

Version 2.6

Subscriber Tracker

UMKa300



UMKa301

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REVISION HISTORY

| Version | Description | Date |
|---------|--|------------|
| 0.8 | First draft. | 23.01.17 |
| 0.9 | Updates in Sections 5 and 6, and Appendices A and B. | 15.02.17 |
| 1.0 | Updates in Sections 1 – 4 and Appendix A. Release. | 19.02.17 |
| 1.1 | Section 2.3, Appendices C and D added. Updates in Sections 3.1, 3.8, 4.3 and Appendix A. | 2.03.17 |
| 1.2 | Updates in Section 4.1 and Appendices A – D. Figure 3.13 and Figures in Section 4.1 changed. | 23.03.17 |
| 1.3 | Updates in Appendices A и C. Figure 3.14 added. | 4.04.17 |
| 1.4 | Section “Operating the configurator” updated for the new design. | 17.04.17 |
| 1.5 | Updates in Section 3.14 and Appendices A, C and D. | 05.05.17 |
| 1.6 | Updates in Appendices A и C. Figures 3.20, 4.11, 4.12 changed. | 08.06.17 |
| 1.7 | Updates in Appendices A, C and D. Figures 4.10 и 4.11 changed. | 01.08.17 |
| 1.8 | Section 4 remade. Instructions for configuring additional parameters transmission, roaming, static navigation, interfaces and CAN-LOG and others added. Configurator figures updated. Troubleshooting described. Appendix C changed. Updates in Appendices A, B and D. | 14.09.17 |
| 2.0 | UMKa01 description added; Versions description added; 0.9.9 configurator functionality added; Commands added; Wialon protocols added. | 19.12.17 |
| 2.1 | A bug with the location of the microphone and speaker connectors fixed. | 31.01.2018 |
| 2.2 | Version UMKa300.AR2 added; Command “SETRSSI” added. | 09.02.2018 |
| 2.3 | Information about SD card number of entries added. | 29.03.2018 |
| 2.4 | Section 2.20 “Voice communication” added; Section 2.21 “Power manager” added; Section 3.15 “System” augmented; New commands added; | 04.04.2018 |

| | | |
|-----|--|------------|
| | New default parameters added. | |
| 2.5 | Table 2.1 corrected. | 09.04.2018 |
| 2.6 | Section 2.22 "Data transmission to two servers" added; Section 2.23 "Remote configuration" added; Indication patterns for yellow LED in Section 3.1 changed; Icon description in Table 3.4 "Toolbar and status icons" added; New commands added; "Status" parameter in Wialon changed; New default parameters added; Warranty for backup battery. | 13.06.2018 |

INTRODUCTION

This Operating Manual (subsequently referred to as the manual, MM) covers installation and operating instructions for the Subscriber trackers UMKa300 and UMKa301 (subsequently referred to as the tracker, device, and product).

The manual is designed for technicians understanding vehicle repair and maintenance procedures, with expertise in electrical and electronic equipment for various vehicles.

In order to ensure proper operation, only skilled technicians should perform installation and setting of the tracker. For the tracker use to be successful, one should get integrally acquainted with the operating principle of navigation system and grasp the purpose of all its components. Therefore, before starting it is strongly recommended to learn the operating fundamentals of GPS/GLONASS navigation systems and GSM networks, and the peculiarities of data transmission via GPRS, as well.

This manual describes the operation of the product equipped with the versions of firmware and configurator listed in the Table 1.1.

Table 1.1 Software version

| Software | Version |
|------------------|---------|
| tracker firmware | 1.1.7 |
| Configurator | 1.1.0 |

The product meets these technical specifications: TY 26.30.11-001-29608716-2017.

The manufacturer reserves the right to modify design, technical characteristics and software without notice. Contact this address to get information on the latest changes:

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Manufacturer Website: <http://glonasssoft.ru>

Technical support: <http://help.glonasssoft.ru>

Phone number: 8(800)700 82 21

1. PURPOSE AND USE CONDITIONS

1.1. General information

The tracker is designed to be installed in vehicles as an auxiliary equipment for tracking vehicle location, speed and movement direction.

An extra range of parameters is logged as well, eg: analog input status, digital input status and sensor readings. The tracker also provides peripheral control through discrete output.

Event and status logs are stored in the non-volatile memory. Accumulated data is transmitted over GPRS by GSM mobile network operators to dedicated servers with static IP addresses or domain names. The data on servers is accessible via the Internet for further processing and analysis on a dispatcher console.

The tracker setting is performed either directly via the USB-interface or remotely – either via the remote control server or with GPRS/SMS commands.

Data transmission is only possible when GSM 850/900/1800/1900 mobile network supporting GPRS is available. To ensure data integrity in case of an external power loss or GSM signal loss the tracker is provided with the internal non-volatile memory storage.



Figure 1.1 Device overview

Vehicle traffic route is logged as discrete spots containing all the data from internal sensors and auxiliary equipment. A route spot is recorded even if one of listed events occurs: vehicle-course angle exceeds set value, straight-line driving distance exceeds set values, acceleration exceeds set values, time lapse in motion (stop) spotting, equipment status change, occurrence of the analog/digital input events.

Therefore, traffic route spots can be recorded within the intervals from one second to several minutes rendering high-quality tracing possible without redundant packets in GPRS traffic and non-volatile memory storage (vehicle "black box").

1.2. Technical characteristics

The main technical characteristics are listed in Table 1.2.

Table 1.2 Main technical features and technical details

| Characteristic | Value |
|--|-----------------------------|
| Navigation systems | GPS, GLONASS |
| Number of GNSS Receiver Channels | Tracking–33, acquisition–99 |
| GNSS Receiver sensitivity | -166 dBm (GLONASS + GPS) |
| Main data transmission channel | GSM 850/900/1800/1900 |
| Number of SIM card slots, form factor | 2, mini-SIM (2FF) |
| Antenna type | Internal |
| PC gateway | USB |
| Number of spots in the tracker memory | Up to 80000 ¹ |
| Number of spots in Micro SD card | Up to 82000000 ¹ |
| Number of digital inputs | 2 |
| Number of analog inputs | 2 |
| Analog input voltage range ² , V | 0...40 |
| Number of discrete outputs | 1 |
| Built-in accelerometer | Yes |
| Bus wire RS-485 | Yes |
| 1-Wire interface | Yes |
| Supply voltage, V | 8...40 |
| Consumption current (at a voltage of 13,8 V), mA | average – 70, max. – 200 |
| Rump-up time (“cold” start), sec | 32 |
| Positional accuracy, m | <2.5 |
| Velocity accuracy, m/s | 0.05 |
| Temperature range, °C | -40...+85 |
| Dimensions (bracketry included), mm | 71x107x32 |
| Max weight, gr | 120 |
| Wire bus RS-232/CAN ³ | Optional ⁴ |
| Case opening button | Optional |
| Micro SD card installation | Optional |
| SIM chip installation | Optional |
| Backup battery | Optional |
| Expansion board slot ⁵ | Optional |
| External antennas | Optional |
| Voice communication | Optional |

¹ The number of spots is provided for the minimum set of transmitted parameters.

² Analog inputs can to operate as discrete ones within the set bounds for logical high and low.

³ Either CAN or RS-232 interface can be installed.

⁴ “Optional” units can be installed on the customer's order.

⁵ Expansion boards provide means for the extension of the terminal functionality.

1.3. tracker: block diagram

Block diagram of the tracker is given in Figure 1.2.

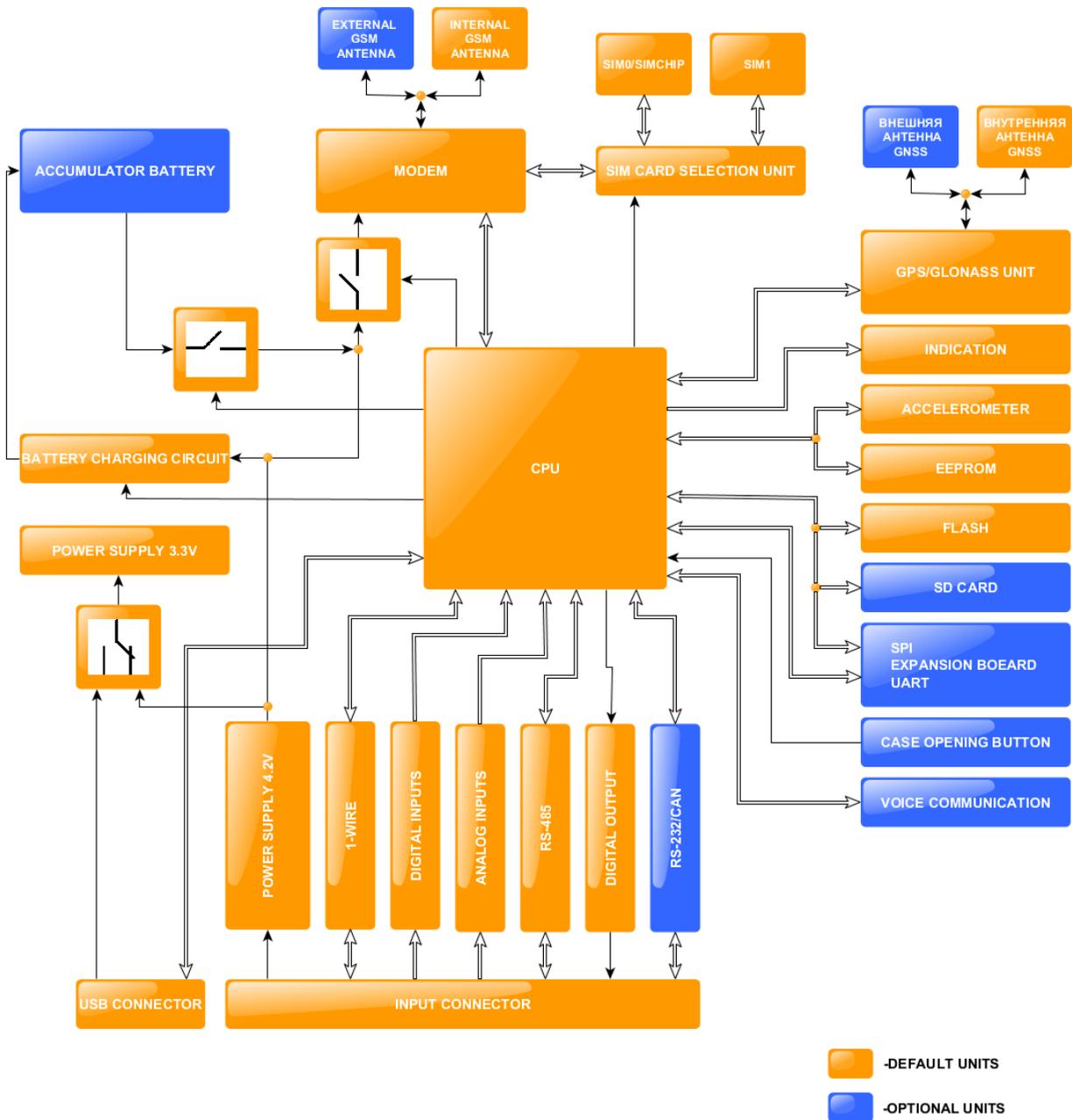


Figure 1.2 Block diagram of the navigation tracker

2. INSTALLATION

2.1. tracker description

Review of the essential items in Figure 2.1.

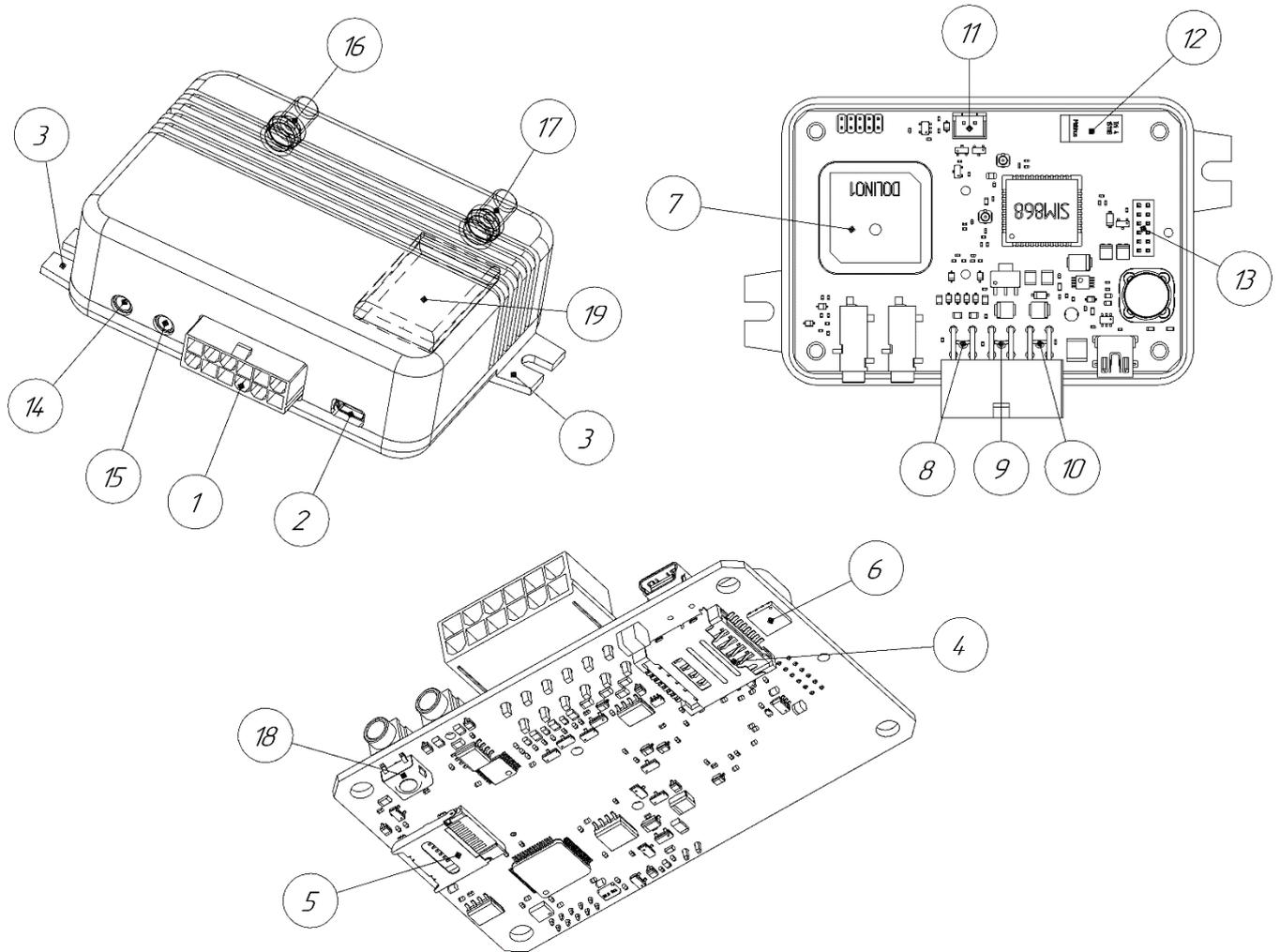


Figure 2.1 Principal items of the tracker

1. Mount Port;
2. Mini-B USB port;
3. Bracketry;
4. Socket for two SIM cards;
5. SD card slot;
6. SIM chip seat;
7. GNSS antenna;
8. Red status LED for the GNSS module;
9. Yellow status LED for the GSM module;

10. Green power supply LED;
11. Battery connector;
12. GSM antenna;
13. Expansion board slot;
14. Headphones socket;
15. Microphone socket;
16. External GNSS antenna;
17. External GSM antenna;
18. Case opening button;
19. Battery.



Attention! The tracker without power supply may be connected to a PC for the purpose of configuration. In this case, GSM modem has no power supply and location data is not transmitted.

Status LEDs for the navigation tracker are immediately behind the mount port; as a result, the port is backlit while in operation.

2.2. tracker versions

There are a number of versions of the subscriber trackers UMKa300 and UMKa301, these versions are represented in Table 2.1.

Table 2.1 tracker modifications.

| Modifications tracker name | RS-232 | CAN | Case opening button | MicroSD slot | Backup battery | Voice communication | External antennas | Secure hosting | Expansion board slot |
|-------------------------------|--------|-----|---------------------|--------------|----------------|---------------------|-------------------|----------------|----------------------|
| UMKa300 | - | - | - | - | - | - | - | - | - |
| UMKa300.H | - | - | - | - | - | - | - | + | - |
| UMKa300.2 | - | - | - | - | + | - | - | - | - |
| UMKa300.R2 | + | - | - | - | + | - | - | - | - |
| UMKa300.A2 | - | - | - | - | + | - | + | - | - |
| UMKa300.AR2 | + | - | - | - | + | - | + | - | - |
| UMKa301.B | - | - | - | - | - | - | - | - | - |
| UMKa301.B2 | - | - | - | - | + | - | - | - | - |
| UMKa301.BA2 | - | - | - | - | + | - | + | - | - |
| UMKa301.BR2 | + | - | - | - | + | - | - | - | - |
| UMKa301.M2 | - | - | + | - | + | + | - | - | - |
| UMKa301.FC2 | - | + | + | + | + | + | - | - | + |
| UMKa301.FR2 | + | - | + | + | + | + | - | - | + |

2.3. Pinout

Pin numeration for the tracker mount port is represented in Figure 2.2. Pin assignment is given in Table 2.2.

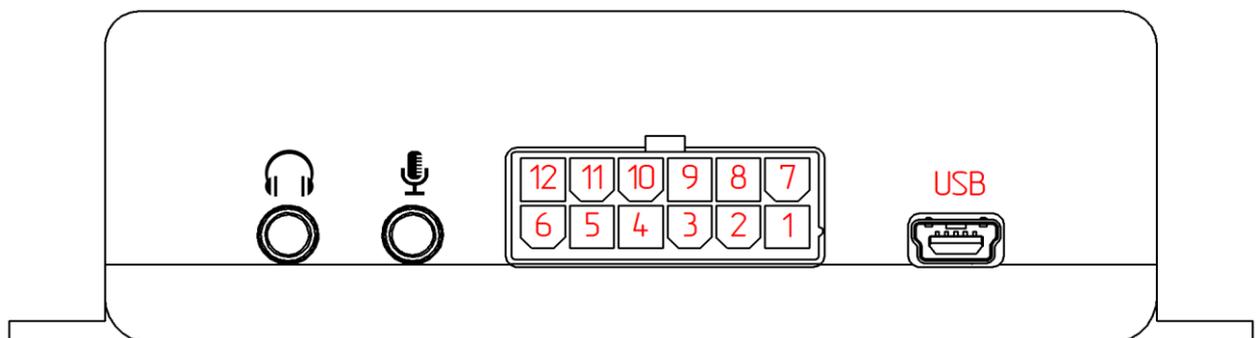


Figure 2.2 tracker pin numeration

Table 2.2 Connector pin assignment

| Pin number | Assignment |
|------------|--|
| 1 | VDC (+) |
| 2 | RS-485 (A) |
| 3 | RS-485 (B) |
| 4 | Input 0. Analog 0. IN0 (AIN0) |
| 5 | Input 1. Analog 1. IN1 (AIN1) |
| 6 | CH output for CAN or TxD output for RS-232 interface |
| 7 | GND |
| 8 | 1-Wire interface |
| 9 | Output 0. «Open collector». OUT (OUT0) |
| 10 | Input 2. Digital 0. IN2 (DIN0) |
| 11 | Input 3. Digital 1. IN3 (DIN1) |
| 12 | CL output for CAN or RxD output for RS-232 interface |

2.4. Device update.

There are two ways to update the tracker firmware: via the configurator or via the remote control server.

Update to the release version is automatic. If the tracker failed to update automatically, it can be updated via configurator: on the toolbar click  “Firmware update” or enter “UPDATE” command in the “Console” tab. If the tracker does not display firmware on the toolbar, click  “Check for updates”. One can also update firmware by sending SMS command “UPDATE” to the tracker phone number.

It is possible to carry out manual update. To this effect, close the configurator and put the required firmware file into the folder “C:\Program Files (x86)\UMKa3XX\firmware”. Then open the configurator, wait for the loading to end until suggestion to update the tracker appears.

If necessary, it is possible to update to the test version of firmware. In order to do that, use manual update mentioned above or send SMS command “UPDATE VER=X.Y.Z” (command description ref. app. A) to the tracker telephone number.

2.5. SIM cards installation

In order to install SIM cards open the casing of the tracker after unscrewing fasteners with PH1 screwdriver, then take the board out.

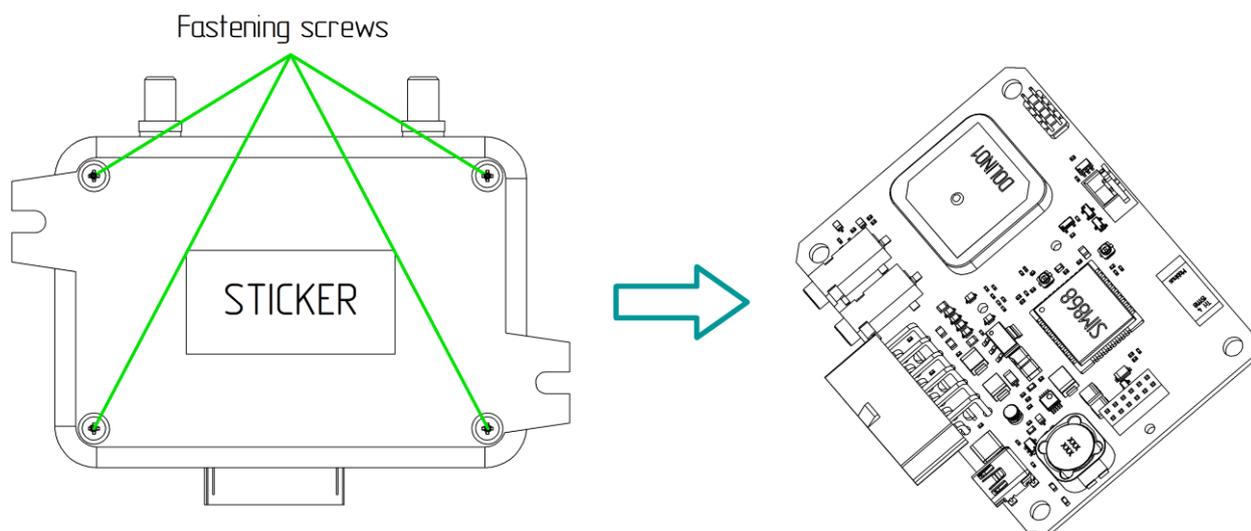


Figure 2.3 Opening tracker casing

There is a socket for SIM cards on the board back. Insert SIM cards as shown in Figure 2.4.

After SIM cards are installed, assemble the device in reverse order.



Attention! SIM card socket has 2 slots for SIM cards (when SIM chip is installed, only the upper one is available). The lower slot is for SIM0. The upper slot is for SIM1. Only SIM0 is active by default, and SIM1 is switched off. SIM cards are placed with pins facing down, bevel facing out. The tracker works with mini-SIM (2FF) cards.

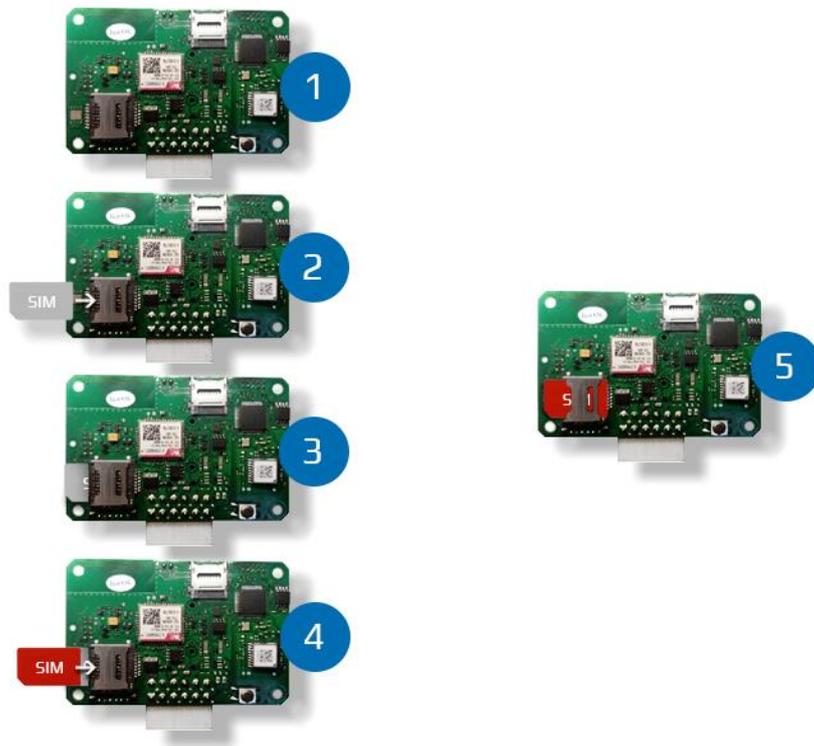


Figure 2.4 SIM cards installation

2.6. GPRS traffic cost optimization

One can reduce the costs of GPRS traffic in the online monitoring mode by following these tips:

1. In order to reduce traffic volume use Wialon Combine protocol. To change the protocol: in “Servers” tab menu chose “Protocol” option, then chose “Wialon Combine” in dropdown menu.

2. Disable transmission of the unused parameters. To do so: open the configurator tab “Servers”, and then uncheck unused parameters in “Advanced options” group.

3. Increase the number of records in data packets. To do so: open the configurator tab “Servers”, chose “Online mode” option, and then increase the “Group entries by” parameter.

4. Increase the spot recording period. To do so: open the configurator tab “Navigation”, chose “Setting the recording period” option and increase the parameter.

5. Increase the value of the angle and distance, exceeding of which leads to spot recording. To do so: open the configurator tab “Navigation”, increase the values in “Angle in degrees” and “Distance, m” options. One can also change the parameter by sending SMS command “TRACK” (command description ref. app. A). Route drawing quality will get lower, but the traffic volume will be reduced as well.

6. If CAN-LOG is used, disable unused parameters. To do so: open the configurator tab “CAN-LOG” and disable unused parameters.

2.7. Battery installation procedure

The tracker can be equipped with an internal battery. It is meant for logging and transmitting external power supply cut off event, and it ensures the navigation module quick start after power up. It is also advised to install the inner battery to secure data integrity and to mitigate the risk of data loss.

In order to install the battery one should open the casing of the tracker and take the board out (ref. “SIM card installation” section). Then connect the battery to the corresponding connector as shown in Figure 2.5.

The battery itself is attached to the upper part of the casing either by hot-melt glue or by double-sided tape. The battery should be placed in such manner as not to overlap GPS and GNSS antennas in the tracker assembled. The optimal place for the battery is shown in Figure 2.5.



Attention! The battery is pre-installed by the manufacturer only in certain product versions. If an available version does not have the battery, it can be separately purchased from the manufacturer.



Figure 2.5 Battery installation

2.8. MicroSD card installation procedure

In the tracker versions with the memory card support, it is possible to use MicroSD card for storing a “black box”. The tracker supports MicroSD cards with capacity of 4 to 32 GB.

In order to install a MicroSD card one should open the casing of the tracker and take the board out (ref. “SIM card installation” section). Then push the carriage towards the center of the board until it clicks (Figure 2.6). Now one can open the carriage and insert the MicroSD card.

Then close the carriage and snap it back (away from board center).

