



DOT i4B

User Manual

Document version 2.0

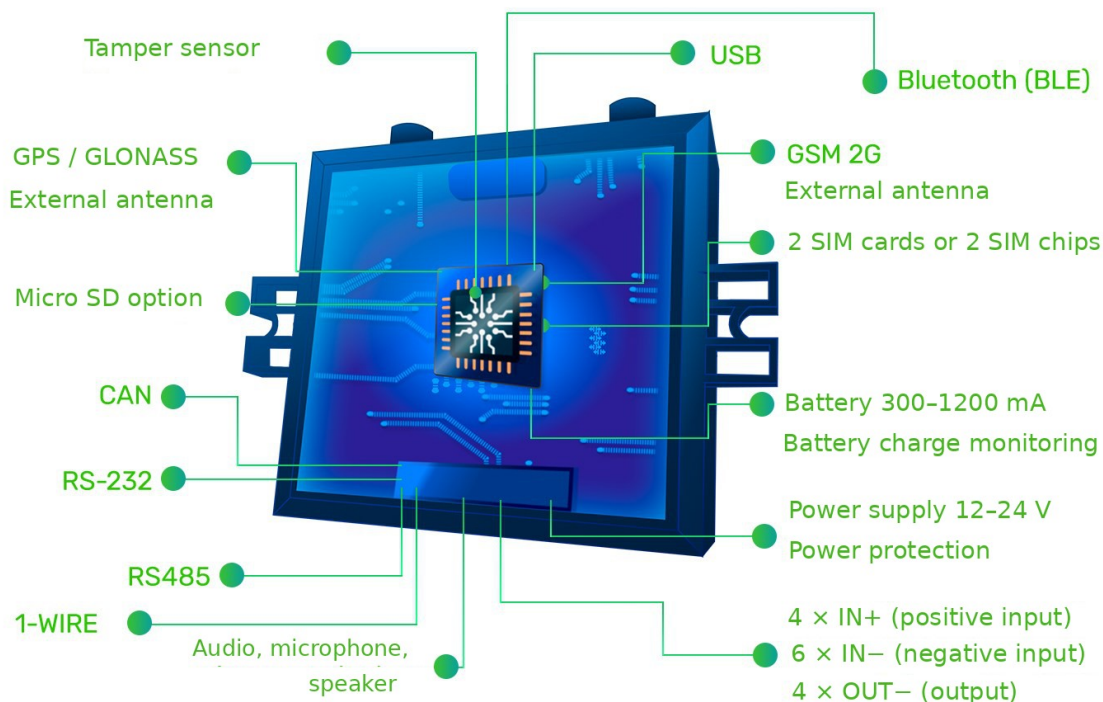
Software version 2.2 or later



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GENERAL INFORMATION



The DOT i4B navigation controller (hereinafter the “tracker”) is designed for remote monitoring of mobile assets. It can communicate with two monitoring servers and can be used with any compatible software platform.

Supported protocols for data transmission to the server:

- DOT (INTERNAL) – the manufacturer’s own open protocol, available for integration
- EGTS

For more comprehensive monitoring of the vehicle and its installed equipment, discrete (on/off), analog and frequency/pulse sensors can be connected to the device (fuel flow, passenger presence, temperature sensors, etc.).

Digital sensors can be connected via the RS232, RS485 and 1-WIRE interfaces.

Four programmable open-collector outputs provide remote control of systems such as remote engine start and engine immobilization.

The device has built-in CAN bus support. An external CAN module can also be connected via RS232 or RS485. More than 20 parameters can be read: total fuel consumption, fuel level, total mileage, operating time, engine speed and temperature, vehicle speed, axle loads, fault controllers, etc.

The built-in backup battery keeps the device operating independently if the vehicle battery is disconnected and provides notification of this event. This function is widely used for security and anti-theft purposes.

The built-in motion (acceleration) sensor is used in intelligent power-saving algorithms and can also be used to identify vehicle parking locations.

The tracker can record GSM signal strength, identify base stations and determine the validity of navigation data when each position point is recorded.

Firmware can be updated over GSM without removing the tracker from the vehicle or physically accessing the device.

The plastic housing complies with European electrical and fire safety standards.

The tracker operates at temperatures from -40 to +80 degrees Celsius (storage temperature: -45 to +85 degrees Celsius). It is suitable for passenger vehicles with a 12 V electrical system, heavy vehicles with a 24 V electrical system and other types of vehicles.

The permissible supply voltage is 8 to 44 V. Protection is provided against reverse polarity, brief voltage surges not exceeding 300 V and overcharging of the built-in battery.

For questions or further information, contact support@edvado.com.

1.1 Technical specifications

The main technical specifications of the tracker are listed in Table 1.

Table 1

Parameter	Value	Note
Device dimensions, mm	74 x 69 x 22	Excluding antennas and mounting hardware
Weight, g	70	Excluding wires, antennas and battery
Supply voltage, V	8 — 44	Excluding transient spikes
Reverse polarity protection	Yes	
Operating temperature range, °C	-40 ... +80	Excluding battery
Analog inputs, qty.	4	Measuring range 0-33 V. Discrete mode available.
Discrete inputs, qty.	6	Logic "1": input voltage below 1 V. Shared with discrete outputs.
Discrete outputs, qty.	4	Open collector; switching current up to 540 mA. Shared with discrete inputs.
Motion/tilt sensor	+	Built-in
USB interface	Yes	Diagnostics, updates
RS485 interface	Yes	
RS232 interface	Yes	
CAN interface	Yes	
1-WIRE interface	Yes	Temperature sensors, iButton keys
Bluetooth 4.0	Yes	Wireless sensors, diagnostics
Non-volatile memory, Mbit	32	400 000 events
micro SD memory card		Optional
GSM module (2G)	SIM868E	GSM 850 / 900 / 1800 / 1900 MHz
Navigation module	SIM868E	Glomass / GPS
GSM antenna		External, included
Navigation antenna		External, included
Bluetooth antenna		Internal
Number of SIM card slots	2*	Without using SIM chips
Number of SIM chip slots	2*	Without using SIM cards
Backup battery, mA	200-1500	Li-Pol
Built-in battery protection	Yes	Overcharge and deep-discharge protection; battery temperature monitoring

Parameter	Value	Note
Hands-free connection	Yes	
Tamper sensor		Optional, mechanical

1.2 Main connector pinout and device appearance

Figure 1 and Table 2 provide information on the pinout of the main connector. The appearance of the device is shown in Figures 2-3.

