



FM-PR04

USER MANUAL

2014/10

VILNIUS

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1 PREFACE

1.1 USE OF THIS DOCUMENT

This document provide required information for proper device handling, preparation, configuration and installation to vehicle. This document has linear structure – from opening box to recommendations how to install device to vehicle. However it is not overfilled with unnecessary information. You will find basic description of functions and actions to start using device with reference to extensive content descriptions.

The following markings are used to highlight important information:

- Notes contain important information that you need to pay attention to.

NOTE

Notes like this contain important information!

- Actions and various elements of software required for configuration of device are marked in **bold**.
- All actions are described in sequence in five sections: Introduction, Device description, Device preparation, Device configuration and Installation recommendations.

1.2 DOCUMENT CHANGE LOG

DATE	VERSION	CHANGE DETAILS
2014-07-23	v1.0	Initial draft
2015-02-05	v1.1	Branding change
2015-07-28	v1.2	Corrected mistakes with PortC 485A & PortC 485B wire colors
2015-09-02	v1.3	J1708 support added
2015-09-30	v1.4	CAN, CAN2 configuration rules
2015-10-28	v1.5	GPS/GLONASS module
2016-01-22	v1.6	SIM lock, SIM card status, Towing detection, Send data without GPS fix, Custom ignition, Calc HRLFC
2016-02-18	v1.7	2G, 3G support
2016-04-08	v1.8	K-line improvements, 2 nd level temporary black list, CANbus FF filters, Smart LCV Selection changes

2 INTRODUCTION

2.1 PURPOSE

Purpose of this document is to provide physical and technical data of the device, explain device behavior and indication of various conditions. Also device preparation for operation and configuration instructions are included.

2.2 ACRONYMS

PC – Personal Computer;
 GPRS – General Packet Radio Service;
 GPS – Global Positioning System;
 GSM – Global System for Mobile Communications;
 GLONASS – Global Navigation Satellite System;
 SMS – Short Message Service;
 AC / DC – Alternating Current/Direct Current;
 PCB – Printed Circuit Board;
 LED – Light Emitting Diode;
 I / O – Inputs / Outputs;
 2G – second generation of mobile telecommunications technology;
 3G – third generation of mobile telecommunications technology;
 UMTS – Universal Mobile Telecommunications System;

2.3 LEGAL INFORMATION

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2.4 SAFETY



All the associated (additional) equipment as PC, batteries, sensors and others, shall meet the requirements of standard EN60950-1.



Do not disassemble the terminal. If the enclosure of the terminal is damaged, or the insulation of wires is damaged, first of all disconnect power supply cables from power supply source.



All of the wireless data transferring equipment produces interference that may affect other devices which are placed nearby.

-  The terminal can be installed or dismantled only by qualified personnel!
-  The terminal must be firmly fastened in the predefined location. Predefined location is explained in the mounting instructions.
-  The programming must be performed using a 2nd safety class of PCs (with autonomic power supply).
-  Be sure that the terminal is installed in a place where it will not be affected by harsh environment conditions for extended periods.
-  Caution! There is a risk of explosion if the battery is replaced by an incorrect type. Dispose used batteries according to the environmental requirements.
-  Any installation and/or handling during a lightning storm is prohibited.
-  Use cables for configuration purchased from Ruptela. Ruptela is not responsible for any harm caused by using wrong cables for PC ↔ FM Terminal connection.
-  Attention! Do not connect the wires marked red (power supply) and black (chassis) wrongly to battery poles. Device has reverse polarity protection but if you connect incorrectly, device will not work.
-  To disconnect the device from the power supply, you need to disconnect 12 PINs plug from device or disconnect wires from vehicle's power supply.
-  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.

This chapter contains information on how to operate with the FM terminal safely. By following these requirements and recommendations, you will avoid dangerous situations. You must read these instructions carefully and follow them strictly before operating the device! The terminal is supplied from a car battery with these ratings: 12/24 V @ 250/125 mA. The allowed voltage range for the battery is: 10 – 32 V DC.

To avoid mechanical damage, it is advised to transport the FM terminal in an impact-proof package.

Before connecting the wires of 12 PINs cable to the vehicle, ensure that cross-sectional area of wires mounting is at least 0.75 mm².

To dismantle terminal correctly from the vehicle, first of all disconnect power supply wires (12 PINs connector) and only then other plugs or interfaces can be disconnected.

The terminal is intended to be installed in a restricted access location, which is not accessible for the operator.

2.5 REFERENCES

This document is designed to work in conjunction with other documents. This way documentation is kept light, not overfilled with unnecessary information. All additional and extensive explanation can be found in referenced documentation:

- FM-Pro4 Datasheet – Technical data of FM-Pro4 device. Can be acquired from support@ruptela.com
- [Quick start guide](#) – A quick guide for better configuration process and functions understanding.
- [Peripheral accessories](#) – Instructions how to use peripheral accessories with FM-Pro4 device.
- [FTP link](#) – Our FTP containing newest firmware, newest configurator and sample configuration files.
- [Microsoft Framework](#) – This additional software is required in order to run our configurator.
- [VCOM drivers](#) – Drivers required for device connection to PC.

All links are also provided in corresponding sections where additional information might be needed.

NOTE

Ruptela FTP address: [doc.ruptela.it](ftp://doc.ruptela.it)

3 DEVICE DESCRIPTION

3.1 ABOUT

Ruptela's FM-Pro4 is 4th generation advanced, low power consumption, but powerful tracking device. It acquires its position by GPS/GLONASS signal and transfer data to server via GPRS cellular network. FM-Pro4 new features compared to PRO3:

- Lower power consumption
- More powerful 1-wire interface
- USB power supply for configuration
- 2 x RS232 and 1 x RS485 ports work at the same time
- 2 SIM card slots (on demand)
- Gyroscope (on demand)

3.2 PACKAGE CONTENTS

FM-Pro4 device is supplied in cardboard package. GPS/GLONASS antenna and IO cables are disconnected from device. Package contents:

- FM-Pro4 device
- 12 PINs and 14 PINs cables
- GPS/GLONASS all-in-one antenna



Figure 1. FM-Pro4 device



Figure 2. Box contents: FM-Pro4 device, GP/GLONASS antenna, IO cables

NOTE

Providing SIM card is optional, according to your payment plan. SIM card is necessary for connection to the GSM network! SIM card can be obtained from your local GSM service provider! SIM card can work with the terminal only when all SIM card security codes are disabled!

3.3 PHYSICAL CHARACTERISTICS

PROPERTIES

Enclosure dimensions	111 x 75 x 25 mm
Indication	3 LEDs: Sat. status, GSM status, Periph. status
Housing	Plastic
External elements	GPS/GLONASS all-in-one antenna
Configuration interface	USB
Connectors	12 & 14 PINs

3.4 TECHNICAL CHARACTERISTICS

POWER CONSUMPTION

Deep sleep mode	16 mA @ 12 V
Normal mode	Max. 100 mA @ 12 V
Battery charging	Max. 250 mA @ 12 V
Ambient temperature ratings, °C:	
Storage temperature	-40 - +65
Operating temperature	-35 - +55
Battery charging	-20 - +45
Battery discharging	-20 - +60

ELECTRICAL AND INTERNAL ELEMENTS

Power supply	10-32 V DC
Absolute maximum ratings	50 V @ 60 s
	72 V @ 0.1 s
Internal power supply	3.7 V, 1050 mA
Digital input threshold	4 V
Analogue input resolution	12 bit
GPS/GLONASS module	72 channel
Sensitivity	-163 dBm
GPS/GLONASS antenna frequency	1575.42 ± 3 MHz
GSM modem	Quad band
GSM antenna	Internal, Quad band

PROTECTIONS

Short circuit protection
Reverse polarity protection
Electrostatic discharge protection on USB
Electrostatic discharge protection on 1-wire
Overcurrent protection on 1-wire power

3.5 IO PIN OUT

12 PIN CONNECTOR

PIN NR	PIN	WIRE COLOR	DESCRIPTION
1	10-32 V	Red	Power supply 12/24 V (range: 10-32 V)
2	Chassis	Black	Ground connection
3	DIN1	Pink	Digital input, threshold 4 V
4	AIN1	Gray	Analogue input (range: 0-30 V)
5	DIN2	Blue	Digital input, threshold 4 V
6	AIN2	Green	Analogue input (range: 0-30 V)
7	DIN3	White	Digital input, threshold 4 V
8	DOUT1	Purple	Digital output open collector up to 32 V, 1 A
9	DIN4	Yellow	Digital input, threshold 4 V
10	DOUT2	Orange	Digital output open collector up to 32 V, 1 A
11	CAN2 L	Blue/red	J1939 CAN interface low connection
12	CAN2 H	White/red	J1939 CAN interface high connection

14 PIN CONNECTOR

PIN NR	PIN	WIRE COLOR	DESCRIPTION
1	PortB-232 RX	Yellow	RS 232 port B receive signal
2	Chassis	Black	Ground connection
3	PortB-232 TX	Orange	RS 232 port B transit signal
4	1W. +5V	Red	1-wire power supply +5 V, 200 mA
5	PortA-232 RX	Purple	RS 232 port A receive signal
6	1W. Data	Green/yellow	1-wire data channel
7	PortA-232 TX	Pink	RS 232 port A transit signal
8	CAN1 H	White	J1939 CAN interface high connection
9	L-Line	Green	J1939 CAN interface L line channel, diagnostics
10	CAN1 L	Blue	J1939 CAN interface low connection
11	K-Line	Brown	J1939 CAN interface K line channel, diagnostics
12	Chassis	Black	Ground connection
13	PortC-485 A -	White/red	RS 485 differential signaling line A (-)
14	PortC-485 B +	Yellow/brown	RS 485 differential signaling line B (+)

Note

Only one CAN line work at the same time. Connect your hardware to one of the interfaces and configure it accordingly.