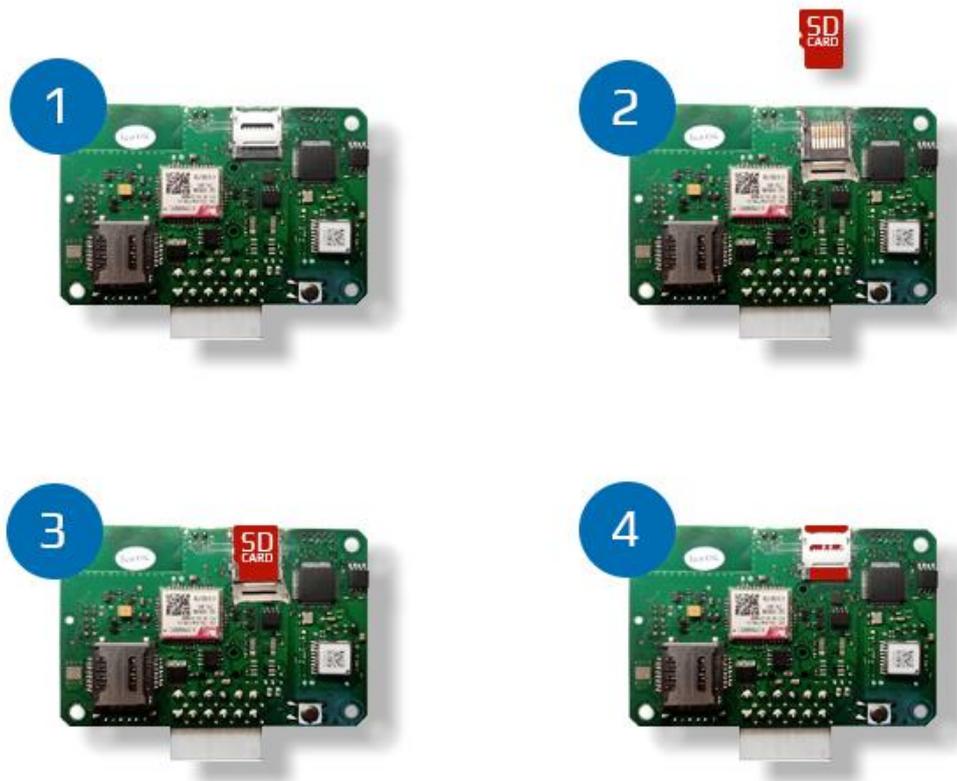


Figure 2.6 MicroSD card installation



Attention! MicroSD card support is optional, so it should be specified when ordering the product from the manufacturer. MicroSD card is not included in the package, and it is purchased separately.

2.9. Installing the tracker in a vehicle

When mounting the tracker, take into consideration that the GLONASS/GPS antenna should be oriented in space in such manner as to point the peak of the radiation pattern to the sky zenith. Radiation pattern of the flat ceramic antenna installed inside the tracker is hemispherical, and it is therefore recommended to install the tracker horizontally. In other positions, the main source is a re-reflected signal, which considerably impairs positioning accuracy and affects navigation task time.

Presence of metal objects near the antenna, especially in the direction of the main beam, markedly impairs signal reception.

The tracker should be installed as far as possible from the RF interference sources (interrupters, transmitters etc.).

It is recommended to place the power wire and other wiring into corrugated protection pipe. And try to avoid cable sagging, as it can cause the cable cuts. In order to fasten the cable use some special fasteners (e.g.: nylon tie).

Do not install the tracker near any heat sources (such as, exhaust manifolds, radiators etc.).

The tracker itself and all the connected cables should be securely fastened and do not interfere with the proper operation of the vehicle machinery.

For connections, it is recommended to use either special clamping wire connectors or the mating cable connectors (e.g.: to connect to the CAN bus via the special socket).

2.10. Connecting power supply

Connect the power to the navigation tracker using the cable supplied. In order to protect the power lead from short circuit failures, it is strongly recommended to install a fuse with a rated current of 1 A, and as close as possible to the voltage power supply.

When connecting the tracker, safety regulations for vehicle maintenance must be strictly observed. All the connections must have reliable contacts and be thoroughly insulated. If the length of an available wire is insufficient, the wire can be extended with another wire (cross-section at least 0,35 mm²).

The power inlet of the controller is rated for the on-board vehicle network voltage of 4 to 40 V.

In order to provide power supply to the controller, one can connect it either directly to the battery or to the on-board vehicle network (Figure 2.7).

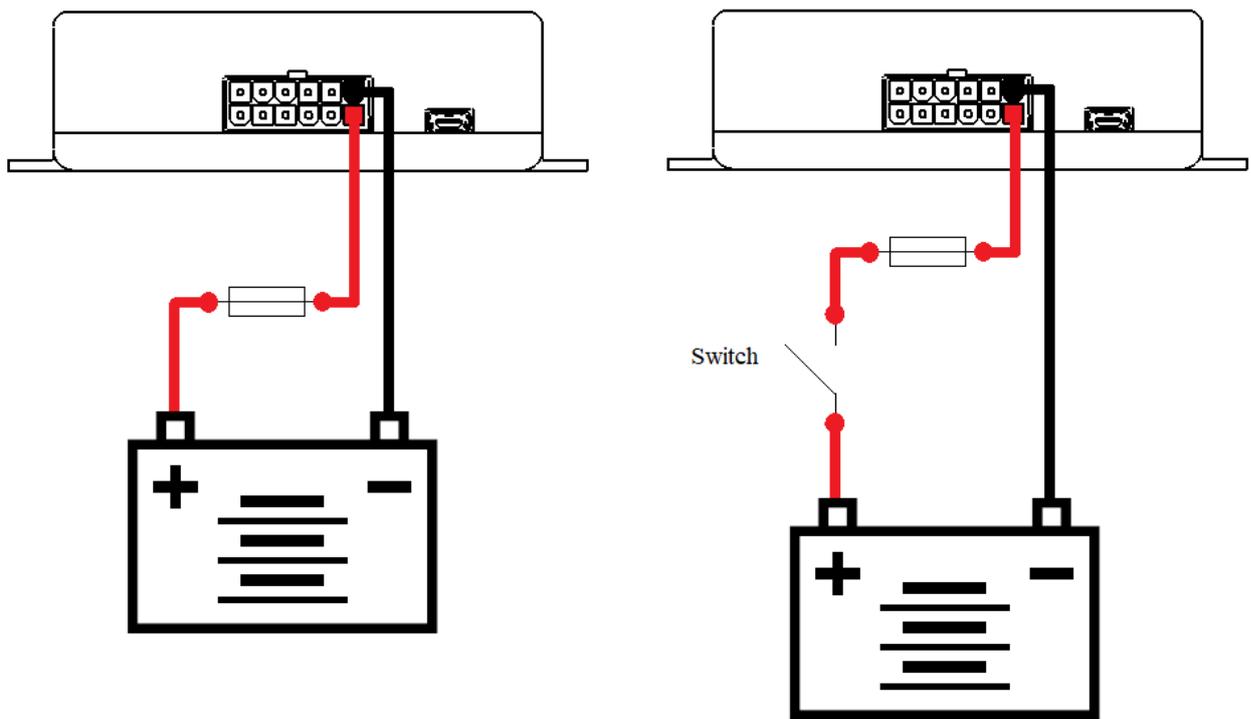


Figure 2.7 Connecting the power



Attention! The tracker itself has built-in protection from short-circuits, power supply polarity reversals and from a pulse overvoltage. However, due to the naturally limited resource of the protection installed, it is strongly recommended to use an external fuse with a rated current of 1 A.

2.11. Connecting analog inputs

Analog inputs of the tracker are used for monitoring vehicle parameters by utilizing of analog data (from an analog fuel level sensor an analog thermometer etc.).

Analog inputs can operate as discrete ones with adjustable voltage levels of the logical high and low (see “Configurator operation” section).

The tracker has two channels for measuring external impressed voltages (AIN0 and AIN1), and two internal channels (AIN2 and AIN3) for measuring the voltage of the on-board vehicle network and of the internal battery. Channels AIN0, AIN1 and AIN2 can perform measurements across the 0 to 40 V range, and the AIN3 channel – across the 0 to 6,6 V range.

When connecting simple analog sources, refer to the diagram in Figure 2.8.

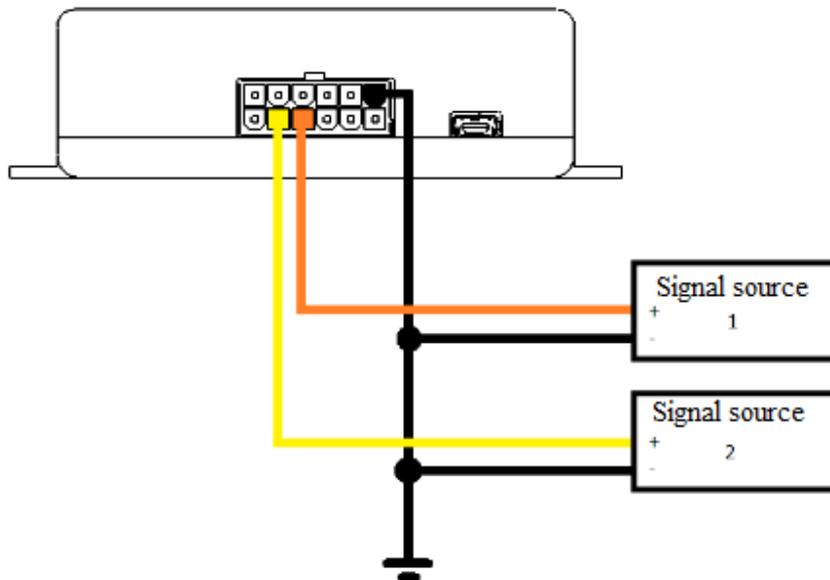


Figure 2.8 Connecting analog sources

To connect an analog input in the discrete input mode with a pull-up to VDC refer to the circuit diagram in Figure 2.9, in doing so one must use an additional pull-up resistor of 3.9 k Ω with the power dissipation factor of at least 0.5 W.

The following elements can act as a switch: relay contacts, sealed contacts, and other devices with the "dry contact" or "open collector" outputs.

To connect an analog input in the discrete input mode with a pull-up to GND refer to the circuit diagram in Figure 2.10.

After connected, perform setting of the inputs and their modes in the configurator (ref. "Configurator operation" section).

The conversion of an analog input signal into a discrete one is implemented in accordance with the principle of the Schmitt trigger.

The switching thresholds are set in the configurator or by means of the "SETLIMn" command (where "n" is the input number). For example, the default thresholds are as follows: voltage for the logical low is 5 V (5000 mV), voltage for the logical high is 6 V (6000 mV). An input signal with a voltage below 5 V is converted to the logical low, above 6 V - to logical high, and within 5 to 6 range it retains the last registered value (Figure 2.11).

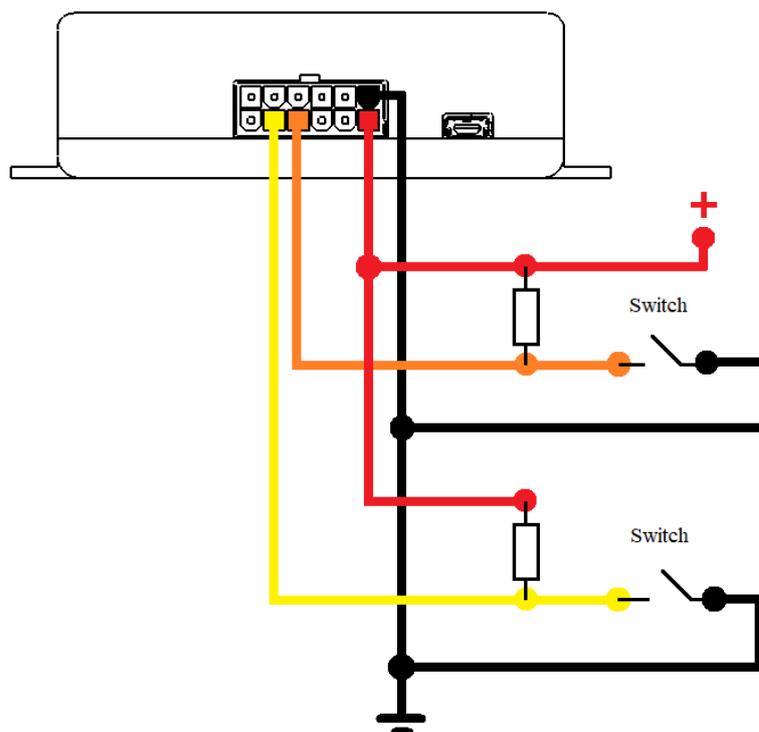


Figure 2.9 Connection with a pull-up to VDC

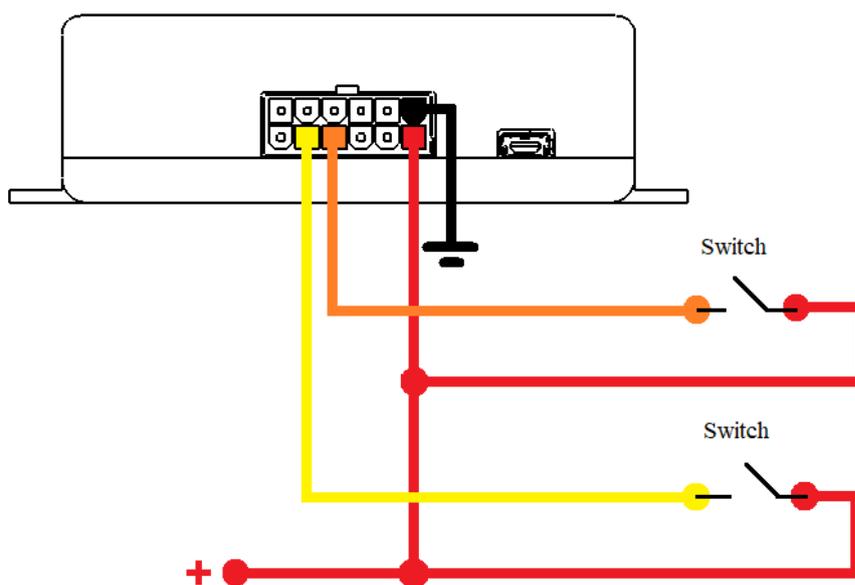


Figure 2.10 Connection with a pull-up to GND

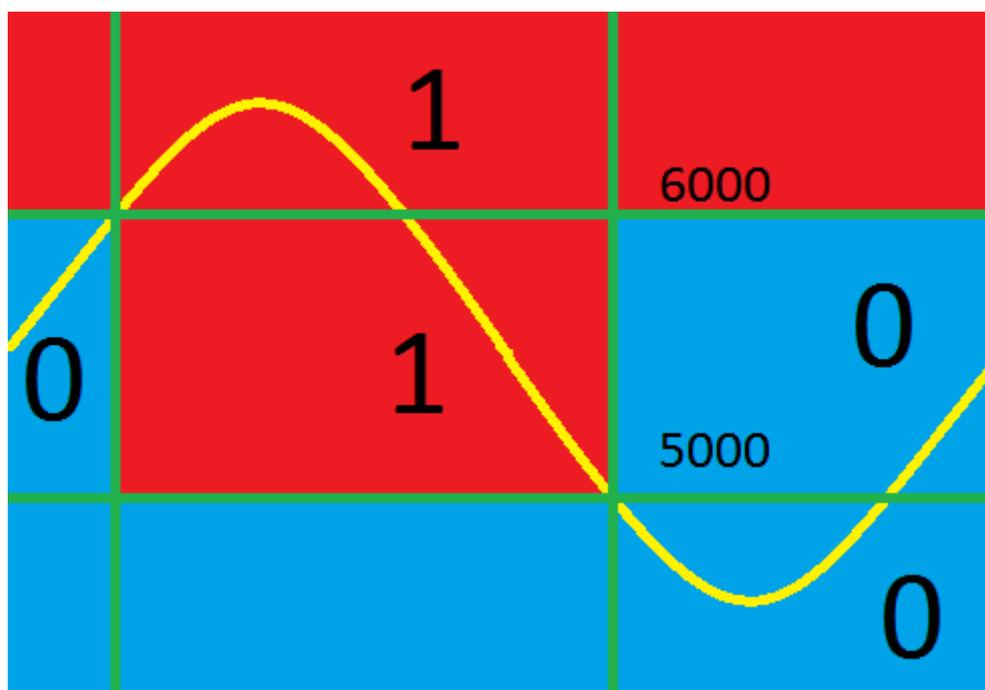


Figure 2.11 Conversion of an analog signal into a discrete signal

2.12. Connecting digital inputs

In order to connect digital devices (frequency fuel level sensor, flowmeters) and discrete sensors, two digital inputs of the tracker are used. One can adjust operating modes of these inputs via the configurator.

Digital outputs allow an internal pull-up either to GND or to VDC, and so devices with "dry contact" or "open collector" outputs, connected to GND or VDC, can act as signal sources (Figure 2.12).

In figure 2.13 find an example of connecting two flowmeters in differential mode.

In Figure 2.14 find an example of connecting a rotary encoder.

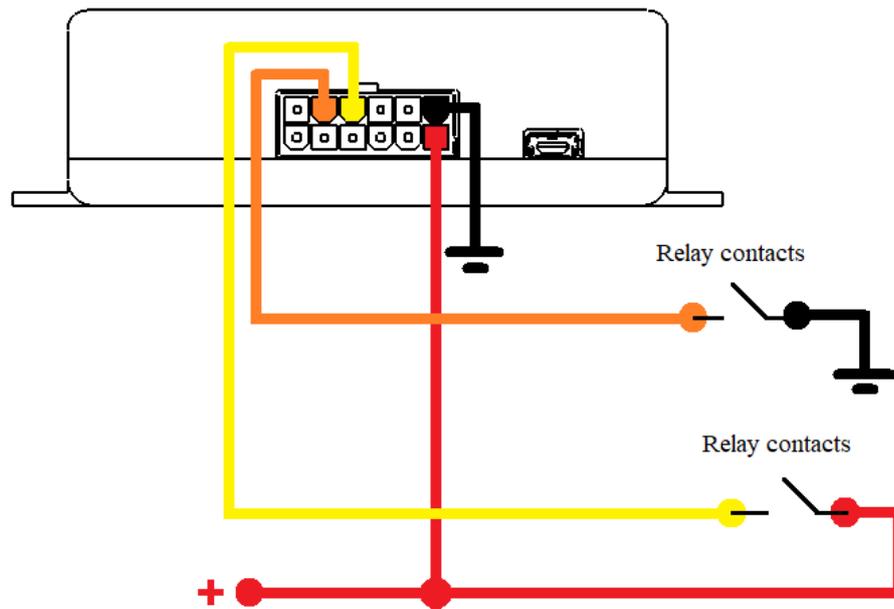


Figure 2.12 Examples of connecting discrete sensors connection

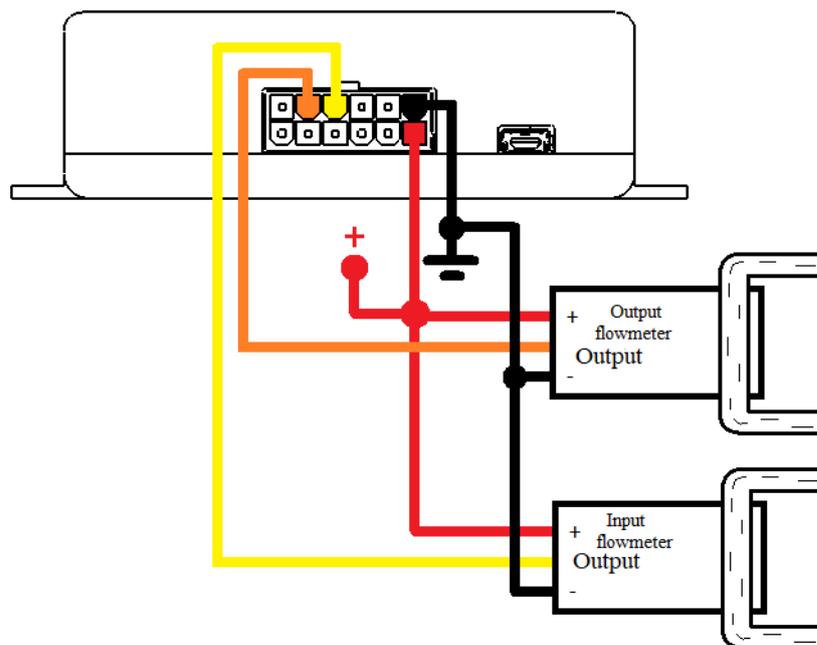


Figure 2.13 An example of connecting flowmeters in differential mode

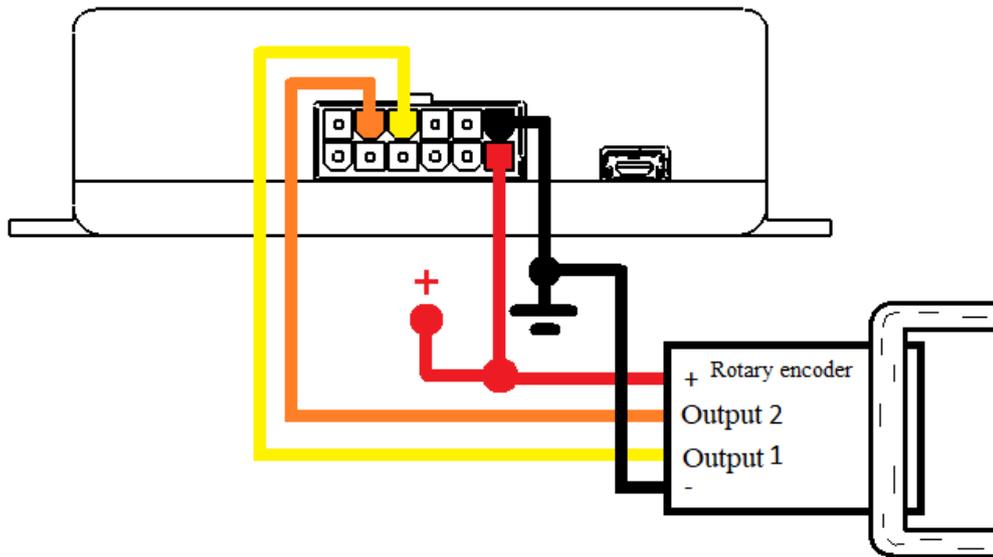


Figure 2.14 An example of connecting a rotary encoder

2.13. Connecting “open collector” output

The tracker has an output of the "open collector" type; it can be used to control the external load.

If the load to be controlled consumes no more than 0.5 A, then to connect it use the scheme in Figure 2.15.

In order to connect the loads consuming more than 0.5 A, use an additional relay (Figure 2.16).

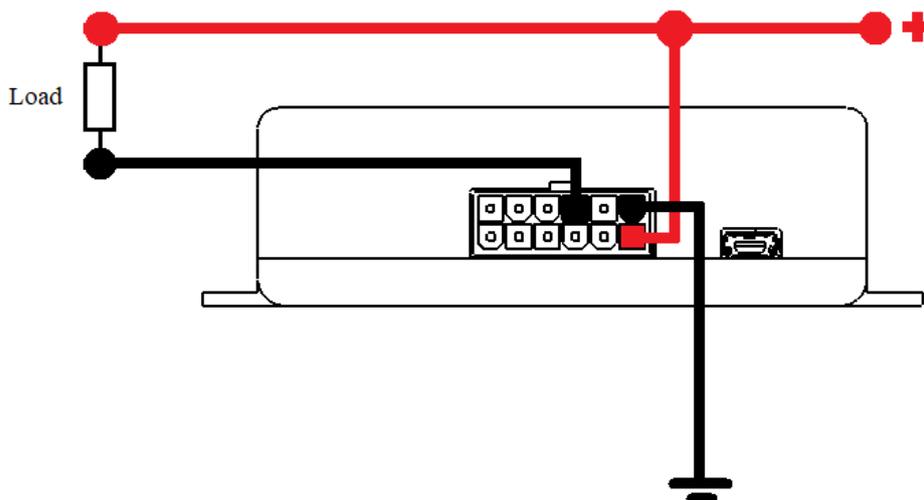


Figure 2.15 Connecting low-power load

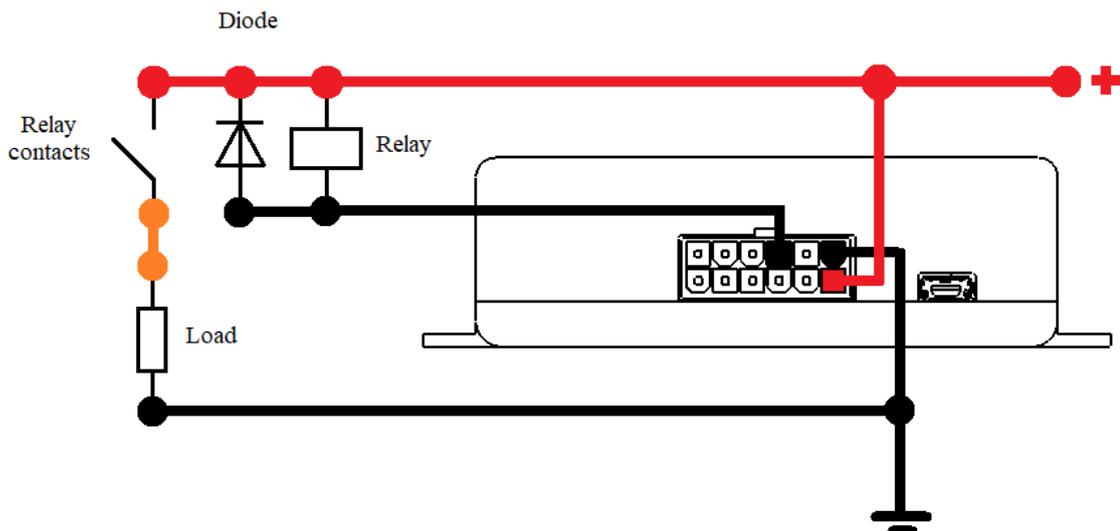


Figure 2.16 Connecting high-power loads



Attention! To protect the tracker output from the self-inductance EMF, which occurs when switching inductive loads (for example, a relay coil), use a fly-back diode. This diode must have the peak inverse voltage higher than the load supply voltage and a forward current higher than the current consumed by the load.

2.14. Connecting RS-485 (Fuel Level Sensor/RFID)

Up to seven LSS Fuel Level Sensors (FLS) and up to four RFID readers can be simultaneously connected to the tracker.

In Figure 2.17 find an example of connecting FLSs. The resistance at the end of the bus is installed to match the impedance and is equal to 120 Ω . For the RS-485 bus, the recommended cable type is a “twisted pair”. Connect the RFID readers in the same way.

RS-485 bus stubs should be as short as possible, as to match bus impedance. And to prevent bus collisions, assign each device a unique address.

