Advanced Configurator

User Manual
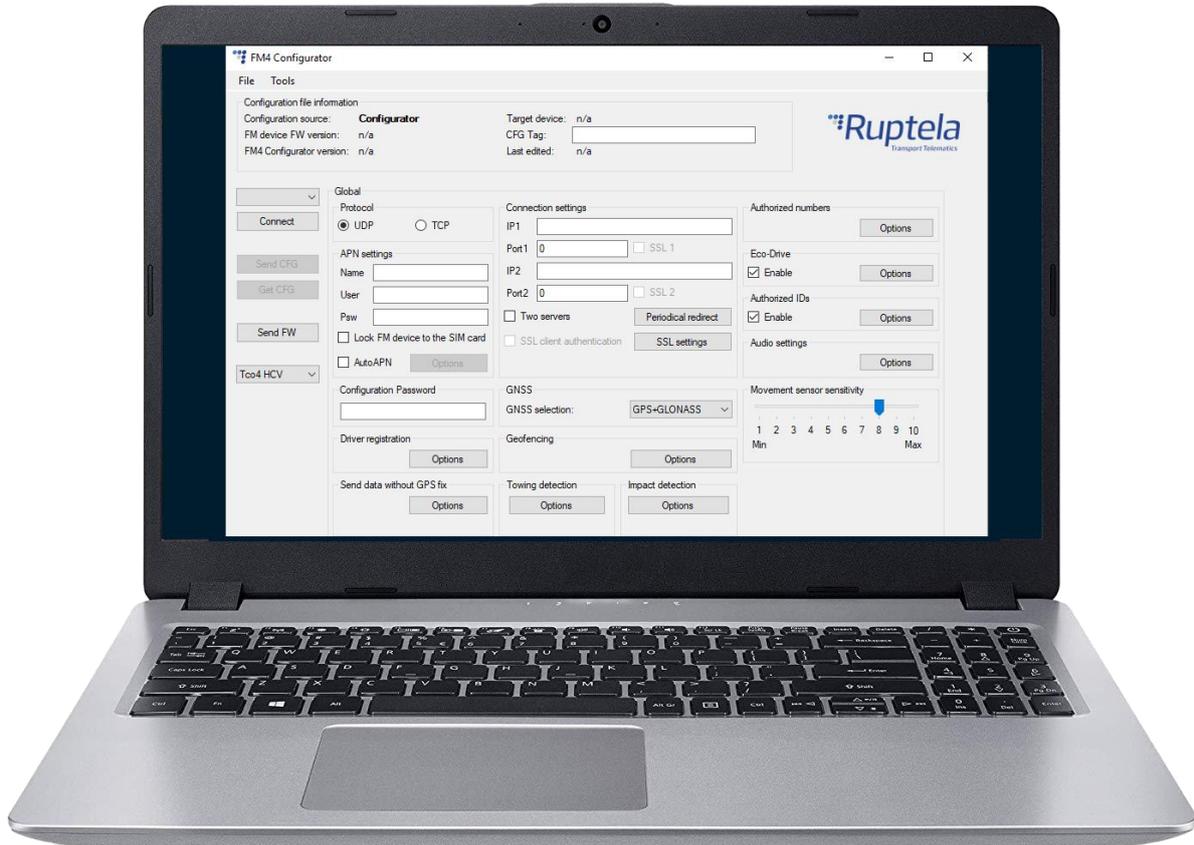
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1   Introduction

1.1   Purpose of This Document

The purpose of this user manual is to provide information about the advanced configurator. This user manual describes the main features of the advanced configurator and how to use it. Detailed descriptions of functionalities and peripheral devices can be found on our documentation website: doc.ruptela.lt.

1.2   Legal Information

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1.3   Document Application

The advanced configurator can be used with all 4th and 5th generation tracking devices and all computers with a Windows 7/8/10 operating system.

1.4   Contact Information

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1.5   Document Changelog

Version	Date	Modification
1.0	2019-10-10	Initial draft.
1.1	2019-10-22	Updated: GNSS.
1.2	2019-10-28	Updated: GNSS.
1.3	2019-11-08	Added: Auto-geofencing.
1.4	2019-12-03	Updated: Data Sending.
1.5	2019-12-18	Updated: GNSS.
1.6	2020-01-10	Updated: GNSS.
1.7	2020-02-21	New device: FM-Eco4 T. Updated: Launching procedure in About the Advanced Configurator.
1.8	2020-04-07	New device: Trace5. Added: Assisted GNSS. Updated: Accident Detection. Updated: SMS alerts.
1.9	2020-05-15	Updated: Assisted GNSS. Updated: Two Servers.
1.10	2020-06-08	Updated: Data sending.
1.11	2020-07-16	New devices: HCV5, LCV5, Pro5. Removed: New CFG Wizard. Added: GNSS Antenna Selection. Added: Wireless. Updated: Data sending. Updated: Cellular Network Settings.
1.12	2020-08-05	Updated: Configuration Files Extensions. Updated: Serial Port Interfaces.
1.13	2020-08-10	Updated: Data sending. Updated: Wireless.
1.14	2020-09-25	Added: Trip Type Detection. Added: GSM/LTE Cat M1/NB-IoT Network. Updated: Configuration File Extensions. Updated: Manufacturer Specific OBD Data Reading. Updated: Updating Firmware Manually. Updated: Connected Device Information.
1.15	2020-10-16	Added: Updating Firmware using .fwp Pack Added: Menu toolbar: Help. Updated: Firmware File Extensions. Updated: Menu toolbar: Tools. Updated: Wireless.
1.16	2020-11-06	Updated: Data collection. Updated: Identification String.

1.17	2020-11-27	Added: DNS Settings.
		Added: Advanced CAN Options.
		Updated: Connection Settings.
		Updated: Identification String.
		Updated: Additional CAN Mode Parameters.
		Updated: Manufacturer Specific OBD Data Reading.
		Updated: Light Commercial Vehicle Configuration
1.18	2020-12-18	Updated: GSM/UMTS/LTE Cat M1 Network.
		Updated: GNSS Antenna Selection.
		Updated: Updating the Firmware.
1.19	2021-02-12	Updated: Legal Information.
		Updated: Additional CAN Mode Parameters.
		Updated: Prerequisites.
1.20	2021-04-23	Added: DMP Settings.
		Updated: Configuration File Extensions.
		Updated: Additional CAN Mode Parameters.
		Updated: Firmware File Extensions.
1.21	2021-05-07	Added: Device Type and Model Selection.
		Updated: Advanced Configurator Overview.
		Updated: Connected Device Information.
		Updated: Configuring the FM Device for the First Time.
		Updated: Serial Port Interfaces.

1.6   Safety Information

The following information is provided to ensure safe operation of the device. Please read it carefully before you start using the device!

⚠ The configuration must be performed using a 2nd safety class computer (with an autonomic power supply).

⚠ For configuration use cables that were purchased from Ruptela. Ruptela is not responsible for any harm or damage caused while using the wrong cables.

🗑 This crossed-out wheelie bin symbol means that waste equipment should not be disposed of with your other household waste. The product must be taken to separate collection points at the product's end-of-life.

1.7   Notations

The following notations are used in this document to highlight important information:

Bold text

Used to indicate user interface elements or for emphasis.

Italic text

Used to indicate items that belong to a list and can be selected.

Note

ℹ	Used to highlight important information or special conditions.

Caution

⚠	Used to mark actions that require caution when handling the product.

Warning

⊘	Used to mark actions that may cause irreversible damage if performed incorrectly.

Tip

✔	Suggestions on how to proceed.

Availability table

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	⊘	⊘	⊘

Used to mark which devices support a given functionality. 4th generation device names are written without the FM prefix.

1.8   Acronyms and Abbreviations

AIN – Analog Input

APN – Access Point Name

ATH – Anti-Theft Hardware

CAN – Controller Area Network

CFG – Configuration File

DIN – Digital Input

DNS – Domain Name System

DOUT – Digital Output

DTC – Diagnostic Trouble Code

FM – Fleet Management

FMS – Fleet Management System

FW – Firmware

ICCID – Integrated Circuit Card Identifier

IO – Input/Output

GLONASS – GLObal NAvigation Satellite System

GNSS – Global Navigation Satellite System

GPRS – General Packet Radio Service

GPS – Global Positioning System

GSM – Global System for Mobile Communications (2G)

LTE – Long-Term Evolution

OCSP – Online Certificate Status Protocol

OBD – On-board Diagnostics

RPM – Revolutions per Minute

SIM – Subscriber Identity Module

SMS – Short Message Service

SSL – Secure Sockets Layer

TCP – Transmission Control Protocol

UDP – User Datagram Protocol

UMTS – Universal Mobile Telecommunications Systems (3G)

USB – Universal Serial Bus

VCOM – Virtual Communication Port

1.9   References

Device Center: https://doc.ruptela.lt/display/AB/Device+Center

Virtual COM Port drivers: https://doc.ruptela.lt/display/AB/Drivers+and+utilities

Microsoft Framework: https://www.microsoft.com/en-us/download/details.aspx?id=53344

User manuals: https://doc.ruptela.lt/display/AB/Tracking+devices

2 Prerequisites

Before configuring the device, install the following:

- The latest version of the Device Center
- The latest version of the Microsoft Framework
- Virtual COM Port drivers

> ℹ️ Only Windows 7/8/10 operating systems are supported.

> ℹ️ We recommend using a resolution of at least 1440x900 for optimal viewing.
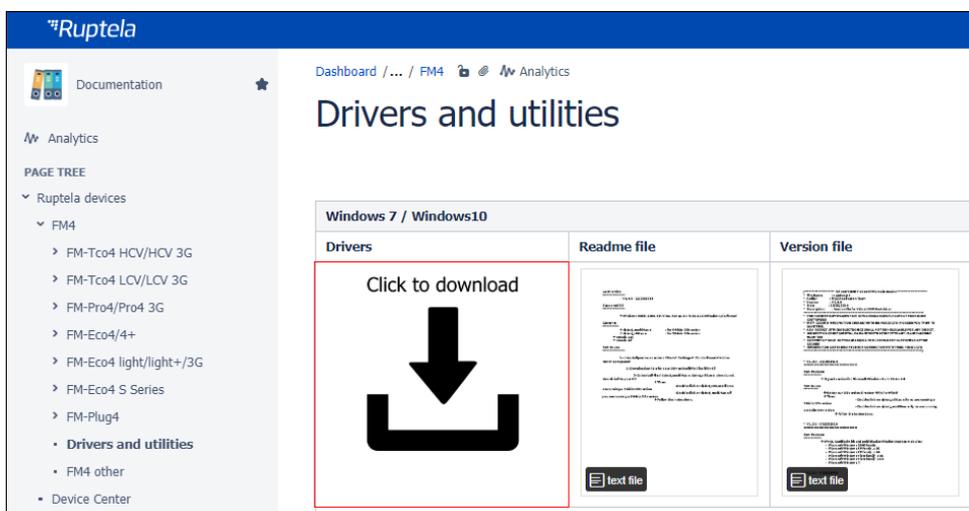
Follow these steps to install the VCOM drivers:

1. Uninstall any previous VCOM drivers:

   Windows 7: **Start** -> **Settings** -> **Control Panel** -> **Add or remove programs**

   Windows 8: **Start** -> **Settings** -> **Control Panel** -> **Programs** -> **Programs and Features**

   Windows 10: **Start** -> **Settings** -> **Apps** -> **Apps & features**

2. Extract the downloaded driver archive to your desired location. Launch the appropriate installation file for your operating system:

   32-bit operating system: launch **dpinst_x86.exe**

   64-bit operating system: launch **dpinst_amd64.exe**

3. Follow the instructions in the installation wizard. Once it is finished, the drivers are installed and operational.

3 About the Advanced Configurator

The advanced configurator is used to configure Ruptela tracking devices and all their functionalities, allowing you to find the best solution for your needs. The advanced configurator allows you to do the following:

- Make a new configuration file

- Edit an existing configuration file

- Send a configuration file to your device

- Load an existing configuration file from your device

- Modify all device functionalities

- Update the device firmware

3.1 Launching the Advanced Configurator

The advanced configurator is contained within the Device Center application. Extract the downloaded Device Center archive to your desired location. Launch **DeviceCenter.exe**.
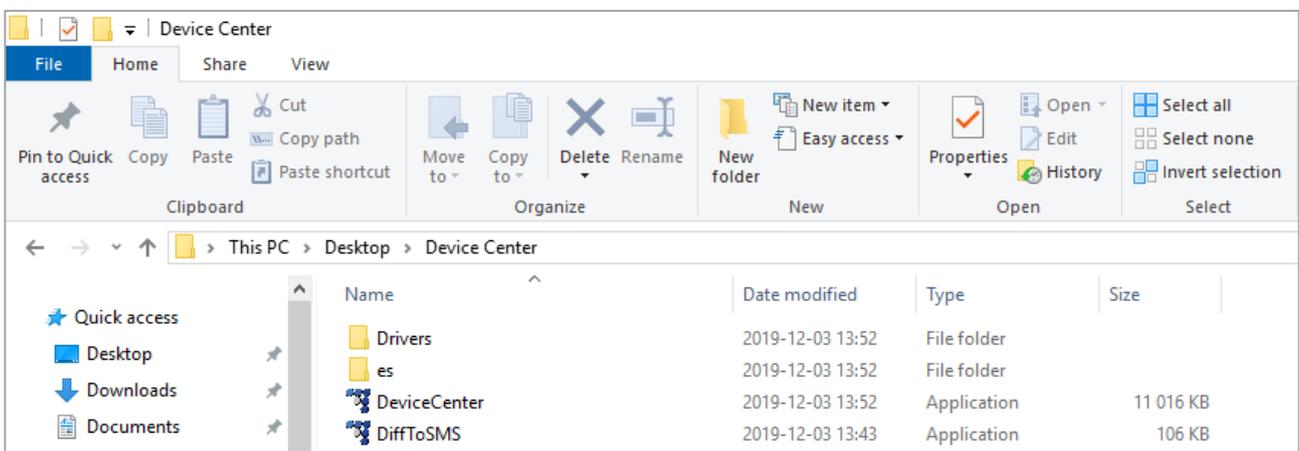
Switch to the advanced configurator by clicking **Advanced mode** in the top bar.

3.2 Configuration File Extensions

HCV5:   **.ft5c**

LCV5:   **.fl5c**

Pro5:   **.fp5c**

Trace5:   **.fa5c**

Trace5 NA: **.fb5c**

FM-Tco4 HCV: **.ft4c**

FM-Tco4 LCV: **.fl4c**

FM-Pro4:   **.fp4c**

FM-Eco4:   **.fe4c**

FM-Eco4 S: **.fk4c**

FM-Eco4 T: **.fk4c**

FM-Eco4 RS T: **.fj4c**

FM-Plug4:   **.fo4c**

3.3　Advanced Configurator Overview

The main device configurator window has the following main sections:

1. Menu toolbar

2. Configuration file information

3. Interaction with the device – used to load/send configuration and firmware files

4. Connected device information

5. Configuration settings
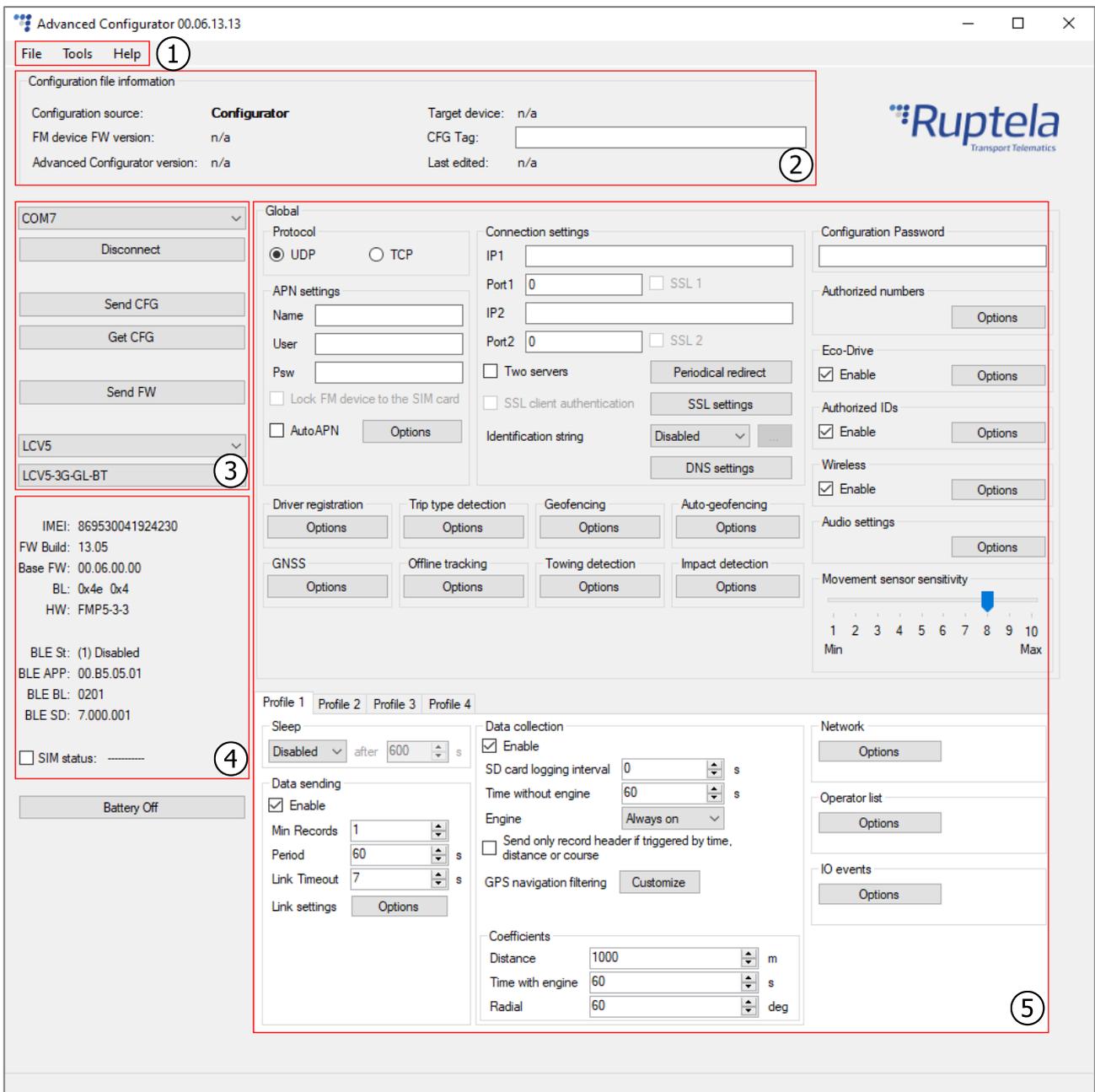
3.3.1 Menu toolbar: File

The menu toolbar contains two drop-down lists – **File** and **Tools**. When **File** is clicked, the following configuration file actions are displayed in the drop-down list:

New CFG	Resets the current configuration and begins the creation of a new configuration.
Open default CFG	Loads a default configuration with predefined values. More information: Configure the FM device for the First Time
Save CFG	Saves the configuration file.
Open CFG	Loads a preset configuration file.
Save DIFF CFG	Creates a DIFF file which is used to change only one or a few certain parameters without a need to upload the full configuration to the device. It is useful when updating devices over-the-air.
Open DIFF CFG	Opens a saved DIFF configuration file.
Generate SMS	Generates an SMS command to configure the FM device remotely. More information: Device Configuration via SMS
Exit	Closes the advanced configurator.

⚠ **Save DIFF CFG** will only save changes made to the initial configuration (a loaded preset configuration).

