ritm
SECURITY SOLUTIONS

GPS/GLONASS tracker

Voyager 2N

Operating Manual.
Rev. 1.3

St Petersburg, 2017

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Introduction

This operating manual covers Voyager 2N tracker (hereinafter referred to as the tracker) designed for monitoring of mobile objects and supporting connection of external devices for fuel level monitoring, connection to on-board computer, monitoring of operation of mechanisms and alarm system installed on the vehicle.[1]

This manual contains data on the design, principle of operation, tracker properties, its parts, and guidelines for proper and safe operation of tracker (intended use, maintenance, storage, and transportation).

This operating manual provides necessary information for preparatory training and further use of tracker.

This manual covers the following tracker versions:

1. Voyager 2N.
2. Voyager 2N 3G.
3. Voyager 2N Wi-Fi.
4. Voyager 2N ARI.
5. Voyager 2N ATOL.
6. Voyager 2N LIGHT.
7. Voyager 2N LIGHT RS-485.

1) The list of supported features depends on the tracker version.

Device Overview

Designation and Principle of Operation

Voyager 2N is a small form-factor device for monitoring of mobile objects powered from a built-in battery and supporting connection of an external power source with 12/24 V rated voltage.

A working tracker receives signals from global navigation satellite systems[2] GPS and GLONASS in order to determine the location and other parameters (such as current time, direction of travel, speed, number of satellites).
The tracker saves messages it generates to the internal memory and submits them to the monitoring software. Transfer of data to the coordinate receipt server is done via a GSM cellular communication channel.

The tracker may operate only provided that an intact, activated SIM card is used that has not been locked by an MNO and has an activated package of necessary services (GPRS, CSD, roaming).

Independent power supply from a battery[3] allows the tracker to be used as a portable device for monitoring of people, cargoes, and vehicles[4].

The tracker is fastened directly to the monitored object.

Do not use the tracker in the vicinity of working medical equipment, on planes and in prohibited locations, as it can generate interference adversely affecting electronic equipment.

2) Hereinafter referred to as GNSS.
3) For tracker versions featuring a battery.
4) Hereinafter referred to as vehicles.

Different tracker versions have their unique distinctions and features. Such as:

Voyager 2N supports the following features: operation via global navigation satellite systems GPS and GLONASS, data transfer over a GSM channel, installation of 2 SIM cards, non-volatile memory, built-in battery for standalone operation and wide possibilities for external connection of optional devices enable using the tracker for a wide range of applications: from basic monitoring to monitoring the condition of key vehicle assemblies.

The **Voyager 2N 3G** has all the features of the **Voyager 2N** version and is capable of transmitting and receiving data over 3G networks.

The **Voyager 2N Wi-Fi** has all the features of the **Voyager 2N** version, while also being capable of transmitting and receiving data over IEE 802.11 (Wi-Fi) wireless networks, enabling it to serve as an access point for driver identification, or as a client capable of connecting to wireless networks for further data transfer and configuration setup via server.

Voyager 2N ATOL is a version completed in a special enclosure enabling receipt of data from ATOL Drive5 tachographs.

Voyager 2N LIGHT is a cheaper version of the tracker. The device has one SIM card slot. The device has only one discrete input, which can be used for connecting a panic button or monitoring limit switches of any vehicle mechanism.

Voyager 2N LIGHT RS-485 is another cheaper version of the tracker. Options: installation of 1 SIM card, connection of external devices, connection of intrusion sensors or mechanism monitoring sensors. The tracker has one discrete input and one input for connection of a digital fuel gauge unit with an RS-485 interface.

Voyager 2N LIGHT CAN is a cheaper version of the tracker with the ability to read CAN-bus of the vehicle.

Specifications

ATOL, ARI, 3G and Wi-Fi Versions of Voyager 2N

GPS	+
GLONASS	+
Communication channels in the GSM network	CSD, GPRS
GSM antenna	External
GPS/GLONASS antenna	External
EGTS protocol data transfer	+
3G network data exchange	Yes (Voyager 2N 3G version)
Number of SIM cards, pcs	2
Type of SIM cards	micro-SIM
PC connection over USB	+
Connection to vehicle CAN bus	+
Connection of digital fuel gauge units	Yes, via RS-232 and RS-485 interfaces
Connection of Touch Memory reader	+
Connection of audio actuation device	Yes (in ARI Version)
Connection of dispatch unit	+
Universal inputs (discrete/ frequency/analog/counter)	2
Discrete inputs	2
Outputs (~ 1 A)	2
External indicators	"GPS/GLONASS Reception", "SIM1 Reception", "SIM2 Reception", "External Power"
Built-in motion sensor	+
Non-volatile memory, MB	8
Non-volatile memory, No. of entries	150,000
Battery type	BL-5C
External supply, V	10–36
Tracker energy consumption, A	0.02–0.15 (depending on mode)
Enclosure Protection Rating	IP52 (IP20 for ATOL Version)

Enclosure break-in tamper	Yes (excluding ATOL Version)
Dimensions, mm	20×80×110 (23×80×108 for ATOL Version)
Weight, g	150
Operating temperature range, °C	-40...+85

LIGHT and LIGHT RS-485 Versions of Voyager 2N

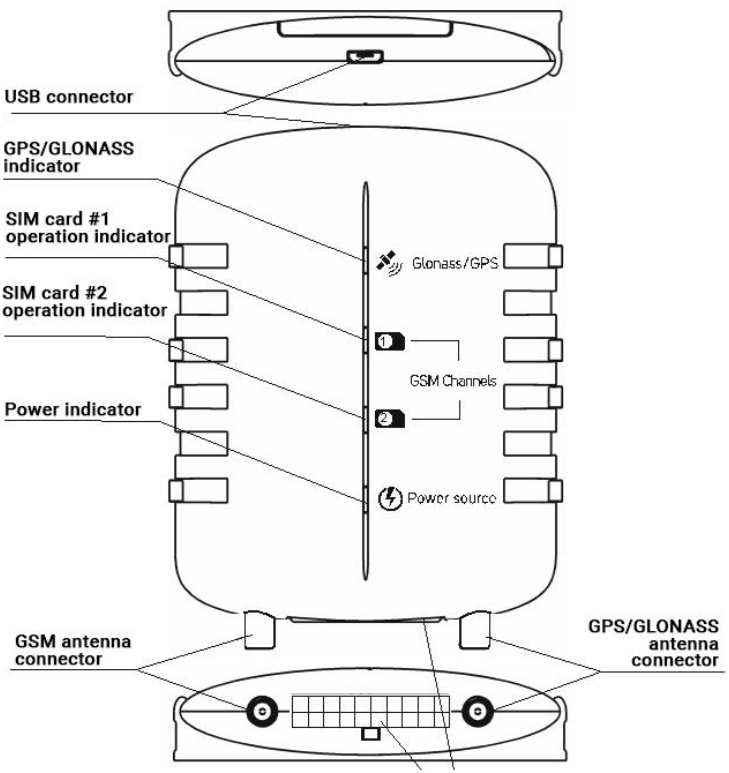
GPS	+
GLONASS	+
Communication channels in the GSM network	CSD, GPRS
GSM antenna	Built-in
GPS/GLONASS antenna	Built-in
Number of SIM cards, pcs	1
Type of SIM cards	micro-SIM
PC connection over USB	+
Discrete input	1
Connection of digital fuel gauge units	Yes, over RS-485 interface (for LIGHT RS-485 Version)
External indicators	"Test"
Built-in motion sensor	+
Non-volatile memory, No. of entries	29,000
External supply, V	10–36
Tracker energy consumption, A	0.02–0.15 (depending on mode)
Enclosure Protection Rating	IP52
Dimensions, mm	20×80×110
Weight, g	140
Operating temperature range, °C	-40...+85

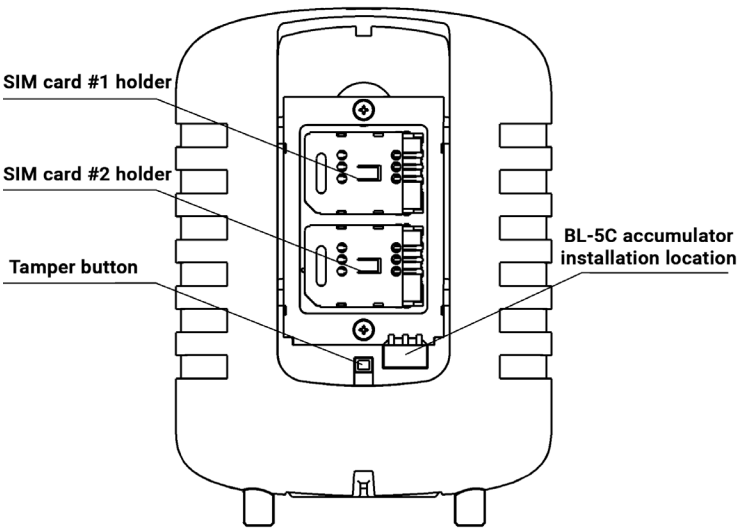
Design

The tracker is made in a plastic enclosure.

Different tracker versions have their unique design features.

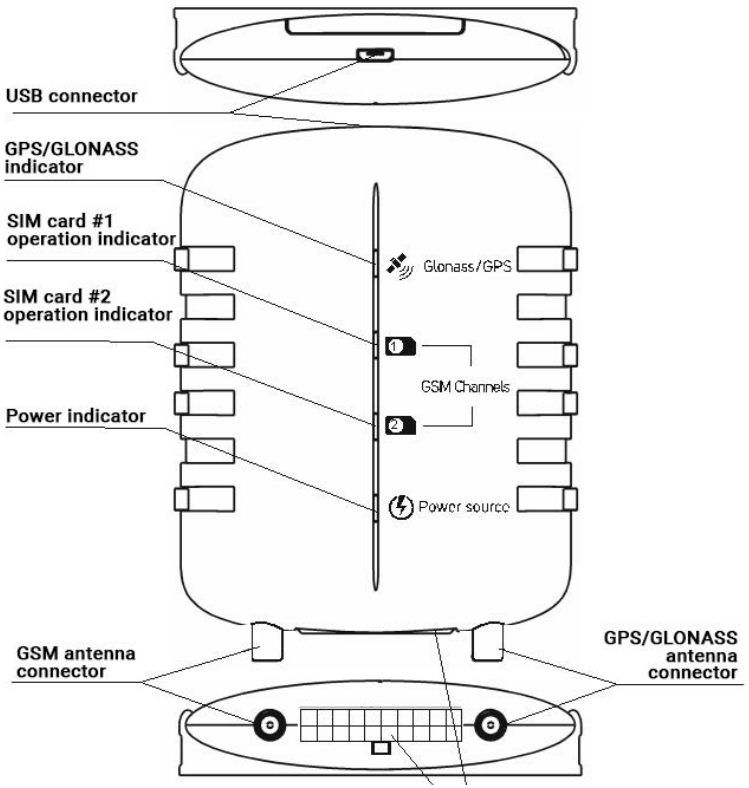
Voyager 2N

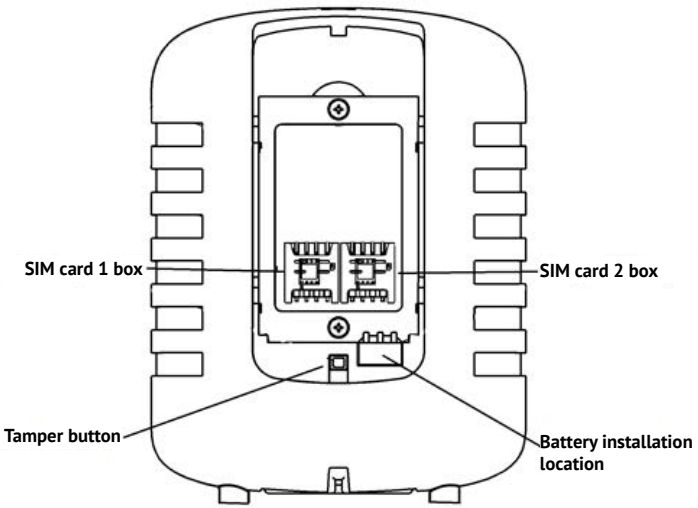




Part	Designation
Tamper button	When the battery compartment cover is opened, device operating indicators turn on. When the cover is closed, the indicators are turn off.
USB connector	For configuration cable connection.
20-pin connector	For connection of power supply and peripherals.

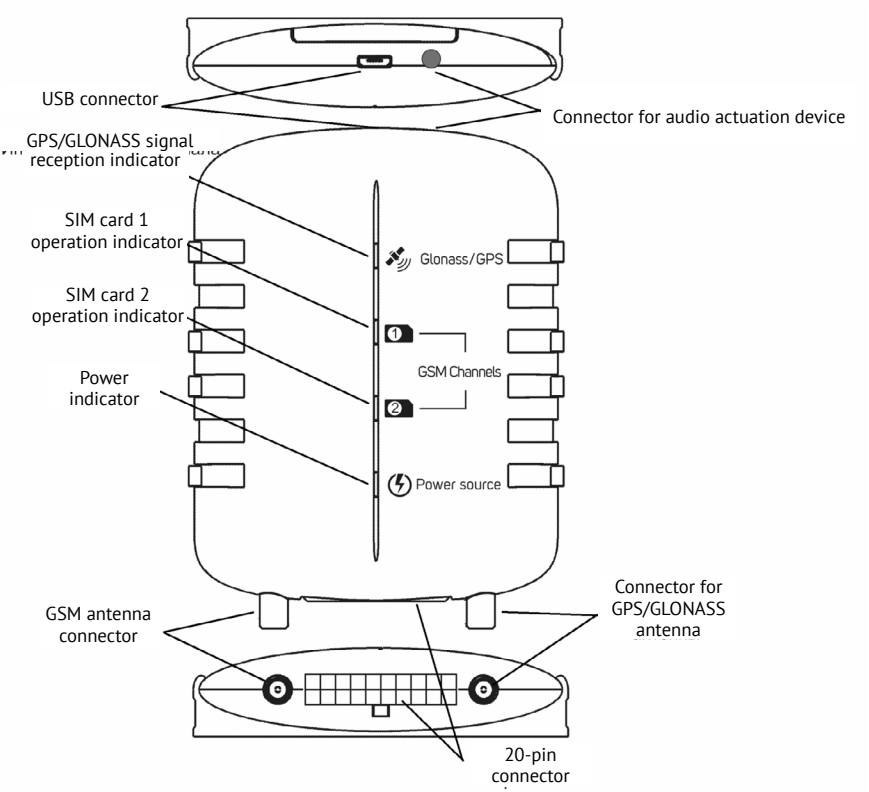
Voyager 2N Wi-Fi

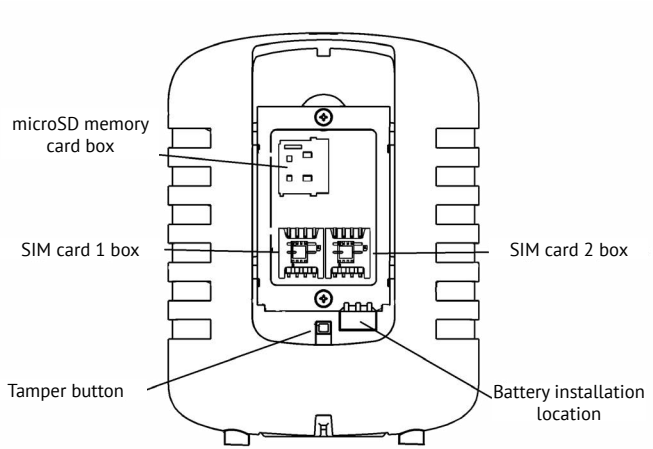




Part	Designation
Tamper button	When the battery compartment cover is opened, device operating indicators turn on. When the cover is closed, the indicators turn off.
USB connector	For configuration cable connection.
20-pin connector	For connection of power supply and peripherals.

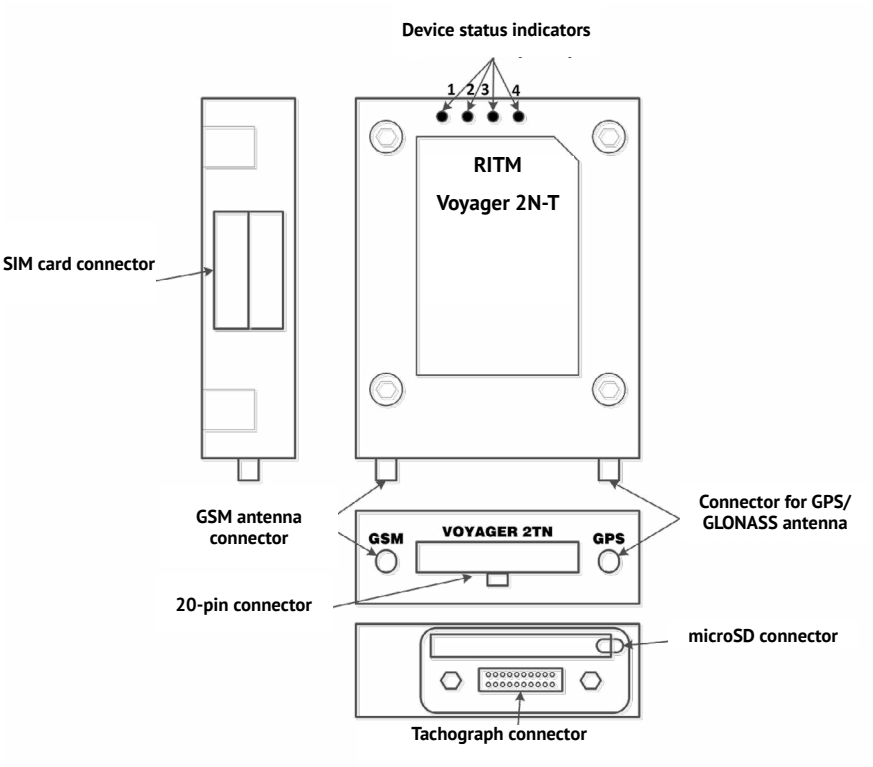
Voyager 2N ARI

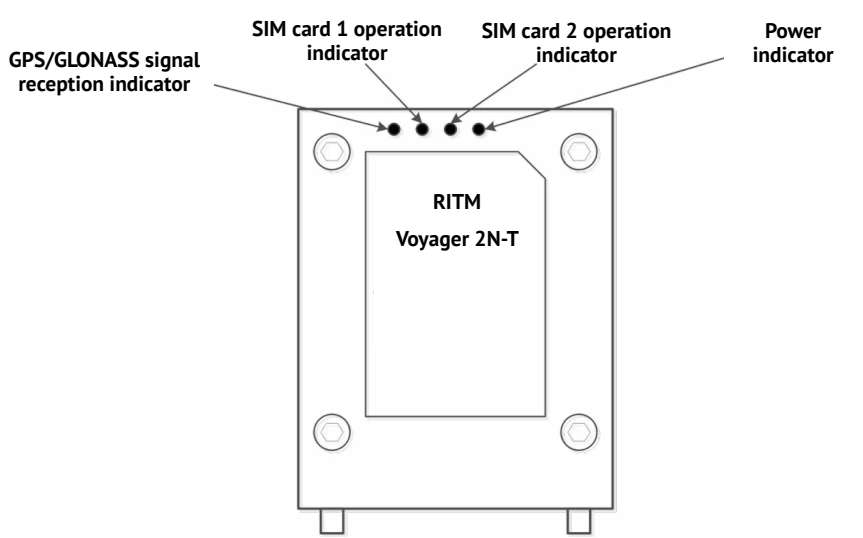




Part	Designation
Tamper button	When the battery compartment cover is opened, device operating indicators turn on. When the cover is closed, the indicators are turn off.
USB connector	For configuration cable connection.
Connector for audio actuation device	For connection of external speaker or amplifier. Required for IVR.
20-pin connector	For connection of power supply and peripherals.

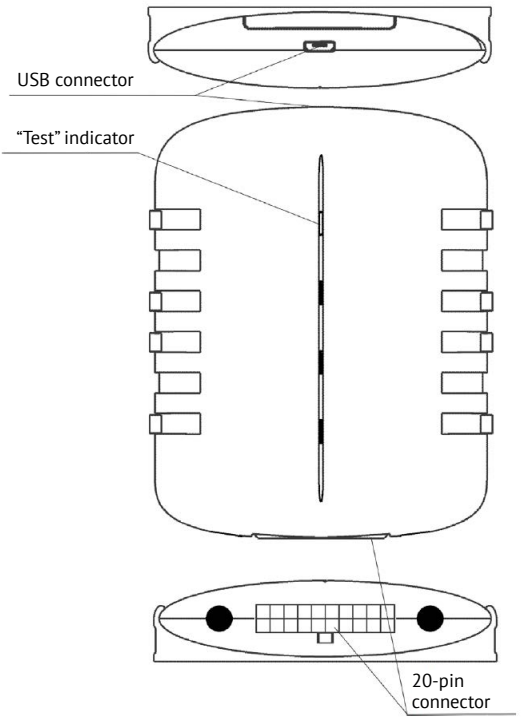
Voyager 2N ATOL

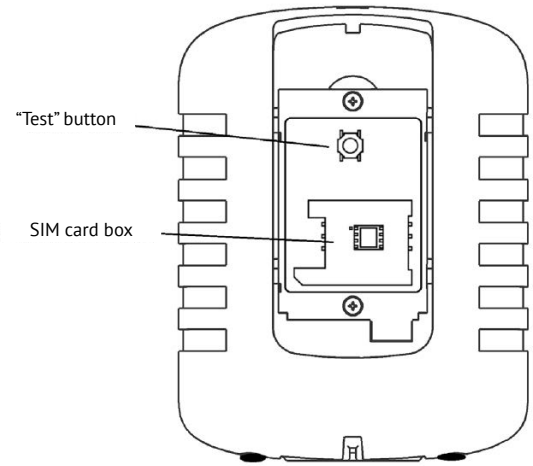




Part	Designation
USB connector	For configuration cable connection.
20-pin connector	For connection of power supply and peripherals.
Tachograph connector	Connector for ATOL Drive5 tachograph.

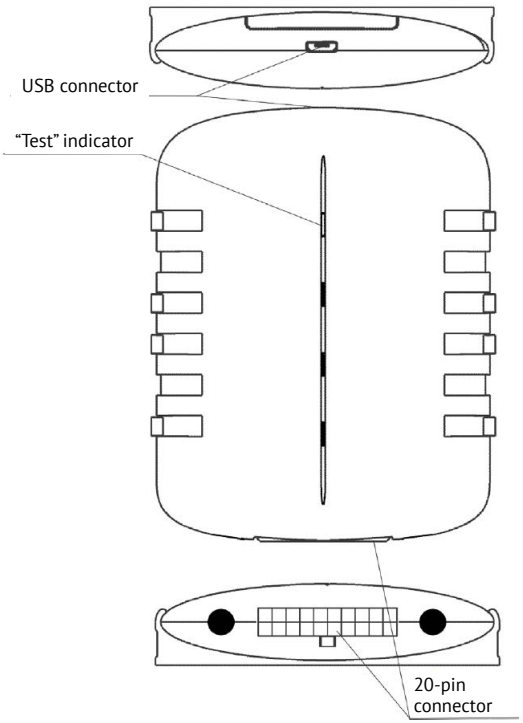
Voyager 2N LIGHT

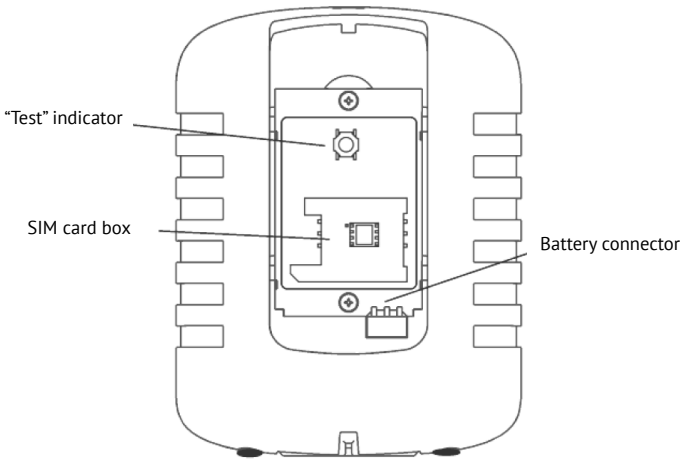




Part	Designation
“Test” button	Used for waking the tracker up from the sleep mode (turning on the GPS receiver and the GSM modem), as well as for switching on/off the GPS receiver operation indicators.
USB connector	For configuration cable connection.
20-pin connector	For connection of power supply and peripherals.

Voyager 2N LIGHT RS-485





Part	Designation
“Test” button	Used for waking the tracker up from the sleep mode (turning on the GPS receiver and the GSM modem), as well as for switching on/off the GPS receiver operation indicators.
USB connector	For configuration cable connection.
20-pin connector	For connection of power supply, discrete input, devices with RS-485 interface.

Indication

All tracker versions, but **LIGHT, LIGHT CAN** and **LIGHT RS-485**, have four indicators:

1. GPS/GLONASS reception indicator.
2. SIM card 1 reception indicator.
3. SIM card 2 reception indicator.
4. Power indicator.

The device enters its work mode within a minute after power is supplied. While the device enters its work mode, all indicators blink at the same frequency.

By default, all indicators work only when the battery compartment cover is open and for no longer than 30 minutes. To ensure continuous work of indicators, choose the "Permanent" mode in Section "Indication".

After the tracker has entered its work mode, the indicators act as described below:

GPS/GLONASS reception indicator

Indicator state	Value
Off	GPS/GLONASS receiver is either off or faulty
Flashes often	Seeking GNSS signal (satellites not detected)
Flashes rare	GNSS signal detected, location being determined

SIM card reception indicators

Indicator state	Value
SIM card 1 indicator ON	SIM card 1 used
SIM card 2 indicator ON	SIM card 2 used
Off	GPS modem is either off or faulty

Power indicator

Indicator state	Value
Continuously on	External power supplied
Off	External power not supplied

The versions **LIGHT, LIGHT CAN** and **LIGHT RS-485** include one “Test” indicator.

The indicator is switched on by pressing the “Test” button and operates for 30 minutes. If satellites are not determined, the indicator blinks frequently. If satellites are determined, the indicator blinks rarely. The indicator may be turned off by pressing the button again.

To operate, the indicator does not require connection to the vehicle’s on-board mains (works from a built-in BL-5C charged battery).[5]

Delivery Package

The delivery package is listed in the device's data sheet and depends on its version.

5) The **LIGHT** version does not include a battery.

Intended Use

Operating Limits

Operating conditions of the tracker should not exceed the allowed limits given in Section “Specifications”.

Unpacking Tracker

Prior to unpacking carefully inspect the package for visual signs of damage.

After unpacking the device, visually verify the delivery package complies to the data sheet.

Visual Inspection

After unpacking the tracker, check the following:

- The condition and completeness of the operation documentation;
- Absence of mechanical damage of the tracker, connector, cable, and integrity of protective and decorative coatings.

If the check reveals any defects or lack of any components, fill out a report, which should include the manufacture and commissioning dates, and describe the defect character.

Submit the faulty device together with the fault report to the device purchase address or the claim handling organization.

Getting Ready for Operation

Monitoring Server Data

Data received during tracker operation are transferred to GEO.RITM monitoring software.

Please clarify the following data with your monitoring service provider: IP-address and GEO.RITM monitoring server port.

eu.ritm.ru is used by default.

GSM Package Selection

Choosing a package for a SIM card to be installed in the device, please verify the availability of the following channels in the package's list of services:

- GPRS: This channel is used for transmission of navigation data to monitoring software and setup via cloud-based software;
- CSD: This channel is used for configuration;
- Voice: Voice channel (only for **ARI** version).

Choose packages with the lowest traffic rounding threshold, i.e., 1–2 KB.

SIM card Insertion

Prior to inserting SIM card, please make sure of the following:

- *Tracker is powered off;*
- *PIN code is disabled at each SIM card;*
- *GPRS Internet service is enabled;*
- *Call Routing is not enabled;*
- *SIM cards have positive balance.*

Prior to inserting SIM cards in the tracker, insert them in a mobile phone. Turn off the PIN code entry feature, check availability of data links that are to be used (CSD, GPRS), and check if the balance is positive.

Open the cover on the tracker enclosure and insert SIM cards into the holders.

Battery Installation

Install a battery to the tracker battery compartment[6]. The battery will automatically charge whenever the tracker is connected to an external power source.

The voltage value threshold, above which the battery charging begins, can be set in the configuration software section “Sensors” → ”Voltage Sensor”.

After the battery service life is over, replace the battery.

6) Excluding **LIGHT** Version.

Power On

To power on the tracker you only need to connect an external 12/24 V power source and it will automatically switch on.

The tracker has to be configured prior to its first use.

1. Using the configuration software connect to the tracker by one of the following ways:
   - Desktop configuration. To connect use a Micro-USB cable and one of general purpose configuration software applications[7];
   - Remote configuration via CSD. To connect use a GSM modem and one of general purpose configuration software applications;
   - Remote configuration via TCP/IP. To connect use a GSM GPRS channel and cloud-based configuration software GEO.RITM and RITM-Link.

To use ritm.conf configuration software, download it from the Ritm's official website.

To use Ritm Configure application, install it in the Chrome Web Store.

To connect using a Micro-USB cable, install the necessary drivers.

To connect via a digital CSD-channel make sure the digital data transmission service (CSD) is enabled and the balance of the SIM card installed in the device is sufficient.

Remote configuration over CSD can be limited with only engineering numbers (see Section "Engineering Numbers").

7) ritm.conf configuration software or the application for Google Chrome Ritm Configure may also be used.

2. Enter valid APN access point settings.
3. Enter details for the used GEO.RITM server.
4. Select the required operation mode and track record options.
5. If necessary, correct the history structure.
6. Use the indicators (see Section “Indication”) to verify the connection to satellites and registration in the mobile network.
7. If necessary, install the tracker on the vehicle.

Tracker Operation

After the tracker powers on, all of its indicators turn on for a while, then the tracker goes into the previously configured operation mode. All indicators go off when the cover is closed (tamper button pressed).

To determine the location using a GPS/GLONASS signal, the tracker has to be in the place under the sky.

In buildings, underground parkings, subway, and other similar places, GPS/GLONASS location detection is impossible. LBS data can be used for location approximation.

The location detection accuracy depends on the GNSS signal reception conditions.

Supported Devices and Interfaces

RS-485 interface

The tracker uses digital high-precision fuel gauge units Omnicomm LLS-AF20160 that can be connected to it using an RS-485[8] interface. The LLS-AF20160 fuel gauge unit is designed for measuring the fuel level and temperature in vehicle fuel tanks. The tracker allows up to four Omnicomm LLS-AF20160 units to be connected to it[9].