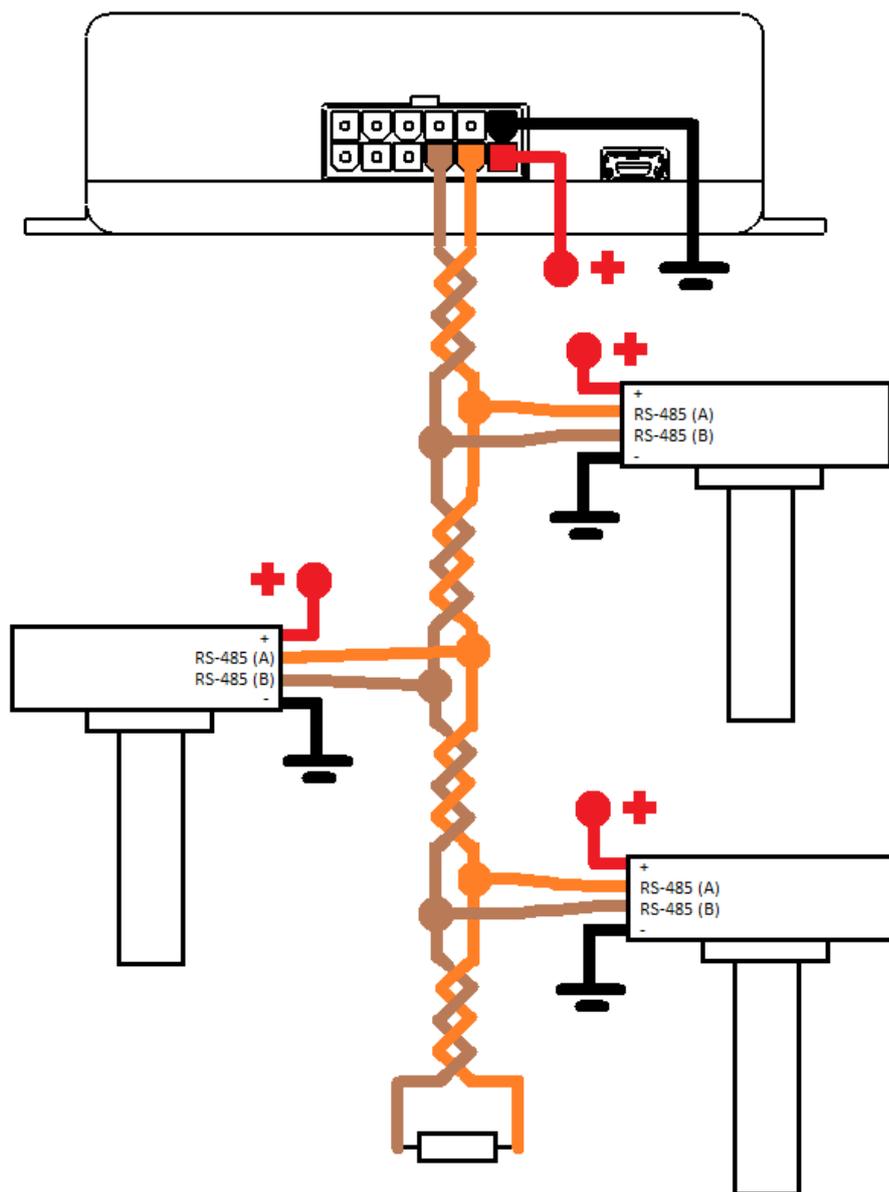


Figure 2.17 Connecting FLS via RS-485 interface



Attention! While working with fuel level sensors, one must strictly adhere to the requirements of the relevant maintenance manuals.

2.15. Connecting to CAN bus

In Figure 0 find an overview diagram of connecting the tracker to the CAN bus.

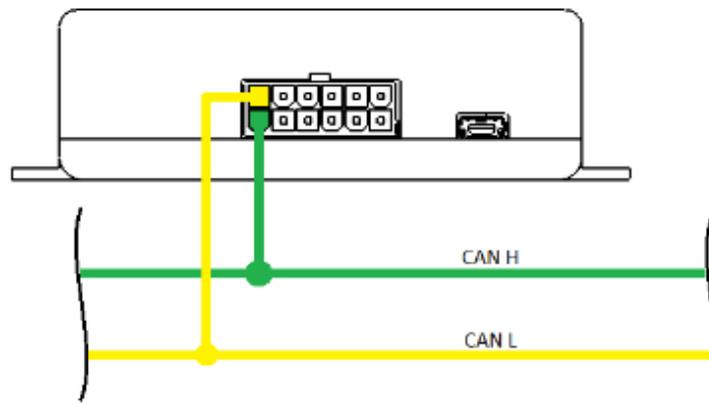


Figure 2.18 Connecting to CAN bus



Attention! CAN interface support is optional, so it should be specified when ordering the product from the manufacturer.

2.16. Connecting RS-232

For connecting RS-232 devices, the tracker is provided with corresponding outputs. In Figure 2.19 find an example of connecting a device via RS-232. This interface supports following protocols: NMEA (Trimble - <https://www.geospatial.trimble.com>), LLS (FLS), and CAN-LOG message protocol as well.

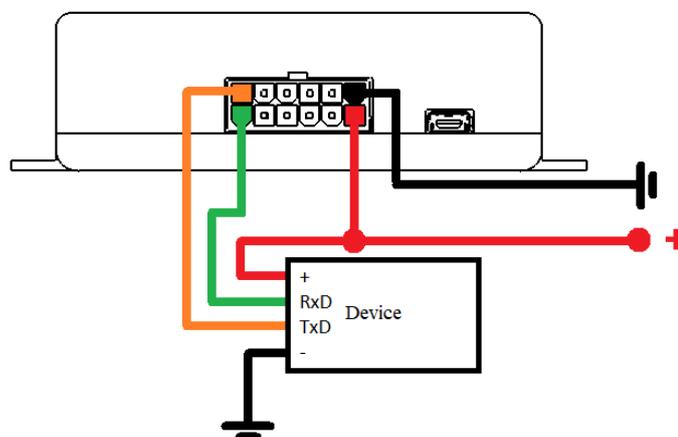


Figure 2.19 Connecting via RS-232 interface



Attention! RS-232 interface support is optional, so it should be specified when ordering the product from the manufacturer.

2.17. Connecting 1-Wire

Up to four thermometers of the DS18B20, DS1822, DS18S20 type (hereinafter referred to as DS18) and one access control sensor of the iButton type can be connected to the tracker. In Figure 2.20 find an overview diagram of connecting devices via 1-Wire.

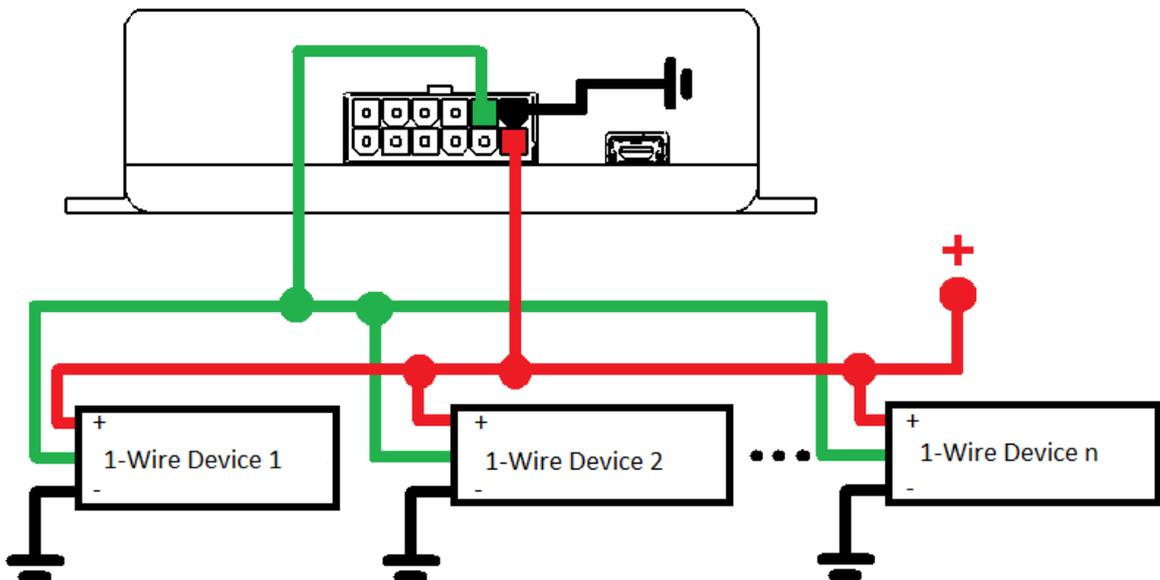


Figure 2.20 Connecting devices via 1-Wire

Note that devices can have the supply voltage different from the tracker voltage or have no supply voltage at all (powered directly from the 1-Wire bus). For more information about the installation of such devices, read relevant manuals.

2.18. Connecting CAN-LOG

The tracker supports the transmission of data received from the CAN-LOG controller of the P145 Series (details can be found here <http://farvater-can.ru>) or from another

compatible one. The controller is connected to the tracker either directly, via RS-232 interface (Figure 2.21), or using UART-RS485 adapter, via RS-485 interface (Figure 2.22).

Connect CAN-LOG to the vehicle and configure it in accordance with its maintenance manual. To configure the tracker, follow instructions in 3 section of this here manual.



Attention! RS-232 interface support is optional, so it should be specified when ordering the product from the manufacturer.

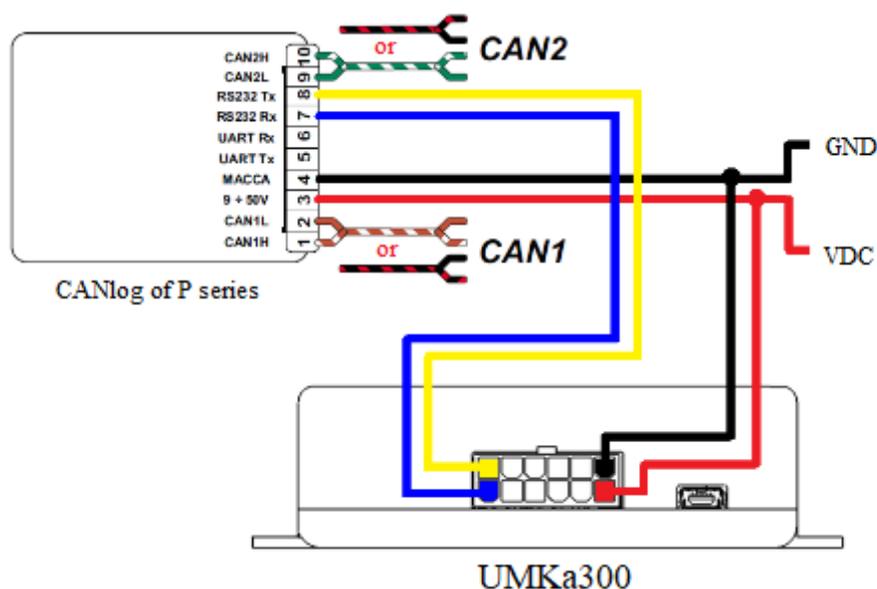


Figure 2.21 Connecting CAN-LOG via RS-232

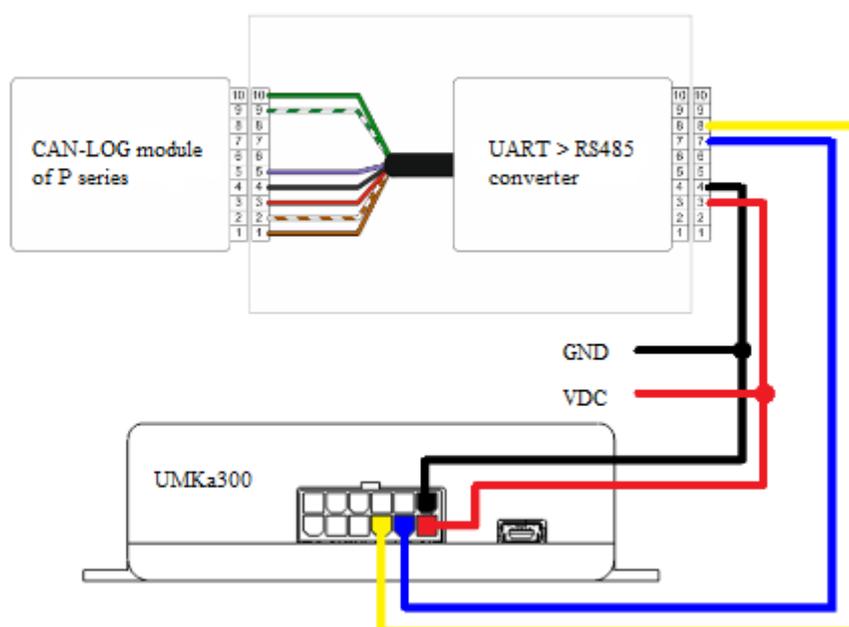


Figure 2.22 Connecting CAN-LOG using UART-RS485

2.19. Connecting expansion boards

To expand the tracker functionality the slot for expansion boards is installed on the board of the tracker (Figure 2.23):

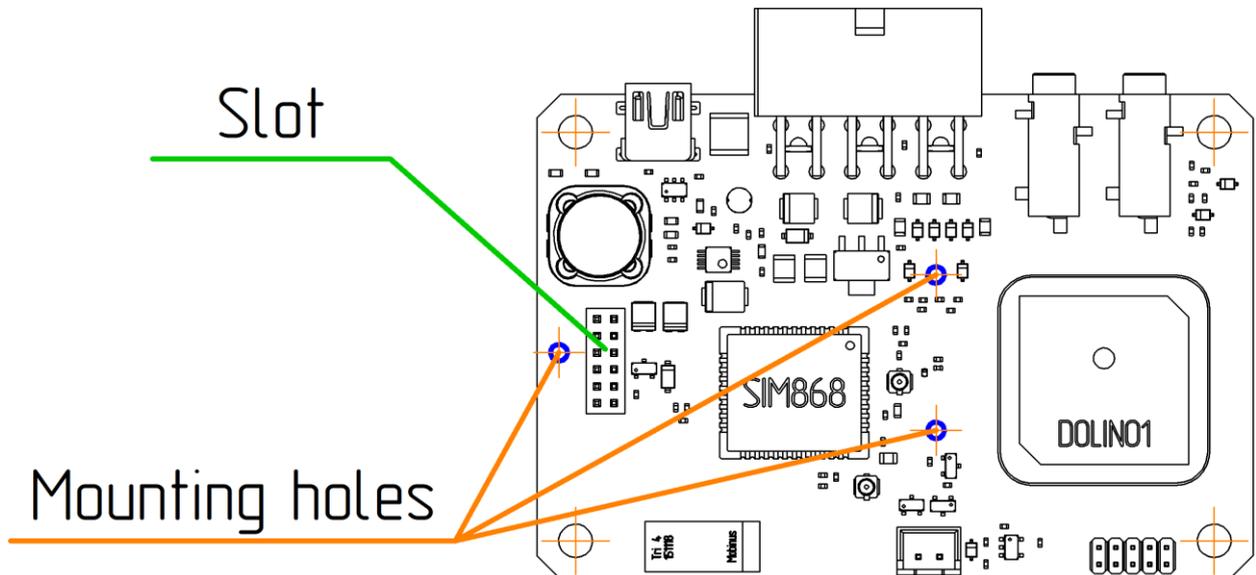


Figure 2.23 Installation place for expansion boards



Attention! Expansion boards support is optional, so it should be specified when ordering the product from the manufacturer.

2.20. Voice communication

Some versions of the UMKa301 tracker support voice communication. The tracker can receive incoming calls and make outgoing voice calls.



Attention! During a voice call, the data transmission is unavailable. During a long phone call, the server connection may be lost.

Using “VOICE” command, one can adjust the speaker volume and microphone sensitivity.

In order to configure the properties of the incoming connection, use the "RINGS" command, which sets the number of the tones required to enable auto answering (or disables it), and also the ringer melody and its volume.

By default, incoming calls from any number are answered. One can limit the number of phone numbers, from which incoming calls will be received; to do so, use “WHITELIST” command, which allows entering five phone numbers. An incoming call from the unlisted phone number is automatically cancelled.

Some functions of the voice communication are operated with push-to-talk button. One can use this button for accepting an incoming call, dialing one of the pre-recorded numbers, and sending “SOS” signal to the server.

The list of possible operations with the push-to-talk button is given in Table 2.3.

Table 2.3 Operations with the push-to-talk button

| Operation | Description |
|------------------|---|
| Click | Short press of the push-to-talk button for less than 0,5 seconds |
| Series of clicks | One or more clicks in a row alternating with the pauses lasting less than 0,5 seconds. Series of clicks ends with the pause lasting more than 0,5 seconds |
| Short press | Holding the push-to-talk button for more than 0.5 but less than 5 seconds |
| Long press | Holding the push-to-talk button for more than 5 seconds |

"Short press", depending on the context, leads to one of the effects listed in Table 2.4.

Table 2.4 Effects of short pressing the push-to-talk button

| Context | Effect |
|---------------|---------------|
| Incoming call | Answer a call |
| Talking | Hang up |
| Idle | Dial a number |
| Outgoing call | Hang up |

In order to make outgoing calls, one must pre-enter one to five phone numbers using “DIALLIST” command. After that, use the “series of clicks” to select a desired number: 1 click – for the first in the list, ..., 5 – for the fifth one. And then, the “short press” initiates

a call to the selected number. To re-dial the last number, one does not have to re-select it. The first one in the list is the default phone number.

The “Long press” of the push-to-talk button changes the status of the Bit 15 of the “status” parameter. If necessary, this Bit can be committed to the “SOS” function on the telemetry server.

2.21. Power manager

The power manager is designed to optimize battery charging and power saving modes of the tracker.

While operating, the tracker can be in one of the following power saving modes:

1) Run mode (RUN). While in this mode, the tracker is fully functional and stays in it, unless the conditions for switching to other power saving modes are met.

2) Idle mode (IDLE). The tracker is switched to this mode when one of the two following conditions are met: the tracker runs on the battery for the period longer than specified (the switching time is set by the second parameter of the DISCHARGE command) or the tracker is in the static navigation mode (on the accelerometer, input or their combination) for the period longer than specified (the switching time is set by the second parameter of the POWERSAVE command). While idle, the modem gets disconnected from the server and is in OFFLINE mode. In OFFLINE mode, the modem stays registered in the cellular network and processes incoming SMS and voice calls (only for UMKa301). Besides switching to OFFLINE mode, LED indication (except for the green LED) turns off as well. The rest of the operations function in a normal mode.

3) Standby mode (STANDBY). The tracker is switched to this mode when it is in the static navigation mode (on the accelerometer, input or their combination) for the period longer than specified (the switching time is set by the first parameter of the POWERSAVE command). During standby, the modem is completely disconnected (SLEEP mode). LED indication (except for the green LED) turned off. The rest of the operations function in a normal mode.

While operating, the tracker can be in one of these basic power modes:

1) USB power mode. The tracker is switched to this mode, when after the system start there is no main supply voltage. In this mode, the modem does not function (and in UMKa301 GNSS does not function as well, since it is combined with the modem). The battery is not charged or discharged. Data is not recorded into the black box. It is possible to switch to the recovery mode or the slow charging mode, if the main supply voltage has appeared.

2) Battery recovery mode. The tracker is switched to this mode, when the battery is deeply discharged or not connected. When the battery is deeply discharged (below ~2.4 V), the built-in protection turns the battery off to prevent further discharging. In order to bring the battery out of the deep discharge, the tracker applies a small charge current. When the voltage drop corresponding to a fully discharged battery occurs in the battery connector pins – this means the battery recovery process has begun. If the battery is not connected, the voltage corresponding to the maximum possible in the slow charging mode (<4.1 V) appears in the battery connector pins. Situations, when the battery is deeply discharged or not connected, are treated as equivalent ones by the tracker, that is: the battery cannot provide backup power. After the battery gets sufficiently charged (above 3.3 V), the tracker is switched to the slow charging mode.

3) Battery slow charging mode. Notably, in this mode it is possible to switch to the operation from the battery, if the supply voltage is disconnected. Battery is charged at the small direct current up to 100 mA. This mode is operational within the full range of operation temperatures, since lithium batteries can be charged at the small current in subzero temperatures. In this mode, the maximum voltage of a charged battery is about 4.0 – 4.1 V, which approximately corresponds to charging at 80 – 90 %. In general, this mode is the most fitting for the battery and ensures the maximum service life. Prolonged charging time is a considerable drawback of this mode though. Besides, as the battery voltage steps up, the charging rate drops. Another drawback of this mode is that the battery does not get fully charged. It is possible to switch from this mode to the fast charging mode.

4) Battery fast charging mode. In this mode, the charge current depends on the duration of the battery connection to 4.2 V circuit. The PWM controller with the period of 10 ms and the voltage step of 0.1 ms step regulates the duration of the connection depending on the actual voltage on the battery. By default, the fast charging mode is disabled and must be enabled with the "CHARGE 1,250" command, where 1 – “enable fast charging”, and 250 - the capacity of the battery in mA·h. The capacity can range from 250 to 1100 mA·h. It is strongly recommended to designate the actual capacity of the battery when configuring this mode, otherwise battery service life can be significantly reduced. One can switch to fast charging mode when these conditions are met: the mode is allowed, the battery voltage is above 3.3 V, the supply voltage of the tracker is within the range of 10.7 to 40.5 V, the temperature inside the tracker casing is within the range of +5 to +70 degree Celsius. In this mode, the battery is charged up to 4.2 V, which corresponds to charging at 100 %.

5) Battery protection mode. The device is switched to this mode, when the short circuit occurs on the battery trackers. All charge circuits get turned off to avoid damage

to the tracker and the battery. A short-circuit is considered to be a situation in which a voltage less than 2.0 V is measured at the battery trackers. In the fast charging mode, a short-circuit may cause the tracker reboot. In this case, the tracker will switch to the protection mode after restart.

6) Battery discharge mode. When the supply voltage disappears in the run mode, the tracker is powered by the battery, if the battery is connected and functional. The purpose of the battery discharge mode is to prolong the work of the tracker and save the battery. With "DISCHARGE" command one can set the tracker battery life, upon expiry of which the tracker will be switched to the power-saving mode or shut down. Also, the tracker is shut down when the battery is discharged to a level below 3.2 V.

7) tracker shutdown mode. In this mode, all the tasks run by the tracker are properly terminated. EEPROM write operation and FLASH memory write operation are terminated. After that, the tracker gets rebooted, while rebooted the tracker is disconnected from the battery. The reboot procedure is required when the supply voltage has appeared during the termination of active tasks. In doing so, the tracker will not hang up in the intermediate state. It is possible to switch from this mode to the backup mode.

8) Backup mode. The tracker is switched to this mode when properly terminated and there is no supply voltage. In this mode, the battery voltage is applied only to the CPU and GNSS backup circuits. Power supply of the CPU backup circuit ensures the detection of the case opening when the opening button is tripped. Power supply of the GNSS backup circuit ensures the "warm start" and the operation of other processes, which reduce the time prior to the obtaining of the first valid coordinates.

2.22. Data transmission to two servers

The tracker is able to transmit data concurrently to two different telematic servers, and to be updated and configured at the same time.

The Black Box ensures that data on the transmitted spots is independently saved to each of the two possible telematic servers. The tracker always makes records in the black box for both primary and alternate servers, regardless of whether the data transmission to an alternate server is turned on in the settings. Yet only one copy of the data is stored in the black box.

To transfer data to an alternate server, one should enter its address, port and select the transmission protocol via the configurator or using the "SETSERV" and "SETPROTOCOL" commands. Other settings, such as "Uploading order", "On-line mode" and "Advanced options" work for the both of servers.

To disable data transmission to the alternate server, you should clear the alternate server name in the tracker settings.

In logging the exchange between the tracker and the servers, the [Connection ID] field was added to the messages about receiving and transmitting data packets. The possible connection IDs and their values are given in Table 2.5.

Table 2.5 Connection ID

| Connection ID | Description |
|---------------|-----------------------------|
| [1] | Primary server |
| [2] | Alternate server |
| [3] | Remote update server |
| [4] | Remote configuration server |

2.23. Remote configuration

In the remote configuration mode, it is possible to operate the remote tracker practically the same way, as if it were connected to the configurator via USB.

In the remote configuration mode, the remote server acts as an intermediary between the configurator and the tracker. The tracker and the configurator are connected to it.

There are two possible modes of connecting the tracker to the remote control server: permanent and session.

In the permanent mode, the tracker keeps the connection to the remote control server, as long as the tracker is in the "ONLINE" state. By default, the permanent mode is disabled. To enable it, use the "REMCFG ENABLE" command. To disable - the "REMCFG DISABLE" command.

In the session mode, before starting the configuration session, one should send the "REMCFG START" command via any available communication channel. By doing so, the tracker will stay connected to the remote control server for 30 minutes. If configuration requires more or less time, one can also specify the duration of the session in the parameters of the "REMCFG START" command.

Switching from the session mode occurs upon the session timeout, at the tracker reboot, upon the receiving of "REMCFG STOP" command or when the tracker is switched to the power saving mode.

After the tracker has been connected to the remote control server, it becomes possible to connect the configurator to it. To do so, click  on the toolbar. In the opened "Connecting to server" window, enter the tracker IMEI and password for accessing it, and then press the "Connect" button. The subsequent operating the configurator is described in Section 3.3 and the further ones.

It is important to understand that remote configuration is realized via the GPRS channel, which has considerable limitations in both the bandwidth capacity and transmission delay, and in the connection stability as well. These features of the data channel impose limitations on the configurator performance and the implementation of some additional functions, such as debugging mode and the like.



Attention! By default, the permanent connection mode is disabled in the settings and only the session mode is available.

3. OPERATING INSTRUCTIONS

3.1. LED indication

There are three LED installed behind main socket for determining tracker state. They are placed behind the mount port and backlight it during operation (Figure 3.1):

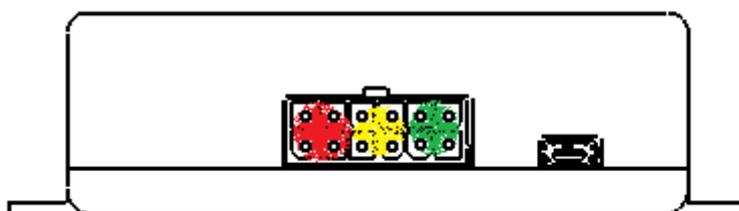


Figure 3.1 Indicating LEDs arrangement

Each LED indicates the status of individual modules:

Table 3.1 LEDs

| LED state | Module status |
|--|---|
| Green – indicates whether the navigation tracker is powered or not: | |
| On | Powered |
| Off | Not powered |
| Yellow – indicates the state of GSM module: | |
| Off | Sleep mode. The modem is off or SIM or modem error occurred |
| 1 short flash | GSM module initialization |
| 2 short lashes | GSM network logon |
| 3 short lashes | “Offline” mode. The modem only accepts SMS and voice calls |
| 4 short lashes | GPRS logging in. GPRS logging out |
| 3 short pauses | “Online” mode. No connection to the both servers |
| 2 short pauses | “Online” mode. No connection to the alternate server |
| 1 short pause | “Online” mode. No connection to the primary server |
| Steady On | “Online” mode. All the customized servers are connected |
| Red – indicates the state of GNSS module: | |
| Off | GNSS module malfunction |
| Flashes 1 time | Coordinates re not valid. Searching for satellites |
| Flashes 2 times | 2D-positioning done |
| Flashes 3 times | 3D-positioning done |



Attention! Remote update status and configuration status have no LED indication, as these processes are background and supportive ones.

3.2. Preparing PC for the tracker configuring

To configure the tracker, use a PC running Windows 7 or higher.

Download the «UMKa3XX Configurator» installer from the manufacturer official website at <http://glonasssoft.ru/equipment/umka/umka300.php>.

To start the installation run the downloaded file and allow changes (Figure 3.2).