⚠ If you click **Exit**, the configurator will close without any prior confirmation and the configuration will not be saved.
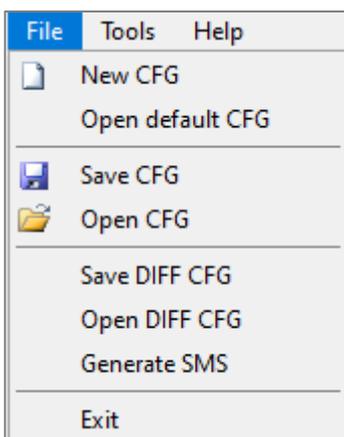
3.3.2 Menu toolbar: Tools

When the **Tools** menu is opened, the following options are displayed in the drop-down list:

Language	Select the language. English and Russian are available.
Diagnostic tool	Only applicable for the 4th generation devices. Opens a window where you can troubleshoot your tracking device.
Live IO data	Opens a window where all enabled inputs and outputs and their current parameter values are listed.
Set Virtual odometer	Opens a window where you can set a new value for the virtual odometer (in meters).
Sensor marker	Opens a window where you can mark your temperature and humidity sensors.
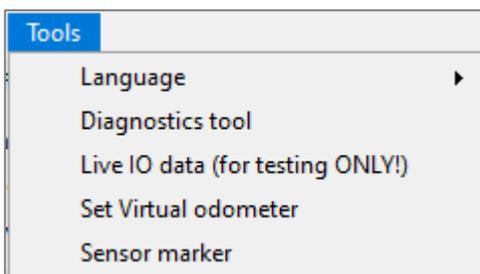
3.3.3 Menu toolbar: Help

If you need some help with the advanced configurator, click **Help** to open the latest user manual.
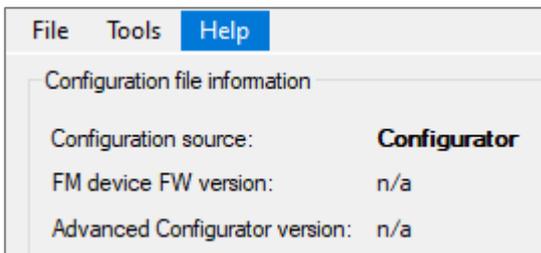
3.3.4 Configuration File Information

The configurator displays additional information about the loaded configuration file. The following information will be displayed at the top of the configurator once the configuration is loaded:

Configuration source	From where the configuration was loaded: • **Configurator** – the configuration was loaded from a file • **Device [IMEI]** – the configuration was loaded from the device
FM device FW version	The current device firmware version. Displayed only if the configuration was loaded from the device.
Advanced Configurator version	The configurator version on which the currently loaded configuration was made.
Target device	The FM device model for which this configuration was created or from which device it was loaded.
CFG Tag	An input field where additional information about the configuration file can be saved. The maximum length is 32 symbols. Only ASCII characters are allowed.
Last edited	The exact time and date when the configuration was last edited.

> **ⓘ** If the configuration was loaded from the device and the **Last edited** value is *2000.01.01 00:00:00*, the device cannot get time from any source at this moment.

If any changes were made to the currently loaded configuration, a small "*" symbol will appear next to the name of the configuration.

3.3.5 Connected Device Information

The configurator displays additional information about the connected tracking device on the left of the main configurator window. The following information will be displayed:

IMEI	The unique IMEI code of the device.
FW Build	The build of the firmware version (5th generation devices only).
FW	The current firmware version of the device.
BL	The bootloader version.
HW	The hardware version of the device.
SIM status	Displays the current status of the inserted SIM card and enables the **Lock FM device to the SIM card** functionality. The proper **SIM status** will only be shown if an external power supply is connected. Otherwise, *Error* will be displayed. Possible values: • *Ready* – the PIN code is acknowledged, or the PIN code check is disabled. The GSM/GPRS modem can operate normally. • *Error* – represents a wide range of possible SIM card issues. Common reason – an old FW version which does not support the SIM card. • *Unknown* – the communication between the device and the GSM/GPRS modem has failed, therefore, the SIM status is unknown. • *PIN Request* – the SIM card requests a PIN code (or the provided PIN code is incorrect). • *PUK Request* – the SIM card requests a PUK code. • *Locked* – the FM device is locked to a different SIM Card. • *Not inserted* – no SIM card is inserted.
Only for 5th generation devices with Bluetooth	
BLE St	The Bluetooth status. *0* – disabled, *1* – enabled, *2* – not connected, *3* – not supported, *4* – bad version, *5* – no power.
BLE APP	The current Bluetooth firmware version.
BLE BL	The current Bluetooth bootloader version.
BLE SD	The current Bluetooth SoftDevice version.

```
       IMEI: 869530041924230
   FW Build: 13.05
    Base FW: 00.06.00.00
         BL: 0x4e  0x4
         HW: FMP5-3-3

     BLE St: (5) No power
    BLE APP: n/a
     BLE BL: n/a
     BLE SD: n/a

☐ SIM status:  ----------
```

If the external power supply is connected to the tracking device and a SIM card with a PIN code is inserted, you will have to enter the PIN code.

⚠️ If the **SIM status** checkbox is not enabled, the **Enter PIN** window will not appear when connecting to the FM device, meaning that you will not be able to access your device.

If the wrong PIN is entered three times in a row, the SIM card will be locked, requiring the PUK code, provided by the service operator. After PUK code verification, you will need to set a new PIN code.

⚠️ If the wrong PUK code is entered ten times in a row, the device will be permanently blocked, requiring a new SIM card.

3.3.6   Configuration Password

This functionality restricts access to the configuration. If entered, you will need to enter this password each time before saving or loading the configuration.

In the main window, locate the **Configuration password** section and enter the password.
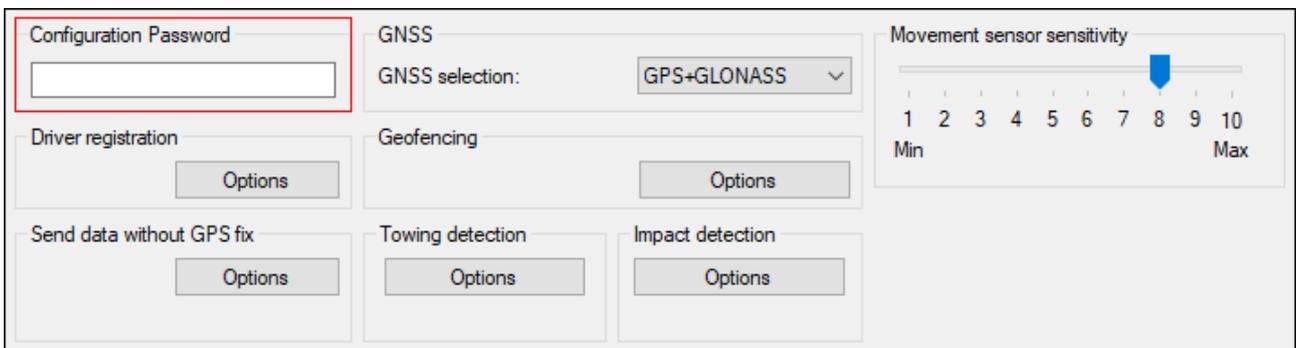
ℹ️ Over-the-air configuration updates ignore the configuration password.

🚫 Make sure to remember the password! If you forget the configuration password, the only way to reset it is to return the device to the manufacturer.

3.3.7 Device Type and Model Selection

The functionalities that are available for configuration depend on the device type and model.

When a device is connected, the type and model are selected automatically and only the available settings for the exact type/model combination are displayed. If the model could not be detected, it is set to *Unknown* and all settings available for the device type will be displayed.

Example: An LCV5 device with 3G and Bluetooth is connected. The type is set to *LCV5* and the model is set to *LCV5-3G-GL-BT*. LTE network and DMP settings are not displayed.

When no device is connected, you can manually select the device type and model in the drop-down selectors.

> ✔ If you do not know the exact model of the device, select *Unknown* in the version drop-down selector. All settings available for the device type will be displayed.

3.3.8 Configuring the FM Device for the First Time

The purpose of this chapter is to help configure the FM device for the first time in order to send basic data to the server.

The **Default Configuration** is a present configuration file which makes the configuration process significantly easier and shorter. Follow these steps to load the default configuration file:

1. Select your device type from the drop-down list.

2. Click the **File** tab, located at the top left side of the configurator, and select **Open default CFG**.
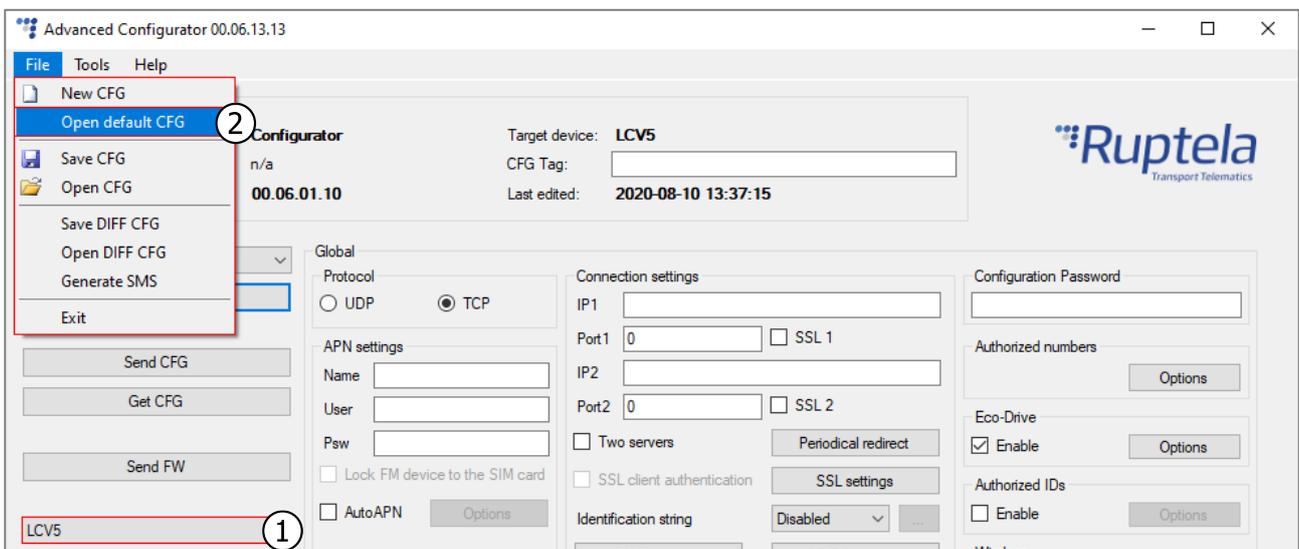
Default parameters will be loaded. However, you will need to enter a few other entries on your own to establish the connection and complete the configuration:

1. Select which protocol to use:

   - **UDP** – Uses less data but is less reliable. The default setting.

   - **TCP** – Uses more data but is more reliable.

2. Fill the **Connection settings**. Enter an IP address (255.255.255.255 format) or a domain name (up to 40 characters) and a **Port** where the device will send collected data. No default server is provided.

3. Fill the **APN settings**. This includes the APN name, username and password (if they are needed). No default APN is provided.

4. Select the **COM port** through which the FM device is connected to the computer.

5. Click **Connect**.

6. Click **Send CFG** to upload the configuration to your device.

Now the device is configured to send data to the specified server. Standard IO parameters are enabled (loaded with the configuration file). You can log in to your tracking platform to see whether the device is sending data.

> ✔ The APN settings (name, login and password) are provided by your mobile network operator.

Proceed to next chapters for information how to configure the other functionalities.

4 Device Communication

This part of the configuration describes how to configure the device to establish the communication between your fleet management system platform and the FM device. This chapter contains the following configuration settings:

1. Communication protocol

2. Access point settings

3. Connection to the server settings

4. Device positioning network settings

5. Sending data without GPS fix

6. Identification string

4.1 Communication Protocol

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Select which internet protocol you wish to use: **UDP** or **TCP**.

UDP	Uses less data but is less reliable. UDP does not check for lost packets or their order. The default setting.
TCP	Uses more data but is more reliable. TCP checks that all packets are received and if needed, resends the missing ones and reorders them.

4.2 APN Settings

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

APN settings are needed to connect to the internet (GPRS). They must be provided by your SIM card provider.

Name	The APN name. This parameter is mandatory and depends on the mobile network operator.
User	The APN username. This parameter is optional.
Password	The APN password. This parameter is optional.
Lock FM device to the SIM card	If enabled, the SIM card's ICCID number will be locked to the specific device. The device will not use another SIM card to connect to the network. More information: Lock FM device to the SIM card
AutoAPN	If enabled, the APN settings will automatically be selected from a list of predefined APNs and the settings fields will be greyed out. More information: AutoAPN

4.2.1 Lock FM Device to the SIM Card

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	⊘

Purpose

Lock the FM device to the SIM card to prevent using other SIM cards on the device. The SIM card's ICCID (a unique SIM card serial number) will be locked to the device.

How it works

If the locked SIM card is replaced (the device detects a different ICCID), device will not use that SIM card to connect to the mobile network.

Activation

1. Tick the **SIM status** checkbox in the connected device information bar located at the bottom of the configurator window.

2. Enable the **Lock FM device to the SIM card** functionality in the **APN settings** section.

3. Click the **Send CFG** to send configuration to the device and activate the functionality.

4.2.2 AutoAPN

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	⊘	✔	⊘

Purpose

APN settings are needed to establish an internet connection. Without the APN settings, the device will not send any data. These settings are provided by your mobile network provider.

How it works

When activated, the APN will be automatically selected from a list of predefined APNs and the setting fields will be greyed out. The selection is made according to the SIM card's ICCID. If there is no suitable APN detected, the first APN in the list will be used. If there is no GPRS connectivity, the device will attempt to connect to the next APN in the list.

Activation

1. Tick the **AutoAPN** checkbox in the **APN settings** section.

2. Click the **Options** button to open the **AutoAPN Settings** window.

3. Enter at least one entry of APN settings. Each entry contains the following input fields:

MII	Major Industry Identifier, the value is pre-set and is always 89.
CC	Country Code (for example, "370")
II	Issuer Identifier
APN name	The name of the APN

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4.3   Connection settings

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Configure connection settings to connect to the fleet management platform tracking server.

⚠ **The device will not send any data without IP and port settings.**

IP	The IP address of the server. You may enter a numerical address or domain name (up to 40 characters). **IP2** is optional is and used for a backup server, which is used when the device is unable to connect to the first server. Default value: *None*
Port	The port of the server. **Port2** is optional and is used for a backup server, which is used when the device is unable to connect to the first server. Default value: 0
SSL1/2	Used to establish an encrypted connection between the server and the client. More information: SSL Authentication chapter. Default value: *Disabled*
Two servers	Used to repeatedly transmit the same data to two servers. More information: Two servers chapter. Default value: *Disabled*
Periodical redirect	Used to periodically redirect the FM device to a specified server to initiate automatic updates when 3rd party tracking software is used. More information: Periodical Redirect chapter.
SSL client authentication	Used to enable SSL authentication on the client-side. Default value: *Disabled, Inactive*
SSL settings	Used to configure SSL authentication settings for the server and the client.
Identification string	Allows defining the identification packet which is transferred to the server. More information: Identification String chapter.
DNS Settings	The DNS address of the server. You can change the servers default DNS address, given by your network provider. More information: DNS Settings chapter.

> ℹ️ UDP and TCP protocols may have different ports. Make sure you select the correct protocol and enter the correct ports.

4.3.1 Two Servers

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Purpose

Used to repeatedly transmit the same data to two servers.

How it works

When activated, the same data is repeatedly transmitted to another server with **IP2** and **Port2**, unless a timeout occurs. **IP1** is the primary server, it sends acknowledgment (ACK) packets when it receives records. After the ACK packet is received, the record is considered as successfully transmitted to the server and it is deleted from the device memory.

Only records are sent to the server with **IP2**. Other data packets, such as Transparent Channel, Tachograph, SD card, Garmin will not be sent to the second server.

Scenarios when data cannot be sent to the **IP2** server:

- If the connection to the **IP1** server is not established, the device does not connect to the **IP2** server as well.

- If the connection to the **IP1** server is established, but the **IP2** server is unavailable after an ACK packet from **IP1** is received, the data will be deleted from the device memory. This may result in data loss in the **IP2** server.

> ⚠️ The **Two servers** mode doubles the amount of data that is being sent and may incur additional costs.

Activation

1. Enter **IP1** and **Port1** of the first server.

2. Enter **IP2** and **Port2** of the second server.

3. Tick the **Two servers** checkbox to enable the functionality.

4.3.2 Periodical Redirect

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Purpose

Used to periodically redirect the FM device's sent data to a specified server to initiate automatic configuration/firmware updates when using 3rd party tracking software.

How it works

Once the **Period** timer passes, the device checks the following conditions:

- If there are any unsent records in device memory

- If the GSM signal is weak (the GSM level is lower than 9 out of 32)

- If the power supply voltage is lower than 8 volts (power supply voltage status is 0)

- If the device is in a critical process (for example, firmware update)

If at least one condition is true, the device waits until all conditions are false. After that, the device connects to the configured server. Then the device initiates updates and closes the connection. The **Period** timer is then reset.

Activation

Click the **Periodical redirect** button in the **Connection settings** section. The **Periodical redirect** window will open. Configure the following settings:

IP	Enter an IP of the server.
	Default value: 92.62.134.34 (TrustTrack server)
Port	Enter a port of the server.
	Default value: 9015 (TrustTrack server)
Period	Set timer in hours.
	Default value: 0 (disabled)
	Maximum value: 168 h (7 days)
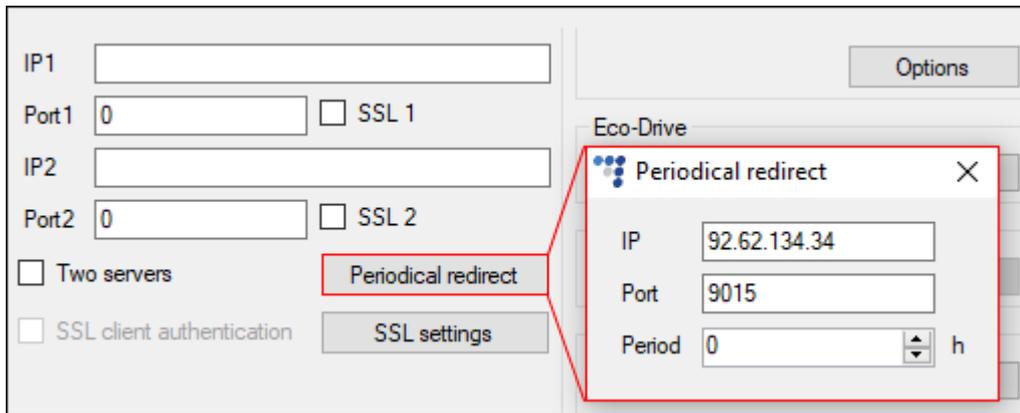
4.3.3 SSL Authentication

✔ Detailed functionality description: SSL Authentication.

5ᵗʰ Generation Devices				4ᵗʰ Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	⊘	Eco4 T and RS T only	⊘

Purpose

SSL (Secure Sockets Layer) is a security technology used to establish encrypted connections between server and client, as well as authenticating the identity of the server/client. All transmitted data is encrypted.

⚠ The SSL authentication functionality increases data consumption and may incur additional costs.

How it works

An **SSL certificate** is required to create an SSL connection. The **SSL certificate** is a file installed on the server-side. An additional certificate can be installed on the client-side for extra security.

> ⚠ If *econnect* or *connect* SMS commands are used along with SSL, the device will **disable** SSL for that connection. To ensure that no unauthorized device sends SMS commands, it is highly recommended to use the authorized numbers functionality, described in the Authorized Numbers chapter.

> ⚠ If the functionality is configured incorrectly (e.g., wrong certificates were uploaded), the device will not send any data to the server. The only way to restore data transmission is to reconfigure the device.

Activation

> ℹ To activate the functionality, an external power supply must be connected to the device. It is needed to start up the GSM module, where the SSL certificate is stored.

1. Enable the **TCP** protocol in the **Protocol** section.

2. Tick the **SSL [1/2]** checkbox to enable the SSL functionality for the specific server.
   A pop-up warning window will always appear, informing that if SSL is enabled without uploading the certificates, the device will remain unprotected.

3. *Optional*. Tick the **SSL client authentication** checkbox to enable SSL authentication on the client-side. To activate, upload a client certificate and private key in **SSL settings**.

