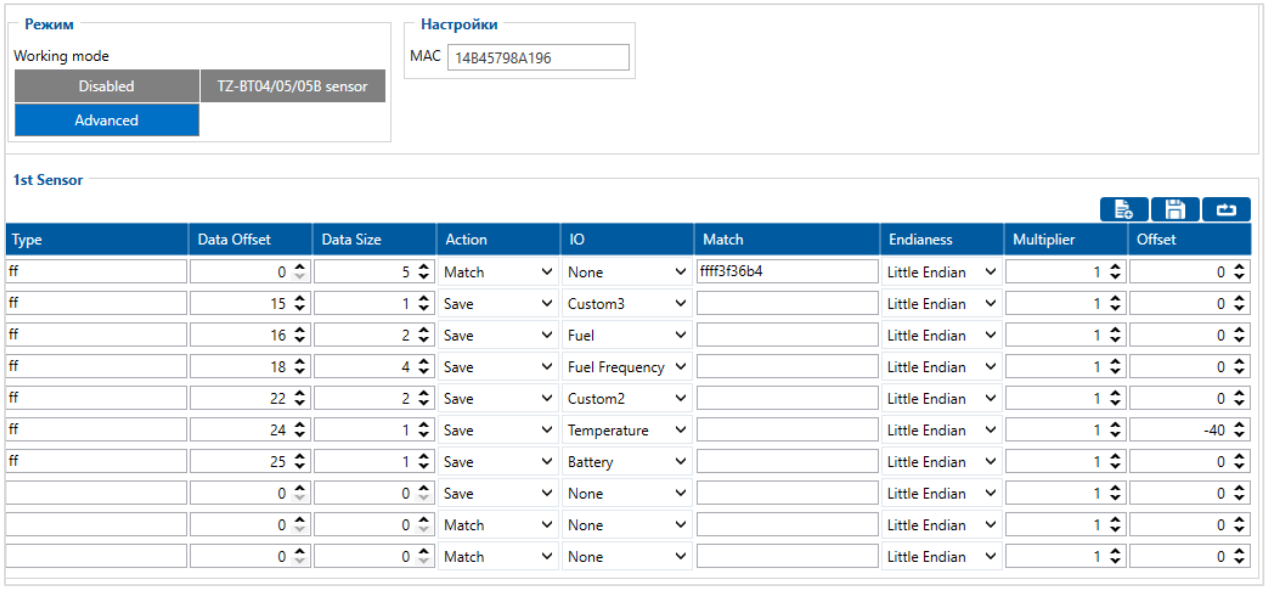
Launch the tracker configurator "Teltonika.Configurator.exe"

Go to the Bluetooth 4.0 section. In the connection #1 table, select the “Advanced” operating mode. In the 1st Sensor field, fill out the table as indicated.Fig. 1(relevant for protocol version 1. For protocol version 2 seeFig. 2).



Type	Data Offset	Data Size	Action	IO	Match	Endianess	Multiplier	Offset
ff	0	5	Match	None	ffff795fb862	Little Endian	1	0
ff	16	2	Save	Fuel		Little Endian	1	0
ff	18	4	Save	Fuel Frequency		Little Endian	1	0
ff	22	2	Save	Custom2		Little Endian	1	0
ff	24	1	Save	Temperature		Little Endian	1	-40
ff	25	1	Save	Battery		Little Endian	1	0
	0	0	Save	None		Little Endian	1	0
	0	0	Save	None		Little Endian	1	0
	0	0	Match	None		Little Endian	1	0
	0	0	Match	None		Little Endian	1	0

Fig. 1 Protocol version 1.0



Type	Data Offset	Data Size	Action	IO	Match	Endianess	Multiplier	Offset
ff	0	5	Match	None	ffff3f36b4	Little Endian	1	0
ff	15	1	Save	Custom3		Little Endian	1	0
ff	16	2	Save	Fuel		Little Endian	1	0
ff	18	4	Save	Fuel Frequency		Little Endian	1	0
ff	22	2	Save	Custom2		Little Endian	1	0
ff	24	1	Save	Temperature		Little Endian	1	-40
ff	25	1	Save	Battery		Little Endian	1	0
	0	0	Save	None		Little Endian	1	0
	0	0	Match	None		Little Endian	1	0
	0	0	Match	None		Little Endian	1	0

Fig. 2 Protocol version 2.0

In the MAC address settings, you need to specify the sensor address, which can be found in the configurator in the "Information" tab.

The sensor status parameter is transmitted in field 15_1 Custom3.

16_2 Fuel the detector value is transmitted.