Dispatch

The tracker allows connection of a dispatch unit[10]. The dispatch unit is designed for maintaining communication between a vehicle driver and an operator in the dispatch center via a GSM voice channel.

Universal inputs

Input type (discrete, analog, or frequency) is set up in the configuration software.

A discrete input features a configurable polarity and can be used for connecting a security system, monitored mechanism, or a panic button to the tracker.

The analog and frequency inputs can be connected to fuel consumption and level meters.

IRMA MATRIX traffic sensors

The tracker operates with IRMA MATRIX sensors for passenger traffic flow calculation. Details see in sections “CAN” and “Connection of IRMA MATRIX traffic sensors”.

8) An RS-485 is not provided in the **LIGHT** Version.
9) When using GEO.RITM cloud-based software, data can be displayed for only two fuel gauge units.
10) Not available in versions **LIGHT** and **LIGHT RS-485**.

Tracker Setup

Accessing Configuration Software

The device configuration software can be accessed both via GEO.RITM and RITM-Link cloud-based software and general purpose configuration software applications ritm.conf and Ritm Configure.

Setup via cloud-based software is only possible in presence of an active GPRS connection with the device.

Configuration over USB Cable

To establish a connection with the tracker over a USB cable, you will need to install an appropriate driver. This driver can be downloaded from the official manufacturer's website in the "Mobile Object Monitoring Systems" section, "Voyager 2N" tab.

To verify the availability and working condition of the driver, connect a cable to your PC and open the "Device Manager" section, "Ports" subsection (Fig. 1). This subsection will show the name and number of the port, to which the cable/modem has been connected.

For your COM port, the number may differ from that shown in the Figure 1.

*For **LIGHT, LIGHT CAN** and **LIGHT RS-485** Versions, the port name will differ from that shown in the Figure.*

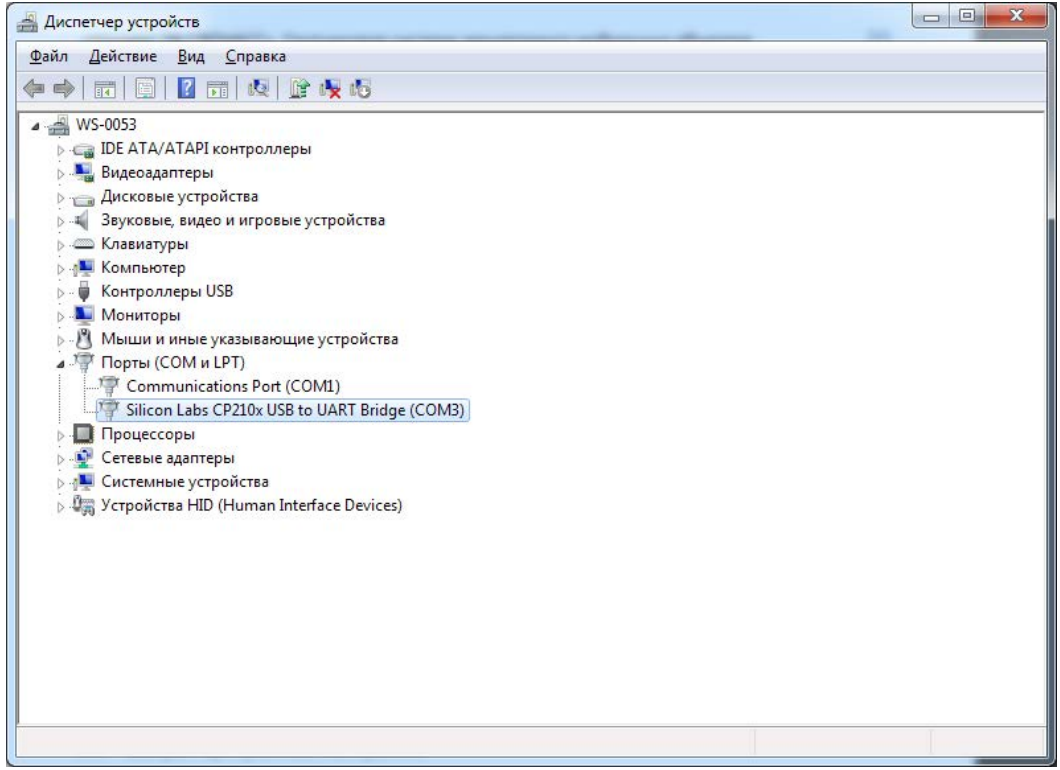


Figure 1. Driver Check

Connect the tracker to your PC using a USB cable and run the configuration software. In the Connection Wizard, specify the connection type as USB/COM (Cable) and the COM port used by the tracker (Fig. 2).

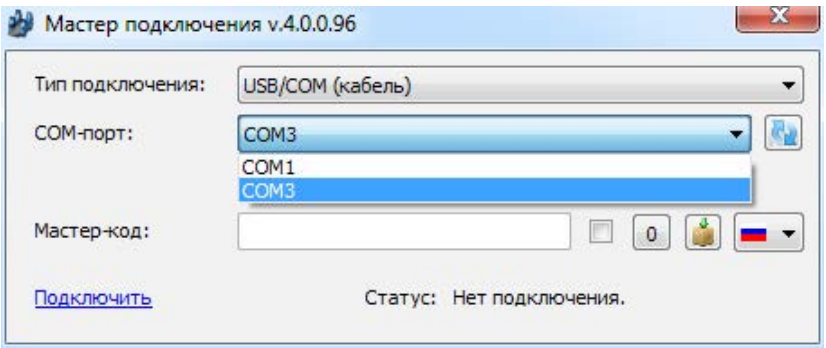


Figure 2. USB Connection

If the device has a master code (see Section “Service”) set for protection from non-authorized connection, set the **Master Code** flag and enter it in a corresponding field.

*By default, the **Master Code** is not used for connection.*

Click on the “Connect” hyperlink and begin the tracker configuration procedure.

Configuration over CSD

For a remote connection to the tracker over a CSD channel (Fig. 3) using a GSM modem, open the Connection Wizard and specify the following:

- Connection type: CSD (GSM Modem);
- COM Port accessed by GSM Modem (see in Device Manager);
- Phone number of SIM card installed in tracker.

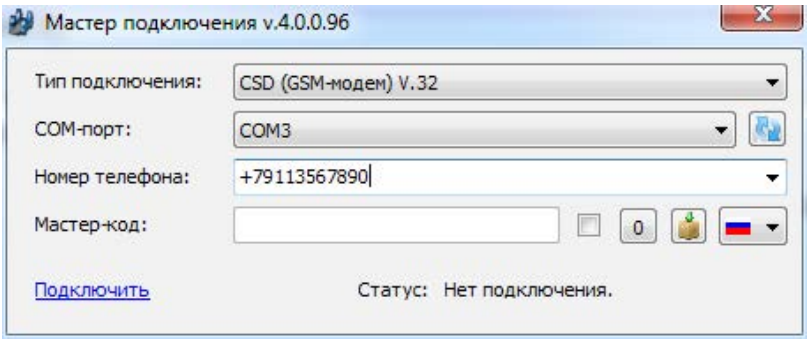


Figure 3. CSD Connection

To connect via a digital CSD-channel make sure the digital data transmission service (CSD) is enabled and the balance of the SIM card installed in the device is sufficient.

The remote configuration via CSD is only possible from the engineering phone numbers.

Configuration via GEO.RITM

To access the configuration software via GEO.RITM cloud-based software, open the object card's tab "Equipment" (Fig. 4). Below the tracker picture, click "Setup a device".

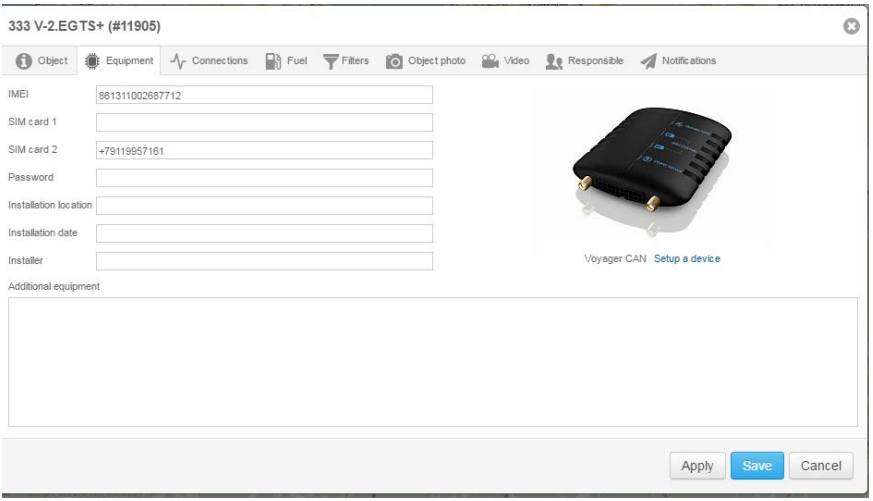


Figure 4. Device configuration via GEO.RITM

Configuration via RITM-Link

To access the configuration software via RITM-Link cloud-based software, open the “Devices” section (Fig. 5). Use the pop-up menu to open the configuration software by clicking the “Setup” line.

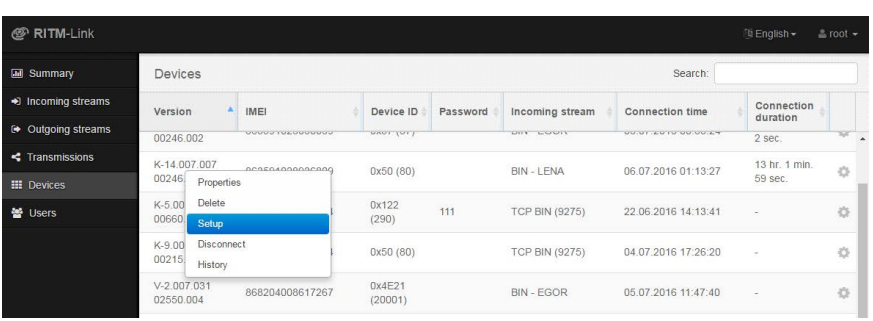


Figure 5. Device configuration via RITM-Link

Setup utility

The setup utility is used for defining and setting operation parameters of a tracker and data transfer channels.

Upon specifying required options on the each page, click “Save changes” (Fig. 6). Otherwise, all specified settings will be reset.

Figure 6. The "Save changes" button

The configuration software window is separated into the following areas (Fig. 7):

1. Configuration software sections.
2. Settings area.
3. Configuration software versions.
4. Details on:
    - Time of connection to device;
    - Current status and connection parameters;
    - Version of device firmware.

The tracker configuration procedure is composed of switching between different sections of the configuration software and setting the required parameters.

If any firmware updates are available, a corresponding section of the configuration software would be highlighted in red. In this case, we recommend you begin setting up the device with installing the updates (see Section "Available Update").

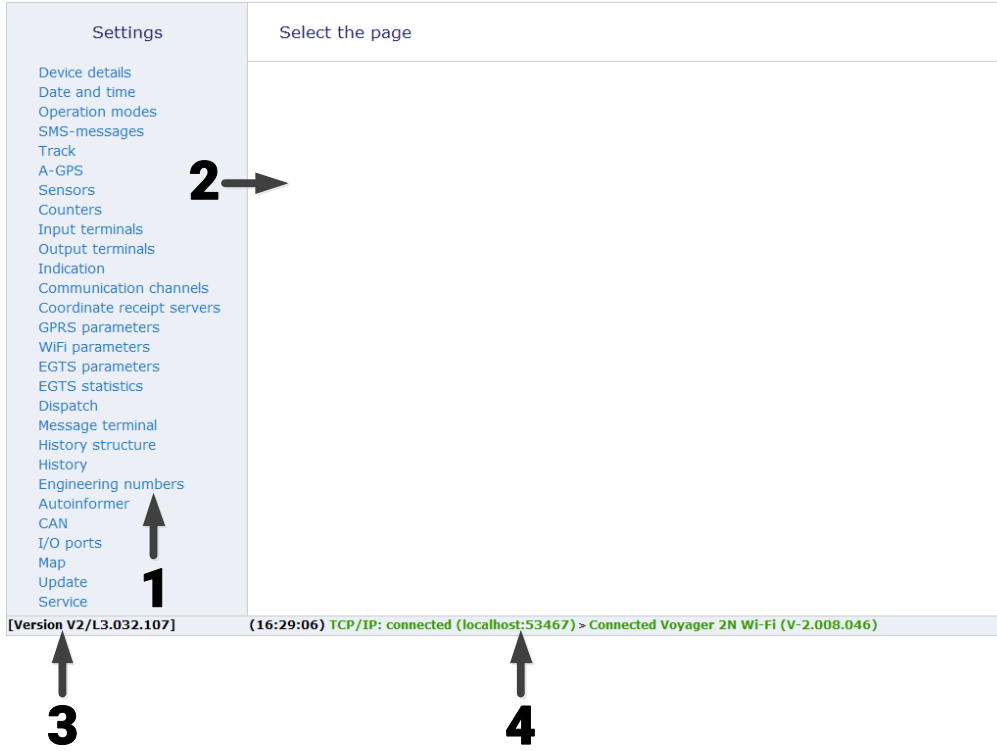


Figure 7. Configuration software's Main page

Device Details

This section shows current details on the tracker and its main units (Fig. 8):

1. Tracker name.
2. Firmware version.
3. Navigation receiver type and version.
4. GSM modem type, modem firmware version and IMEI code[11].
5. Details on SIM cards 1 and 2:
   - SIM card ID;
   - mobile network operator of the SIM card;
6. Tracking mode (Enabled/Disabled)[12].
7. Security mode (Enabled/Disabled).Turn on this mode if you need to send the SMS messages about alarm events from the tracker. The SMS sending parameters, as well as transmitted alarm events are configured in the "SMS-messages" section.

11) IMEI is required for adding the tracker to the monitoring software GEO.RITM. IMEI is also listed in the data sheet.

12) The Tracking mode allows receiving object data more often than the Normal mode. An example of situation, where tracking would be used, is equipment diagnostics or searching for an object in case of theft or towing. The Tracking mode increases the GPRS traffic and, consequently, communication service costs. This is why we do not recommend leaving the Tracking mode constantly on.

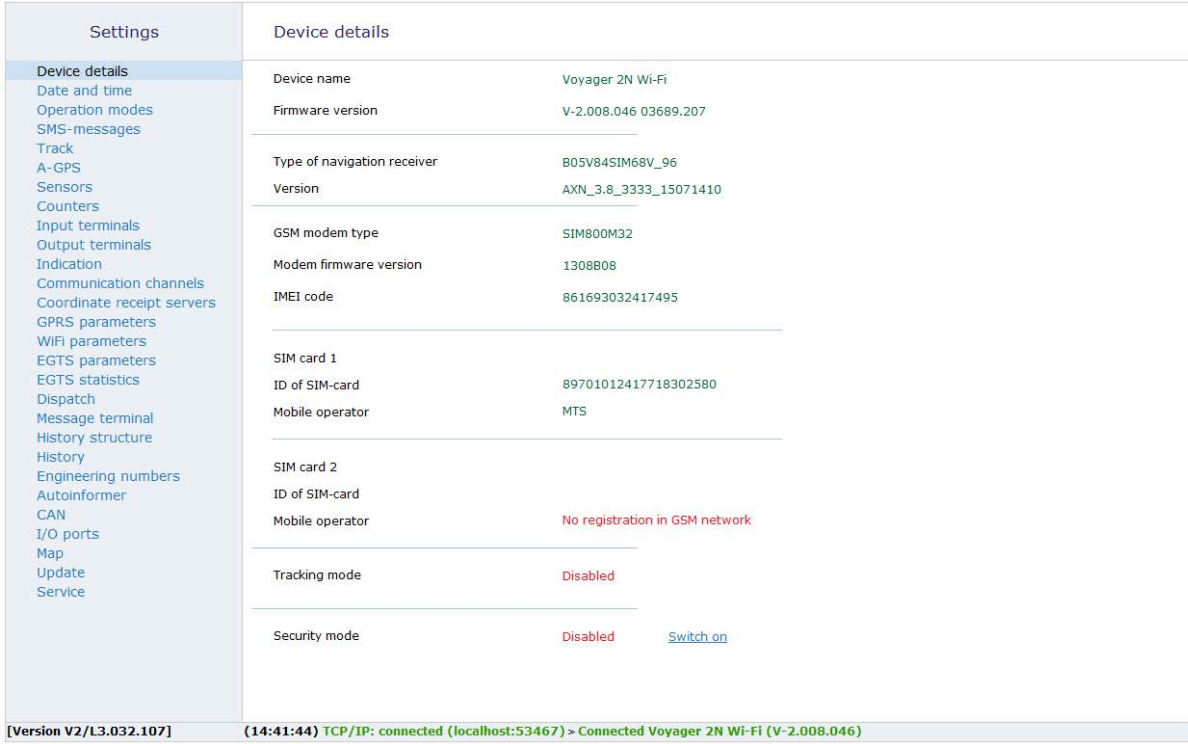


Figure 8. “Device Details” section

Date and Time

This section (Fig. 9) shows the date and time set in the tracker, as well as the date and time in the PC used for configuration.

When the battery is removed, the tracker automatically resets the date and time settings.

Each time coordinates are received from a satellite, the tracker automatically adjusts the date and time settings. However, when the tracker is out of coverage of a strong satellite signal, the date and time have to be set manually. To do this, use the “Synchronise with this computer now" hyperlink.

“Synchronise with this computer now"

Immediate synchronization of the time with the PC, to which the tracker is connected for configuration.

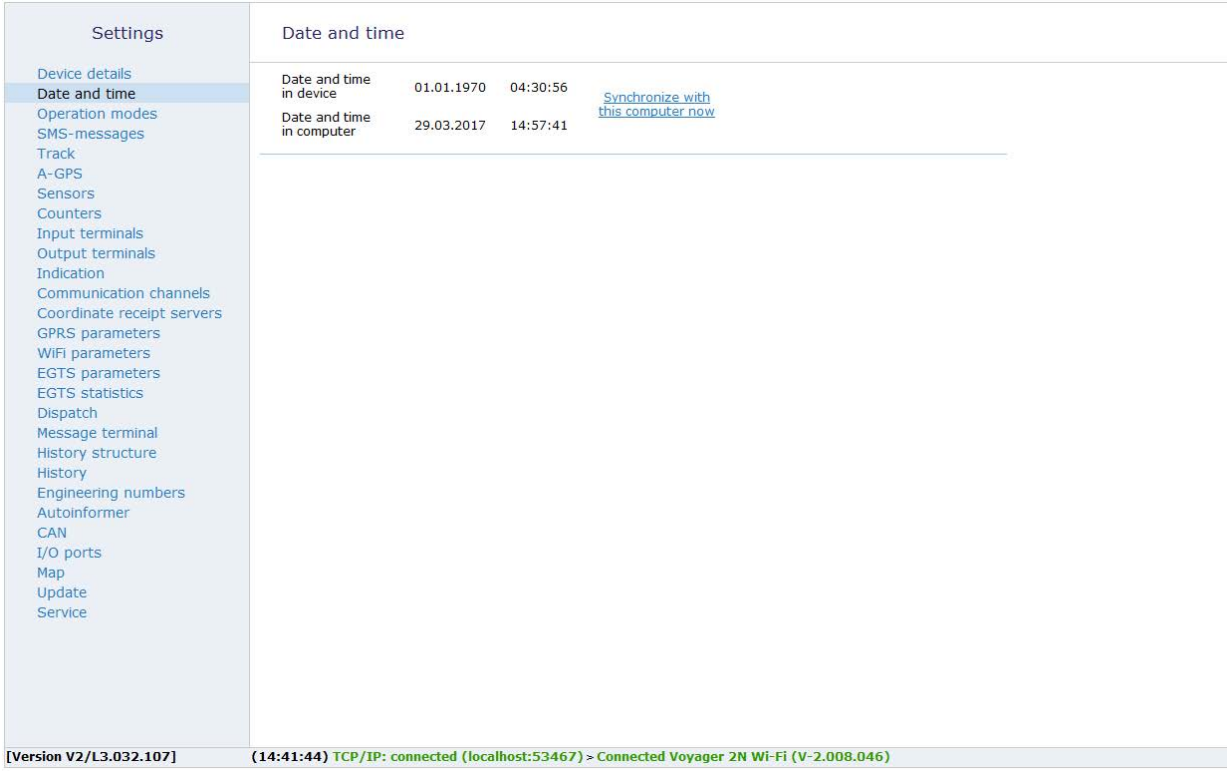


Figure 9. “Date and Time” section

Operation Modes

The operation modes (Fig. 10) define the conditions, in which a navigation receiver is turned on to seek coordinates or a GSM modem is turned on to transmit data from the tracker to a monitoring system server.

The operation modes affect energy consumption of the tracker and the volume of GSM traffic transferred. The principal conditions for turning on a device are readings of the motion sensor, on-board voltage sensor, and the work schedule. The user can choose between of the three most typical operation modes of the tracker, which have all the conditions previously set, or a custom mode, which allows fine tuning of all parameters.

“Online” mode

This mode enables monitoring of an object in a continuous and uninterrupted way. The tracker is always on, constantly seeking and determining coordinates and sending data to the server over a GSM network.

This mode is characterized by elevated energy consumption, highest bills for GSM traffic, and minimum operation time when powered from a built-in battery.

It is not recommended for use in vehicles sensitive to elevated energy consumption while the engine is off.

It is not recommended for use in rarely operated vehicles, or those with prolonged time between rides.

“Online with power saving” mode

The optimal mode for vehicle monitoring. Enables monitoring of a moving object/object with the running engine in a continuous and uninterrupted way. During parking, the tracker is off, has minimal energy consumption and its effect on the vehicle on-board battery are negligible.

Proper determination of motion depends on sensitivity settings of the motion sensor (for settings, see Section “Sensors”).

To ensure proper operation of the motion sensor, we recommend using data listed in Chapter “Tracker Installation on Vehicle”.

“Online at motion”

The most energy-saving mode. The navigation receiver works only when both the vehicle is moving and the engine is running. The tracker submits data to the server and receives commands over a GSM network only when the vehicle is moving or the engine is running. It can be used for transport monitoring (if constant location tracking is not required for the mobile object).

When the tracker is used on a vehicle, make sure you have setup the running engine sensor!

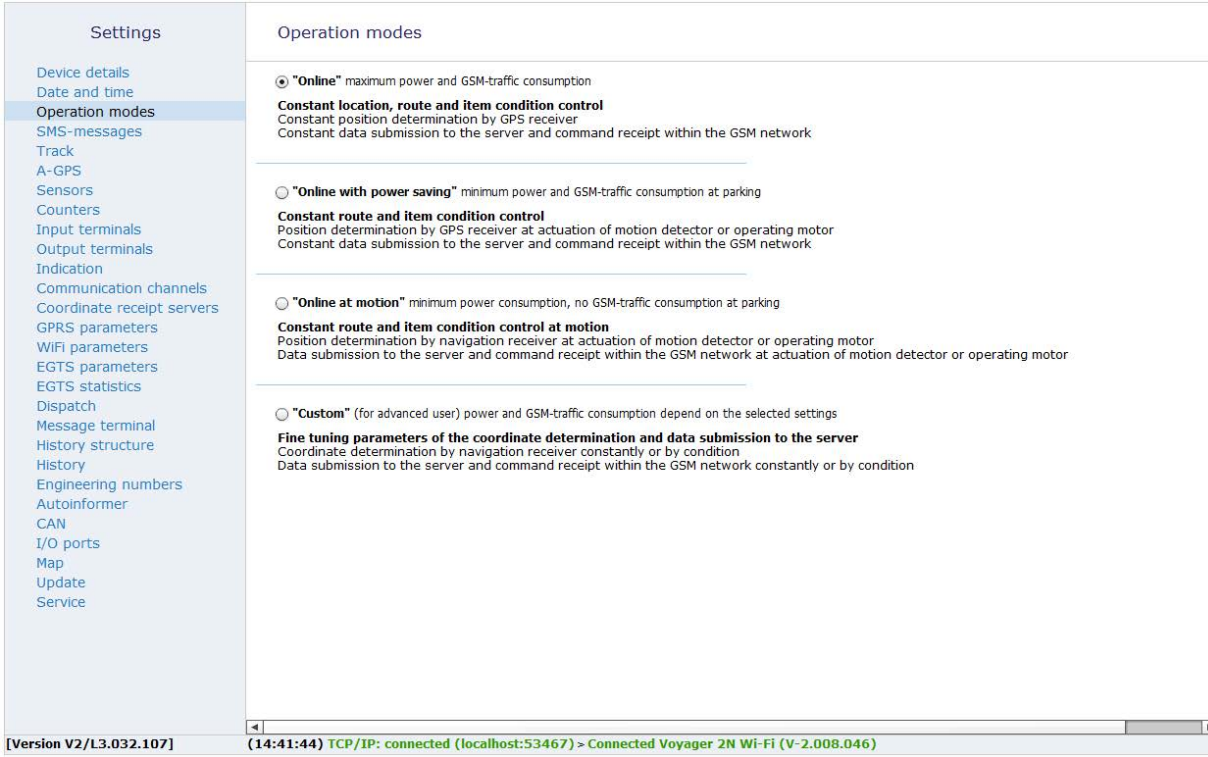


Figure 10. “Operation Modes” section

“Custom” mode

This mode (Fig. 11) allows the user to manually select and setup individual conditions for turning on coordinate reception and submitting data to a monitoring system server. When the “Constant coordinate detection/Always connected to server” mode is selected, the tracker will operate the same as in the “Online” mode. Coordinate detection and the periodicity with which the tracker establishes communication in the “by the condition” mode are defined by the following parameters:

1. “At engine start".
2. “At engine operation".
3. “At engine stop".
4. “At motion start".
5. “At motion".
6. “At motion stop".
7. “At parking".

The periodicity with which the tracker establishes communication/ determines coordinates, can be set additionally. These parameters are setup using the following fields:

1. “On a regular basis”.
2. “Schedule 1–4”.

When setting up tracker operation on schedule, the required days of week and time are set. To enable proper work of a schedule in the set day of week and hour, you should also specify the time zone of the region, in which the tracker is planned to be used, in the settings of the “Custom” mode.

Settings

Device details
Date and time
Operation modes
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Track
A-GPS
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Output terminals
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Communication channels
Coordinate receipt servers
GPRS parameters
WiFi parameters
EGTS parameters
EGTS statistics
Dispatch
Message terminal
History structure
History
Engineering numbers
Autoinformer
CAN
I/O ports
Map
Update
Service

Operation modes

"Online at motion" minimum power consumption, no GSM-traffic consumption at parking

Constant route and item condition control at motion
Position determination by navigation receiver at actuation of motion detector or operating motor
Data submission to the server and command receipt within the GSM network at actuation of motion detector or operating motor

"Custom" (for advanced user) power and GSM-traffic consumption depend on the selected settings

Fine tuning parameters of the coordinate determination and data submission to the server
Coordinate determination by navigation receiver constantly or by condition
Data submission to the server and command receipt within the GSM network constantly or by condition

Operation mode:	coordinate determination by the condition	connection by the condition
At engine start:	No	No
At engine operation:	No	No
At engine stop:	No	No
At motion start:	No	No
At motion:	No	No
At motion stop:	No	No
At parking:	No	No
On a regular base:	No	No

Schedule 1	Mo Tu We Th Fr Sa Su	4 h. 0 m.	Mo Tu We Th Fr Sa Su	4 h. 0 m.
Schedule 2	Mo Tu We Th Fr Sa Su	4 h. 0 m.	Mo Tu We Th Fr Sa Su	4 h. 0 m.
Schedule 3	Mo Tu We Th Fr Sa Su	4 h. 0 m.	Mo Tu We Th Fr Sa Su	4 h. 0 m.
Schedule 4	Mo Tu We Th Fr Sa Su	4 h. 0 m.	Mo Tu We Th Fr Sa Su	4 h. 0 m.

Time zone for schedule: Samara time (UTC+4)

[Version V2/L3.032.107] (14:41:44) TCP/IP: connected (localhost:53467) > Connected Voyager 2N Wi-Fi (V-2.008.046)

Figure 11. “Custom” operation mode

SMS-messages

In this section (Fig. 12) the settings are configured the coordinates of the tracker according to a specified schedule, as well as alarm events, for sending to the user via SMS messages.

General settings

Configure the general settings for sending and displaying SMS:

Device name

Specify the name of the tracker. The Latin letters can be used only. The specified name will be image into SMS messages sending by the tracker.

Notification phone number 1/2

Specify the phone number in the format + 7XXXXXXXXXX to which the SMS will be sent by the tracker.

Send notifications in roaming

Specify whether to send SMS when the mobile object is in the roaming zone.

Setting the schedule for sending tracker coordinates

Set up a schedule according to which the tracker will send SMS with information about its location:

Send coordinates on schedule

Assign a mode of operating as per schedule: specify the necessary days of the week and the time when the tracker will send SMS with coordinates.

Send coordinates in format

Specify the format for coordinates' sending:

1. Text – the coordinates will be transmitted as text in the format:

<Device name>:<Time><Coordinates><Un/Ur/T/>

where:

- **Device name** is as the name that is specified in this section;
- **Time** is as the date and time that is specified in this section (Schedule 1-4);
- **Coordinates** are as the fixed coordinates of the tracker;
- **Un** - the voltage of the main power source;
- **Ur** - the voltage of the battery-backed power supply (the built-in battery in tracker);
- **T** - tracker CPU temperature.

An example of SMS-message with the coordinates as text:

Voyager 2N: 12:10:00 07-02-2017 N59.9563483 E030.4320933 12.1V/3.7V/45C

2. Yandex map/Google map/OSM – the coordinates will be given in the form of links to the map of Yandex/Google/OSM[13] respectively.

Timezone

Specify the time zone where the tracker is located.

Settings the alarm sending

The tracker can transmit alarm events (based on the drawdown of built-in or connected sensors) as the SMS-messages.

*Make sure to set a **security mode** using one of the methods for the transmission of events:*

- *Enable the **security mode** in the "Device details" section;*
- *Send the command **GUARD** on the SIM-card installed in the tracker (See description of the commands in the section "SMS commands").*

13) OSM - OpenStreetMap.

In the table of reports set the desired text for each event (in the column **SMS-messages**), which is received by user as the SMS. Either the letters of Cyrillic or Latin alphabet can be used when you set the SMS.

When putting the check mark in the column "**Send**" and select the event at which occurrence the tracker will send SMS-messages.

When you click through the "**Restore default settings**" link, it allows using the SMS in the factory default mode.

