# FM-Eco4 T User Manual

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# Purpose of This Document

The purpose of this user manual is to provide information about the FM-Eco4 T Series devices. This user manual describes the main features of the device and how to use it.

# Legal Information

# Document Changelog

| Version | Date | Modification |
|---------|------|--------------|
| 1.0 | 2020-02-14 | Initial draft. |
| 1.1 | 2020-04-03 | Added: Backup Server. <br> Updated: GNSS module characteristics in Connectivity. |
| 1.2 | 2020-04-27 | Added: 2G variations of FM-Eco4 T series. <br> Added: Installation Assistant. <br> Updated: Inserting a SIM card (IP67 housing). |
| 1.3 | 2020-08-05 | Added: RS variations of FM-Eco4 T series. |
| 1.4 | 2020-10-16 | Added: Settings Menu. <br> Added: Location Accuracy. <br> Updated: Configuration Menu. |
| 1.5 | 2020-10-26 | Updated: Certifications. |

# Safety Information

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

| ⚠ | All the associated (additional) equipment such as computers, batteries, sensors, etc. shall meet the requirements of standard EN60950-1. |
|---|---|
| ⚠ | Do not disassemble the device. If the enclosure of the device is damaged, or the insulation of the wires is damaged, disconnect the power supply cables from the power supply source first. |

| | |
|---|---|
| ⚠ | All wireless data transferring equipment produces interference that may affect other devices placed nearby. |
| ⚠ | The device can be installed or dismounted only by qualified personnel! |
| ⚠ | The device must be firmly fastened in a predefined location. The predefined location is described in the installation instructions. |
| ⚠ | The configuration must be performed using a 2nd safety class computer (with an autonomic power supply). |
| ⚠ | Make sure that the device is installed in a location where it will not be subjected to harsh environmental conditions for extended time periods. |
| ⚠ | Any installation and/or handling during a lightning storm is prohibited. |
| ⚠ | Caution! If an incorrect type of battery is used for replacement, there is a high explosion risk. Dispose of used batteries according to the environmental requirements. |
| ⚠ | For configuration use cables that were purchased from Ruptela. Ruptela is not responsible for any harm or damage caused while using the wrong cables. |
| ⚠ | Attention! Do not connect the wires marked red (power supply) and black (chassis) to the wrong battery poles. The device has reverse polarity protection, however, if connected incorrectly, the device will not work. |
| ⚠ | Disconnect the device from the power supply before dismounting it. |
| ⚠ | To disconnect the device from the power supply, you need to disconnect the 12 Pin connector from the device or disconnect the wires from the vehicle's power supply. |
| ⚠ | Ensure that the cross-sectional area of the wires is at least 0.75 mm$^2$. |
| ⚠ | Install the device in a restricted access location, not accessible or visible to the driver. |
| 🗑 | 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. |

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

**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. |
|---|---|

# Acronyms and Abbreviations

AC/DC – Alternating current/Direct current

APN – Access Point Name

DIN – Digital Input

DOUT – Digital Output

HDOP – Horizontal Dilution of Precision

GLONASS – Global Navigation Satellite System

GMT – Greenwich Mean Time

GNSS – Global Navigation Satellite System

GPRS – General Packet Radio Service

GPS – Global Positioning System

GSM – Global System for Mobile Communications

OBD – On-board Diagnostics

LED – Light Emitting Diode

PCB – Printed Circuit Board

SMS – Short Message Service

TCP – Transmission Control Protocol

UDP – User Datagram Protocol

UMTS – Universal Mobile Telecommunications System

USB – Universal Serial Bus

VCOM – Virtual Communication Port

# References

Datasheets: https://doc.ruptela.com/articles/#!project-tracking-devices/fm-eco4t-datasheets

Quick Start Guides: https://doc.ruptela.com/articles/#!project-tracking-devices/fm-eco4t-quick-start-guides

Device Center: https://doc.ruptela.com/articles/#!downloads-publication/device-center

Advanced configuration manual: https://doc.ruptela.com/articles/#!tracking-devices-publication/advanced-configurator-user-manual

Firmware and configurator files: https://doc.ruptela.com/articles/#!downloads-publication/downloads-home

Microsoft Framework: https://dotnet.microsoft.com/download/dotnet-framework/net48

VCOM drivers: https://doc.ruptela.com/articles/#!downloads-publication/tracking-device-drivers

## 1.1 FM-Eco4 T Product Information

## About

FM-Eco4 T is a low cost, low power consumption basic tracking device. It acquires its position with a GNSS signal and transfers data to a server via cellular GSM/GPRS/UMTS networks. The FM-Eco4 T Series devices come in the following variations:

- FM-Eco4 light T (does not include an internal battery)
- FM-Eco4 light+ T (includes an internal battery)
- FM-Eco4+ T (includes an internal battery and IP67 certified housing)
- FM-Eco4+ E T (includes an internal battery, IP67 certified housing and external GNSS antenna)
- FM-Eco4 light+ 3G T (includes an internal battery and UMTS (3G))
- FM-Eco4+ 3G T (includes an internal battery, IP67 certified housing and UMTS (3G))
- FM-Eco4+ 3G E T (includes an internal battery, IP67 certified housing, an external GNSS antenna and UMTS (3G))
- FM-Eco4 light+ RS T (includes an internal battery and RS232 serial interface)
- FM-Eco4+ E RS T (includes an internal battery, IP67 certified housing, an external GNSS antenna and RS232 serial interface)
- FM-Eco4 light+ 3G RS T (includes an internal battery, UMTS (3G) and RS232 serial interface)
- FM-Eco4+ 3G E RS T (includes an internal battery, IP67 certified housing, an external GNSS antenna, UMTS (3G) and RS232 serial interface)

| | | |
|---|---|---|
|  |  |  |
| FM-Eco4 light+ RS T | FM-Eco4+ 3G T | FM-Eco4+ 3G E T |

## Device Overview (Regular Housing)

| 1 12 Pin port | 2 Mini USB port | 3 Indication LEDs |
|---|---|---|

# Device Overview (IP67 Housing)



| 1 12 Pin cable | 2 GNSS antenna cable | 3 Indication LEDs |
|---|---|---|

**GNSS antenna cable applicability**

| | | | |
|---|---|---|---|
| ⊘ FM-Eco4+ T | ✔ FM-Eco4+ E T | ⊘ FM-Eco4+ 3G T | ✔ FM-Eco4+ 3G E T |
| ⊘ FM-Eco4+ RS T | ✔ FM-Eco4+ RS E T | ⊘ FM-Eco4+ 3G RS T | ✔ FM-Eco4+ 3G RS E T |

# Key Features

- Real-time data from GPS and accelerometer
- Driver behavior monitoring (Eco-Drive)
- Driver identification
- Temperature monitoring
- Remote ignition blocking

- Internal geozones
- Jamming detection
- Commands and configuration via SMS
- Supports additional sensors

# Package Contents (Regular Housing)

The device is packed in a cardboard box. The package contains the following items:

1. The device itself
2. A 12 Pin cable

> ℹ️ By default, no SIM card is provided in the package. SIM cards can be obtained from your local phone operator.



# Package Contents (IP67 Housing)

The device is packed in a cardboard box. The package contains the following items:

1. The device itself

2. An external GNSS antenna (FM-Eco4+ E S only)

3. A signal cable

> ℹ️ By default, no SIM card is provided in the package. SIM cards can be obtained from your local phone operator.



# Certifications

The FM-Eco4 T Series devices have passed quality tests and comply with the following certifications:

| | | |
|---|---|---|
| (E1) | E-Mark | Certification of Economic Commission for Europe is the European conformity mark issued by the transport sector, indicating that the product complies with relevant laws and regulations or directives. |

| | | |
|---|---|---|
| $CE$ | CE/RED | CE is a certification mark that ensures conformity with health, safety and environmental protection standards for products sold within European Economic Area (EEA). The Radio Equipment Directive, or RED, covers the standards for wireless devices. |
| FC | **FCC** (Valid only for 3G variations) | **(47 CFR part 15, subpart B)** The FCC Declaration of Conformity is a certification mark employed on electronic products manufactured or sold in the United States which certifies that the electromagnetic interference from the device is under limits approved by the Federal Communications Commission.<br><br>This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:<br><br>• Reorient or relocate the receiving antenna.<br>• Increase the separation between the equipment and receiver.<br>• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.<br>• Consult the dealer or an experienced technician for help.<br>**Contains FCC ID: XMR201508UG96** |
| **RoHS** | RoHS | The Restriction of Hazardous Substances Directive restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. |
| ⌧ | WEEE | The Waste Electrical and Electronic Equipment Directive is the European Community Directive set collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic electronic waste. |
| EAC | EAC | The Eurasian Conformity Mark indicates products that conform to all technical regulations of the Eurasian Customs Union. It means that the device meets all requirements of the corresponding technical regulations and have passed all conformity assessment procedures. |
| РСТ | GOST | GOST refers to a set of technical standards maintained by the Euro-Asian Council for Standardization, Metrology and Certification (EASC), a regional standards organization under the auspices of the Commonwealth of Independent States (CIS). |
| IP67 | IP67 | The device is protected from total dust ingress. |

| | | The device is protected from immersion in depths from 15 centimeters to 1 meter. |
| :--- | :--- | :--- |
| | | The following devices have an IP67 rating: |
| | | <ul><li>FM-Eco4+ 3G T</li><li>FM-Eco4+ 3G E T</li><li>FM-Eco4+ T</li><li>FM-Eco4+ E T</li><li>FM-Eco4+ E RS T</li><li>FM-Eco4+ 3G E RS T</li></ul> |
| **ANATEL** 14328-20-10736 | **ANATEL** (Valid only for 2G variations) | A certification of radio products for the Brazilian market based on an approval of the local authority Agência Nacional De Telecomunicações (Anatel). This equipment is not entitled to protection against harmful interference and must not cause interference in duly authorized systems. |

## 1.2 FM-Eco4 T Technical Information

# Indication LED Patterns

| LED | Pattern | Description |
|---|---|---|
| **GNSS** | Once every second | Accurate signal |
| | Once every 0.4 seconds | No signal |
| **GSM** | Once every 4 seconds | Accurate GSM and GPRS signal |
| | Once every second | Accurate GSM signal, no GPRS |
| | Once every 0.2 seconds | No signal |
| | Always on | Link with the server is open |
| **1-Wire** | Always off | No devices connected |
| | Once every 5 seconds | One device connected |
| | Twice every 5 seconds | Two devices connected |
| | Three times every 5 seconds | Three devices connected |
| **All** | Once every 5 seconds | Sleep/deep sleep mode |

# Device Pinout

## Variations without RS232 interface

| Pin | Wire color | Description |
|---|---|---|
| **+BAT/VIN** | Red | Power supply 6/12/24V |
| **GND** | Black | Ground connection |
| **DIN1** | Pink | Digital input 1 |
| **DIN2** | Blue | Digital input 2 |
| **DIN3** | White | Digital input 3 (invertible) |
| **DIN4** | Yellow | Digital input 4 (invertible) |
| **AIN1** | Grey | Analog input 1 |
| **AIN2** | Green | Analog input 2 |
| **DOUT1** | Purple | Digital output 1 |
| **DOUT2** | Orange | Digital output 2 |
| **1-Wire POWER** | White/Red | 1-Wire power |
| **1-Wire DATA** | Green/Yellow | 1-Wire data |