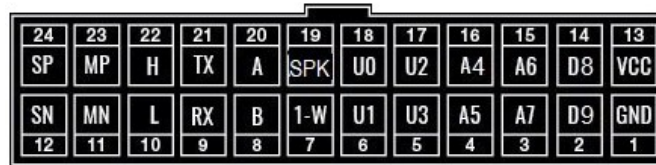


Figure 1

Table 2

№	Designation	Purpose	Application/connection
1	GND	Power supply negative	Power supply negative voltage
2	D9	Discrete -	Discrete / frequency / pulse sensors
3	A7	Analog +	Analog and discrete sensors
4	A5	Analog +	Analog and discrete sensors
5	U3	Discrete output -	Switching current up to 540 mA. Discrete / frequency / pulse sensors
6	U1	Discrete output -	Switching current up to 540 mA. Discrete / frequency / pulse sensors
7	1-W	1-WIRE interface	Digital temperature sensors, identification keys
8	B	RS485 interface	RS485 sensors
9	RX	RS232 interface	RS232 sensors
10	L	CAN interface	CAN L line
11	MN	Microphone -	Connection for the hands-free microphone
12	SN	Speaker -	Connection for the hands-free speaker
13	VCC	Power supply positive	Power supply positive voltage

No	Designation	Purpose	Application/connection
14	D8	Discrete -	Discrete / frequency / pulse sensors
15	A6	Analog +	Analog and discrete sensors
16	A4	Analog +	Analog and discrete sensors
17	U2	Discrete output -	Switching current up to 540 mA. Discrete / frequency / pulse sensors
18	U0	Discrete output -	Switching current up to 540 mA. Discrete / frequency / pulse sensors
19	SPK	Automatic announcement system	Connection for an automatic announcement system
20	A	RS485 interface	RS485 sensors
21	TX	RS232 interface	RS232 sensors
22	H	CAN interface	CAN H line
23	MP	Microphone +	Connection for the hands-free microphone
24	SP	Speaker +	Connection for the hands-free speaker

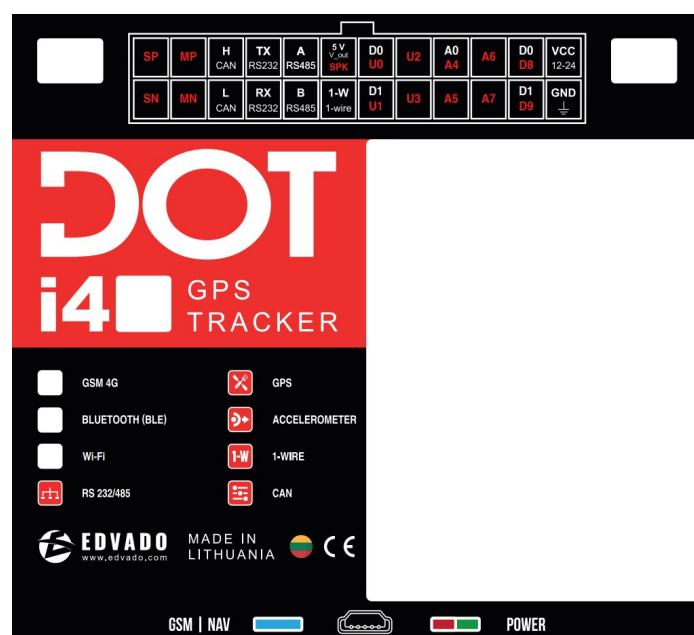


Figure 2. Device information section

1.3 Connection recommendations

Recommended device connection sequence:

1. Install SIM card
2. Connect the internal battery of the device
3. Close the case
4. Connect power to the device (red and black wires of the main harness)

Warning: connect the permanent positive supply wire last, through a 2 A fuse installed as close as possible to the

connection point on the vehicle electrical system.

Connect the remaining harness wires as required for the functions used.

For the best signal reception from satellites, the tracker should be placed so that the logo on the body faces up. Positioning the device at any other angle is also acceptable. When installing, the tracker body on the logo side must not be obscured by metal objects or coatings.

If driving style monitoring will be used, orient the tracker with the main connector side facing the vehicle's direction of travel.

WARNING! Do not place the tracker near very hot vehicle components. Ambient temperatures above +80°C may affect stable operation of the device.

1.4 Status indicators

The tracker has two status indicators: NAV | GSM and PWR | BAT (Fig. 3).

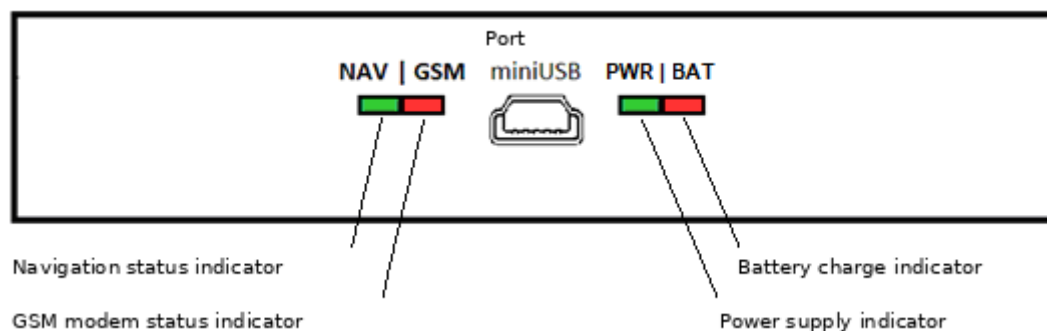


Figure 3 – View of the bottom panel (schematically)

PWR | BAT LED

- Steady green – external power connected
- Steady green and red simultaneously – external power connected; the built-in battery is charging.