4. Click the **SSL settings** button. The **SSL Settings** window will open.

5. Configure **SSL settings** according to your needs. The following actions can be taken:

Load	Used to upload an appropriate certificate for the following certificate types: • Server 1/Server2 CA • Client certificate • Private key The files cannot be larger than 2025 bytes. **Status** and **CRC** columns are displayed for each certificate for additional information.
OCSP	A checkbox used to enable the **OCSP** validation for that server. OCSP validation is performed after device boot and periodically every 4 hours. Currently unavailable for Trace5 devices.
Refresh status	Click the button to update the status of all files. Possible values: • *Uploaded* • *Empty* • *Unknown*
Remove all certificates	Deletes all certificates and key files stored in the FM device. The statuses will be updated automatically.
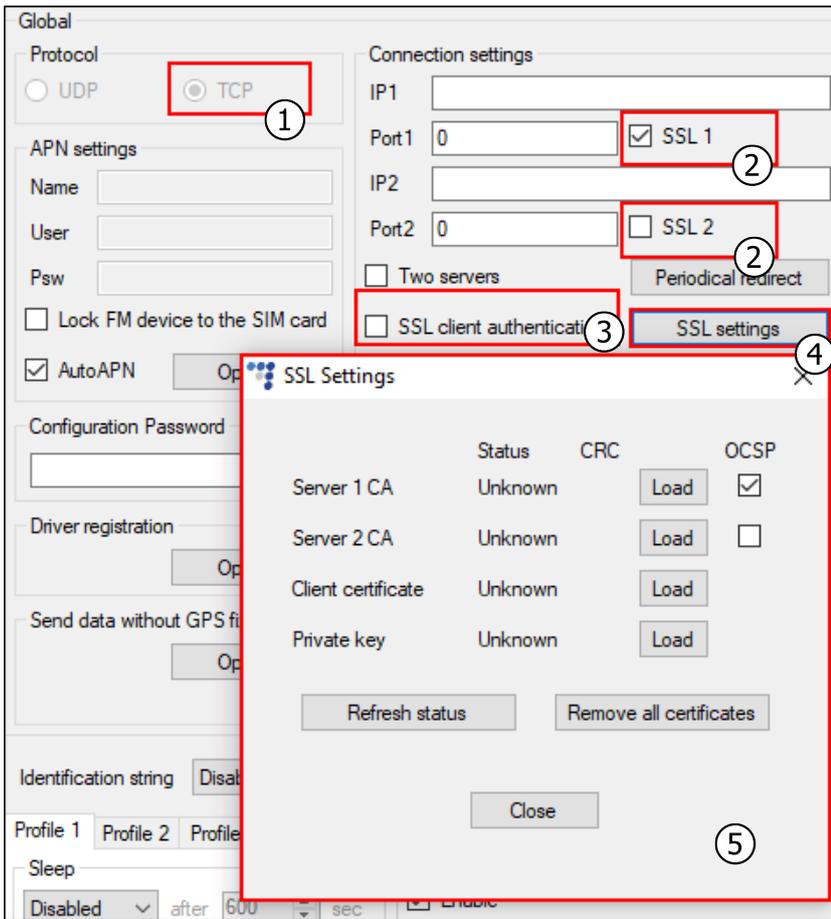
⚠️ OCSP validation will not be performed if **Two servers** mode is enabled.

4.3.4 Identification String

✔️ A full functionality description: [Identification string](#).

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️

Purpose:

The identification string functionality allows defining the identification packet which is transferred to the server. After the tracking device sends the identification packet, it begins data transfer.

⚠️ If the identification string feature is enabled, the transparent channel functionality cannot be used and vice versa.

This functionality has three modes:

Identification string	1. *Disabled*

Disabled
The functionality is disabled.

2. *Static*
If enabled, the following parameters will be included in the identification packet (unavailable for HCV5, LCV5, Pro5, Trace5 devices):
- Device type
- Firmware version
- IMSI code
- GSM operator code

Coefficients:
- Distance
- Time
- Angle

3. *Dynamic*
If enabled, click the **Customize** button to select what parameters to include into the identification string (unavailable for Eco4 and Plug4 devices):

Default value: *Disabled*
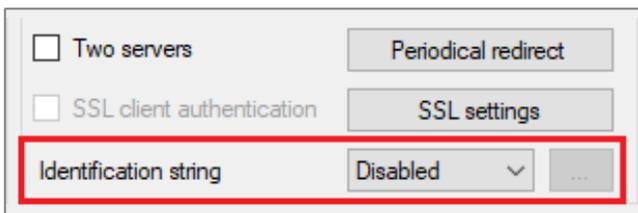
4.3.5 DNS Settings

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘

Purpose:

This functionality allows you to set the custom DNS server address. By default, the DNS address, provided by the network provider is used.

ℹ️   The address should be a string type and have a maximum length of 32 symbols.

Activation:

1. Click the **DNS Settings** button.

2. Enter the required DNS server address to the **DNS1** field.

3. Enter the required DNS server address to the **DNS2** field.
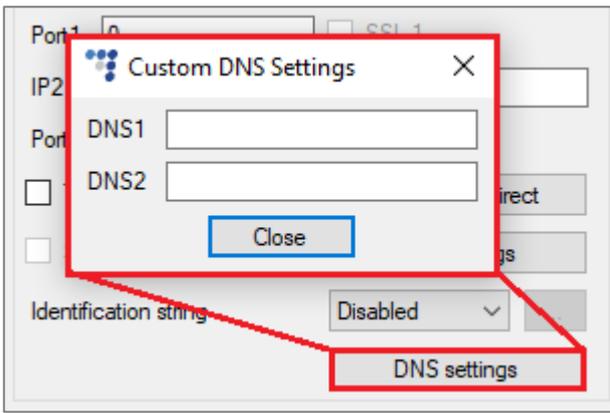
4.3.6 DMP Settings

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘

Purpose:

This functionality allows you to set how the device will connect to the device management platform (DMP) to receive remote firmware and/or configuration updates. The connection to the device management platform is enabled by default. Contact technical support to disable it.

Activation:

1. Click the **DMP Settings** button.

2. Set the **Connection frequency**.

Connection frequency	Set how often the device will connect to the device management platform. Possible values:
	• *Every 5 minutes*
	• *Twice a day*
	• *Custom* – allows setting the following:
	    ○ **Connection frequency** – set a custom connection frequency
	    ○ **Inactivity timeout** – set how long the device will wait for updates after connecting before closing the connection
	Default value: *Every 5 minutes*
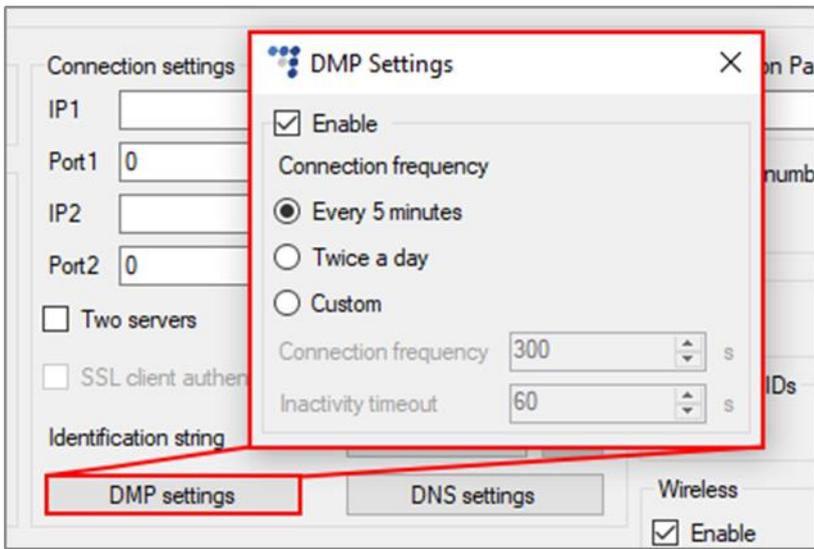
4.4 GNSS

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	⊘

Select which positioning systems you wish to use. Typically, the more systems are used, the more satellites are visible and the more accurate the position is. We recommend using all three positioning systems.

> ✔ If the vehicle is often near airports, governmental institutions or other places where signal spoofing might be used, you can disable the spoofed system to receive more accurate position data.

GNSS selection	Which positioning systems will be used. Available systems: • *GPS* • *GLONASS* • *GALILEO* Default value: All systems
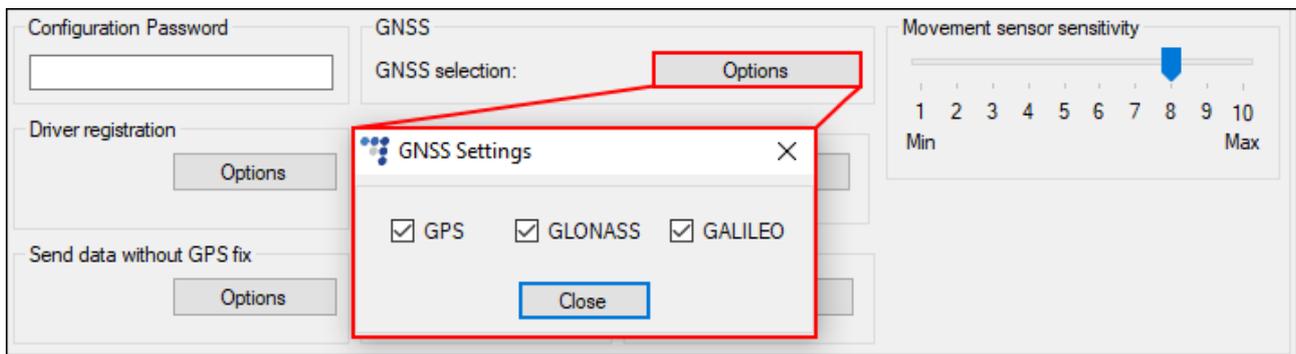
> ℹ Only devices manufactured since late 2017 support the Galileo positioning system.

> ℹ The Galileo positioning system cannot be used on its own as it is still in development and has not yet reached its full operational capacity.

> ℹ For FM-Plug4 devices, all 3 positioning systems are enabled in the background and this setting cannot be changed.

4.4.1 GNSS Antenna Selection

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘

In some devices with external and internal GNSS antennas, there is a possibility to automatically switch to the internal antenna if the external antenna is disconnected or damaged.

The functionality has three modes:

| Antenna selection | 1. *Auto*
Checks the external antenna status, and if the status is not OK, the tracking device instantly switches to the internal antenna and does not switch back to the external antenna until next start-up of the GNSS module.
This mode is selected by default.
2. *Internal*
If selected, the tracking device will always use the internal antenna.
3. *External*
If selected, the tracking device will use the external antenna and will not switch to the internal antenna despite the external antenna status. |
|---|---|
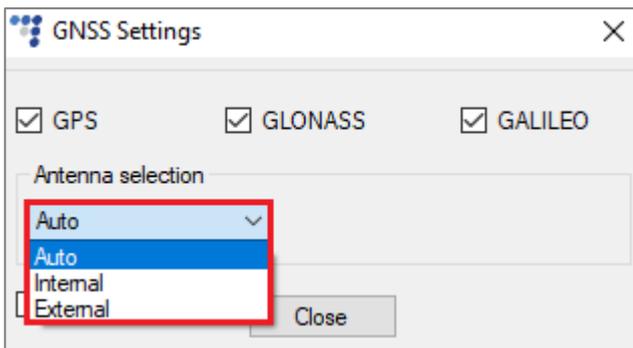
> ✔ You can check which antenna is used by enabling the *GNSS antenna used* parameter in the IO events.

4.4.2 Assisted GNSS

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	⊘	⊘	⊘	⊘	Eco4 T and RS T only	⊘

Enable the Assisted GNSS functionality to speed up the GNSS fix acquisition process. It can decrease GNSS fix acquisition down to 25 seconds in normal conditions, and down to 4-6 seconds if the device was previously in sleep mode with an active modem.

Assisted GNSS works by downloading additional data from U-blox servers. The data is downloaded after the device boots up or wakes up from sleep mode if there was no previous GNSS fix.

To enable the Assisted GNSS functionality, tick the **Assisted GNSS** checkbox.
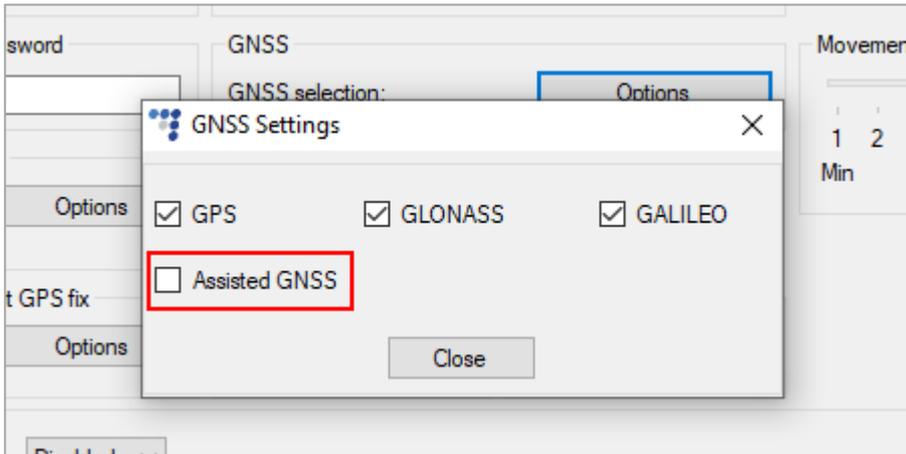
Assisted GNSS increases data consumption by about 5 kB for every assisted GNSS fix.

4.5 Send Data Without GPS Fix

✔ A full functionality description: [Send data without GPS fix](#).

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

This functionality covers two methods on how to send data without a GPS fix.

1. **Send data without GPS fix** – device cold-start often causes problems because it is not sending data, therefore the user is unable to see parameter values until a GPS fix is obtained. This functionality allows data sending even when there is no GPS fix.

2. **GSM tracking** – when the device loses GPS fix, there is no way to determine its location. The GSM tracking feature can be used to obtain an approximate location in densely urbanized areas, where the GNSS signal is not available. Unavailable for Trace5 devices.

Tick the checkbox to enable the functionality and configure its settings according to the full functionality description.
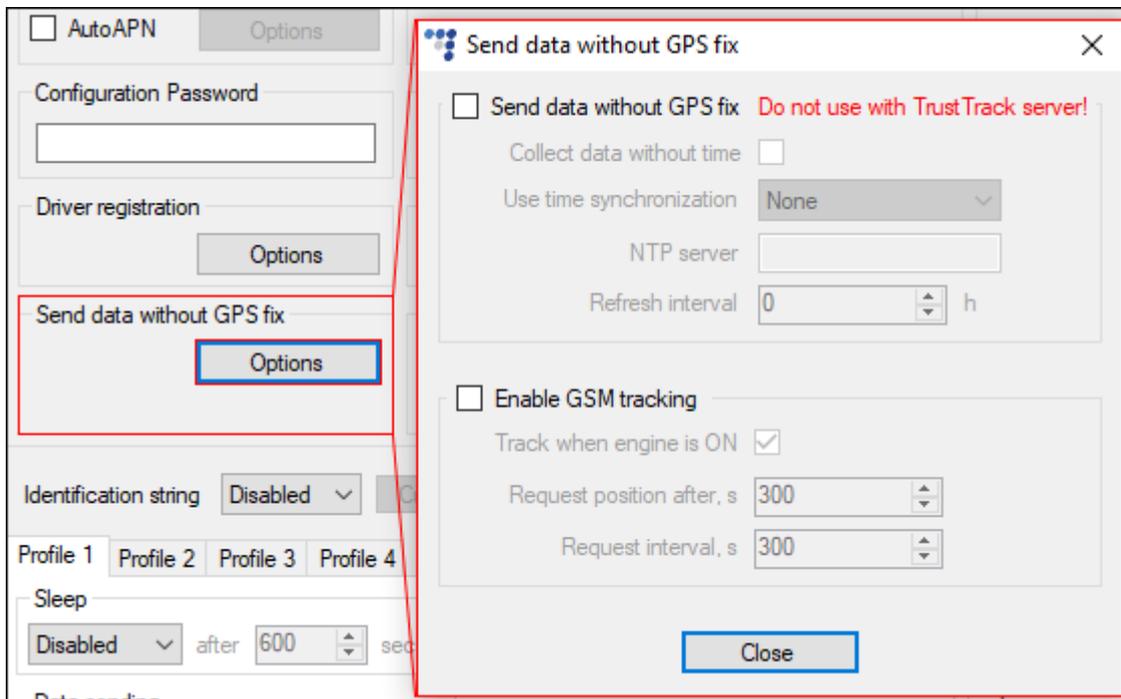
5 Driver Registration and Authorization

> ✔ A full functionality description: Driver Registration.

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	✔	✔	✔	✔	✔	✔	⊘

The driver registration functionality is used to authorize vehicle start, identify the driver and account working hours. In the **Driver registration** options, you can set one of our prepared driver registration types. RFID card reader and iButton registration sources are supported. It is possible to set FM device outputs to indicate registration information via a LED, a buzzer or even use it to block the vehicle ignition.

This part of the configuration summarizes how to configure driver registration and authorization settings. Refer to the driver registration manual for an in-depth description.

In short, the driver registration and authorization settings are configured as follows:

1. Configure peripheral devices connected to the FM device's DOUTs.

   - Locate the **IO events** section in the main window. Click the **Options** button. A new **IO settings** window will open.

   - Configure the peripherals in the **Digital outputs** section.

2. Configure the **Driver registration** settings.

   - Locate the **Driver registration** section in the main window. Click the **Options** button. A new **Registration settings** window will open.

   - Configure the **Driver registration** settings.

3. *Optional*. Configure the **Authorized IDs** functionality if you want to accept only authorized IDs.

   - Tick the **Enable** checkbox to enable the functionality in the **Authorized IDs** section.

   - Click the **Options** button. A new **Authorized IDs** window will open.

   - Enter peripheral (iButton, RFID or magnetic card) IDs, which are allowed to unblock or register.
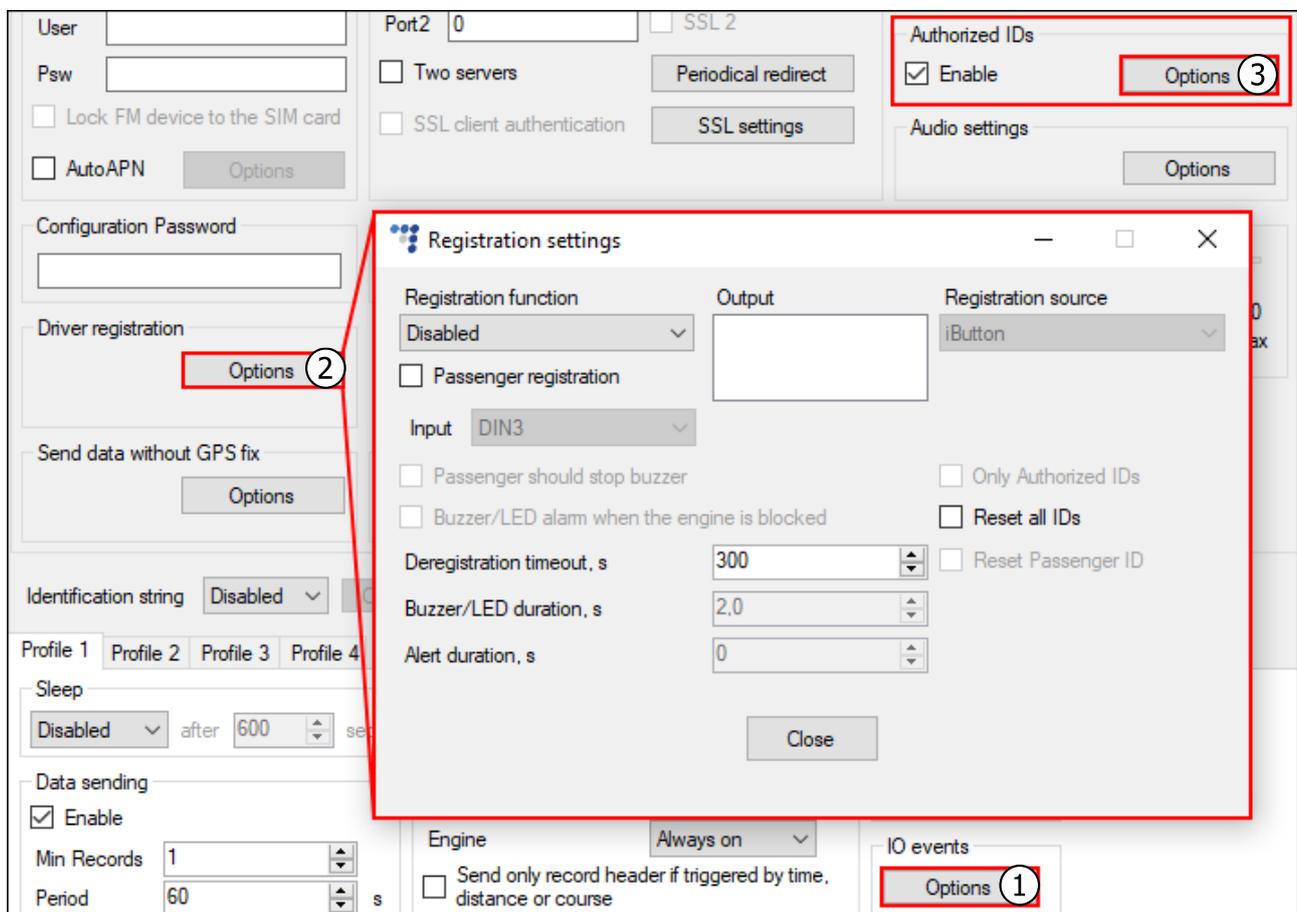
6   Trip Type Detection

✅   A full functionality description: Trip Type Detection

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	✔	✔	✔	✔	⊘	✔	⊘

The trip type detection functionality allows you to register a particular trip as private or business.