## RS232 variations

| Pin | Wire color | Description |
|---|---|---|

| | | |
|---|---|---|
| **+BAT/VIN** | Red | Power supply 6/12/24V |
| **GND** | Black | Ground connection |
| **DIN1** | Pink | Digital input 1 |
| **RS232 RX** | Blue | RS232 RX |
| **DIN3** | White | Digital input 3 (invertible) |
| **DIN4** | Yellow | Digital input 4 (invertible) |
| **AIN1** | Grey | Analog input 1 |
| **RS232 TX** | Green | RS232 TX |
| **DOUT1** | Purple | Digital output 1 |
| **DOUT2** | Orange | Digital output 2 |
| **1-Wire POWER** | White/Red | 1-Wire power |
| **1-Wire DATA** | Green/Yellow | 1-Wire data |

# Physical Characteristics

**2G variations**

| | |
|---|---|
| Dimensions | 64.5 x 61 x 22 mm (regular housing) |
| | 95 x 76.4 x 28.8 mm (IP67 housing) |
| Weight | 59 ± 5 g (FM-Eco4 light T) |
| | 65 ± 5 g (FM-Eco4 light+ T and FM-Eco4 light+ RS T) |
| | 148 ± 5 g (FM-Eco4+ T) |
| | 185 ± 5 g (FM-Eco4+ E T and FM-Eco4+ E RS T) |
| Housing material | Plastic |
| Connector | 12 Pin, insulated |
| Configuration interface | Mini USB |
| Antenna | Internal |
| | External (FM-Eco4+ E T and FM-Eco4+ E RS T only) |

**3G variations**

| | |
|---|---|
| Dimensions | 64.5 x 61 x 22 mm (regular housing) |
| | 95 x 76.4 x 28.8 mm (IP67 housing) |
| Weight | 65 ± 5 g (FM-Eco4 light+ 3G T and FM-Eco4 light+ 3G RS T) |
| | 148 ± 5 g (FM-Eco4+ 3G T) |

| | 185 ± 5 g (FM-Eco4+ 3G E T and FM-Eco4+ 3G E RS T) |
|---|---|
| Housing material | Plastic |
| Connector | 12 Pin, insulated |
| Configuration interface | Mini USB |
| Antenna | Internal<br><br>External (FM-Eco4+ 3G E T and FM-Eco4+ 3G E RS T only) |

# Technical Characteristics

## Environmental Specifications

| Temperature | Operating: -20 to +60 °C<br>Battery charging:    0 to +45 °C<br>Battery discharging: -20 to +60 °C<br>Storage: -20 to +60 °C |
|---|---|
| Relative humidity | 5 % to 95 % Non-condensing |

## Electrical Specifications

**2G variations**

**FM-Eco4 light T**

| Power supply range | 6 – 31.5 V DC |
|---|---|
| Maximum current rating | 500 mA @ 6 V DC |
| Internal battery | None |
| Protections | Battery short circuit protection (not applicable for FM-Eco4 light T)<br>Reverse polarity protection<br>Overcurrent protection on 1-Wire power line |

**FM-Eco4 light+ T, FM-Eco4 light+ RS T, FM-Eco4+ T, FM-Eco4+ E T, FM-Eco4+ E RS T**

| Power supply range | 6 – 31.5 V DC |
|---|---|
| Maximum current rating | 500 mA @ 6 V DC |
| Internal battery | LiPo 3.7 V 190 mAh |
| Protections | Battery short circuit protection (not applicable for FM-Eco4 light T)<br>Reverse polarity protection<br>Overcurrent protection on 1-Wire power line |

**3G variations**

| Power supply range | 6 – 31.5 V DC |
|---|---|
| Maximum current rating | 500 mA @ 6 V DC |
| Internal battery | LiPo 3.7 V 190 mAh |
| Protections | Battery short circuit protection<br>Reverse polarity protection<br>Overcurrent protection on 1-Wire power line |

## Power Consumption @ 12 V DC

**2G variations**

| Operating<br>(battery fully charged) | Idle mode: 33 mA<br>Active mode (peak @ GSM): 135 mA<br>Sleep mode: 7 mA<br>Deep sleep mode: 4 mA |
|---|---|

**3G variations**

| Operating<br>(battery fully charged) | Idle mode: 33 mA<br>Active mode (peak @ GSM): 138 mA<br>Sleep mode: 6.3 mA<br>Deep sleep mode: 4 mA |
|---|---|

**2G RS variations**

| Operating<br>(battery fully charged) | Idle mode: 33 mA<br>Active mode (peak @ GSM): 135 mA<br>Sleep mode: 11 mA<br>Deep sleep mode: 4 mA |
|---|---|

**3G RS variations**

| Operating<br>(battery fully charged) | Idle mode: 33 mA<br>Active mode (peak @ GSM): 138 mA<br>Sleep mode: 12 mA<br>Deep sleep mode: 4 mA |
|---|---|

## Connectivity

**2G variations**

| GSM/UMTS modem | Modem: Quectel M95<br>Antenna: Internal (Quad-band)<br>Frequency band @ GSM: 850/900/1800/1900 MHz |
|---|---|
| GNSS module | Module: U-blox EVA-M8M<br>Antenna: Internal or external (FM-Eco4+ E T and FM-Eco4+ RS E T only)<br>Positioning systems: GPS, GLONASS, Galileo<br>Augmentation systems: QZSS, SBAS (WAAS, GAGAN, EGNOS, MSAS)<br>Aided start services: AssistNow Online<br>Frequency: 1575.42 MHz (GPS, Galileo); 1602 MHz (GLONASS)<br>Tracking sensitivity: -154 to -164 dBm<br>Reacquisition sensitivity: -152 to -160 dBm<br>Cold start duration: < 30 s<br>Aided start duration: As low as 3 s |

**3G variations**

| GSM/UMTS modem | Modem: Quectel UG96<br>Antenna: Internal (Quad-band)<br>Frequency band @ 2G (GSM): 850/900/1800/1900 MHz<br>Frequency band @ 3G (UMTS): 800/850/900/1900/2100 MHz |
|---|---|
| GNSS module | Module: U-blox EVA-M8M<br>Antenna: Internal or external (FM-Eco4+ 3G E T and FM-Eco4+ RS E T only)<br>Positioning systems: GPS, GLONASS, Galileo<br>Augmentation systems: QZSS, SBAS (WAAS, GAGAN, EGNOS, MSAS)<br>Aided start services: AssistNow Online<br>Frequency: 1575.42 MHz (GPS, Galileo); 1602 MHz (GLONASS)<br>Tracking sensitivity: -154 to -164 dBm<br>Reacquisition sensitivity: -152 to -160 dBm<br>Cold start duration: < 30 s<br>Aided start duration: As low as 3 s |

# Interfaces

## Power Supply

| Pins | +BAT/VIN, GND/CHASSIS |
|---|---|
| Purpose | To power the device |
| Parameters | Voltage range: 6 – 31.5 V DC |

## Analog Inputs

| Pins | AIN1, AIN2 (AIN2 is not applicable for RS variations) |
|---|---|
| Purpose | To monitor the values of various peripherals |

| Parameters | Voltage range: 0 – 30 V DC |
| --- | --- |
| | Resolution: 12 bit |
| Applications | Various sensors |

## Digital Inputs

| Pins | DIN1, DIN2, DIN3 (invertible), DIN4 (invertible) (DIN2 is not applicable for RS variations) |
| --- | --- |
| Purpose | To monitor the values of various peripherals |
| Parameters | Voltage range: 0 – 30 V DC |
| | Voltage threshold: 4 V DC (250 mV DC if in ground mode) |
| Applications | Ignition detection |
| | Various sensors |

## Digital Outputs

| Pins | DOUT1, DOUT2 (both invertible) |
| --- | --- |
| Purpose | To control various peripherals |
| Parameters | Maximum voltage: 32 V DC |
| | Maximum current: 1 A |
| Applications | Driver registration |
| | Engine blocking |
| | Warning indication |
| | Network jamming detection |

## 1-Wire

| Pins | 1-Wire POWER, 1-Wire DATA |
| --- | --- |
| Purpose | To monitor the values of various peripherals |
| Parameters | Power output: 100 mA @ 4.67 V DC |
| | Maximum cable capacitance: 4 nF |
| Applications | Driver registration |
| | Temperature sensors |
| | Trailer assignation |

## Serial Ports (Only for RS232 Variations)

| Pins | RS232 RX, RS232 TX |
|---|---|
| Purpose | To connect and communicate with peripheral devices |
| Applications | LED display<br>Alcohol sensor<br>Magnetic card reader<br>RFID reader<br>UHF-RFID reader<br>Fatigue sensor |

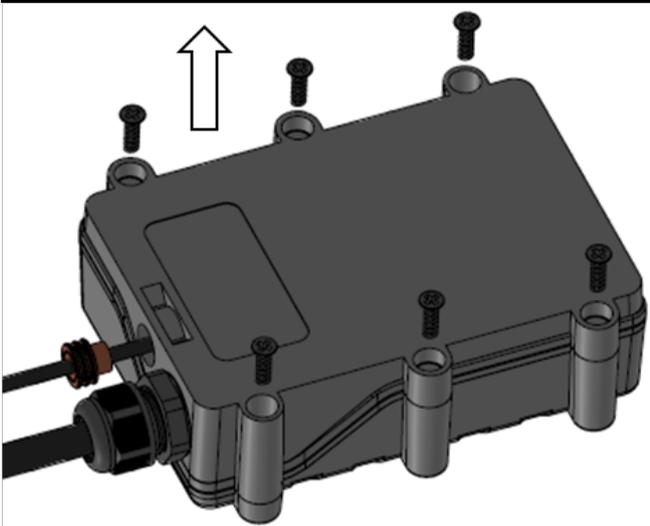## 1.3 FM-Eco4 T Device Preparation (Regular Housing)

For the device to work, you first need to insert a SIM card. To do so, open the device housing and perform the actions described below.

## Opening the Device

Use a flat head screwdriver to open the plastic housing. Insert the screwdriver between the top and bottom parts of the housing and lift the top part up as shown in the image below. The top of the housing should easily dismount from the holding pins.

| ⊘ | Make sure that the device is powered off before opening it! |
|---|---|

| ⊘ | The use of inappropriate tools or excessive force may cause permanent damage to the device. |
|---|---|



| ⚠ | Avoid opening the device more times than required, as it may wear out the holding pins. |
|---|---|

## Inserting a SIM Card

Insert your SIM card into the device as shown in the image below. The microchip must be facing down.

| ℹ | All SIM card security codes must be disabled, otherwise, the SIM card will not work with the device. |
|---|---|

| ✔ | Use a non-prepaid SIM card to ensure that the balance does not suddenly run out and cause connectivity issues. |
|---|---|

# Closing the Device

To close the device, you first need to reinsert the PCB if it was taken out of the housing and attach it to the holding pins. Reinsert the PCB in the following order:

1. Orient the PCB so that it is facing up
2. Put the PCB under the middle plastic pin (1)
3. Mount the PCB on the stabilizer pin (2)
4. Mount the PCB on the support pin (3)

Once one side of the PCB is attached to the holding pins, push the other side of the PCB down onto the other pins. The PCB should attach to them easily.



Once the PCB is attached to the pins, place the of top the housing on one side of the device as shown in the image below. Then simply push the other side down until you hear a clicking sound and the housing is closed.

# Cable Connection

## 12 Pin Cable Connection

Connect the 12 Pin cable to the 12 Pin Micro-Fit port on the device as shown in the image below. The cable can be connected in only one way.



## USB Cable Connection

Connect the USB cable to the mini USB port as shown in the image below. The cable can be connected in only one way. Connect the other end to your computer.



| ✔ | The device can be configured when powered via USB, using an external power supply for configuration is optional. |
|---|---|

## 1.4 FM-Eco4 T Device Preparation (IP67 Housing)

For the device to work, you first need to insert a SIM card. To do so, open the device housing and perform the actions described below.