NAV | GSM LED

Green – navigation module status:

- Off – module switched off / no coordinates
- 1 flash / 1 second – satellites acquired, coordinates valid

Red – GSM modem status:

- Off – modem switched off
- Steady on – searching for a network
- 1 flash / 5 seconds – attempting to connect to the server
- 1 flash / 1 second – server connection established

After 1-2 min, the NAV | GSM LED should flash green and red, each with 1 flash / 1 second, indicating normal device operation.

Otherwise, check the installation and settings, or contact support@edvado.com.

SETUP AND UPDATE

2.1 Local configurator

The Arnavi Configurator application provides local tracker diagnostics and configuration over a wired USB connection. It displays all current device operating parameters in real time. Additional resources, including manuals and drivers for Arnavi equipment, can also be downloaded in the application.

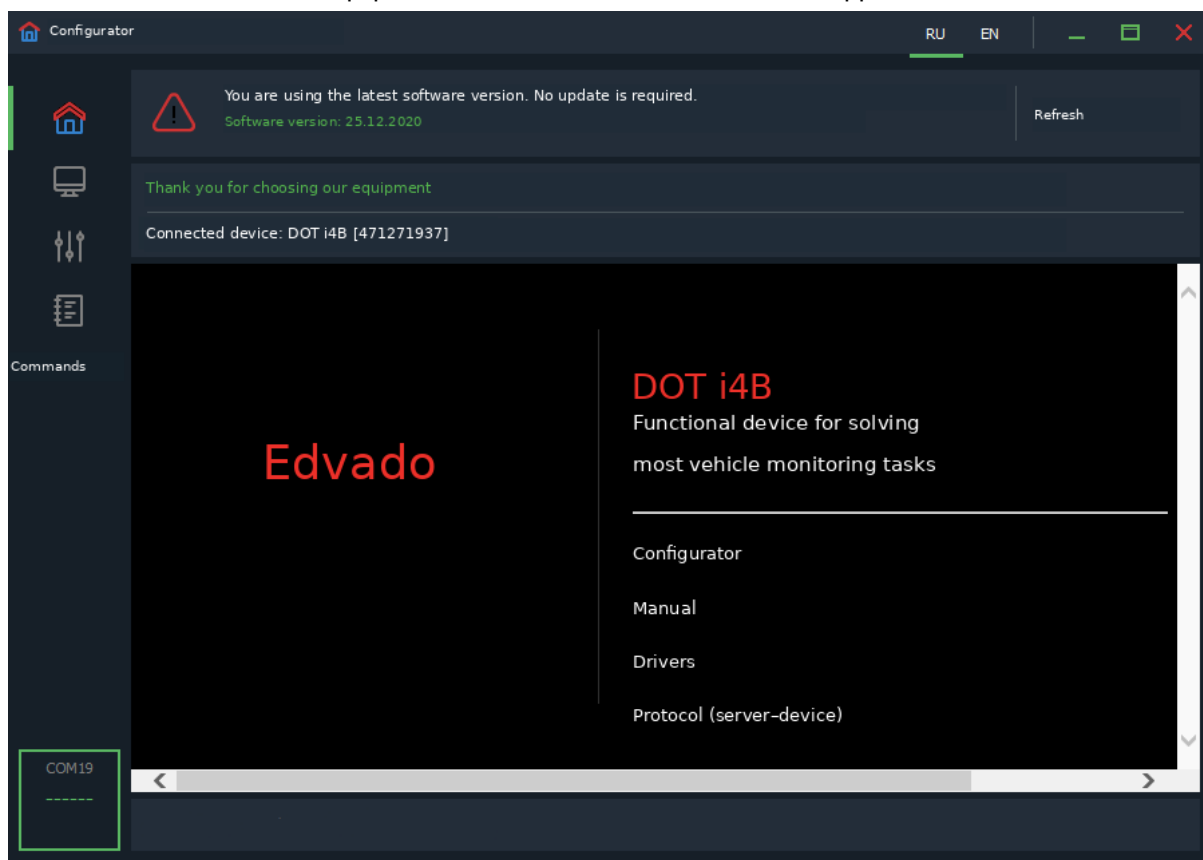


Figure 4 – “Welcome” section

Main sections of the configurator (vertical panel on the left):

- Welcome – General device information and additional materials for download.
- Monitoring – Real-time display of device status and connected peripherals.
- ⌚ Settings – Menu for changing the device configuration, or cloning the configuration to a file.
- ⌚ Commands – Menu for sending service commands to the device.