An Example of SMS message with an alarm event:

Voyager 2N: 12:09:27 07-02-2017 Incline

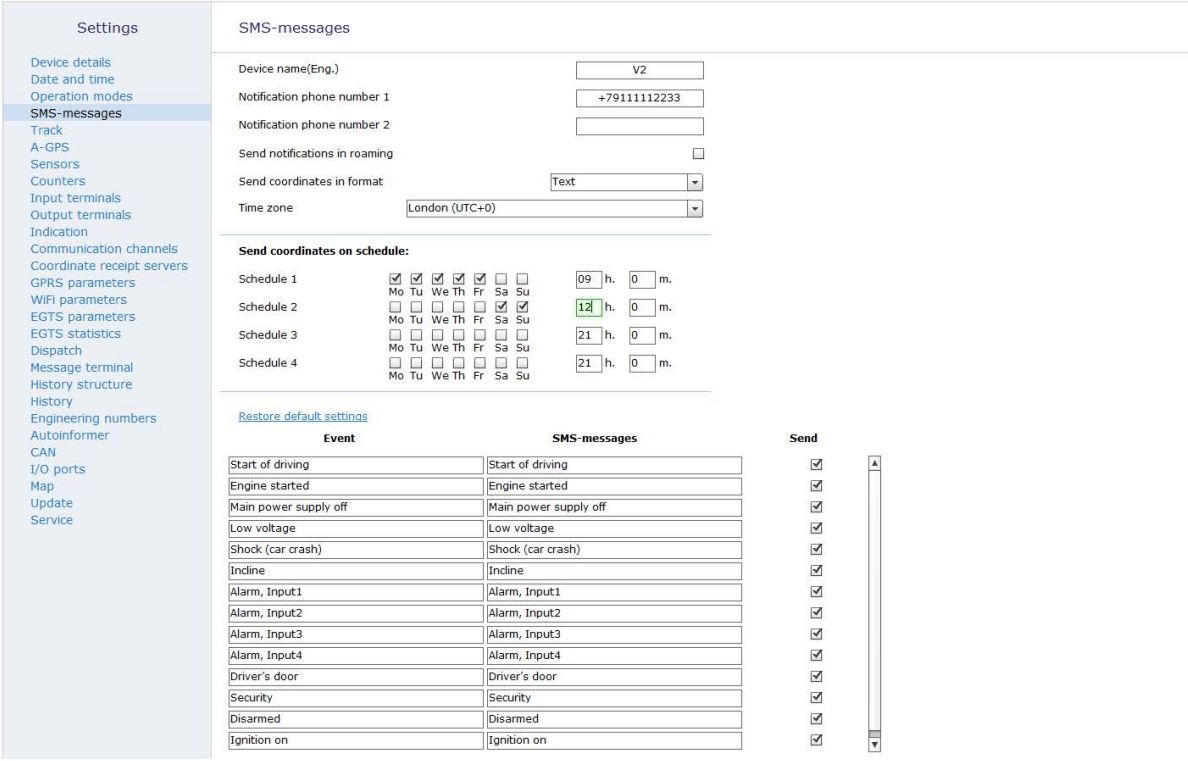

Figure 12. SMS-messages

Track

The “Track” section (Fig. 13) allows setting conditions for storing route points in the tracker memory.

The conditions for storing route points within the tracker memory are readings of the motion sensor, running engine sensor, schedule for storing points, mileage, and the maximum speed.

The **“Record coordinates”** parameter determines the conditions, at which storage of specific coordinates is performed to the tracker memory.

The following options are available:

- Always;
- Only at motion;
- Only at running engine;
- At motion or running engine;
- At motion and running engine.

The “At motion” storage condition allows for substantial economy in the non-volatile memory volume used and cuts costs on GSM traffic by not storing redundant points, when the object is immobile.

Record coordinates over time allows setting the required update frequency for storing coordinates to the tracker memory and submitting data to the server.

Record coordinates at distance covered allows setting the periodicity of storing coordinates in order to properly show the route on the map and correctly count the distance traveled. At turns, the tracker would automatically record additional route points (in order to store a more precise trajectory of a mobile object).

Record coordinates at speed not exceeding a set threshold allows filtering out coordinates with the wrong speed.

Record coordinates at 3D fixation allows for high-precision record of coordinates to the tracker memory and transfer of data to the server.

The number of coordinate records to be transmitted from the history to the server is set up by the user and cannot exceed 30 records. When 1 to 4 records in entered in locations with low GSM signal strength (depending on a mobile network), the tracker may encounter difficulties in connecting over a CSD channel, since frequent sending of records to the server may cause delays in the configuration software operation. Thus, we recommend setting the “package” volume as not exceeding 4 records.

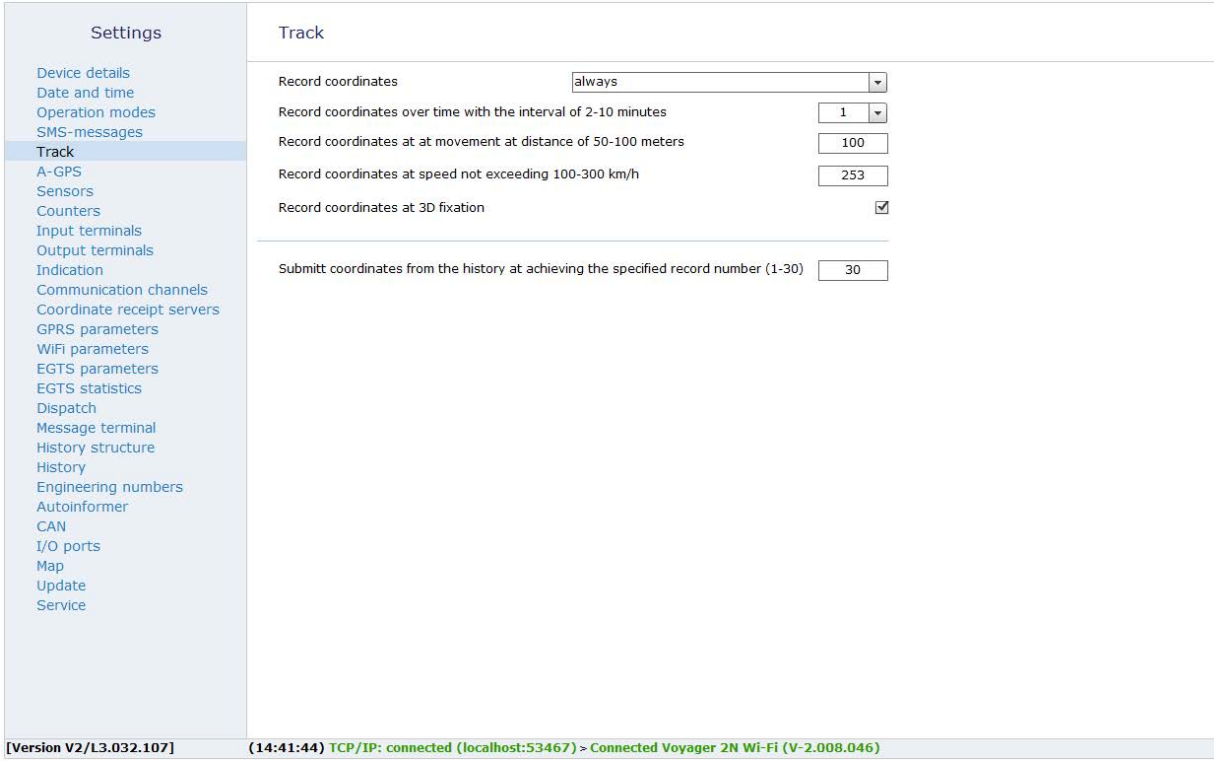

Figure 13. Track

A-GPS

This section is intended to activate the Assisted GPS function (Fig. 14). In this case, the tracker receives additional data via GPRS, and the time required to determine the coordinates is reduced to tens of seconds.

The mobile internet traffic increases when using A-GPS. With the enable option "Do not include GPRS roaming" in the "GPRS Settings" section the function will not be used. This can lead to an increase in the coordinates' fixation time.

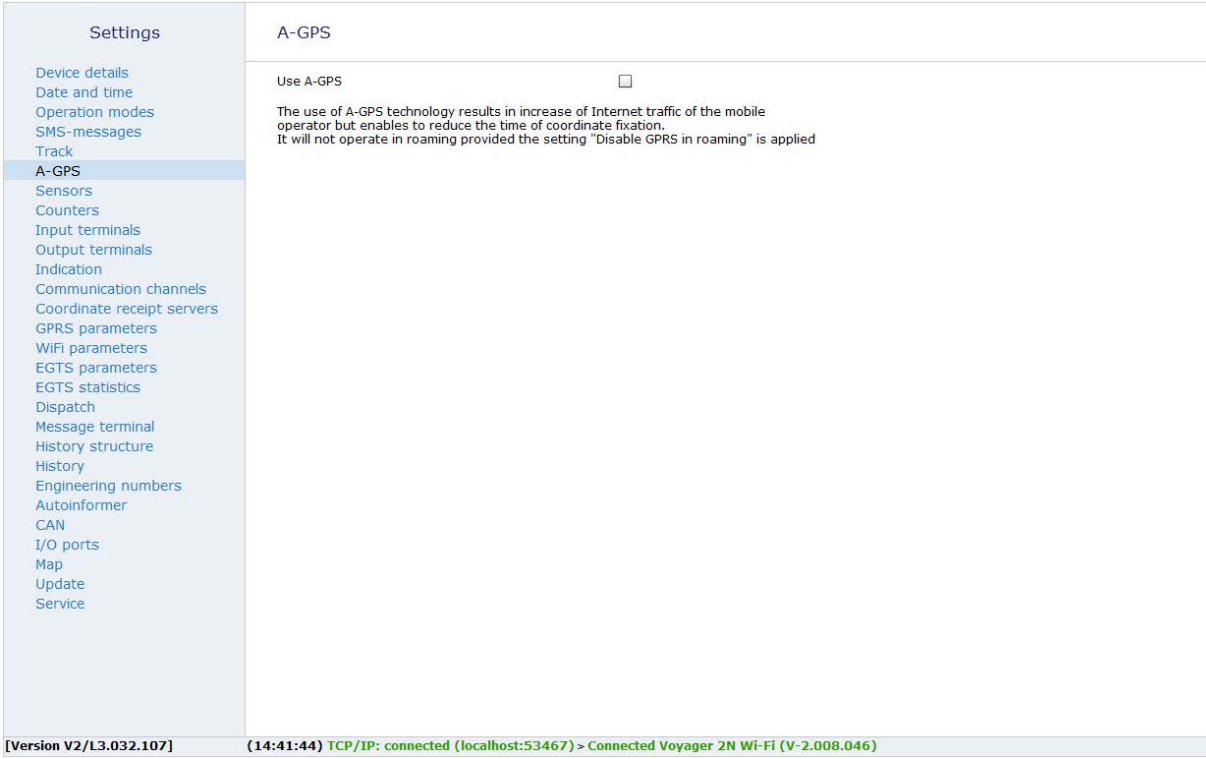

Figure 14. A-GPS

Sensors

The “Sensors” section (Fig. 15) allows configuration of parameters of motion, voltage, tilt, acceleration, crash, and temperature sensors. The tracker also takes into account the condition of sensors according to the selected operation mode and settings of track filters.

Motion sensor

The motion sensor (Fig. 15) can be turned off (not recommended). If the sensor is constantly triggered within the set time period of 1 to 120 seconds, it is assumed that the object has begun its motion. If the sensor remains inactive within the set time period of 1 to 600 seconds, it is assumed that the object has stopped.

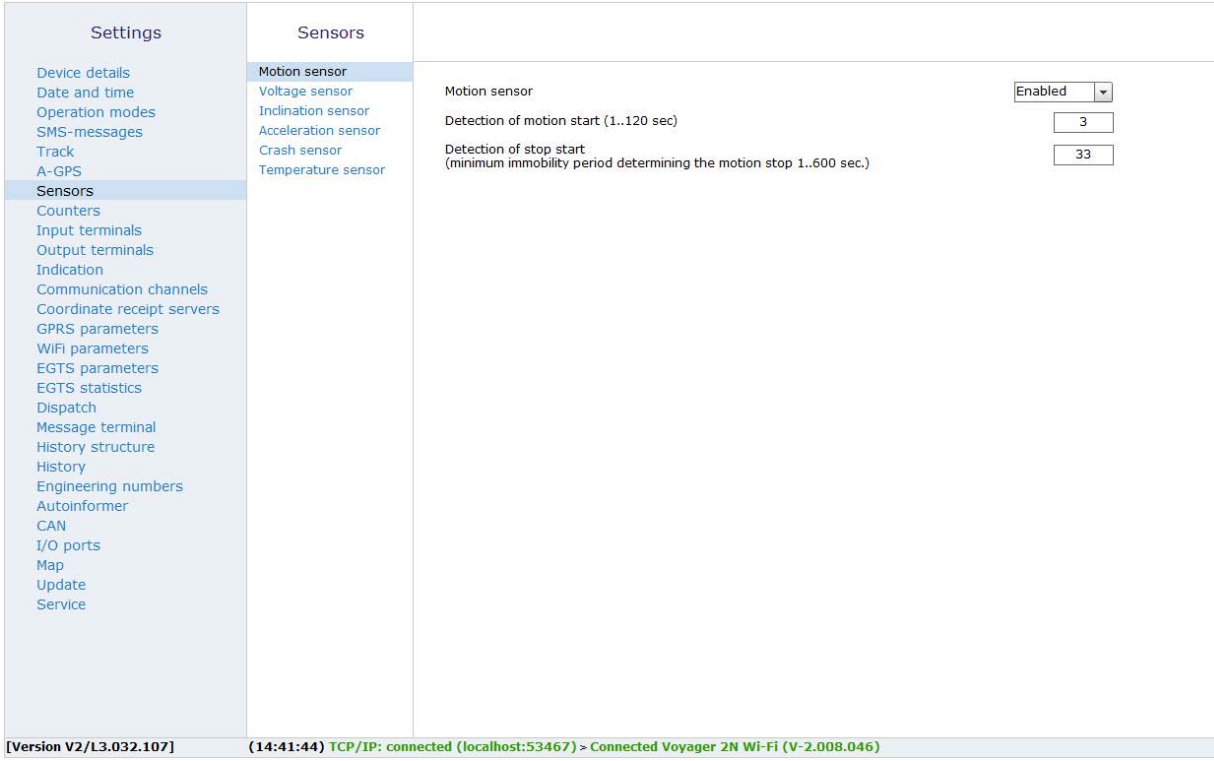

Figure 15. Sensors

Voltage sensor

When this sensors is on and the voltage drops below the discharge threshold (below the set “blue” threshold), an alarm is activated, a distress event is generated and stored in the history, and a respective message is submitted to the server.

Charging of the tracker battery begins 10 minutes after the “Engine on” threshold has been exceeded (above the set “red” threshold).

To determine the on-board voltage level, you need to connect the tracker power supply to the vehicle on-board mains. A green line on the chart will show the measured voltage level.

To determine the voltage level when the engine is running, you will need to turn on the engine and, while it remains idle, turn on all possible energy consumers, i.e., low and high beams, fog lamps, mirror and rear window heaters, seat heater, and ACU. The on-board voltage threshold at the running engine should be set between the value at the running engine and maximum number of consumers and the voltage measured with the engine off. We recommend the measurement of voltage values before configuring operating thresholds to be done for at least 1–2 minutes.

For determining the vehicle battery discharge, we recommend setting the threshold below the normal voltage at engine off to be 1–2 V.

To change voltage thresholds, drag and drop an arrow with the desired voltage to the right of the chart. For precise adjustment of voltage thresholds, please use keyboard keys “↑” and “↓”. A dashed line on the chart allows visual comparison of the chosen voltage value with the measured on-board mains voltage level (Fig. 16).

Please note, that on-board voltage levels are individual for each vehicle.

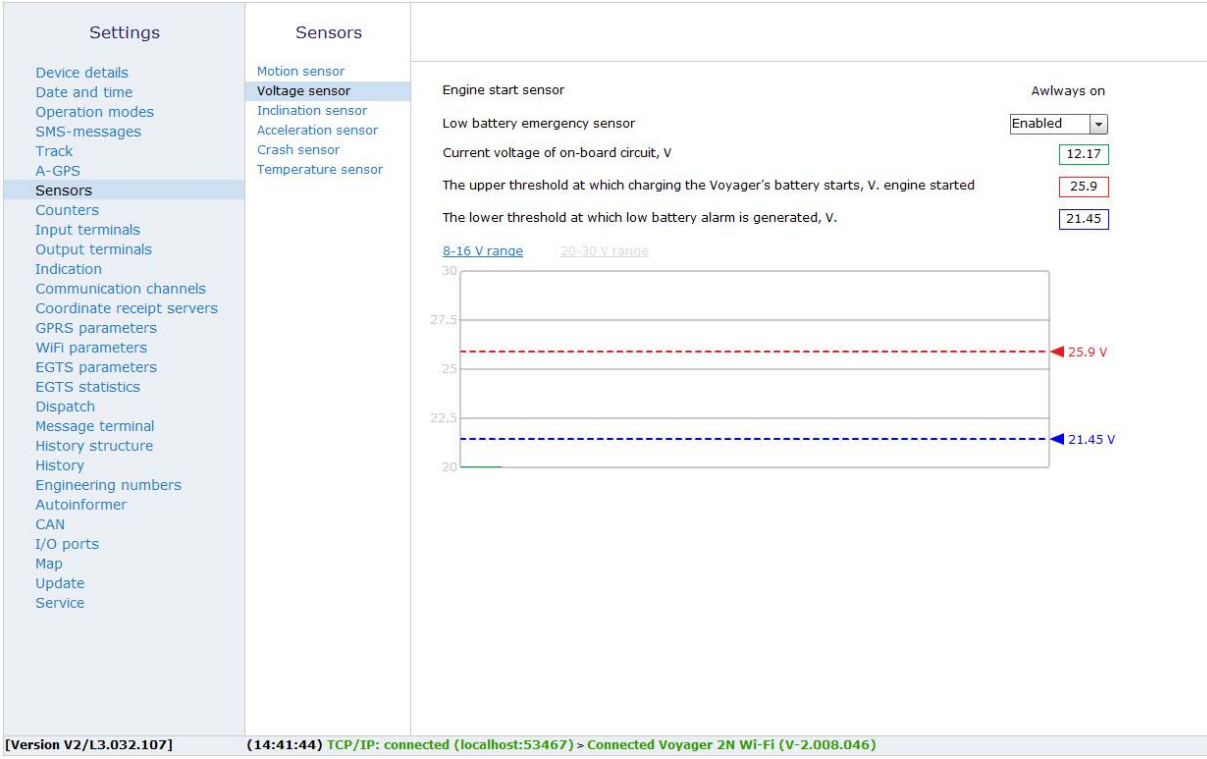

Figure 16. Voltage sensor

Inclination sensor

This section shows and enables adjustment of tilt sensor parameters. The following alarm messages can be received when the sensor is triggered:

1. “Tip” message: This message is generated at sensor inclination of over 45 degrees.
2. “Roll over” message: This message is generated at sensor inclination of over 90 degrees.
3. “Tilt” message: When this option is selected, you can manually choose the required tilt (1 to 45 degrees) and tilt duration (1 to 20 seconds).

You can also specify the initial tracker position. To do so, choose either of the following options:

- Antennas forward;
- Sidewards, GPS antenna forward;
- USB connector — forward;
- Sidewards, GSM antenna forward;
- Battery pack — forward;
- Tracker indication — forward.

Clicking the hyperlink “Store an initial position” starts sensor calibration. The current position of sensor is shown at the bottom of the page (Fig. 17). The following sensor position parameters are also shown:

- Inclination angle, in degrees;
- Pitching, in degrees;
- Roll, in degrees.

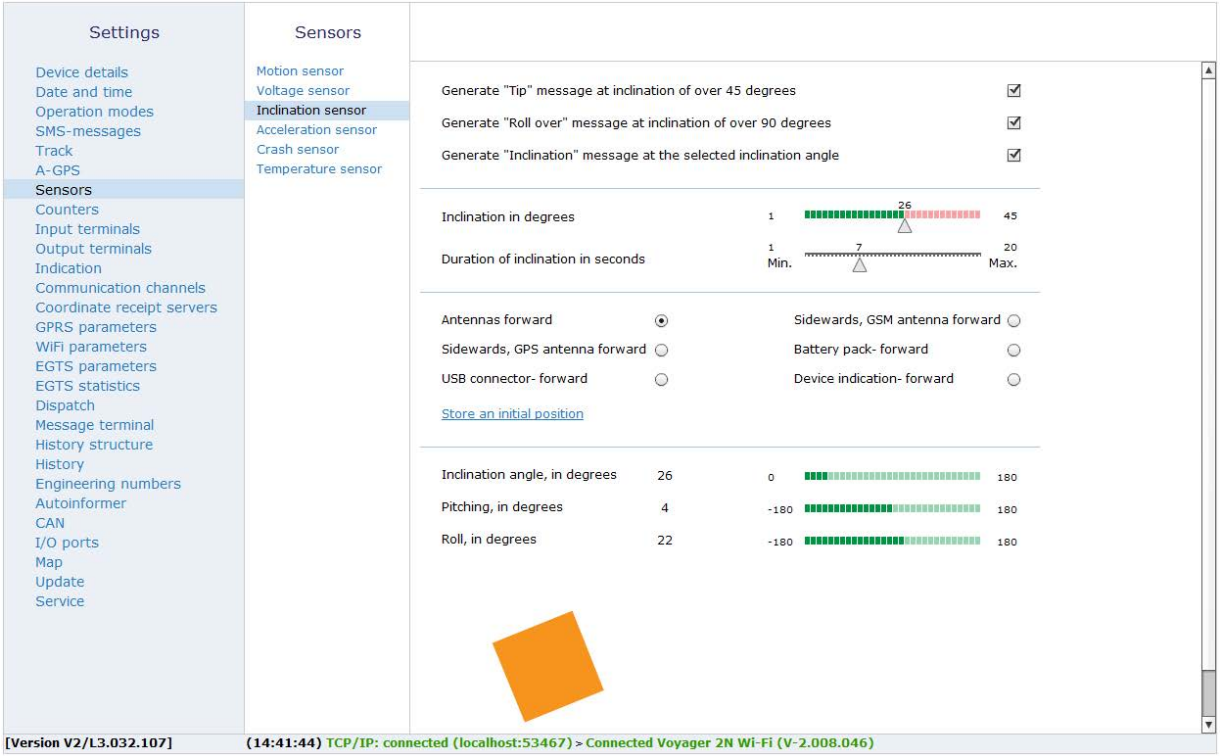

Figure 17. Inclination sensor

Acceleration sensor

For monitoring safety characteristics of the driving style, the device may generate an alarm event whenever an acceleration above the set threshold is detected.

Set the value of 1 to 10 (m/s^2), upon exceeding of which an “Acceleration” event is to be generated.

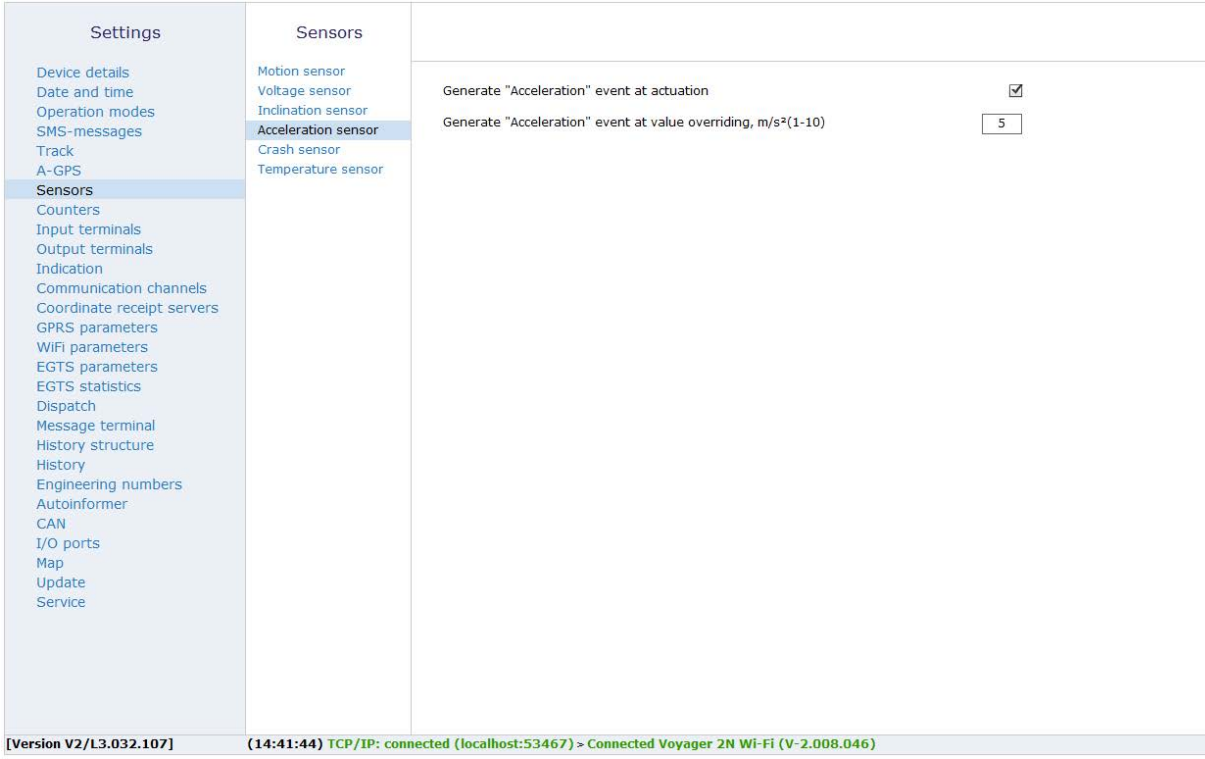

Figure 18. Acceleration sensor

Crash sensor

For monitoring of accidents and safety characteristics of the driving style (absence/presence of emergency braking), the device may generate “Failure” events. Specify the acceleration threshold for crashing or emergency braking of 0.1 to 24 g, upon exceeding of which a “Failure” event is to be generated.

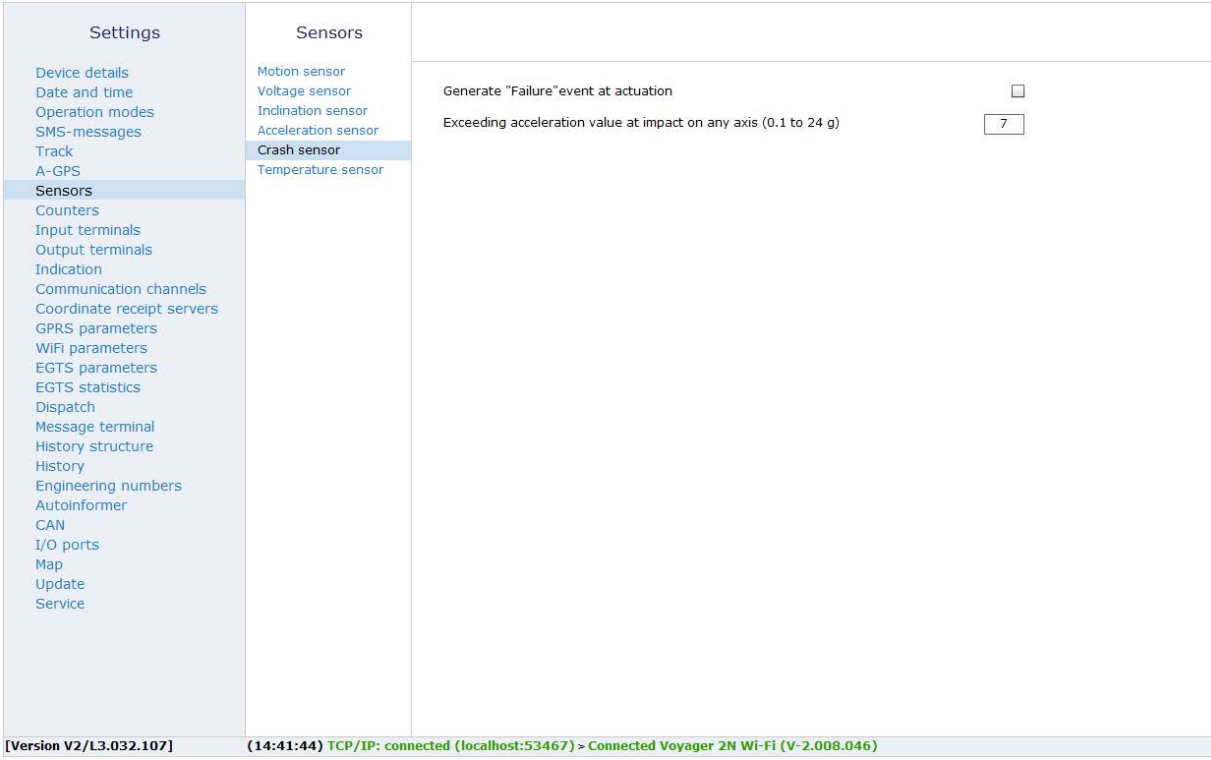

Figure 19. Crash sensor

Temperature sensor

This section (Fig. 20) shows two real-time charts of the CPU temperature updated at different frequency: once in 5 seconds and once in 2 minutes.

The current temperature of external sensor 1-Wire (if installed) is also shown.