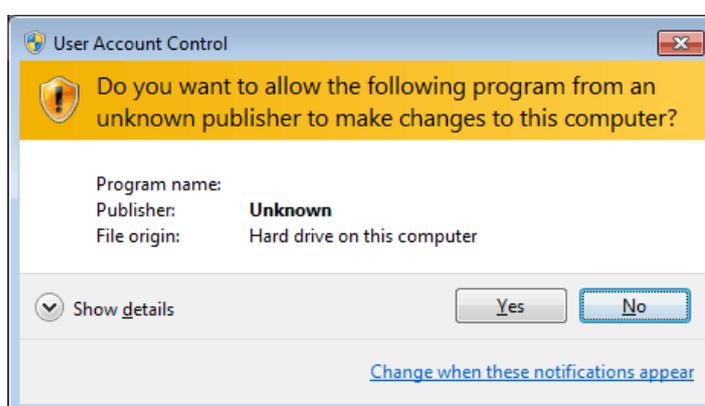


Figure 3.2 Allowing changes

Select the installation language (Figure 3.3) and click "OK".

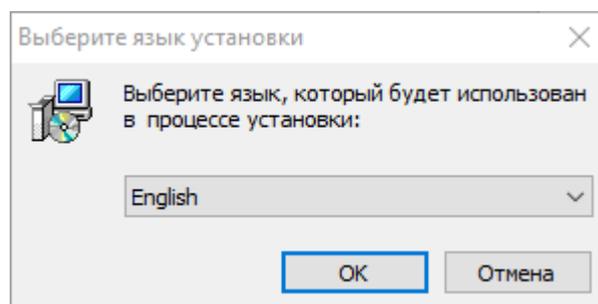


Figure 3.3 Selecting installation languages

Select the installation path (Figure 3.4) and click "Next".

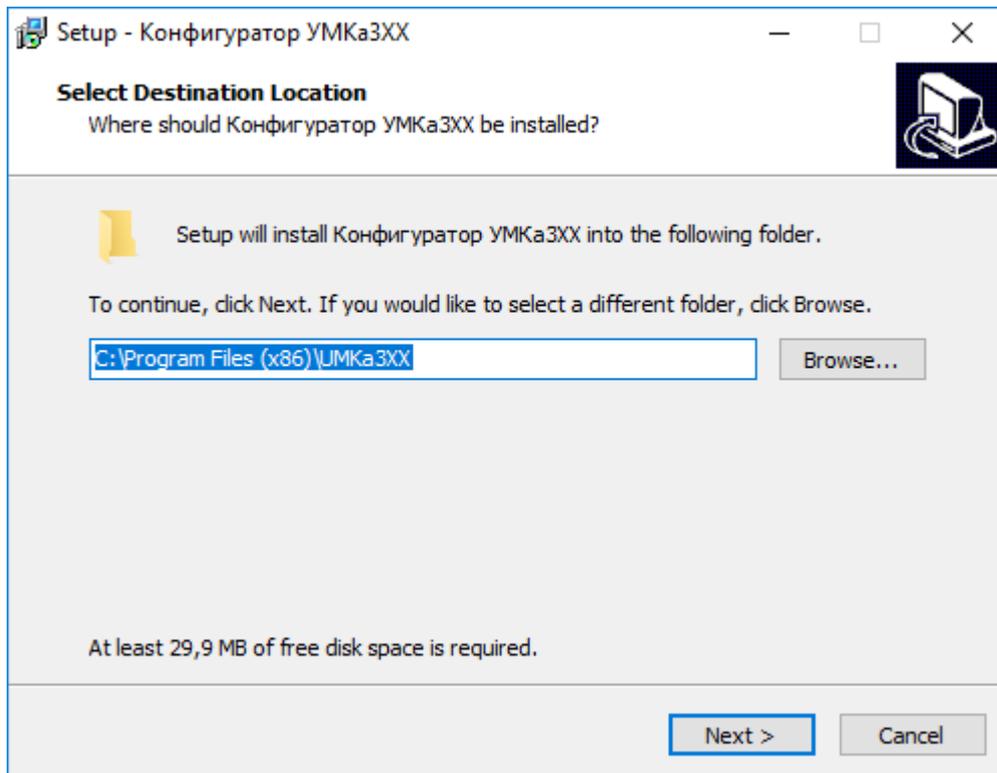


Figure 3.4 Selecting installation path

When installing for the first time, select the option "Install the tracker driver" (Figure 3.5) and click "Next".

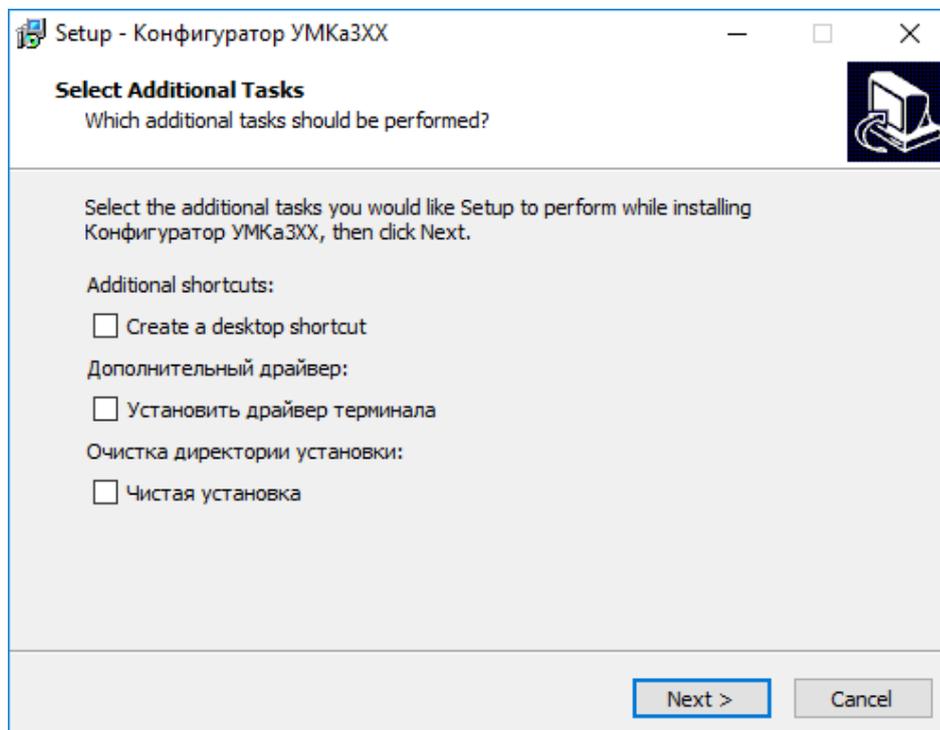


Figure 3.5 Selecting installation options

The program is ready for installation, click the “Install button” (Figure 3.6).

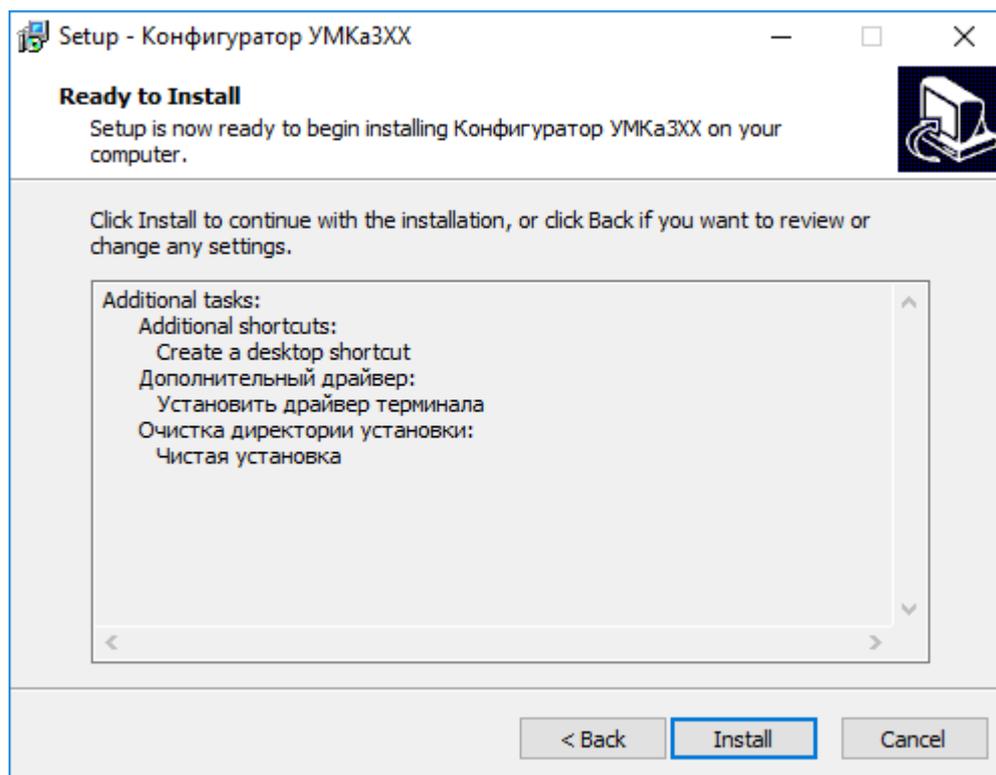


Figure 3.6 Ready to install

After the installation is completed, you can immediately start the configurator by selecting the option "Start Configurator UMKa3XX" (Figure 3.7).

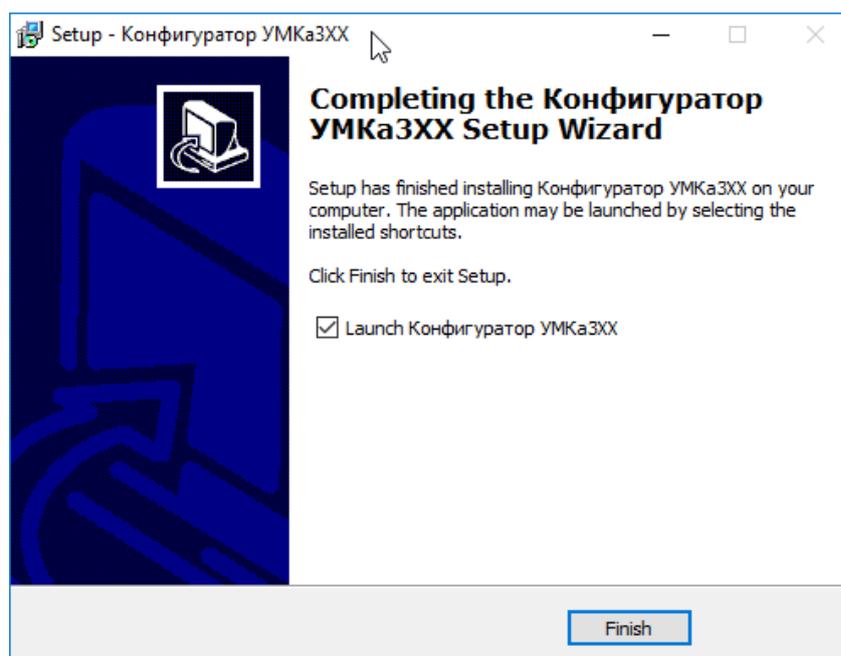


Figure 3.7 Starting the application

3.3. Configuration

Connect the tracker to a PC using USB cable of the A to Mini-B type. The cable is not included in the package, and it is purchased separately.

To start the application, go to "Start" → "All Programs" → "Configurator UMKa3XX." The startup window of the configurator (Figure 3.8) opens, it can be conventionally divided into four zones: Status panel (1), Toolbar (2), Settings tree (3) and Data display window (4).

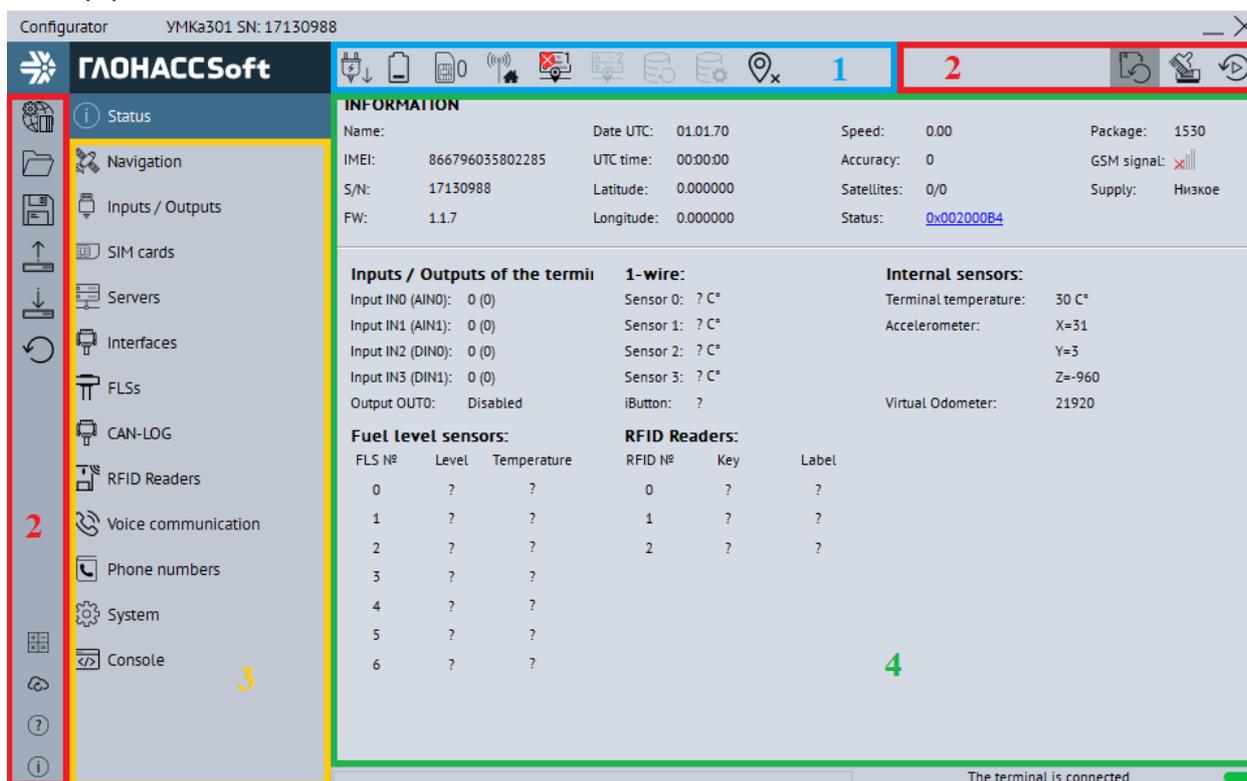


Figure 3.8 Startup window "Status"

At startup, the configurator connects to the update server and checks for updates for the configurator and the tracker firmware.

If there is an available configurator update, a window with the information about the version of the update will appear (3.9). Click "Yes" to download the update. The update will be downloaded and installed automatically, then the program will be restarted.

You can also check for updates manually, by clicking the  "Check for updates" icon on the toolbar.



Attention! To ensure steady operation of the tracker, one should always update the tracker to the latest firmware version.

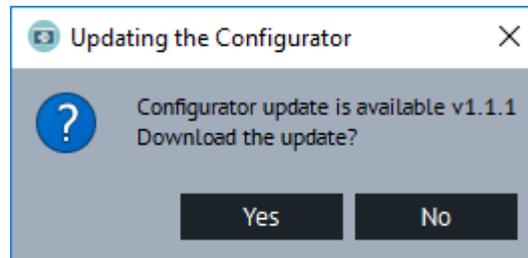


Figure 3.9 Updating the configurator



Attention! If any problems with the configurator auto-update occur, try running the configurator as an administrator. To do so, right-click the "UMKa3XX Configurator" shortcut and select "Run as administrator" in the opened context menu.

In 3.2 the purposes of the toolbar and status icons are described.

Table 3.2 Toolbar and status icons

| Icon | Purpose |
|---|--|
|  | Open a configuration file. |
|  | Save a configuration file. |
|  | Remote configuration |
|  | Read a configuration from the tracker. |
|  | Write a configuration into the tracker. |
|  | Reconnect the tracker. |
|  | Update the tracker. When updates are available, icon gets darker. |
|  | Cleaning the tracker memory. Enables erasing of the user settings and the "black box". |

| | |
|---|--|
|  | Reboot the tracker. |
|  | Status calculator. |
|  | Check for updates. |
|  | Help (maintenance manual). |
|  | About program. |
|  | Supply voltage (Normal/High/Low) |
|  | Battery voltage (Low/High) |
|  | Active SIM card number (SIM0/SIM1) |
|  | Roaming (Guest Network/Home Network) |
|  | Connection to the primary server (Link up/Link down) |
|  | Connection to the alternate server (Link up/Link down) |
|  | Connecting update server |
|  | Coordinates (Not valid / Fixed / Valid) |
|  | Connecting configuration server |

To view and edit tracker settings, use the settings tabs (Figure 3.8). When clicking a tab in the data display window, one can view the corresponding values and settings and edit them.

For remote configuration, click  "Remote configuration" icon in the upper left of the configurator, enter the tracker password and IMEI in the popup window, then click "Connect" button. Further, operating the configurator is no different from configuring via USB.

To write the changed settings into the tracker, use  "Write a configuration into the tracker" icon.

When configuring multiple trackers, to speed the procedure up one can save the configuration of the first tracker to the file by clicking  "Save a configuration file" icon; and then load the settings into the next trackers by clicking  "Open a configuration file" and  "Write a configuration into the tracker".

For help information click  "Help" on the toolbar.

To view information about the configurator, click  "About Program" icon on the toolbar.

3.4. "Status" tab

General information about the tracker, tracker input and output statuses, internal and external sensors is displayed in the "Status" tab (Figure 3.8).

General information about the tracker is at the top of the data display window. Here one can see the tracker serial number, its name and IMEI, the current firmware version and navigation information. In the "Validity of coordinates" line two values can be displayed: 0 - coordinates are not valid and 1 - coordinates are valid.

By clicking on the value displayed in the "Status" line, one can open the "Status calculator" window (Figure 3.10) displaying the parameters of the current tracker status (active SIM card number, coordinate fixation status, "black box" status, battery status, etc.). You can also call the status calculator by clicking on the  "Status Calculator" icon on the toolbar.

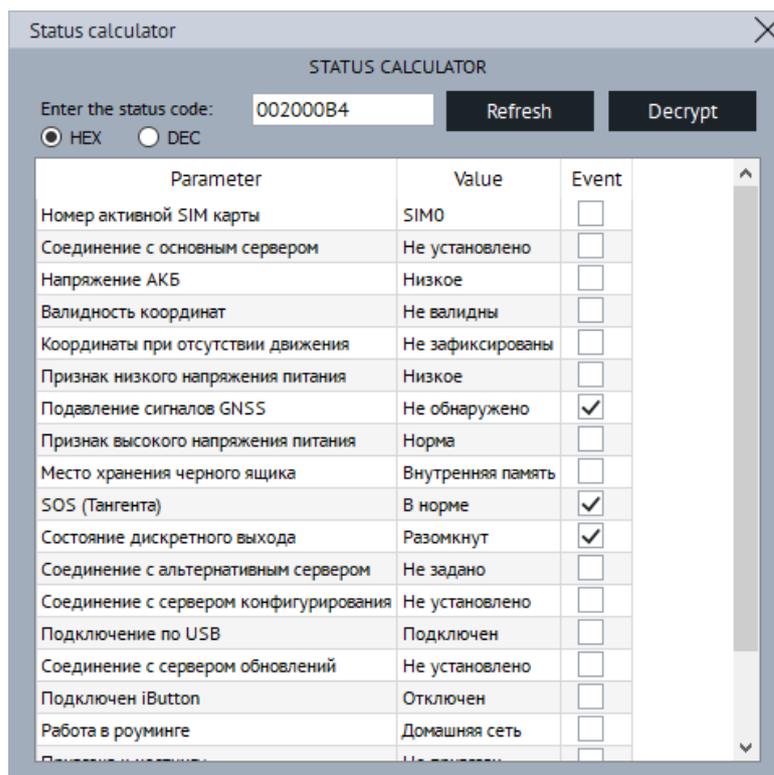


Figure 3.10 Status calculator

3.5. "Navigation" tab

To set the route drawing quality and the spot recording periods, use the "Route drawing quality" option group in the Navigation tab (Figure 3.11). Please note, that the higher the drawing quality gets, the more GPRS-traffic increases. This may entail additional communication costs (in accordance with the operator tariffs).

The "Minimum speed" option is for setting the speed value, exceeding of which assumes the vehicle is in motion.

The "Angle in degrees" option is for setting the value of the steering angle, exceeding of which leads to recording the next track spot.

The "Distance" option is for setting the value of the maximum straight-line driving distance between track spots, exceeding of which leads to recording the next track spot.

The "Acceleration" option is for setting the value of the acceleration, exceeding of which leads to recording the next track spot.

The option "Recording period setting" is for setting the maximum period between spot recordings in the moving and parked vehicle.

Option group "Static Navigation" allows positioning of the vehicle at stops. This helps to filter the "coordinates crowding" or "stars" arising out of navigational errors of the GNSS module, and eliminate redundant GPRS traffic.

The stop can be detected in two ways: using built-in accelerometer or reading discrete input status.

The "Positioning by accelerometer" option enables the mode wherein positioning is performed using the accelerometer. When the option checked, the "Vibration threshold" and "Mode switching timeout, sec" options become available.

"Vibration threshold" option is for setting the vibration level, which can be a guaranteed sign of the vehicle engine operation. 1000 units correspond to the vibrational acceleration of 1g.

"Mode switching timeout, sec" option specifies the time of switching to the positioning mode after the vibration level is reduced below the set threshold.

The option "Positioning by the input" enables the mode of positioning by the logical level on one of the inputs. When the option checked, the options "Input for static navigation" and "Logical level of input" become available.

"Input for static navigation" option is for setting the number of the input used for detection of the vehicle engine operation.

"Logical level of input" option is for setting the logic level of the signal that the input receives when the vehicle engine is stopped.



Attention! If the “Positioning by the input” option is on, then the input selected in the “Input for static navigation” option should be set as a “Discrete input with a pull-up to GND” or “Discrete input with a pull-up to VDC” in the “Inputs/Outputs” tab.

When configuring the mode of static navigation by the digital input and enabling the static navigation by accelerometer, the positions are fixed only if both channels register the parking mode. Thus, positions are not fixed if the ignition is off, but the vibration level is higher than the set one and vice versa.

The "Validity of Coordinates" option group is for setting the validity of the coordinates. The validity (i.e., reliability of coordinates) is determined on the basis of the number of visible satellites and the HDOP level (horizontal dilution of precision, depending on the location of the satellites in the sky).

The "Maximum HDOP" parameter is used to set the maximum HDOP value, when exceeded, the coordinates will be transmitted as invalid regardless of the number of visible satellites.

"Max. HDOP at min. satellites" option is for setting the maximum HDOP value, when exceeded, the coordinates will be transmitted as invalid if the number of satellites is less than the one set in the "Minimum number of satellites" option.

"Minimum number of satellites" option is for setting the minimum number of satellites, below which the coordinates will be transmitted as not valid if the HDOP level is higher than the one set in the "Max. HDOP at min. satellites".

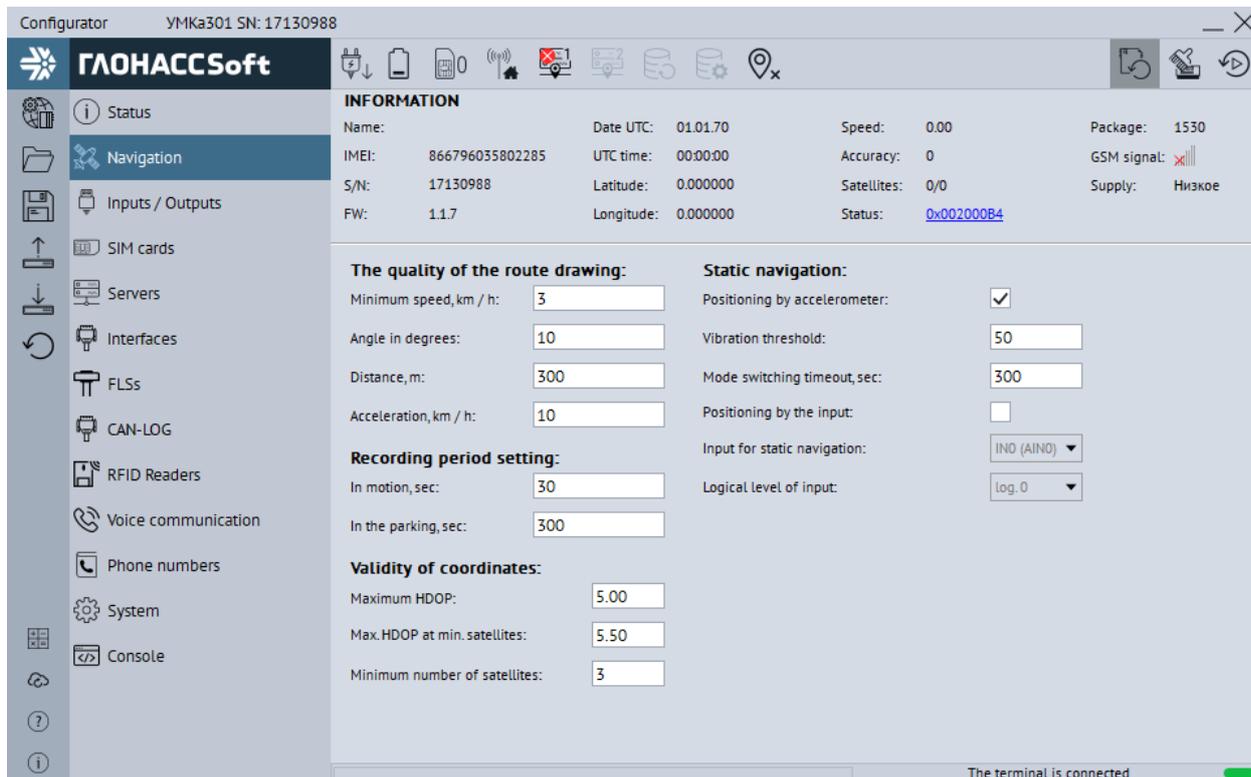


Figure 3.11 “Navigation tab”

3.6. “Inputs/Outputs” tab

“Inputs/Outputs” tab is used for configuring the inputs (3.12). The “Discrete input with a pull-up to GND” and “Analog” modes are available for the analog inputs. In the “Discrete input with a pull-up to GND” mode the levels of the logical high and logical low are set, within the range of 0 to 40000 mV. The level of the logical low cannot be higher than the level of the logical high. The following modes are available for the digital outputs: “Discrete input with a pull-up to GND”, the “Discrete input with a pull-up to VDC”, “Rotary encoder”, “Frequency meter” modes, and the flowmeters mode as well.

The difference between the DFM and VZP flowmeters is in the necessity of the input pull-up to the VDC. For DFM flowmeters there is no need to enable the pull-up, and when VZP flowmeter is selected the internal (tracker) pull-up to the VDC gets enabled. Differential VZP and DFM flowmeters have the same special features.