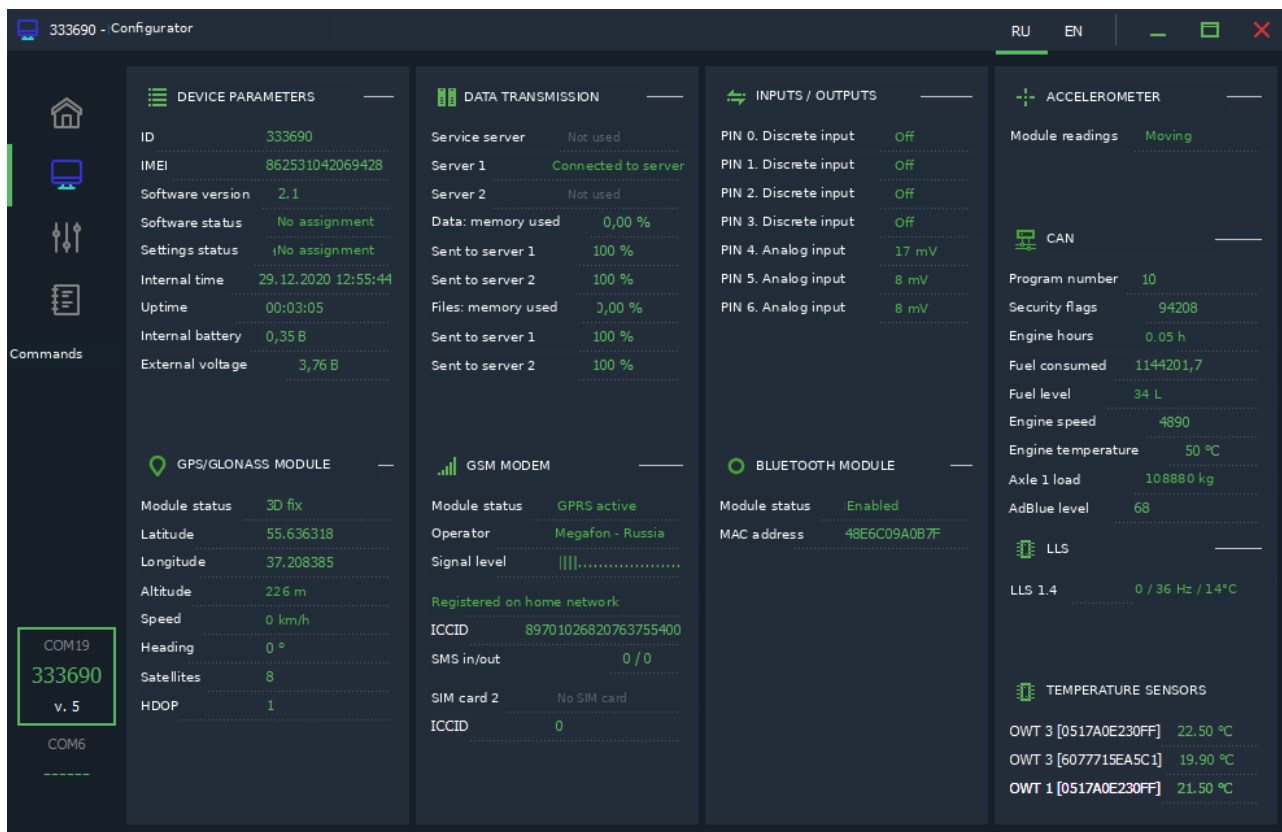


Figure 5 - "Monitoring" section

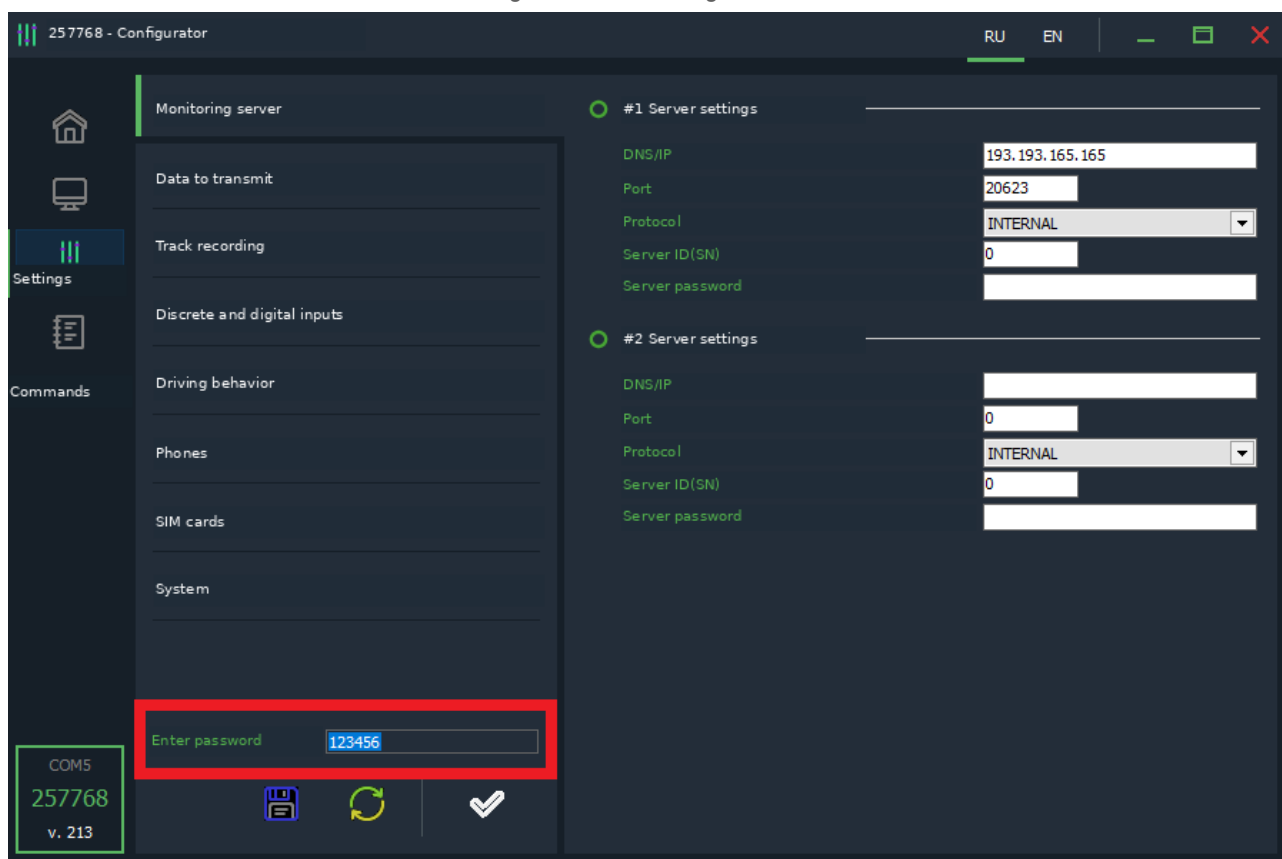


Figure 6 - "Settings" section

You may need to enter your device password to change settings.

Setting up DOT i4B

Monitoring Server tab

The tracker can transmit data to two monitoring servers simultaneously. Set the server address and port and select the protocol type (INTERNAL or EGTS) for each of the one or two monitoring servers.