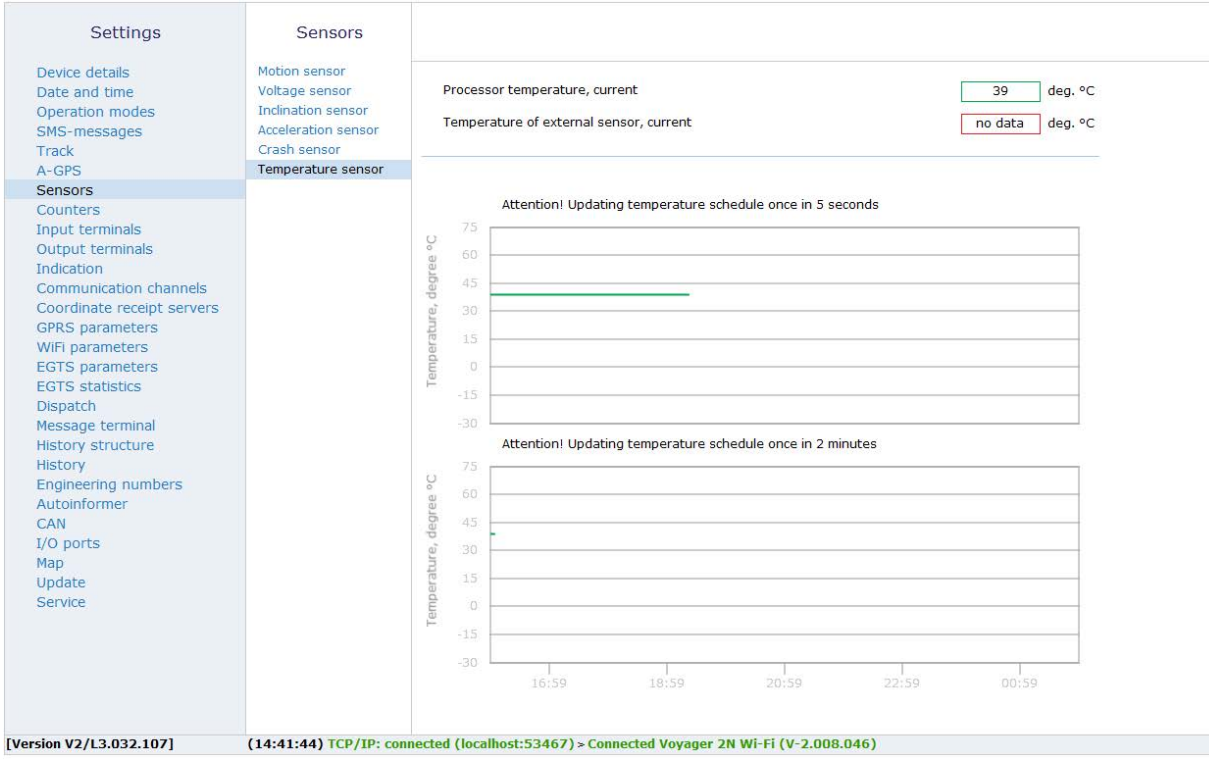

Figure 20. Temperature sensor

Counters

This section (Fig. 21) enables control and monitoring of the following built-in devices:

- Odometer, which counts the overall mileage using GPS/GLONASS receiver data as source;
- Machine hour counter, which uses built-in engine operation sensor data as source.

To reset the counter, set a zero value and press “Save”.

This method can also be used for setting the counter to a non-zero position.

The machine hour counter requires a configured engine operation sensor to work.

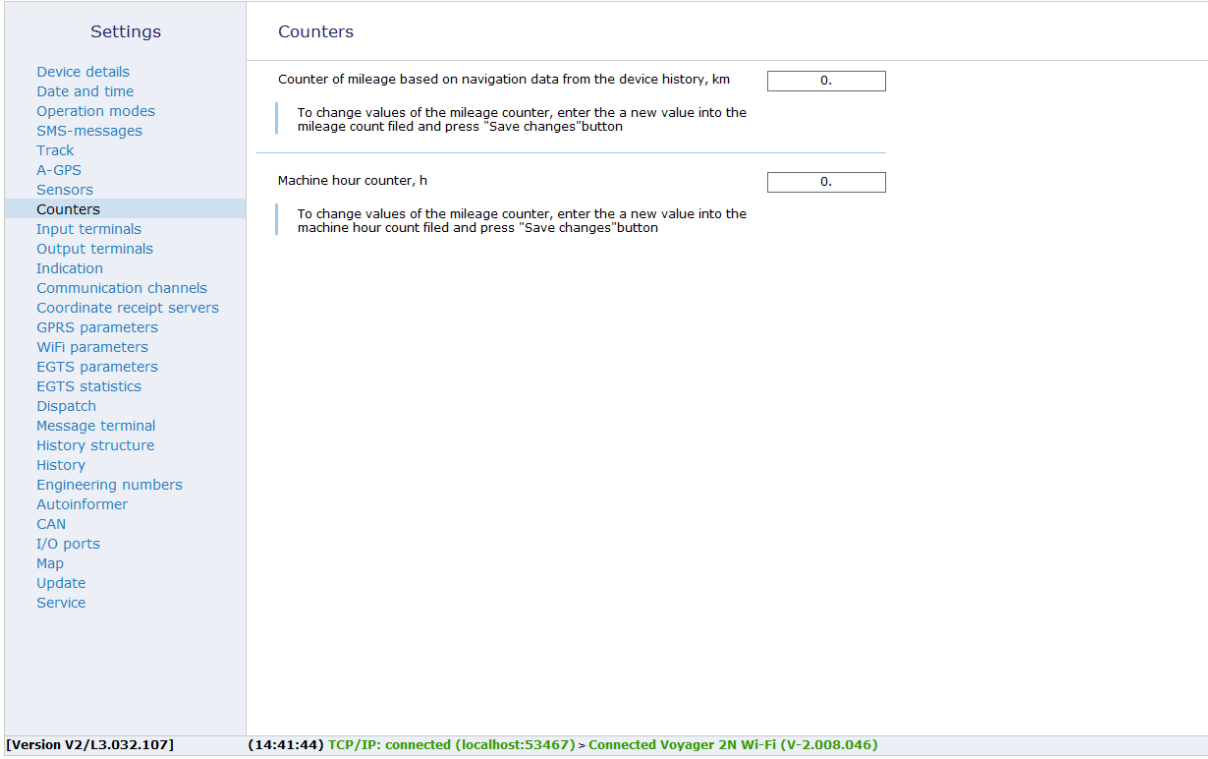

Figure 21. “Counters” section

Input terminals

Discrete inputs

Inputs 1 and 2 (Fig. 22) are discrete. You can either turn them off or set as “discrete”.

After the input type has been selected, you can specify its designation:

- Mechanism;
- Ignition (only Input 1);
- Panic button.

Then, the signal polarity at input has to be selected as either negative or positive, and the duration of the control signal, below which any data would be ignored.

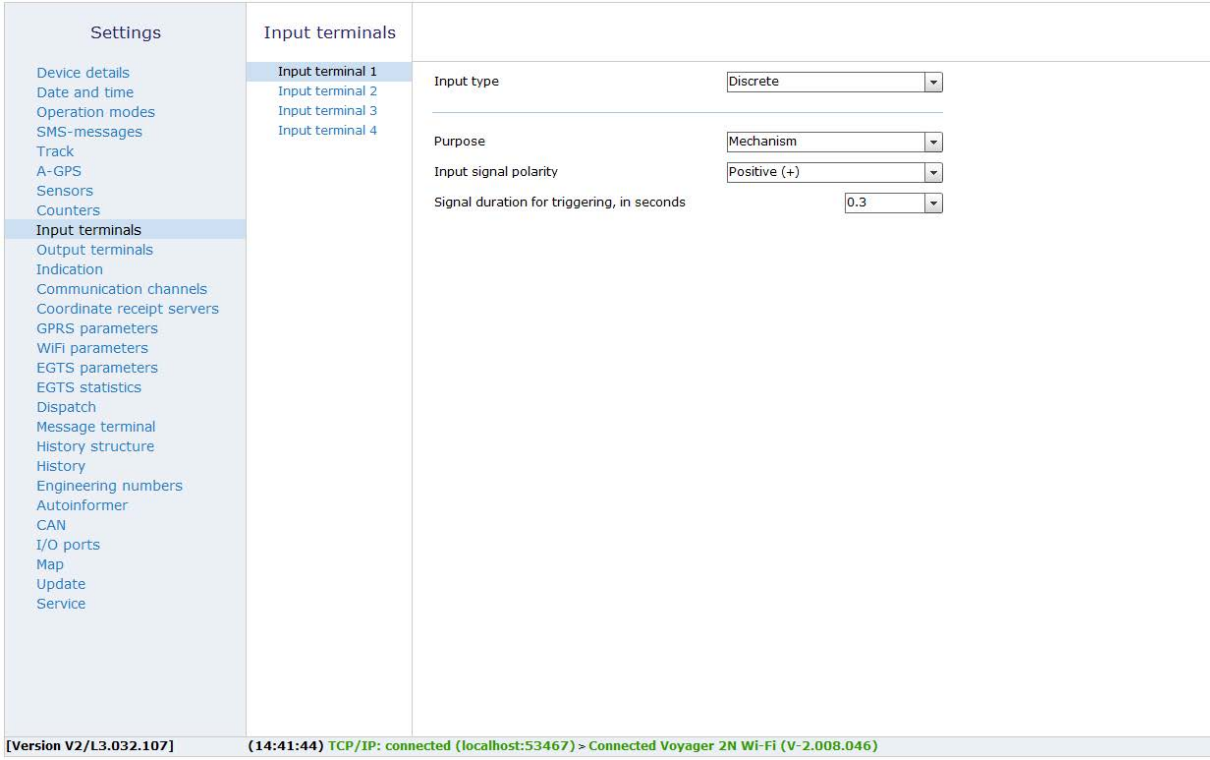

Figure 22. Discrete input

Analog/frequency/pulse inputs

Inputs 3 and 4 — universal. Specify the type of external signal to be supplied to these inputs:

- Discrete;
- Analog;
- Frequency;
- Pulse.

Analog and frequency inputs are designed for connection and configuration of the fuel gauge unit. The use can choose one of two fuel level measurement options: constantly measure the level or begin measurement with the ignition.

A pulse input (Fig. 23) allows connection of a fuel consumption sensor. You can specify the fuel consumption sensor position at either the inlet of the internal combustion engine (ICE), or at the ICE outlet.

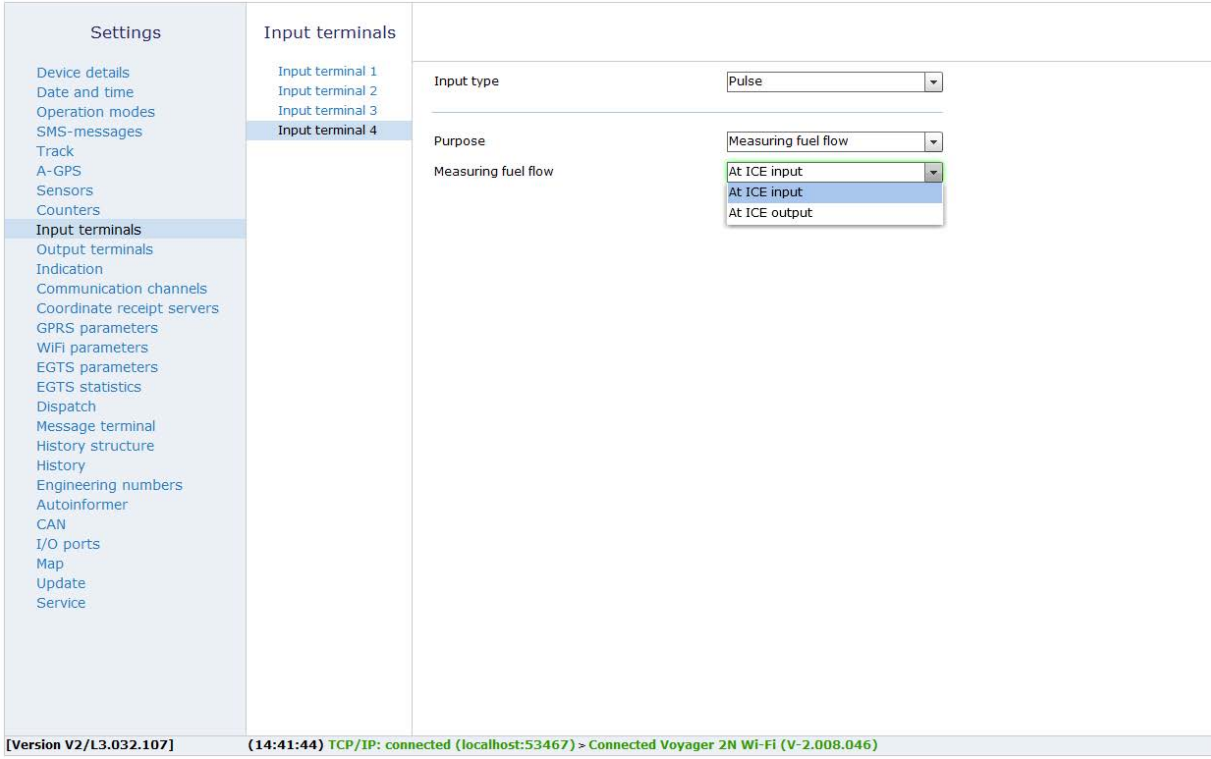

Figure 23. Pulse input

Output terminals

The tracker has two open collector outputs for connection of actuation devices.[14]

Configure the output control mode (Direct/Inverse). To change an output's current state, press the "Switch on/Switch off" hyperlink.

"Speed mode violation alarm device"

Specify the speed (km/h) and acceleration (m/s^2) values, upon exceeding of which a speed mode violation signal is to be generated.

Pressing the "Additional parameters" hyperlink (Fig. 24) allows you to set up the following parameters:

1. Duration of "on" impulse, in seconds.
2. Duration of "off" impulse, in seconds.
3. Impulse number.
4. Switch on, if duration is exceeding the value, in seconds.
5. If exceeding continues, repeat, in seconds.

14) Versions **LIGHT** and **LIGHT RS-485** have no outputs.

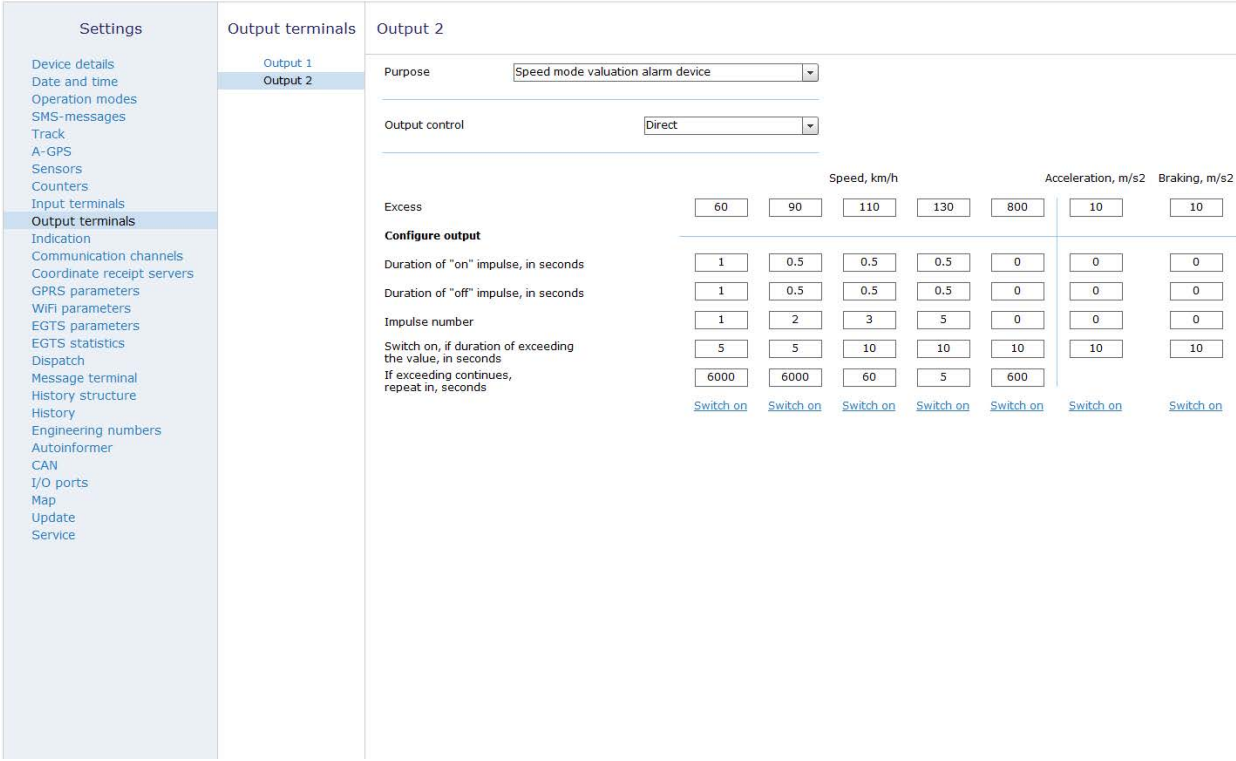

Figure 24. “Output terminals” section

Indication

The “Indication” section (Fig. 25) allows the user to select either of two available indicator operation modes on the tracker enclosure: “Standard” or “Constant”.

Whenever the **”Standard”** mode is chosen, indicators turn on for 30 minutes only after the battery compartment cover is taken off for diagnostics of tracker performance. For energy saving purposes, indicators are off when the tracker is fully assembled.

Whenever the **”Constant”** mode is chosen, indicators are always on (provided the tracker has active power supply). It is not recommended for use in vehicles sensitive to elevated energy consumption while the engine is off. It is not recommended for use in rarely operated vehicles, or those with prolonged time between rides.

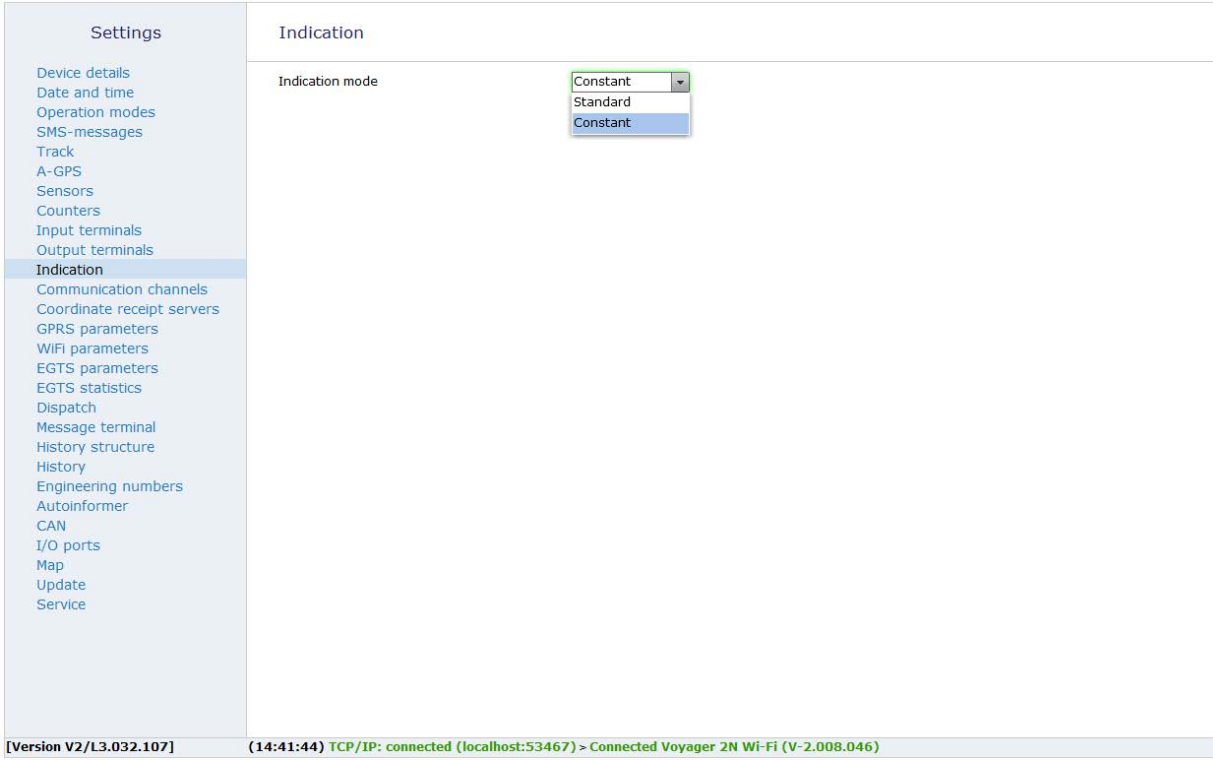

Figure 25. “Indication” section

Communication channels

The “Communication channels” section (Fig. 26) allows the user to select a channel of data transferring.

Establish connection

Select communication channels which the tracker will use to transmit data:

- Only through GPRS - use only GPRS for data transferring.
- Only through Wi-Fi - use only Wi-Fi for data transferring.
- Wi-Fi first, then GPRS - data transferring through Wi-Fi is in priority. If within 2 minutes does not appear an available network to connect, data transmission will be done via GPRS.

*Please note that the change of the communication channel will be made only after reconnecting the device to the server. For immediate change of the communication channel click on the **Apply** link.*

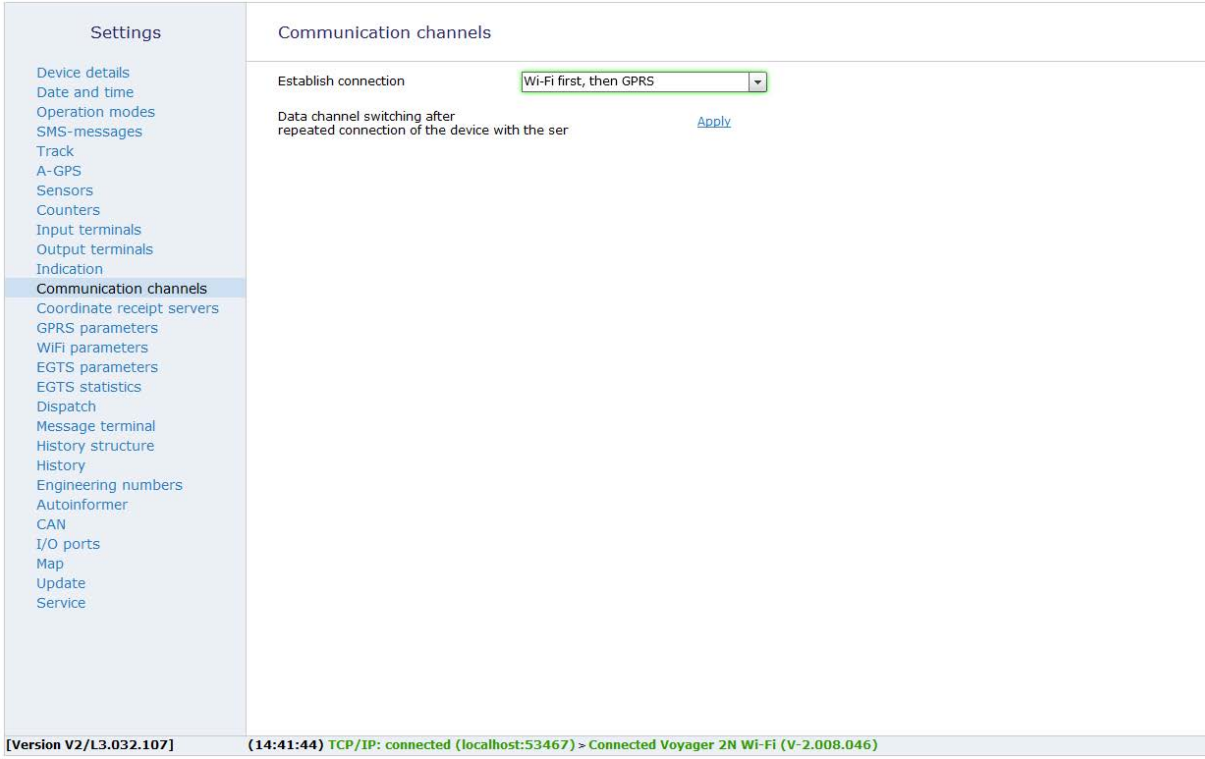

Figure 26. “Communication channels” section

Coordinate Receipt Servers

GEO.RITM Coordinate Receipt Servers

This section is designed for adjustment of connection with the main and reserve monitoring servers (Fig. 27) and is used for working with eu.ritm.ru service.

Please clarify parameters with your monitoring service provider.

If the eu.ritm.ru server is used, do not change settings in this section.

The following values have to be specified:

- Object number for connection to server (when not using GEO.RITM server);
- Main coordinate receipt server IP address;
- Password of the object to be connected to the server;
- Main coordinate receipt server port;
- Reserve coordinate receipt server IP address;
- Reserve coordinate receipt server port.

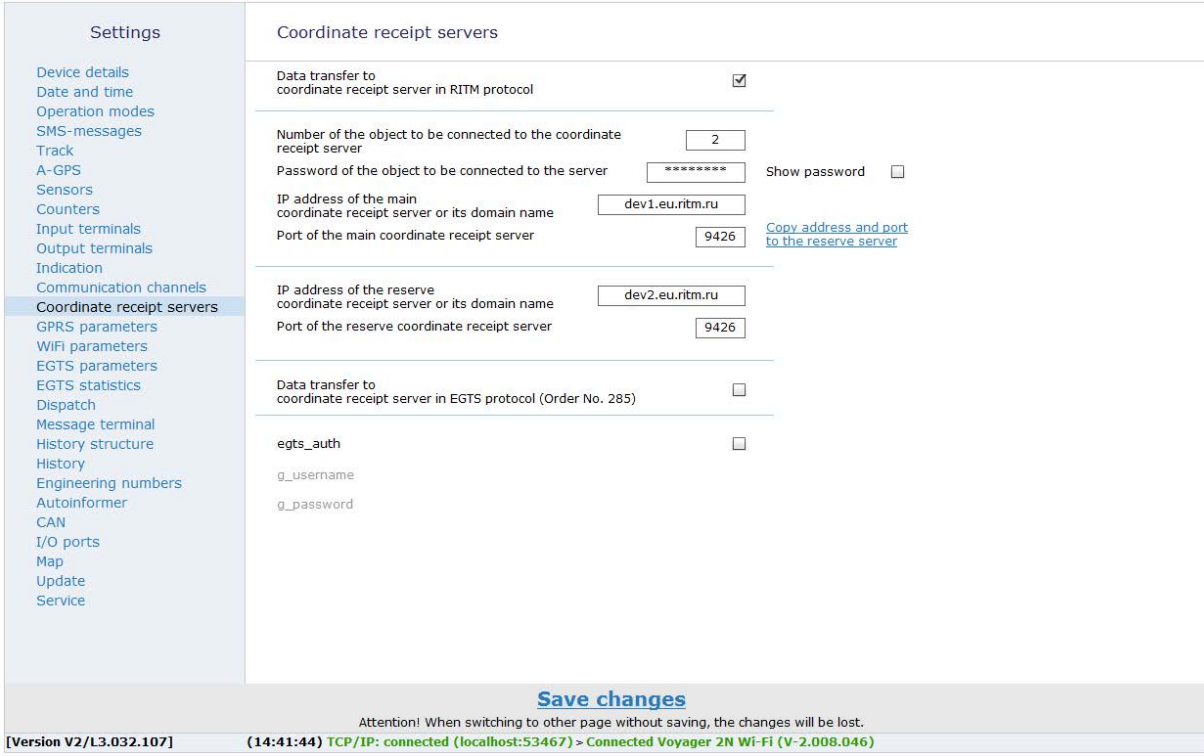

Figure 27. “Coordinate Receipt Servers” section

Coordinate Receipt Servers in EGTS Protocol

It's an open protocol, created for ERA-GLONASS system.

If you want to learn more about this protocol, please follow the link http://www.nis-glonass.ru/en/.

An object number is a unique tracker identifier in the mobile object monitoring system. A password is used for authorization of a tracker in the monitoring system. The object number and password are specified upon creation of a new account for a mobile object within the monitoring system.

The tracker initiates a connection with a monitoring system server. The port and IP address/domain name of a mobile object monitoring server are specified in the tracker. You can specify connection parameters for both the main and reserve servers. If the reserve server is not used, you need to copy the main server settings to the reserve server configuration by either pressing “Copy address and port to the reserve server” or entering them manually.

If the server marked as main is unavailable, the tracker tries connecting to the reserve server. If the reserve server is also unavailable, the tracker tries to connect to the main server again until it connects to either of the servers or the modem stops operating. Data transferred to either of the servers are not copied to the other one.

Do not enter a non-existing address for the reserve server, as this will slow down connection to the main server and may increase your GSM/GPRS traffic expenditures.

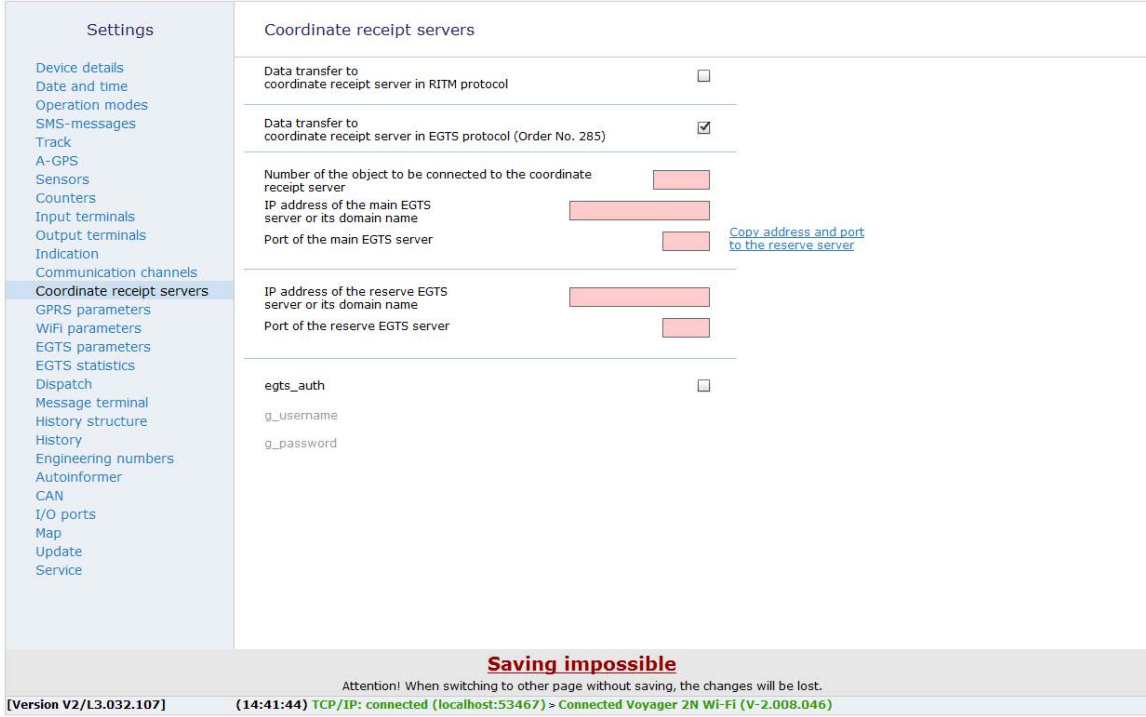

Figure 28. EGTS protocol server configuration[15]

15) This example uses random EGTS servers and ports. Please clarify connection parameters with your service provider.

GPRS Parameters

This section is used for setting parameters of connection to a GPRS access point (Fig. 29).

If the **“Auto detect APN settings”** feature is enabled all connection options are set automatically depending on the communication service provider.

The automatic detection feature uses a predefined set of providers shown whenever the “Extra” hyperlink is pressed.

To specify options manually disable “Auto detect APN settings” feature and set access point options. The required settings obtain from the communication service provider.