3.6 INTERFACES AND PERIPHERAL ACCESSORIES

There are several peripheral accessories that can be mounted with FM-Pro4 device. With peripherals you can get even more features and extend application. All available peripherals can be purchased from Ruptela. Please contact your manager for details.

NOTE

1-Wire power maximum power output is 200 mA @ 5 V

FM-Pro4 device supports RS232, RS485, 1-wire and CAN interfaces.

List of available peripherals devices that can be used with FM-Pro4:

Available on 1-Wire:

- 4 × Temperature sensors DS18B20/DS18S20 (10 mA @ 5 V)
- 1 × iButton DS1990 (20 mA @ 5 V)

Available on DOUTs:

- 1 × Buzzer/LED
- 1 × ECO Driving panel (Power supply from 1-Wire. 40 mA @ 5 V)
- 1 × Ignition lock

Available on AINs:

- 2 × Analogue fuel sensors

Available on RS232 ports A and/or B:

- 2 x LLS digital fuel sensors
- 1 x Garmin (Send and receive SMS, routes to/from navigation system. Only on port B)
- 2 x RFID readers
- 1 x CANlog adapter (to get CAN data from CANlog adapter connected to vehicle)
- Spreader
- Alcohol sensor

Available on RS485 port C:

- Up to 10 LLS fuel sensors
- 1 x J1708 interface

Available on CAN interface:

- Vehicle CANbus (FMS) information reading
- MobilEye

You can find peripheral accessories installation instructions and documentation at our [FTP server](#).

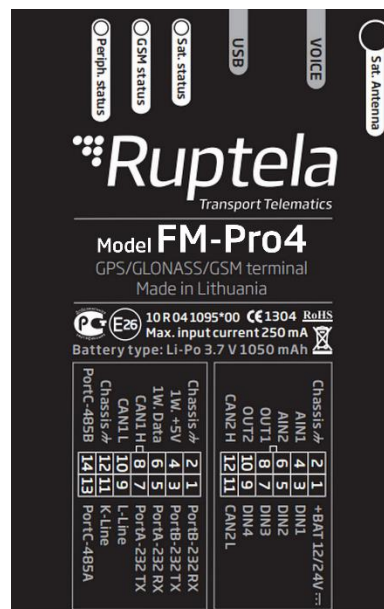


Figure 3. FM-Pro4 label

3.7 CERTIFICATION

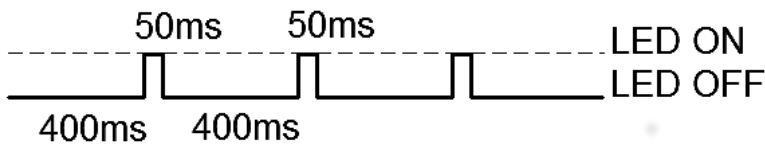
FM-Pro4 devices have passed quality tests and comply with following certifications:

- E-Mark (E26 10 R 04 1095*00)
- CE (CE 1304)
- RoHS

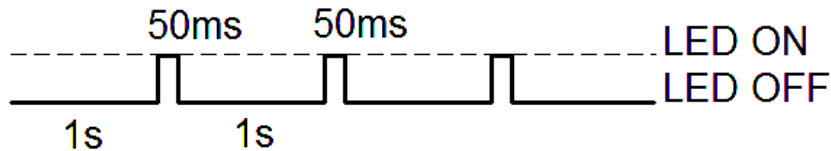
3.8 LED STATUS

3.8.1 GNSS LED

When GPS/GLONASS signal is not received or GPS/GLONASS signal is not accurate, the GPS LED is blinking as follows:

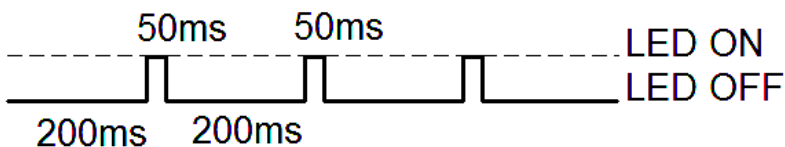


When accurate GPS/GLONASS signal is received, the GPS LED is blinking as follows:

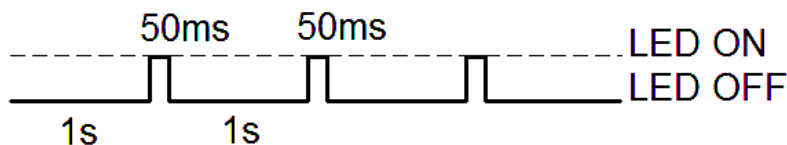


3.8.2 GSM LED

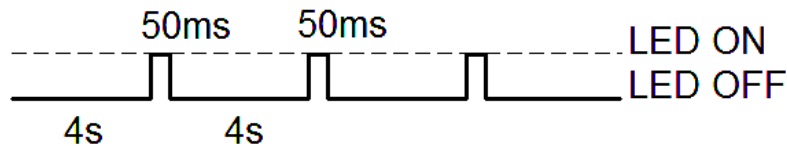
When GSM signal is not received, GSM LED is blinking as follows:



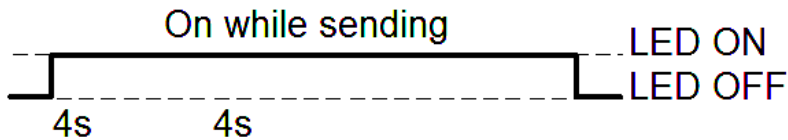
When device has a good GSM signal, but no GPRS, LED is blinking as follows:



When device has good GSM signal and it is connected to GPRS, then LED is blinking as follows:



When the FM-Pro4 terminal has GSM signal and it is sending data via GPRS, LED is blinking:

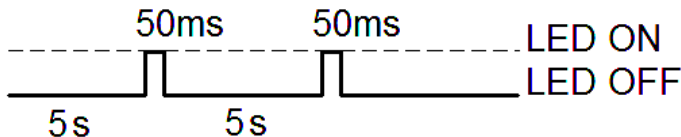


3.8.3 PERIPHERAL LED

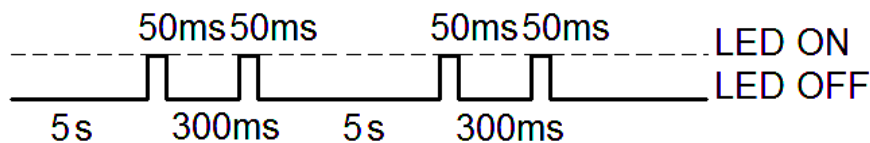
To the FM-Pro4 terminal can up to 3 peripheral devices attached (e.g. CAN, LLS, 1-wire). So there are 4 different types LED states when peripheral device is connected. When there is no peripheral attached, LED will not blink at all:



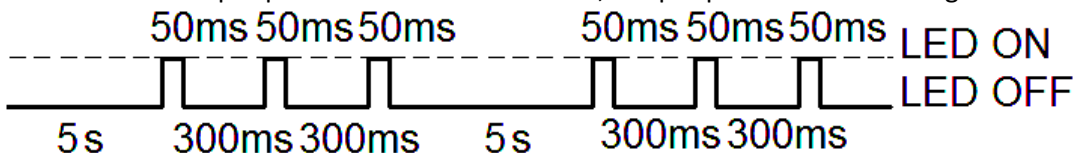
When there is 1 peripheral interface connected, the peripheral LED is blinking:



When there are 2 peripheral interfaces connected, the peripheral LED is blinking:



When there are 3 peripheral interfaces connected, the peripheral LED is blinking:



4 DEVICE CONFIGURATION

4.1 DRIVER INSTALLATION

Virtual COM port driver installation is mandatory, only then your PC will recognize the FM- FM-Pro4 device that was connected to the USB port. You can download newest drivers from our FTP server ([VCOM drivers](ftp://ftp.dev.ruptela.lt/Temp/FM4_drivers/)).

Choose correct archive file with drivers for your OS version and download it to your PC.