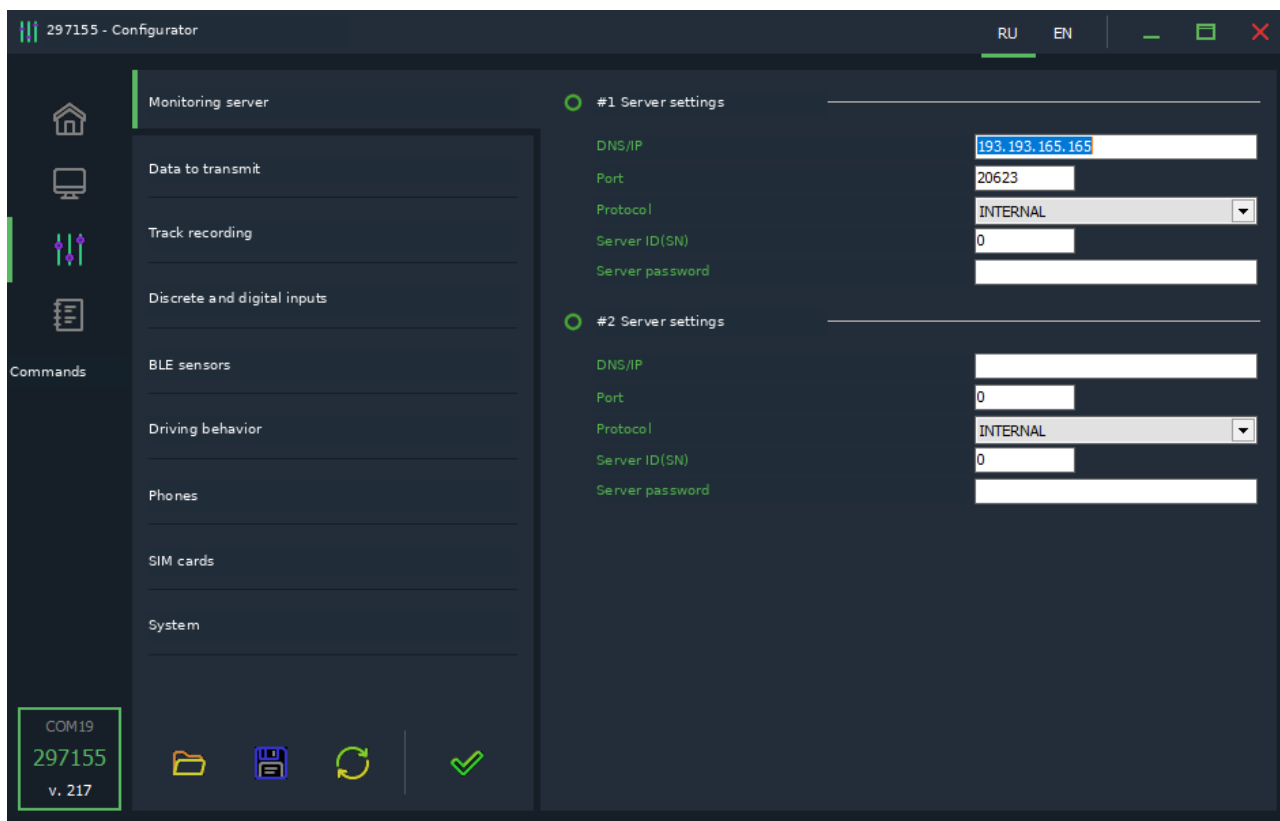


Figure 7 - "Monitoring Server" tab

<DNS/IP> - monitoring server address.

<Port> - monitoring server port (1-65535).

<Protocol> - Protocol for data transmission to the server (DOT (Internal) or EGTS).

“Data for transmission” tab

To transmit data efficiently and reduce traffic, select the data to be sent to the server.

If the device is used only to locate a mobile asset (vehicle), without additional equipment, select only the first two “Packet structure” items: GPS / GLONASS coordinates and GPS / GLONASS parameters. This minimizes data traffic from the device to the server and reduces mobile data costs.

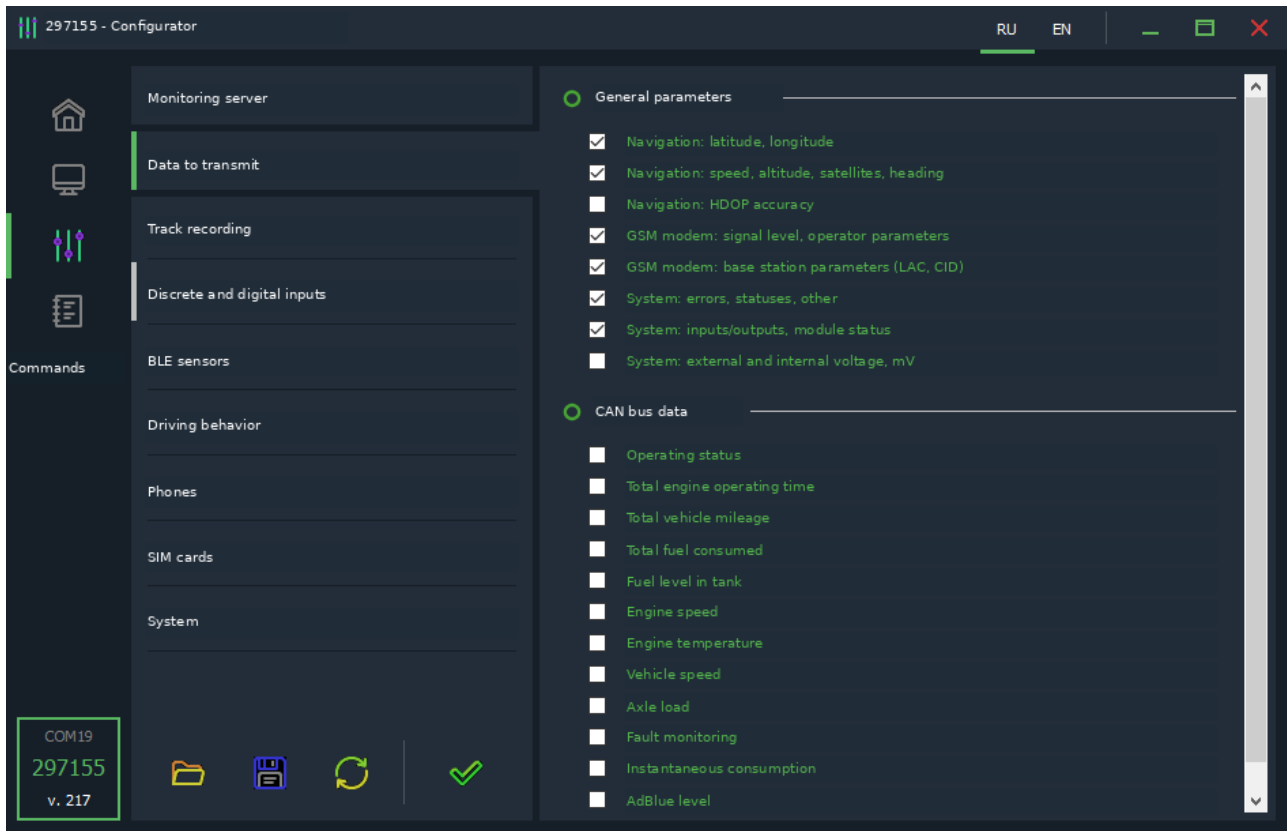


Figure 8 - “Data for transmission” tab

“Route point transmission” tab

Track recording parameters determine the balance between track detail and data traffic.