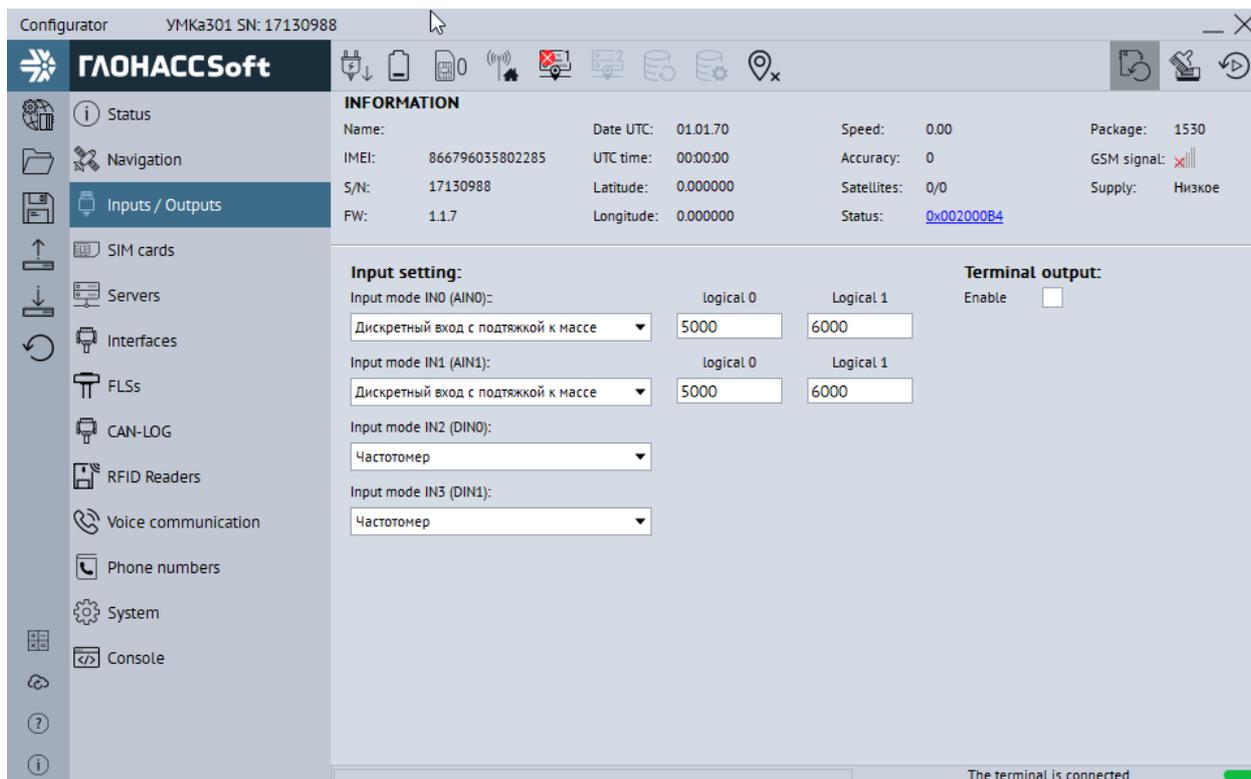


Figure 3.12 “Inputs/Outputs” tab

3.7. “SIM cards” tab

It is possible to install two SIM cards in the tracker (or a SIM chip instead of the SIM0 and a second SIM card). To configure SIM card access (PIN) and GPRS connection use “SIM cards» tab (Figure 3.13).

All the Internet access information (APN, login, password) can be obtained from the mobile operator. For the widespread operators, one can select a fit profile, which settings are automatically loaded.

If there is a need to use the SIM card in the roaming mode, check "Enable roaming" option.



Attention! tracker operation in roaming can entail additional expenditures according to the tariff of the operator!

It is also possible to set the SIM-cards use priorities in the option "SIM card operation mode". In this case, the tracker uses the network of the higher-priority operator, and if

there is a lack of coverage connects to the lower priority network. Later, if the network of the higher-priority operator is re-detected, the tracker switches back to it.

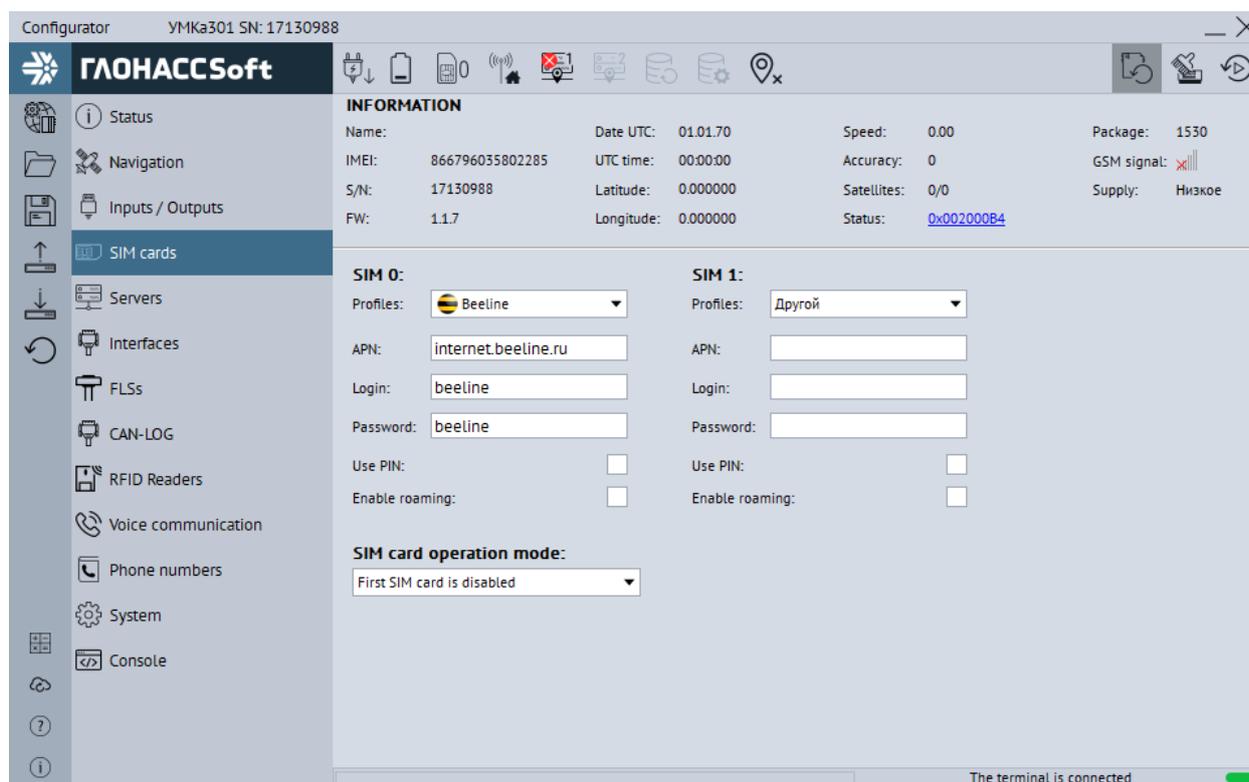


Figure 3.13 “SIM cards” tab

3.8. “Servers” tab

Server connection is configured in the “Servers” tab (Figure 3.14), where one should enter server IP address (or domain) and server port.

It is possible to specify an alternative address for the navigation server in the "Alternate server" field, to which the tracker will be connected if the primary address is not available.

The "Advanced Options" group administers the recording and transmitting the data from internal and external sensors to the server. If there is no need to send some of the parameters, then uncheck the corresponding options. In doing so, one reduces the traffic volume and increases the capacity of the “black box”.

"Protocol" option allows selecting the data transfer protocol.

"Uploading order" option determines in which order the data will be uploaded to the server when successfully connected. There are two available option choices: "From old to new" (sequential transmission of packages) or "Current first" (priority transmission of the current positioning data).

The "Online mode" option group configures the grouping of several spots into one packet, the time interval between packet transmissions, and it also allows to set the maximum size of the transmitted packet.

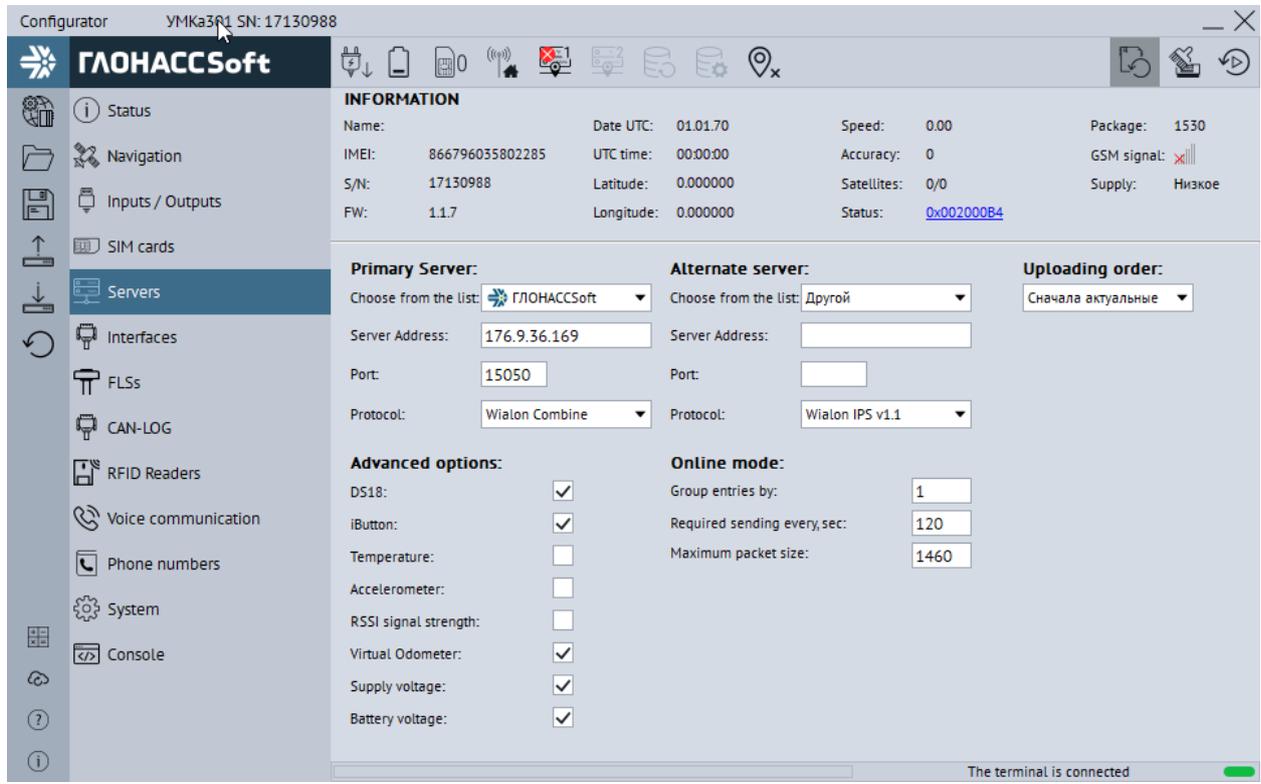


Figure 3.14 "Servers" tab

3.9. "Interfaces" tab

In order to connect RS-485 or RS-232 devices to the tracker, use the "Interfaces" tab (Figure 3.15). If the tracker version does not have RS-232 interface, then the "RS-232" field will not be available for editing.

In this tab, one can select the type of device to be connected to any of the given interfaces (for example, FLS, CAN-Log etc.). To do so, select the suitable mode in the "Mode" dropdown menu, and specify the interface operating speed in the "Speed" dropdown menu.

The "Transparent Mode" option group allows to connect directly to the device or module of the tracker via the console or third-party utilities using the tracker as a USB-RS232 / 485 adapter.

"Source" option allows selecting an interface from the dropdown menu.

"Speed" option allows specifying the interface operating speed from the dropdown menu.

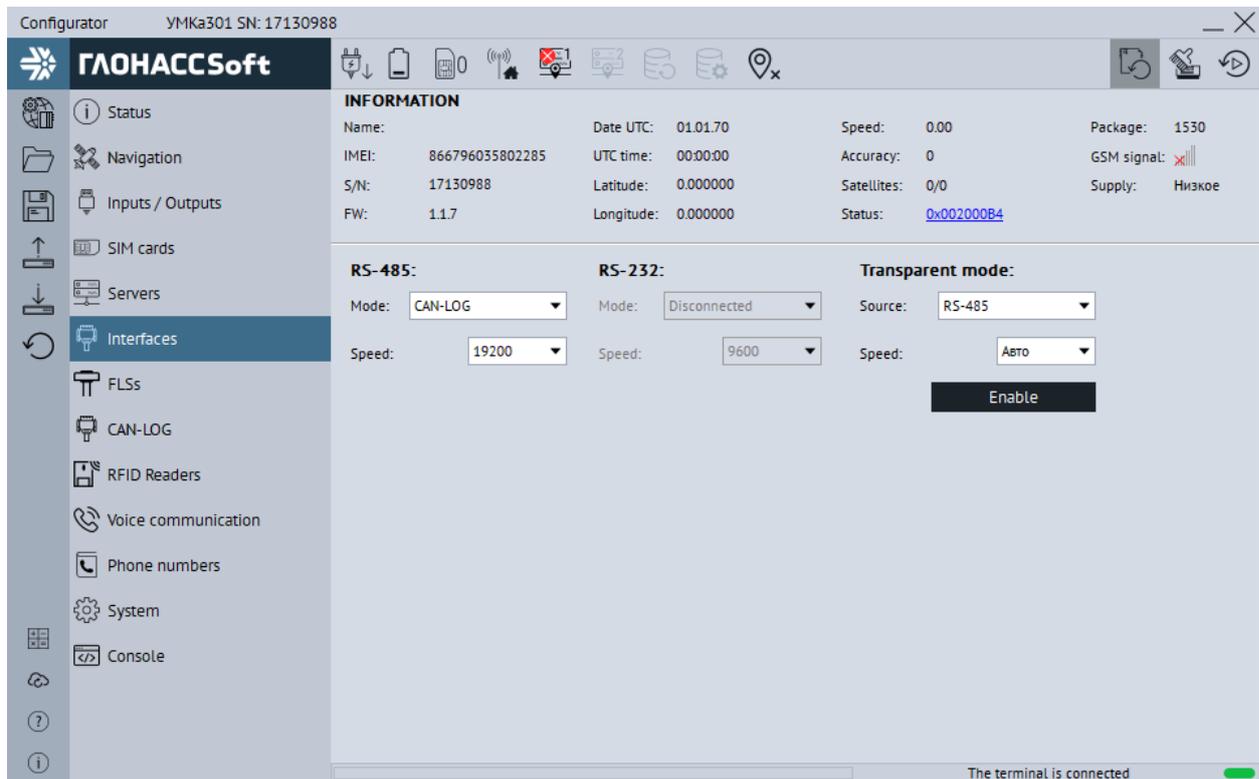


Figure 3.15 “Interfaces” tab



Attention! In transparent mode, the tracker does not respond to commands, but retransmits them to the interface. To exit the "transparent mode", one must physically disconnect the USB port from the PC.

3.10. “FLSs” tab

In order to configure and obtain the data from the fuel level sensors with RS-485 interface, use “FLSs” tab (Figure 3.16), first assign addresses to each of the sensors in the appropriate field. To assign the addresses in the tracker, it takes only to enter them in "RS-485 FLS addresses setting" field and write the configuration into the tracker. The configurator automatically displays the connected sensors and the parameters they provide.

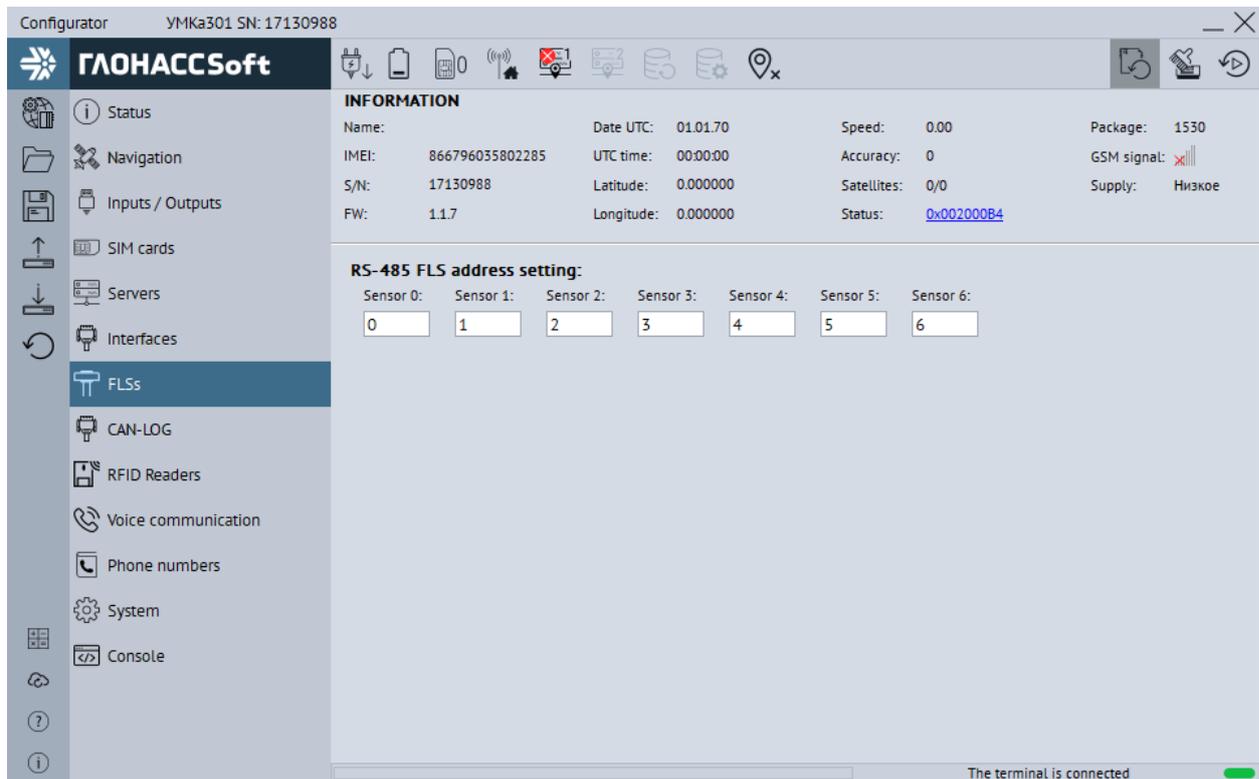


Figure 3.16 “FLSs” tab



Attention! Beforehand, switch one of the available interfaces into the "FLS via LLS" mode in the "Interfaces" tab, set the "Speed" option to "19200" and write the configuration into the tracker.

3.11. “CAN-LOG” tab

The tracker supports the transmission of data received from the CAN-LOG controller or from another compatible one (ref. Section 2.18). “CAN-LOG” tab is used for configuring the data transmission to the server (Figure 3.17).



Attention! Beforehand, switch one of the available interfaces into the "CAN-LOG" mode in the "Interfaces" tab, set the "Speed" option to "9600" and write the configuration into the tracker.

Check the "CAN-LOG polling" option, this done the current parameter values transmitted via the CAN bus will be displayed in the corresponding lines.

The parameters "Car alarm system", "Failure controllers", "Farm equipment status" are of the "bit field" type. To see the values of these parameters in detail, click the "Detail equipment status" button, after that done a supplemental window will open (0).

In the "Equipment status» window, vehicle equipment statuses are displayed in the form of black and white icons for inactive parameters and colored icons for active ones. When you point to the icon, a tooltip will appear, explaining its function.

The option "Send to server" is available for each of the parameters. Check the parameters to transfer, taking into account that the more parameters are checked, the more the GPRS traffic volume gets, and the less capacity of the black box is available.

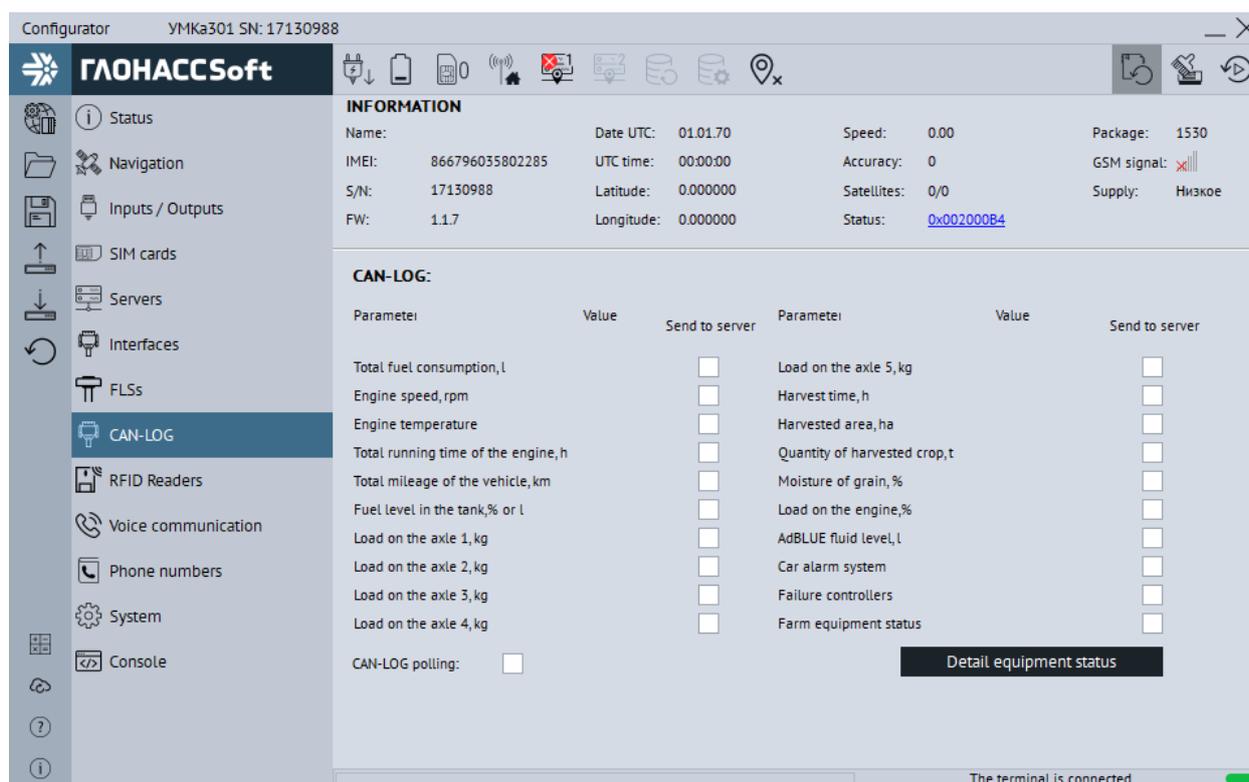


Figure 3.17 "CAN-LOG" tab

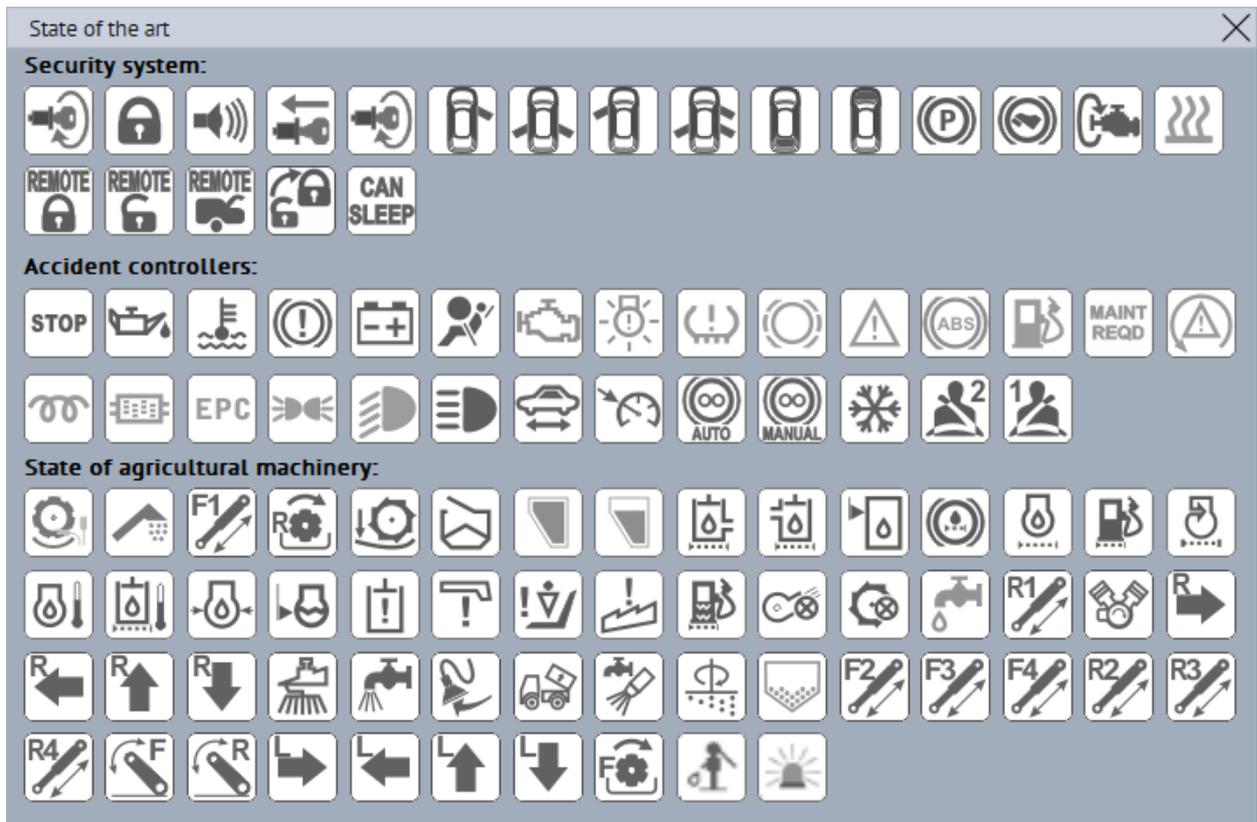


Figure 3.18 "Equipment status" tab

3.12. "RFID reader" tab

In order to configure and obtain the data from the RFID readers with RS-485 interface, use "RFID reader" tab. To assign addresses to readers in the tracker, it takes only to enter them in "RFID addresses setting" field and write the configuration into the tracker.



Attention! Beforehand, switch the RS-485 interface into the "RFID" or "FLS via LLS" mode, set the "Speed" option to "19200" and write the configuration into the tracker. Reader addresses should differ from FLS addresses.