The following parameters can be configurated:

Trip type source	Select to which digital input a button/switch is connected. Default value: *DIN1*.
Trip type logic	Select, which logic will be used to define the trip type: • *Low: Private, High: Business* – if the switch is OFF, the trip is considered to be private. If the switch is ON, the trip is considered to be business. • *Low: Business: High: Private* – if the switch is OFF, the trip is considered to be business. If the switch is ON, the trip is considered to be private. • *Switch on pulse* – is used only with a push button. When a button is pressed, the trip type changes. **Default value** can be set to *Private* or *Business*. Additionally, set how the trip type changes when turning the ignition on: *Keep current type* – the trip type does not change. *Switch to 'Business'* – the trip type changes to business. *Switch to 'Private'* – the trip type changes to private. In this mode you can also enable the **Preserve trip type when ignition is switched off** checkbox, which allows you to save the last set trip type after switching off the ignition. When the ignition is turned on, the saved trip type is set again. Default value: *Private, Keep current type.* Default value: *Low: Private, High: Business*

7 Eco-Drive

✔ A full Eco-Drive configuration description: Eco-Drive configuration.

✔ A full Eco-Drive parameters description: Eco-Drive parameters description.

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

The purpose of this functionality is to cut transport operation costs by teaching drivers fuel-efficient and safe driving, thus, reducing damage to the vehicle and environment. This functionality is enabled by default.

8   Vehicle Movement

This part of the configuration describes how to configure various functionalities related to the vehicle movement. This chapter contains the following configuration settings:

1. Geofencing

2. Auto-geofencing

3. Towing detection

4. Impact detection

5. Movement sensor sensitivity
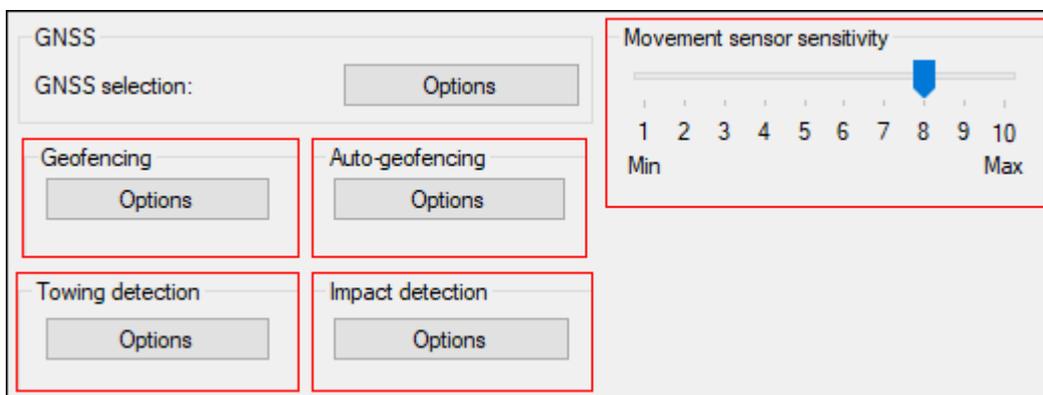
8.1   Geofencing

> ✔ A full functionality description: [Geofencing](#).

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	⊘

The geofencing functionality allows getting information and alerts about the vehicle in/out of geofences (specified areas). Two types of geofences are available:

- Circular

- Multipoint

8.2   Auto-Geofencing

✔ A full functionality description: [Geofencing](#).

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Auto-geofencing creates a circular geofence of a defined radius around the vehicle after the engine is off for a defined time. This can be used to receive alerts when the vehicle leaves the geofence while the ignition is off and can be used for theft prevention.
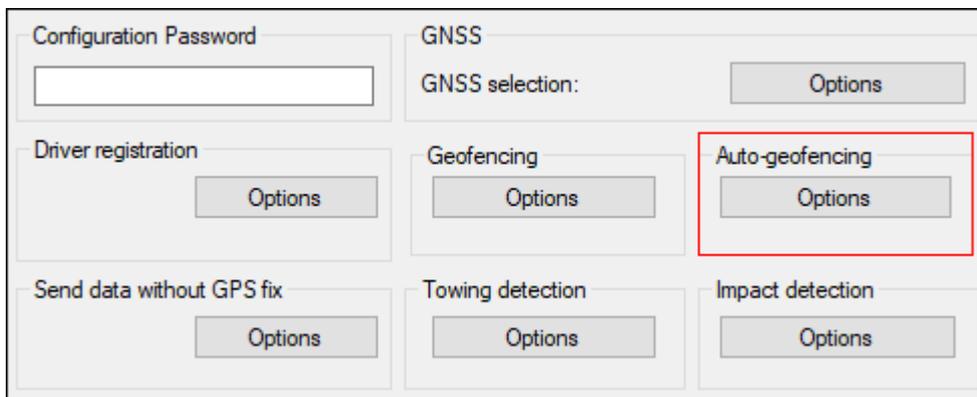
8.3 Towing Detection

✔ A full functionality description: Towing detection.

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Configure towing detection to know if your vehicle is being towed. Towing is detected when the vehicle tilt changes by a configured angle. This may help to save the driver's time and money.

The towing detection mechanism works only when the engine is turned off. If the device detects a change in acceleration (defined in the configuration) and if it lasts for a defined period, then towing is detected.

ℹ The *Towing alarm* IO parameter must be enabled to register towing detection events.

⚠ Setting *Movement sensor* as the engine source will disable towing detection.

Delay after engine is off	Towing detection becomes active after this period. Default value: 360 s
Tilt angle	The minimum tilt angle change required for towing to be detected. Default value: 10°
Minimum duration	For how long the tilt must be detected for towing to be detected. Default value: 1000 ms
Engine check after event	For how long after a detected towing event the device will monitor the engine state. Default value: 10 s
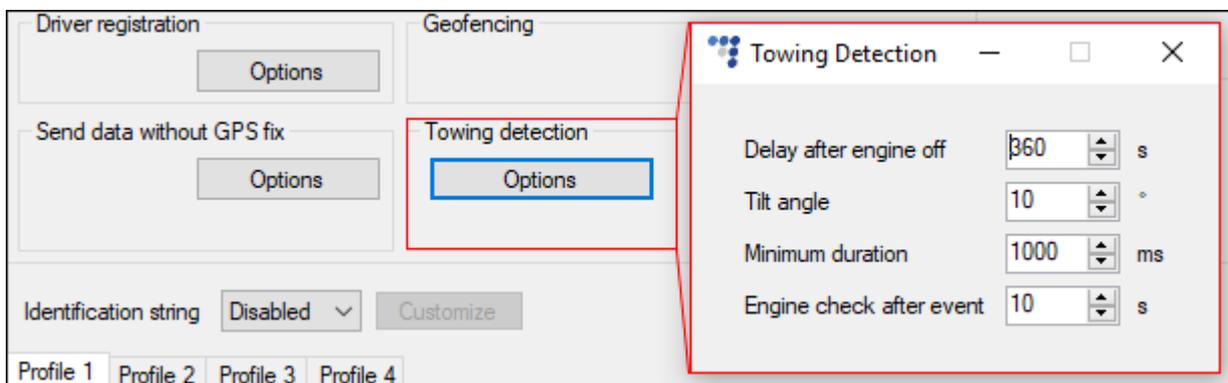
8.4 Impact and Rollover Detection

> ✔ A full functionality description: [Impact and Rollover detection](#).

	5th Generation Devices			4th Generation Devices						
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

The tracking device monitors its acceleration in all directions and generates records whenever the acceleration exceeds the configured limits. You can use impact detection to receive notifications to the server about irresponsible drivers, who hit sidewalks or other obstacles, or when the driver gets into anhis feature can also be used for rollover detection in environments, where vehicle rollover is possible.

> ℹ To ensure proper operation of impact and rollover detection, the accelerometer must be calibrated. The accelerometer is calibrated automatically when driving, taking up to an hour of driving in an urban location. The existing calibration can be reset using the *accreset* SMS command. Use the *accreset r* SMS command to receive calibration process status.

This chapter covers two different vehicle impaction type configurations:

1. Accident detection
2. Rollover detection
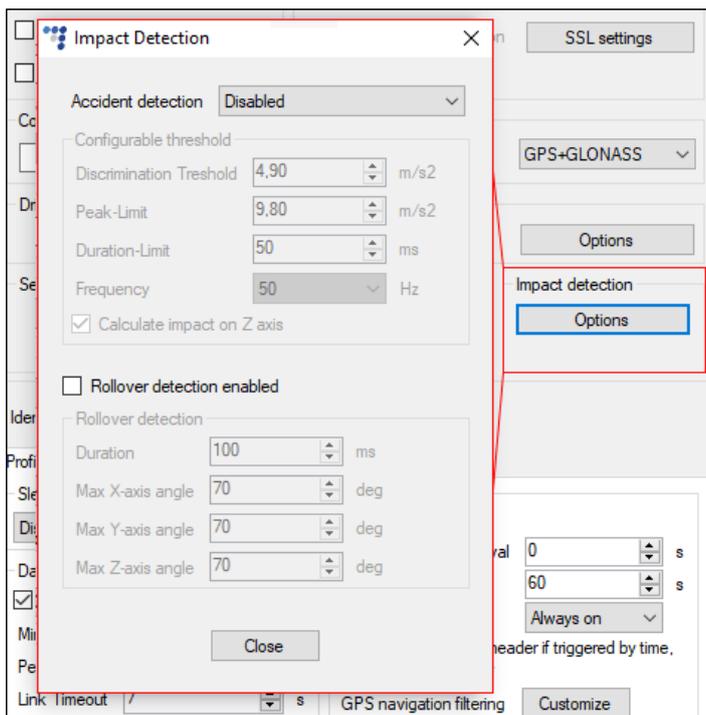
8.4.1 Accident Detection

Purpose

The functionality is used to detect accidents and notify when the vehicle hits an object.

How it works

The functionality monitors the acceleration in all directions and generates records when the acceleration exceeds configured parameters limits.

> ℹ️ If accident detection is enabled, the device cannot enter sleep or deep sleep mode.

Activation

1. Click **Options** in the **Impact detection** section.

2. From the **Accident detection** drop-down list, select *Dynamic Threshold*.

   Dynamic threshold is not available for FM-Eco4 and FM-Plug4 devices.

> ✔️ For better performance, we highly recommend using *Dynamic Threshold* over *Configurable threshold* option in most cases.

3. Configure the parameters required for the dynamic threshold:

Speed condition enabled	If ticked, an additional speed condition will be used that checks if the vehicle has stopped. Default value: Disabled
Duration until condition check	If the vehicle stops during this time period after an impact, a record is generated. Default value: 5000 ms
Upper threshold	The highest value the peak limit can obtain. Default value: 19.62 m/s^2
Lower threshold	The lowest value the peak limit can obtain. Default value: 5.89 m/s^2

> ℹ️ If the speed condition is enabled, a record will be generated even if the vehicle stops normally during the configured time period.

We advise you to increase the thresholds under bad road conditions:

Upper threshold → 27.5 m/s^2

Lower threshold → 7.8 m/s^2.

We do not recommend to exceed these values, as it may filter out real impact notifications.

> ⓘ It is not recommended to use the speed condition with heavy vehicles, as it might take a long time for a heavy vehicle to stop even after a real impact due to its high inertia (mass).

4. Enable **Accident detection** IO parameters in **IO settings** to register accident events.

In exceptional cases or if the device does not have the *Dynamic threshold* option, select *Configurable threshold* during the second step. Configure the parameters according to your needs:

Discrimination Threshold	At what amplitude shock measurements start. Default value: 4.9 m/s^2 (0.5 g)
Peak-Limit	The minimum amplitude needed for a shock event to be registered. Default value: 9.8 m/s^2 (1 g)
Duration-Limit	For how long the amplitude must be above the discrimination threshold for a shock event to be registered. Default value: 50 ms
Frequency	How often the device checks whether a shock event has occurred. Default value: 50 Hz
Calculate impact on Z axis	If ticked, the Z-axis will be included in impact detection measurements. Default value: Enabled

8.4.2 Rollover Detection

Purpose

The rollover detection functionality is used to inform if the vehicle has rolled over.

How it works

Rollover is detected when the vehicle tilt changes by a configured angle in any direction.

Activation

Click **Options** in the **Impact detection** section.

1. Tick the **Rollover detection enabled** checkbox to enable the functionality.

2. Configure **Rollover detection** parameters according to your needs:

Rollover detection enabled	If ticked, rollover detection will be enabled. Default value: Disabled.
Duration	For how long the tilt must be detected for rollover to be detected. Default value: 100 ms
Max X-axis angle	The maximum allowed X-axis tilt. If the tilt angle is greater than the entered value, a rollover event is detected. Default value: 70°
Max Y-axis angle	The maximum allowed Y-axis tilt. If the tilt angle is greater than the entered value, a rollover event is detected. Default value: 70°
Max Z-axis angle	The maximum allowed Z-axis tilt. If the tilt angle is greater than the entered value, a rollover event is detected. Default value: 70°

☑ Rollover detection enabled

Rollover detection

Duration	100	ms
Max X-axis angle	70	deg
Max Y-axis angle	70	deg
Max Z-axis angle	70	deg

Close

3. Enable **Rollover detection** IO parameters in **IO settings** to register rollover events.

8.4.3 Accident Reconstruction

Purpose

The accident reconstruction is used to collect data about the car accident.

How it works

This functionality records accelerometers and GNSS speed values before and after the accident.

Activation

Click **Options** in the **Impact detection** section.

1. Tick the **Accident reconstruction enabled** checkbox to enable the functionality.

2. Configure **Rollover detection** parameters according to your needs:

ACC	Set at which frequency and duration before and after the accident the accelerometer's measurements will be recorded. Default value: **Frequency**: 100 Hz **Duration before**: 15 s **Duration after**: 15 s
GNSS	Set at which frequency and duration before and after the accident the GNSS speed values will recorded. Default value: **Frequency**: 10 Hz **Duration before**: 30 s **Duration after**: 30 s

3. Enable **Accident reconstruction** IO parameter in **IO settings** to register accident events.

8.5 Movement Sensor Sensitivity

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Movement sensor sensitivity is used in vehicle movement and engine status detection.

It can be configured using the slider in the **Global settings** in the main window.

- If you slide the bar towards *Max*, the sensor will detect very slight movements

- If you slide the bar towards *Min*, the sensor will only detect significant movements

> ✔ The optimal sensitivity depends on the type of vehicle and how it is used.
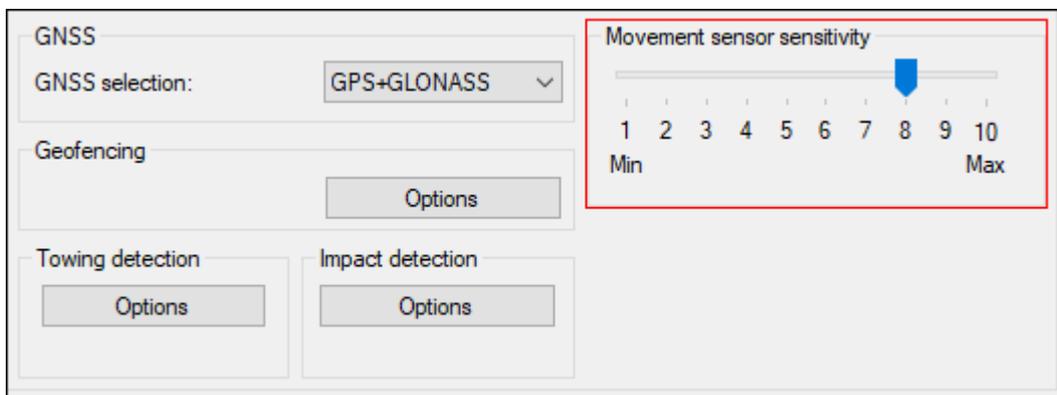
9 Profile Settings

This part of the configuration describes how to configure various functionalities based on the **Profile** settings. Each of the four profiles is a set of settings for specific circumstances. For example, one profile can be used when the vehicle is operated in the native country and a different one can be used when it is abroad.

The FM device will switch to a different profile if one of the following conditions is met:

- An IO parameter with an active **Switch to** setting is triggered.

  More information can be found in the IO Parameters chapter.

- No suitable operators are found in the operator list in the current profile.

  More information can be found in the Operator List chapter.

This chapter contains the following functionalities and their configuration settings:

1. Sleep mode

2. Data sending

3. Data collection

4. Cellular network settings (2G-3G)

5. Operator list
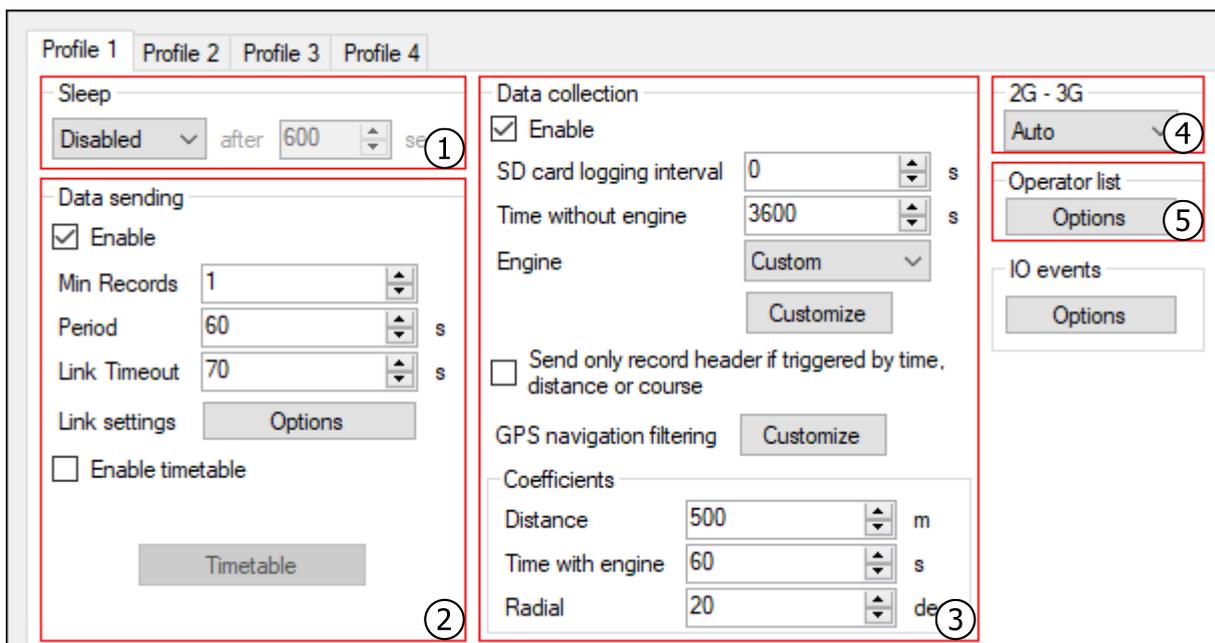
9.1 Sleep Mode

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Different sleep modes are used to manage the power consumption of the FM device to extend the battery's state of charge. The following sleep modes and settings are available:

Disabled	The FM device is not in sleep mode and operates normally.
Sleep	This mode turns off GPS/GSM modems. Unavailable for Trace5 and FM-Plug4.
Deep sleep	This mode turns off GPS/GSM modems and disables the advanced peripherals (1-Wire, CANs, Serial Ports, K-Line). Unavailable for Trace5.
Custom	If enabled, functionalities which should work during the sleep can be selected. More information: Configurable sleep
Sleep timeout	If *Sleep*, *Deep sleep or Custom* mode is selected, the timeout period can be modified. Once it runs out, the configured sleep mode will be activated if there are no unsent records. The entered timeout doubles if the device has unsent records and afterwards, the sleep mode is activated in any case. Default value: 600 s
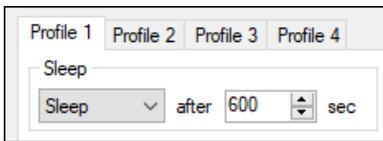
There are some exceptions when the FM device will not go to sleep:

- If the **Engine** detection is set to *Always on* in the **Data collection** section

- If the DIN state is High (value = 1)

- If the Garmin peripheral is connected and turned on

- Any of the triggered IO events that are set on the *High* priority will wake up the device

- When the FM device is connected via an USB cable

- When the FM device is configured for a profile switch

There are some conditions that will wake up the device:

- A high priority event is triggered

- Configured engine state status is changed to **ON**

- The *Sleep timer* IO parameter's configured time is exceeded

- When an USB cable is inserted into the FM device

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9.2 Data Sending

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

These settings allow configuring the frequency and conditions of the data that is sent to the server.