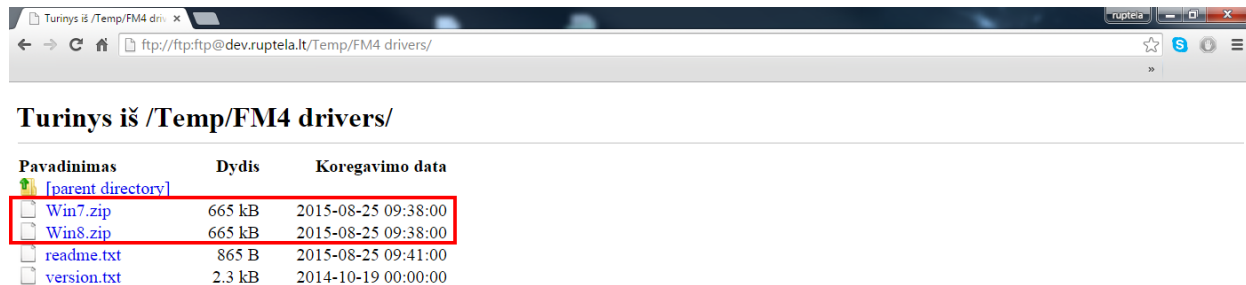
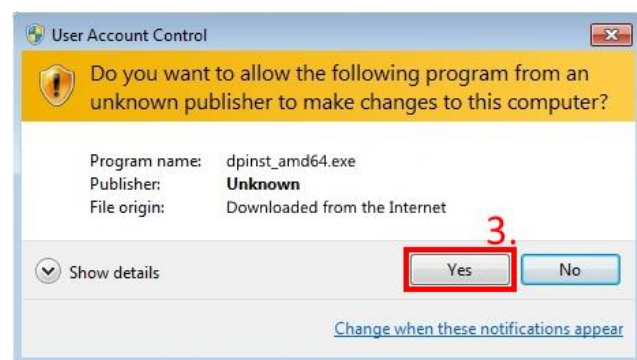


Figure 4. Driver installation files

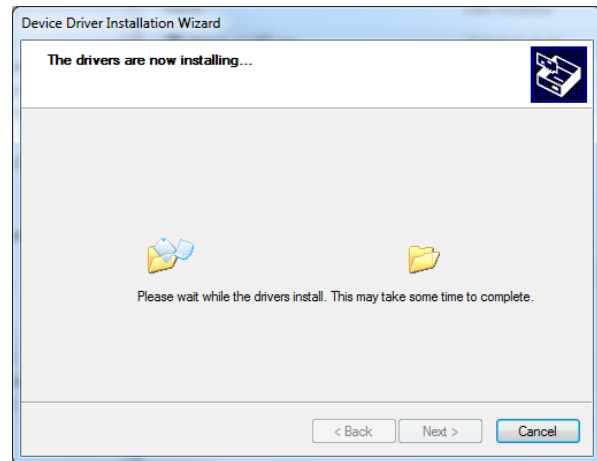
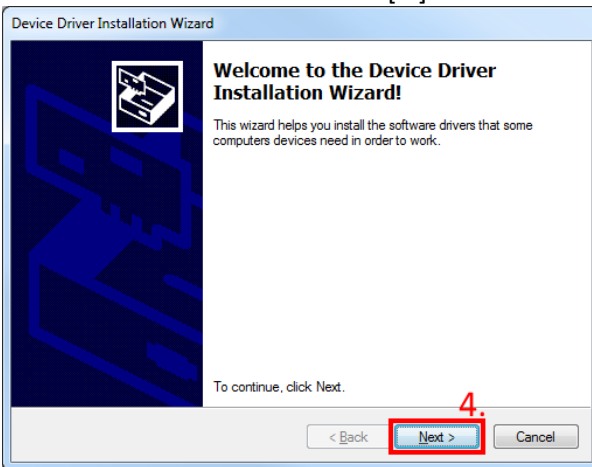
Installation procedure:

- ❖ Uninstall previous Virtual COM port driver versions (Start-> Settings-> Control Panel-> Add or remove programs).
- ❖ Extract archive file “Win7.zip” or “Win8.zip” to a desired location on your PC.
 - If you are running a 32-bits OS version, launch the “dpinst_x86.exe” [1.]
 - If you are running a 64-bits OS version, launch the “dpinst_amd64.exe” [2.]

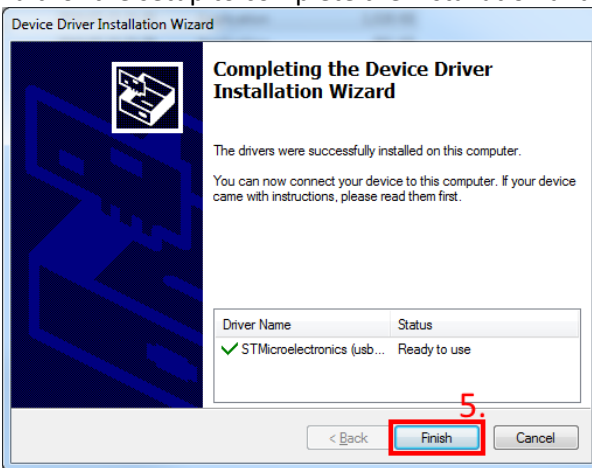
Windows 7 Users might get a Security Warning message. Click “Yes” [3.].



In the next window select “Next” [4.].



Wait for the setup to complete the installation and click “Finish” [5.].



Driver is now installed and ready to use.

4.2 SAMPLE CONFIGURATION

Please log in to our FTP server and download [sample configuration](#) and newest [configurator](#) . Also you need newest [Microsoft Framework](#).

Operating system requirements:

- MS Windows XP/Vista/7/8

Start VCP.exe from configurator folder.

1. Select Pro4
2. Click **File** → **Open CFG**
3. In dialog window, browse sample configuration file you downloaded from FTP.
4. Click **Open**

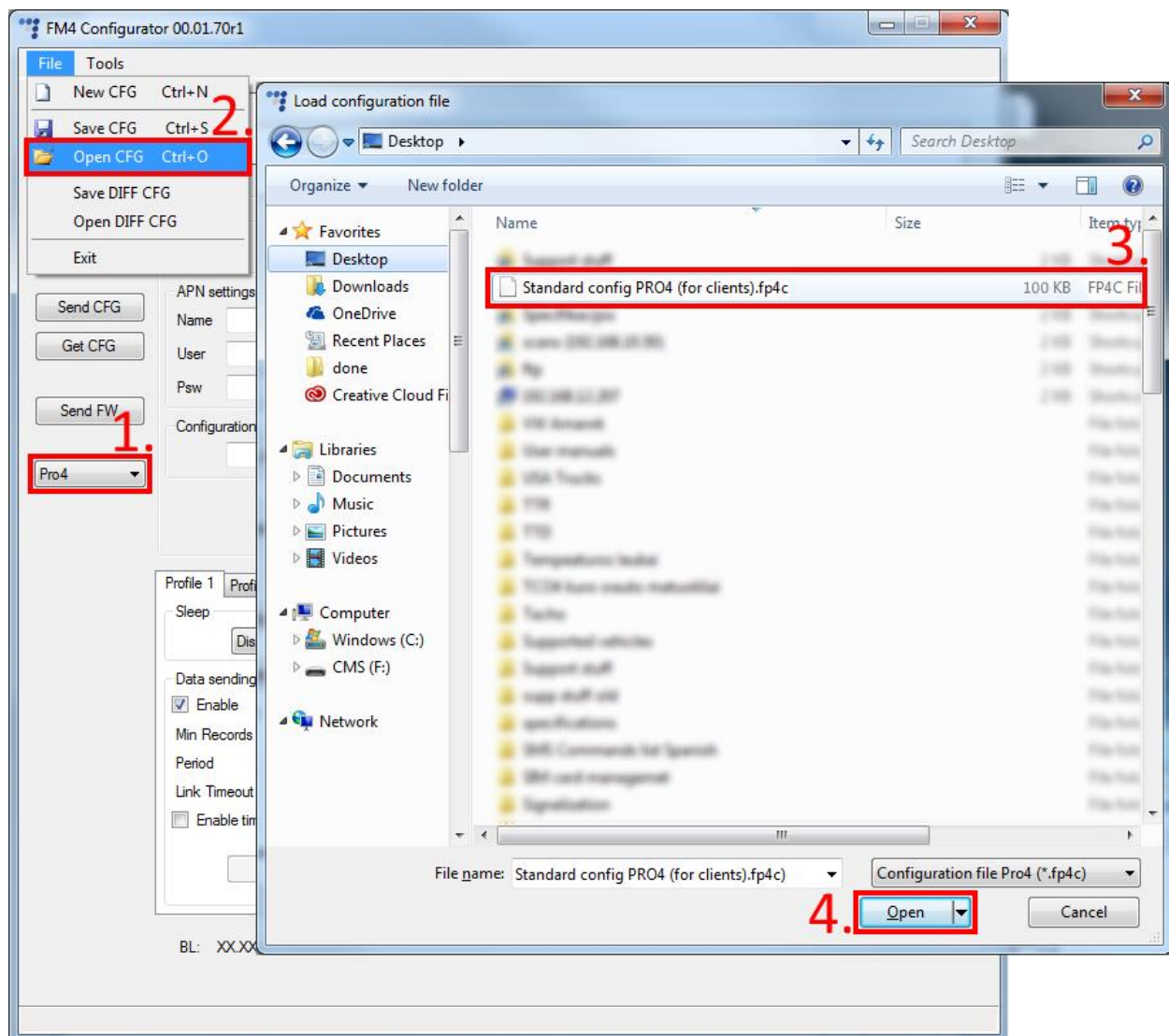


Figure 4. Configuration steps

Sample parameters will be loaded. However you need to enter some parameters on your own.

1. Enter IP (in the 256.256.256.256 format) or Domain name (not exceeding 40 characters) and PORT to which device should send data.