## Opening the Device

Use a "+" type screwdriver to open the plastic housing. Unscrew the 6 screws at the bottom of the device as shown in the image below. Once unscrewed, the top of the housing should come off easily.

| ⊘ | Make sure that the device is powered off before opening it! |
|---|---|

| ⊘ | The use of inappropriate tools or excessive force may cause permanent damage to the device. |
|---|---|



| ⚠ | Avoid opening the device more times than required, as it may wear out the holding pins. |
|---|---|

## Inserting a SIM Card

Insert your SIM card into the device as shown in the image below. The microchip must be facing down.

| ℹ | All SIM card security codes must be disabled, otherwise the SIM card will not work with the device. |
|---|---|

| ✔ | Use a non-prepaid SIM card to ensure that the balance does not suddenly run out and cause connectivity issues. |
|---|---|

# Cable Connection

## 12 Pin Cable Connection

The 12 Pin cable is connected out of the box, you do not need to reconnect it.

## USB Cable Connection

Connect the USB cable to the mini USB port as shown in the image below. The cable can be connected in only one way. Connect the other end to your computer.
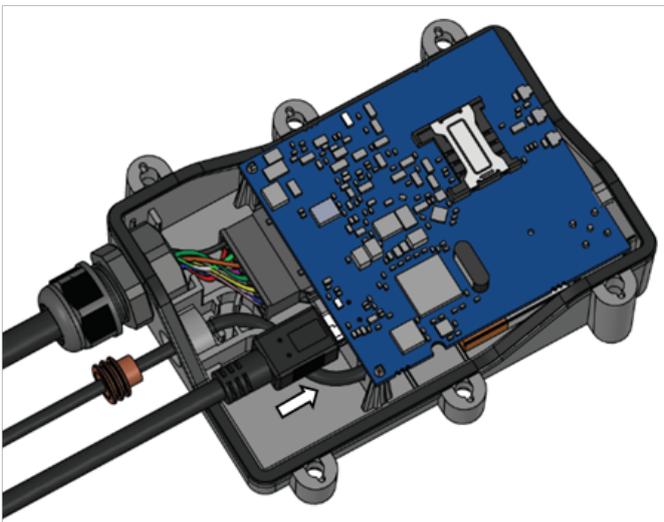
✔ The device can be configured when powered via USB, using an external power supply for configuration is optional.

## External GNSS Antenna Cable Connection (if applicable)

The external GNSS antenna cable is connected out of the box, you do not need to reconnect it.

## External GNSS Antenna Cable Reconnection (if applicable)

In some cases, you may need to disconnect the antenna from the device during installation. It is important to disconnect and reconnect the antenna properly to maintain the integrity of the housing. Follow these steps to disconnect the antenna:

| | |
|---|---|
| 1. Unscrew the housing screws and remove the top (see the picture in section 5.1).  | 2. Carefully remove the PCB from the holding points.  |
| 3. Disconnect the antenna cable from the PCB  | 4. Move the antenna gasket (1) out of the housing and remove the antenna cable (2) from the housing.  |
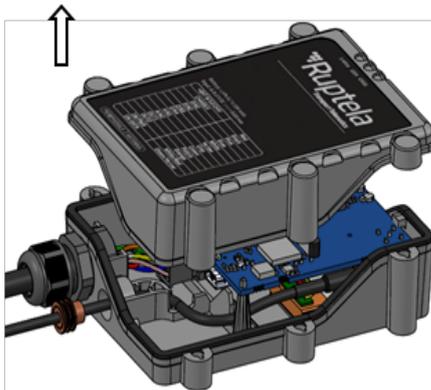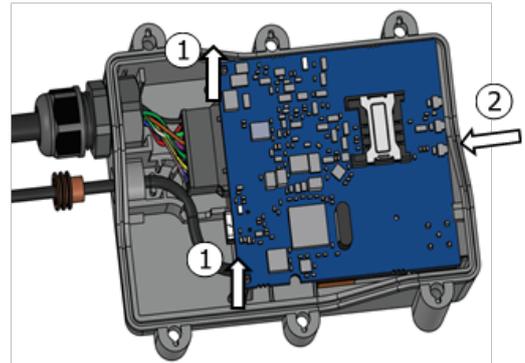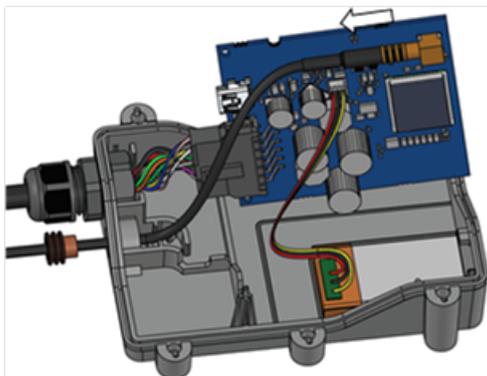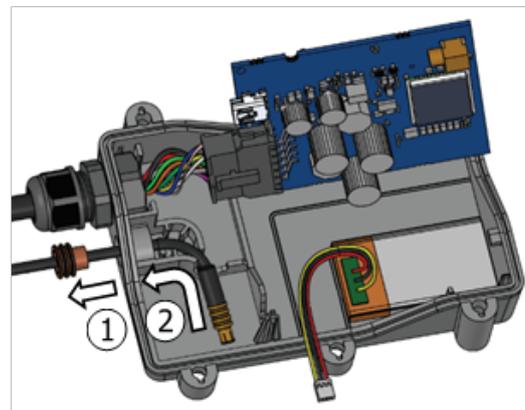
Afterwards, follow these steps to reconnect the antenna:

| | |
|---|---|
| 1. Insert the antenna cable into the housing.  | 2. Reconnect the antenna cable to the PCB.  |
| 3. Mount the PCB onto the holding points (1) (2), while firmly placing the cable into its fixing point (3).  | 4. Put the top on and screw in the screws (1). Carefully insert the gasket (2) into its place, make sure it is inserted tightly.  |
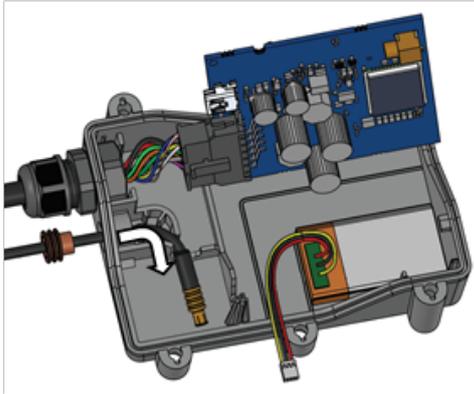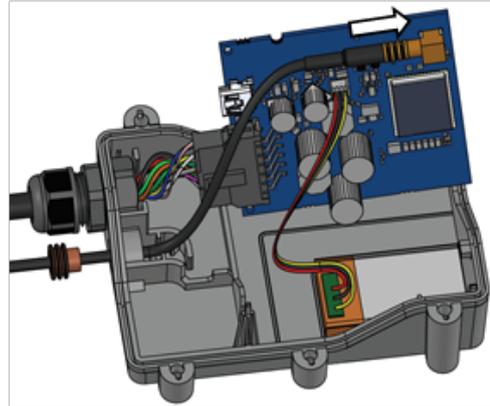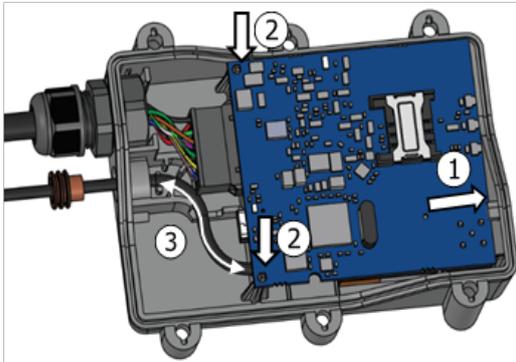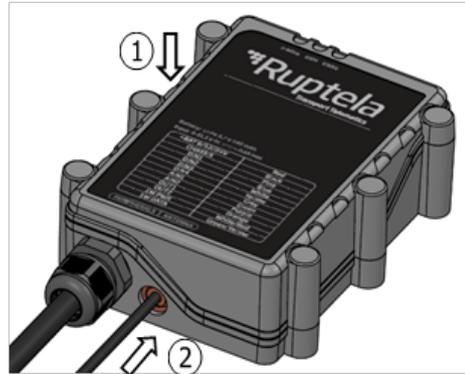
⊘ If step 4 is not completed, the housing will not be waterproof!

## 1.5    FM-Eco4 T Device Configuration

## Device Center

The Device Center application is used to configure the device. The Device Center 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
- Update the device firmware

Download the Device Center from our documentation website: Device Center.

**Make sure to download and install the required drivers listed below:**



You can also find a detailed description of the Device Center in the User manual section.