The **Enable** checkbox has to be ticked in order to enable the configured **Data sending** parameters.

The checkbox is ticked by default. The following parameters can be configured:

Min Records	The minimum number of records required to establish a connection to the server. Default value: 1
Period	How often the device will check for the **Min Records** parameter. Default value: 60 s
Link Timeout	For how long the device will keep the link before closing it, after the connection was successfully established. Default value: 7 s

Click **Link settings** to configure the following settings between the tracking device and the server:

Constant link	If enabled, the link between the tracking device and the server is always open. Default value: *Disabled*
TCP Keep alive	If enabled, special keep-alive packets will be sent periodically if there is no data being sent. Therefore, the device will be accessible via GPRS all the time. Available only, if the *TCP* protocol is used. Default value: *Disabled*
Idle	How often keepalive packets are sent. Default value: 300 s
Interval	How often keepalive packets are resent if they are not sent successfully. Default value: 10 s
Heartbeat	If enabled, keeps an open socket on the server-side by sending the GPRS command 16/116 after the set time period has passed since the last packet was sent. Default value: *Disabled*
Interval	How often heartbeat packets are sent. Default value: 240 s

ⓘ If **Constant link** is enabled, the device ignores the link timeout parameter for the main connection and uses it only for the emergency connections.

> ℹ️ The **Constant link** and **Heartbeat** functionalities do not work with the second server if the **Two Servers** mode is used.

You should note, that for the BG96 (LTE Cat M1 devices) modem the TCP Keepalive settings are a bit different than devices with M95 or MC60 modems (2G devices), or UG96 modems (3G devices). The differences are defined in the table below:

	M95/MC60	UG96	BG96
Idle time range	1-1800 seconds	60-7200 seconds	1-120 minutes
Interval time range	10-20 seconds	30-100 seconds	25-100 seconds

Therefore, for applicable devices the configurator allows to set the value with the following ranges:

- Idle time: 60 - 7200 seconds (default time – 300 seconds)

- Interval time: 10 - 100 seconds (default time – 10 seconds)

> ⚠️ **TCP Keepalive** will work with 3G devices only from the A10 modem firmware version. This functionality will not work with the FM-Eco4 light 3G variant.

> ℹ️ For the LTE Cat M1 devices the idle time is set in minutes.

> ℹ️ If the idle time is set to more than 1800 s for 2G devices, the device will set the idle time to 1800 s. If the interval time value is set more than 20 s, the device will set the time to 20 s.

> ℹ️ If the interval time value is set to less than 30 s for 3G devices, the device will set the time to 30 s.

> ℹ️ If the interval time value is set to less than 25 s for LTE Cat M1 devices, the device will set time to 25 s.

> ℹ️ After enabling the TCP keepalive functionality, for the devices with BG96 modem, we recommend a restart, as the link with a server should be closed to TCP keepalive start working.

Tick the **Enable timetable** checkbox and click **Timetable** to set at what days and hours can data be sent. The device will connect to GPRS only during the set days and hours.

> ⚠ If the **Enable timetable** checkbox is ticked and none of the days are checked, the device will never connect to GPRS and will be reachable only via SMS commands.

9.3   Data Collection

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

These settings allow configuring the frequency and conditions of the data that is collected.

The **Enable** checkbox must be ticked to configure **Data collection**. The checkbox is ticked by default. The following parameters can be configured:

SD card logging interval	How often the data is logged to the SD card. If the value is 0, the SD card only stores records. If the value is above 0, the SD card logs data. Available for: HCV5, LCV5, Pro5, FM-Tco4 HCV, FM-Tco4 LCV, FM-Pro4 Default value: 0
Time without engine	Determines how often records are made when the engine is off. Default value: 60 s
Engine	How the device detects whether the engine is turned on. • *Always on* – considers that ignition is always turned on. • *Ignition (DIN4)* – DIN4 is used for detection (unavailable for Trace5 and FM-Plug4) • *MovSensor* – the engine is considered to be on when movement is detected • *Power voltage* – the voltage on pin 16 of the OBD socket is used for detection (FM-Plug4 only) • *Custom* – configure your engine detection conditions. More information: Custom Ignition Default value: *Always On*
Send only record header if triggered by time, distance or course	If enabled, sends only the record header to reduce the data consumption. The record header contains only basic time, position and speed data.
GPS navigation filtering	Used to eliminate inaccurate GPS coordinates. This functionality can be enabled and modified by clicking the **Customize** button. More information: Configurable navigation filtering
Coefficients	Used to collect records in addition to other parameters for a more accurate vehicle route. A record will be made when: • **Distance** is reached Default value: 1000 m • **Time with engine** has passed Default value: 60 s • **Radial** tilt is reached Default value: 60°

9.3.1 Data Collection to SD Card

The SD card can store temporarily the tracking device records, or it can log the data. When the SD card stores the records, they are sent to a server via special command. When the data is logged, it must be retrieved by request via another command.

> ℹ The SD card must be formatted with the FAT32 (File Allocation Table32) file system.

> ℹ If the record data is present in the SD card, the logging will not start, until records are sent to a server.

> ℹ If the there are logs in the SD card, then the record data will not be stored there.

9.4 Cellular Network Settings

9.6.1 GSM/UMTS Network

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	⊘	⊘	⊘	✔	✔	✔	✔	✔	✔

The **2G-3G** section allows setting the cellular network type for the tracking device if its modem supports the UMTS (3G) network. Three different operation modes can be set:

2G-3G	Possible values:
	• *Auto* – the device will use the 3G network when it is available. If 3G is unavailable, the device automatically switches to 2G mode. Once 3G is available again, it will switch back to 3G mode automatically.
	• *GSM only* – the device operates only in 2G mode.
	• *UMTS only* – the device operates only in 3G mode.
	Default value: *Auto*

ⓘ If the tracking device does not have a modem that supports 3G, this option will have no effect.

9.6.2 GSM/UMTS/LTE Cat M1/NB-IoT Network

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
Only Trace5 GL	✔	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘

The **Network technology configuration** section allows you to select between the 2G, 3G, LTE Cat M1 and NB-IoT networks. Four different operation modes can be set:

Network technology	Possible values:
	• *Auto: Auto:*
	○ 2G device – the device will operate in 2G mode.
	○ 3G device – the device will use the 3G network when it is available. If 3G is unavailable, the device automatically switches to 2G mode. Once 3G is available again, it will switch back to 3G mode automatically.
	○ LTE device – the device will use the LTE Cat M1 network when it is available. If LTE Cat M1 is unavailable, the device automatically switches to 2G mode. The device will switch back to LTE Cat M1 mode only after reaching no 2G signal zone or after reset.
	• *GSM*: The device operates only in 2G mode.
	• *LTE only:*
	○ *CAT-M1 only*: The device operates only in LTE Cat M1 mode.
	○ *NB-IoT only*: The device operates only in NB-IoT mode.
	In this operation mode, you can enable the **Emergency network switch** checkbox, which allows the device to fall back to the *Auto* mode for 30 minutes if the device did not succeed to connect to the GPRS in the last 12 hours.
	Default value: *Auto*.

You can also enable required frequency bands for the LTE Cat M1 and NB-IoT networks. Select a geographic location from the **Region** section, and the configurator will automatically check the applicable checkboxes. If you want to enable the required frequency bands manually, select *Custom*.

> ⓘ We do not recommend using the NB-IoT network with moving objects, as it is designed for use with stationary objects.

> **ⓘ** We strongly recommend you use only those bands, which belong to the region, where the tracking device is used. Enabling of unnecessary bands will decrease the performance of the tracking device.
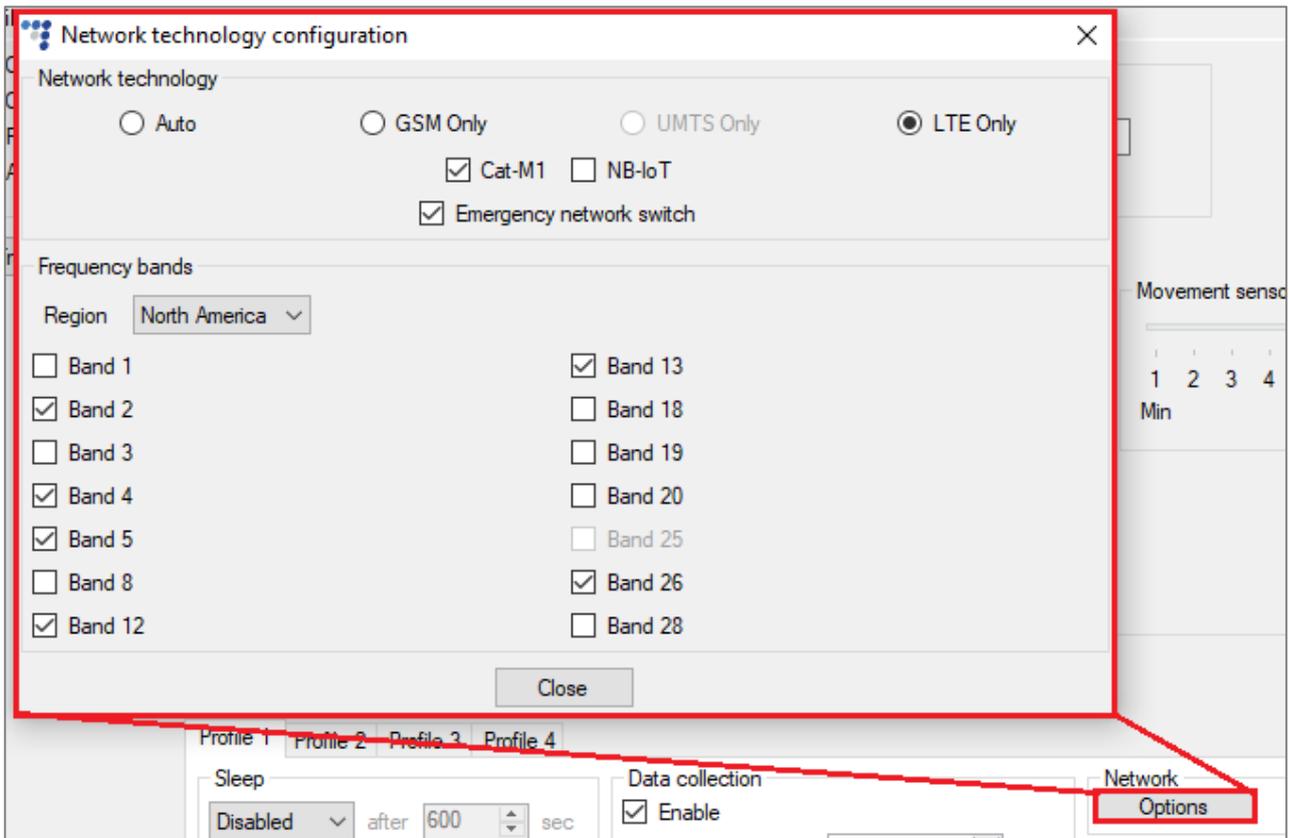
9.5 Operator List

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

The **Operator list** functionality allows configuring the operator acquisition settings. The following settings can be configured:

GPRS Attempt	How many times the device will try to connect to GPRS before trying a different operator. Default value: 2
GPRS data counter	How many bytes of data the device will send before searching for other GPRS operators. Default value: 1000
Temporary blacklist	For how long the operator with an unavailable GPRS is banned. This prevents the FM device from connecting to this operator during the next operator search. The operator is banned after not responding to 3 consecutive ping requests. The blacklist is cleared after resetting the device. Default value: 0 s
Enable priority in list	If enabled, searches for the operators according to their number in the list. If disabled, the device will search for a random operator. Default value: *Disabled*
Profile tab	Operators used in the current profile are entered here. If the listed operator was not found, the device will search for the next one in the list. The device will switch to the next available profile if no operators were not found.
Blacklist	The operators entered in the blacklist will be ignored during the operator search.

ℹ A single blacklist is used for all profiles, but each profile has a different operators list.

Click **Clear All** to clear all operators from the current profile operator list.

Click **Clear Blacklist** to clear all operators from the blacklist.
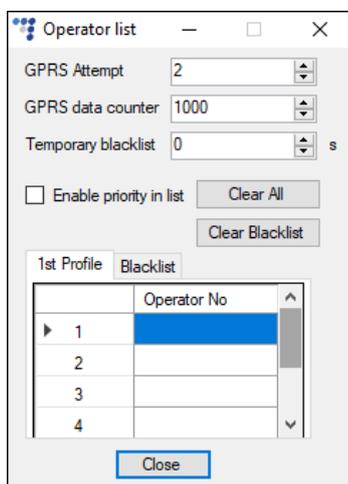
10 IO Parameters

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

After configuring the needed interfaces, you need to enable IO parameters for the selected interfaces. There are three methods to enable IO parameters:

1. Using the **Enable IO** functionality (recommended).

2. Enabling IO parameters manually.

3. Automatically enabling the commonly used (predefined) IO parameters.

> ✔ We highly recommend using the **Enable IO** functionality to instantly enable all IOs for selected interfaces and significantly reduce configuration time. This requires the extended protocol to be enabled.

Also, all enabled IO parameters can be disabled by clicking the **Clear all IO** button.
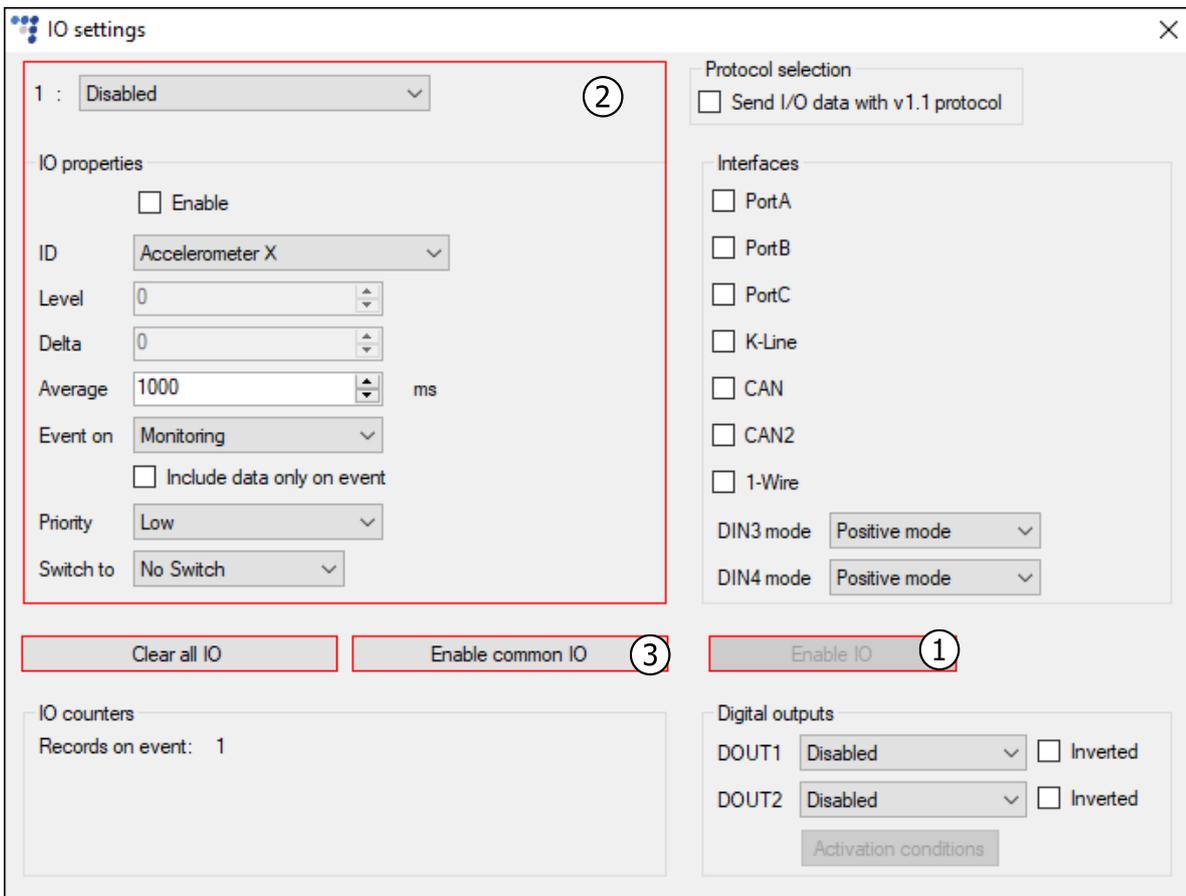
> ℹ A total of 80 IO parameters (40 for Eco4, Eco4 S/T and Plug4) can be enabled at a time.

10.1 Enable IO

It is used to enable all IO parameters for the selected interfaces with the default and recommended IO properties for each enabled interface. This feature significantly reduces the configuration time. However, it requires the extended protocol to be enabled and cannot be used with some interface modes.

To enable IO parameters using **Enable IO**, follow these steps:

1. Tick the **Send I/O data with v1.1 protocol** checkbox (for 5th gen devices enabled in the background).

2. Configure interfaces, modes and additional parameters according to your needs.

3. Click **Enable IO**. A new **Configured IO** window will appear.

4. Select which IO parameters to enable.

5. Click **Save**.

6. Optionally, properties for each IO parameter can be configured manually.

10.2 Enabling IO Parameters Manually

This method requires you to enable each IO parameter and configure all properties manually.

Follow these steps to enable IO parameters:

1. Configure interfaces, modes and additional parameters according to your needs.

2. Select a slot for the IO parameter.

3. Tick the **Enable** checkbox in the **IO properties** section to use the selected slot.

4. Configure the following **IO properties** for each IO parameter.

ID	Select a parameter from the drop-down list to enable it in the selected slot. Only one parameter can be enabled in a slot at a time.
Level	Used with hysteresis mode to set a reference value. Default value: 0
Delta	Used with hysteresis mode as a maximum possible value deviation from the reference **Level** value. Default value: 0
Average (Debounce)	Some parameter values tend to change rapidly and do not correspond with any valuable information. The averaging of values for a period gives more reliable and accurate information. Some IO parameters have a **Debounce** parameter instead of **Average**. Debounce defines for how long the device must receive the changed state of an IO to register the new state. Default value: 1000 ms
Event on	Defines the logic of when an IO event is generated. • *Monitoring* – the parameter value is monitored and sent with every record. • *Change* – the parameter value is monitored and sent with every record. Moreover, when the value changes, a record will be generated. • *Hysteresis* – a record is generated when the parameter value changes in a specified way based on the **Level** and **Delta** values. Default value: *Monitoring*
Include data only on event	If enabled, includes the parameter value in records only when the *Change* or *Hysteresis* condition is met. Default value: *Disabled*
Priority	Used to determine the importance of IO parameter value changes. • *High* – if *Change* or *Hysteresis* conditions are met, the record is sent immediately, disregarding the data sending settings. • *Low* – if *Change* or *Hysteresis* conditions are met, the device will wait for suitable conditions to open a link to the server to send records. Default value: *Low*
Switch to	Used to switch another profile if the *Change* or *Hysteresis* conditions are met. Default value: *No switch*

10.3 Using Enable Common IO

It is used to automatically enable the most commonly used IO parameters.