2. Enter APN settings: APN name, User login and Password (if login and password needed). If you choose to enable **Lock FM device to the SIM card** check-box you will be required to enter SIM card's PIN code every time you try to connect to the device via USB cable. As long as it is checked you will not be able to use different SIM cards with this device.
3. Select COM port you connected device to and click **Connect**. At this point configuration is ready to send to device so device must be connected to computer.
4. Click **Send CFG** button. Configuration will be uploaded to device.

NOTE

APN name, login and password should be provided by your mobile network operator

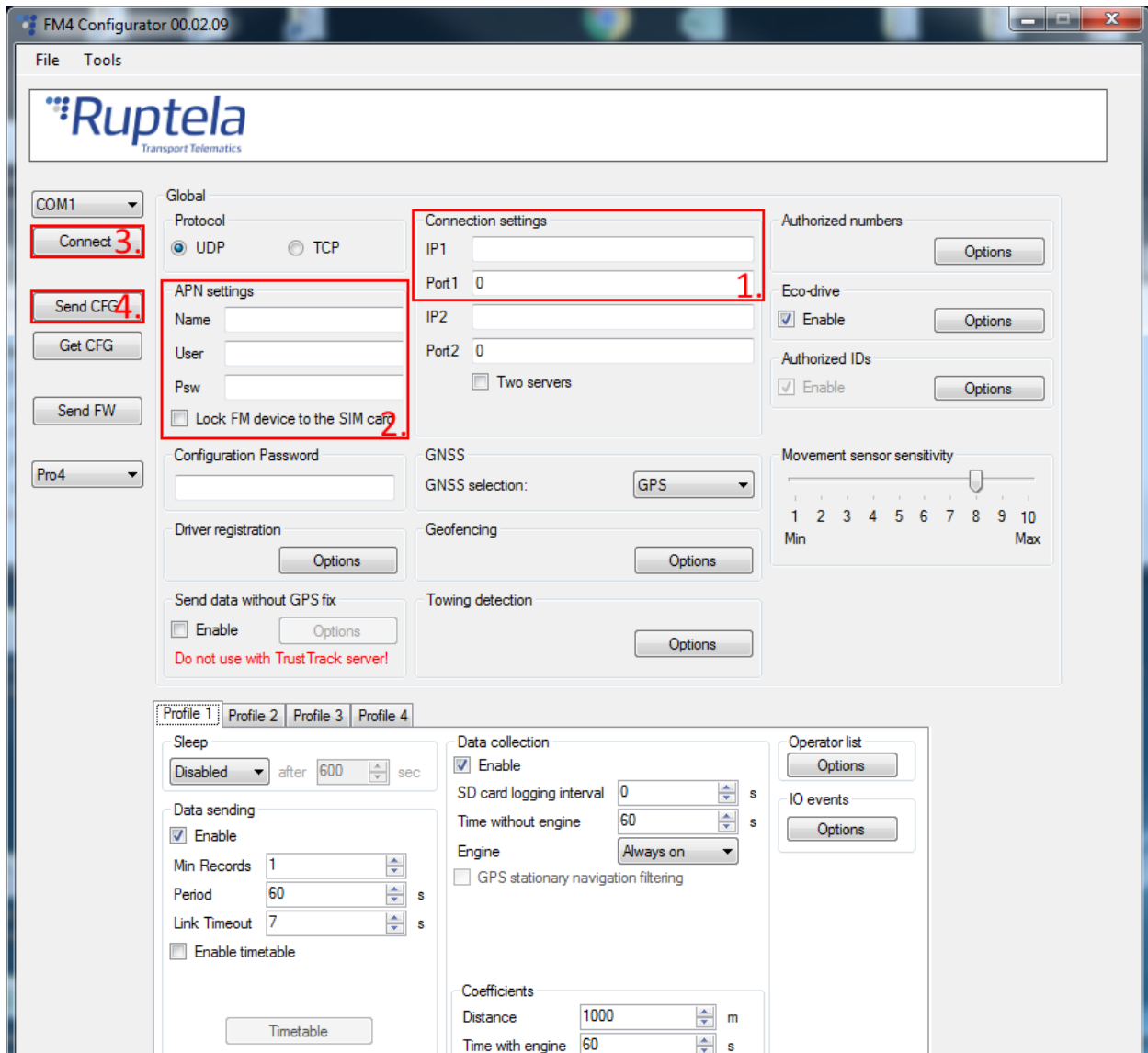
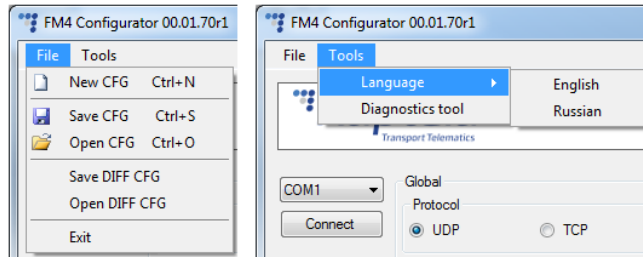


Figure 5. Required connection settings

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

4.3 ADVANCED CONFIGURATION

Configuration tool is quite similar to 3rd generation devices. Overview of configuration is described in sections.



File menu gives you access to control configuration files. Choose *New/Save/Open CFG* to perform corresponding action. CFG means full configuration file.

Tools menu contain language selection: English or Russian.

Save/Open DIFF allow you to create DIFF file. DIFF files are used to change only one or few certain parameters without need to upload full configuration to device. It is useful when updating over-the-air.

ATTENTION

DIFF file will save EVERY field in configuration that you touch with mouse. For example, you only click on IP field but do not change anything – when you save DIFF file, IP will be included in DIFF even if it was not changed. That is why particular attention must be taken when using DIFF files. It is very easy to change/remove parameters that you do not want to change.

Control panel on left side allow you to choose and control device.



Select COM port that device is connected and hit **Connect**.

Send CFG and **Get CFG** buttons are used to send and receive configuration file to hardware.

Send FW is used to send new firmware to your device.

In **drop box** you can select device type. If you connected one to your PC, it will be displayed.

4.3.1 GLOBAL SETTINGS

First part of configuration tool is global settings.

Global include connection settings and other settings independent from profile settings – global settings are same for all profiles.

UDP protocol is less reliable than **TCP** but also uses less traffic. TCP however use more internet traffic but is more reliable. Choose one according to your needs.

APN settings are needed for internet connection. These settings must be provided by your mobile network provider. Without APN settings device will not send any data.

- If you choose to enable **Lock FM device to the SIM card** check-box you will be required to enter SIM card's PIN code every time you try to connect to the device via USB cable. As long as it is checked you will not be able to use a different SIM cards with this device.

If the wrong PIN is typed in more than three times, either the SIM card become locked.

It can be returned to its original unlocked state by entering a PUK, provided by the service operator after verification. If the wrong PUK is entered ten times in a row, the device will become permanently blocked and unrecoverable, requiring a new SIM card. Once you enter the PUK code, you must set a new PIN.

SIM status section at the bottom of the configuration tool displays SIM card related information.

Total of seven different statuses are available:

1. Ready – PIN code is known or PIN code check is disabled. GSM/GPRS modem can operate normally.
2. Error – Represents a wide range of possible problems. Common reason would be old FW version, which does not support SIM commands.
3. Unknown – Communication between device and GSM/GPRS modem failed, SIM status is unknown.
4. PIN Request – SIM card requests a PIN code, FM device cannot provide it (code provided by the device is incorrect).
5. PUK Request - SIM card requests a PUK code.
6. Locked – This FM device is attached to a different SIM card.
7. Not inserted – SIM card is not inserted.

Configuration password allow to lock configuration – without password no one can change device configuration via cable. However, over-the-air update ignores configuration password.

GNSS allow to select positioning network – GPS or GLONASS. GPS by default (*suggestion not to change this*).

In **Connection settings** you should enter server IP and port that the device should connect to. The IP can be entered in the numeric format: 255.255.255.255. You can also use a Domain name (not exceeding 40 characters). IP 2 is a backup IP address, which is used when the device is unable to connect to the first server.

NOTE

Please have in mind that ports for TCP and UDP transfer protocols usually are different – please select correct transfer protocol and enter correct port.

- **Two servers** – checkbox changes the logic described above. It enables a two servers mode – the same data is repeatedly transmitted to another server with IP2, unless we get a timeout. IP1 is dedicated IP for server, from which we get the ACK's for our record packets sent. After we get the ACK from this IP, record data is considered as successfully transmitted to the server and it is removed from the memory.

In this mode data is sent to IP2 only when connection to the IP1 is established. Packet, which is sent to the IP1 server is also sent to the IP2 server.