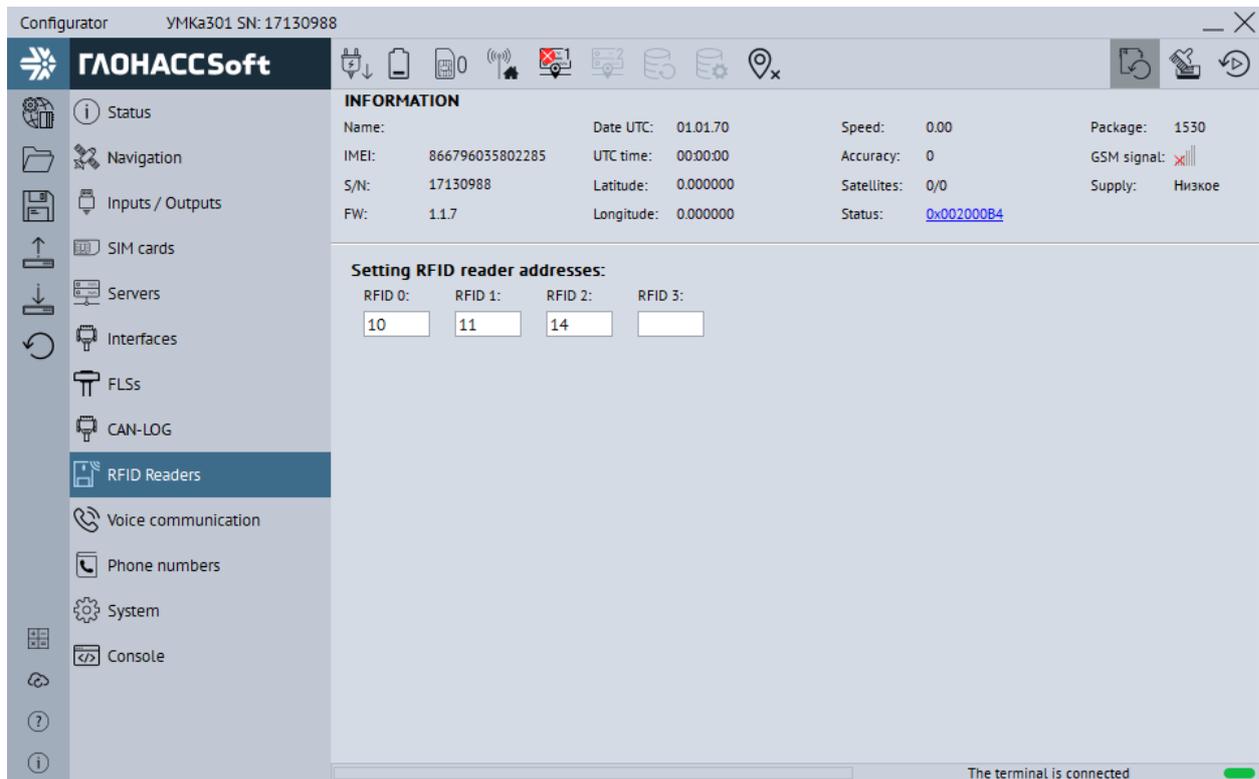


Figure 3.19 "RFID reader" tab

3.13. "Voice communication" tab

To set the speaker and microphone parameters, as well as to specify the list of phone numbers, use the "Voice communication" tab.

The "Push-to-talk parameters" option group is for adjusting the speaker volume and microphone gain. To do this, move the corresponding slider to the desired position.

The "Call settings" option group is for setting the number of the tones required to enable auto answering in the option "Auto answering after:", the ringer volume and select a ringtone from the dropdown menu.

The "Incoming white list" option is for adding, editing and deleting phone numbers from which the device will receive calls. Please note that one can list only five phone numbers. To overcome the restrictions imposed by the list, enable the "Receive from any phone number" option. In case the list is empty and the option "Receive from any phone number" is unchecked, the device will not receive calls.

The "Dial list" option is for adding, editing and deleting phone numbers to which the device can make an outgoing call. Please note that one can list only five phone numbers. To enable the ability to make outgoing calls, check the "Allow outgoing calls" option; otherwise, even if there are phone numbers in the list, the call will not be made.

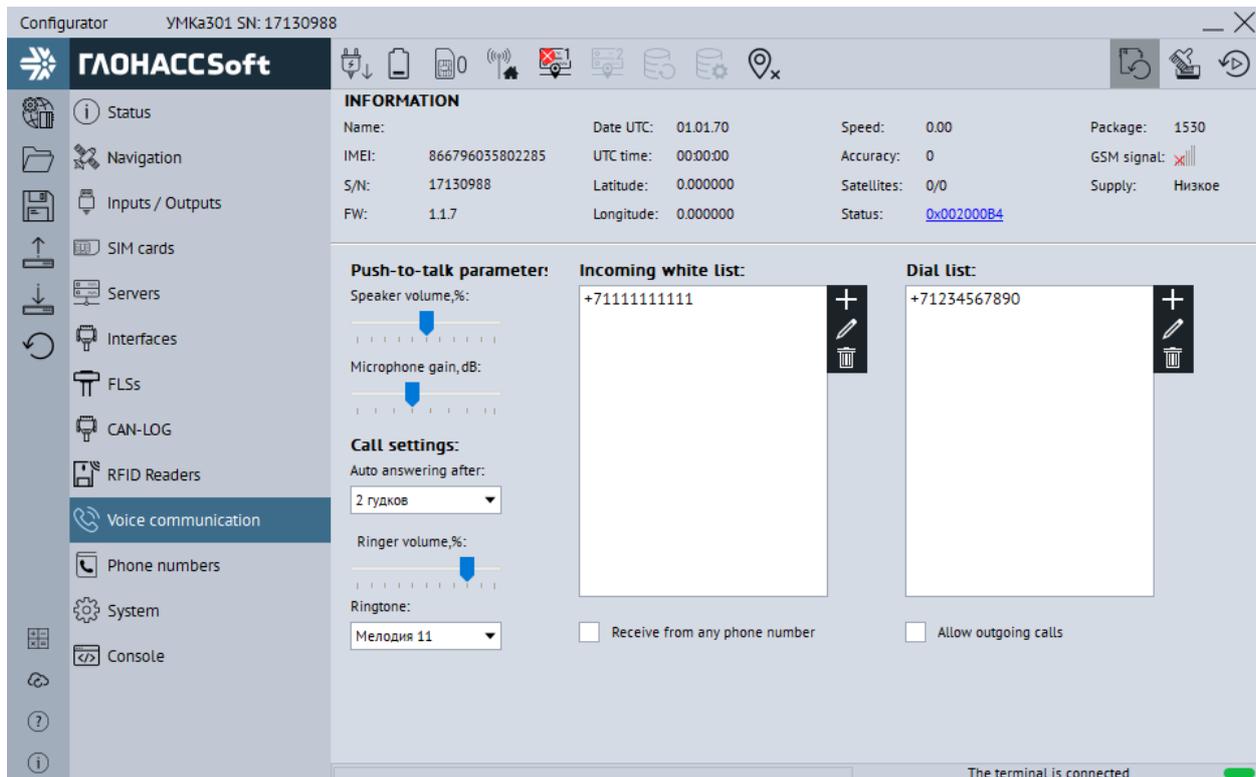


Figure 3.20 “Voice communication” tab

To accept or end an incoming call, press the pluggable push-to-talk button.

To dial the phone number from the list, press the pluggable push-to-talk button. The number of pressings determines the sequence number of the dialed phone in the list.

The long press of the push-to-talk button changes the status of the Bit 15 of the “status” parameter. If necessary, this Bit can be committed to the “SOS” function on the telemetry server.

3.14. “Phone numbers” tab

For adding, editing and deleting phone numbers with the access to the tracker configuration, use the “Phone numbers” tab (Figure 3.21). Please note that number of phone numbers is limited to five.

To add a phone number press **+** “Add”, enter the phone number in the dialogue-box field and press “OK” (Figure 3.22).

To edit a phone number select the number from the list and press **✎** “Edit”, enter the phone number in the dialogue-box field and press “OK” (Figure 3.22).

To delete a phone number select the number from the list and press **🗑** “Delete”, press “Yes” in the dialogue-box (Figure 3.23).

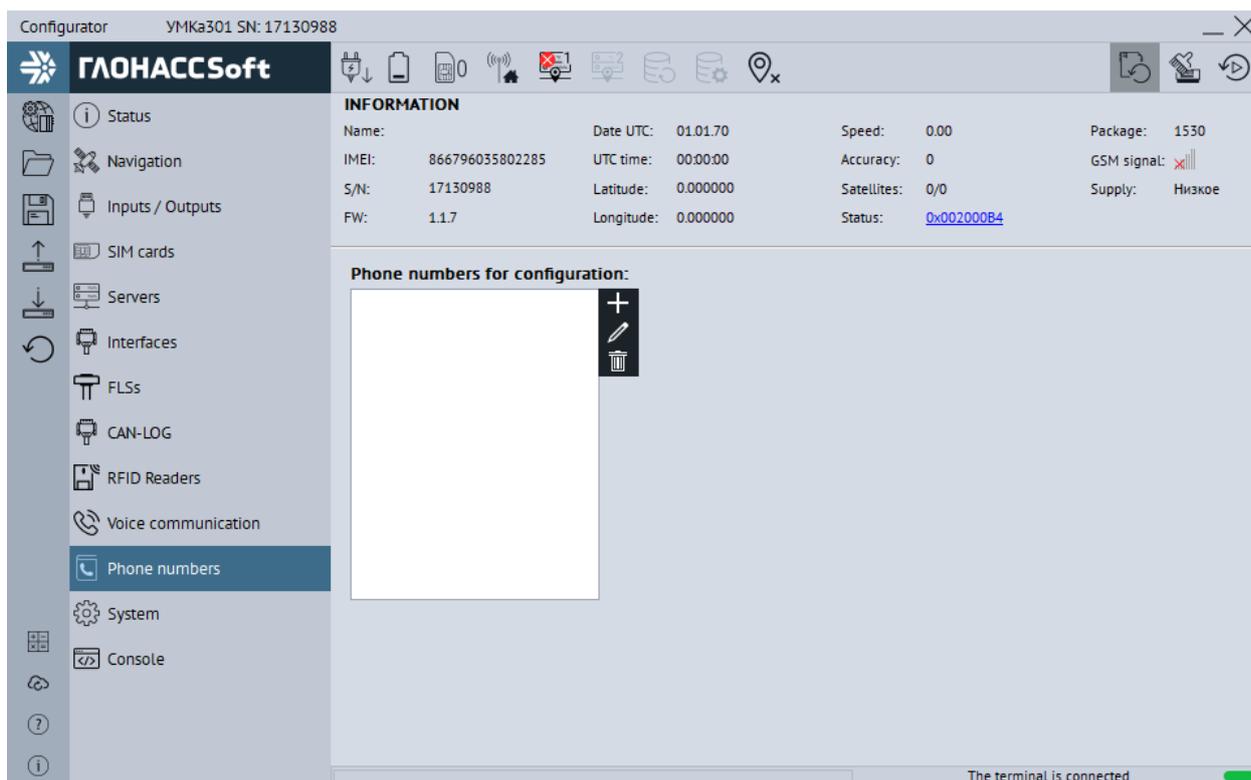


Figure 3.21 “Phone numbers” tab

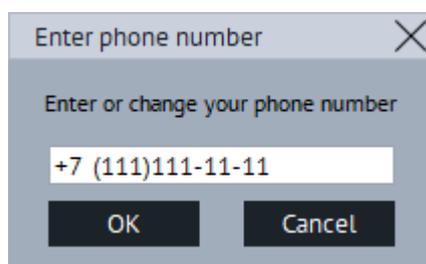


Figure 3.22 Phone number enter/edit dialogue-box

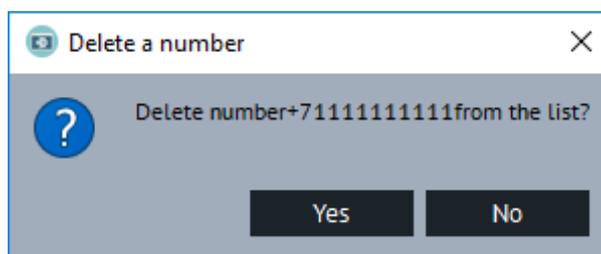


Figure 3.23 Phone number delete confirmation dialogue-box

3.15. “System” tab

For configuring tracker access, use the “System” tab (Figure 3.24), where one can assign the tracker name and access password. The same password is used for remote configuring and configuring the tracker via SMS commands. In order to change the

password, one must click the "Change password" button. The name can be changed without confirmation.

To configure power saving, use the "Power Management" option group.

Check the "Fast Charging" option to turn on the battery fast charging mode. The description of the mode can be found in the section "Power Manager".

Use the "Battery capacity, mA" option to set the capacity of the battery installed for proper operation. Available values fall within the range of 250 to 1100 mA.

Use the "Battery life, sec" option to set the limit for the tracker battery life in seconds. When the value is set to "0", the tracker will continue to operate for as long as possible. The maximum value of the parameter is 84600 sec.

Use the "Idle mode timeout while on battery, sec" option to set the timeout for switching to idle mode (IDLE) when operating from the battery.

Use "Standby mode timeout, sec" option to set the timeout for switching standby mode (STANDBY). Available values fall within the range of 1 to 592,200 seconds. If you set the value to "0", the switching to the standby mode does not occur.

Use the "Idle mode timeout, sec" option to set the timeout for switching to idle mode (IDLE). Available values fall within the range of 1 to 86400 seconds. If you set the value to "0", the switching to the idle mode does not occur.

Use the "LED indication" option to configure the tracker LED indication. When the option is checked, the LED indication operates in the normal mode. When the option is unchecked, the indication is disabled (except for the green LED).

To configure the black box, use the "Black box" option. One can use the drop-down menu "Storage location" to select the black box storage location. The function is available for the trackers provided with MicroSD card support.

To enable permanent remote configuration, check the "Permanent connection" option in the "Remote configuration" option group. When this option is checked, the tracker being online will be permanently connected to the configuration server while waiting for the configurator to connect.



Attention! This option can be enabled only if a password other than the default password is set.

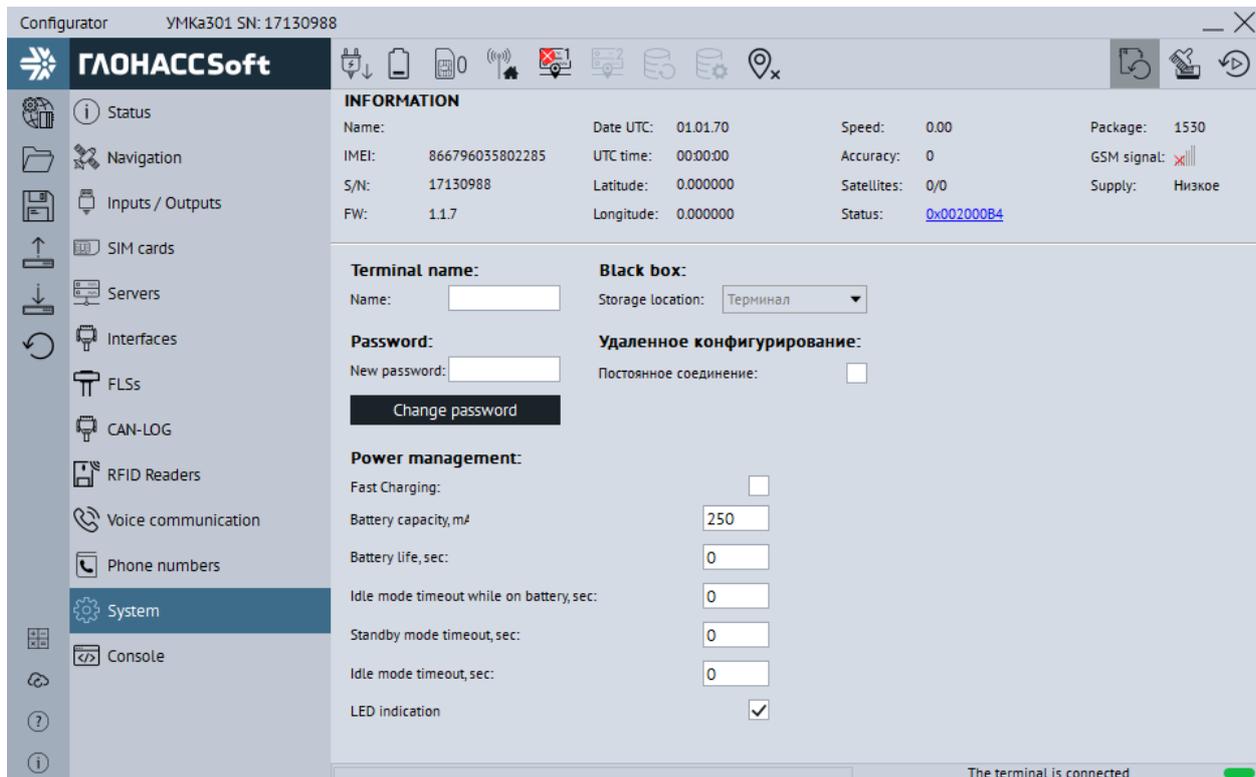


Figure 3.24 “System” tab

3.16. “Console” tab

Use the “Console” tab to enter the commands manually (Appendix A) and for the tracker troubleshooting (Figure 3.25).

Commands are entered in the field at the bottom of the window. When typing, the previously entered commands are displayed. To speed up entering process, one can select one of them. All previously entered commands are as well available in the dropdown list.

The command is sent by pressing the "Enter" key or the "Send" button.

The sent commands and their outputs are displayed in the main window. Therein, the symbol ">" is displayed in the command row, and the symbol "<" - in the result row.

To clear the console select the option "Clear Log" from the rightclick menu.

To save the contents of the console select the option "Save to file" in the rightclick menu.

To test the operation of individual modules or the tracker as a whole, one can press the "Troubleshooting" button. As a result, a dialogue-box will pop up (Figure 3.26) containing the "Source" option with the field for selecting a module and the “Level” option with the field for selecting a message level filter ("Level"). Click the "Apply" button, and debug messages will be displayed in the main window.

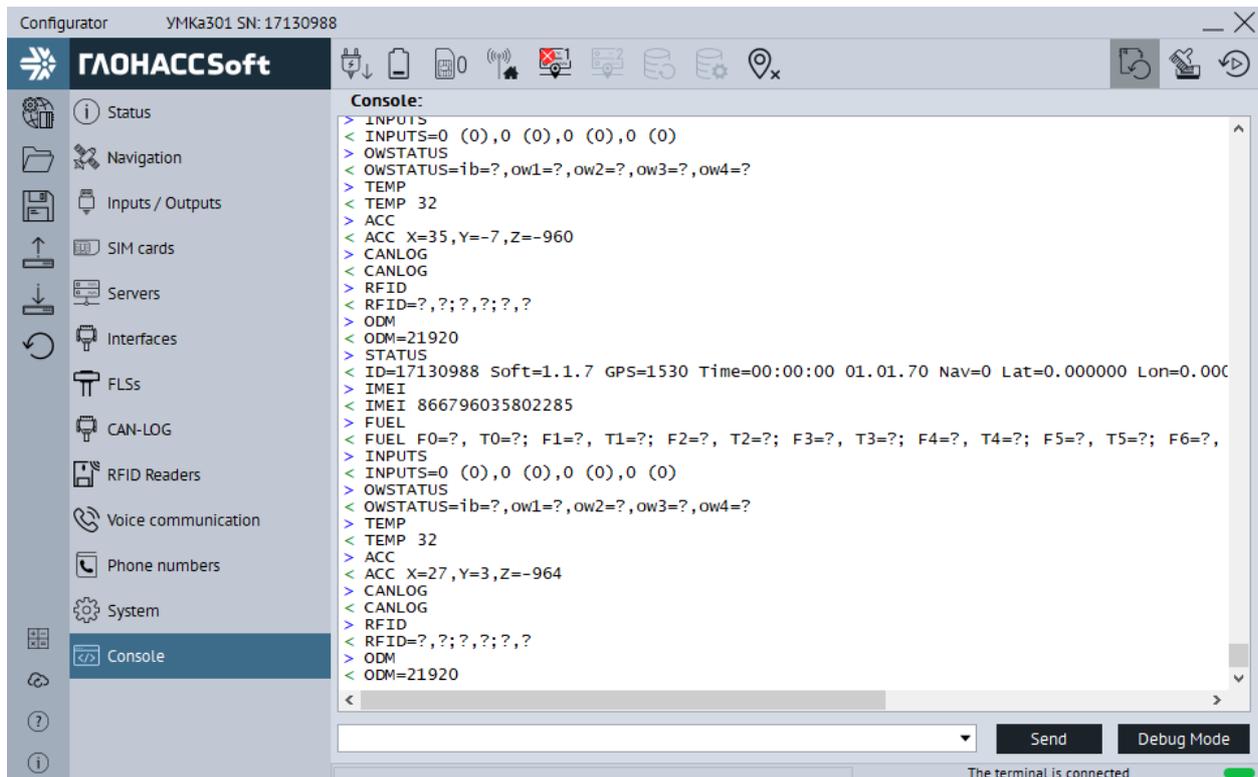


Figure 3.25 “Console” tab

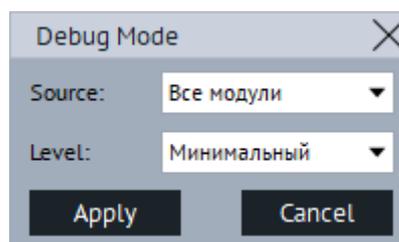


Figure 3.26 “Troubleshooting” dialogue-box

3.17. Configuring via SMS

It is possible to perform tracker configuration and troubleshooting via SMS. The tracker will respond to every sent command described in Appendix A. Before starting tracker configuration via SMS, one must authorize the phone number from which the command will be sent. To do so, send the AUTH command from it.

For instance, “AUTH 0” command, where “0” is a default password, authorizes the phone number, which sent the SMS. “AUTH OK +7XXXXXXXXXX” message will be sent in respond to this command. In order to delete the second phone number from the list, use “AUTH 0,2,-” command, where “-” signifies “delete the phone number”.

Thus, some of the commands have mandatory and optional parameters to specify, this in turn simplifies the configuration. To get detailed information on the list of commands and their purpose see Appendix A.

4. MALFUNCTION

Information about typical malfunctions, that arise when configuring and debugging the trackers and methods for their elimination, can be found in Appendix B of this document. Beforehand, it is advised to read the sections "INSTALLATION", "OPEARTING INSTRUCTIONS" very carefully, and the operator's manual on the navigation system as well.

5. INDICATIONS OF USE

5.1. Safety instructions

Installation of the trackers should be carried out by specially trained technicians with the knowledge of the fundamentals of electrical engineering and safety.

Installation should be performed under normal illumination and in the absence of rain.

When connecting the tracker to an auxiliary equipment (FLS, flowmeters, etc.), one should follow the maintenance manuals for this equipment.

5.2. Operational constraints

Operational constraints of the trackers are imposed by limiting values of the technical characteristics specified in the passport of the VBRM 004.000.000 PS product (VBRM.014.000.000 PS for UMKa301) and in technical specifications TU 26.30.11-001-29608716-2017.

5.3. Technical maintenance

Technical maintenance (hereinafter referred to as TM) of the product must be performed in compliance with the technical specifications TU 26.30.11-001-29608716-2017.

TM is carried out with the purpose of maintaining the operability or integrity of the product during its entire service life.

While in use, the product should go through the following types of TM:

- periodic maintenance;
- preventive maintenance;
- corrective maintenance.

Periodic maintenance is performed at least once a year.

Preventive maintenance includes a technical survey of the product. Technical survey is performed with an interval of 2 years or after the repair or modernization of the product.

Corrective maintenance is performed immediately when a malfunction is detected.

When maintaining the product, it is necessary to follow safety instructions specified in 5.1 paragraph of this manual.

All tests should be carried out under normal conditions:

- air temperature (25 ± 10) ° C;
- relative air humidity of 45 to 80%;
- air pressure of 630 to 800 mm Hg.

It is allowed to perform maintenance under other conditions, if they fall within the permissible range. In this case, the values of parameters characterizing these conditions should not exceed the value limits of operating conditions for the instrumentation (measuring instruments).

When troubleshooting the product, follow the instructions in Section 3 and Appendix B of this MM.

The product repair is performed by the manufacturer.

5.4. Transportation and storage

When transporting and storing, follow the technical specifications of TU 26.30.11-001-29608716-2017. Transportation by water (river or sea) is carried out in a sealed package or in dry sealed compartments or containers. Transportation by air is carried out in the sealed compartments. After transporting the tracker at subzero temperatures, it is necessary to keep it at room temperature for 24 hours.

If the battery is included in the packaging of the tracker, one should also follow industry standards GOST R IEC 62133-2004. And it is necessary to study the guidelines of the battery manufacturer, where maintenance and storage conditions for the batteries should be specified. Failure to comply with these guidelines leads to a shorted battery lifetime or its breakdown. Before everything else, pay heed to these crucial factors: the operational temperature and long-term storage conditions.

Besides, please keep in mind that mobile operators can impose some extra restrictions on the use of the SIM cards and SIM chips inactive for a long period of time.

5.5. Manufacturer warranty

The manufacturer guarantees 12 months of the tracker operability from the sale date, but no more than 18 months from the manufacture date, provided the consumer comply with the conditions and rules of transportation, storage, installation and operation.

Warranty for backup batteries (see device versions in Table 2.1) is for 6 months from the sale date, but no more than 12 months from the manufacture date.

The warranty does not cover:

- trackers with mechanical damages and defects (cracks and nicks, dents, traces of blows, etc.), due to the fault of customers due to violating operating, storage and transportation conditions. If there are traces of corrosion or other signs of water exposure;

- trackers without casing;

- trackers with the signs of an unauthorized repair;

- trackers with electrical and/or other damages due to the invalid condition of the external electrical circuit or misuse of the tracker;

- trackers that failed due to unauthorized software updates.

The average service life of the subscriber tracker is 5 years.

5.6. Claim information

The manufacturer does not accept claims when the products have failed due to the fault of the customers due to improper operation and failure to comply with the instructions of this manual, and violation of transportation conditions by freight companies.