Follow these steps to enable them:

1. Click **Enable common IO** in the **IO settings** window. A new **Configured IO** window will appear.

2. Select which of the 12 (10 for the Eco4 RS T series) common IO parameters to enable.

3. Click **Save**.

4. Optionally, properties for each IO parameter can be configured manually.

5. Optionally, other parameters can also be enabled before using the **Enable common IO** method.
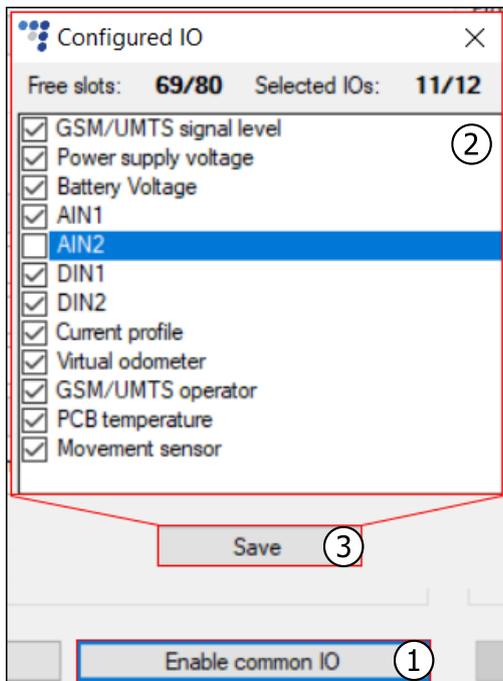
11 Peripherals and Interfaces

This part of configuration describes how to configure various peripherals and interfaces that are connected to the device physically. Peripherals and interfaces work under the logic of the profiles; thus, profiles can be switched once the input or the output of the interface is triggered and meets the configured conditions.

Configure which interfaces and peripherals will be active and how they behave. Click the **Options** button in the **IO events** section.

This chapter contains the following functionalities and their configuration settings:

1. Selection of the extended protocol

2. Various interfaces

3. Light commercial vehicle configuration

11.1 Extended Protocol

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

There is only one setting in the **Protocol Selection** section. The **Send I/O data with v1.1 protocol** is an extended data transmission protocol. Some of the IO parameters require this protocol to be enabled to work properly. Otherwise, these parameters will not be available for the selection.

✔	We highly recommend to always keep the extended protocol enabled.

To enable the extended protocol functionality, tick the **Send I/O data with v1.1 protocol** checkbox.

The **Confirm Protocol Change** dialogue window will appear, that all unsent records will be deleted from the device. Click **Yes** to enable the protocol.
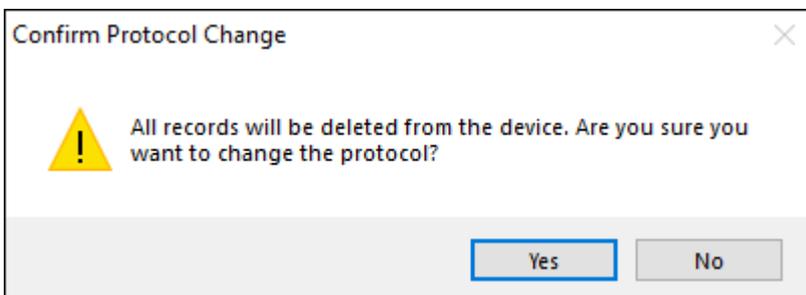
✔	If the extended protocol is enabled, the **Enable IO** functionality can be used to instantly enable all IOs for the selected interfaces and significantly reduce configuration time.

ℹ	5th gen devices use the v1.1 protocol by default.

11.2 Serial Port Interfaces

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	✔	✔	✔	✔	⊘	Eco4 RS T only	⊘

Serial ports are used to connect and communicate with various peripheral devices.

The following tables displays the compatibility of the peripherals and devices and which serial port can be configured.

	HCV5	LCV5	Pro5
DFS RS232	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
RFID reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
Alcohol sensor	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
Magnetic card reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
LED display	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
UHF-RFID reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
Fatigue sensor	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
Camera	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)
TCO card reader	Port A / Port B (RS232)		
Optitemp	Port A / Port B (RS232)		
Weighting system	Port A / Port B (RS232)		
Carrier Vector 1550	Port A / Port B (RS232)		
TK Touchprint	Port A / Port B (RS232)		
Spreader	Port A / Port B (RS232)		Port A / Port B (RS232)
IQ Freeze			Port A / Port B (RS232)
Kimax weight sensor	Port A / Port B (RS232)		Port A / Port B (RS232)
CANLog			Port A / Port B (RS232)
Garmin	Port B (RS232)	Port B (RS232)	Port B (RS232)
TK		Port B (RS232)	Port B (RS232)
DFS RS485	Port C (RS485)	Port C (RS485)	Port C (RS485)
J1708		Port C (RS485)	Port C (RS485)
J1708 + DTC		Port C (RS485)	Port C (RS485)
Transparent channel	Any Port	Any Port	Any Port

	Tco4 HCV	Tco4 LCV	Pro4	Eco4 RS T
DFS RS232	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
RFID reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
Alcohol sensor	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
Magnetic card reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
LED display	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
UHF-RFID reader	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
Fatigue sensor	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A (RS232)
Camera	Port A / Port B (RS232)	Port A / Port B (RS232)	Port A / Port B (RS232)	
TCO card reader	Port A / Port B (RS232)			
Optitemp	Port A / Port B (RS232)			
Weighting system	Port A / Port B (RS232)			
Carrier Vector 1550	Port A / Port B (RS232)			
TK Touchprint	Port A / Port B (RS232)			
Spreader	Port A / Port B (RS232)			
IQ Freeze			Port A / Port B (RS232)	
Kimax weight sensor			Port A / Port B (RS232)	
CANLog			Port A / Port B (RS232)	
Garmin	Port B (RS232)	Port B (RS232)	Port B (RS232)	
TK	Port B (RS232)			
DFS RS485	Port C (RS485)	Port C (RS485)	Port C (RS485)	
J1708	Port C (RS485)		Port C (RS485)	
J1708 + DTC	Port C (RS485)			
Transparent channel	Any Port	Any Port	Any Port	Any Port

11.3 K-Line Interface

| 5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	⊘	✔	✔	⊘	⊘	⊘	⊘

The K-Line interface is used to read tachograph data in heavy vehicles. It can also be used to read parameters and diagnostic trouble codes via the OBD2 socket in light vehicles.

K-Line	If turned on, data will be read via the K-Line interface. Default value: Off
Mode	K-Line interface working mode. Possible values for different devices: **HCV5 and FM-Tco4 HCV** • *TCO* – used for driver information reading from back of the tachograph • *OBD* – CAN data reading via the OBD2 socket • *Tacho read* – used to read tachograph data. Works only with specific tachographs and if a frontal connection is used Default value: *TCO* **LCV5, FM-Tco4 LCV and FM-Plug4** • *OBD* – CAN data reading via the OBD2 socket

If *TCO* mode is used, sometimes invalid CRC values might be received in the data packets. One of the following invalid CRC values elimination methods can be selected from the drop-down list:

- *Discard data* – packets with invalid CRC values will be discarded. In this case, new records contain previously obtained K-Line data (from data packets that had a good CRC value).

- *Put FF values* – the device will put FF (255) values.

If *OBD* mode is used, DTC reading will be enabled by default, where reading time interval can be specified. Additionally, the fuel type should be selected, as it is used in the **OBD fuel usage** parameter calculations. If the wrong fuel type is selected, then the parameter will give wrong values. These codes are sent as a separate command and not as an IO parameter.
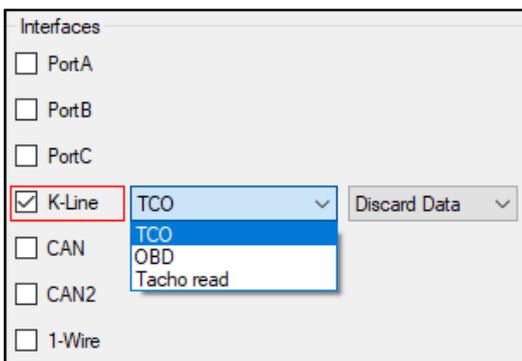
11.4 CAN Interfaces

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	✔	✔	✔	✔	⊘	⊘	✔

CAN interfaces are used to get various data from vehicle on-board systems.

Each CAN mode can be activated on any CAN port. The interface must be physically connected to the same CAN port as it is configured.

	HCV5/Tco4 HCV	LCV5/Tco4 LCV	Pro5/Pro4	Plug4
FMS	Yes		Yes	
HCV	Yes		Yes	
J1939 + DTC	Yes		Yes	
Trailers	Yes		Yes	
MobilEye	Yes	Yes	Yes	
DXP CAN	Yes	Yes	Yes	
LCV	Yes	Yes		
OBD	Yes	Yes		Yes
Tacho read	Yes			

11.4.1 CAN Interface Modes

Depending on the device, the following modes can be selected from the *CAN* drop-down list:

FMS	CAN data standard used for trucks and heavy vehicles. Recommended when the vehicle has an FMS connector. Refer to your vendor for more details. An additional **Remember tachograph parameters when engine is OFF** checkbox appears when this mode is selected.
HCV	Used with a specific set of heavy commercial vehicles, mostly Mercedes Benz trucks.
MobilEye	Used for communication with the MobilEye collision avoidance system.
DXP CAN	Used to read DXP electric vehicle data.
LCV	Used to read light and commercial vehicle CAN data.
OBD	Used to read CAN data via the OBD2 socket.
J1939 + DTC	Used to read diagnostic trouble codes (DTC) from the J1939 data line.
Trailers	Used to read trailer CAN parameters. More information: Trailer CAN parameters
Tacho read	Used to read tachograph data.
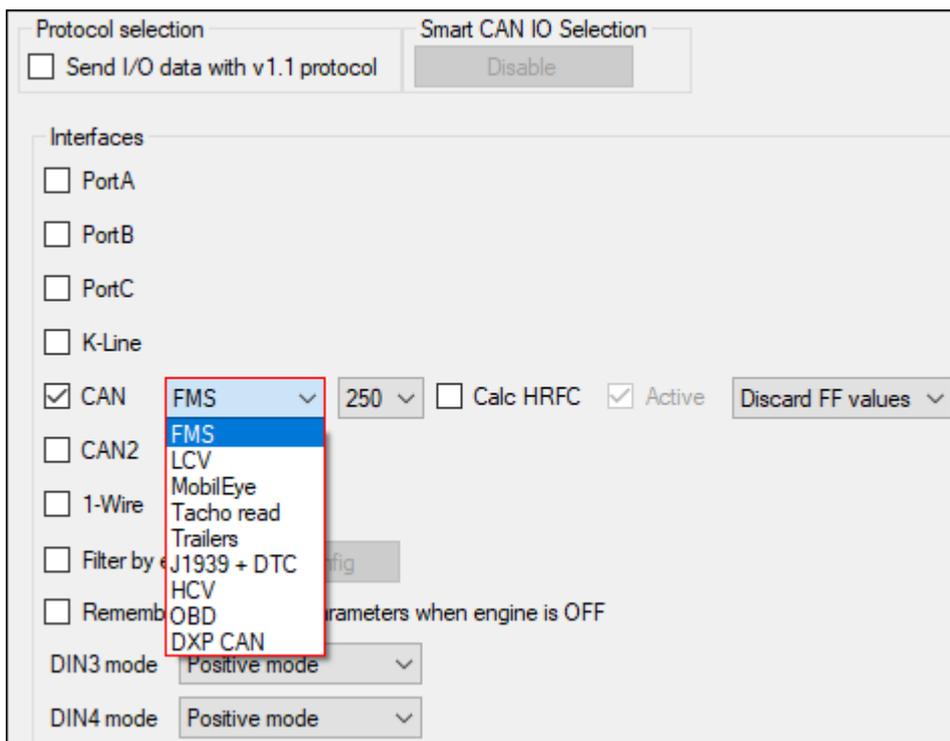
11.4.2 Additional CAN Mode Parameters

Each mode has additional parameters which can be configured according to your needs. The following table displays which parameters are available for each mode:

	Baudrate	Calc HRFC	Active	FMS data filter	Filter by engine	Remember tachograph parameters when engine is OFF	Smart CAN IO selection	EasyCAN
Tacho read	Yes					Yes		
FMS	Yes	Yes	Yes	Yes			Yes	
HCV	Yes	Yes	Yes	Yes			Yes	
J1939+DTC	Yes	Yes	Yes		Yes		Yes	
LCV	Yes	Yes	Yes		Yes		Yes	Yes
DXP CAN	Yes		Yes		Yes		Yes	
MobilEye	Yes		Yes					
Trailers	Yes		Yes					

If *OBD* mode is used, DTC reading will be enabled by default, where reading time interval can be specified. Additionally, the fuel type should be selected, as it is used in the **OBD fuel usage** parameter calculations. If the wrong fuel type is selected, then the parameter will give wrong values. Also, you can tick the **Splitter-Harness** checkbox. In this case the end line terminating resistor will be disabled. For more information see the Advanced CAN Options chapter. Moreover, the **OBD communication when ignition OFF** parameter can be configured after clicking **Config**.

Baudrate	CAN interface data transfer speed. This requires *FMS, MobilEye, Trailers, J1939, Tacho Read, DXP CAN* to be selected as the CAN1/CAN2 mode. The required baudrate depends on the vehicle itself. Possible values: • *125* • *250* • *500* Default value: *250*
Autobaud	HCV, LCV and Tacho read (HCV5 device only) modes have an **Autobaud** parameter. • If enabled, the device will automatically set a correct baudrate for all used CAN lines in the vehicle. It is recommended to use the functionality when several CAN lines are used, and data cannot be acquired. • If disabled, the baudrate will depend on the vehicle. Default value: *Disabled*

Calc HRFC	If enabled, fuel consumption will be recalculated from the fuel rate. Recalculation works only when high-resolution fuel consumption data from CANbus is not available. Default value: *Disabled*
Active	If enabled, the device will send queries to the vehicle's onboard computer to ask for specific data. Default value: Depends on the configured mode
FMS data filter	Used to set an FMS data filter. One of the following methods can be selected from the drop-down list: • *Discard FF values* – the device will send only valid data (according to the SAE J1939 standard) to the server. It discards FMS data packets with invalid FF values. In this case, new records will contain previously obtained FMS parameters values (from valid data packets). • *No filters* – the device sends all data to the server Default value: *No filters*
Filter by engine	If enabled, filters CANbus data by engine state. It helps to solve errors in EcoDrive data calculations, which come from invalid CANbus data. Errors can occur, while the vehicle's ignition is turned off and shortly after it was turned on. More information: CANbus filter by engine state. Default value: *Disabled*
Remember tachograph parameters when engine is OFF	If enabled, the FM device keeps the last known driver related IO parameter values when the engine is turned off and there is no communication with the digital tachograph. This might happen when the FMS gateway and digital tachograph switch to sleep mode. Default value: *Disabled*
Smart CAN IO selection	Mostly used on the *LCV* mode. This functionality is used when it is needed to switch from one CAN interface to another without losing enabled CAN IO parameters. Default value: *Enabled*
DTC enable	Only available on the *OBD* mode. If enabled, DTCs will be read via the OBD2 socket. Default value: *Disabled*
EasyCAN	Only available in the *LCV* mode. If ticked, the end line terminator on the corresponding CAN line is enabled. More information: Advanced CAN Options chapter. Default value: *Disabled*

Some use case examples of the **Smart CAN IO Selection**:

1. You have configured **CAN** *FMS 250* ***Active*** on the 1st CAN port. You have enabled a few CAN IO parameters. Then, if you want to switch to the 2nd CAN port without losing enabled CAN IO parameters, click the **Disable** button in the **Smart CAN IO Selection** section. Disable the 1st CAN interface or set a different mode. Enable the 2nd CAN and set *FMS 250* **Active**. The switch is completed.

2. The same method can be applied for the *LCV* mode. The same **Group** or **Subgroup** *LCV* combinations can be used on both interfaces and switched from one CAN interface to the other.

3. Switching *FMS* to *LCV* or from *LCV* **GroupX**, **SubgroupX** to *LCV* **GroupY**, **SubgroupY** is not recommended. Some CAN IO parameters may be lost.

11.4.3 Possible Combinations of CAN Modes

Both CAN interfaces can be used at the same time and some combinations of CAN modes can work together.

> ℹ️ Only one CAN interface can be configured on Pro5 and FM-Pro4 devices.

CAN2 / CAN	DXP CAN	LCV	MobilEye	OBD	HCV	Tacho read	Trailers	FMS	J1939 + DTC
DXP CAN									
LCV		HCV / LCV				HCV			
MobilEye	HCV / LCV								
OBD								HCV	
HCV			HCV						
Tacho read		HCV							
Trailers									
FMS									
J1939 + DTC									

If the intersection area of two modes is coloured, their combination can fully work when set on different CANs. Otherwise, if the intersection area is blank (white), only one of these modes can work at a time.

- Green intersection areas show which combined interfaces work both for the HCV5, FM-Tco4 HCV and FM-Tco4 LCV devices.

- Blue intersection areas show which combined interfaces work only for the HCV5 and FM-Tco4 HCV devices.

11.4.4 Advanced CAN Options

	5th Generation Devices			4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘	⊘

This functionality allows you to enable/disable the end line terminating resistor in the particular CAN interface.

After enabling **CAN** or/and **CAN2**, the terminating resistors in both CAN interfaces are turned on by default. Click the **Config** button in the **Advanced CAN options** section and tick the corresponding CAN checkbox to disable the resistor.
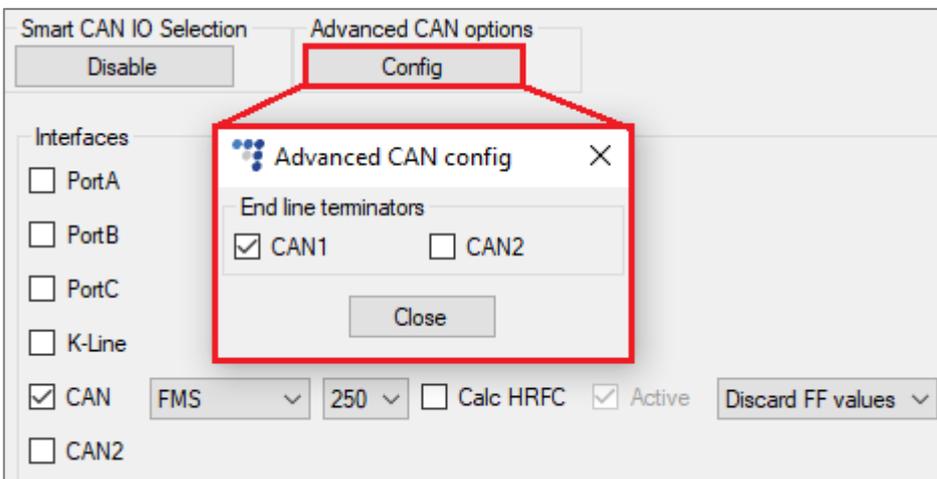

If you select the *LCV* CAN mode, then the **EasyCAN** checkbox will be enabled by default. This will automatically enable the end line terminating resistor in the CAN interface and grey it out.
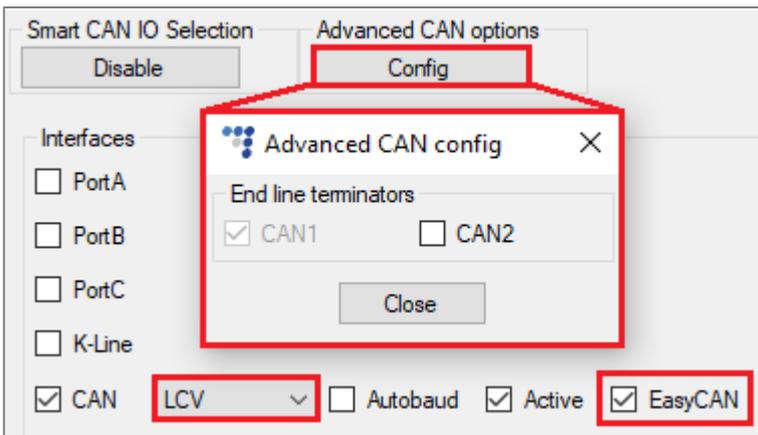
> ℹ️ If you are not using EasyCAN, but still need to turn on the terminating resistor, untick the **EasyCAN** checkbox, and enable the resistor.