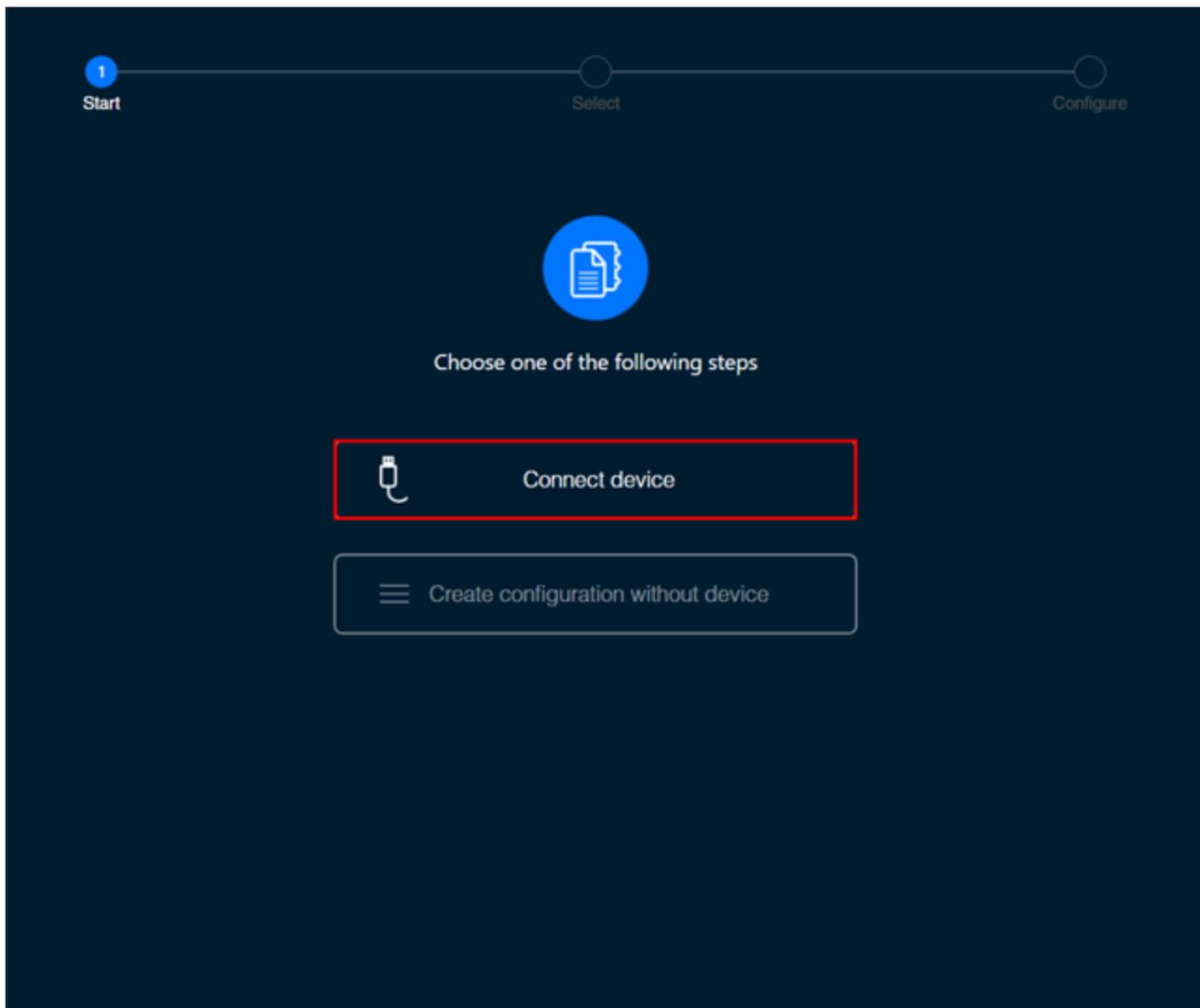Extract the downloaded archive to your desired location. Launch **DeviceCenter.exe**.
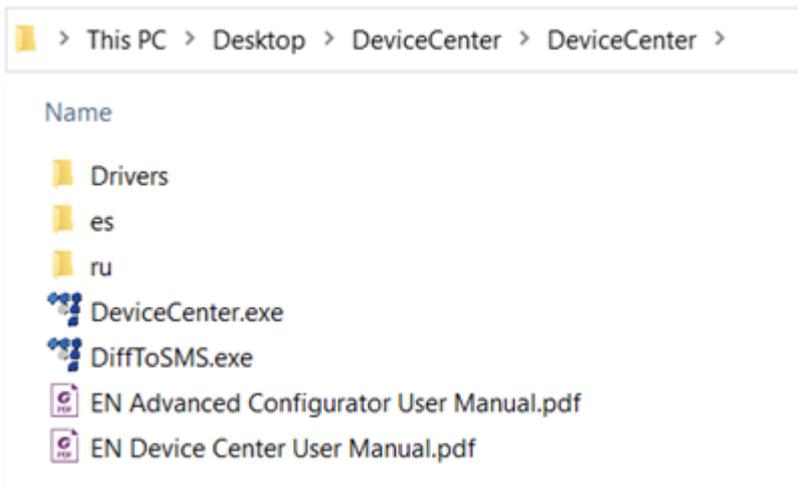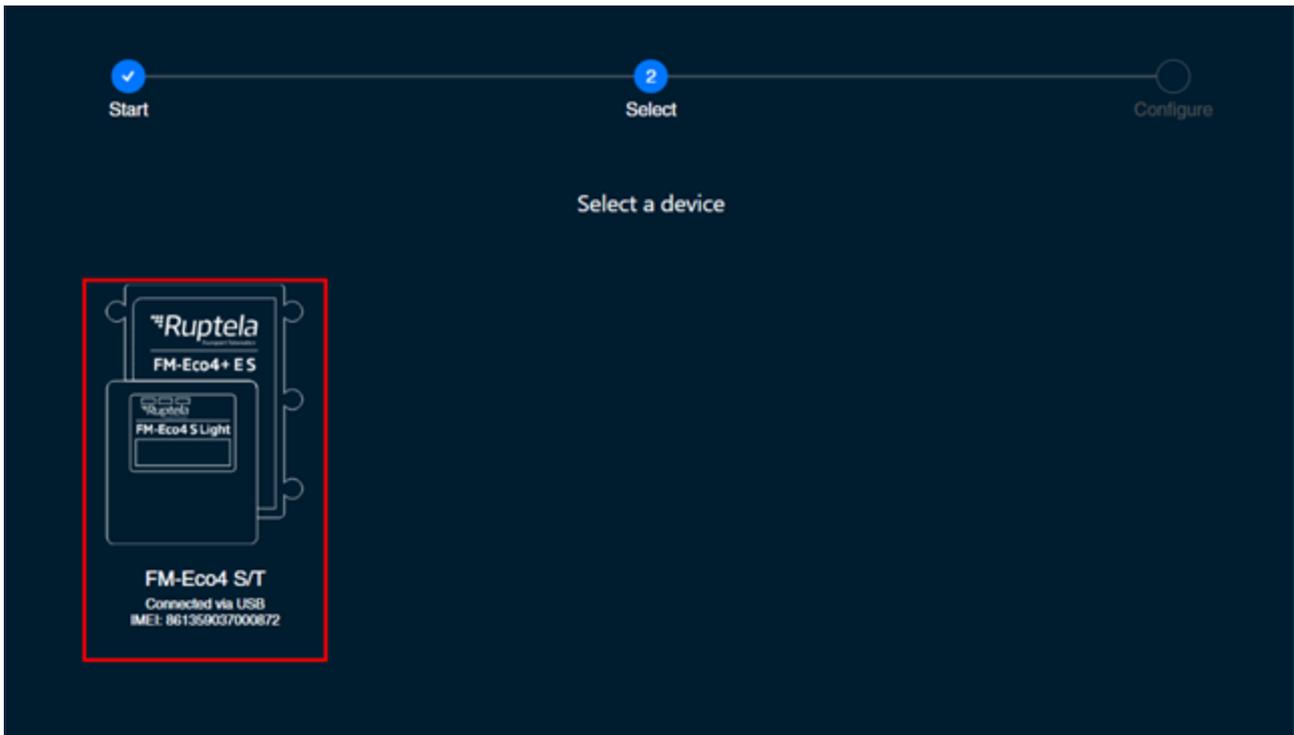
# Starting the Configuration

After launching the Device Center, click **Configure device** in the main menu.
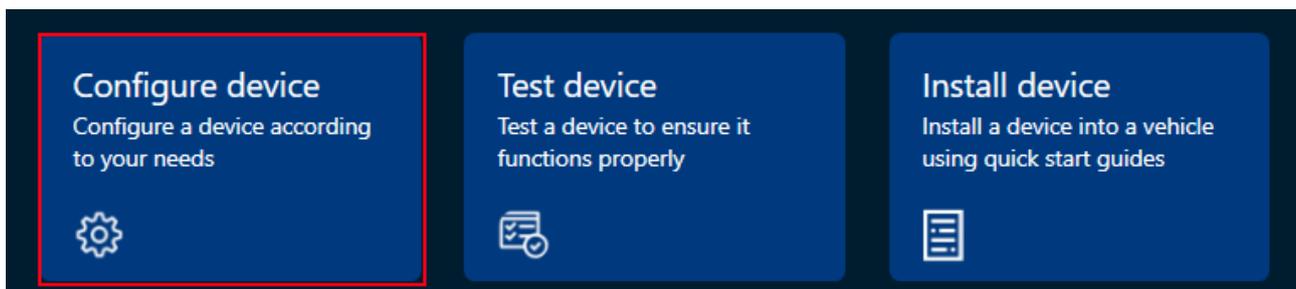


If the VCOM drivers are installed, you will be directed to the configuration type selection menu. Click **Connect device**.

Select your device in the device selection menu by clicking on it.

## Configuration Menu

After device selection, you will be directed to the main configuration menu. This menu has the following elements:

1. An **Advanced mode** button – opens the advanced configurator
2. Device info – displays information about the connected device
3. An information icon – opens the Device Center user manual
4. Settings icon – opens general settings, and information about Device Center
5. A configuration load/save button bar – used to load/save configuration files
6. Device settings, grouped by functionalities
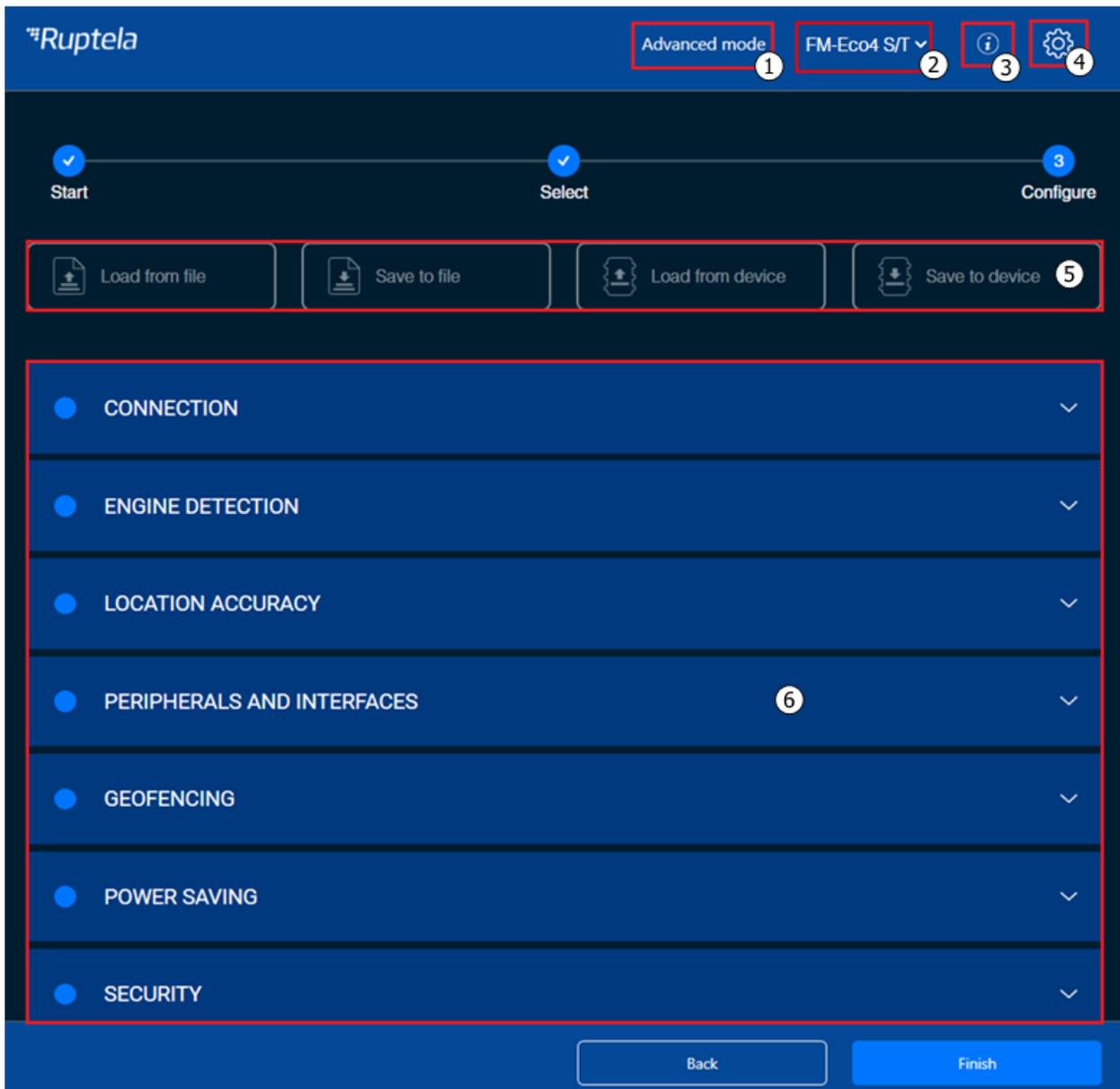
## Configuration Basics

For the device to be fully operational, it must have a configuration file uploaded to it. A configuration file contains information on what functionalities are active, how they are configured and what kind of data is included in records.