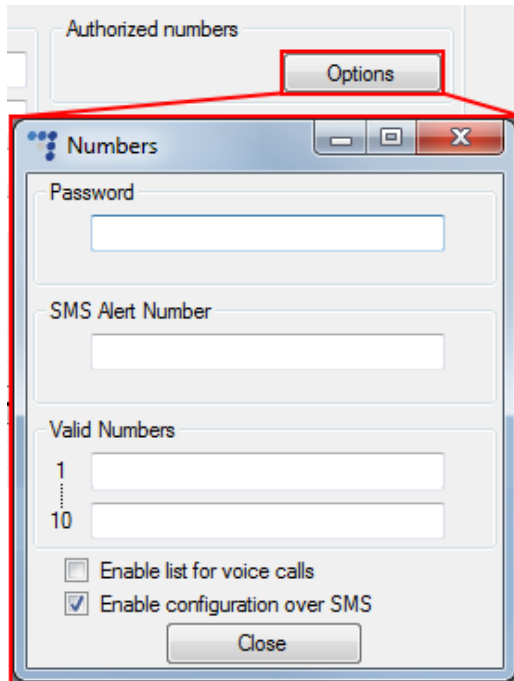
Only records are going to be send to the IP2. Data packets such as Transparent Channel, Tachograph, SD card, Garmin will not be send to the IP2.

Unable to send data:

When unable to establish connection to IP1, device does not connect to the IP2 as well. When connected to IP1 and doing data transmission, but IP2 is unreachable – after receiving ACK from IP1 server, data is removed from memory, which can cause information loss in IP2 server.

NOTE

Two server mode doubles the amount of data that is being sent. Before using this functionality consider the cost which arises from the higher data traffic.

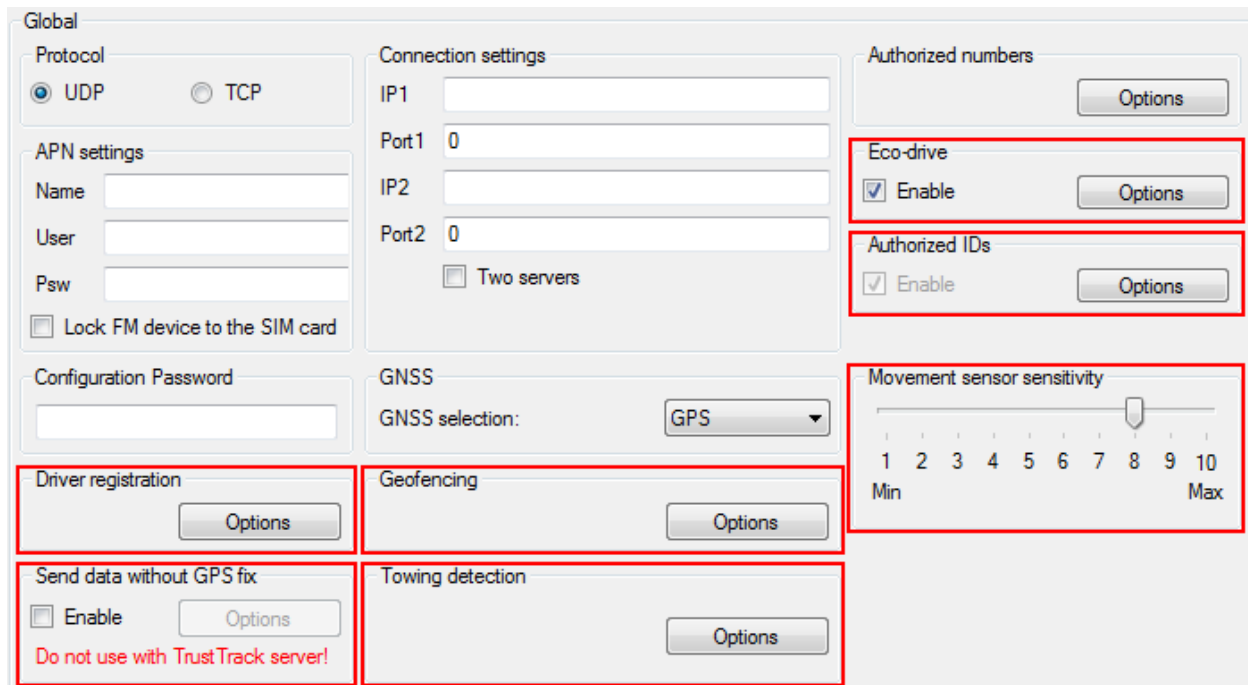


With **Authorized numbers** you can apply password for SMS commands. Also you can enter specific numbers who can send commands to device.

If you check **Enable list for voice calls** entered numbers will be able to call to device for conversation or for listen-in purposes.

Enable configuration over SMS - this checkbox controls configuration over the SMS feature. Full functionality description can be found at our [FTP server](#).

Following features need extensive configuration and functionalities descriptions are available.



ECO Driving options are used to choose sensitivity for ECO Drive functionality. It help rate drivers by safety or by fuel economy. Full functionality description can be found at our FTP server, [ECO Drive](#).

Authorized ID's allows you to fill in a list of authorized IDs who can start engine when ignition blocking is used. More information about this functionality is available on our FTP server, [FM-Eco4, Pro4, Tco4 + Driver registration](#).

Driver registration is used to authorize vehicle start, identify driver and account working hours. Full functionality description can be found at our FTP, [Driver registration](#).

Geozone setting allow to use internal geozones, configured directly into device. Full description can be found at our FTP, [Internal geozones](#).

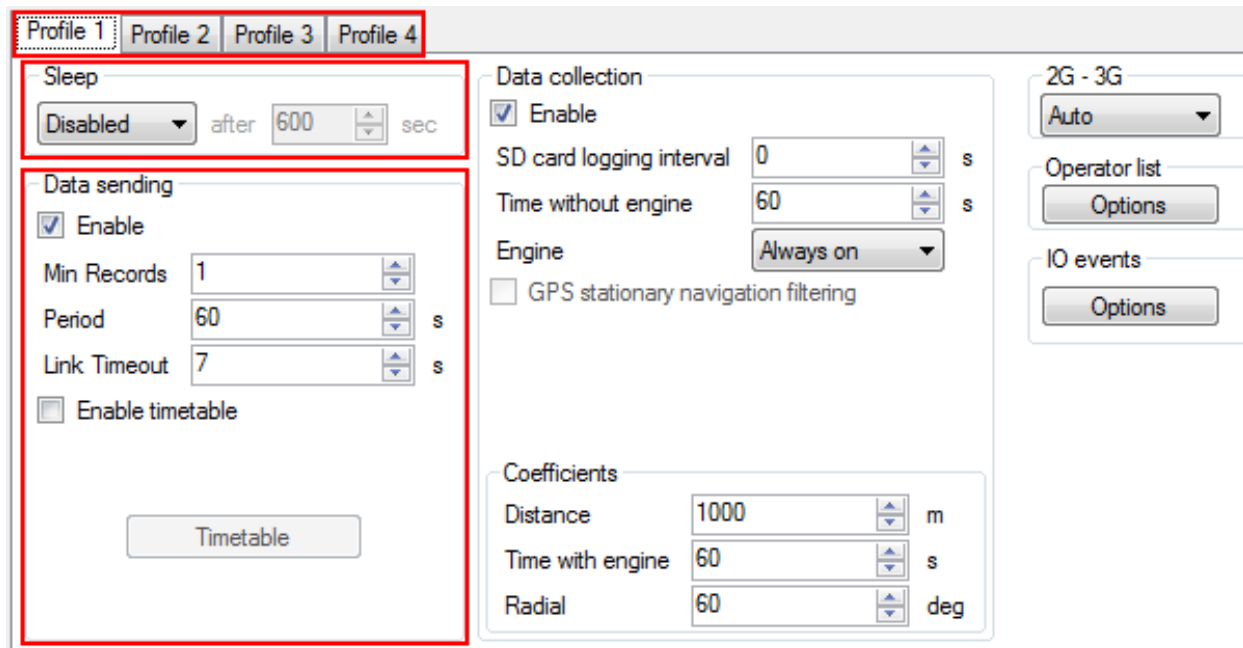
Movement sensor sensitivity allows you to configure movement sensor according to your needs. If you slide the bar towards the Max, the sensor will detect even very slight movements. If you slide it to the Min, than only stronger movements will be detected.

Send data without GPS fix - device cold-start often causes problems, because it is not sending data, therefore user is unable to see parameter values until the GPS fix is obtained. In order to face these problems new functionality, which enables sending data without GPS fix was implemented. This feature cannot be used with TrustTrack server! Full functionality description can be found at our [FTP server](#).

Towing detection - With Towing detection driver can be informed, that his car is being towed. Information about such event is sent to the server, therefore driver might still have time to come back to his vehicle before it is taken away. Full functionality description can be found at our [FTP server](#).

4.3.2 PROFILE SETTINGS

Second part of configuration tool is settings for each profile. Profile is a set of settings for specific circumstances (e.g. when vehicle is operated in native country or abroad).