“Do not enable GPRS in roaming”

To allow money savings, there is an option for an automatic disabling of the connection to the monitoring server in case the mobile object enters a roaming zone. In this case, the object travel data are stored in the “black box” of the system and are later transferred to the monitoring system server after the object returns to its home mobile network.

Use of two SIM cards registered in different regions or countries allows constant receipt of data from any object that frequently crosses the roaming zone boundaries without costly roaming fees. Whenever a roaming zone boundary is crossed, the tracker switches to the SIM card, to which the current zone is home-base.

If both SIM cards are registered in a different regions (country) and the GPRS channel connection is off while in roaming, the tracker will not connect to the monitoring system server until it returns to its home network or its settings are changed (incoming calls over CSD/voice channel are available).

Additionally section

This section is used for storing access points, settings of which should be used for automatic detection. Enter parameters of available mobile networks in your region.

Proper APN parameters can be requested from your mobile network operator.

Default APN settings may include data for the most common operators in your country, but it might be neccessary to check this settings.

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- WiFi parameters
- EGTS parameters
- EGTS statistics
- Dispatch
- Message terminal
- History structure
- History
- Engineering numbers
- Autoinformer
- CAN
- I/O ports
- Map
- Update
- Service

GPRS parameters

SIM card 1

Specify APN configuration automatically	☑
Operator's SIM-card inserted	**MTS**
Access point	internet.mts.ru
GPRS username	mts
GPRS user password	mts
Do not enable GPRS in roaming	☑

SIM card 2

Specify APN configuration automatically	☑
Operator's SIM-card inserted	**Operator not identified**
Access point	
GPRS username	
GPRS user password	
Do not enable GPRS in roaming	☑

Additionally

IMSI	Operator	Access point (APN)	User	Password
25001	MTS	internet.mts.ru	mts	mts
25002	Megafon	internet		
25099	Beeline	internet.beeline.ru	beeline	beeline
35374	TELE2	internet.tele2.ru	tele2	tele2

Figure 29. "GPRS Parameters" section

Wi-Fi parameters

The section is available only for the execution of the device with Wi-Fi.

The version of Voyager 2N GLONASS Wi-Fi supports the transmission and reception of data on standard WLAN IEE 802.11 (Wi-Fi) and can act as:

1. **A client.** In this case, data from the tracker's history is transferred to the server when connected to one of the saved wireless networks;
2. **An access point**. In this case, the identification of drivers is available (The MAC addresses connected to the access point of mobile devices are recorded in the history of the tracker).

Configure the settings of the tracker's Wi-Fi module in this section.

Module details

The "Module details" page provides basic information about the Wi-Fi-module of the tracker (Fig. 30):

1. SDK Wi-Fi version presumes an integrated Wi-Fi module;
2. The functional firmware is the current version of this Wi-Fi module;
3. Wi-Fi access point settings:
   - MAC-address;
   - IP- address;
   - Mode (works / does not work);
4. Wi-Fi client settings:
   - MAC-address;
   - IP- address;
   - Connection to a network (shows the quality of the signal as a percentage).

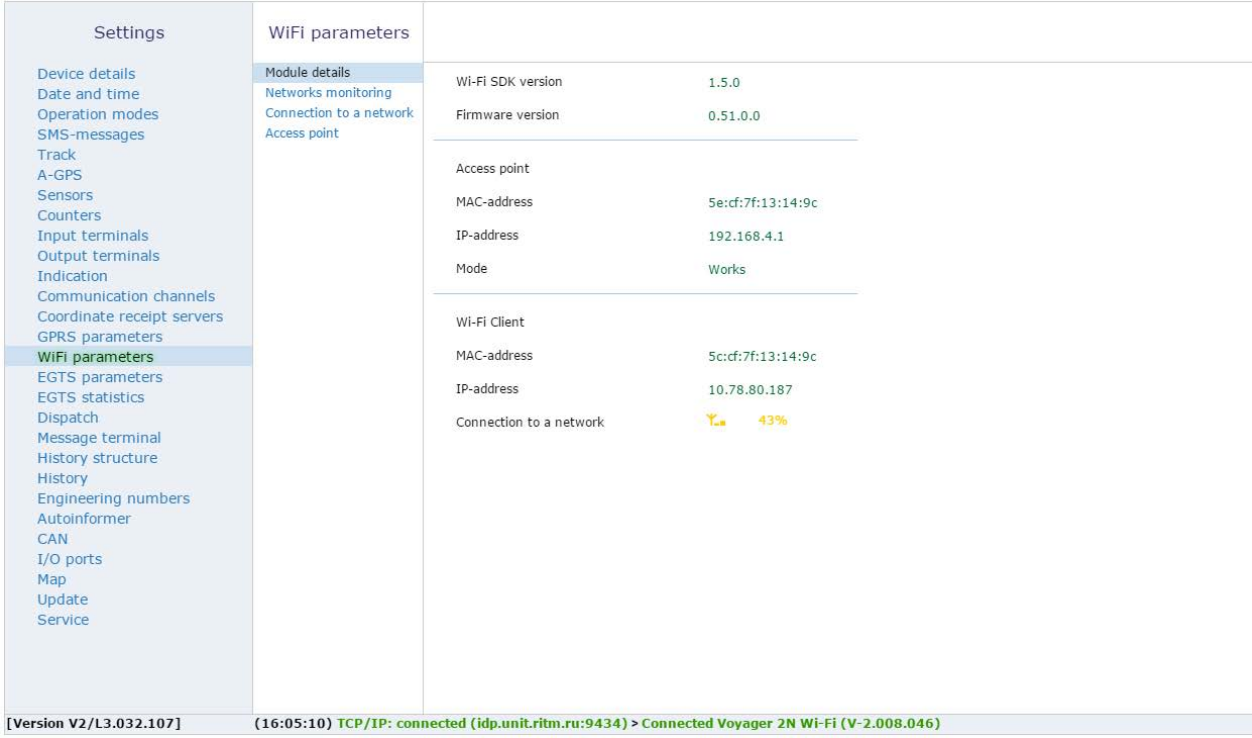


Figure 30. Module details

Netwoks monitoring

This page (Fig.31) shows all the currently available Wi-Fi network and identifies their main parameters:

- SSID - broadcast network name;
- MAC-address;
- Security (No / WPA / WPA2);
- Network signal strength; the level of signal attenuation.

You can connect to any available network. To do so, click on the desired network with the left mouse button, and then click on the “**Connect to network**” link that appears (See Fig. 30).

In this case, you will be automatically redirected to the page “**Network Connection**” where you have to complete the connection by entering your password and clicking “**Connect**”.

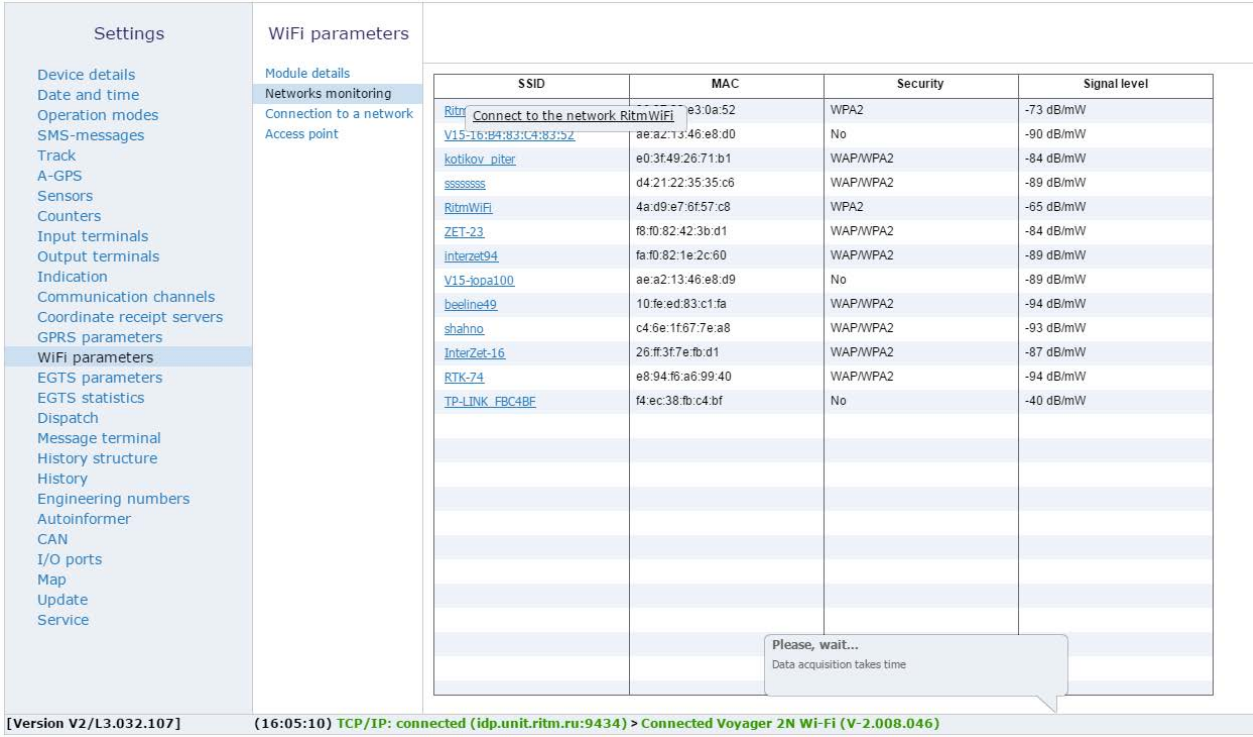


Figure 31. Networks monitoring

Connection to a network

This page (Fig. 32) shows the current network to which the tracker is connected.

You can manually specify the network to connect to. To do so, enter your name and password and click the **Connect** link.

Check the “**Connect automatically**” box, so that the tracker automatically connects to the selected network every time when it turns on.

To minimize the possibility of entering an incorrect password, tick the “**Show password**” field and the password will be displayed completely.

To disconnect from the current network click the “**Disconnect**” link.

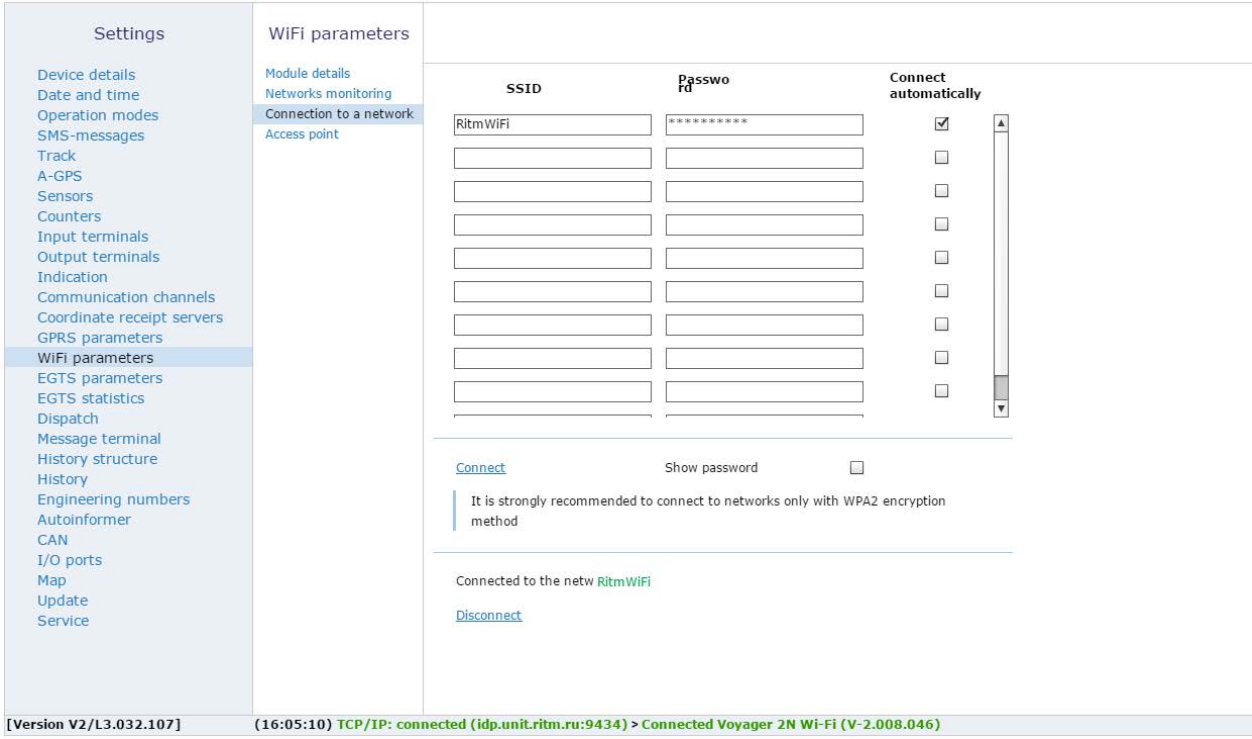


Figure 32. Connection to a network

Access point

The access point mode is used to connect mobile devices to the tracker. The main parameters for the tracker operation as the access point mode are set and displayed on the page (Fig.33):

1. Enable access point - select one of the available modes for enabling the access point:
   - access point disabled;
   - only at motion;
   - only at started engine;
   - at motion or started engine;
   - at motion and started engine;
   - always on;
2. MAC-address.
3. IP-address – specify the access point IP-address with the default value - **192.168.4.1.4**.
4. SSID – the broadcast network name. By default, the network is called **Ritm<the last 8 digits of IMEI>**.
5. Security (Open/WPA2).
6. Password - set a password to restrict the ability to connect to an access point.
7. Channel - this parameter is determined automatically. If you know the number of the free channel, then specify it.

How to create a strong password. Recommendations:

- *The password must consist of at least eight characters;*
- *The password must not contain a user name, a valid name or a company name;*
- *The password must not contain complete words;*
- *The password should be significantly different from the passwords used earlier;*
- *The password must not contain Cyrillic.*

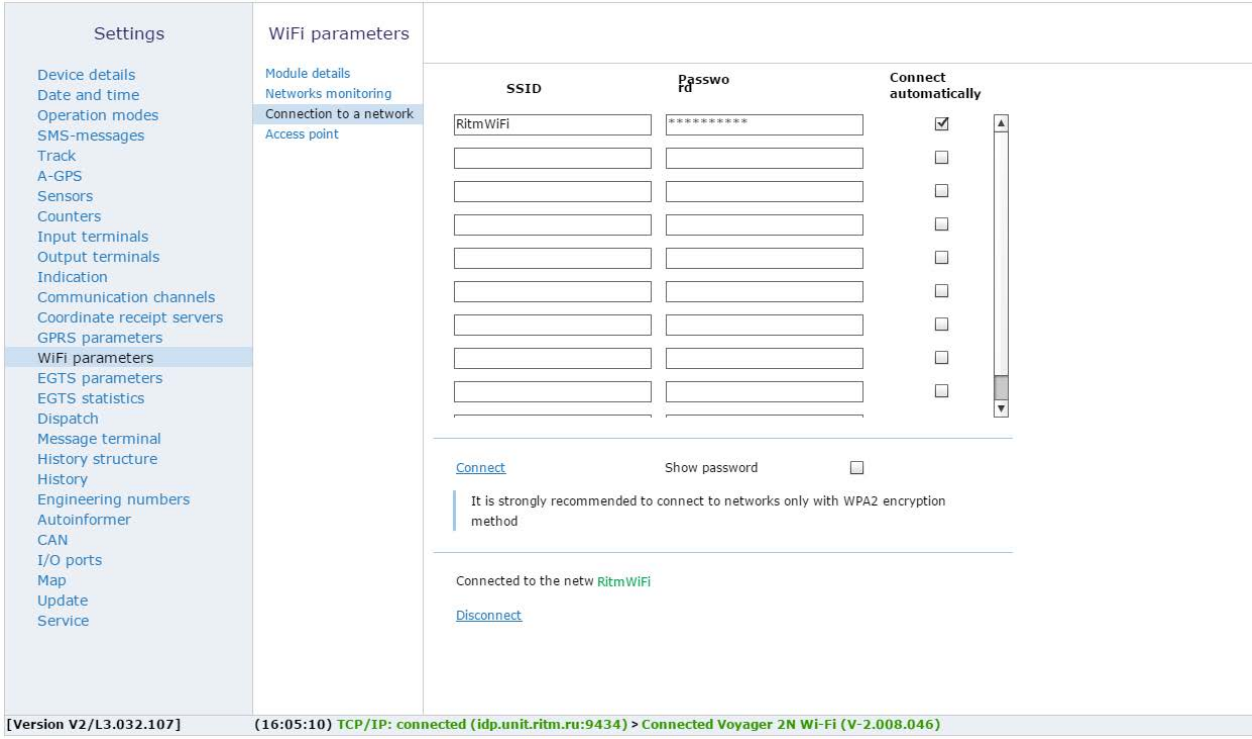


Figure 33. Access point

EGTS Parameters

This section (Fig. 34) is designed for users, who need to transfer data to third-party coordinate receipt servers over the EGTS protocol.

EGTS is a data transfer protocol used for transmission of data from vehicles of Category M used for commercial passenger transfer and vehicles of Category N used for dangerous goods transfer. As per the order by the Ministry of Transport of the Russian Federation No. 285 dated July 31, 2012, any data received from vehicles of the mentioned categories should be re-transmitted to Rostransnadzor servers and, from 2014 and on, ERA-GLONASS system servers.

The section features the following options:

Identifier of home telematics group

Specify an identifier in the corresponding field.

Allow EGTS statistics transfer

To allow/restrict EGTS statistics transfer, select/deselect the corresponding field.

Allow unscheduled transferring of alarm events to the EGTS Server

Check this box to increase the priority of sending alarm events to the server EGTC.

Transfer subrecord EGTS_SR_STATE_DATA

It is used to send information about the status of the subscriber terminal to the server.

Transfer subrecord EGTS_SR_ACCELL_DATA

It is used to send accelerometer readings to the server.

Please clarify any required EGTS parameters with your service provider.

Use encryption in protocol

Encryption of data upon transfer using the EGTS protocol:

- Disabled - encryption is off;
- GOST - data are encrypted according to the algorithm described in GOST 28147. Press **“Additionally”**, enter the encryption key and fill out the replacement table (if necessary);
- Alternative - Press **“Additionally”**, enter the encryption key.

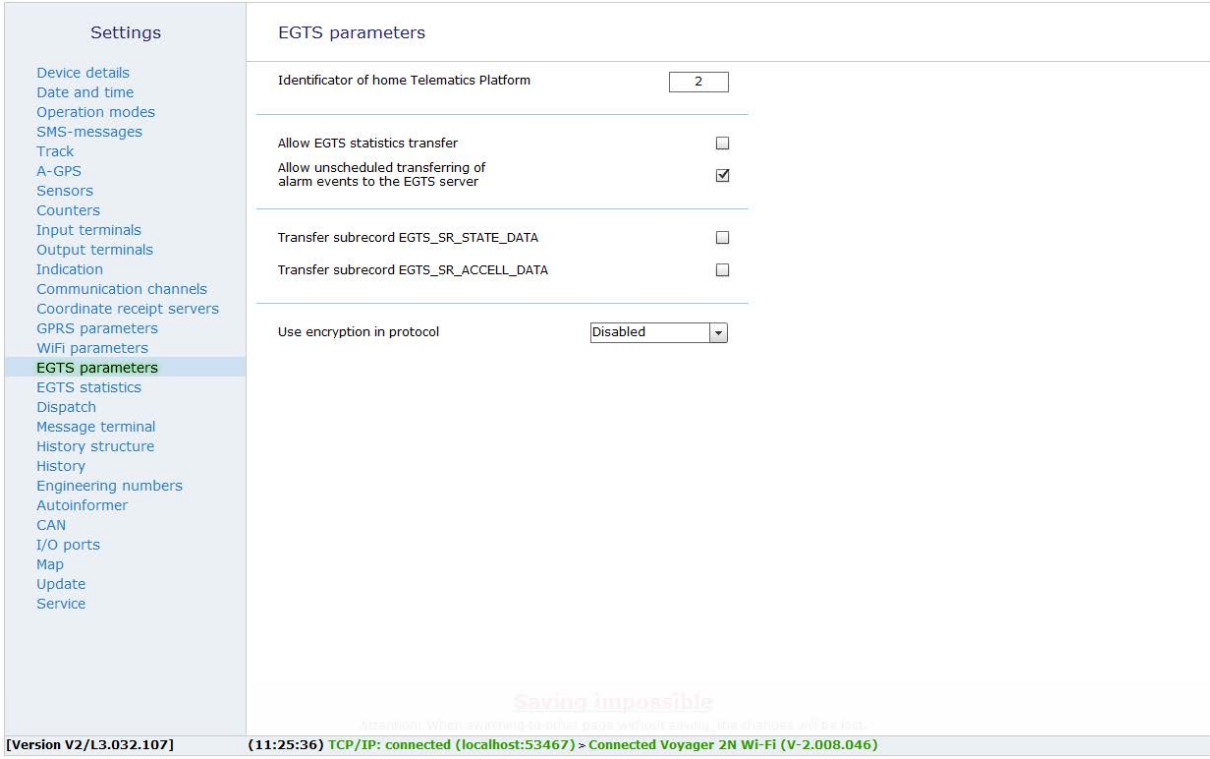


Figure 34. “EGTS parameters” section

EGTS statistics

This section shows data transfer statistics for the EGTS protocol (Fig. 35). Any data transferred by the device over this protocol is shown. This section is used for reference and contains the following information:

- Number of all confirmed points;
- Number of all lost points;
- Number of server connections;
- Number of the latest point in the tracker log;
- Number of the oldest point in the tracker log;
- Date and time of the oldest point (UTC);
- Number of the transfered point.

Pressing “Clear statistics” nullifies the EGTS statistics.

Settings

Device details
Date and time
Operation modes
Track
Sensors
Counters
Input terminals
Output terminals
Indication
Coordinate receipt servers
GPRS parameters
EGTS parameters
EGTS statistics
Network mode
Dispatch
Message terminal
History structure
History
Engineering numbers
CAN
I/O ports
Map
Update
Service

EGTS statistics

Number of all confirmed points	285545
Number of all lost points	0
Number of server connections	2486
Number of the latest point in the device log	824698
Number of the oldest point in the device log	763392
Data and time of the oldest point (UTC)	30.06.2016 00:14:31
Number of the transfered point	823897

Clear statistics

[Version V2/L3.032.029] (14:52:54) TCP/IP: connected (cn1.geo.ritm.ru:6668) > Connected Voyager 2N (V-2.107.040)

Figure 35. “EGTS statistics” section

Dispatch

The “Dispatch” section (Fig. 36) is used to turn on a special dispatch unit connected to the tracker.[16]

When the dispatch unit is on, the system automatically answers any voice call from then engineering or any other number (if engineering numbers are not used and calling from any number is allowed).

The maximum length of voice call can be setup. After the set time passes, the call is automatically disconnected.

Transfer of data to the monitoring system server pauses for the duration of a call.

16) The dispatch unit is sold separately. The dispatch unit cannot be connected to **LIGHT** and **LIGHT RS-485** Versions.

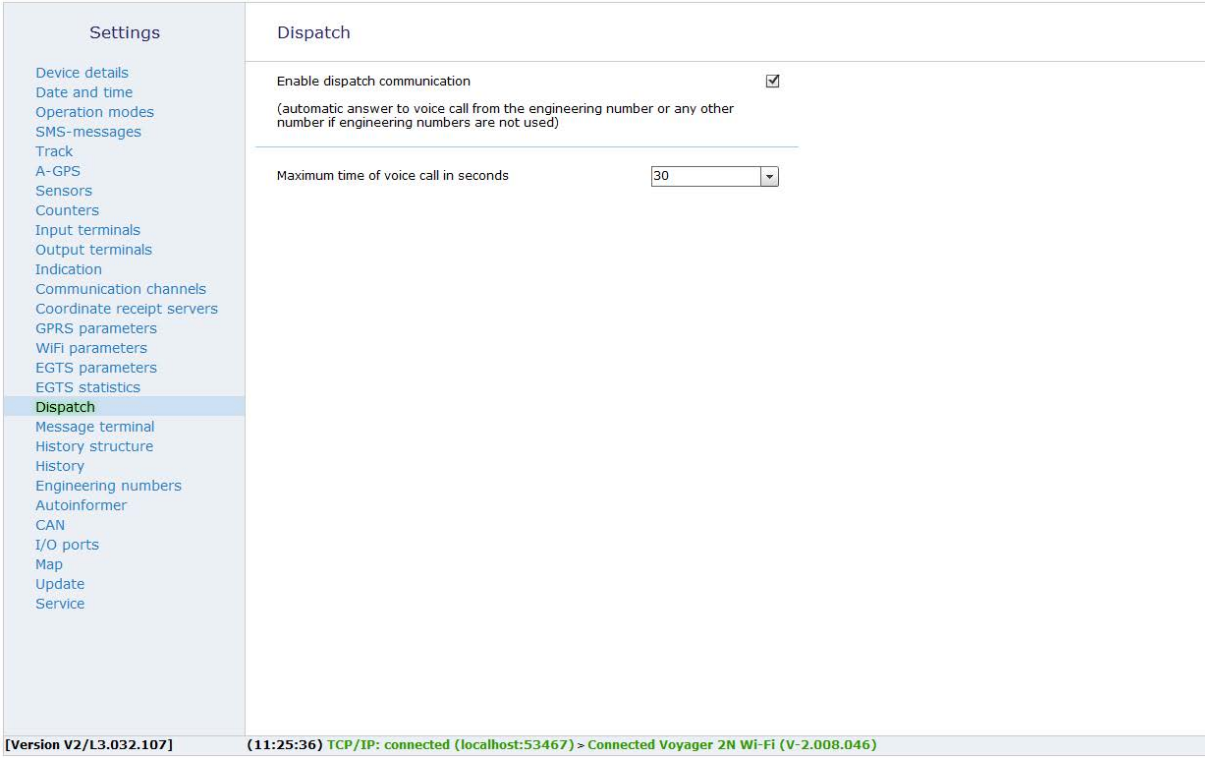


Figure 36. “Dispatch” section

Message Terminal

The “Message Terminal” (Fig. 37) allows the dispatcher to exchange messages with the tracker installed in the driver’s cabin. The driver would see incoming messages on the display of a touch screen connected to the tracker and installed in the vehicle cabin. Two types of messages can be sent:

1. Formalized messages (predefined).
2. Dispatcher-created (max. 20 characters).

List of dispatcher’s formalized message groups:

Code	Message group
01	Traffic control commands
02	Orders, confirmations, driver’s query answers
03	Info messages

List of formalized messages to be shown on indicator’s display upon receipt of message from dispatch center:

Code	Message
	Traffic control commands
01	Traffic schedule delay — enter the schedule
02	Ahead of traffic schedule — enter the schedule
	Orders, confirmations, driver’s query answers
11	Firefighting vehicle on the way
12	Police on the way
13	Ambulance on the way
14	Road Police vehicle on the way
15	Tow truck on the way
16	Road Security Police vehicle on the way
17	Please, connect with the dispatcher at stop
18	Message receipt acknowledged, taking measures
19	Message receipt acknowledged

	Info messages
21	Speed was reduced by 10%
22	Speed was reduced by 20%
23	Danger! Clear ice
24	Dense fog, speed 5 kph
25	Cancel speed reduction
26	The ride is not discharged for delay

When a message is created by a dispatcher, they need to enter a message (max. 20 characters) to be transferred in the “Line text” field. The dispatcher can specify additional parameters for the transferred message:

- “Blink”;
- “Sound”;
- "Life time".

Visual indication and audio signal are necessary to attract attention of a vehicle's driver, while the life time ensures the message is displayed on a screen in the driver’s cabin for the period specified.

When several editable messages are edited and sent together by clicking “Send all”, the transferred messages would be shown on the vehicle’s screen in the order corresponding to the submitted message line number.

The status of a formalized message transferred from the dispatcher to driver is shown to the right of the selected message and has three possible values:

- Waiting (message is being transferred);
- Transferred (message has been transferred, but not yet read by the driver);
- Read (message has been transferred and read by the driver).

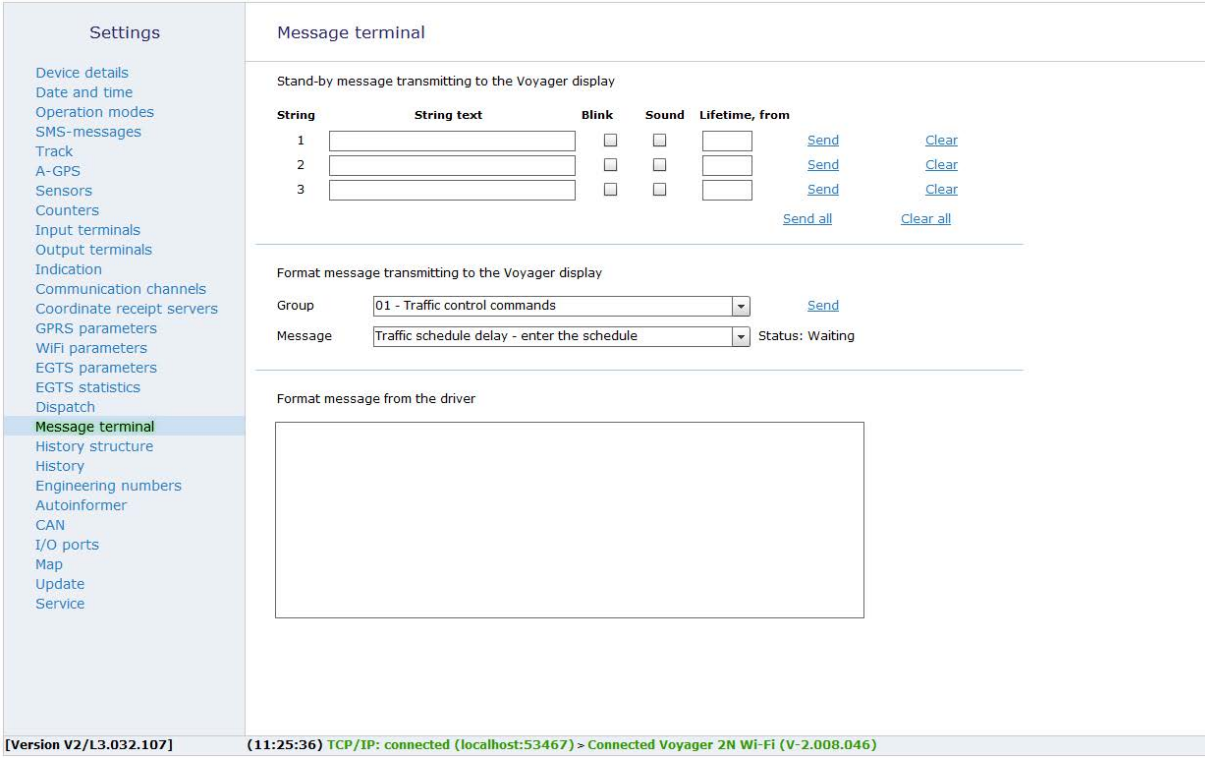


Figure 37. “Message Terminal” section

Touch Screen Operation

Screen (Fig. 38) is designed for installation on vehicles and enables dispatching of rides.