You can upload the same configuration file to multiple devices, making it easy to receive identical data from all your vehicles.

### File Extension

Configuration file extension for Eco4 T Series devices: **.fk4c**

Configuration file extension for Eco4 RS T devices: **.fj4c**

| ✔ | Configuration files can easily be recognized by their own icon: |
|---|---|

## Loading a Configuration from a File

Click **Load from file** in the button bar. Locate your configuration file and click **Open**.



You can also load a configuration file by dragging and dropping the file into the Device Center.

| ⚠ | Loading a configuration from a file will discard any changes to the existing configuration. |
|---|---|

## Saving a Configuration to a File

Click **Save to file** in the button bar. Choose where to save your configuration file and click **Save**.



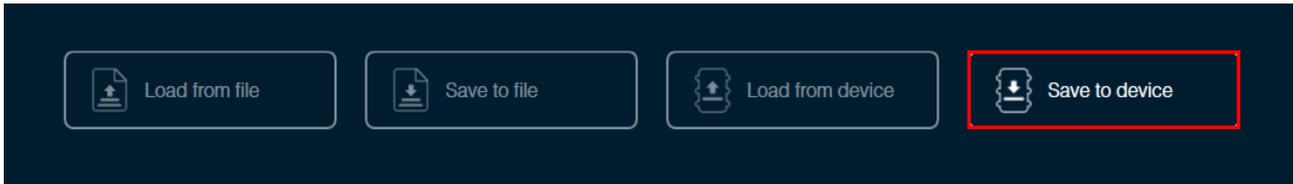## Loading a Configuration from a Device

Click **Load from device** in the button bar. The configuration will be loaded from the connected device.



| ⚠ | Loading a configuration from a device will discard any changes to the existing configuration. |
|---|---|

## Saving a Configuration to a Device

Click **Save to device** in the button bar. The configuration will be saved to the connected device.

> ⚠️ Saving a configuration to a device will overwrite the existing configuration in the device without any confirmation.

# Essential Settings

Only the settings that are essential to use the device are described in this document. For a detailed description of all the additional functionalities, please refer to the Device Center and advanced configuration user manuals.

## Server Settings

Open the **Connection** settings section. Enter the IP address and port of your fleet management platform server. If you are using TrustTrack, you do not need to enter anything as the server settings are already entered.

| IP/Domain name | The IP address of the server. You may enter a numerical address or a domain name. Default value: 92.62.134.34 (TrustTrack server) |
|---|---|
| Port | The port of the server. Default value: 9015 (TrustTrack server, TCP protocol) |
| Protocol | The connection protocol. Possible values: <br> • *UDP* – uses less data but is less reliable. UDP does not check for lost packets or their order. <br> • *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. <br> Default value: *TCP* |
| ℹ️ | UDP and TCP protocols may have different ports. Make sure you select the correct protocol and enter the correct ports. |

## Backup Server

You can use a second server as a backup, in case the main server is unreachable. If the main server is reachable, no data is sent to the backup server. Both servers use the same protocol.

| IP/Domain name | The IP address of the backup server. You may enter a numerical address or a domain name. Default value: None |
|---|---|
| Port | The port of the server. Default value: 0 |
| Copy all data | If turned on, a copy of all data will be sent to the backup server even if the main server is reachable. If the main server is unreachable, no data will be sent to any server. **Note:** Copying data will double the data consumption. Default value: Off |

# APN Settings

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

| Name | The APN name. This parameter is mandatory for most SIM cards. Consult with your SIM card provider for more information. |
|---|---|
| Username | The APN username. This parameter is optional. |
| Password | The APN password. This parameter is optional. |
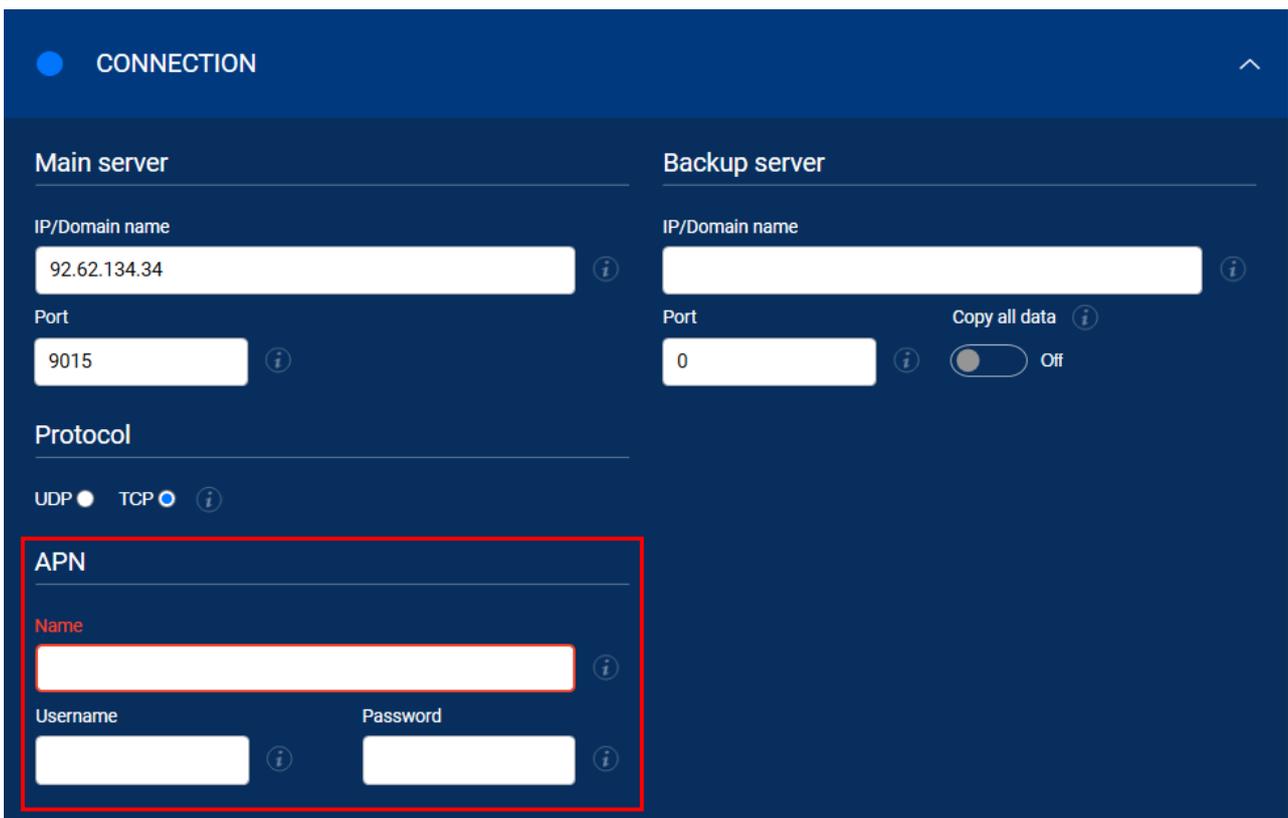


# Engine Detection Settings

Open the **Engine detection and data collection** section. Configure engine state detection conditions and set the location update rate. When the engine is turned on, records are generated more often, and the state can be displayed in your tracking platform.

| Engine state detection method | How the device detects whether the engine is turned on. Possible values:<br>• *Custom* – configure your own engine detection conditions<br>Default value: *Custom* |
|---|---|
| Remote blocking | Allows the engine to be blocked remotely via your fleet management platform. It uses a constant connection to the server and increases data consumption by up to 500 kB per month. |

| | Default value: Off |
|---|---|



Decide which detection logic to use and whether to use a delay for state changes.

| Connection detection method | Which logical operator will be used for the engine detection conditions. Possible values:<br>• *AND* – all conditions must be true<br>• *OR* – at least one of the conditions must be true<br>Default value: *OR* |
|---|---|
| Engine switch off delay | If turned on, the device registers engine state changes only after the set time period passes.<br>Default value: Off |
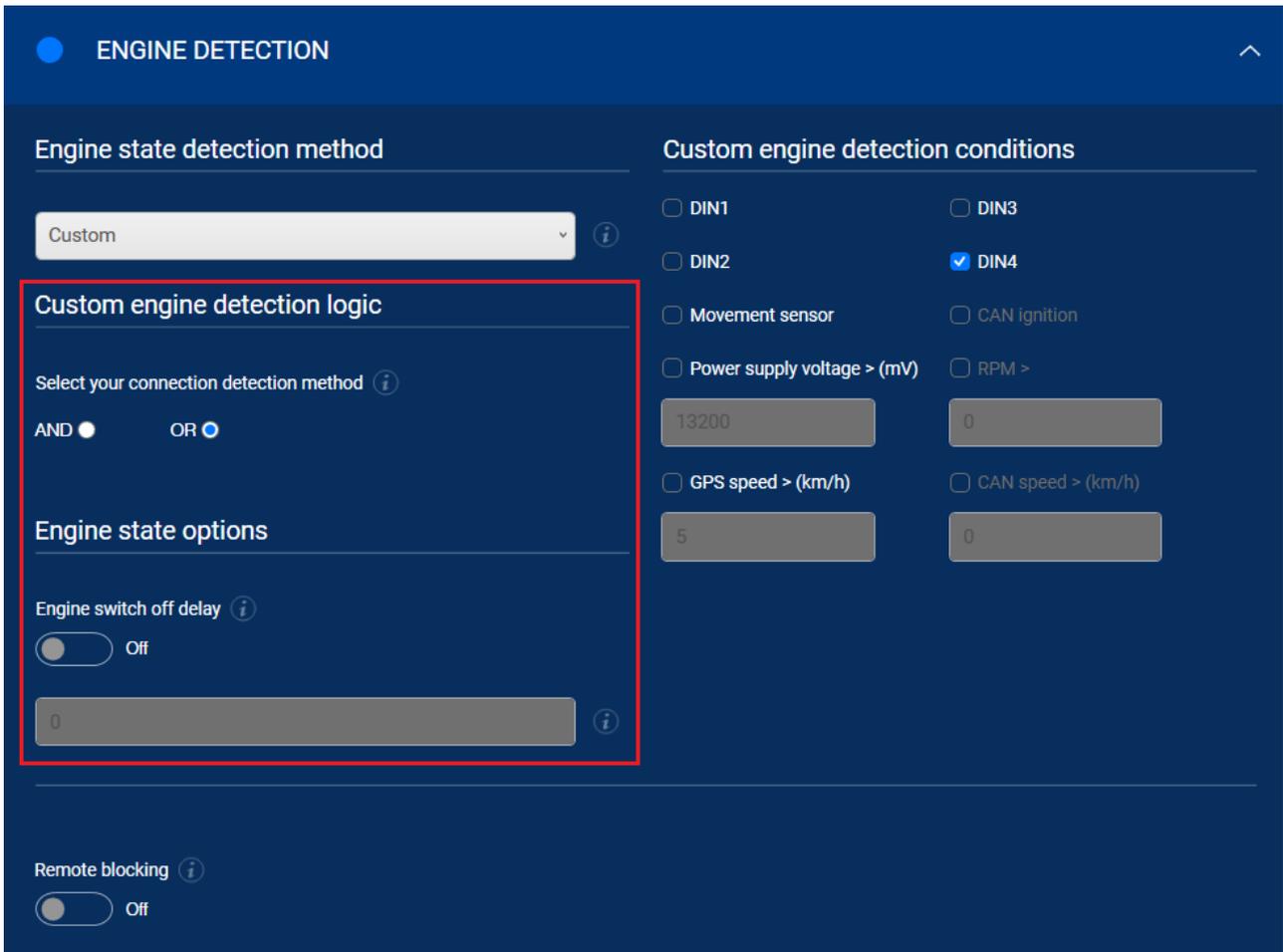
Then, decide which conditions you wish to use for engine state detection.