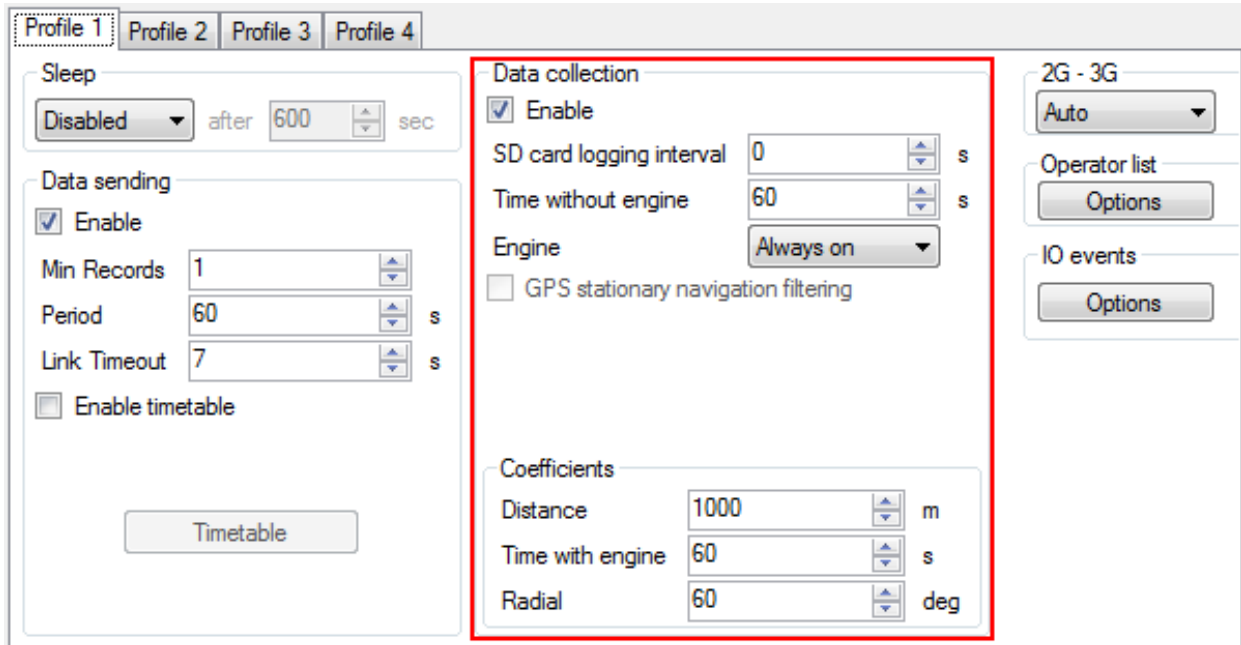


Sleep can be *Disabled* or set to *Sleep* or *Deep sleep*. Sleep extends internal battery life by turning off GPS/GSM modems. Deep sleep disables everything except DINs. When *Sleep* or *Deep sleep* is selected, it is possible to set a time limit. Once this time limit is reached, the device will switch to Sleep/Deep sleep mode.

With **Data sending** settings you can configure data sending frequency and conditions. **Enable** check box must be enabled.

- **Min. records** – Minimum number of records required to establish connection to server. If device detects less records than entered, link will not be opened to server.
- **Period** – sets how often device will check for required number of records.
- **Link timeout** – when device opens link to server and send all records, this value indicate how long device should wait before closing it. Default is 7 seconds, suggested not to change.

Timetable allow you to select particular days and hours data should be sent.



Data collection must be enabled to collect information. **Time without engine** means how often records should be made when engine is off. **Engine** drop box allow you to choose how device will pick up ignition (consider that engine is on).

- *Always on* – No ignition pick up, engine considered always to be on
- *Ignition(DIN4)* – Digital input 4 is default DIN used for ignition pick up.
- *MovSensor* – Detect moving of vehicle and consider engine to be on.
- *Custom* – Custom Ignition functionality enables user to select more than one condition to detect engine ignition. Full functionality description can be found at our [FTP server](#).

GPS stationary navigation filtering eliminates GPS jumps when vehicle is not moving.

Coefficients are used to collect records in addition to engine on/off parameters. Record will be made when:

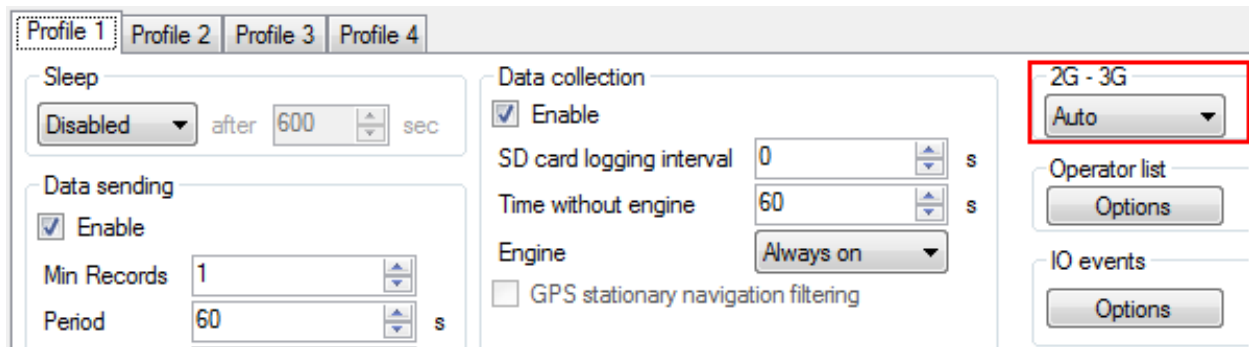
- **Distance** that is set is achieved
- **Time with engine** have passed
- **Radial** turn of degrees entered is detected.

These coefficients help to get route of vehicle more accurate.

NOTE

Keep in mind that FM Device is not designed to have a perfectly accurate time tracking function. Due to various reasons minimal deviations are possible. Over prolonged time periods these small deviations might add up and produce time tracking inaccuracies. Few examples:

- ❖ Device is configured to track one event for 1h. However actual event tracking might last for 1h ± Error (i.e. 5 seconds).
- ❖ Device is configured to gather records every second. Depending on the device's state, record gathering time might deviate and last longer (i.e. 2, 3 or even 5 seconds).



The screenshot shows the configuration interface for the FM-Pro4 device. The '2G - 3G' section is highlighted with a red box. It contains a dropdown menu set to 'Auto'. Below this are buttons for 'Operator list' and 'Options'. The 'Data collection' section is also visible, with options for 'Enable', 'SD card logging interval', 'Time without engine', 'Engine', and 'GPS stationary navigation filtering'.

2G – 3G section allows to set device operation mode either to 2G or to 3G.

This feature is supported only with the most recent FM-Pro4 device hardware versions that have UG96 GSM modem. These devices have (3G) added in their label.

Three different operation modes can be set:

- *Auto* – default option. FM device uses 3G when it is available. If for some reason 3G is unavailable or it becomes unavailable during operation, device makes 3 attempts to connect to the UMTS network. In case this is not possible, it will automatically switch to GSM/GPRS (2G mode) and stay in this mode.

Device can be forced to switch back to UMTS network with a SMS command. Command structure would be:

password set3g 1/0 – where value: '1' means enabled and '0' means disabled.

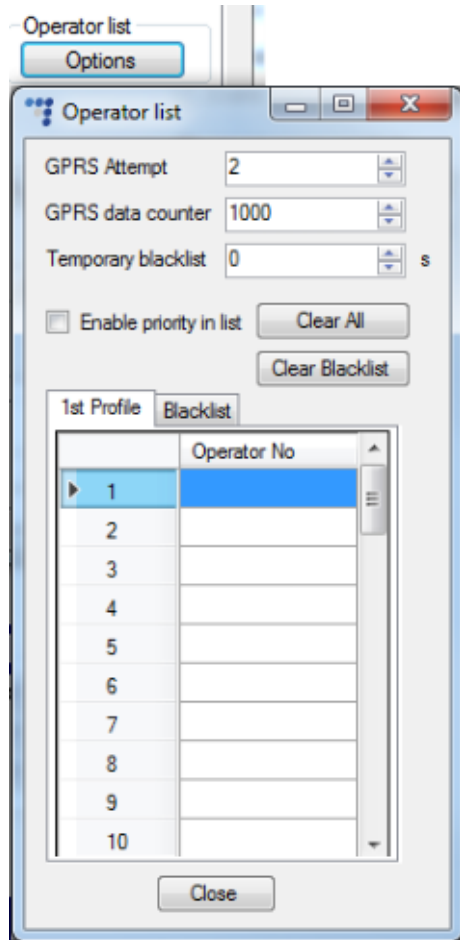
Example: password set3g 1 – In this example, 3G would be enabled.

More information about SMS commands available in "SMS Commands List" which can be found in our FTP server: [FTP link](#)

- *GSM only* – device operates only in 2G mode.
- *UMTS only* – device operates only in 3G mode.

NOTE

FM-Pro4 devices with hardware versions that do not have UG96 modem operate only in 2G mode. For these devices "Auto", "GSM only" and "UMTS only" options have no effect.



Operator list

- **1st... 3rd Profile** tab – operators list in this tab allows selection of operators used in current profile. If operator that is in the list was not found, then device will search for other operator in the list. If no operators were found, device will switch to the next profile.
- **Blacklist** has opposite meaning for operator list. Operators that are in blacklist will not joined.
- **Enable priority in list** - search for operators according to number in list. If it is not selected, device will search for operator randomly.

NOTE

Black list is one for all profiles but operator lists are different for each profile.

- **GPRS Attempt** – how many times device will try to attach to operator's GPRS before trying another operator.
- **GPRS data counter** – how many kilobytes of data device should send before performing next operator search.
- **Temporary blacklist** – temporal ban period in seconds. Sometimes when the FM device connects to the operator with unavailable GPRS, the device is connected, but cannot transmit any data to the server. In such case temporary blacklist is used. Operator with unavailable GPRS gets into the temporary blacklist, which prevents the FM device's connection to this operator on the next operator search.