18_4 Fuel Frequency transmits the volume of fuel in liters.

22_2 Custom 2 transmits % of fuel in the tank.

24_1 Temperature temperature is transmitted.

25_1 Battery transmits the battery charge level.

After setting up, in the “status” section you can see the received data (Fig. 3AndFig. 4).

If there is no data from the sensor in the Teltonika configurator, try the following steps:

1. Exit the Eurosens sensor configurator application.
2. Replace the "Match" option in the "Action" column with "Save." This will disable data filtering by protocol ID. This is useful if preset files from different protocol versions are mixed up.
3. Please check if the MAC address is correct.

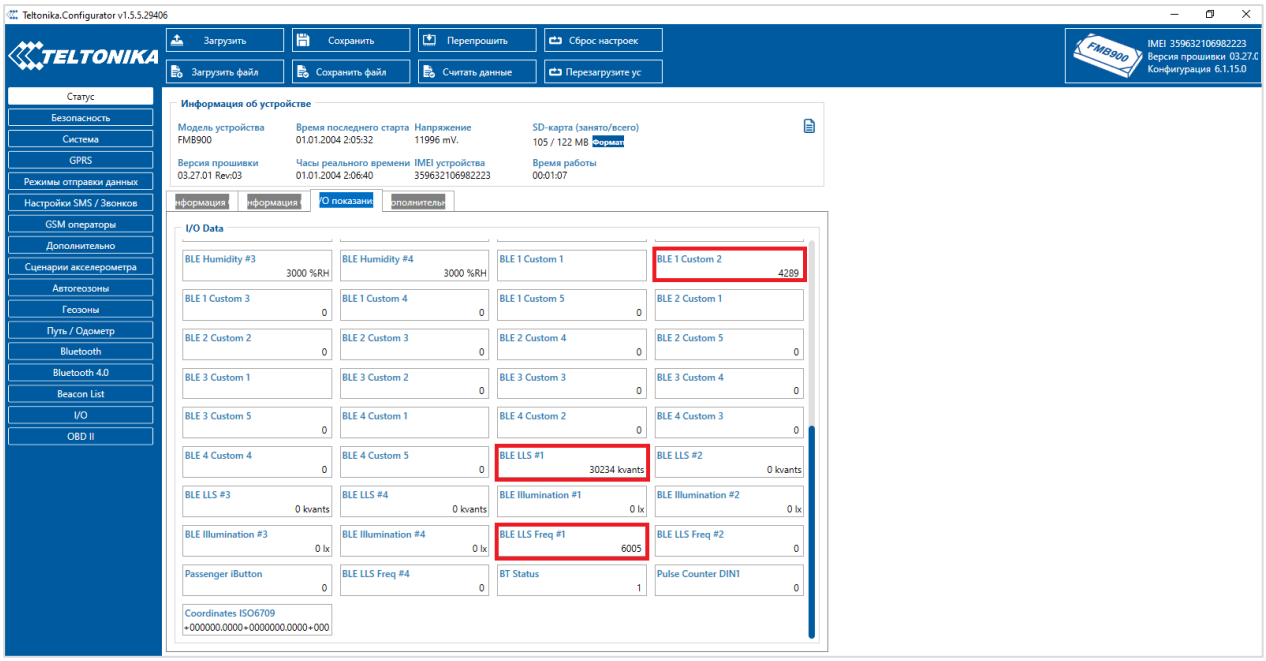

Teltonika.Configurator v1.5.5.29406
TELTONIKA
Загрузить
Сохранить
Перепрошить
Сброс настроек
Загрузить файл
Сохранить файл
Считать данные
Перезагрузите ус
FMB900
IMEI 359632106982223
Версия прошивки 03.27.0
Конфигурация 6.1.15.0
Статус
Безопасность
Система
GPRS
Режимы отправки данных
Настройки SMS / Звонков
GSM операторы
Дополнительно
Сценарии акселерометра
Автогеозоны
Геозоны
Путь / Одометр
Bluetooth
Bluetooth 4.0
Beacon List
I/O
OBD II
Информация об устройстве
Модель устройства
FMB900
Время последнего старта
01.01.2004 2:05:32
Напряжение
11996 mV.
SD-карта (занято/всего)
105 / 122 MB
Формат
Версия прошивки
03.27.01 Rev:03
Часы реального времени
01.01.2004 2:06:40
IMEI устройства
359632106982223
Время работы
00:01:07
Информация
Информация
I/O показани
ополнитель
I/O Data
BLE Humidity #3
3000 %RH
BLE Humidity #4
3000 %RH
BLE 1 Custom 1
BLE 1 Custom 2
4289
BLE 1 Custom 3
BLE 1 Custom 4
BLE 1 Custom 5
BLE 2 Custom 1
BLE 2 Custom 2
BLE 2 Custom 3
BLE 2 Custom 4
BLE 2 Custom 5
BLE 3 Custom 1
BLE 3 Custom 2
BLE 3 Custom 3
BLE 3 Custom 4
BLE 3 Custom 5
BLE 4 Custom 1
BLE 4 Custom 2
BLE 4 Custom 3
BLE 4 Custom 4
BLE 4 Custom 5
BLE LLS #1
30234 kvants
BLE LLS #2
0 kvants
BLE LLS #3
0 kvants
BLE LLS #4
0 kvants
BLE Illumination #1
0 lx
BLE Illumination #2
0 lx
BLE Illumination #3
0 lx
BLE Illumination #4
0 lx
BLE LLS Freq #1
6005
BLE LLS Freq #2
Passenger iButton
BLE LLS Freq #4
BT Status
1
Pulse Counter DIN1
Coordinates ISO6709
+000000.0000+0000000.0000+000