| DIN1/DIN2/DIN3/DIN4 | If ticked, the condition is true when the configured DIN detects a constant input voltage.<br>Default value: DIN4 enabled, other inputs disabled |
|---|---|
| Movement sensor | If ticked, the condition is true after detecting movement.<br>Default value: Enabled |
| CAN ignition | If ticked, the condition is true if the engine on state is provided by CAN data. Active only when at least one CAN interface is turned on.<br>Default value: Disabled, inactive |
| Power supply voltage > | If ticked, the condition is true if the power supply voltage is greater than the entered value (in mV).<br>Default value: Disabled |
| RPM > | If ticked, the condition is true if the RPM value provided by CAN data is greater than the entered value. Active only when at least one CAN interface is turned on.<br>Default value: Disabled, inactive |

| GPS speed > | If ticked, the condition is true if the speed value obtained from GPS is greater than the entered value. Default value: Disabled |
|---|---|
| CAN speed > | If ticked, the condition is true if the speed value obtained from CAN data is greater than the entered value. Active only when at least one CAN interface is turned on. Default value: Disabled, inactive |
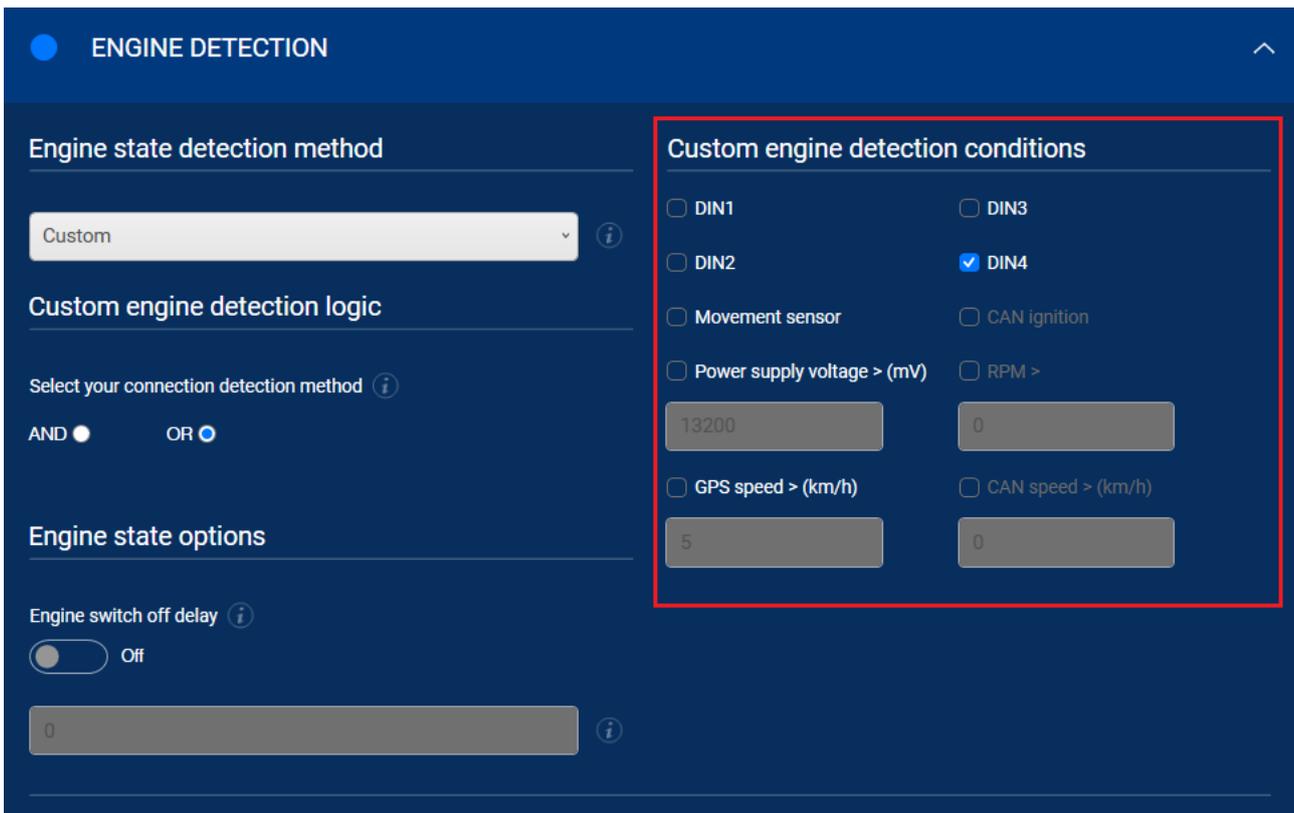


## Location Accuracy

Select the location update rate and set the location accuracy to generate more accurate coordinates.

| Location update rate | How often the device updates its location. This controls how often data is collected and sent. Possible values:<br>• *High* – at least twice a minute when driving (3-7 MB/month on average)<br>• *Medium* – at least once a minute when driving (2-5 MB/month on average)<br>• *Low* – at least once every two minutes when driving (1-3 MB/month on average)<br>• Custom -– configure parameters, to define how often the data should be updated: |
|---|---|

| | |
|---|---|
| | <ul><li>○ **Ignition off (s)** – set how often the location should be updated when the ignition is off. Default value: *3600* s</li><li>○ **Distance travelled (m)** – set how far the vehicle should travel to update the location. Default value: *500* m</li><li>○ **Ignition on (s)** – set how often the location should be updated when the ignition is on. Default value: *60* s</li><li>○ **Angle turned (deg)** – set how far the vehicle should turn to update the location. Default value: *15* deg</li></ul>Default value: *Medium* |
| Stationary filter | Discards inaccurate coordinates while the vehicle is not moving.<br>Default value: On |
| Active filter | Discards inaccurate coordinates by evaluating the vehicle's movement speed.<br>Default value: On |
| Acceleration threshold (m/s$^2$) | Used in the calculation of the maximum possible distance. If a new coordinate is too far away from the previous one, it will be discarded.<br>Default value: *19.6 m/s$^2$* |
| Accuracy filter | Sets the coordinate accuracy. The higher the accuracy, the more coordinates are filtered. We recommend using a lower accuracy, unless you are sure the GNSS signal quality is excellent. Possible values:<ul><li>*Off*</li><li>*Low* (recommended)</li><li>*Medium*</li><li>*High*</li></ul>Default value: *Off* |

# Advanced Configuration

The Device Center allows you to configure the main functionalities of your device. If you wish to have additional control over what data is received or to configure more advanced functionalities, you can switch to the advanced configurator by clicking **Advanced mode** in the top bar at any time.
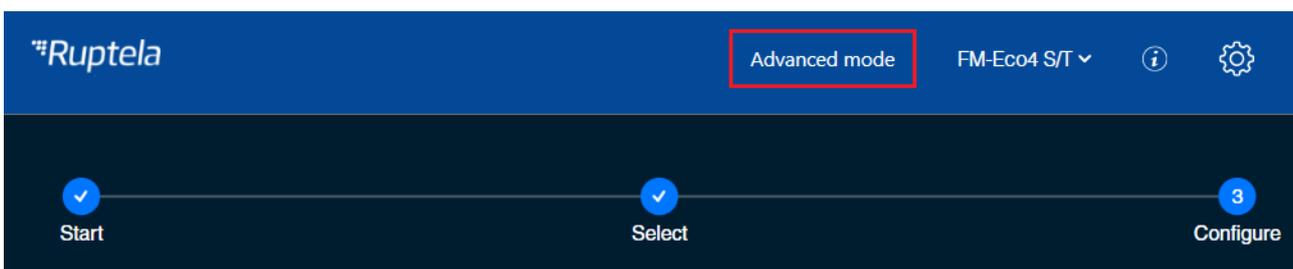


A detailed description of the advanced configurator is available in the advanced configurator user manual.

Close the advanced configurator to return to the Device Center.

# Configuration via SMS Commands

Alternatively, the device can be configured using SMS commands. Please refer to the following documents for an in-depth description:

- Device configuration via SMS
- SMS commands list

# Updating Firmware

We highly recommend using the newest firmware to take advantage of our newest functionalities and improvements. Device firmware can be updated in the following ways:

- Automatically when using a configurator that is newer than the firmware
- Manually by sending a firmware file to the device
- Over-the-air using your fleet management software

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

## File Extension

Firmware file extension for Eco4 T Series devices: **.efwk4**

Firmware file extension for Eco4 RS T devices: **.efwj4**

## Updating Firmware Automatically

If the Device Center is newer than the detected device firmware, it will suggest updating the firmware. Click **Update firmware** to update the firmware. If the firmware is not updated, you will not be able to load and save configuration files from/to the device.

| | |
|---|---|
| ✔ | 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 Device Center. |

| | |
|---|---|
| ℹ | If the Device Center 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 Device Center. |

| | |
|---|---|
| ✔ | 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. |

## Updating Firmware Manually

| | This feature requires the use of the advanced configurator. |
|---|---|

**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.
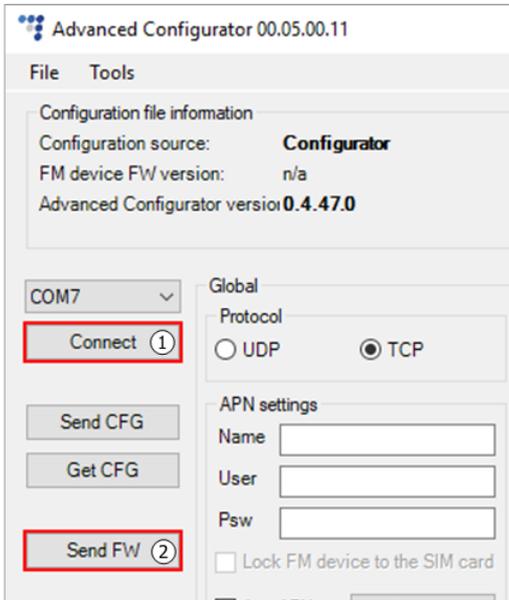


**Updating Firmware using .fwp Pack**

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.

# Updating Firmware Over-the-air

The exact process of how to update firmware over-the-air depends on your fleet management software. The following conditions must be met for the update to be successful:

- The device must be connected to a power supply
- The device must be connected to a GSM/GPRS network

## 1.6 FM-Eco4 T Installation in Vehicle

# Installation Method

To install the device, you need to connect it to a power supply and an ignition source. They may be found in the following locations:

- The OBD diagnostic port
- The fuse box
- The 9-Pin Deutsch port

# Required Tools

Before starting the installation, make sure you have the following tools:

- An installation harness (recommended)
- A panel removing tool
- A wrench
- Zip-ties or double-sided tape
- Crimp terminals

# Installation Recommendations

⚠️ Make sure the installation is carried out only by qualified personnel!