Connection of the screen to the tracker is done using an RS-232 serial port[17].

Colors and shades may differ from the original image depending on the hardware version of the screen.

Figure 38. Touch Screen

The screen enables depiction of the following:

- Alphanumeric messages transmitted onboard of a vehicle from the dispatch center;
- Messages selected by driver from the screen memory for transmission to the dispatch center;

17) Not available in LIGHT and LIGHT RS-485 Versions.

- Confirmation of receipt of messages with confirmation request sent to the driver from the dispatch center;
- Selection and transmission of a formalized message to be sent to the dispatch center.

Name of touch-sensitive button	On-screen image of touch-sensitive button	Designation of touch-sensitive button
YES	YES	1) Locking of specific message/message group selection in the formalized messages/ message groups lists. 2) Transfer of selected message's text to the dispatch center. 3) Confirmation of receipt of the text message by a dispatcher.
LEFT	<	1) Begin selection of formalized messages group from the top of the list. 2) Show the previous formalized message/ message group in the list of messages/ groups, move to the top of the list.
RIGHT	>	1) Begin selection of formalized messages group from the bottom of the list. 2) Show the next formalized message/ message group in the list of messages, move to the bottom of the list.
NO	NO	Cancel last action, cancel message/ message group selection, cancel transmission of dispatcher's text message receipt confirmation.

Submission of formalized messages from driver to dispatcher

Formalized messages are stored to the screen's non-volatile memory at the manufacturing plant. List of names of dispatcher's formalized message groups:

Code	Message group
01	Emergency call
02	Leaving the line
03	Messages to the dispatcher
04	Traffic delay
05	Help request

Texts of formalized messages for transmission from driver to dispatch center:

Code	Message
	Emergency call
01	Fire emergency alarm
02	Police alarm
03	Ambulance alarm
04	Road Police alarm
05	Tow truck alarm
06	Road Security Police alarm
07	Call to the dispatcher for voice-to-voice communication
	Leaving the line
08	Leaving: Technical malfunction
09	Leaving: Rubber defect
10	Leaving: Operational faults
11	Leaving: Team
12	Leaving: Traffic accident

	Messages to the dispatcher
13	No remarks for road
14	Ready to move
15	Return to the fleet park
16	Return to the fleet park, towing
17	Work completed — early leaving
18	Lunch time
19	No shift turnaround
	Traffic delay
20	Accumulation of foreign vehicles
21	Traffic accident of foreign vehicles
22	Road works
23	Weather conditions
	Help request
24	The number of trips completed
25	Time of the lunch start and end
26	Shift turnaround time
27	Knocking-off time
28	Current traffic schedule

Reserved automatically generated codes:

Code	**Message**
Group	**00–Automatic messages and messages not from the list**
29	Code is sent automatically after message receipt and displaying it on the indicator screen (Answer)
30	Automatically generated at pressing the button “YES” by the driver after reding the message to be acknowledged by the driver (Answer)
31	Backup
32	Any text message sent by the dispatcher, but not present on the display

Using on-screen buttons, the driver selects a group of formalized messages, chooses a specific message within the group, and presses the confirmation button to sends it to the dispatcher. After the submission confirmation button has been pressed, the screen switches to its standby mode and shows the standby screen. If the driver has chosen a formalized message or formalized message group, but has not confirmed its submission, the indicator goes into its primary mode after one minute in idle state.

Before formalized message selection begins, the text shown on the display is saved to be restored after the submission is completed, or after an idle timeout passes in the course of the selection procedure.

If a message from a dispatcher is received during the formalized message selection procedure, the message is stored, the selection is not cancelled, and the dispatcher's message is shown immediately after work with formalized messages has been finished and the screen has been put to the standby mode.

On-Screen Display of Messages from Dispatcher

Messages of the following types are shown on the screen:

- Formalized messages shown from the screen memory according to the code received from the dispatch center;
- Non-formalized messages received from the dispatch center.

The format and contents of any non-formalized message shown on the screen are determined by the dispatch center software that generates three lines of text, each 20 characters long.

Arrival of a new message on the screen may also be accompanied with audio signals.

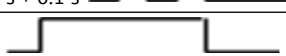
For on-screen display, text blinking can be used either for the complete message, or separately for each of its lines.

The dispatch center can also send a delete command for the last formalized message received from a dispatcher.

Text of any message received from a dispatcher is shown on the screen for the duration specified by the dispatch center; if the driver presses the “Yes” button, the message is deleted and the screen returns to its primary mode.

Screen Audio Signals

The screen uses several types of audio signals:

Signal number	Frequency	Audio duration
1	3000 Hz	0.1 s 
2	3000 Hz	0.5 s 
3	3000 Hz	0.1 s + 0.1 s 
4	3000 Hz	1 s 

Audio signals are received together with text messages. Sound is played while the message is displayed on the screen.

Whenever the screen control button is pressed, this action is reconfirmed by Audio Signal 1 in all cases, but:

- Confirmation of selection of a formalized message to be sent by the driver is announced using Audio Signal 2;
- Confirmation of receipt of a formalized message by the driver from a dispatcher is announced using Audio Signal 2;
- Refusal to receive a formalized message from a dispatcher by the driver is announced using Audio Signal 3;
- Arrival of a new message from a dispatcher may be announced by any audio signal (with Audio Signal 4 as the default value).

History Structure

The “History Structure” section (Fig. 39) enables selection of a list of parameters stored within the tracker and transmitted to the monitoring system server.

For adding yet another parameter, the size of this parameter is automatically added to the overall size of the record in the field “One history record size, bytes”, and the total possible number of records in history.

These parameters are used by technicians to configure the tracker. Removal of certain parameters may affect the capability for displaying reports and routes in the user interface of the monitoring system.

Any change in the history structure deletes all history previously recorded from the tracker memory.

When connecting fuel sensors make sure that they have been added to the history structure!

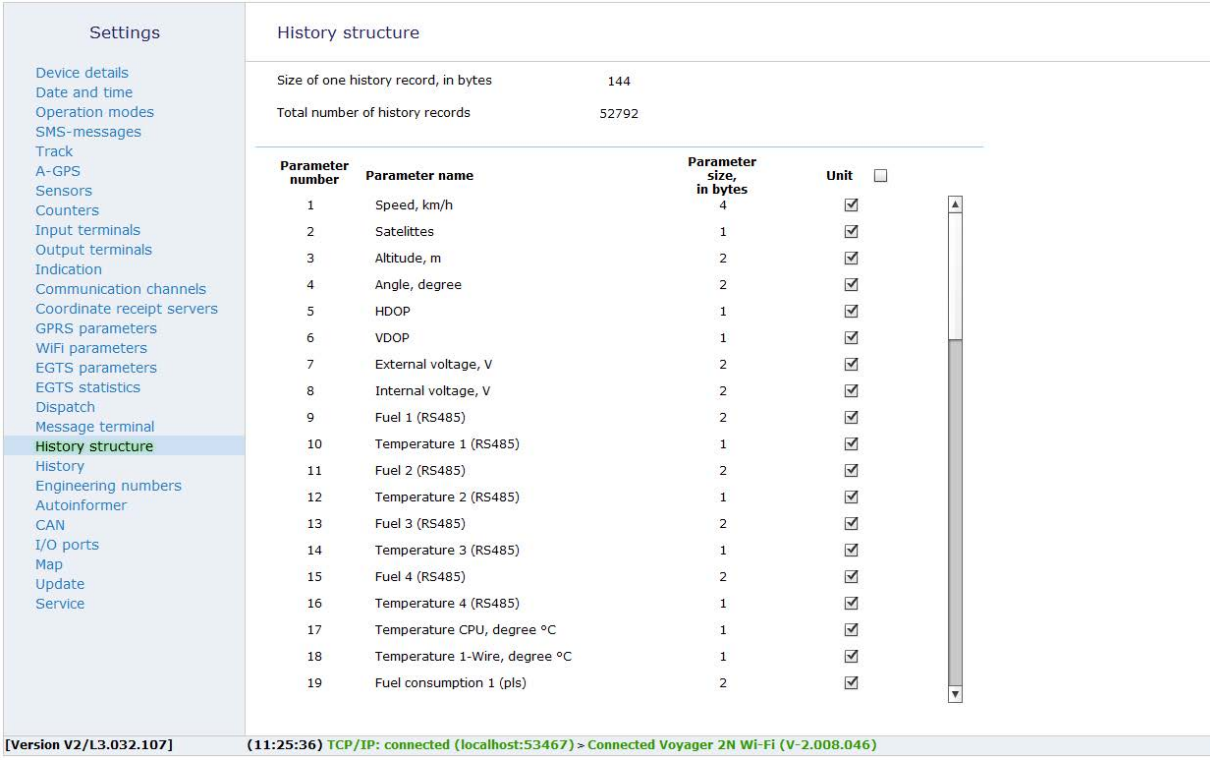


Figure 39. "History structure" section

History

The “History” section (Fig. 40) shows history of changes of parameters stored within the tracker memory. Parameters to be stored in the tracker memory may be chosen in the “History Structure” section.

To configure record presentation parameters, press the gear button in the top right corner of the screen.

Besides selected parameters, each history record has the following data:

1. “Record number”: Serial number of the record (the last number is saved with cleaning of the history).
2. “Record type”: “By event”, “By shift”, “By time”.
3. “Transmitted”: Status of record transmission to the server (“Transferred”/”Not transferred”).

History can be exported to .txt, .kml and .json files. When exporting to a .json file, you can use export filters by date and record number. To do so, choose the export format “JSON Date” or “JSON Record Number”, respectively. To save data to a file, use corresponding hyperlinks.

Numbers of recorded history pages are shown under the table. You can open any history page by clicking on its number or entering its number in the corresponding field and clicking “Go”.

When clicking the “Update page” hyperlink, the page is updated with the latest history records.

Click “Erase history” if you want to completely erase the tracker memory (the “index” serial number is not removed, so all new records will follow the same numbering).

Settings

- Device details
- Date and time
- Operation modes
- SMS-messages
- Track
- A-GPS
- Sensors
- Counters
- Input terminals
- Output terminals
- Indication
- Communication channels
- Coordinate receipt servers
- GPRS parameters
- WiFi parameters
- EGTS parameters
- EGTS statistics
- Dispatch
- Message terminal
- History structure
- History
- Engineering numbers
- Autoinformer
- CAN
- I/O ports
- Map
- Update
- Service

History

Record type	Transmitted	Record number	Latitude	Longitude	Date	Time	Speed, km/h	Satelittes
By shift	EGTS and RITM	423	59.984755	30.362326	24.03.17	23:09:14	57.560	13
By shift	EGTS and RITM	422	59.985588	30.363446	24.03.17	23:09:07	57.560	13
By shift	EGTS and RITM	421	59.986408	30.364604	24.03.17	23:09:00	57.560	13
By shift	EGTS and RITM	420	59.987213	30.365801	24.03.17	23:08:53	57.560	13
By time	EGTS and RITM	419	59.987556	30.366323	24.03.17	23:08:50	57.560	13
By shift	EGTS and RITM	418	59.988008	30.367028	24.03.17	23:08:46	57.560	13
By shift	EGTS and RITM	417	59.988788	30.368295	24.03.17	23:08:39	57.560	13
By shift	EGTS and RITM	416	59.989551	30.369598	24.03.17	23:08:32	57.560	13
By shift	EGTS and RITM	415	59.990303	30.370933	24.03.17	23:08:25	57.560	13
By shift	EGTS and RITM	414	59.991040	30.372301	24.03.17	23:08:18	57.560	13
By shift	EGTS and RITM	413	59.991758	30.373701	24.03.17	23:08:11	57.560	13
By shift	EGTS and RITM	412	59.992463	30.375129	24.03.17	23:08:04	57.560	13
By shift	EGTS and RITM	411	59.993151	30.376595	24.03.17	23:07:57	57.560	13
By shift	EGTS and RITM	410	59.993821	30.378093	24.03.17	23:07:50	57.560	13
By shift	EGTS and RITM	409	59.994476	30.379614	24.03.17	23:07:43	57.560	13
By shift	EGTS and RITM	408	59.995113	30.381168	24.03.17	23:07:36	57.560	13
By shift	EGTS and RITM	407	59.995731	30.382746	24.03.17	23:07:29	57.560	13
By shift	EGTS and RITM	406	59.996333	30.384356	24.03.17	23:07:22	57.560	13
By shift	EGTS and RITM	405	59.996914	30.385991	24.03.17	23:07:15	57.560	13
By shift	EGTS and RITM	404	59.997481	30.387651	24.03.17	23:07:08	57.560	13

<< < 491 492 493 494 495 496 497 498 499 500 > >> Jump to 500 of 513 Update page

Export format TXT Read the records 5000 Export Clear history

[Version V2/L3.032.107] (11:25:36) TCP/IP: connected (localhost:53467) > Connected Voyager 2N Wi-Fi (V-2.008.046)

Figure 40. "History" section

Engineering Numbers

This section (Fig. 41) is used to define a list of numbers, which allow to remotely connect to the tracker over a GSM/CSD channel for its reconfiguration.

Numbers should be entered in either of the formats 8 XXX XXXXXXX or +7 XXX XXXXXXX (numbers shown in the figure are used for example only, so please use actual engineering numbers). When a new incoming call is received over a CSD channel, the tracker would only allow connection when the number is detected and matches a number in the list.

In order to connect to the tracker, the number detected by the tracker upon connection should exactly match a number in the engineering numbers list!

If a GPRS connection is active at the moment the incoming call is received, it would be aborted upon connection from an engineering number for a conversation using a dispatcher's intercom or for configuration of the tracker over a CSD channel. Whenever a connection attempt from an unknown number is made, or if the number cannot be detected, the call is aborted, and the GPRS connection is retained.

If the **"Allow setting tracker from any number"** parameter is on, the tracker would allow a configuration connection with any number.

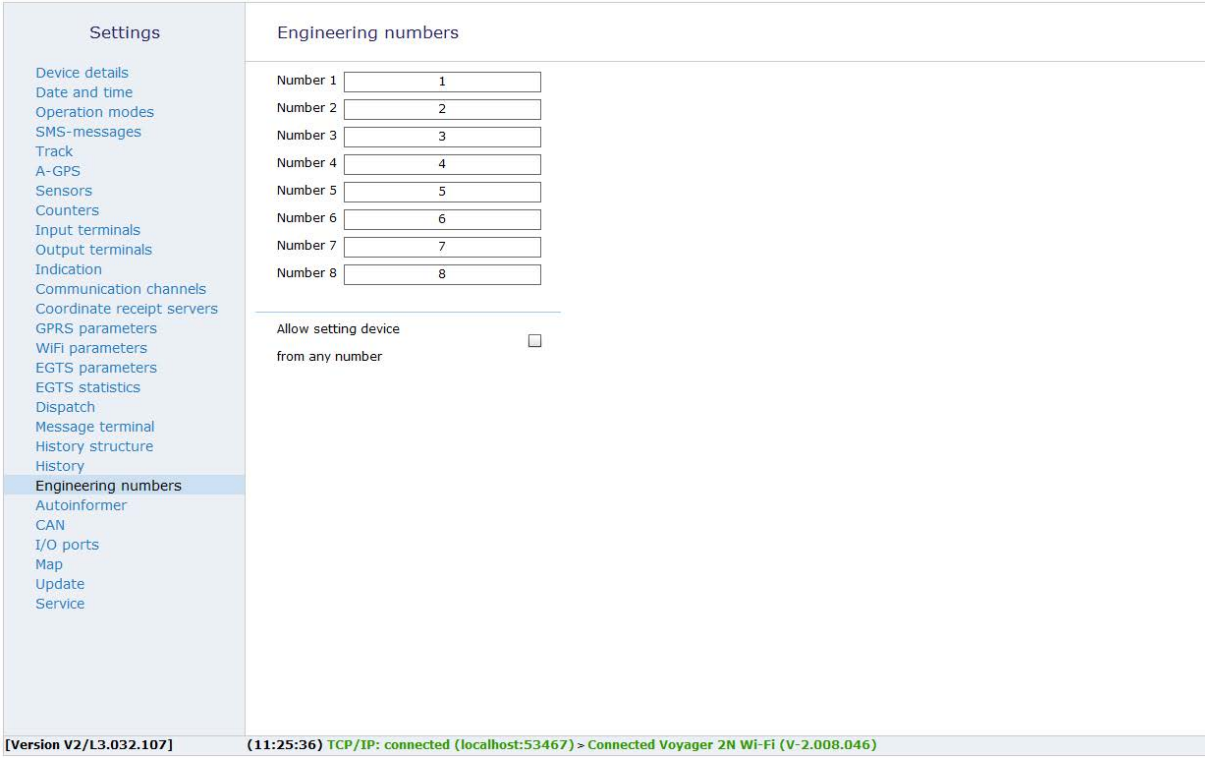


Figure 41. “Engineering Numbers” section

Autoinformer

The version of Voyager 2N GLONASS ARIS[18] supports the ability to play audio files stored on the MicroSD card that is installed in the tracker. This section (Fig.42) is used to play sound files on the card or local computer.

If you know the exact path to the file stored on the card, select it in the "**Playback file path related to root**" and click on "**Playback file copy on device**".

Check the box "**Continuous Play**", if you want to play an unlimited number of times the specified file. Click "**Stop**" to stop playing.

You can play a copy of the file on the local computer (for example, for the checking) if the exact path to the file is unknown. To do so, click the "**Copy of file for playback**" in the window that opens, select the desired file, and click "**Playback file copy on PC**".

Thus, to simplify the search for files stored on the MicroSD card, be sure to copy created on the SD card directory with folders and audio files on the local computer.

18) ARIS - Automated Rout Identification System.

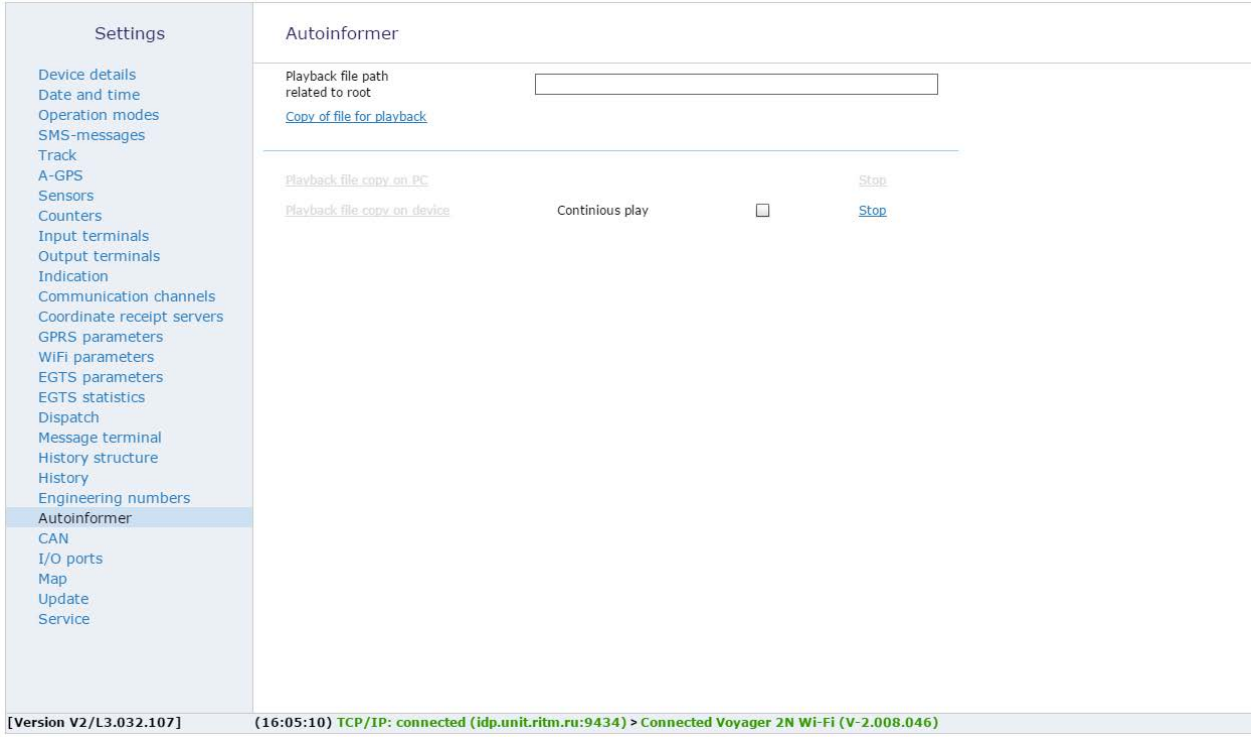


Figure 42. “Autoinformer” section

CAN

This section (Fig. 43) enables configuration of tracker-to-vehicle CAN bus connection and inputs configuration for connecting passenger traffic sensors MATRIX IRMA.

CAN bus connection

To work with CAN bus of the vehicle choose “Vehicles data transfer bus“ for parameter “Purpose“.

Choose the vehicle make from the “Vehicle make” drop-down list. Then select the desired model and manufacture year in the corresponding fields. Prior to going to the next page of the configuration software, click “Save changes”.

The list of supported vehicles is available via the official manufacturer’s website in the “Documentation and Software” section.

The J1708[19] standard is supported starting from the tracker software version 36 (this standard is used in Volvo and Renault trucks). In this case, connection does not involve the CAN pin of the tracker, but the RS-485 pin. This way, to connect using the J1708 standard, follow the actions described below:

1. Connect the CAN bus of the vehicle to the RS-485 pin of the tracker.
2. In the “I/O Ports” section, select the RS485 port and assign the BUS J1708 bus to it (Fig. 44).
3. In the “CAN” section, field “Vehicle make”, choose the “J1708 <RS-485>” value.

Different vehicle models may employ various methods of connection to the RS-485 pin of the tracker. Connect the Low connector of the vehicle’s CAN bus to the B connector of the RS-485 pin of the tracker, and the High connector of the vehicle’s CAN bus to the A connector of the RS-485 pin of the tracker, and make sure data transfer occurs. If no data transfer can be observed, make the connection using a reverse pattern.

19) This standard is not supported in **Light** and **Light RS-485** Versions.

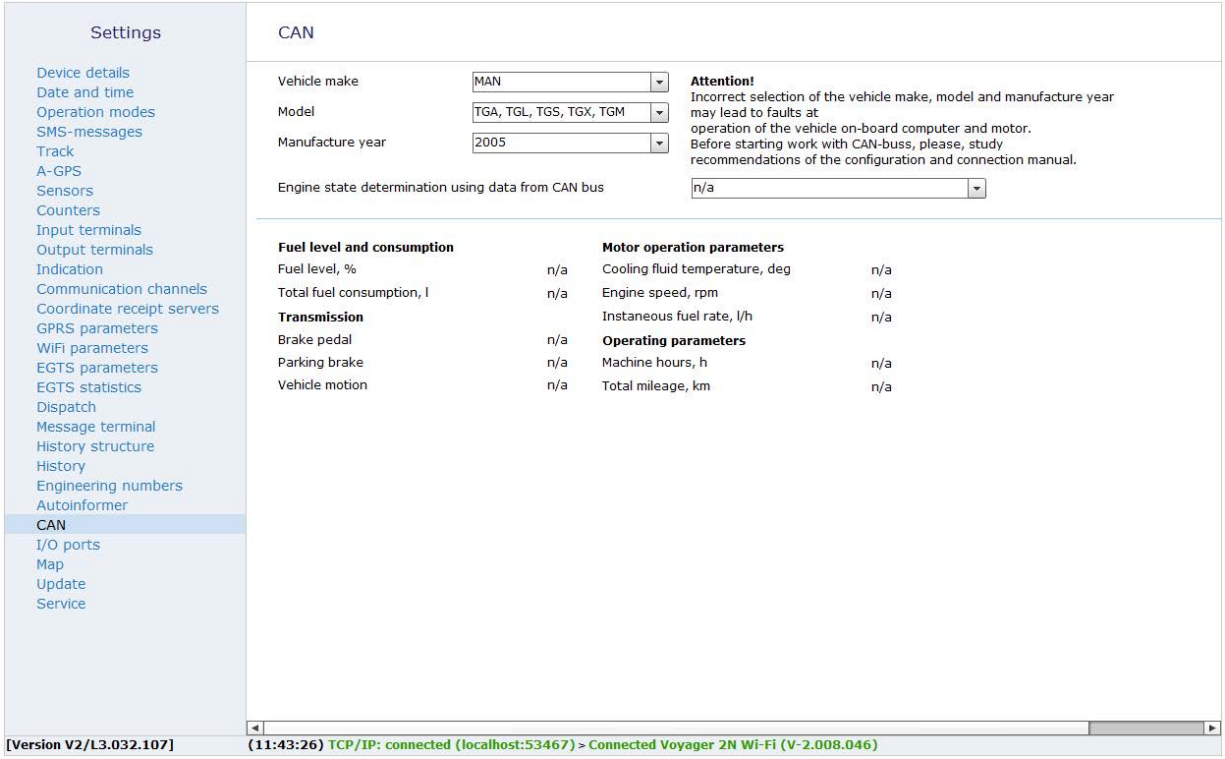


Figure 43. “CAN” section → Vehicles data transfer bus

Passenger traffic sensors MATRIX IRMA

Overview

The tracker allows to connect up to 8 IRMA MATRIX traffic sensors. The tracker is equipped with 3 discrete inputs to control connected sensors (1 of 4 discrete tracker inputs is used for connection of an alarm button). If individual control of more than 3 traffic sensors is needed use “Input Extender (V-EB)” manufactured by the “Ritm” company. Connection diagram see in the “Connection of IRMA MATRIX traffic sensors” section.

Operation concept

The common concept of operation with traffic sensors is the following:

1. The sensors are connected to the tracker according to the connection diagram contained in the “Connection of IRMA MATRIX traffic sensors” section.
2. Vehicle units allowing to control opening/closing doors during stops (for example vehicle door limit switches) are connected to the tracker discrete inputs.
3. Upon opening doors the tracker receives the appropriate signal from the door limit switches and transmits it to the connected sensors. The sensors start to calculate passengers. After closing doors the sensors are deactivated till the nest stop.

Configuration

To operate with traffic sensors configure the following settings:

1. Configure tracker inputs which should be used for connection to limit switches of vehicle doors: set "**Discrete"** type for desired inputs in the "Input terminals" section. In addition configure the triggering signal (positive or negative) in the "Input terminals" section, “**Input signal polarity”** option).
2. To transmit data into the GEO.RITM software activate transmission of data on states of required discrete inputs in the section "History Structure".

3. In the “Purpose” field of the “CAN” section select **“Automatic Passenger Counting sensor IRMA MATRIX"**.
4. Set the required number of vehicle doors (**“The number of doors”** option).
5. Set the **Tracker input→Vehicle door** ration according to your sensor connection diagram.
6. Define **Delay closing** time. This option is intended to minimize false sensor operations (for example in case of the faulty vehicle door which does not close at the first attempt).

For proper operation of sensors:

- *The number of vehicle doors should correspond to the number of functional areas;*
- *Each functional area should have a unique number corresponding to the vehicle door number;*
- *Numbers of functional areas should be in consecutive order.*

When process of configuring and connecting sensors is complete you can create the **Passenger traffic report (MATRIX sensor)** in the GEO.RITM monitoring software.

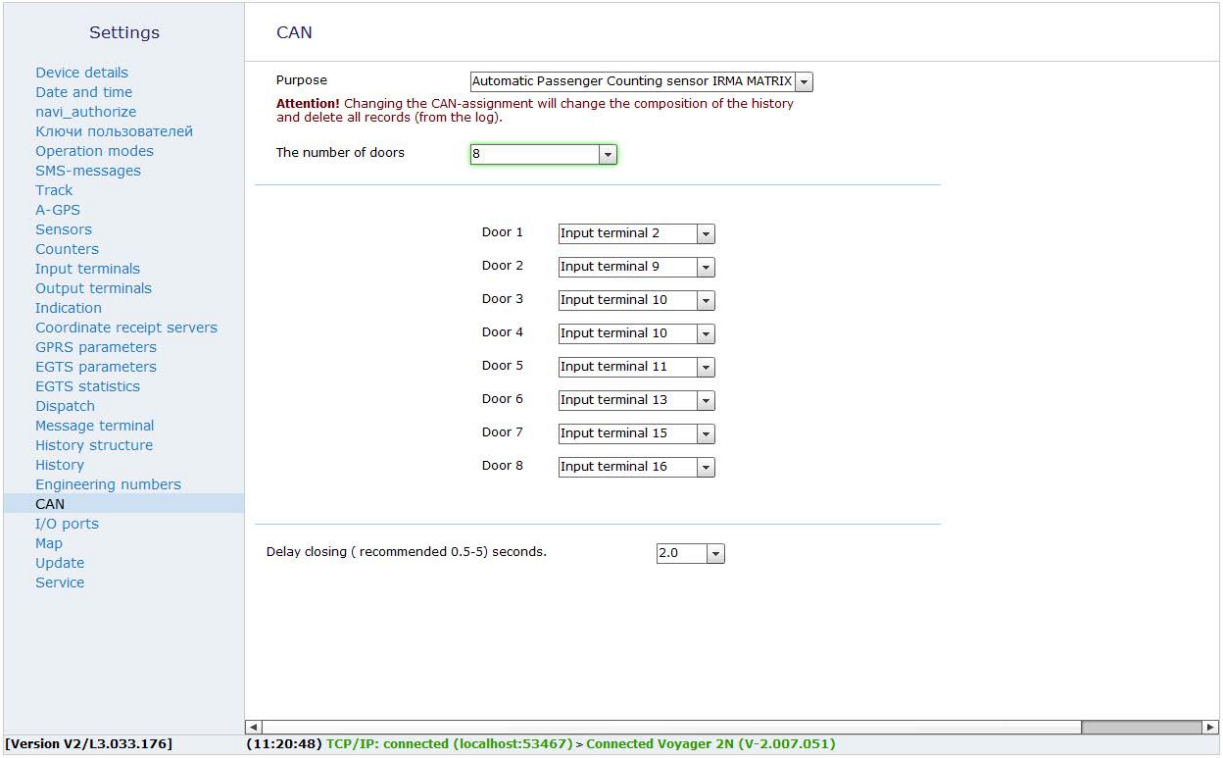


Figure 44. “CAN” section → Automatic Passenger Counting sensor IRMA MATRIX

I/O Ports

This section (Fig. 45) is used for assigning the RS232 and RS485 ports.