In other case, device connects to mobile operator and successfully obtains GSM and GPRS signal. However, records still do not reach the server. Device has an ability to work around the faulty network (i.e. when network connection is lost) by putting this operator into the temporary backlist. Ban in this case is implemented via 2nd level temporary black list logic. Network verification is done as follows:

- Server ping – device performs server ping only when there is no response (no ACK) from the server and if the connection to server is not available.

It will make up to 3 separate ping attempts. If any of these attempts are successful, network will be verified. In an ideal case, server responds after the first attempt, network is verified and no more ping operations are needed.

If the server fails to respond to all of them, the device will switch to another operator, after putting current operator into the temporary black list.

During a single ping operation device transmits approximately 256 bytes of data. If device needs to make all three attempts, it will send approximately 768 bytes.

- Operator is also added to the temporary black list, when the device receives "13110" error code from the operator. According to Quectel M95 AT command manual the first number in error code "1" stands for "Cause for protocol stack (PS) layer" and the rest "3110" stands for "Network fail".

Received trouble codes can be monitored with the help of "GSM trouble codes" IO parameter.

NOTE

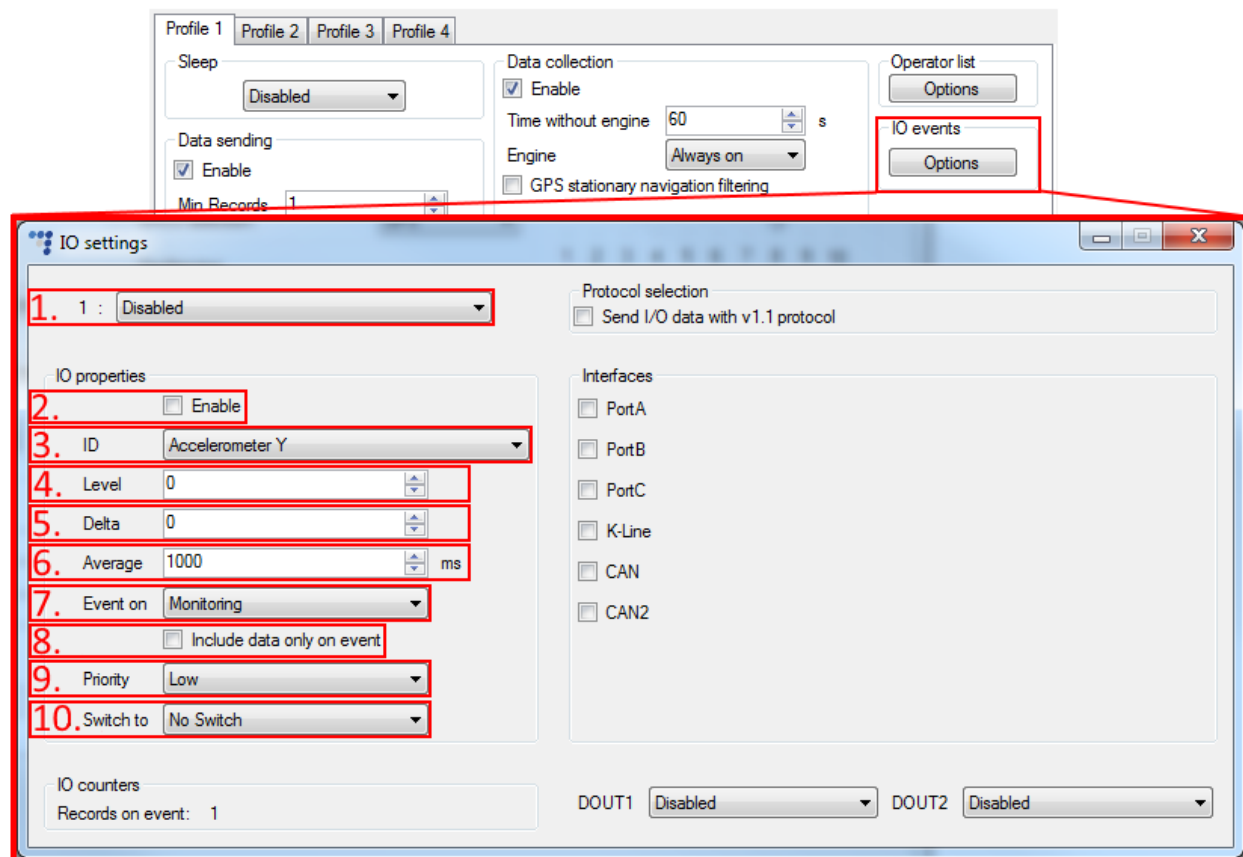
This functionality might be compatible and might be supported with 3G modems used in Ruptela's FM devices.

Key point about the temporary black list:

- Ban period is configurable. When all operators get into the ban list, ban list is cleared.
- Banned means that the terminal was not able to get the GPRS context, it was unable to connect to the operator, server failed to respond to 3 consecutive ping requests or that the terminal received "3110" error code from the mobile operator.
- Ban list is in the RAM the memory, it is cleared after reset or power off.

4.3.3 IO SETTINGS

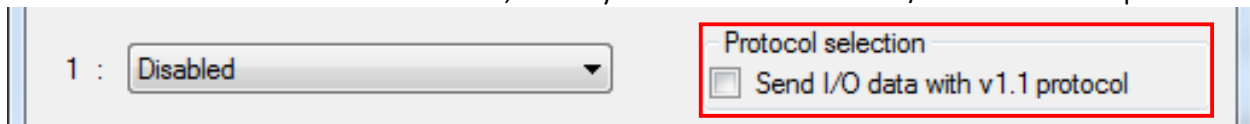
Next important section is IO events. Here you can enable or disable IO parameters that will be sent to server.



1. You have 80 slots for parameters. Select slot you want to enable.

2. Enable this check box otherwise slot will remain empty
3. Parameter list. Choose parameter you want to enable for selected slot. One parameter can be enabled only one time.
4. Used with hysteresis mode, *see 7.c*
5. Used with hysteresis mode, *see 7.c*
6. Value averaging time. Some parameter's values change rapidly and do not correspond any valuable information. Averaging values for some period of time gives usable value of parameter (e.g. fuel level often oscillates. Averaging gives you value approximated value that correspond real fuel level in tank)
7. Event on describes how parameter will be measured and sent:
 - a. Monitoring – Parameter value is always monitored and sent with every record
 - b. Change – when value is changed record will be made regarding this change. However parameter is monitored and sent to server with every record
 - c. Hysteresis – Record is generated because of specified change in parameter value. E.g. parameter is *Power supply voltage*. Level sets point of reference, in this case 12700 mV. Delta is variation in value, e.g. 1000 mV. Record will be generated (because of parameter value change) when Power supply voltage drops to < 11700 mV and/or > 13700 mV. You can select condition “on rising” or “on falling”
8. Select **Include data only on event** to get parameter value only when condition (set in step 7) is met. In other cases parameter value will not be included in records
9. If priority is set to high, record will be sent immediately, disregarding data sending settings. If it is low, device will wait for suitable conditions to open link to server
10. Upon event of value change in some parameter you can configure device to **switch to** another profile

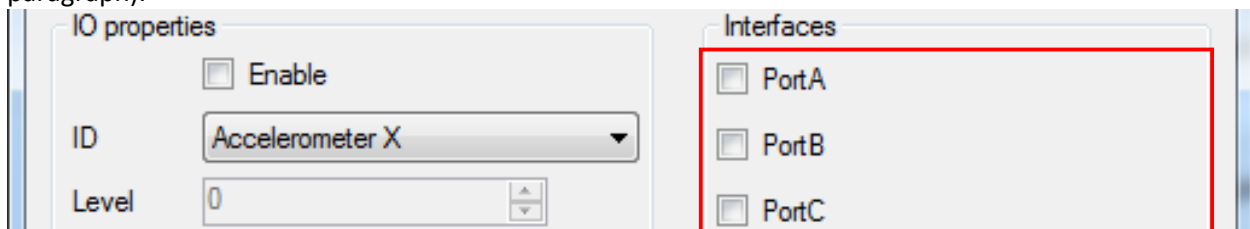
Protocol selection section has a checkbox, where you can choose to “Send I/O data with v1.1 protocol”.



NOTE

Enabling this checkbox will result in the loss of all unsent records.

Interfaces section gives ability to enable or disable all of the device's interfaces (described in 3.6 paragraph).



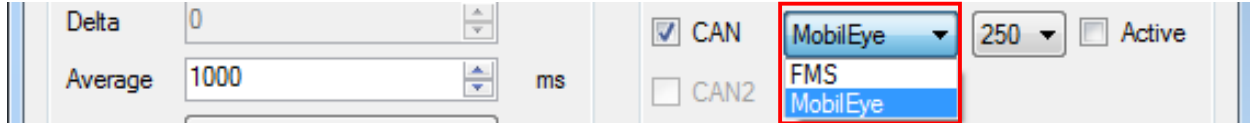
11. **Port A** – RS232 PortA.
12. **Port B** – RS232 PortB.
13. **Port C** – RS485 PortC.