Manufacturer contacts:

OOO Internet Veshchey

Ul. Zipovskaya, d. 5, korp. 1, liter 2B

Krasnodar, Krasnodar Krai

Russia

350010

Manufacturer Website: <http://glonasssoft.ru>

Technical support: <http://help.glonasssoft.ru>

Phone number: 8(800)700 82 21

APPENDIX A. Table of supported SMS commands

| No | Command | Reply | Arguments | Description | Versions |
|----|--|--|--|---|-----------------|
| 1 | AUTH X,Y,Z Example: AUTH 1234 AUTH 0,2 AUTH 0,1,+79001234567 AUTH 0,1,- | AUTH OK Z Example: AUTH OK +79001234567, AUTH FAIL +79001234567 | X – password (by default 0). Y=0..4 – memory location for storing a phone number (optional argument), Z=phone number in format “+7xxxxxxxxx” to be written in the memory location (optional argument, used when sending the command via GPRS and USB). Z=- -delete a telephone number in the specified memory location | Authorize the phone number which sent the SMS or the explicit phone number Z, and write in into the first free location or into Y location. Authorization is only required for the tracker configuration via SMS. Numbers are always entered and displayed in an international format. Example: +79001234567 | 0.3.1 or higher |
| 2 | PHONES X Example: PHONES 1234 | PHONES (0)= (1)= (2)= (3)= (4)= Example: PHONES (0)= (1)= +798765432101 (2)= (3)= (4)= | X – password | Display the list of authorized phone numbers. Password is required for SMSs from unauthorized phone numbers. | 0.3.1 or higher |
| 3 | STATUS | Example: ID=0 Soft=0.3.0 GPS=0 Time=08:33:18 09.02.17 Nav=1 Lat=44.016106 Lon=39.173347 Speed=45.50 SatCnt=9+4 RSSI=-81 Stat=0x00000000 | Command without arguments | Current tracker status request. ID – serial number, Soft – software version, GPS – current phone number of data package, Time – current date and time GMT, Nav – coordinates validity, Lat – latitude, Lon – longitude, Speed – velocity, SatCnt – number of satellites (GPS+ГЛОНАСС), Stat – status. | 0.3.1 or higher |
| 4 | PASS X,Y Example: PASS 0,1234 | PASS OK PASS FAIL Example: PASS OK | X – Old password, by default X=0. Y – New password. | Password setting. | 0.3.1 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---|--|---|-----------------|
| 5 | IMEI Example: IMEI | IMEI Example: IMEI 866104027972994 | Command without arguments | Display IMEI of the GSM module, installed in the tracker. (Available at any time. The copy is saved in the configuration). | 0.3.1 or higher |
| 6 | SETGPRS0 X,Y,Z Example: SETGPRS0 internet.beeline.ru,beeline,beeline | GPRS0: APN=X, user=Y, pass=Z Example: GPRS0: APN=internet.beeline.ru, user=beeline, pass=beeline | X – access point, by default X=internet.beeline.ru Y – login, by default Y=beeline Z – password, by default Z=beeline | Setting GPRS parameters for the SIM card №0. Command without arguments returns the current GPRS setting. | 0.3.1 or higher |
| 7 | SETGPRS1 X,Y,Z Example: SETGPRS1 internet.mts.ru,mts,mts | GPRS1: APN=X, user=Y, pass=Z Example: GPRS1: APN=internet.mts.ru, user=mts, pass=mts | X – access point Y – login Z – password | Setting GPRS parameters for the SIM card №1. | 0.3.1 or higher |
| 8 | SETSERV X:Y,N:M Example: SETSERV 176.9.36.169:15002, hosting.glonasssoft.ru: :15002 | SERVER=X:Y,N:M Example: SERVER=176.9.36.169:15002 SERVER=176.9.36.169:15002, hosting.glonasssoft.ru:15002 | X,N – server IP address or domain name, Y,M – server port | Setting IP address or domain name for the primary and alternate servers, to which the tracker gets connected to transfer data. Addresses and ports are separated by colon. If the alternate server is not specified, it is off. Command without arguments returns the current addresses/domain names, and ports either for both servers or for the primary server only. | 0.3.1 or higher |
| 9 | PERIOD X,Y | PERIOD X,Y Example: PERIOD 30,300 | X – The recording period while driving, sec Y – The recording period at stops, sec. | Setting the recording period for data packages while driving and at stops in seconds. | 0.3.1 or higher |
| 10 | TRACK X,Y,Z,A | TRACK X,Y,Z,A Example: TRACK 3,10,300,10 | X – minimum velocity Y – angle in degrees Z – distance in meters A – acceleration in km/h | The command sets tracing quality. New spot is recorded when vehicle-course angle exceeds Y, or the distance to the previous | 0.3.1 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---|---|--|-----------------|
| | | | | point is larger than Z, or acceleration is bigger than A. | |
| 11 | RELOAD | Reloading... | Command without arguments | tracker reload. | 0.3.1 or higher |
| 12 | RESET | Reloading... | Command without arguments | tracker reset. | 0.3.1 or higher |
| 13 | WHO | DEV: UMKa300 FW: 0.2.26 SN: 17001234 OPT: None IMEI: 866104027988164 | Command without arguments | Returns the tracker data. | 0.3.1 or higher |
| 14 | NAME X Example: NAME SuperCar NAME - | NAME "X" Example: NAME "SuperCar" NAME "" | X – tracker name, '-' character resets the name to blank | Setting tracker name. The name may contain only Latin characters and numbers. The name is no more than 10 characters. It is added to SMSs. | 0.3.1 or higher |
| 15 | PINO X Example: PIN0 1234 PINO | PINO OK PINO FAIL PINO SET PINO CLEAR Example: PIN0 OK | X = PIN X='-' - PIN disabled | Setting the PIN for the SIM card №0. Command without arguments displays status: PIN0 SET – PIN is set, PIN0 CLEAR – PIN is cleared. | 0.3.1 or higher |
| 16 | PIN1 X Example: PIN1 1234 | PIN1 OK PIN1 FAIL Example: PIN1 OK | X = PIN X='-' - PIN disabled | Setting the PIN for the SIM card №1. Command without arguments displays status: PIN1 SET – PIN is set, PIN1 CLEAR – PIN is cleared. | 0.3.1 or higher |
| 17 | SIMMODE Y | SIMMODE=Y Example: SIMMODE=0 | Y=0 –SIM0 is active. SIM1 disabled; Y=1 – both SIMs are active. SIM0 priority; Y=2 – both SIMs are active. SIM1 priority; Y=3 – both SIMs are active. SIM0 without priority. | Setting SIM cards operating mode. Command without arguments returns the current settings. | Not specified |
| 18 | ERASE X Example: ERASE EEPROM | X ERASED! Reloading... Example: EEPROM ERASED! Reloading... | X=FLASH – cleaning “black box”; X=EEPROM – tracker factory reset; | “Black box” clearing and tracker reset. tracker factory reset. | 0.3.1 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--|--|---|--|-----------------|
| | | | X=SDCARD - SD card formatting; X=ALL – erasing all the data and factory reset. | | |
| 19 | LLS485 X0,X1,X2,X3,X4,X5,X6 Example: LLS485 0,1,2,3,4,5,6 | LLS485=X0,X1,X2,X3,X4,X5,X6 Example: LLS485 0,1,2,3,4,5,6 | X0,X1,X2,X3,X4,X5,X6 – addresses of the LLS sensors connected to the tracker via RS485. X='- ' – query disabled | Setting LLS sensors addresses. | 0.3.1 or higher |
| 20 | FUEL | Example FUEL F0=187, T0=19; F1=321, T1=21; F2=0, T2=0; F3=235, T3=21; F4=377, T4=24; F5=0, T5=0; F6=0, T6=0; | Command without arguments | Display current fuel level and temperature readings from fuel level sensors connected via RS485. If a sensor query fails, "?" character is rendered in corresponding fields F and T. | 0.3.1 or higher |
| 21 | SN | SN X Example: SN 17003456 | Command without arguments | Returns tracker serial number. | 0.3.1 or higher |
| 22 | UPDATE | Updating... | Command without arguments | Connecting to update server, checking for the current firmware version, updating up to the current version. | 0.3.1 or higher |
| 23 | INPUTS | INPUTS=A,B,X,Y Example: INPUTS=0 (0),12875 (12875),1 (1),0 (0) | A – input value IN0 (AIN0) B – input value IN1 (AIN1) X – value IN2 (DIN0) Y – value IN3 (DIN1) | Burst reading of input values. The range of measured input values is specified by setting. Analog inputs returned in mV. In brackets there is the unprocessed input current state. For AINn - voltage in mV, for DINn – current logical level. | 0.4.0 or higher |
| 24 | SETINPUTS A,B,X,Y Example: SETINPUTS 0,2,1,1 | SETINPUTS=A,B,X,Y Example: SETINPUTS=0,2,1,1 | A – input mode IN0 (AIN0) B – input mode IN1 (AIN1) X – input mode IN2 (DIN0) Y – input mode IN3 (DIN1) Modes (applicability): 0 – discrete input with a pull-up to GND (all); | Burst input setting. Command without arguments returns the current settings. | 0.4.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|-------------|-------------------------------------|--|---|-----------------|
| | | | 1 – discrete input with a pull-up to VDC (DIN0 и DIN1); 2 – analog input (AIN0 и AIN1); 3 – DFM flowmeter (DIN0 и DIN1); 4 – differential DFM flowmeter (DIN0 и DIN1); 5 – rotary encoder (DIN0 и DIN1); 6 – frequency meter (DIN0 и DIN1); 7 – DFM flowmeter(DIN0 и DIN1); 8 – differential DFM flowmeter (DIN0 и DIN1). | | |
| 25 | SETINPUT0 X | SETINPUT0=X Example: SETINPUT0=0 | X – input mode IN0 (AIN0) Modes: 0 – discrete input with a pull-up to GND; 2 – analog input. Default value: X = 0. | IN0 input mode setting. Command without arguments returns the current settings. | 0.4.0 or higher |
| 26 | SETINPUT1 X | SETINPUT1=X | X – input mode IN1 (AIN1) Modes : 0 – discrete input with a pull-up to GND; 2 – analog input. Default value: X = 0. | IN1 input mode setting. Command without arguments returns the current settings. | 0.4.0 or higher |
| 27 | SETINPUT2 X | SETINPUT2=X | X – input mode IN2 (DIN0) Modes : 0 – discrete input with a pull-up to GND; 1 – discrete input with a pull-up to VDC; 3 – DFM flowmeter; 4 – differential DFM flowmeter; 5 – rotary encoder; 6 – frequency meter ; 7 – VZP flowmeter; 8 – differential VZP flowmeter. | IN2 input mode setting. Command without arguments returns the current settings. | 0.4.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--|---|---|---|-----------------|
| | | | Default value: X = 0. | | |
| 28 | SETINPUT3 X | SETINPUT3=X | X – input mode IN3 (DIN1) Modes : 0 – discrete input with a pull-up to GND; 1 – discrete input with a pull-up to VDC; 3 – DFM flowmeter; 4 – differential DFM flowmeter; 5 – rotary encoder; 6 – frequency meter ; 7 – VZP flowmeter; 8 – differential VZP flowmeter. Default value: X = 0. | IN3 input mode setting. Command without arguments returns the current settings. | 0.4.0 or higher |
| 29 | SETLIM0 X,Y Example: SETLIM0 6000,8000 SETLIM0 6000 | SETLIM 0= X,Y Example: SETLIM0=6000,8000 SETLIM0=6000,6000 | X – lower switching threshold IN0 (AIN0). Y – upper switching threshold IN0 (AIN0). Default values: X = 5000, Y = 6000. | Setting the switching thresholds for IN0 input. Thresholds are specified in mV. Only one threshold is allowed. Command without arguments returns the current settings. | 0.4.0 or higher |
| 30 | SETLIM1 X,Y | SETLIM 1= X,Y | X – lower switching threshold IN1 (AIN1) Y – upper switching threshold IN1 (AIN1) Default values: X = 5000, Y = 6000. | Setting the switching thresholds for IN1 input. Thresholds are specified in mV. Only one threshold is allowed. Command without arguments returns the current settings. | 0.4.0 or higher |
| 31 | INSTATIC X,Y Example: INSTATIC 0,0 INSTATIC -1 | INSTATIC=X,Y Example: INSTATIC=0,0 INSTATIC=-1,0 | X –input number for static navigation mode. To disable: X = -1 или X = 255 Y –inputa logical level in static navigation mode 0 or 1. Default values: X = -1, Y = 0 | Selecting the input static navigation mode. Selected input should be set with SETINPUTx command into 0 or 1 mode. Command without arguments returns the current settings. | 0.4.1 or higher |
| 32 | OUTPUT0 X Example: OUTPUT0 0 OUTPUT0 1 | OUTPUT0=X Example: OUTPUT0=0 OUTPUT0=1 | X –outputa value OUT (OUT0). X=0 – output open; X=1 – output shorted to GND. | Monitoring of the discrete output OUT (OUT0). Command without argument returns the current settings. | 0.4.5 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--|--|--|--|------------------|
| 33 | STATMASK X Example: STATMASK 0 STATMASK 0x20000 | STATMASK=X Example: STATMASK=0x00000000 STATMASK=0x00020000 | X – status events mask in decimal or hexadecimal format | Status field mask. When any of set bits changed, non-queue black-box entry occurs. By default 0x20000 | 0.4.9 or higher |
| 34 | SPEEDALARM X Example: SPEEDALARM 90 SPEEDALARM -1 | SPEEDALARM X Example: SPEEDALARM=90 SPEEDALARM=-1 | X – the vehicle velocity, km/h. Within the range of 0 to 1192. To disable X = -1. Default values: X = -1. | Monitoring the discrete output OUT (OUT0) of the tracker as a function of the vehicle speed. Configuration of the tracker discrete output OUT (OUT0). Output gets shorted when vehicle velocity exceeds X and opens when the velocity less than or equal to X. | 0.4.21 or higher |
| 35 | OWSTATUS | OWSTATUS=ib=X,ow1=Y 1,ow2=Y2,ow3=Y3,ow4=Y4 Example: OWSTATUS=ib=?,ow1=26,ow2=26,ow3=?,ow4=? | X – number of the connected iButton key; Y1 – temperature 0 from DS18 sensor; Y2 – temperature 1 from DS18 sensor; Y3 – temperature 2 from DS18 sensor; Y4 – temperature 3 from DS18 sensor. | Status of the sensors connected to 1-wire. | 0.5.0 or higher |
| 36 | PSTATIC X Example: PSTATIC 1 | PSTATIC=X Example: PSTATIC=1 | X – mode of the static navigation by accelerometer. X=0 – disabled; X=1 – enabled. | Managing the static navigation by accelerometer. | 0.6.3 or higher |
| 37 | MAXACC X,Y Example: MAXACC 100,300 | MAXACC=X,Y Example: MAXACC=100,300 | X – accelerometer threshold in nominal units. Y – static navigation mode timeout in seconds. | Setting accelerometer threshold and static navigation mode timeout. | 0.6.3 or higher |
| 38 | SETPROTOCOL X,Y Example: SETPROTOCOL 0,1 | SETPROTOCOL=X,Y Example: SETPROTOCOL=0,1 | X – server communication protocol Y – alternate server communication protocol Для X и Y: 0 – Wialon IPS v1.1 protocol; 1 – Wialon IPS v2.0 protocol; 2 – Wialon Combine v1.04 protocol; 7 – EGTS protocol; | Selecting communication protocol between the server and the tracker. Command without arguments returns the current settings. | 1.1.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--|---|---|--|-----------------|
| | | | By default X = 0 , Y = 0 | | |
| 49 | ROAMING0 X Example: ROAMING0 1 | ROAMING0=X Example: ROAMING0=1 | X – SIM0 roaming. X=0 – disabled; X=1 – enabled. Default value: X = 0. | The command enables or disables SIM0 work in roaming. Command without arguments returns the current settings. | 0.7.1 or higher |
| 50 | ROAMING1 X Example: ROAMING1 1 | ROAMING1=X Example: ROAMING1=1 | X – SIM1 roaming. X=0 – disabled; X=1 – enabled. Default value: X = 0. | The command enables or disables SIM1 work in roaming. Command without arguments returns the current settings. | 0.7.1 or higher |
| 51 | SERIAL X Example: SERIAL 1 | SERIAL=X Example: SERIAL=1 | X – data uploading order. X=0 – From old to new; X=1 – Current first. Default value: X = 0. | Configuring the sequence of data transfer to the server. Command without arguments returns the current settings. | 0.8.4 or higher |
| 52 | OWTEMP X Example: OWTEMP 1 | OWTEMP=X Example: OWTEMP=1 | X – DS18 sensors data transfer. X=0 – disabled; X=1 – enabled. Default value: X = 1. | Configuring the transfer of temperature data from DS18B20 sensors to the server. Command without arguments returns the current settings. | 0.8.4 or higher |
| 53 | OWIBUTTON X Example: OWIBUTTON 1 | OWIBUTTON=X Example: OWIBUTTON=1 | X – iButton key number transfer. X=0 – disabled; X=1 – enabled. Default value: X = 1. | Configuring the transfer of the number of connected iButton key. Command without arguments returns the current settings. | 0.8.4 or higher |
| 54 | TEMP | TEMP X Example: TEMP 35 | X – Temperature inside the tracker. | Current temperature inside the tracker. | 0.8.4 or higher |
| 55 | SETTEMP X Example: SETTEMP 1 | SETTEMP=X Example: SETTEMP=1 | X – transfer of temperature inside the tracker. X=0 – disabled; X=1 – enabled. Default value: X = 0. | Configuring the transfer of temperature data from the inside the tracker. Command without arguments returns the current settings. | 0.8.4 or higher |
| 56 | ACC | ACC X=X, Y=Y, Z=Z Example: ACC X=27, Y=15, Z=1031 | X – acceleration in the X axis of the tracker; Y – acceleration in the Y axis of the tracker; Z – acceleration in the Z axis of the tracker;. | Current acceleration in the tracker axes. | 0.8.4 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--------------------------------------|------------------------------------|--|--|------------------|
| 57 | SETACC X Example: SETACC 1 | SETACC=X Example: SETACC=1 | X – tracker acceleration transfer. X=0 – disabled; X=1 – enabled. Default value: X = 0. | Configuring the transfer of current acceleration data. Command without arguments returns the current settings. | 0.8.4 or higher |
| 58 | RS485 [X,Y] Example: RS485 1,9600 | RS485 X,Y Example: RS485 1,9600 | X – interface operating mode: X=0 – interface disabled; X=1 – FLS polling via LLS mode; X=2 – CAN-LOG polling mode; X=3 – RFID readers polling mode; X=4 – combined FLS via LLS and RFID readers polling mode; X=5 – Trimble; Y – interface operating speed. The following values are available for Y: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bit/sec. Without arguments returns current settings. | RS-485 interface configuring. Specifying data transfer speed and the operating mode. | 0.13.0 or higher |
| 59 | RS232 [X,Y] Example: RS232 1,9600 | RS232 X,Y Example: RS232 1,9600 | X – interface operating mode: X=0 – interface disabled; X=1 – FLS polling via LLS mode; X=2 – CAN-LOG polling mode; X=3 – RFID readers polling mode; X=4 – combined FLS via LLS and RFID readers polling mode; X=5 – Trimble; Y – interface operating speed. The following values are available for Y: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bit/sec. | RS-232 interface configuring. Specifying data transfer speed and the operating mode. | 0.13.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---|--|--|-----------------|
| | | | Without arguments returns current settings. | | |
| 60 | SETCANLOG [X[,Y]] Example: SETCANLOG 1, 0x001FFF7F | SETCANLOG X,Y Example: SETCANLOG=1,0x001fff7f | X – CAN-LOG polling mode: X=0 – CAN-LOG polling disabled; X=1 – CAN-LOG polling enabled. Y – 0x001FFF7F mask for data transmission, where for bit value 1 – parameter is transferred, for 0 – parameter is not transferred. | Configuring CAN-LOG polling and data transmission masks. | 0.9.0 or higher |
| 61 | CANLOG Example: CANLOG | CANLOG Example: CANLOG S=0x026F1B,A=10540.00 ... | Command without arguments. Reply: «CANLOG S=0x026F1B,A=10540.00...», where “S” and “A” protocol prefixes. | CAN-LOG current values polling. | 0.9.0 or higher |
| 62 | RS2USB X,Y Example: RS2USB 0,9600 | - без ответа - | X – Interface: X=0 – RS-485; X=1 – RS-232. X=2 – GNSS module X=3 – Modem X=4 – UART expansion board Y – interface operating speed. Y=0 automatic speed assignment | Input in the interface converting. The tracker will be in this mode until disconnected from the host. The only available command input is via USB. | 0.9.0 or higher |
| 63 | GNSSRESTART X Example: GNSSRESTART 1 | GNSSRESTART=1 | X – start mode of GNSS module after restart: X=0 – hot start; X=1 – warm start; X=2 – warm start; X=3 – end-to-end cold start. | Restart GNSS module. Write only. | 0.9.4 or higher |
| 64 | GNSSMODE X Example: GNSSMODE 1 | GNSSMODE=1 | X – satellites grouping: X=0 – GPS and GLONASS; X=1 – GLONASS only; X=2 – GPS only. | Selecting satellites grouping for GNSS operating. Write only. | 0.9.4 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|--|---------------------------------|--|---|------------------|
| 65 | GNSSMONITOR [X[,Y[,Z]]] Example: GNSSMONITOR 1,5,120 | GNSSMONITOR=1,5,120 | X – monitoring of the minimum number of visible satellites: X=0 – disable monitoring; X=1 – enable monitoring. Y – the minimum number of visible satellite to start GNSS reload timeout, within the range of 1 to 12. Z - GNSS reload timeout in seconds within the range of 60 to 3600. | Automatic end-to-end cold start of the GNSS module when number of visible satellites is below minimum for the set period of time. | 0.9.7 or higher |
| 66 | RINGS [X[,Y[,Z]]] Example: RINGS 2,80,11 | RINGS=2,80,11 | X – number of the tones to enable auto answering. Within the range of 1 to 10, or 0 if auto answering is disabled. Y – ringer volume in percentage form. Within the range of 0 to 100. Z – number of ringtone. Within the range of 1 to 19. Without arguments returns the current settings. | Setting incoming call parameters. | 0.11.0 or higher |
| 67 | VOICE [X,Y] Example: VOICE 40,8 | VOICE=40,8 | X – speaker volume in percentage form. Within the range of 0 to 100. Y – microphone gain. Within the range of 0 to 15. 0 = 0 dB, 15 = +22.5dB, шаг 1.5dB. Without arguments returns the current settings. | Setting speaker volume and microphone gain. | 0.11.0 or higher |
| 68 | WHITELIST [X[,P1[,P2[,P3[,P4,P5]]]] Example: WHITELIST 1,+711111111111 | WHITELIST=1,+711111111111,.,.,. | X = 0 – disable “white list”. Incoming calls from any phone number. X = 1 – enable “white list”. Incoming calls only from P1-P5 phone numbers. P1-P5 - number in the format +71234567890 or an empty line. | Configuring “white list”. | 0.11.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---------------------------------------|--|---|-------------------|
| 69 | DIALLIST [X[,P1[,P2[,P3[,P4,P5]]]] Example: DIALLIST 0,+71234567890 | DIALLIST=0,+71234567890,,, 7890,,, | X = 0 – disable dial list. Outgoing calls are not allowed. X = 1 – enable dial list. Outgoing calls only to phone numbers P1-P5. P1-P5 – number in the format +71234567890 or an empty line. | Configuring outgoing calls. | 0.11.0 or higher |
| 70 | TRAFFIC [X[,Y[,Z]]] Example: TRAFFIC 1,0,1460 | TRAFFIC=1,0,1460 | X – grouping by number. If X = 1 - grouping disabled; Y – grouping time in seconds. If Y = 0 – time grouping disabled. Z – maximum packet size. Within the range of 536 to 1460. | Setting the number of grouped spots and intervals between packets sent aims to reduce traffic volume. | 0.12.1 or higher |
| 71 | ICCID | ICCID="89999999999999999999" | Command without arguments | Returns ICCID of the active SIM card | 0.12.1 or higher |
| 72 | MAXHDOP [X] Example: MAXHDOP 5.5 | MAXHDOP=5.5 | X – maximum HDOP X value is within the range of 0 to 12 | Setting maximum HDOP. All the coordinates with the HDOP above maximum will be transmitted as the invalid ones. By default X=5.0 | 0.12.8 or higher |
| 73 | SATHDOP [X,Y] Example: SATHDOP 3,5.5 | SATHDOP=3,5.50 | X – minimum number of satellites. Within the range of 1 to 10. Y – maximum HDOP. Within the range of 0 to 25. | Setting maximum HDOP for the minimum number of satellites. All the coordinates with the HDOP above Y, number of satellites below X, will be transmitted as the invalid ones. By default X=6,Y=2.0. | 0.12.8 or higher |
| 74 | NAVMODULE | NAVMODULE="B03V02SIM868_96" | Command without arguments | Return GNSS module firmware version. If the version is not defined returns "NONE". | 0.12.12 or higher |
| 75 | SETRFID [A[,B[,C[,D]]]] Example: SETRFID 10,11,14 | SETRFID=10,11,14 | A – first reader address, B – second reader address and so on. Addresses should fall within the range of 0 to 254. | Enabling and setting addresses for up to 4 readers. | 0.13.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---|--|--|------------------|
| | | | Without arguments returns the current settings. | | |
| 76 | RFID | RFID=X1,Y1;X2,Y2;X3,Y3; X4,Y4 Example: RFID=2423025,0;?,?;0,10 0460 | n – reader number of 1 to 4; Xn –RFID card number; Yn – number of RFID tags (normally 0). If the reader does not respond, the command will return “?,?”. For example, “RFID=2423025,0;?,?;0,100460” reply means that 2423025 card is installed in reader 1, reader 2 does not respond, reader 3 received the signal from 100460 tag, and reader 4 is not polled. | Polling the current RFID card and tag number. | 0.13.0 or higher |
| 77 | SETODM [X] Example: SETODM 1 | SETODM=1 | X – virtual odometer operating mode: X=0 – odometer disabled; X=1 – odometer enabled. | Configuring the transmission of the virtual odometer value to the server. | 0.13.0 or higher |
| 78 | ODM [X] Example: ODM 150 | ODM=150 | If X is specified – initial mileage setting. X – initial mileage in meters. | Obtain or set the virtual odometer value. Returns mileage in meters or “?” in case of error. | 0.13.0 or higher |
| 79 | SETRSSI [X] Example: SETRSSI 1 | SETRSSI=1 | X – signal level transmission mode: X=0 – transmission disabled; X=1 – transmission enabled. | Configuring the transmission of the RSSI signal strength to the server. | 0.12.2 or higher |
| 80 | UPDATE VER=X.Y.Z Example: UPDATE VER=0.13.2 | Updating... | VER=X.Y.Z update up to current version. X.Y.Z – three version numbers separated by dots. | Updating up to the set firmware version, but not lower than the current one. | 0.12.7 or higher |
| 81 | SENDSMS X,Y Example: SENDSMS +71111111111,WHO | SENDSMS=OK,+71111 111111 | X – phone number, to which the reply to the Y command will be sent. Y – command, the reply to which will be sent to phone number X. | Responding to the Y command in the form of SMS to the X number. | 0.14.0 or higher |
| 82 | CHARGE [X[,Y]] Example: CHARGE 1,250 | CHARGE=1,250 | X – battery fast charging mode; X=0 – fast charging disabled; X=1 – fast charging enabled. | Configuring battery fast charging | 0.14.1 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|---------------------------------|--|---|------------------|
| | | | Y – battery capacity in mA·h within the range of 250 to 1100. By default X = 0, Y = 250 | | |
| 83 | DISCHARGE [X[,Y]] Example: DISCHARGE 3000,1200 | DISCHARGE=3000,1200 | X – time in seconds within the range of 1 to 86400 before full shutdown while on battery. If X = 0 – maximum for the battery life is not set. Y – time in seconds within the range of 1 to 86400 before switching to IDLE mode while on battery. If Y = 0 – switching to IDLE mode does not occur. By default X = 0 и Y = 0. | Setting the maximum battery life time of the tracker and the power saving mode switching timeout. | 0.15.1 or higher |
| 84 | SETEXT [X] Example: SETEXT 1 | SETEXT=1 | X – supply voltage transmission to the server; X=0 – transmission disabled; X=1 – transmission enabled. By default X = 1 | Configuring supply voltage transmission to the server. | 0.14.2 or higher |
| 85 | SETAKB [X] Example: SETAKB 1 | SETAKB=1 | X – battery voltage transmission to the server X=0 – transmission disabled; X=1 – transmission enabled. By default X = 1 | Configuring battery voltage transmission to the server. | 0.14.2 or higher |
| 86 | GNSSTIME X Example: GNSSTIME 04.04.2018 15:12:41 | GNSSTIME=04.04.2018 15:12:41 | X – UTC time in the “DAY.MON.YEAR HOUR:MIN:SEC” form. For example: “29.12.2017 12:45:05”. UTC time = MSK – 3 h. Where MSK – current local time in Krasnodar. | Setting the tracker time, when the tracker for some reason see not a single satellite. | 0.14.2 or higher |
| 87 | ENABLELEDS [X] Example: | ENABLELEDS=1 | X – LED indication mode. X = 0 – LED indication always disabled; | Configuring LED indication mode (except for green). | 0.14.6 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|---|--|--|--|------------------|
| | ENABLELEDS 1 | | X = 1 – normal mode of LED indication. By default X = 1 | | |
| 88 | SDLOG [X] Example: SDLOG 0 | SDLOG=0 | X – “black box” writing mode. X = 0 – “black box” writing into internal memory. X = 1 – “black box” writing into the SD card. By default X = 0 | “Black box” writing into the SD card mode. | 0.15.0 or higher |
| 89 | POWERSAVE X,Y Example: POWERSAVE 0,1500 | POWERSAVE=0,1500 | X – timeout in seconds within the range of 1 to 592200 for switching to STANDBY mode. If X = 0 – switching to STANDBY mode does not occur. Y – timeout in seconds within the range of 1 to 86400 for switching to IDLE mode. If Y = 0 – switching to IDLE mode does not occur. By default X = 0 и Y = 0. | Setting timeouts for switching to idle and standby mode in the static navigation mode. | 0.15.1 or higher |
| 90 | REMCFG STATUS | REMCFG=OK,X,Y:Z Example: REMCFG=OK,Disable, medium.glonasssoft.ru: 12358 | X – permanent connection to the remote configuration server: X = Disable – disconnected; X = Enable – connected; Y:Z – remote configuration server address and port. By default X = Disable, Y:Z = medium.glonasssoft.ru:12358 | Request settings for remote configuration mode. | 1.1.0 or higher |
| 91 | REMCFG ENABLE | REMCFG=OK | | Enable permanent connection to the remote configuration server. | 1.1.0 or higher |
| 92 | REMCFG DISABLE | REMCFG=OK | | Disable permanent connection to the remote configuration server. | 1.1.0 or higher |
| 93 | REMCFG DEFAULT | REMCFG=OK | | Restore the default settings. | 1.1.0 or higher |

| No | Command | Reply | Arguments | Description | Versions |
|----|----------------|--|--|--|--------------------|
| 94 | REMCFG START | REMCFG=OK,1800,Y Example: REMCFG=OK,1800,86151 0030390799 | 1800 – session duration in seconds. Y – tracker IMEI. | Start the remote configuration session with the duration of 30 minutes. | 1.1.6 or higher |
| 95 | REMCFG START=A | REMCFG=OK,X,Y Example: REMCFG=OK,1800,86151 0030390799 | A – session duration. It may be specified in seconds, minutes and hours. For example: if A = 600 or A = 600s – session duration is 600 seconds, if A = 30m – 30 minutes, if A = 2h – 2 hours. X – session duration in seconds. Y – tracker IMEI. | Start the remote configuration session with the set duration. | 1.1.6 or higher |
| 96 | REMCFG STOP | REMCFG=OK | | Terminate the remote configuration session. | 1.1.6 or higher |
| 97 | REMCFG | REMCFG=OK,X,Y Example: REMCFG=OK,1800,86151 0030390799 | X – session duration in seconds. Y – tracker IMEI. | Command without arguments is equivalent to “REMCFG START”. | 1.1.6 or higher |
| 98 | SU X,Y | Ответ на команду Y. | X – tracker password. Y – Command with arguments to run. If successful, returns the reply for Y command. | Run the command without prior authorization in the tracker (“Super User”). | 1.1.5 or higher |