Port	Designation	Application
RS232	Not in use	This port is not used
	Ritm-bin protocol	Connection of Ritm-manufactured devices
	Strela D232 fuel sensor	Connection of fuel gauge unit Strela D232
	Input Expander (V-EB)	Connection of Ritm-manufactured "Input Expander (V-EB)". Expander allows you to increase quantity of discrete inputs of the tracker to 12.
RS485	Not in use	This port is not used
	Ritm-bin protocol	Connection of Ritm-manufactured devices
	Omnicomm fuel gauge unit or equivalent model	Connection of Omnicomm fuel gauge units or equivalent models
	BUS J1708	Connection of vehicles supporting the J1708 standard

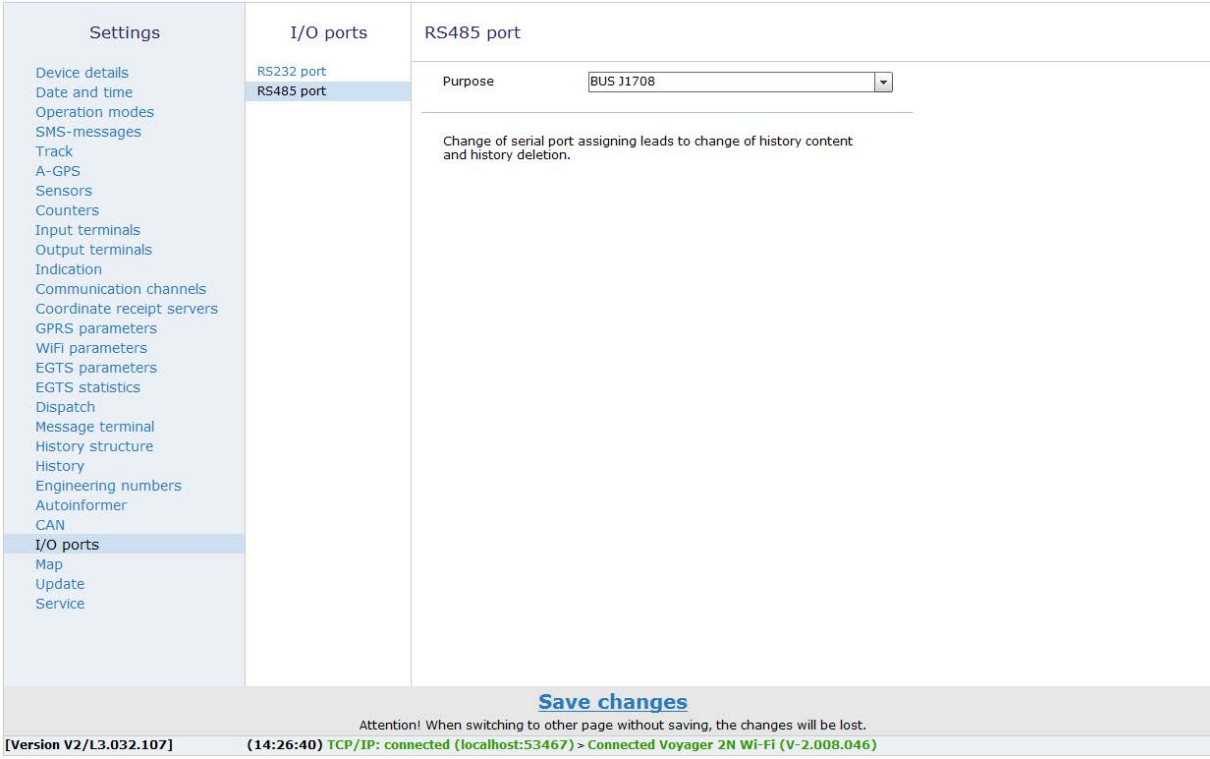


Figure 45. “I/O Ports” section

Map

This section (Fig. 46) is used for showing the current tracker location on the map according to LBS data.

Location detection by LBS may be used when the tracker is out of coverage of GPS/GLONASS satellites. For instance, in a building or covered parking.

The map shows a pin with the approximate location of the tracker and a circle showing the inaccuracy margin for the location detected using base station data.

To reduce the zone of possible location, data from all detected base stations may be shown on the map. To do so, select **“Show all base stations”**. The tracker location will be at the intersection of all circles.

To automatically update the map with a certain periodicity, select the **“Send a request at any... 120 seconds”** field.

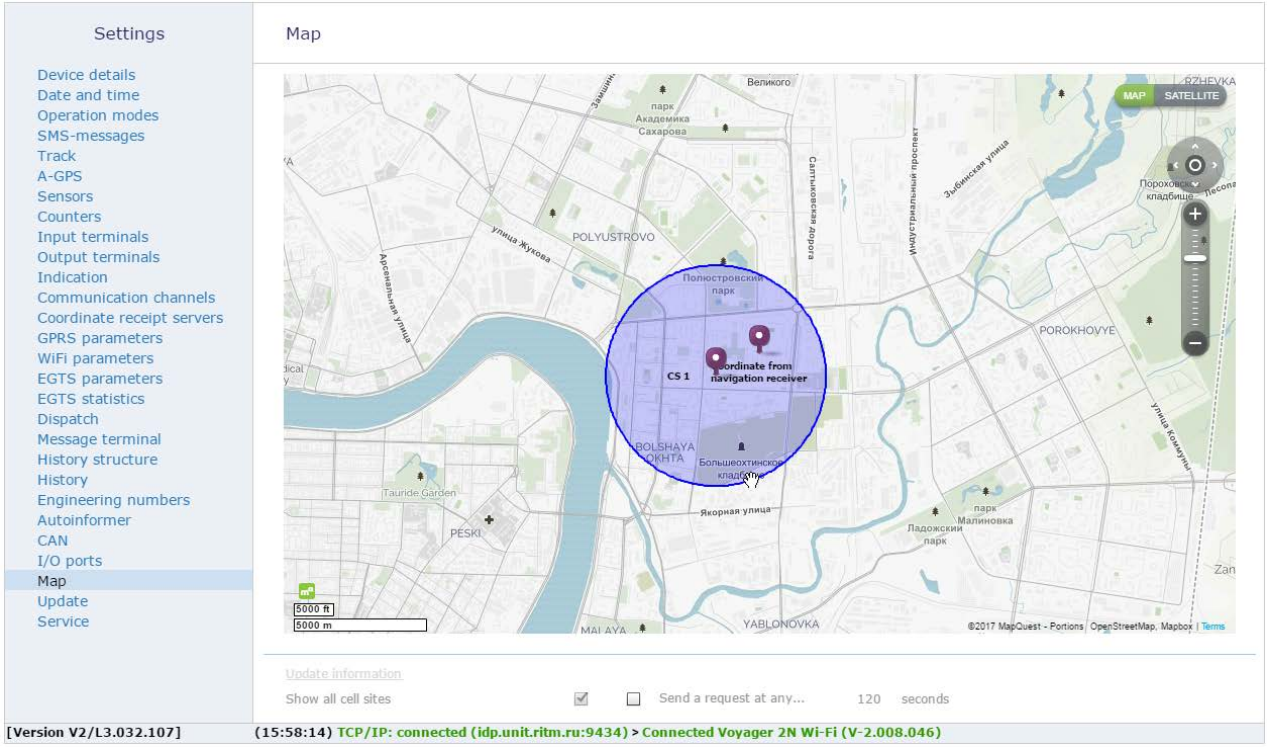


Figure 46. “Map” section

Available Update

This section enables installation of available updates of the tracker software (Fig. 47).

Install new versions of the software consistently. Before installing the latest update version download and install all previous versions.

To update the tracker software, follow the steps below:

1. Select a version of the firmware to update in ”Version”.
2. Click the “Start updating” hyperlink to begin downloading the software to the tracker.

The tracker will restart after firmware installation is completed. After restarting make sure the “Tracker Details” section contains the current version of the software.

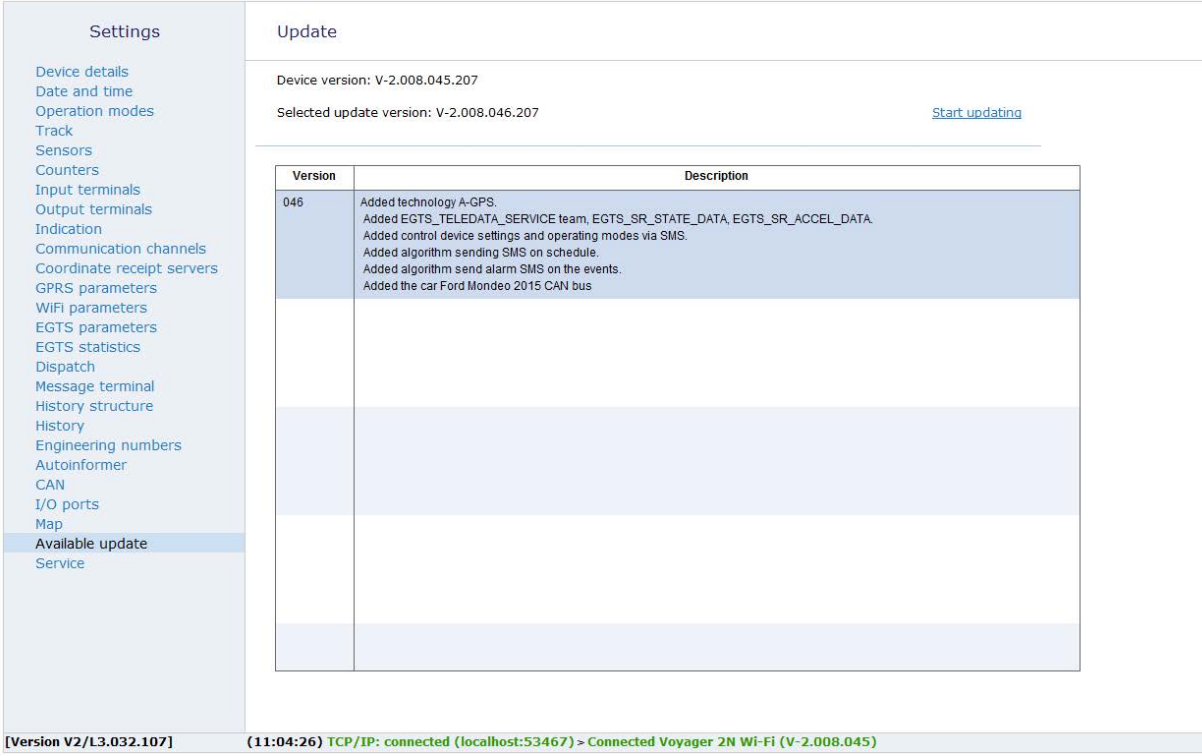


Figure 47. "Available Update" section

Service

The “Service” section is used for storing the applied configuration to a file and loading it from a file, setting the master code and the IMEI number submittal form (Fig. 48).

When similar setup has to be applied to a large number of devices, the best practice would be to properly setup one device, store its configuration in a file, and then upload it to other devices from this file.

“Load settings from the file”

This is used to upload the tracker with the configuration from a previously created file. Enter the file path in the new window.

“Save settings into the file”

This is used for downloading the device configuration to a file.

“Receive data from navigation receiver”

When this button is pressed, the response field will show the response directly from the GPS/GLONASS receiver.

Master-code

If you need to limit access for connection of the universal configuration software, use a four-character master code. In this case, this code will be required for connecting to the tracker.

“Recognize phone numbers of the device's SIM-cards and send modem IMEI to the number in SMS”

After you specify your number in the international format and click the “Apply” hyperlink, a text message containing the IMEI tracker will be sent to this number. The sending will be done from the number of the SIM card installed in the device.

To use this feature, the SIM card installed should have the text messaging option enabled.

“Forced reset of device”

If the tracker has stopped working as expected, reset it.

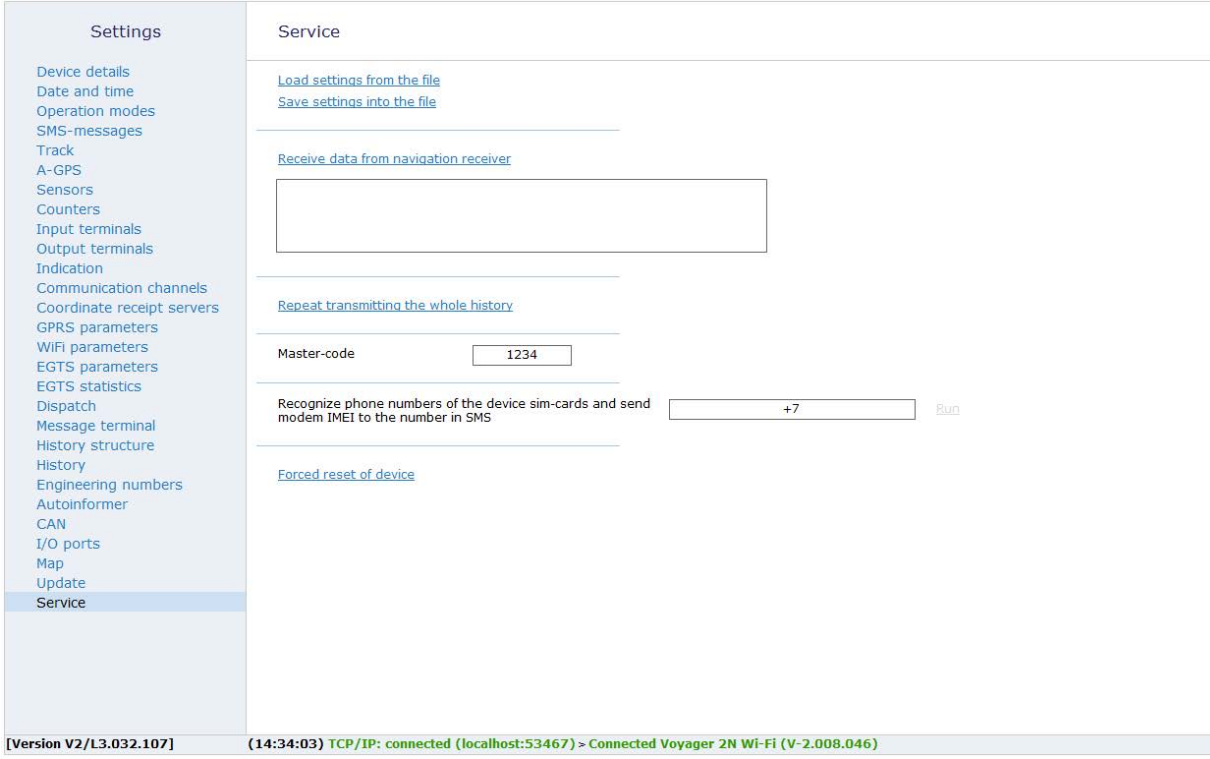


Figure 48. "Service" section

Adding to GEO.RITM

Follow eu.ritm.ru or another URL provided by your monitoring service provider.

To add a device to an account, you will need to enter its IMEI provided in the device data sheet and the "Device Details" section.

By default, the tracker uses the eu.ritm.ru server.

If you do not yet have a user account, perform the registration procedure by following the "**Registration**" hyperlink.

Follow the wizard hints during the registration procedure. In case of questions, please refer to "GEO.RITM. User Manual" document.

Enter your account.

In the main menu select the "Mobile Objects" section.

Click "**Add an object**" (Fig. 49).

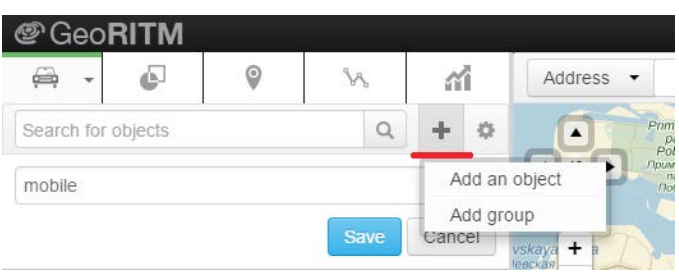


Figure 49. Button "Add an object" in "Mobile Objects" section

Follow the instructions given by the Configuration Wizard.

After add an object procedure is finished, the new object will appear in the “Mobile Objects” section of the main menu (Fig. 50).

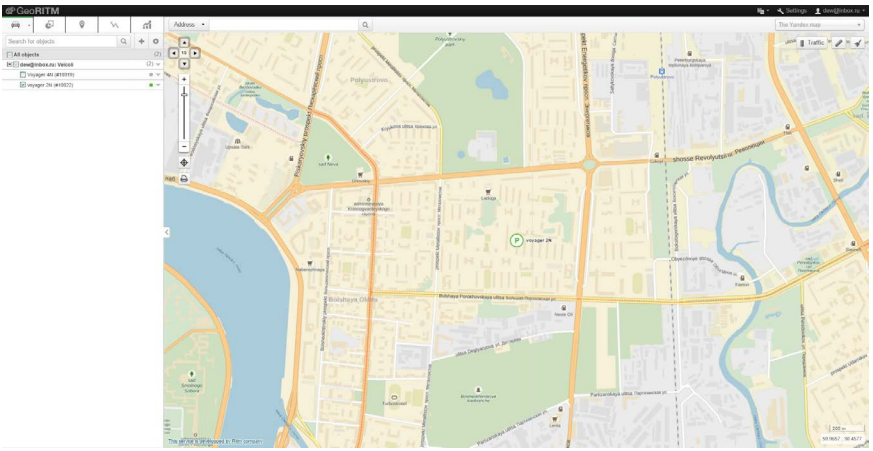


Figure 50. GEO.RITM Service

Tracker Installation on Vehicle

To avoid cross interference, do not install the tracker nearby radio sets, recorders, and speaker systems.

When installing on a vehicle, make sure the tracker is connected to 12/24 V on-board mains. Use wire with the cross section of at least 0.75 mm^2. The power supply circuit should be protected with a 5 A fuse.

Connect the GSM and GPS/GLONASS antennas.

For installation of GSM and GPS/GLONASS antennas, we recommend choosing the installation location that is not screened with metal on all sides.

For a more effective operation of the built-in motion sensor, we recommend installing the device horizontally with rigid fastening of the tracker.

Connect pins of the connection cable to vehicle systems (see pin connection table). Connection points of the device main power supply to the vehicle's on-board system should be selected so as to provide device power supply when the ignition is switched off and the ground connection is de-energized (if necessary, directly from the vehicle's battery).

Insulate unused pins.

Connect the connection cable with a 20-pin connector to the device, and install the device into the holder (for the ATOL Version — into a special recess in the tachograph enclosure).

Installation of the tracker should be done in the vehicle passenger compartment or other parts of the vehicle protected from dust and moisture. If necessary, position the tracker inside the bumper, engine compartment or other place that is not protected from dust and moisture, and put the tracker into a sealed enclosure with a cable terminal. A plastic electrical mounting box with the IP67 protection degree can be used as an enclosure.

From the perspective of coordinate reception, the most favorable conditions for installation of the antenna of a navigation receiver in the vehicle are under the plastic covering in the passenger compartment or nearby the windshield. When choosing the installation location, please note that windows covered with film and electrically heated windows decrease the signal reception strength thus adversely affecting object location detection.

The recommended tracker installation locations in light motor vehicles and trucks are shown in Figures 51 and 52, respectively.

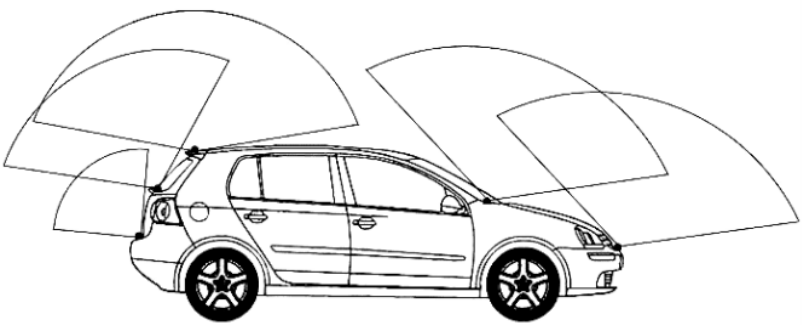


Figure 51. Recommended installation locations in a light motor vehicle

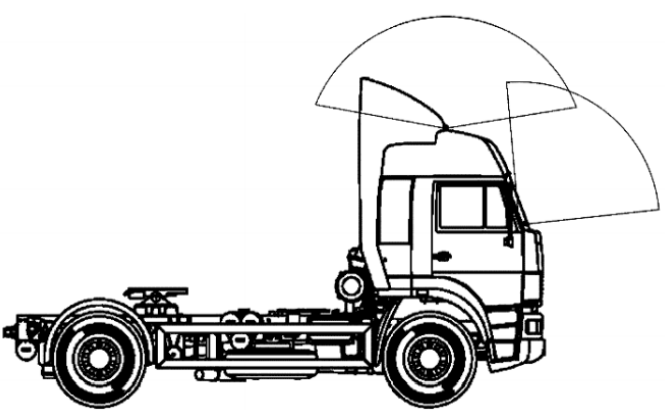


Figure 52. Recommended installation locations in a truck

Connections

Marking and Connection of Connectors

Marking of connectors (Fig. 53) for connection of antennas and external devices is shown on the back side of the battery compartment cover.

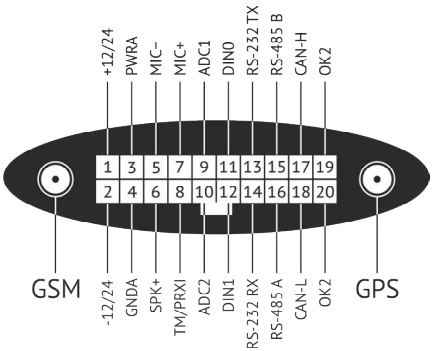


Figure 53. 20-pin tracker connector

We recommend doing all connections with the tracker battery removed. External power should be supplied only after connection of antennas and the 20-pin connector!

20-Pin Connector Pinout

Pin No.	Designation	Application
1	Power positive terminal	On-board mains connection
2	Power negative terminal	
3	Intercom power supply positive terminal	Connection of an intercom for two-way control communications
4	Intercom common terminal (GNDA)	
5	Intercom microphone negative terminal	
6	Intercom speaker	
7	Intercom microphone positive terminal	
8	1-Wire	Connection of Touch Memory key reader, proximity card reader for driver identification, temperature gauge
9	Input 3 (discrete/ analog/frequency)	Universal input. Input type (discrete, analog, or frequency) is set up in the configuration software. The discrete input features a configurable polarity. The analog and frequency inputs can be connected to fuel consumption and level meters.
10	Input 4 (discrete/ analog/frequency)	
11	Input 1 (discrete)	The discrete input features a configurable polarity
12	Input 2 (discrete)	
13	RS232 Tx	Connection of devices with RS232 interface
14	RS232 Rx	
15	RS485 B	Connection of devices with RS485 interface
16	RS485 A	
17	CAN-H	Connection to the vehicle board computer via CAN bus and the passenger traffic sensors MATRIX IRMA
18	CAN-L	
19	Output 2	Connection to actuation devices
20	Output 1	

Power supply connection

Connect power with the power source disconnected and the battery removed!

Connection of power (Fig. 54) should be done via pins 1 (power positive terminal) and 2 (power negative terminal) of the 20-pin connector. The connection should be done using a cable with the minimum cross-section of 0.75 mm^2. The power supply circuit should be protected with a 5 A fuse.

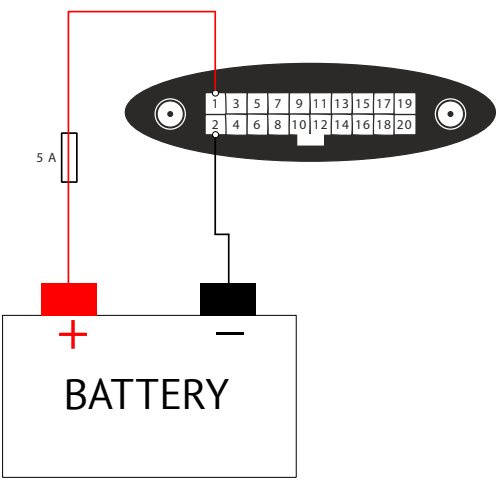


Figure 54. Power connection diagram

Discrete Input Connection

A signal from the security system, panic button, monitored mechanism sensor, or other monitored device can be connected to discrete or universal inputs (pins 9, 10, 11, 12). The input triggers immediately after the power negative terminal is shorted to power (grounded) and recovers upon opening.

For connection of a panic button (Fig. 55), use a button with NO pins.

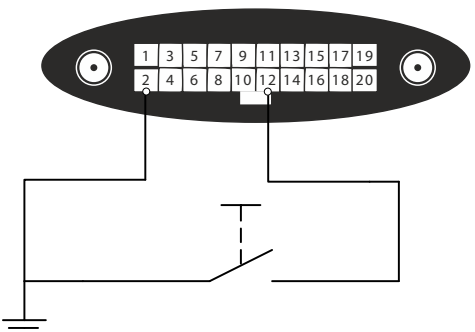


Figure 55. Panic button connection diagram

Adjust parameters for discrete inputs in the “Input terminals” section. Specify the following parameters:

- Input designation (mechanism, ignition, or panic button).
- Input signal polarity.
- Signal duration for triggering.

Use the tracker configuration software to verify that necessary discrete inputs are selected in the “History Structure” section.

Digital Fuel Gauge Unit Connection

Omnicomm LLS-AF20160

The tracker may work with four digital fuel gauge units Omnicomm LLS-AF20160 (Fig. 56). The LLS-AF20160 fuel gauge unit is designed for measuring the fuel level and temperature in vehicle fuel tanks.

Figure 56. LLS-AF20160 fuel gauge

Connection of gauges is done via the RS-485 interface.

Connect (Fig. 57) the white-orange wire from Pin 5 of the gauge connector to Pin 16 (RS-485 A) of the 20-pin tracker connector, and the white-blue connector from Pin 6 of the tracker connector to Pin 15 (RS-485 B) of the tracker. Connect power to Pins 1 of the gauge (+12/24, brown wire) and Pin 2 (GND, white wire).

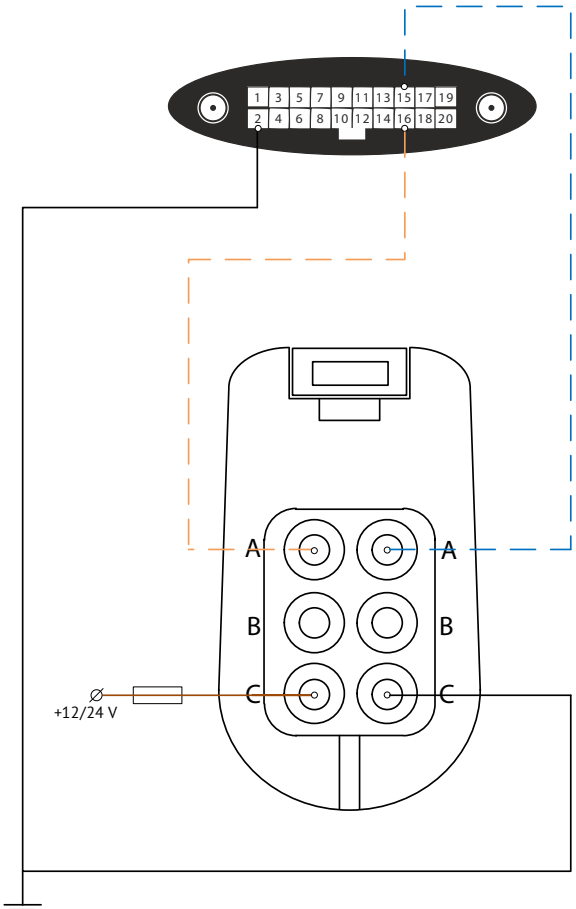


Figure 57. Fuel gauge connection diagram

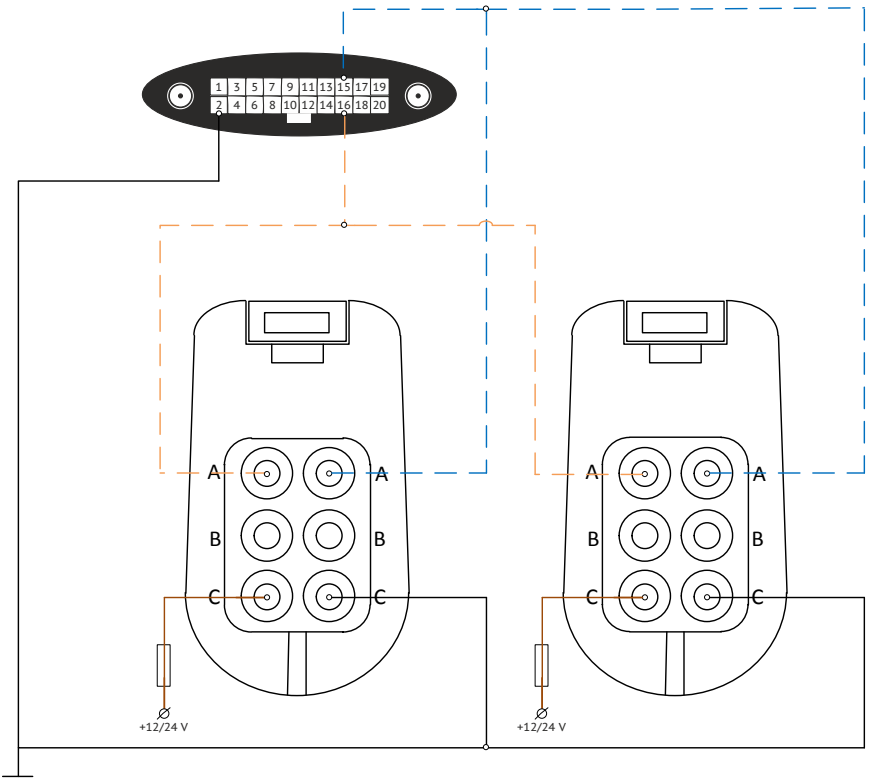


Figure 58. 2 fuel gauge connection diagram

In the “I/O Ports” section, choose the designation “Omnicomm fuel gauge unit or equivalent model” for the port RS-485.

Set a unique number to each of connected gauges in the gauge configuration software.

Use the tracker configuration software to verify that data transfer from the connected gauge is added to the "History Structure" section.

Enter your account in the GEO.RITM service. Open the "Connections" tab in the object card and specify gauges connected to the tracker (Gauge 1 and/or Gauge 2).