If you select the *OBD* CAN mode, then there is an option to enable the **Splitter-Harness** checkbox. Ticking this checkbox will turn off the terminating resistors and the second CAN interface checkbox will be greyed out.
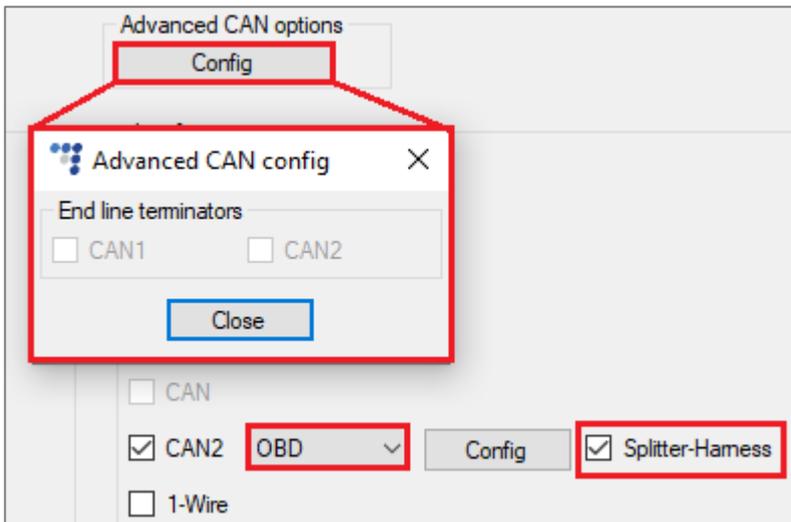
If the **Splitter-Harness** checkbox is not enabled, the terminating resistor will be turned on in the corresponding CAN interface.

> ℹ️ If the second CAN interface is set as *Vendor OBD*, then both CAN interfaces terminating resistors are disabled and greyed-out.

11.4.5 Manufacturer Specific OBD Data Reading

5th Generation Devices				4th Generation Devices						
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	⊘	⊘	✔	⊘	⊘	⊘	⊘

This functionality allows reading vehicle data that is not accessible using generic on-board diagnostics (generic OBD2 parameter IDs).

Configure manufacturer specific OBD data reading settings to read additional data via the OBD2 socket. Follow these steps to enable the functionality:

1. Enable **CAN** or **CAN2** port in the **Interfaces** section.

2. Select *OBD* from the drop-down list.

3. Click **Config**. A new **OBD Configuration** window will open.

4. Tick the **Manufacturer specific data** checkbox to enable the functionality.

5. Select the **Manufacturer** from the drop-down list. *Auto-detect* is the default option which automatically detects the manufacturer based on the vehicle's VIN.

> ℹ️ The received data depends on the vehicle manufacturer, model and in some cases even the engine. Consult our OBD2 supported vehicles list for more details.
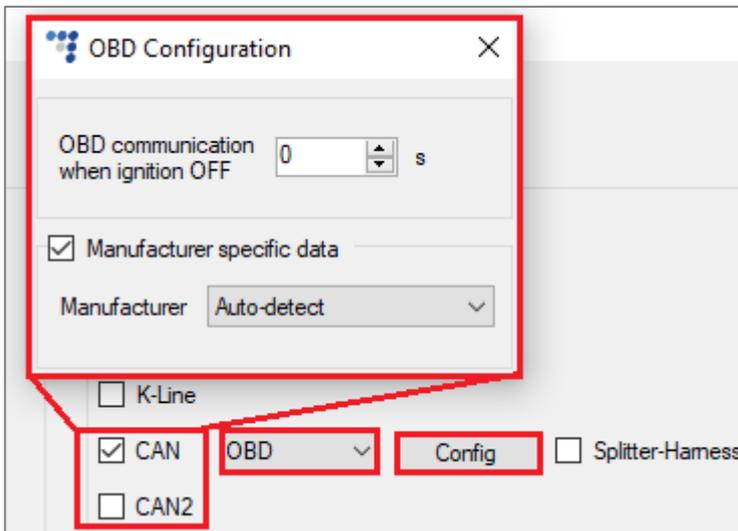
The following manufacturers require a second CAN interface to be configured to read additional proprietary OBD data:

- *Citroen*

- *Peugeot*

> ℹ️ Reading proprietary OBD data for Citroen and Peugeot vehicles requires a physical connection to a second CAN line.

To configure the second CAN interface to read additional proprietary OBD data, tick the checkbox and select *Vendor OBD*.

> ℹ️ If you check the **Splitter-Harness** checkbox, then the second CAN interface will only have the *Vendor OBD* option.

⚠ If you use the Ruptela OBD harness, **CAN2** must be configured as *OBD* and **CAN** must configured as *Vendor OBD*. Otherwise, you will not get the correct data.
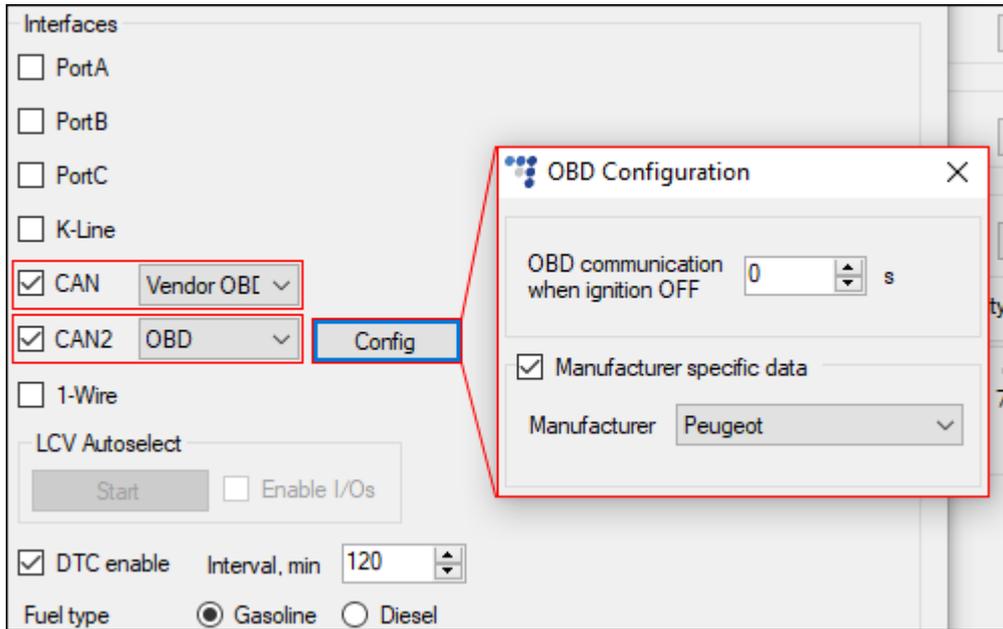
11.5 Light Commercial Vehicle Configuration

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	⊘	✔	✔	⊘	⊘	⊘	⊘

> ⚠ It is not recommended to use the LCV mode on the HCV5 or FM-Tco4 HCV devices. If you need to do so, the device must be configured using a USB cable.

The LCV mode allows reading specific CAN IO parameters that are supported on your vehicle. The combination of vehicle group and subgroup is used to determine the exact set of available CAN IO parameters for the selected vehicle. Follow these steps to configure LCV settings:

1. Enable the **Send I/O data with v1.1 protocol** checkbox (for HCV5 and LCV5 devices enabled in the background). The extended protocol may add some additional IO parameters for your vehicle.

2. Enable **CAN** or **CAN2** port in the **Interfaces** section.

3. Select *LCV* from the drop-down list.

4. If required, untick the **EasyCAN** checkbox (applicable only for HCV5 and LCV5).

5. There are three methods to select the best possible combination of group and subgroup:

   - Manual selection

   - Using the LCV selection wizard

   - Using the LCV autoselect functionality

6. In some cases, an additional **Channel** drop-down list may be displayed, meaning that parameters for this vehicle can be obtained only when two separate physical connections are used. Enable the other CAN interface and select *LCV* to enable the dual configuration.

> ℹ️ The received data depends on the vehicle manufacturer, model and in some cases even the engine. Consult our Supported vehicles list for more details.

> ⚠️ During the selection process, beware, that changing the combination of the LCV Group or Subgroup might automatically disable some of enabled IO parameters.

11.5.1 Manual Selection

Use two drop-down lists in the **LCV Configuration** section and manually set the LCV group and subgroup combination. Use the Supported vehicles list to set the correct group and subgroup.

11.5.2 LCV Selection Wizard

Click the question mark button in the **LCV Configuration** section. A new LCV selection wizard window will appear. Select the *Brand*, *Model*, and *Manufacture year* of your vehicle and click the **Select** button. The group and subgroup will be automatically selected.
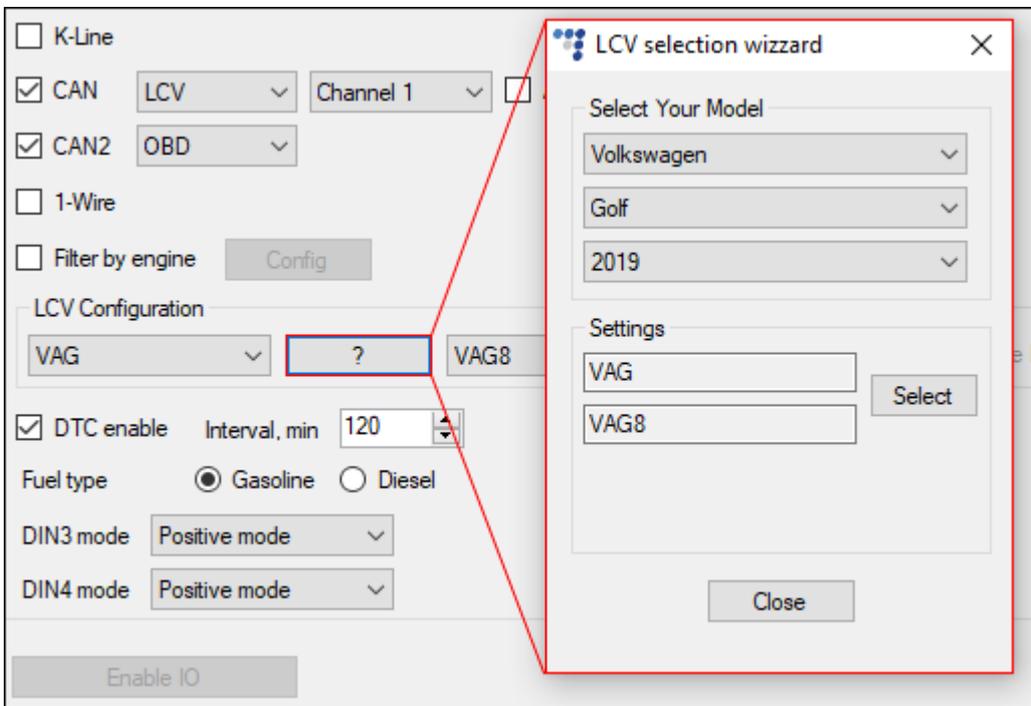
11.5.3 LCV Autoselect

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	⊘	⊘	✔	⊘	⊘	⊘	⊘

The device can automatically select a correct LCV group and subgroup combination. The **LCV Autoselect** functionality allows to read and analyze CANbus line data to find the best matching configuration.

The following parameters are considered as high importance, which has greater significance during the auto-selection process: *Fuel, Vehicle distance, RPM, Wheel based speed.*
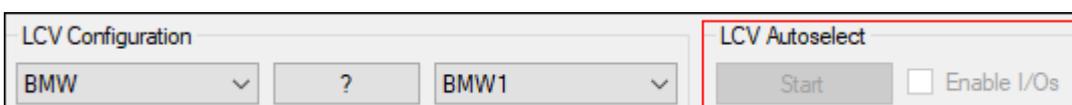
The **Enable I/Os** function will automatically enable all supported IO parameters for the vehicle. Several conditions must be met for the functionality to be activated:

- Tick the **Enable I/Os** checkbox before starting the auto-select functionality

- The **Send I/O data with v1.1 protocol** must be enabled

- Enough free IO slots must be available (the needed number varies, depending on the vehicle)

Activation

The following criteria must be met:

1. The FM device is connected to the advanced configurator.

2. The engine is turned on.

3. The vehicle is not moving.

4. One or both CAN interfaces are connected to the vehicle's CANbus lines.

5. One of the following must be configured:

   - On both CAN interfaces *LCV* mode is selected (LCV group with dual channel)

   - On one CAN interface *LCV* mode is selected and the other CAN interface is disabled.

   - On one CAN interface *LCV* mode is selected and the other CAN interface is set to *Tacho read*, *MobilEye* or *Trailers.*

   - Both CAN interfaces are disabled.

When the criteria are met, click the **Start** button in the **LCV autoselect** section to start the detection process. This might take up to a few minutes and meanwhile, the configurator is inactive. After a successful selection, the CAN interface(s) will be automatically configured with the selected LCV group and subgroup combination. To view the result, go to the main configurator window, click **Get CFG** and proceed to the **IO settings** window to view the current CAN interface configuration.

> ✔ The functionality can also be enabled remotely using the *lcvselect* SMS command. Parameters *distance* or *RPM* can be provided to make the auto-selection process more accurate. The SMS command description can be found in the SMS Command List.

Auto-selection failure is indicated with one of the following responses:

- *LCV Autoselect is impossible now! Old protocol is used!*

- *Not enough I/O slots*

- *LCV Autoselect is impossible now! Wrong CAN configuration*

- *There is no answer from the FM device* – a critical process is running, please try again.

Error

LCV Autoselect is impossible now!
Old protocol is used!

OK
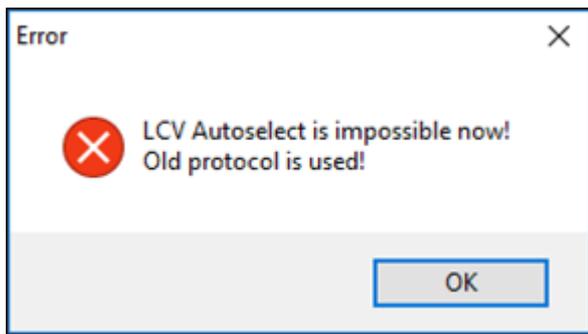
| ℹ | The **LCV Autoselect** functionality works only with light vehicles. Also, the **Active** CAN mode is unavailable and as a result, *Toyota, Truck, Tractor, Claas* and *Komatsu* LCV groups are excluded from the selection process. |

| ⚠ | The **LCV Autoselect** functionality does not guarantee that all supported CAN IO parameters for the selected LCV group and subgroup will be available for a specific vehicle. |

11.6 1-Wire Interface

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
⊘	✔	✔	✔	✔	✔	✔	✔	✔	⊘

The 1-Wire interface is used to connect various peripherals and sensors. Follow these steps to configure the 1-Wire interface:

1. Enable **Send I/O data with v1.1 protocol** in the **Protocol selection** section (for 5th gen devices enabled in the background).

2. Enable **1-Wire** in the **Interfaces** section.

3. Select *DS1971* from the drop-down list.

4. Click **Config**. A new **1-Wire Interface Configuration** window will open.

5. Set the **Data length** to determine how many bytes of data should be read. In an offset, the device will read bytes that are situated after skipped symbols. The default value is 8 bytes.

6. Set the **Offset** value. It defines how many starting symbols from the ID should be skipped when reading the DS1971 iButton. The default offset value is 0. Value range: 0 to 31.

7. Click **Enable IO**. A new **Configured IO** window will open.

8. Click **Save** to enable the selected IO parameters. All properties for the selected IO parameters will be automatically set.
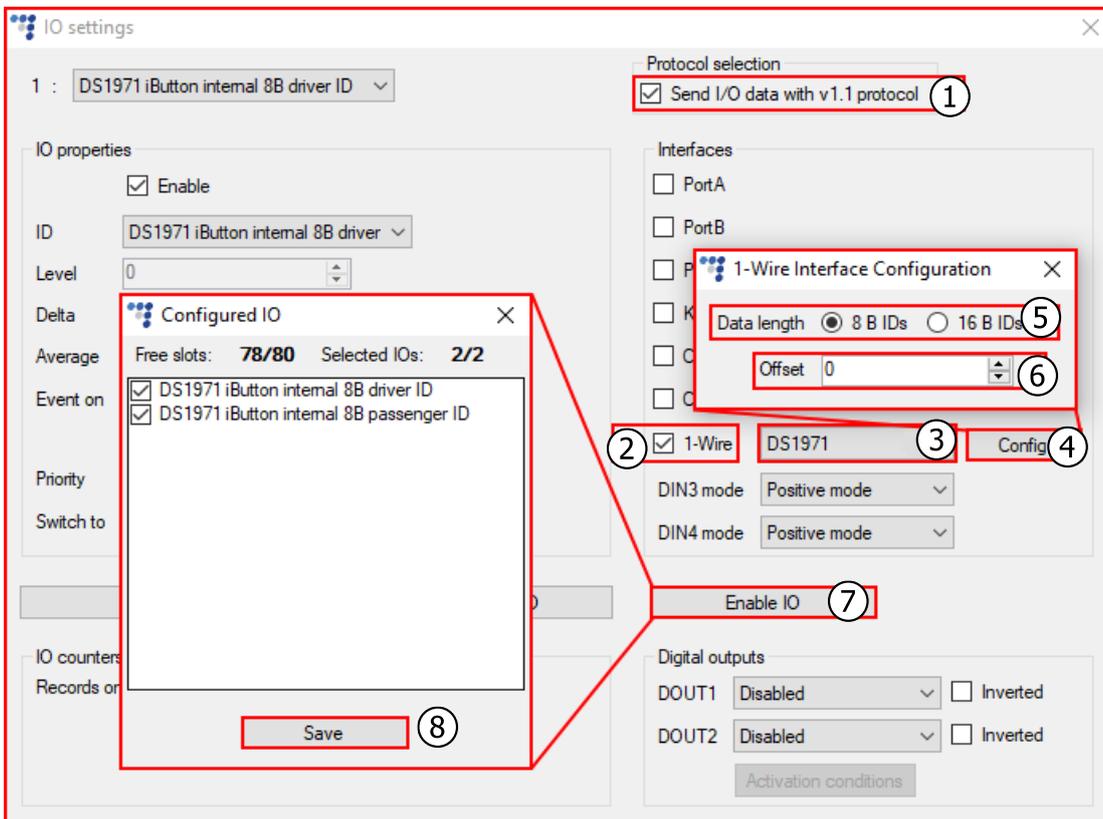
11.7 Digital Inputs

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	⊘

Select which mode to use for digital inputs.

| **DINX mode**	What signal level will change the state of the DIN. Possible values: • *Positive mode* – the state is changed when voltage is detected • *Ground mode* – the state is changed when a ground connection is detected Default value: *Positive mode*

> ℹ️ Some hardware versions of the devices may not support invertible digital inputs. Use the *setdinmode* SMS command to check, if your device supports the functionality.
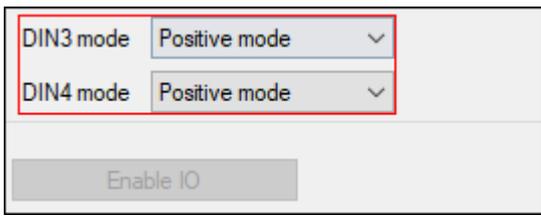
Connection example in *Positive mode* :
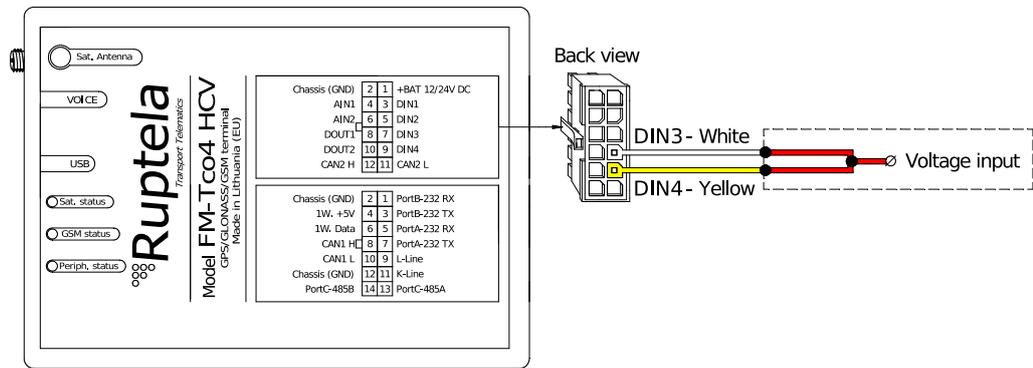
Connection example in *Ground mode* :
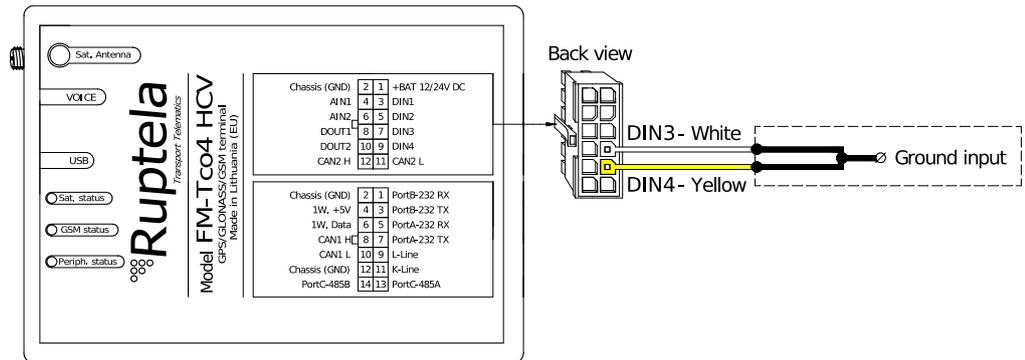
11.8 Digital Outputs

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
✔	✔	✔	✔	✔	✔	✔	✔	✔	⊘

> ✔ A full functionality description: [Digital Output User Manual](#).