Fig. 3

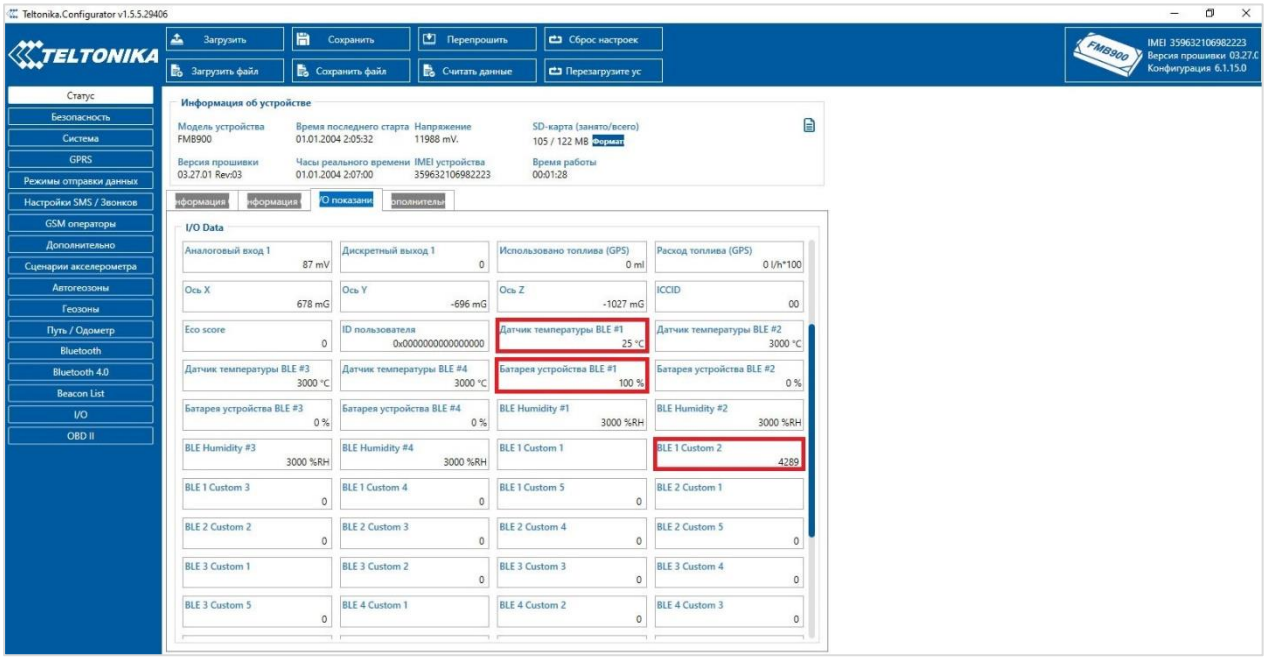

Teltonika.Configurator v1.5.5.29406
TELTONIKA
Загрузить
Сохранить
Перепрошить
Сброс настроек
Загрузить файл
Сохранить файл
Считать данные
Перезагрузите ус
FMB900
IMEI 359632106982223
Версия прошивки 03.27.0
Конфигурация 6.1.15.0
Статус
Безопасность
Система
GPRS
Режимы отправки данных
Настройки SMS / Звонков
GSM операторы
Дополнительно
Сценарии акселерометра
Автогеозоны
Геозоны
Путь / Одометр
Bluetooth
Bluetooth 4.0
Beacon List
I/O
OBD II
Информация об устройстве
Модель устройства
FMB900
Время последнего старта
01.01.2004 2:05:32
Напряжение
11988 mV.
SD-карта (занято/всего)
105 / 122 MB
Формат
Версия прошивки
03.27.01 Rev:03
Часы реального времени
01.01.2004 2:07:00
IMEI устройства
359632106982223
Время работы
00:01:28
Информация
Информация
I/O показани
ополнитель
I/O Data
Аналоговый вход 1
87 mV
Дискретный выход 1
Использовано топлива (GPS)
0 ml
Расход топлива (GPS)
0 l/h*100
Ось X
678 mG
Ось Y
-696 mG
Ось Z
-1027 mG
ICCID
00
Eco score
ID пользователя
0x0000000000000000
Датчик температуры BLE #1
25 °C
Датчик температуры BLE #2
3000 °C
Датчик температуры BLE #3
3000 °C
Датчик температуры BLE #4
3000 °C
Батарея устройства BLE #1
100 %
Батарея устройства BLE #2
0 %
Батарея устройства BLE #3
0 %
Батарея устройства BLE #4
0 %
BLE Humidity #1
3000 %RH
BLE Humidity #2
3000 %RH
BLE Humidity #3
3000 %RH
BLE Humidity #4
3000 %RH
BLE 1 Custom 1
BLE 1 Custom 2
4289
BLE 1 Custom 3
BLE 1 Custom 4
BLE 1 Custom 5
BLE 2 Custom 1
BLE 2 Custom 2
BLE 2 Custom 3
BLE 2 Custom 4
BLE 2 Custom 5
BLE 3 Custom 1
BLE 3 Custom 2
BLE 3 Custom 3
BLE 3 Custom 4
BLE 3 Custom 5
BLE 4 Custom 1
BLE 4 Custom 2
BLE 4 Custom 3

Fig. 4

Appendix 2. Message Format (Protocol 1)

Field name	Description	Example	Offset, byte	Length, byte
48-bit unique identifier (UID)	constant	0x795FB8622EB6	7	6
Type	constant	0x5A (dec 90)	13	1
Serial number	constant	0x00001B (dec 27)	14	3