Open the "Fuel" tab and configure the corresponding gauge by filling out the fields "Summer/winter fuel consumption norm", "Tank volume", "Minimum refuelling", "Minimum drain". For more details, please refer to Section 5.4.3 of the GEO.RITM User Manual[20].

For proper gauge readings, the fuel tank should be calibrated. Calibration means matching the gauge signal level to the fuel volume in a specific fuel tank. The calibration process involves tank refuelling from the empty to full condition with a certain refuelling step and further registration of device readings into the calibration table (the "Calibration table" hyperlink in the "Fuel" tab).

You can find gauge readings necessary for filling out the calibration table in the "History" section.

Choose the refuelling step manually based on the volume and shape of the fuel tank. Take into account that the more complex the tank shape is, the less calibration step you should use. So, for a rectangular tank, the number of calibration steps should be at least 6–8, for a complex-shaped tank this number equals 20.

Follow the steps below to perform calibration:

1. Choose calibration step based on the volume and configuration of the fuel tank.
2. Drain the fuel tank empty.
3. Use a measuring container or liquid flowmeter, fill out the tank with fuel using the step selected.

20) http://www.ritm.ru/documentation/manuals/GEO.RITM/GEO.RITM_User_manual.pdf

4. Register gauge readings in the “History” section of the tracker configuration software.

Register gauge readings only after the fuel level stabilizes!

5. Repeat Steps 3 and 4 the chosen number of calibration steps.
6. Fill out the calibration table with the values gathered (please see a filled example of the table in Figure 59).
7. After the table has been filled out, click “Save”.

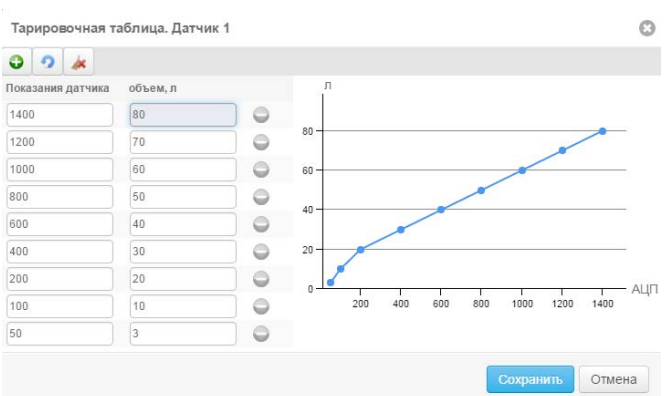


Figure 59. Calibration table

EPSILON ES4

The tracker may work with four digital fuel gauge units EPSILON ES4 (Fig. 60). The EPSILON ES4 fuel gauge unit is designed for measuring the fuel level in vehicle fuel tanks.

Figure 60. EPSILON ES4 fuel gauge

Connection of gauges is done via the RS-485 interface.

Connect (Fig. 61) the yellow wire (RS-485 A) of the gauge connector to Pin 16 (RS-485 A) of the 20-pin tracker connector, and the green connector (RS-485 B) of the tracker connector to Pin 15 (RS-485 B) of the tracker. Connect power to Pins U+ of the gauge (+12/24, red wire) and Pin U- (GND, black wire).

To connect the ES4 sensor, use a terminating resistor of 240 Ohm. Connect the resistor in parallel to the sensor (See Figure 61).

The using EPSILON ES4 sensor similar to the sensor Omnicomm LLS-AF20160. In the “I/O Ports” for RS485 port select the appointment of “fuel gauge Omnicomm or equivalent” and tare the fuel tank similar to the calibration section.

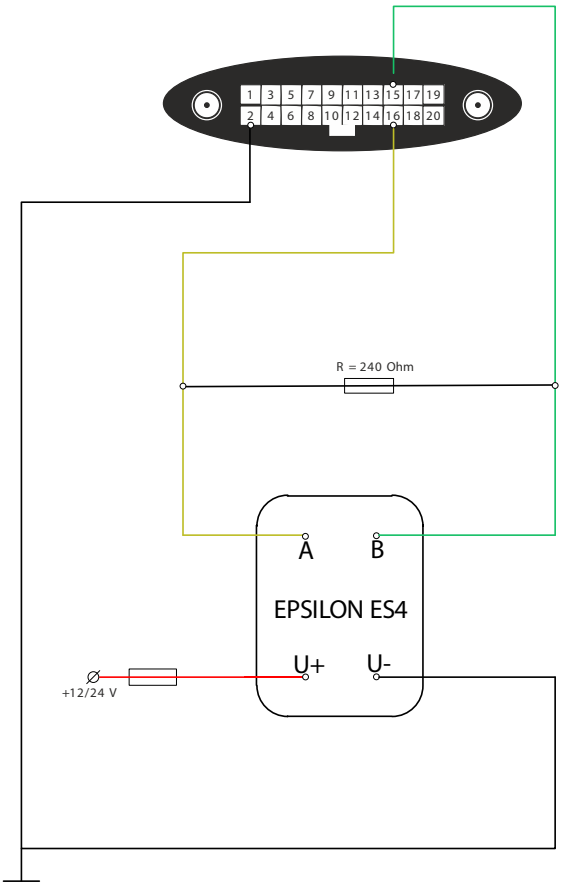


Figure 61. Fuel gauge connection diagram

Frequency Analog Fuel Gauge Unit Connection

The tracker may work with frequency analog fuel gauge units Omnicomm LLS-AF20310. The LLS-AF20310 fuel gauge unit is designed for measuring the fuel level in vehicle fuel tanks and its transformation into an analog or frequency signal.

Connect (Fig. 62) the green wire from Pin B1 of the gauge connector to the universal input (Pin 9/10) of the 20-pin connector of the tracker, connect the white-green wire from Pin B2 of the gauge connector to and the white wire from Pin 2C of the gauge connector to Pin 2 of the tracker.

In the “Input terminals” section of the configuration software use Inputs 3 and 4 to configure frequency analog gauge parameters. Specify the following parameters:

- Input type: Analog/Frequency;
- Input designation: Fuel level sensor;
- Fuel level measurement: Constant or With ignition on.

Use the tracker configuration software to verify that data transfer from the connected gauge is added to the “History Structure” section.

Configuration for the frequency analog gauge is performed similar to that of the digital one. Configure the connected gauge and calibrate the fuel tank according to instructions given in the “Digital Fuel Gauge Unit Connection” section of this manual.

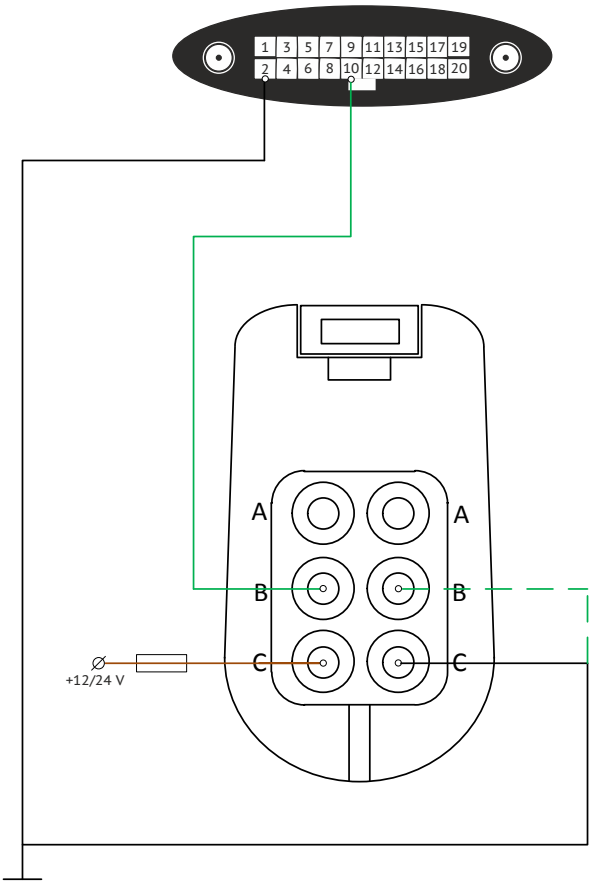


Figure 62. Frequency analog gauge connection diagram

Connection to vehicle CAN bus

Connect the tracker to the CAN bus of the vehicle to enable reception of on-board computer readings.

To establish a connection, connect the CAN-L pin of the tracker with the corresponding CAN-L pin of the ODB2 connector, connect the CAN-H pin of the tracker with the corresponding CAN-H pin of the ODB2 connector of your vehicle (Fig. 63).

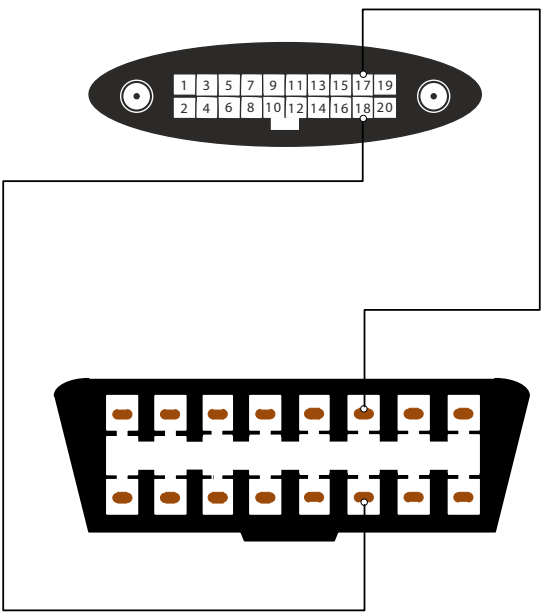


Figure 63. Connection to vehicle CAN bus

If your vehicle does not have an ODB2 connector, contact your vehicle dealer/manufacturer for details on connection to the CAN bus.

Use the tracker configuration software to verify that data transfer over the CAN bus (CAN parameters) is added to the "History Structure" section.

Connection of IRMA MATRIX traffic sensors

The tracker works with IRMA MATRIX passenger counting sensors. Received from the sensors information is stored in the tracker history and is transmitted to the monitoring software GEO.RITM. In the interface of the GEO.RITM you can build the appropriate report of the passenger traffic.

The figure 64 shows a possible connection diagram. The diagram can be changed depending on particular needs. For example another number of sensors can be connected (but not over 8) and the connection order of door limit switches can be changed.

For more details on using traffic sensors contact the sensor manufacturer.

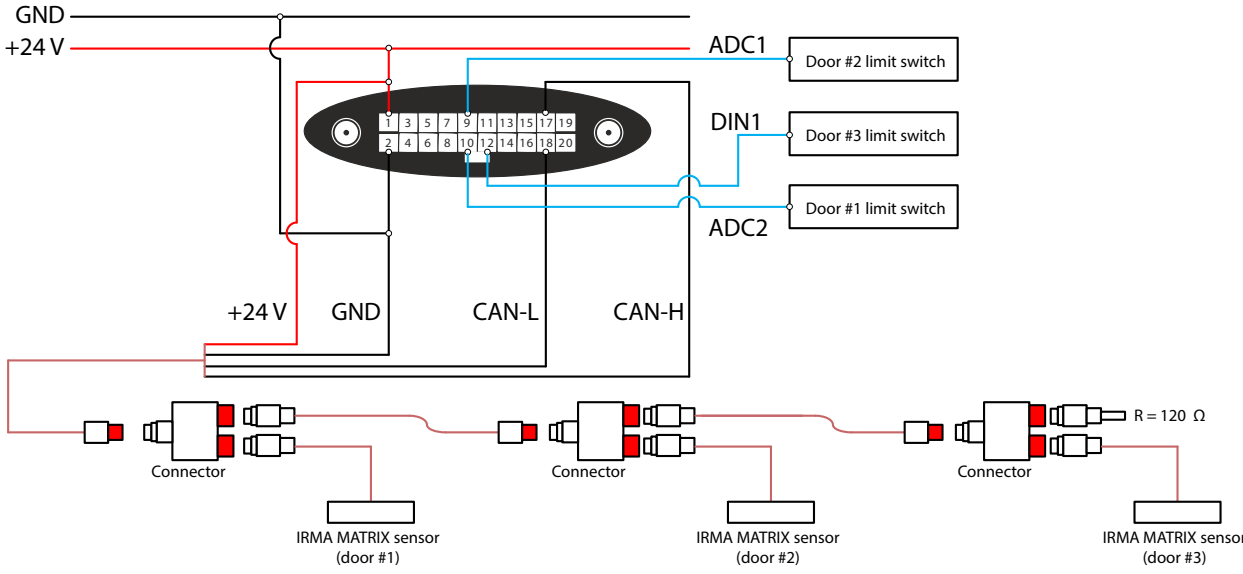


Figure 64. IRMA MATRIX sensors connection diagram

Connection of dispatch unit

To enable two-way voice communication with the dispatcher, the tracker may be used together with the dispatch unit (Fig. 65).

Figure 65. Dispatch unit with PTT button

To connect a dispatch unit to the tracker, use the special connector (supplied with the package). Connection of the tracker (Fig. 66) should be done using the guidlines located in connectors.

In the “Dispatch” section of the configuration software select the “Turn on dispatch” field.

You can also select the maximum duration of a voice call (by default the duration is unlimited).

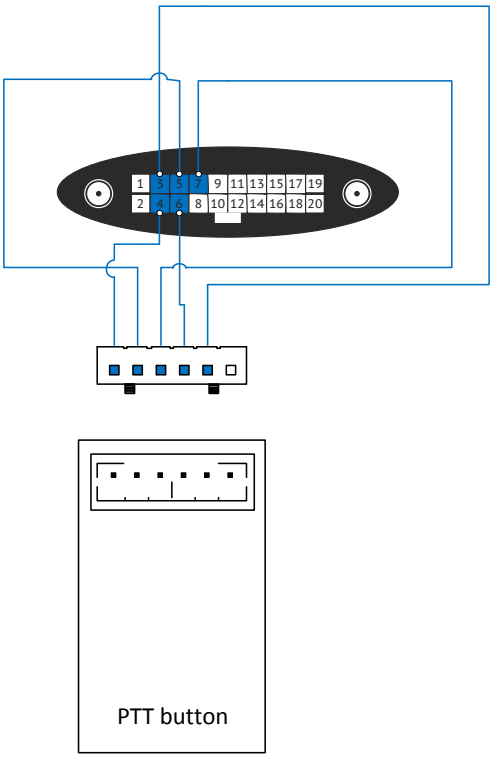


Figure 66. Dispatch unit connection diagram

Temperature Sensor Connection

Connection of a temperature sensor is done via the 1-Wire interface.

Connect the power positive terminal of the temperature sensor to Pin 8 of the tracker. Connect the power negative terminal of the temperature sensor to Pin 2 of the tracker (Fig. 67).

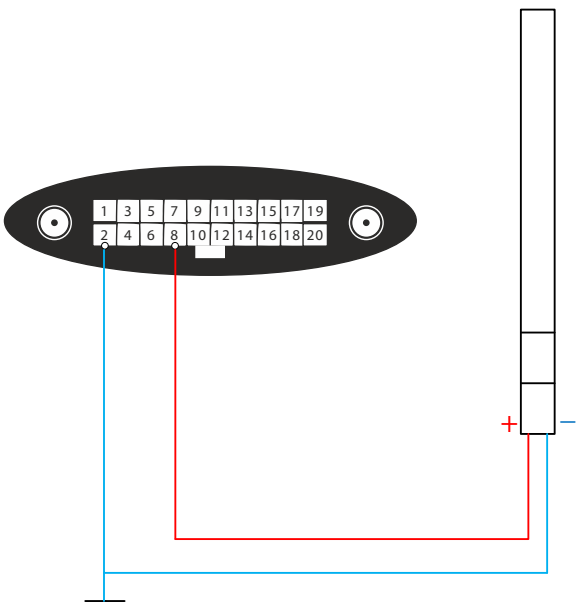


Figure 67. Temperature sensor connection diagram

Temperature sensor readings are shown in the “Sensors” section → “Temperature sensor”.

Use the tracker configuration software to verify that the 1-Wire temperature sensor is added to the “History Structure” section.

Touch Memory Reader Connection

Connection of a TM reader is done via the 1-Wire interface.

Connect the power positive terminal of the reader to Pin 8 of the tracker. Connect the common power negative terminal of the reader to Pin 2 of the tracker (Fig. 68).

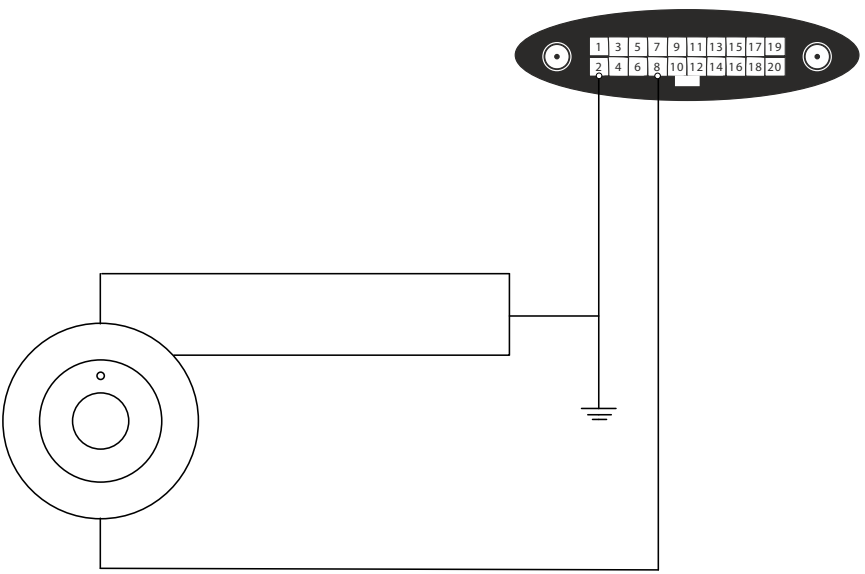


Figure 68. TM reader connection diagram

Use the tracker configuration software to verify that the "TM Key" and "Reader" parameters are added to the "History Structure" section.

Tracker Test Procedure

Never install a battery or connect external power before all connections are completed!

Pressing and holding the tamper button for longer than 1 second switches the tracker to the test mode and restarts the navigation receiver in the “cold” start mode. Repeated pressing and holding of the tamper button for longer than 1 second switches the tracker from the test mode to the current selected operation mode. Testing will automatically switch off 30 minutes after it has been started. Pressing the tamper button leads to a record event creation in the tracker’s history of operation.

While in the test mode, the tracker works in the “Online” mode, the navigation receiver and GSM modem are on, and the tracker connects to the monitoring system server for data transfer. You can monitor the coordinate detection procedure by indicators on the tracker enclosure:

- Frequent short blinks, 5 times per second: Coordinates have not been determined;
- Blinks, once per second: Coordinates have been determined.

If the tracker has already been configured for operation with the monitoring system server, it can be checked using the WEB interface or the monitoring software.

Choose the desired object in the monitoring system interface and ensure it has connected to the monitoring system server. The object communication indicator shows the connection has been established and the connection time matches the current time.

Bring the tracker or a vehicle with the tracker installed outdoors. The location of the object on the monitoring system map should be determined by no longer than 5 minutes after being brought outdoors.

If the object has connected to the monitoring system and detected its location, the test is completed.

If the object has not connected in the period exceeding 10 minutes:

- Check the tracker power supply. In order to go online, 12/24 V external power supply has to be connected;
- Make sure the tracker is in the test mode, the battery compartment cover is removed, and the tamper button is released, or a constant server connection mode is selected;
- Make sure the tracker is within its mobile network coverage;
- Check the normal operation and balance of the SIM cards;
- Make sure the GPRS channel data transfer service is enabled;
- Verify GPRS access point settings. Clarify connection parameters with your mobile network operator;
- Check connection parameters to the monitoring system server entered in the tracker;
- Make sure the object account in the monitoring system is properly configured.

If the tracker has established a server connection, but the coordinate detection procedure takes longer than 10 minutes:

- Make sure the tracker is in the test mode by pressing the “Tamper” button or check the set operation mode and coordinate detection conditions;
- Change the position of tracker antennas.

Maintenance

At least twice per year visually inspect the tracker for enclosure or connector damage.

At least once per month check the SIM card accounts for funds.

Safety Precautions

Properly operate the tracker and follow the safety precautions below:

- Make sure the tracker is always dry, whether it is stored or in use. Ingress of liquid, rain, or other moisture, and operation under elevated humidity conditions may harm the electrical structure of the device;
- Use and store your tracker in dust-free locations. Avoid placing the tracker in extremely hot/cold conditions (i.e., under the vehicle windshield, direct sunlight);
- Do not expose the tracker to strong vibration or quick shock loads;
- If dirty, wipe the tracker with a clean dry cloth. Do not use chemicals or detergents;
- Do not paint the tracker as foreign paint and material particles may get inside and bring it out of service, or adversely affect the directional pattern;
- Do not disassemble or repair the tracker manually;
- To power up and recharge the device only use chargers recommended by the manufacturer. Use of other chargers may lead to tracker damage and void the warranty.

Transportation and Storage

The tracker should be transported in packaging in closed vehicles. Storage and transportation conditions should conform to those listed in class IE12 of EN 60721-3-1. Storage premises should be free of current-conducting dust, acid and alkaline fumes, corrosive gases and gases harmful to insulation.

Manufacturer's Warranties

The manufacturer guarantees that the tracker complies to requirements of the technical specifications, provided the client ensures compliances to conditions of transportation, storage, installation and operation.

Warranty repairs of the tracker are done throughout the life cycle. The manufacturer's warranty does not cover the battery.

The tracker life cycle is 6 years (provided the operating conditions are observed).

The manufacturer shall not be responsible for quality of data links provided by GSM operators and Internet service providers.

The manufacturer reserves the right for modification of the tracker in any way that does not degrade its functional characteristics without prior notice.

Disposal Note

Batteries in the tracker package marked with the symbol (Fig. 69) should be disposed of separately from household waste.

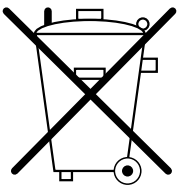


Figure 69. Symbol of separate disposal from household waste

Used batteries may not be:

- Disposed of together with household waste;
- Stored together with batteries of other types;
- Dismantled and exposed to physical impact;
- Burnt.

Bring used batteries to toxic waste drop-off station.

SMS commands

Tracker is able to be configured by SMS. To set up the device, send SMS to the number of SIM card, which is in the device with text of command. At the same time:

1. When assigned a **Master-code** (see section "Service") the following scenarios are possible:
   - Send the command MASTER with the correct master code. After that, access will be granted for 5 minutes to configure the tracker via SMS commands. Send the necessary commands during this time. After this time to configure the tracker via SMS will require re-sending a command MASTER;
   - Send all the necessary commands together with the command MASTER specified separated by commas (e.g. **{"MASTER":"1234","FOLLOW":"ON"}**). It is recommended to use this method as less dependent on the quality of communication.
2. If the tracker has not been assigned a **Master-code** will be accepted and implemented any received commands.

Please note that to be able to configure the tracker by SMS commands, the phone number, which is used to send messages, must be submitted to the engineering numbers list, or should be allowed to configure the device from any number (see section "Engineering Numbers").

JSON commands

Command	Description	Valid values	Examples
MASTER	Set “Master-code” for access to the tracker settings	Four digits from 0 up to 9	{"Master":"1234"} or {"MASTER": "1234"}
REBOOT	Restart device	-	{"REBOOT":""}
FOLLOW	Enable/Disable “Follow” mode	ON - enable; OFF - disable	{"FOLLOW":"ON"} {"FOLLOW":"OF"}
RITM	Activation of the connection to RITM server	ON - enable	{"RITM":"ON"}
EGTS	Activation of the connection to EGTS server (EGTS is open protocol for geolocation, description is in open access, can be used for integration)	ON - enable	{"EGTS":"ON"}

SERVER**x**	Set up the server address	**1**- Main RITM server; **2** - Reserve RITM server; **3** - Main EGTS server; **4** - Reserve EGTS server. Available to set up 2 servers the same time	{"SERVER**1**":"dev1.eu.ritm.ru:9426","SERVER**2**":"dev2.eu.ritm.ru:9426"}
OBJECT	Object number for connection to the server	Number 1 - 65535	{"OBJECT":12345}
PASSWORD	Password for connection to the server	8 symbols, including digits and latin letters	{"PASSWORD":"password"}
GUARD	Enable/disable mode “send alarm events”	ON - enable; OFF - disable	{"GUARD":"ON"}

Text protocol commands

Commands to request current tracker settings

Command	Description	Syntax	Example
+CONNECT_SERVER	Request of the current settings of the coordinate reciept servers	+CONNECT_SERVER=<**N**>,? where <**N**>: **1**- Main RITM server; **2** - Reserve RITM server; **3** - Main EGTS server; **4** - Reserve EGTS server. The response to the command is a SMS message in the following format: <**Object number**>,<"**Password**">, <"**IP address or domain name**">,<**Port**>	+CONNECT_SERVER=1,?
+VR_PACK_SIZE	Request of the current time interval of navigation data transmission to the server	+VR_PACK_SIZE=1,? The response to the command is an SMS message that contains the number from **1** to **30** indicating the number of undelivered records that are required to send data to the server.	+VR_PACK_SIZE=1,?

+PROTOCOL_TYPE	Request of the used data transferring protocol type	+PROTOCOL_TYPE=1,? The response to the command is an SMS message containing the number from **0** to **3**, where: **0**-data transferring only in RITM protocol; **1**- data transferring in RITM and EGTS protocols; **2**- data transferring only in EGTS protocol; **3**- data transferring is off.	+PROTOCOL_TYPE=1,?
+GPRS_SIM	Request of the current settings of GPRS connection	+GPRS_SIM=**SIM card #**,? where **SIM card #** - the number of installed SIM card (1 or 2) The response to the command is a SMS message in the following format: <"**GPRS phone number**">,<"**APN**">, <"**User**">,<"**Password**"> where: <"**GPRS phone number**"> - the dial-in number for establishing a GPRS session; <"**APN**"> - access number; <"**User**"> - GPRS username; <"**Password**"> - GPRS user password.	+GPRS_SIM=1,?

+VR_FILTER_TRACK	Request of the current conditions for saving the route points in the memory of the tracker	+VR_FILTER_TRACK=1,? The response to the command is a SMS message in the following format: **<Criterion>**,**<Time>**, **<Moving>**,**<Speed>** where: **<Criterion>** - record coordinates: **0** - always; **1** - only at motion; **2** - only at started engine; **3**- at motion or at started engine; **4** - at motion and at started engine; **<Time>**: <2..10> minutes, 255 - no recording over time. **<Moving>**: <50..100> meters. **<Speed>**: <100..300> km/h.	+VR_FILTER_TRACK=1,?
+GPRS_APN_AUTO	Request of the information about APN automatical configuration	+GPRS_APN_AUTO=1,? The response to the command is an SMS message containing the number from **0** to **1**, where: **0** - automatical configuration of APN is not used; **1** - automatical configuration of APN is used.	+GPRS_APN_AUTO=1,?

+VER_INFO	Request of the basic information about the tracker	+VER_INFO=1,? The response to the command is a SMS message in the following format: <"**Device name**">,<"**Firmware version**">, <"**Version of memory chips**">	+VER_INFO=1,?
+GET_IMEI	Request of the IMEI	+GET_IMEI=1,? The response to the command is a SMS message containing the IMEI of integrated GSM-modem	+GET_IMEI=1,?
+GET_NMEA_RMC	Navigation data request	+GET_NMEA_RMC=1,? The response to the command is a SMS message containing the string in the NMEA protocol with RMC data, or the empty string if satellite signal receiver is disabled	+GET_NMEA_RMC=1,?

Commands to change the settings of the tracker

Command	Description	Syntax	Example
+CONNECT_SERVER	Specify the server address (equivalent to specifying the options in section "Coordinate Receipt Servers")	+CONNECT_SERVER=<**N**>,<**Object number**>,<"**Password**">, <"**IP address or domain name**">,<**Port**> where <**N**>: **1**- Main RITM server; **2** - Reserve RITM server; **3** - Main EGTS server; **4** - Reserve EGTS server.	+CONNECT_SERVER=1,1, "pass123","dev1. eu.ritm.ru",9426
+PROTOCOL_TYPE	Specify the data transferring protocol type	+PROTOCOL_TYPE=1,<**X**> where <**X**>: **0**-data transferring only in RITM protocol; **1**- data transferring in RITM and EGTS protocols; **2**- data transferring only in EGTS protocol; **3**- data transferring is off.	+PROTOCOL_TYPE=1,0
+VR_PACK_SIZE	Changing of the current time interval of navigation data transmission to the server (equivalent to specifying the options in section «Track»)	+VR_PACK_SIZE=1,<**The number of records**> where <**The number of records**> - number of undelivered records that are required to send data to the server. (1..30)	+VR_PACK_SIZE=1,30

+VR_FILTER_TRACK	Changing of the current conditions for saving the route points in the memory of the tracker (equivalent to specifying the options in section "Track")	+VR_FILTER_TRACK=1,<**Criterion**>, <**Time**>,<**Moving**>,<**Speed**> where: <**Criterion**> - record coordinates: **0** - always; **1** - only at motion; **2** - only at started engine; **3**- at motion or at started engine; **4** - at motion and at started engine; <**Time**>: <2..10> minutes, 255 - no recording over time. <**Moving**>: <50..100> meters. <**Speed**>: <100..300> km/h.	+VR_FILTER_TRACK=1,0, 2,100,250
+GPRS_SIM	Configuring of the GPRS connection (equivalent to specifying the options in section "GPRS parameters")	+GPRS_SIM=**SIM card #**, <"**GPRS phone number**">,<"**APN**">, <"**User**">,<"**Password**"> where **IM card #** - the number of installed SIM card (1 or 2); <"**GPRS phone number**"> - the dial-in number for establishing a GPRS session; <"**APN**"> - access number; <"**User**"> - GPRS username; <"**Password**"> - GPRS user password.	+GPRS_SIM=1,"*99#", "internet.mts.ru","mts","mts"

+GPRS_APN_AUTO	APN automatical configuration (equivalent to specifying the options in section "GPRS parameters")	+GPRS_APN_AUTO=1,<**The value**> where <**The value**>: **0** - automatical configuration of APN is not used; **1** - automatical configuration of APN is used.	+GPRS_APN_AUTO=1,1
+REBOOT	Remote tracker rebooting	+REBOOT=1,1	+REBOOT=1,1

Change history

Revision	Revision date	Description
1.0	22.09.2016	Full revision of document
1.1	04.04.2017	The following sections were added: "A-GPS", "SMS-messages", "Communication channels", "Wi-Fi parameters", "Autoinformer"
1.2	05.06.2017	Appendix 1 was fixed
1.3	26.12.2017	Appendix 1 was fixed. Information about IRMA MATRIX sensors was added