APPENDIX B. Troubleshooting

| Trouble | Indication | Causes | Troubleshooting tips |
|--|----------------------------|--|--|
| The tracker does not turn on | Green LED is off | Power supply is not properly connected | Check that the power supply is properly connected (see section "Connecting power supply") and whether the polarity of the supply voltages is observed. The tracker has protection against reverse polarity and can continue operation after the error is corrected. |
| | | Poor contact | Check the tracker supply connections to the on-board vehicle network. Check the connections made with "twisted pair" cable. |
| | | Undervoltage | Using the multimeter, check the supply voltages directly on the pins of the tracker mount port. If the tracker is connected in close proximity to powerful consumers (heaters, starter, etc.), then during their operation the tracker supply voltage may drop below the minimum value. In this case, connect the tracker as close as possible to the vehicle battery. |
| The tracker is not connected to the server | Yellow LED is off | No supply voltage. tracker is in the SLEEP mode. Modem error. Delayed modem start. LED indication is disabled. | Check the settings of the power saving modes. Check the power supply of the tracker. Wait 5 to 7 minutes for the "cold" start of the receiver to end. Enable the tracker LED indication. |
| | Yellow LED flashes 1 time | The SIM card malfunctions or not installed. Insufficient supply voltage. | Install the SIM card into the corresponding slot (see section "SIM cards installation"). Disable the PIN, if enabled, or write the correct PIN-code into the tracker via the configurator (see section "Operating the configurator"). Check the SIM card priority settings. Check the power supply of the tracker. |
| | Yellow LED flashes 2 times | The tracker cannot register on the GSM network | Check the coverage and the GSM signal strength of the selected mobile operator. Change the SIM card. Install the SIM card of another mobile operator. Make sure that the SIM card is not roaming. Install the card in another slot. |
| | Yellow LED flashes 3 times | The tracker is in the OFFLINE mode. | Check the settings of the power saving modes. Check the power supply of the tracker. |
| | Yellow LED flashes 4 times | The tracker cannot connect to the GPRS network. | Check SIM cards settings (APN, login, password, see section "Operating the configurator"). Check the balance on the SIM card. Ensure that the packet |

| Trouble | Indication | Causes | Troubleshooting tips |
|---------------------|-------------------------------|---|--|
| | | | data service is enabled. Reconnect the packet data service. Try to activate the SIM card in another device and install it into the tracker again. |
| | Yellow LED goes out 1 time | The tracker cannot connect to the primary server. The tracker cannot login on the primary server. | Check the tracker configuration (server IP address, TCP port, see "Operating the configurator" section). Check the balance on the SIM card. Make sure the server is up and running. Check the configuration of the connected tracker on the server. Pay special attention to the correctness of the IMEI entered. Check the correspondence between the selected TCP port and the data transfer protocol. |
| | Yellow LED goes out 2 times | The tracker cannot connect to the alternate server. The tracker cannot login on the alternate server. | |
| | Yellow LED goes out 3 times | The tracker cannot connect to the primary and alternate servers. The tracker cannot login on the primary and alternate servers. | |
| | Yellow LED is permanently off | Invalid coordinates. Disconnected. Unstable connection. | Wait for the GNSS receiver to fix the coordinates. Wait 5 to 10 minutes for the tracker to reconnect. Use the SIM card of another mobile operator. |
| Invalid coordinates | Red LED is off | Navigation receiver error. LED indication disabled. | Reboot the tracker. Enable LED indication. |
| | Red LED flashes 1 time | Positioning failed. "Cold", "warm" or "hot" start. No visible satellites. | Wait 5 to 7 minutes before for the "cold" start of the receiver to end. Follow the recommendations of the section "Installing the tracker in a vehicle". Place the tracker as far as possible away from RF interference sources (interrupters, transmitters, etc.). |
| | Red LED flashes 2 times | Two-dimensional positioning, the minimum number of visible satellites. | Wait 5 to 7 minutes before for the "cold" start of the receiver to end. Follow the recommendations of the section "Installing the tracker in a vehicle". Place the tracker as far as possible away from RF interference sources (interrupters, transmitters, etc.). Check the server connection. Make sure the server is up and running. |

| Trouble | Indication | Causes | Troubleshooting tips |
|---------|-------------------------|---|--|
| | Red LED flashes 3 times | Three-dimensional positioning, sufficient number of visible satellites. | Check the server connection. Make sure the server is up and running. |

APPENDIX C. Default settings values

| Parameter | Default value | |
|---|--------------------------------------|---------------------|
| Navigation | | |
| Minimum velocity, km/h | 3 | |
| Angle in degrees | 10 | |
| Distance, m | 300 | |
| Acceleration, km/h | 10 | |
| The recording period while driving, sec | 30 | |
| The recording period at stops, sec | 300 | |
| Positioning by accelerometer | Enabled | |
| Accelerometer threshold | 50 | |
| Static navigation mode timeout in seconds. | 300 | |
| Positioning by the input | Disabled | |
| Maximum HDOP | 5.0 | |
| Number of satellites | 6 | |
| Maximum HDOP for the minimum number of satellites | 2.0 | |
| Inputs/Outputs | | |
| Input mode IN(0) | Discrete input with a pull-up to GND | |
| Input mode IN(1) | Discrete input with a pull-up to GND | |
| Input mode IN(2) | Discrete input with a pull-up to GND | |
| Input mode IN(3) | Discrete input with a pull-up to GND | |
| Logical Low on IN(0) and IN(1) | 5000 | |
| Logical High on IN(0) and IN(1) | 6000 | |
| tracker output | Disabled | |
| SIM cards | | |
| SIM0 | Profiles | Beeline |
| | APN | Internet.beeline.ru |
| | Login | beeline |
| | Password | beeline |

| Parameter | | Default value |
|---|----------------------|-----------------|
| | Use PIN | Disabled |
| | Enable roaming | Disabled |
| SIM1 | Profiles | Another |
| | Use PIN | Disabled |
| | Enable roaming | Disabled |
| SIM cards operation mode | | SIM0 priority |
| Servers | | |
| Primary server | Select from the list | GlonassSoft |
| | Server address | 176.9.36.169 |
| | Port | 15050 |
| | Protocol | Wialon IPS v1.1 |
| Alternate server | Select from the list | Another |
| | Protocol | Wialon IPS v1.1 |
| Uploading order | | From old to new |
| DS18 | | Enabled |
| iButton | | Enabled |
| Temperature | | Disabled |
| Accelerometer | | Disabled |
| RSSI signal strength | | Disabled |
| Virtual odometer | | Disabled |
| Supply voltage | | Enabled |
| Battery voltage | | Enabled |
| Data grouping by | | 5 |
| Time interval between packet transmissions, sec | | 300 |
| Maximum packet size | | 1460 |
| Interfaces | | |
| RS-485 | Mode | FLS via LLS |
| | Speed | 19200 |
| RS-232 | Mode | Disabled |
| | Speed | 9600 |

| Parameter | Default value |
|-------------------------------|---------------|
| FLS | |
| Sensor 0 | 0 |
| Sensor 1 | 1 |
| Sensor 2 | 2 |
| Sensor 3 | 3 |
| Sensor 4 | 4 |
| Sensor 5 | 5 |
| Sensor 6 | 6 |
| CAN-LOG | |
| CAN-LOG polling | Disabled |
| RFID reader | |
| RFID 0 | Empty |
| RFID 1 | Empty |
| RFID 2 | Empty |
| RFID 3 | Empty |
| Voice communication | |
| Speaker volume, % | 50 |
| Microphone gain, dB | 9 |
| Auto answering after: | Disabled |
| Ringer volume, % | 50 |
| Ringtone | Melody 8 |
| Incoming white list | Empty |
| Receive from any phone number | Enabled |
| Dial list | Empty |
| Allow outgoing calls | Disabled |
| Phone numbers | |
| Authorized phone numbers | Empty |
| System | |
| tracker name | Empty |
| Password | 0 |

| Parameter | | Default value |
|----------------------|---|---------------|
| Black box | Storage location | tracker |
| Remote configuration | Permanent connection | Disabled |
| Power management | Fast charging | Disabled |
| | Battery capacity, mA·h | 250 |
| | Battery life, sec | 0 |
| | Idle mode timeout while on battery, sec | 0 |
| | Standby mode timeout, sec | 0 |
| | Idle mode timeout, sec | 0 |
| | LED indication | Enabled |

APPENDIX D. Description of the Wialon system parameters

| Protocol | | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|---|---|---|-----------------|---|----------|---|---|---|--|---|----------|---|--|---|---|---|--------------------------------|---|--|---|----------|---|------------------------------|----|----------|----|--|----|---|---------|----------|----|---------------------------|----|----------|----|---|----|----------|----|---|----|--|----|-------------------|----|--------------------------------|----|----------------------|----|---|
| IPS | Combine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| status | param1 | tracker status. Bit field. The assignment of bits is given below: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Bit</th> <th>Bit description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Reserved</td> </tr> <tr> <td>1</td> <td>Active SIM phone number. 0-SIM0, 1-SIM1</td> </tr> <tr> <td>2</td> <td>Primary server is disconnected (0-connected)</td> </tr> <tr> <td>3</td> <td>Reserved</td> </tr> <tr> <td>4</td> <td>Low battery capacity attribute (0-standard, 1-low)</td> </tr> <tr> <td>5</td> <td>Coordinates invalidity attribute (0-valid, 1-not valid)</td> </tr> <tr> <td>6</td> <td>Positioning on stops (1-fixed)</td> </tr> <tr> <td>7</td> <td>Low tracker supply voltage attribute (0-standard, 1-low)</td> </tr> <tr> <td>8</td> <td>Reserved</td> </tr> <tr> <td>9</td> <td>1 - Suppressed GNSS signals.</td> </tr> <tr> <td>10</td> <td>Reserved</td> </tr> <tr> <td>11</td> <td>High tracker supply voltage attribute (0-standard, 1-high)</td> </tr> <tr> <td>12</td> <td>“Black box” is written into SD card. (0 – internal memory, 1 – SD card)</td> </tr> <tr> <td>13 – 14</td> <td>Reserved</td> </tr> <tr> <td>15</td> <td>SOS (Push-to-talk button)</td> </tr> <tr> <td>16</td> <td>Reserved</td> </tr> <tr> <td>17</td> <td>Ststus of the discrete output 0 (0 – open, 1 – shortened)</td> </tr> <tr> <td>18</td> <td>Reserved</td> </tr> <tr> <td>19</td> <td>Alternate server is disconnected. (0 – Connected. When the alternate server is not set, 0 is always returned)</td> </tr> <tr> <td>20</td> <td>The tracker is connected to the remote configuration server. (1 – connected)</td> </tr> <tr> <td>21</td> <td>Connected via USB</td> </tr> <tr> <td>22</td> <td>Connected to the update server</td> </tr> <tr> <td>23</td> <td>iButton is connected</td> </tr> <tr> <td>24</td> <td>Roaming (0 – home network, 1 – guest network)</td> </tr> </tbody> </table> | Bit | Bit description | 0 | Reserved | 1 | Active SIM phone number. 0-SIM0, 1-SIM1 | 2 | Primary server is disconnected (0-connected) | 3 | Reserved | 4 | Low battery capacity attribute (0-standard, 1-low) | 5 | Coordinates invalidity attribute (0-valid, 1-not valid) | 6 | Positioning on stops (1-fixed) | 7 | Low tracker supply voltage attribute (0-standard, 1-low) | 8 | Reserved | 9 | 1 - Suppressed GNSS signals. | 10 | Reserved | 11 | High tracker supply voltage attribute (0-standard, 1-high) | 12 | “Black box” is written into SD card. (0 – internal memory, 1 – SD card) | 13 – 14 | Reserved | 15 | SOS (Push-to-talk button) | 16 | Reserved | 17 | Ststus of the discrete output 0 (0 – open, 1 – shortened) | 18 | Reserved | 19 | Alternate server is disconnected. (0 – Connected. When the alternate server is not set, 0 is always returned) | 20 | The tracker is connected to the remote configuration server. (1 – connected) | 21 | Connected via USB | 22 | Connected to the update server | 23 | iButton is connected | 24 | Roaming (0 – home network, 1 – guest network) |
| | | Bit | Bit description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Active SIM phone number. 0-SIM0, 1-SIM1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | Primary server is disconnected (0-connected) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 4 | Low battery capacity attribute (0-standard, 1-low) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5 | Coordinates invalidity attribute (0-valid, 1-not valid) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 6 | Positioning on stops (1-fixed) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 7 | Low tracker supply voltage attribute (0-standard, 1-low) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 8 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 9 | 1 - Suppressed GNSS signals. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11 | High tracker supply voltage attribute (0-standard, 1-high) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 12 | “Black box” is written into SD card. (0 – internal memory, 1 – SD card) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 13 – 14 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 15 | SOS (Push-to-talk button) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 16 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 17 | Ststus of the discrete output 0 (0 – open, 1 – shortened) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 18 | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 19 | Alternate server is disconnected. (0 – Connected. When the alternate server is not set, 0 is always returned) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 20 | The tracker is connected to the remote configuration server. (1 – connected) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 21 | Connected via USB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 22 | Connected to the update server | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | iButton is connected | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | Roaming (0 – home network, 1 – guest network) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Protocol | | Description | |
|--------------|----------|---|--|
| IPS | Combine | | |
| | | 25 | The tracker is attached to hosting. (0 – not attached, 1 – attached) |
| | | 26 | Navigation data source (0 – GNSS receiver data, 1 – Trimble data) |
| | | 27 | Reserved |
| | | 28 | Faulty “black box” (0 – OK, 1 –faulty) |
| | | 29 – 31 | Reserved |
| hdop | | Reduced accuracy in the horizontal plane | |
| sats_gps | param2 | GPS satellites solutions | |
| sats_glonass | param3 | GLONASS satellites solutions | |
| pwr_ext | param8 | External supply voltage, V | |
| pwr_akb | param9 | Battery voltage, V | |
| in1 | | Value of the discrete input IN0 (AIN0) | |
| in2 | | Value of the discrete input IN1 (AIN1) | |
| in3 | | Value of the discrete input IN2 (DIN0) | |
| in4 | | Value of the discrete input IN3 (DIN1) | |
| adc1 | | Voltage value for the analog input AIN0 (IN0), V | |
| adc2 | | Voltage value for the analog input AIN1 (IN1), V | |
| count1 | counter1 | Counter value for the input DIN0 (IN2) | |
| count2 | counter2 | Counter value for the input DIN1 (IN3) | |
| out1 | | Value of the discrete output OUT0. Where 1 – output shortened | |
| fuel1 | | Fuel level from FLS0. | |
| fuel2 | | Fuel level from FLS1 | |
| fuel3 | | Fuel level from FLS2 | |
| fuel4 | | Fuel level from FLS3 | |
| fuel5 | | Fuel level from FLS4 | |
| fuel6 | | Fuel level from FLS5 | |
| fuel7 | | Fuel level from FLS6 | |
| temp1 | | Fuel temperature from FLS0 | |
| temp2 | | Fuel temperature from FLS1 | |
| temp3 | | Fuel temperature from FLS2 | |

| Protocol | | Description | |
|------------|--------------|---|---|
| IPS | Combine | | |
| | temp4 | Fuel temperature from FLS3 | |
| | temp5 | Fuel temperature from FLS4 | |
| | temp6 | Fuel temperature from FLS5 | |
| | temp7 | Fuel temperature from FLS6 | |
| ow1 | temp16 | Temperature 0 from DS18 sensor. The transmission is configured with the "OWTEMP" command. | |
| ow2 | temp17 | Temperature 1 from DS18 sensor. The transmission is configured with the "OWTEMP" command. | |
| ow3 | temp18 | Temperature 2 from DS18 sensor. The transmission is configured with the "OWTEMP" command. | |
| ow4 | temp19 | Temperature 3 from DS18 sensor. The transmission is configured with the "OWTEMP" command. | |
| avl_driver | driver_code1 | iButton key number. The transmission is configured with the "OWIBUTTON" command. | |
| temp_int | param10 | Internal tracker temperature in Centigrade. The transmission is configured with the "SETTEMP" command. | |
| acc_x | param16 | tracker acceleration along the X axis (width). 1000 units are equal to 1G. The transmission is configured with the "SETACC" command. | |
| acc_y | param17 | tracker acceleration along the Y axis (depth). 1000 units are equal to 1G. The transmission is configured with the "SETACC" command. | |
| acc_z | param18 | tracker acceleration along the Z axis (height). 1000 units are equal to 1G. The transmission is configured with the "SETACC" command. | |
| | can0 | Total fuel consumption from 0000000.0 to 9999999.9L (E or F) | |
| | can1 | Engine speed from 0000 to 9999 rpm (H) | |
| | can2 | Engine temperature (I) | |
| | can3 | The total running time of the engine from 000000.00 to 999999.99 h (A or B) | |
| | can4 | Total mileage of the vehicle from 0000000.00 to 9999999.99 km (C or D) | |
| | can5 | Уровень топлива в баке от 000.0 до 100.0 % или от 000.0 до 999.9 л (G или R) | |
| | can6 | Car alarm status. Bit field. (S) The assignment of bits is given below: | |
| | | Bit | Bit description |
| | | 0 | Ignition |
| | | 1 | The factory alarm is activated (in alarm mode). |
| | | 2 | Vehicle was closed with the factory remote start. |
| | | 3 | Key in the ignition lock |
| | 4 | Dynamic ignition | |

| Protocol | | Description | |
|----------|---------|-------------|---|
| IPS | Combine | | |
| | | 5 | Passenger door is open. |
| | | 6 | Rear passenger doors are open. |
| | | 7 | Reserved |
| | | 8 | Driver door is open. |
| | | 9 | Passenger doors are open. |
| | | 10 | Trunk lid is open. |
| | | 11 | Hood is open. |
| | | 12 | Parking brake is applied (data is only available with the ignition on). |
| | | 13 | The pedal brake is pressed (data is only available with the ignition on). |
| | | 14 | The engine is running (information is only available with the ignition on). |
| | | 15 | Webasto |
| | | 16 - 18 | 0x1 – Vehicle was closed with the factory remote start. 0x2 – Vehicle was opened with the factory remote start. 0x3 – Trunk lid was opened with the factory remote start. 0x4 – The module sent the alarm restart signal. 0x7 – CAN module switched to the SLEEP mode |
| | | 19 - 31 | Reserved |
| | can7 | | Failure controllers. Bit field. (P) The assignment of bits is given below: |
| | | Bits | Bit description |
| | | 0 | STOP |
| | | 1 | Pressure / oil level |
| | | 2 | Temperature / coolant level |
| | | 3 | Parking brake system |
| | | 4 | Battery charging required |
| | | 5 | AIRBAG |
| | | 6 - 7 | Reserved |
| | | 8 | CHECK THE ENGINE |
| | | 9 | Faulty vehicle lighting |
| | | 10 | Low air pressure in the tire |

| Protocol | | Description | |
|----------|---------|---|------------------------------------|
| IPS | Combine | | |
| | | 11 | Worn brake pads |
| | | 12 | Warning |
| | | 13 | ABS |
| | | 14 | Low Fuel level |
| | | 15 | Maintenance required |
| | | 16 | ESP (Electronic Stability Program) |
| | | 17 | Glow plug indicator |
| | | 18 | FAP (particle filter) |
| | | 19 | Electric pressure regulator |
| | | 20 | Marker lights |
| | | 21 | Lower beam |
| | | 22 | Upper beam |
| | | 23 | Reserved |
| | | 24 | Ready to drive |
| | | 25 | Cruise-control |
| | | 26 | Automatic retarder |
| | | 27 | Hand retarder |
| | | 28 | Conditioner is on |
| | | 29 | Reserved |
| | | 30 | Passenger seat belt |
| | | 31 | Driver seat belt |
| can8 | | Load on the axle 1 from 00000.0 to 99999.9 kg (K) | |
| can9 | | Load on the axle 2 from 00000.0 to 99999.9 kg (L) | |
| can10 | | Load on the axle 3 from 00000.0 to 99999.9 kg (M) | |
| can11 | | Load on the axle 4 from 00000.0 to 99999.9 kg (N) | |
| can12 | | Load on the axle 5 from 00000.0 to 99999.9 kg (O) | |
| can13 | | Reaper time from 000000.00 to 999999.99 h (WB) | |
| can14 | | Harvested area of up 000000.00 999999.99 ha (WC) | |
| can15 | | Harvested crop quantity 000000.00 до 999999.99 t (WE) | |

| Protocol | | Description | |
|----------|---------|---|--|
| IPS | Combine | | |
| can16 | | Grain moisture from 000.0 to 100.0% (WF) | |
| can17 | | Farm equipment status. Bit field. (WA) The assignment of bits is given below: | |
| | | Bits | Bit description |
| | | 0 | Threshing drum is switched on. |
| | | 1 | The discharge pipe is switched on. |
| | | 2 | First hydraulics is switched on. |
| | | 3 | The rear power take-off is switched on. |
| | | 4 - 7 | Reserved |
| | | 8 | Excessive play under the threshing drum. |
| | | 9 | The entrance to the grain bunker is open. |
| | | 10 | Grain bunker 100% |
| | | 11 | Grain bunker 70% |
| | | 12 | The oil filter of the hydraulic system is clogged. |
| | | 13 | Low hydraulic oil pressure. |
| | | 14 | Low hydraulic oil level |
| | | 15 | The hydraulic system of the brakes is clogged. |
| | | 16 | The engine oil filter is clogged. |
| | | 17 | The fuel filter is clogged. |
| | | 18 | The air filter is clogged. |
| | | 19 | Emergency oil temperature in the hydraulic system of the running gear. |
| | | 20 | Emergency oil temperature in hydraulic system of power cylinders. |
| | | 21 | Emergency engine oil pressure. |
| | | 22 | Emergency coolant level. |
| | | 23 | Overflow section of hydraulic unit. |
| | | 24 | The drive of the discharge auger is on. |
| | | 25 | No operator! |
| | | 26 | Clogging of a shaker |
| | | 27 | Water in the fuel |
| | | 28 | Cleaning fan speed |

| Protocol | | Description | |
|----------|---------|-------------|--|
| IPS | Combine | | |
| | | 29 | Drum speed |
| | | 30 - 32 | Reserved |
| | | 33 | Low water level in the tank |
| | | 34 | The first rear hydraulics is on. |
| | | 35 | The autonomous motor is on. |
| | | 36 | Right joystick to the right |
| | | 37 | Right joystick to the left |
| | | 38 | Right joystick forward |
| | | 39 | Right joystick backward |
| | | 40 | The brush is on. |
| | | 41 | The water supply is switched on. |
| | | 42 | Suction cleaner |
| | | 43 | Unloading from the bunker |
| | | 44 | (Kärcher) high-pressure cleaners |
| | | 45 | Salt (sand) scattering is on. |
| | | 46 | Low salt (sand) level in the tank |
| | | 47 | Reserved |
| | | 48 | The second front hydraulics is on. |
| | | 49 | The third front hydraulics is on. |
| | | 50 | The fourth front hydraulics is on. |
| | | 51 | The second rear hydraulics is on. |
| | | 52 | The third rear hydraulics is on. |
| | | 53 | The fourth rear hydraulics is on. |
| | | 54 | The front three-point suspension system is on. |
| | | 55 | The rear three-point suspension system is on. |
| | | 56 | Left joystick to the right |
| | | 57 | Left joystick to the left |
| | | 58 | Left joystick forward |
| | | 59 | Left joystick backward |

| Protocol | | Description | |
|----------|---------|---|--|
| IPS | Combine | | |
| | | 60 | The front power take-off is switched on. |
| | | 61 | The fluid supply pump is turned on. |
| | | 62 | Special light signals are on. |
| | | 63 | Reserved |
| can18 | | Engine load % (XB) | |
| can19 | | The level of Diesel exhaust fluid is from 000.0 to 100.0% or from 000.0 to 999.9 L (U or V) | |
| rsi | param7 | The strength of the GSM signal received by the GSM modem in dBm. It can range from -113 to -51 dBm. | |
| odometer | param11 | Virtual odometer mileage in meters | |
| frid0 | param20 | Number of the RFID card for reader 1 | |
| radio0 | param21 | RFID tag number for reader 1 | |
| frid1 | param22 | Number of the RFID card for reader 2 | |
| radio1 | param23 | RFID tag number for reader 2 | |
| frid2 | param24 | Number of the RFID card for reader 3 | |
| radio2 | param25 | RFID tag number for reader 3 | |
| frid3 | param26 | Number of the RFID card for reader 4 | |
| radio3 | param27 | RFID tag number for reader 4 | |