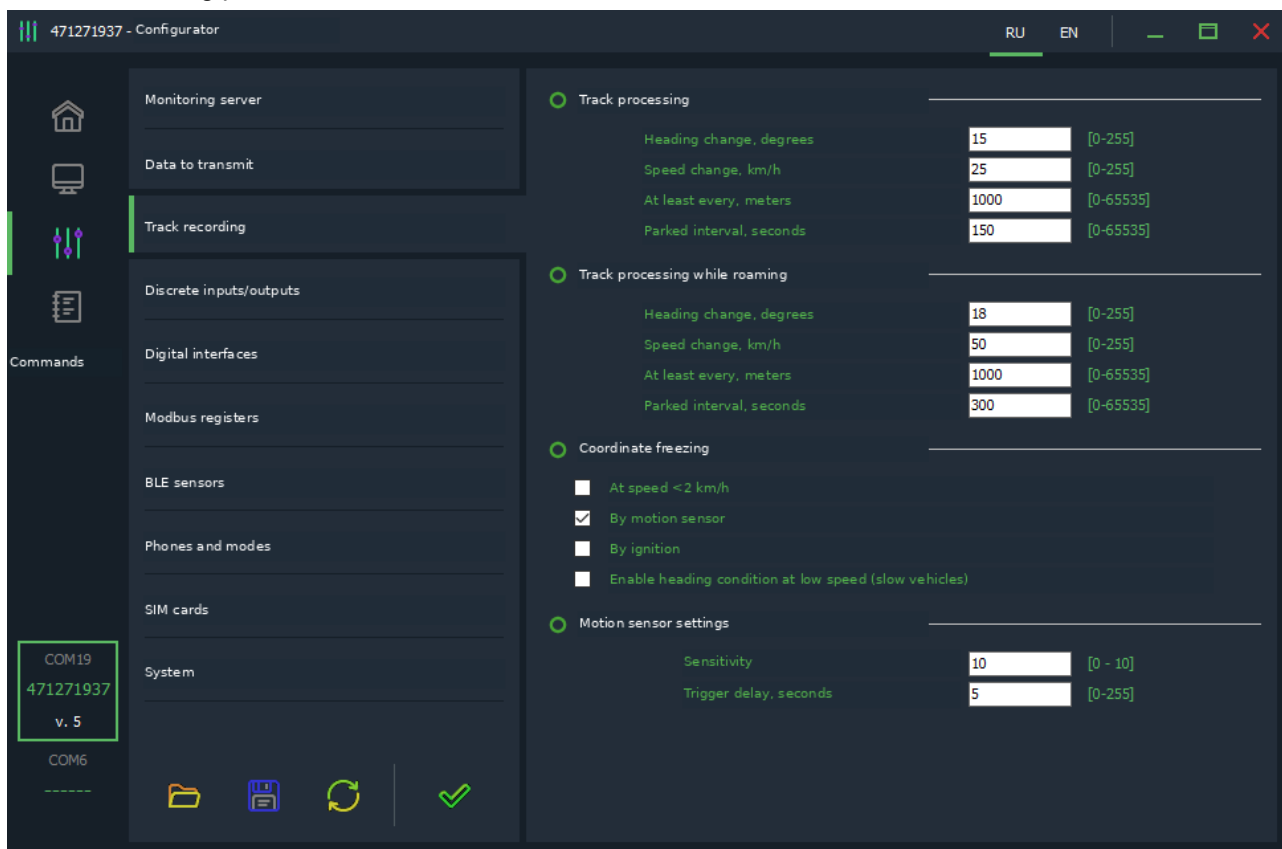


Figure 9 - “Route point transmission” tab

<Heading change - angle> - If the angle between the heading of the last position sent to the server and the current heading exceeds the specified value, the current position is sent to the server.

<Speed change - speed> - If the change between the speed at the time the last position sent to the server was determined and the current speed exceeds the specified value, then the current position will be sent to the server.

<At least every - distance> - If the distance between the last position sent to the server and the current position exceeds the specified value, then the current position will be sent to the server.

<Parked interval - time> - Time between successive data transmissions to the server while parked, in seconds.

Warning: events triggered by angle, speed and distance are sent only while the vehicle is moving, i.e. when the coordinate-freezing conditions are not met.

Coordinate freezing defines the conditions under which the position coordinates are held unchanged while the vehicle is parked. Conditions can be combined.

Motion sensor settings. Sensitivity: higher values increase sensor sensitivity. Trigger delay: the duration of continuous movement, in seconds, required to detect the start of movement.

Warning: to freeze coordinates while parked based on ignition status, connect the ignition signal to one of the analog inputs (A4-A7), configured for "ignition".

“SIM cards” tab

DOT i4B supports simultaneous use of 2 SIM cards.

<Disable operation> – disable GPRS use by the SIM card. Regardless of this setting, SIM cards will still register on the network and remain available for calls and SMS.

<Roaming allowed> – use this SIM card in roaming.

<Enable card PIN entry> – when prompted for a PIN code, the tracker will try to enter the specified PIN.

WARNING: this setting stores the PIN code in the device memory and DOES NOT enable or change the PIN code on the SIM card. If PIN entry is already enabled on the SIM card, entering an incorrect value in this parameter will block the card.

<APN, username, password> - APN settings. Leave the fields empty for automatic APN configuration.