Before starting the installation, decide where you will install the device. The installation location depends on the vehicle and selected installation method. Follow these recommendations to ensure that the device works properly:

- Install the device in a service access area (under the dashboard, behind the fuse box, etc.)
- Fix the device firmly to the attaching surface, make sure it does not move or shake
- Avoid installing the device near metal surfaces or cables
- Do not install the device near heat emitting or moving parts
- Install the device with an angle of up to 45° in any axis
- The GNSS antenna must be facing upwards (see the picture below)

| Correct | Incorrect |
| --- | --- |



| Correct | Incorrect |
| --- | --- |
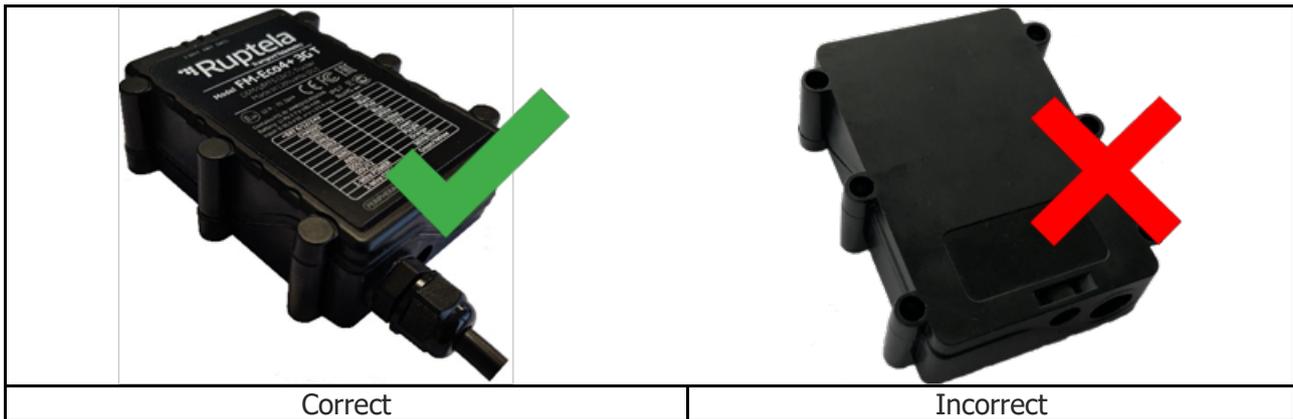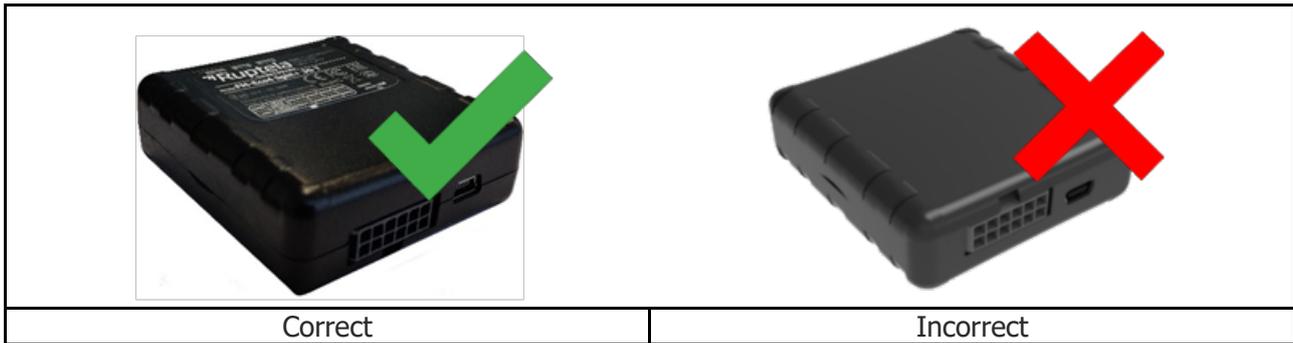
## External GNSS Antenna Positioning

It is recommended to place the GNSS antenna behind the dashboard as close to the windshield as possible and further away from the doors. It must be uncovered and facing up as shown in the picture below.
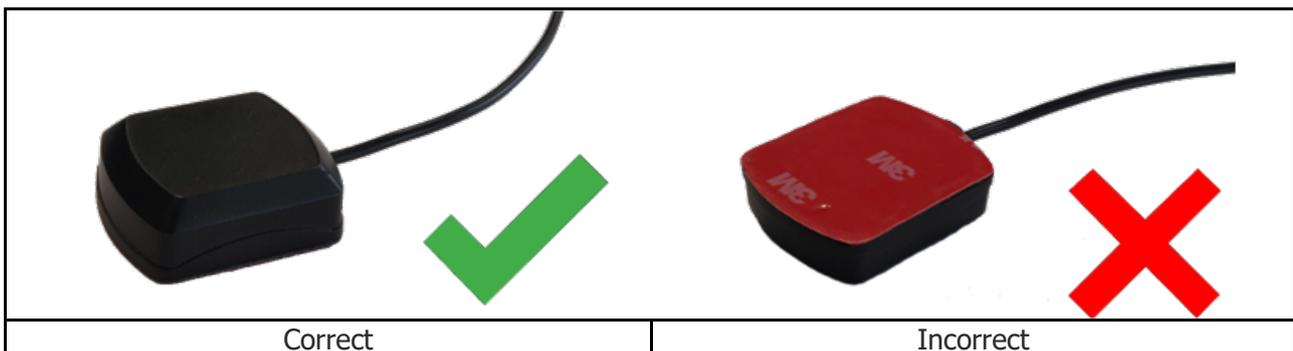


| Correct | Incorrect |
| --- | --- |

⚠️ Incorrect antenna placement may result in reduced tracking accuracy.

# Wiring Diagram (Regular Housing)

Power input: 6-31.5 V DC.

| ⊘ | It is mandatory to use an external automotive 1 A fuse. |
|---|---|

| ✔ | We recommend using specialized insulation methods that ensure reliable long term performance under harsh field conditions. Heat shrink connectors, crimp or solder wire connectors, insulating tape and similar materials can be used. |
|---|---|
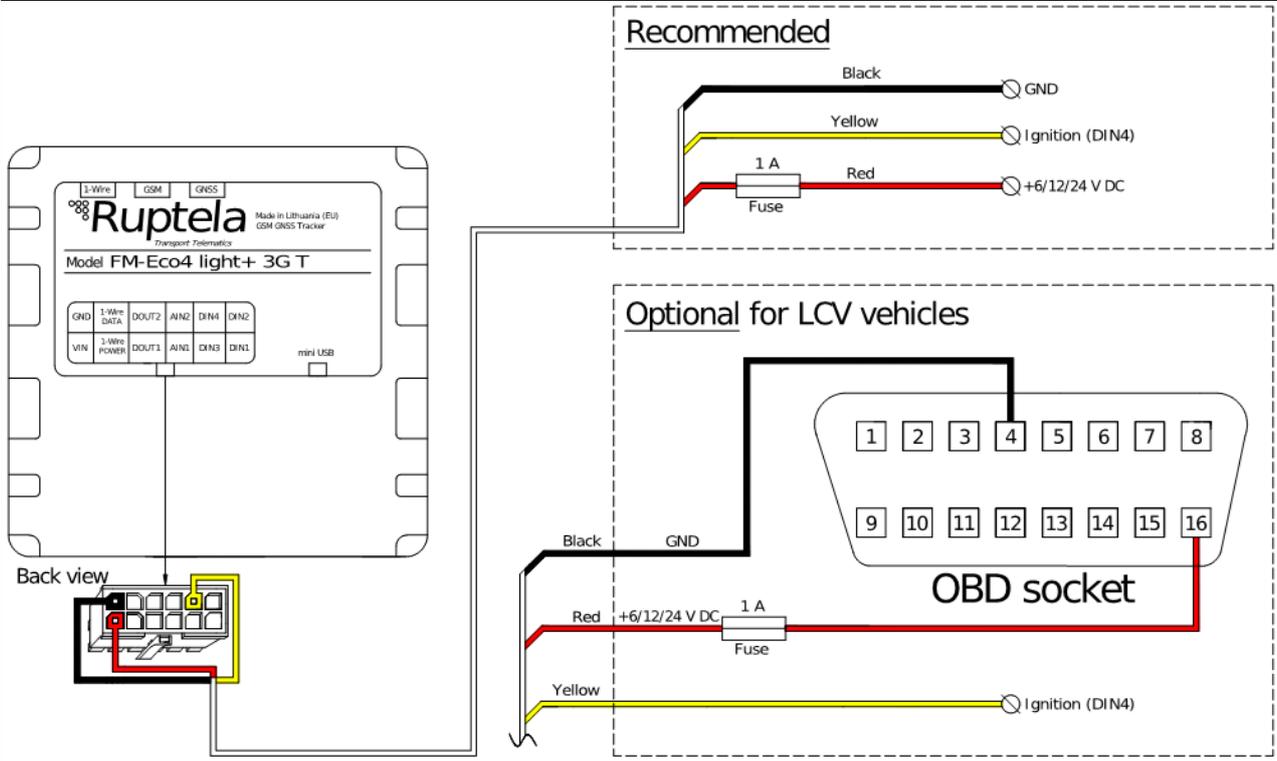


# Wiring Diagram (IP67 Housing)

Power input: 6-31.5 V DC.

| ⊘ | It is mandatory to use an external automotive 1 A fuse. |
|---|---|

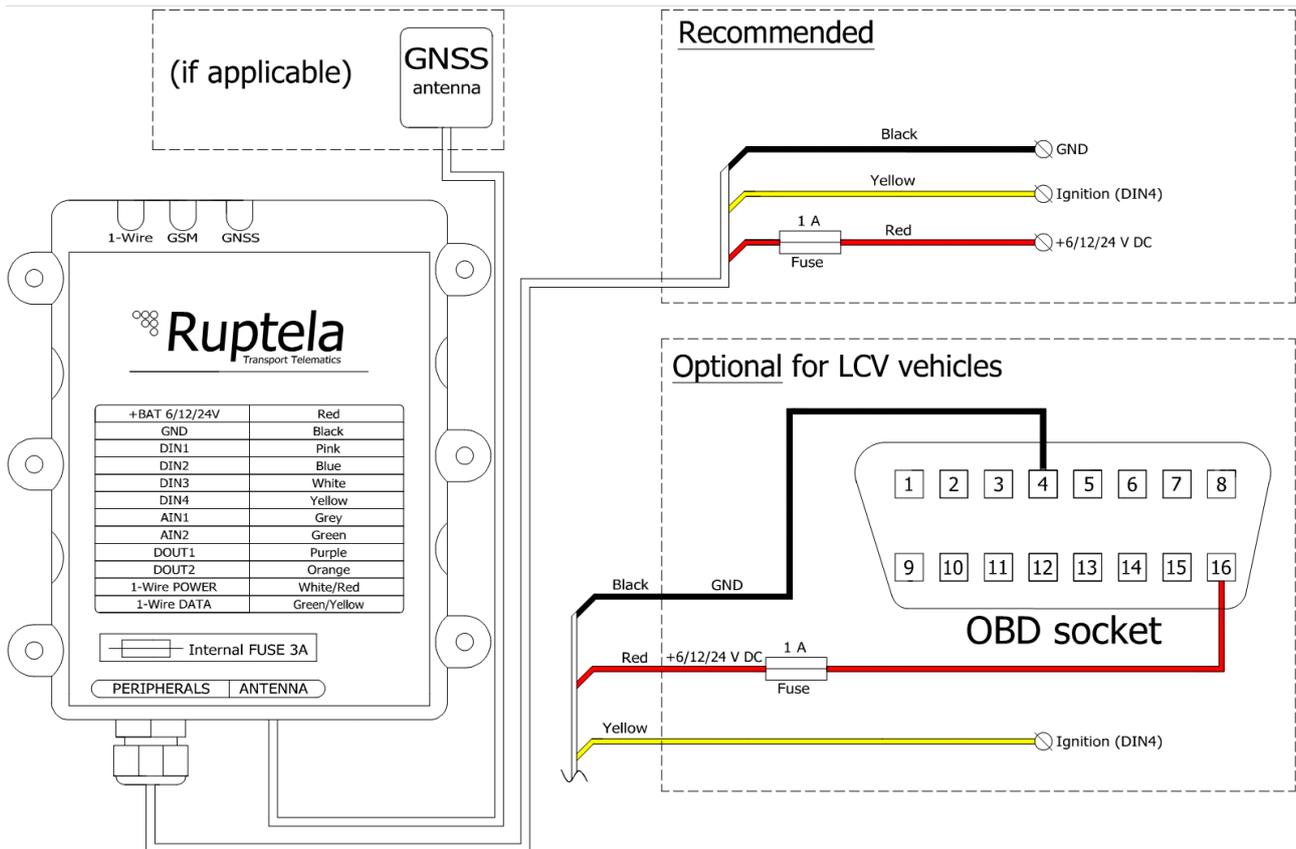| ✔ | We recommend using specialized insulation methods that ensure reliable long term performance under harsh field conditions. Heat shrink connectors, crimp or solder wire connectors, insulating tape and similar materials can be used. |
|---|---|