Configure DOUT settings if you connected any peripherals to them.

DOUTX	Which mode will be used for DOUTs. The mode selection depends on the connected peripherals. The same mode cannot be used on both DOUTs. Possible values:
	• *Disabled* – the DOUT is disabled but can be controlled remotely via SMS or GPRS commands
	• *LED* – the DOUT controls a connected LED indicator
	• *Buzzer* – the DOUT controls a connected sound indicator
	• *Blocking* – used with *Blocking* driver registration mode, the DOUT blocks the engine from being started until a successful registration is made. The DOUT must be connected to a changeover relay.
	• *GSM jamming block* – the DOUT blocks the engine when GSM jamming is detected. The DOUT must be connected to a changeover relay.
	• *Custom* – used to emit a customizable pattern when the DOUT is triggered. *Custom* mode can be used with the Geofencing functionality or DOUT activation by conditions. *Custom* can only be enabled on one DOUT at a time.
	• *Immobilizer* – used to immobilize the vehicle. Can be activated and deactivated only via an SMS command.
	The following modes are available only for Trace5 and FM-Tco4 LCV:
	• *Lock* – used to lock the vehicle doors.
	• *Unlock* – used to unlock the vehicle doors.
	• *Lock/unlock* – used both to lock and unlock the vehicle doors.
	• *ATH* – if selected, the DOUT will block the engine if the *setlock* SMS command includes the *ath-on* parameter.
	More information about door control: [Vehicle door lock-unlock](#).
	Default value: *Disabled*
Inverted	If turned on, the DOUT logic will be inverted (e.g., an active DOUT will output a high signal level instead of a low signal level).
	Default value: *Disabled*
Activation conditions	Used to trigger the DOUT when the configured conditions are met.
	More information: [DOUT activation with conditions](#) chapter.

11.9 Audio Settings

5th Generation Devices				4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	✔	✔	✔	✔	⊘	⊘	⊘

Devices which have an audio jack interface have adjustable audio settings. Click the **Options** button in **Audio settings**. The following settings can be configured:

Audio output level	Sets the volume level of the audio output from **Mute** to the **Loudest**. Default value: 4 of 6
Microphone gain	Sets the gain level of the microphone loudness from **Lowest** to **Highest**. Default value: 4 of 6
Ringtone	Enables or disables the ringtone. Default value: Off
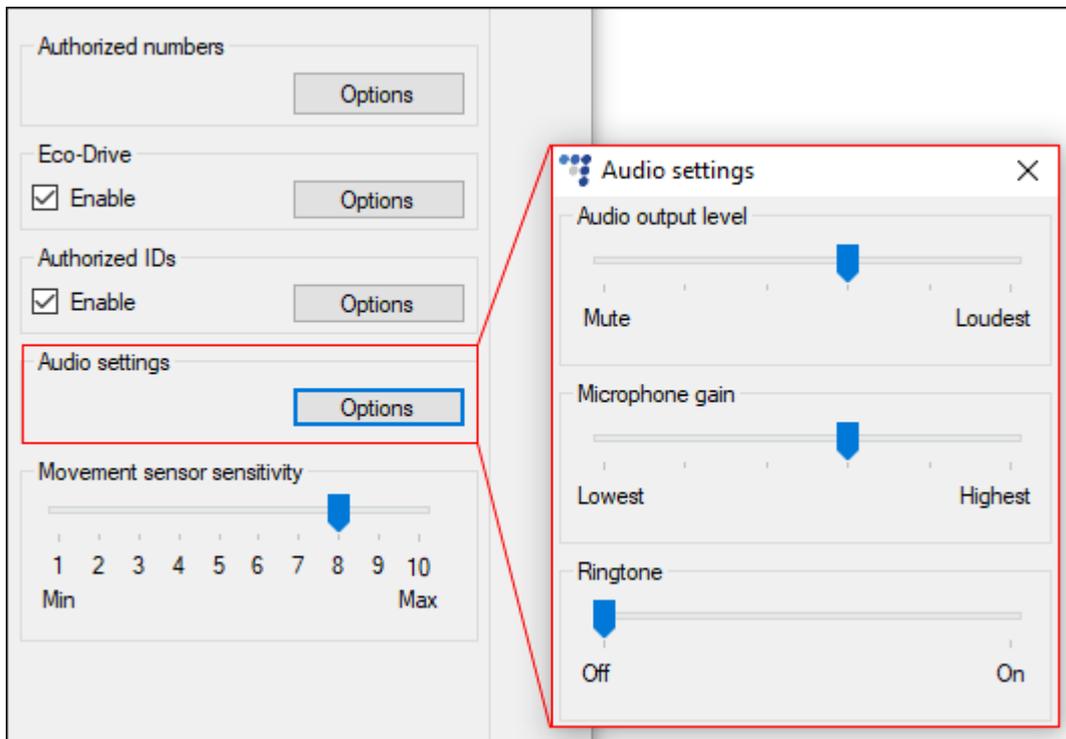
11.10 Wireless

|	5th Generation Devices			4th Generation Devices					
Trace5	**HCV5**	**LCV5**	**Pro5**	**Tco4 HCV**	**Tco4 LCV**	**Pro4**	**Eco4**	**Eco4 S/T**	**Plug4**
⊘	✔	✔	✔	⊘	⊘	⊘	⊘	⊘	⊘

Various wireless peripherals can be connected to tracking devices, which have Bluetooth connectivity.

Click **Options** in the **Wireless** section to open the **Wireless Communication** window and manage your wireless peripherals.

Click **Accessories List** to open the **Bluetooth Accessories** window.

> **ⓘ** **Device name, Connection PIN** and **Admin Password** configuration parameters do not need to be changed.

In the appeared list you can enter up to five Bluetooth accessories. For this you have to enter the following parameters:

Slot	Select a free slot for the accessory. The IOs must be assigned to the respective slot numbers, e.g. if a temperature sensor is configured on the slot 0, the *BT temperature sensor 0* parameter must be selected.
ID/MAC	Enter the sensor identifier. You can find the IDs in the following locations: • For the Tzone TZ-BT04 temperature and humidity sensors – on the back of the sensor (in HEX format). • For the ELA sensors – on the sticker of the sensor (in ASCII format). • For the Technoton S7 DUT-E sensors – below the head of the probe (in HEX format). • For the Technoton S7 GNOM sensors – on the head of the probe (in HEX format). • For the Escort TD sensors – under the sensor cap (enter without colons and in lowercase).
Timeout	How much time can pass between two consecutive advertisement packets, received from a particular sensor. If the timeout is exceeded, the IO parameter will contain an error value.
Type of Bluetooth LE accessory	Select the type of accessory, which you are connecting to.

> ⓘ You should select the slot and type of accessory first before entering the ELA sensor ID. Otherwise you will not be able to enter the ID in ASCII format.

Click the **Add** button to enter the values into the table. To remove an accessory from the list, click **Remove**. If you need to change one of the entered accessories, click on the required row and then **Change**.

To reduce the IO selection time, you can click **Enable IO** in the **Wireless Communication** window. This feature will offer you only those IO parameters, which are applicable for the sensors assigned to the slots. E.g., if there is one sensor, which is assigned to the slot *0*, in the window you will see *BT Temperature sensor 0*, *BT humidity sensor 0*, *Beacon battery 0* parameters. If required, uncheck some checkboxes and click **Save** to enable these parameters.
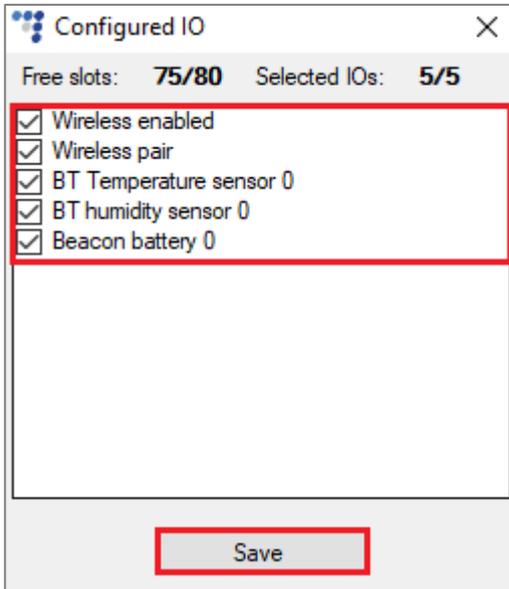
> For ELA sensors, the *Beacon battery X* parameter values will be displayed only when the battery charge level is below 15%. If the battery charge level is higher, the parameter value will be 255.
>
> The Technoton S7 (DUT-E, GNOM) sensors indicate low battery level (<10%) with a 1024 value in DTC. This data can be read via IO parameter *Beacon x DTC*, where *x* is the slot number.

12 SMS Commands and Settings

ℹ️ A full description of the SMS commands: SMS Commands List.

This part of the configuration describes SMS commands. This is an easy and quick way to interact with the FM device remotely. After sending an SMS command to the FM device, it can respond with an SMS message informing about the result.

The following configuration parts are described:

1. SMS authentication settings

2. SMS alerts

3. General description of how to configure the FM device using SMS commands

12.1 Authorized Numbers

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

The authorized numbers settings cover all SMS configuration settings including security, number validation, SMS commands and other.

In the main window, click the **Options** button in the **Authorized numbers** section to configure the following settings:

Password	Set a password to restrict access to the SMS commands feature.
	If entered, you will need to include the SMS password before every SMS command. This password cannot contain any names of any SMS commands and can contain up to 16 symbols. The following symbols are allowed:
	• All digits (0-9)
	• Letters A-Z (lowercase and uppercase)
	• _ @ # / % -
	Default value: *None*
SMS Alert Number	When a specific IO parameter is triggered, the FM device will send an alert message to this number.
	Default value: *None*
Call Number	When a specific IO parameter is triggered, the FM device will call this number.
	Default value: *None*
	Call duration: 300 s
	Not available for: Trace5, FM-Eco4, FM-Eco4 S/T, FM-Plug4
Valid Numbers	Enter a list of numbers that will be able to send commands to the device.
	Default value: *None*
Enable list for voice calls	If enabled, the entered numbers in the list can make a phone call to the device.
	Default value: *Disabled*
	Not available for: Trace5, FM-Eco4, FM-Eco4 S/T
Enable configuration over SMS	If enabled, enables device configuration using SMS commands.
	Default value: *Enabled*
Reject all incoming calls	If enabled, the device will reject all incoming calls.
	Default value: *Disabled*
	Not available for: Trace5, FM-Eco4, FM-Eco4 S/T
Use ID in SMS commands	If enabled, an ID tag must be provided to every sent SMS command. The device will respond with the same ID, showing to which command the device has replied. If the ID is not provided, SMS commands will not be processed.
	Default value: *Disabled*.
	Not available for: FM-Eco4, FM-Plug4

Numbers

Password

[   ]

SMS Alert Number

00 - [   ]

Call Number

00 - [   ]   ☐ Short code

Call duration, s [300] ▲▼

Valid Numbers

1 00 - [   ]

10 00 - [   ]

☐ Enable list for voice calls

☑ Enable configuration over SMS

☐ Reject all incoming calls

☐ Use ID in SMS commands

[Close]

12.2 SMS Alerts

5th Generation Devices				4th Generation Devices					
Trace5	HCV5	LCV5	Pro5	Tco4 HCV	Tco4 LCV	Pro4	Eco4	Eco4 S/T	Plug4
✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Some of the enabled IO parameters have an option to enable the SMS alert feature. The SMS alerts will be sent to the **SMS Alert Number** provided in the **Authorized numbers** options. The SMS alert message can be customized.

The following configured IO parameters can trigger the SMS alert functionality:

- All DINs – if **Event on** is set to *Change*

- Power supply voltage – if **Event on** is set to *Hysteresis* (**On Both** or **On Falling**)

- GPS speed – if **Event on** is set to *Hysteresis* (**On Both** or **On Rising**)

- Autogeofence alert – if **Event on** is set to *Change*

13 Finishing the Configuration

Once you have configured the device, do not forget to save the configuration to a file (using the **Save CFG** button in the menu toolbar) or the device.

Follow these steps to send the configuration to the device:

1. Select the **COM port** through which the FM device is connected to the computer.

2. Click the **Connect** button.

3. Click the **Send CFG** button to upload the configuration to your device.
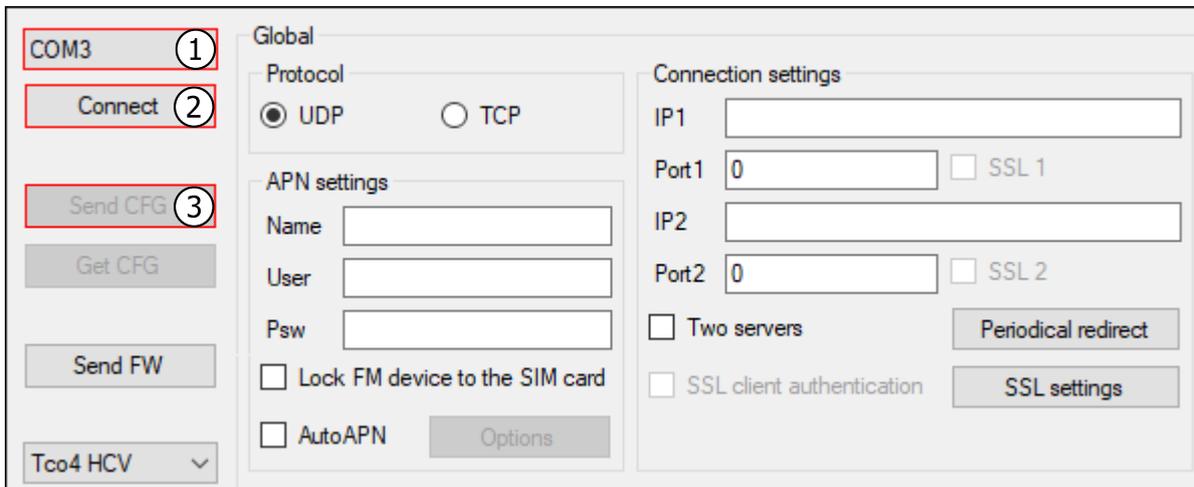
14 Updating the Firmware

We highly recommend using the newest firmware to take advantage of our newest functionalities and improvements. Device firmware can be updated automatically when the Device Center is newer than the firmware.

> ℹ The device will not send any data during firmware updates.

> ℹ If the advanced configurator is older than the firmware, you will not be able to load and save configuration files from/to the device. You will need to update the configurator.

14.1 Firmware File Extensions

HCV5:   **.efwt5**

LCV5:   **.efwl5**

Pro5:   **.efwp5**

Trace5:   **.efwa5**

Trace5 GL: **.efwg5**

FM-Tco4 HCV: **.efwt4**

FM-Tco4 LCV: **.efwl4**

FM-Pro4:   **.efwp4**

FM-Eco4:   **.efwe4**

FM-Eco4 S: **.efwk4**

FM-Eco4 T: **.efwk4**

FM-Eco4 RS T: **.efwj4**

FM-Plug4:   **.efwo4**

General firmware file pack for all the tracking devices: **ReleasePack_XXXX-XX-XX.fwp**. Where **XXXX-XX-XX** is the release of the firmware update.

14.2 Updating Firmware Automatically

If the advanced configurator is newer than the detected device firmware, it will suggest updating the firmware. Click **Yes** to update the firmware. Click **No** to create a configuration without updating the firmware. If the firmware is not updated, you will not be able to load and save configuration files from/to the device.

> **ℹ** To update the firmware of HCV5/LCV5/Pro5 devices, the tracking device must be first connected to a power supply.

> **✔** This method does not require an internet connection. This allows you to update the firmware at any time or location if you have the newest advanced configurator.

> **✔** If you skipped the automatic firmware update suggestion and you do not want to update the firmware manually, click **Send FW** and then **Cancel**. The Advanced configurator will suggest again to update the firmware.

14.3 Updating Firmware Manually

14.3.1 Updating Firmware using .efw* Extension Files

To update firmware with the .efw* extension file, click **Connect** and **Send FW** in the main configurator menu. Locate your firmware file and click **Open**. The firmware update process will start.

> **⚠** Bluetooth module may not work if the tracking device will be updated only with the .efw* firmware extension file. To enable Bluetooth, refer to chapter 14.3.2.
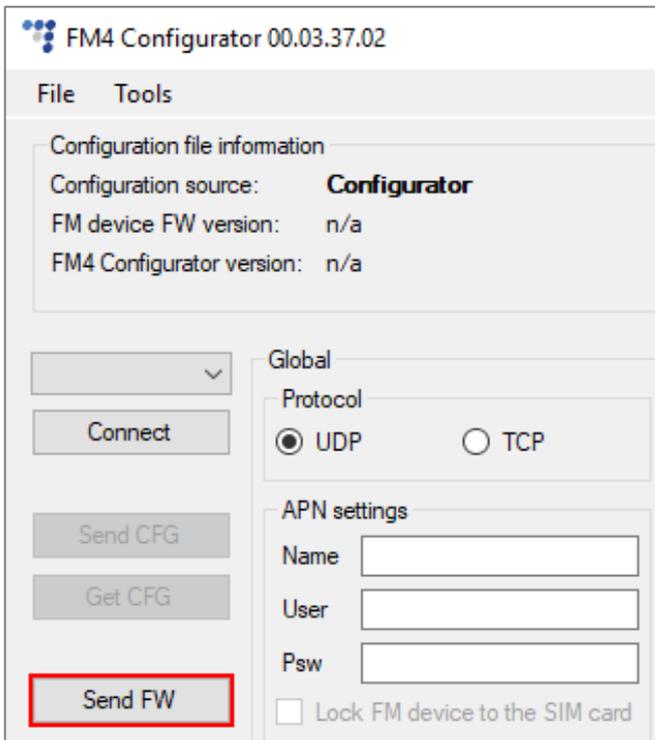
14.3.2 Updating Firmware using .fwp Pack

If you do not want to manually search for an appropriate firmware file for your tracking device, you can use a general firmware pack for all devices and advanced configurator will select the file for you. To update firmware with the .fwp pack, click **Connect** and **Send FW** in the main configurator menu. Locate your firmware .fwp pack and click **Open**. The advanced configurator will upload the required device firmware file(s) and the update process will start.

> **ⓘ** To update the Bluetooth module firmware, the tracking device must be first connected to a power supply.

> **ⓘ** If the Bluetooth module firmware version is incompatible with the device firmware version, Bluetooth will be disabled.