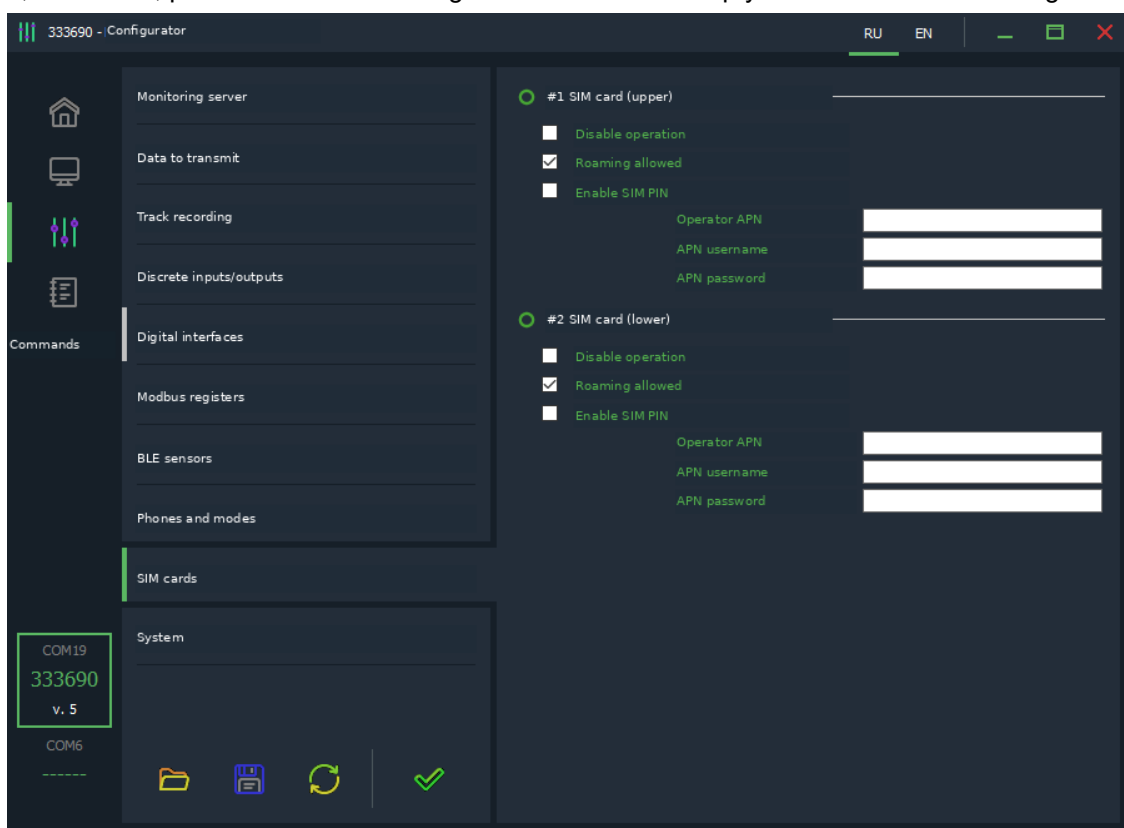


Figure 10 - “SIM cards” tab

"Service" tab

<Device password> - device access password. Used when sending SMS and TCP commands, and when changing settings locally.

<Sleep mode> - in order to save energy, turn off the GPS module, or go into deep sleep in accordance with the selected conditions.

<Connect every, minutes> - in deep sleep mode, the device will wake up and communicate in accordance with the specified time interval.

<Wake on motion sensor> - while driving, the device will operate normally. (This also applies to the "disable GPS" mode)

<Wake on input state change> - When any discrete input changes state, the device connects to send a new packet to the server.