(if applicable) **GNSS** antenna

1-Wire  GSM  GNSS

## Ruptela
Transport Telematics

| | |
|---|---|
| +BAT 6/12/24V | Red |
| GND | Black |
| DIN1 | Pink |
| DIN2 | Blue |
| DIN3 | White |
| DIN4 | Yellow |
| AIN1 | Grey |
| AIN2 | Green |
| DOUT1 | Purple |
| DOUT2 | Orange |
| 1-Wire POWER | White/Red |
| 1-Wire DATA | Green/Yellow |

Internal FUSE 3A

PERIPHERALS    ANTENNA

**Recommended**

Black — GND
Yellow — Ignition (DIN4)
1 A Fuse
Red — +6/12/24 V DC

**Optional** for LCV vehicles

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

**OBD socket**

Black    GND
Red    +6/12/24 V DC    1 A Fuse
Yellow    Ignition (DIN4)

# Installation Assistant

You can test your device during installation using the installation assistant tool in the Device Center. The installation assistant checks the status of the main modules and interfaces in real time, allowing you to monitor the quality of the installation and quickly solve any issues.

If the **Overall status** in the overview bar is green, the device is functioning properly, and the installation was successful.

Device information

FM-Eco4 S/T
IMEI: 863003045653375
Firmware version: 00.03.48.04
Hardware version: FMET4-4-2

Connected to: COM3
IMSI: 246020970010719

Overall status ⓘ

Change device

A full description is available in the Device Center User Manual.

# Installation Check-up

1. Take several minutes to review the installation, check that everything is connected properly.
2. Start the vehicle, drive outside if the vehicle was in a building and wait for several minutes.
3. Check that the required data is received by sending an SMS command, using the installation assistant, or checking your fleet management platform (see chapter "Using TrustTrack" if you are using TrustTrack).
4. Finish up the installation, make sure there are no hanging wires and that all panels are firmly reattached.

# Troubleshooting

If you did not receive the required data during the installation, you can send several SMS commands to your device to check what might be wrong.

## gsminfo

Use the *gsminfo* SMS command to know if the device is connected to mobile networks and the internet.

Command syntax: *password gsminfo*

Response example: *ST:2019.06.20 23:26:33; OP 22210,* **lvl 15***, LAC 20030, CID: 28289, GSM; M:I 126, R 125, SP: 0;* **GPRS 0***: O 64,C 0, E 248; LK:O 575, E 1, TMO 126; RS: 04; P 0*

The relevant parameters and their values are described in the table below.

| lvl | The mobile signal level. If **lvl** is lower than 10, the signal is weak, and it is likely that there is no connection to the network. |
|---|---|
| GPRS | The internet status. Possible values:<br>• 0 – no internet connection<br>• 1 – the device is connected to the internet |

In the previous example, the GPRS value is 0. This would mean that the device is not connected to the internet.

## getapn

If the device is connected to mobile and internet networks but does not send any data, check the APN and connection settings with the *getapn* SMS command.

Command syntax: *password getapn*

Response example: *APN: banga User: PSW: IP1: 92.62.134.38 Port1: 9021 IP2: 195.14.173.3 Port2: 9000 TCP/UDP: 0*

The parameters and their values are self-explanatory, except for **TCP/UDP**.

| **TCP/UDP** | This parameter shows which protocol is used. Possible values:<br><br>• 0 – TCP<br><br>• 1 – UDP |
|---|---|

| ℹ️ | If the *getapn* response text is very long (for example, the APN, username and password are 32 symbols long each and two servers are used), it might not fit into a single message and be cropped. |
|---|---|

## coords

Use the *coords* SMS command to know if the device has an accurate GNSS fix.

Command syntax: *password coords*

Response example if there is no GNSS fix: *GPS is not available*

Response example if there is a GNSS fix: ***2019-06-20 07:01**, lat. 46.1443183, long. 11.881766, alt. 217.5, **sat. 8,** dir. 198.10, **hdop 100, state 3***

The relevant parameters and their values are described in the table below.

| Datetime | The current date and time in GMT. |
|---|---|
| sat. | The number of visible satellites. At least 4 satellites must be visible to get an accurate GNSS signal. |
| hdop | The current HDOP (signal accuracy) level. If the HDOP level is above 3.5, the GNSS signal is inaccurate. |
| state | The current GNSS state. Possible values:<br>1 – GNSS module off<br>2 – GNSS module on, no fix<br>3 – GNSS module on, fix acquired<br>4 – GNSS module not responding<br>5 – GNSS module is in sleep mode<br>6 – GNSS module disabled |

## reset

When all else fails, use the *reset* SMS command to restart the device. Configuration parameters will not be lost.

Command syntax: *password reset*

Response example: *Resetting device*

## 1.7 Using TrustTrack

> ℹ This chapter applies only if you are using the TrustTrack fleet management platform

> ✓ TrustTrack documentation website: https://www.fmsdocumentation.com/

## Accessing TrustTrack

TrustTrack can be accessed via the web or using an app. Use the same server domain (typically track2.ruptela.com) for both web and app. Your login credentials are sent to you by e-mail. If you have not received them, contact your sales manager.

### Accessing TrustTrack via Web

To access TrustTrack via the web, enter your server domain into the browser. Enter your credentials and click **Sign In**.
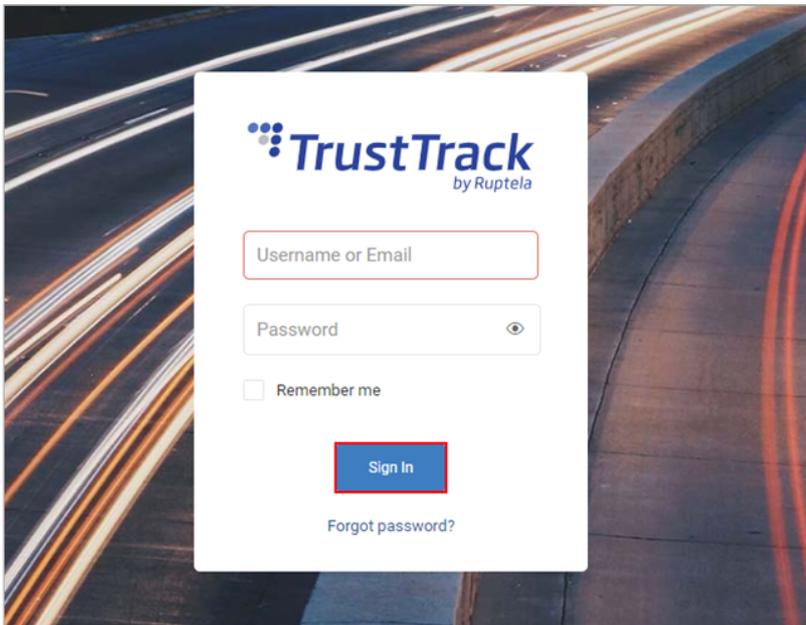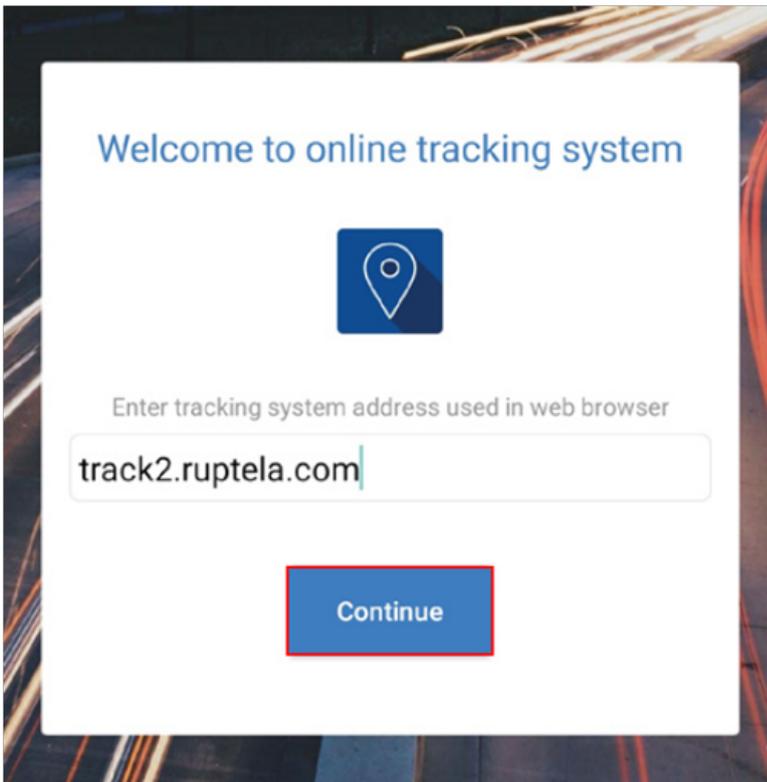
### Accessing TrustTrack via App

Download the TrustTrack app:

- iOS
- Android

Once downloaded, launch the app. Enter the server domain. You will only need to do this once. Tap **Continue**.



| ✔ | If you entered the server domain incorrectly or wish to change it, clear the app cache in your phone settings. The app will ask you for the server domain upon the next launch. |
|---|---|

# Verifying Vehicle Status

After logging in, click the **Fleet status** button in the left menu panel.
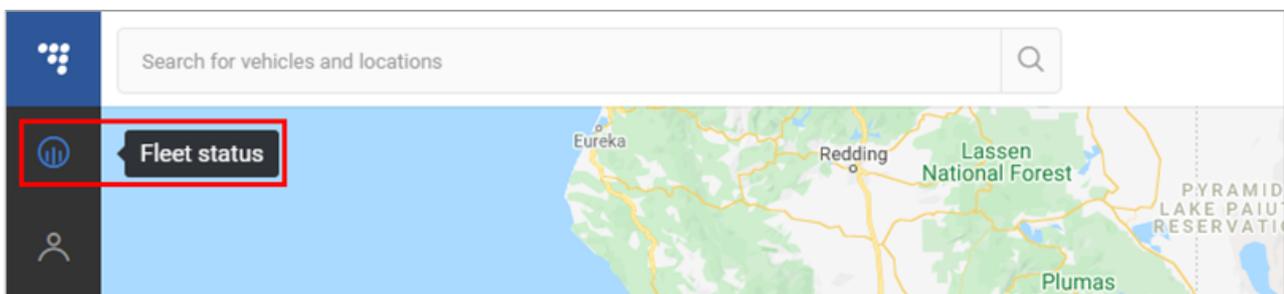


Find your vehicle in the **Fleet Status** panel and click on it. Check the **State duration** and **Last signal sync** in the additional panel. If they have recently been updated, data transfer is successful, and the device is properly installed.