More information and connection instructions available at our FTP server: [FTP link](#)

Bellow you will find checkboxes for the **CAN** and **CAN2** interfaces.

CAN – if you put a tick in the 1st CAN interface checkbox, then a dropdown list appears, where you can choose one of the following:

- *FMS* - for vehicle CANbus (FMS) information reading.
- *MobilEye* – for communication with MobilEye device.



CAN2 – 2nd CAN interface checkbox has all the same options as CAN interface described above.

Something to consider when enabling/disabling CAN interface:

Let's say one of the CAN interfaces is enabled. *FMS* is selected in the drop down menu. Some CAN parameters (*CAN engine speed*, *CAN wheel based speed etc.*) are added to the IO list. If you decide to disable this CAN interface, some of the CAN/LCV IO parameters will be disabled as well. You will be warned about this with a new pop up window.

NOTE

Only one CAN line work at the same time. Connect your hardware to one of the interfaces and configure it accordingly.

Additional fields can be used in conjunction with CAN interfaces. This depends on interface configuration.

Smart LCV selection

“Smart LCV Select” functionality allows to add CAN IO parameters only when *FMS* mode is enabled on the CAN interface. When other modes are set, CAN IO parameters are hidden. Smart select is mostly meant for the CAN LCV mode, hence the name. By default Smart LCV Selection is always on.

First we will describe CAN *FMS* mode. After that, there will be a section explaining how to turn Smart LCV Selection off and why it could be useful.

Something to consider when Smart LCV Selection turned on:

Enabling/disabling CAN interface might cause some issues. Let's say Smart LCV Selection is on. One of the CAN interfaces is enabled. *FMS* mode is selected in the drop down menu. Some CAN parameters (*CAN engine speed*, *CAN wheel based speed etc.*) are added to the IO list. If you decide to disable this CAN interface, some of the CAN IO parameters will be disabled as well. You will be warned about this with a new pop up window.

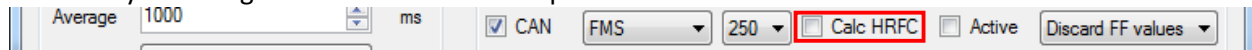
Similarly, if you change CAN *FMS* mode to something else, the CAN IO parameters will be disabled.

CAN FMS:

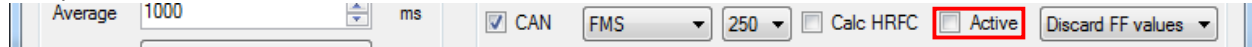
Baud rate - Two possible options are available in the FMS Baud rate dropdown list: 250, 500. Data transfers rate depends on vehicle.



Calc HRLFC - enables fuel consumption recalculation from fuel rate for FMS CANbus mode. Recalculation works only when high resolution fuel consumption data from CANbus is not available.



Active – If this checkbox is enabled, device will do both, receive and send data to the vehicle’s onboard computer.



FMS data filters drop down menu. It is used to set FMS data filter:

- *Discard FF values* - default option. Device sends only valid data (according to SAE J1939 standard) to server. It discards FMS data packets with FF values. In this case, new records contain previously obtained FMS parameter values (from valid data packets).

NOTE

Filter is applied only to the following FMS parameters: *Engine total fuel used, High resolution total fuel used, Engine speed, Wheel based speed, Trailer weight, Cargo weight.*

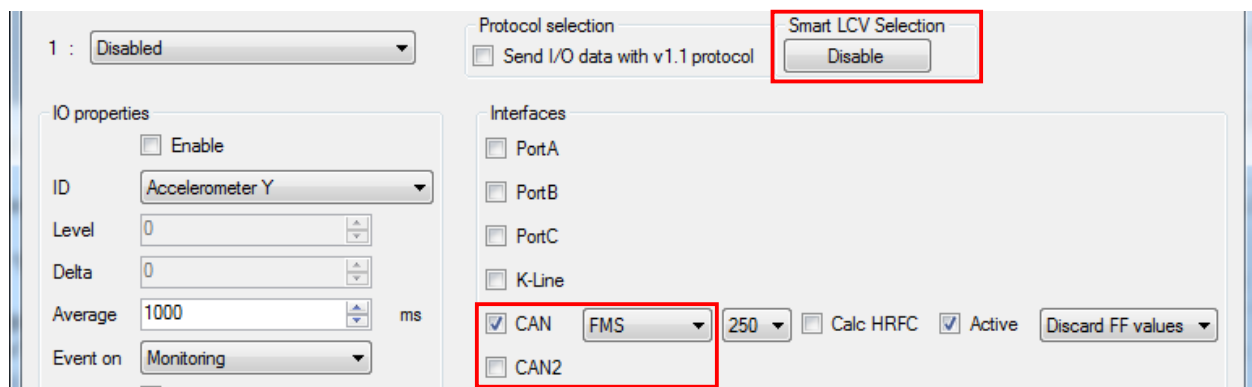
- *No filters* – Device sends all data to the server.



Disable Smart LCV Selection

The section itself and the “Disable” button will be visible only when one of the CAN interfaces is enabled and the *FMS* or mode is selected. With other modes, both are hidden.

As mentioned earlier, “Smart LCV Selection” functionality allows to add CAN IO parameters only when *FMS* or mode is enabled on the CAN interface. When other modes are set, CAN IO parameters are hidden.



Click the “Disable” button to turn the Smart LCV Selection off. Button will be dimmed. To turn this feature back on, close the “IO Settings” window and open it again. Smart LCV Selection functionality will go back to its default ON state.

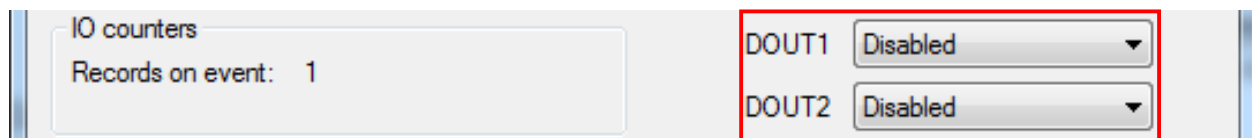
Use smart LCV select “Disable” button, when you need to switch from one CAN interface to another, without losing enabled CAN IO parameters. Don’t forget to set the same configuration

(Example: You have configured CAN FMS 250 Active on the 1st CAN interface. You have enabled few CAN IO parameters. Now you want to switch to the 2nd CAN interface without losing those parameters. Click “Disable” button in Smart LCV Selection section. Disable 1st CAN interface or set different mode. Enable 2nd CAN and set FMS 250 Active. Switch is complete.)

Digital outputs section

DOUT1 and **DOUT2** – dropdown lists let you choose one of the following: *Disabled, LED, Buzzer, Blocking, GSM jamming block.*

More information available at our FTP server: [FTP link](#)



IO counters
Records on event: 1

DOUT1 Disabled ▼
DOUT2 Disabled ▼

4.4 INTEGRATION PROTOCOL

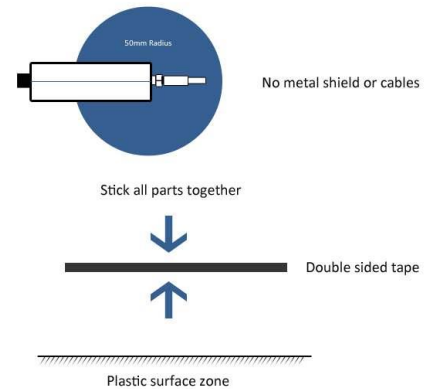
All integration related questions and documentation can be acquired from Ruptela technical support: support@ruptela.com

5 INSTALLATION RECOMMENDATIONS

5.1 DEVICE INSTALLATION

When installing device into vehicle please obey these instructions otherwise you device may not work properly.

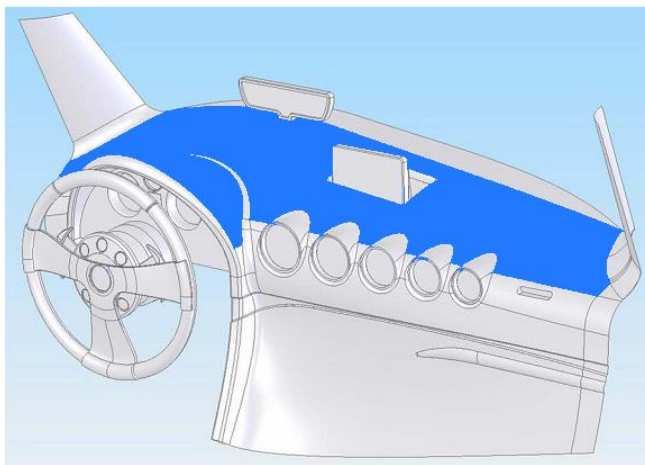
- Device should not be seen or easily reached.
- Device should be firmly fixed to the surface. Please avoid mounting device near the metal surface or cables (see the picture below).
- Wrong device mounting may be the cause of device malfunction.
- Device cannot be fixed to heat emitting or moving parts.
- SIM card should be inserted in the device while the connector is plugged off (while module has no power).
- Device must be fitted with double sided stick tape!



5.2 ANTENNA INSTALLATION



It is recommended to place GPS/GLONASS antenna behind the dashboard as close to the window as possible.



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