Message number	Counter of the number of messages transmitted	0x0003CA36 (dec 248374)	17	4
The value of the detecto	Current average value of the detector	0x3602 (dec 13826)	21	2
Fuel volume, l. (0.01l/bit	Current fuel volume. Resolution: 0.01 liters per bit.	0x00001DE3 (dec 7651, vol 76.51)	23	4
% of fuel from a full tank (0.01 l / bit)	Current % of tank volume. Resolution: 0.01% per bit.	0x0EF1 (dec 3825, % 38.25)	27	2
Temperature, °C (1 °C/bit)	Current temperature. Resolution 1°C per bit. Offset -40	0x45 (dec 69, t +29 °C)	29	1
Battery charge (1%/bit)	Current battery charge Resolution: 1% per bit.	0x64 (dec 100)	30	1

For data row
0x0201061BFFFFFF795FB8622EB65A00001B0003CA36360200001DE30EF14564

Message Format (Protocol 2)

Field name	Description	Example	Offset, byte	Length, byte
40-bit unique identifier (UID)	constant	0x3F36B4FDBE	7	5
Type	constant	0x5A (dec 90)	12	1
Serial number	constant	0x00001B (dec 27)	13	3
Message number	Counter of the number of messages transmitted	0x0003CA36 (dec 248374)	16	4
Status*	status flags	0x00 (dec 0)	20	1
The value of the detector	Current average value of the detector	0x3602 (dec 13826)	21	2
Fuel volume, l. (0.01l/bit)	Current fuel volume. Resolution: 0.01 liters per bit.	0x00001DE3 (dec 7651, vol 76.51)	23	4
% fuel from a full tank (0.01%/bit)	Current % of tank volume. Resolution: 0.01% per bit.	0x0EF1 (dec 3825, % 38.25)	27	2
Temperature, °C (1 °C/bit)	Current temperature. Resolution 1°C per bit. Offset -40	0x45 (dec 69, t +29 °C)	29	1
Battery charge (1%/bit)	Current battery charge. Resolution: 1% per bit	0x64 (dec 100)	30	1

For data row
0x0201061BFFFFFF3F36B4FDBE5A00001B0003CA3600360200001DE30EF14564

Description of the "status" parameter.

Description	Bit number.
The sensor is blocked \ ***Sensor locked***	**0**
Calibration error empty	**1**
Full calibration error	**2**
Broken electrode	**3**
Reserve	**4-7**

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