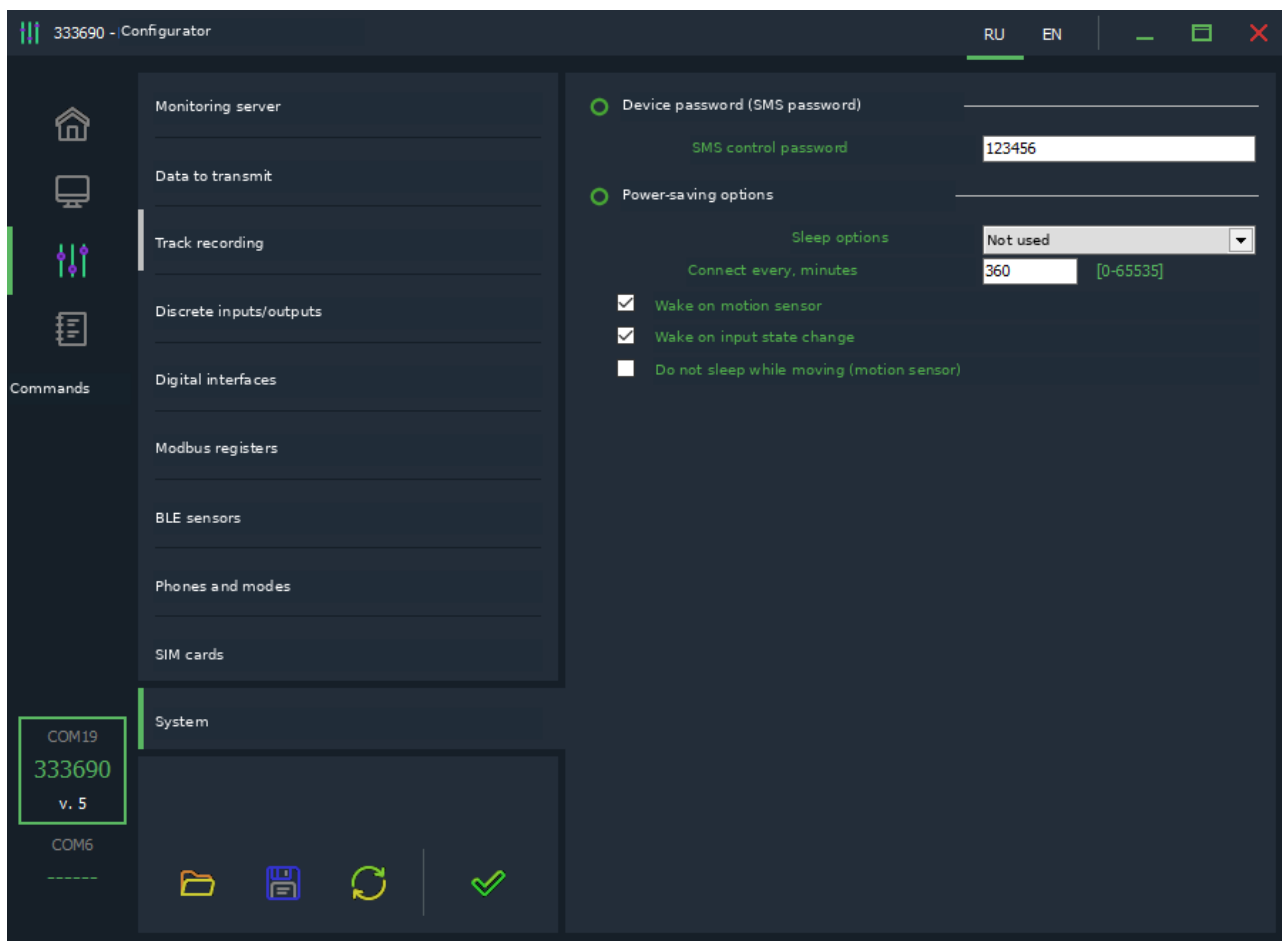


Figure 11 - "Service" tab

Completing the device setup

After configuring the device, click “Apply”. A green pop-up confirms that the settings have been applied successfully.

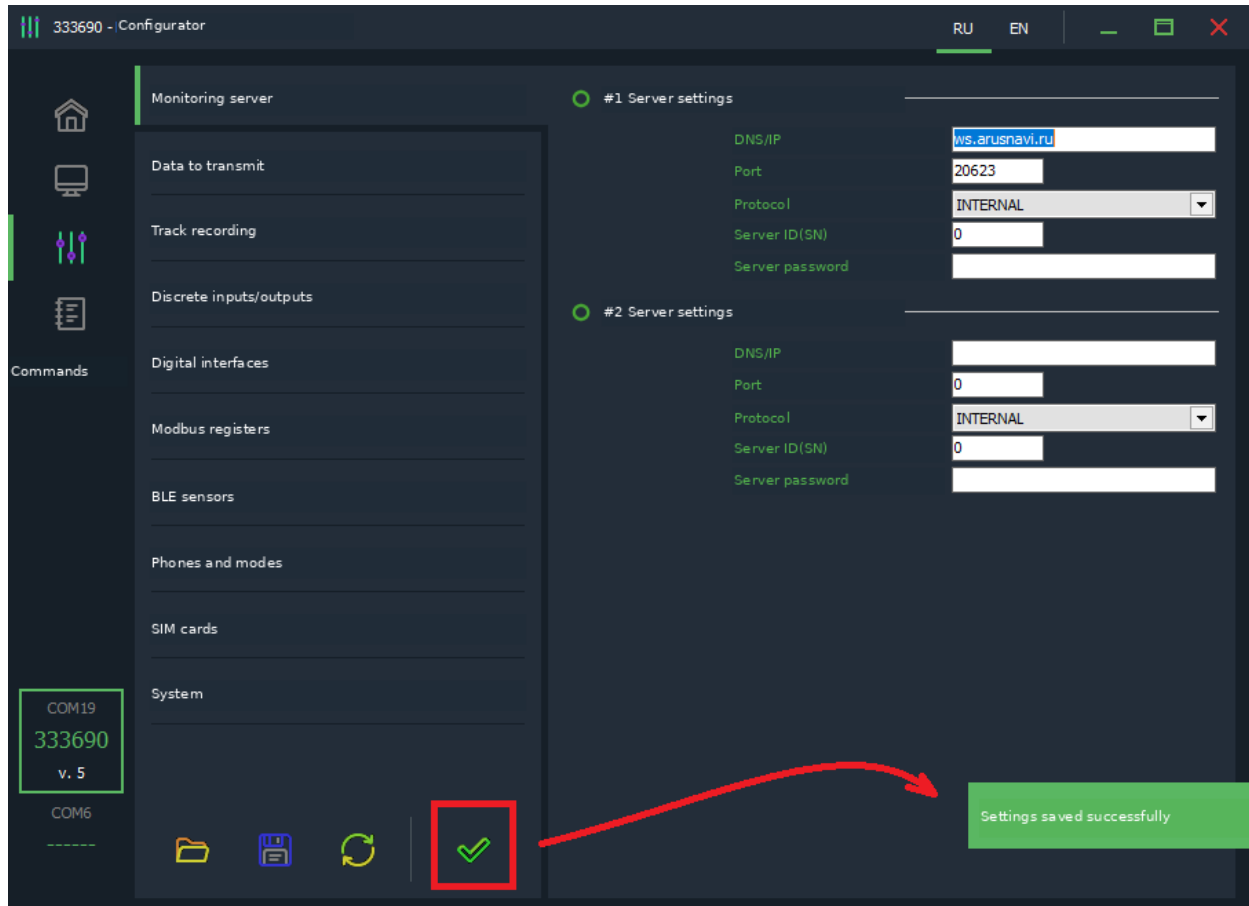


Figure 12 - Applying the configuration

The current configuration can be saved to a local file:



When connecting another DOT i4B tracker, you can save time by applying a ready-made configuration from the file:



2.2 Configuration using SMS and TCP commands

The structure of the message with the command to change settings is as follows:

<access_password>*SETP*<parameters_to_change>

By default, the <access_password> field is 123456

Field <parameters_to_change> contains the number and value of one or more parameters to be changed.

Each element from the list of changeable parameters has the following structure:

#<parameter_number> = <value>

<parameter_number> - numerical index of the parameter.

<value> - new parameter value, can be simple or compound.

A composite value is a sequence of simple values separated only by a comma:

<value_1, value_2, value_N>.

List elements are transmitted without delimiters: the end of one element is indicated by the beginning of the next (# sign).

When sending messages via SMS, it is necessary that the length of the message does not exceed 160 characters, and the message contains letters only of the Latin alphabet.

If the SMS command was accepted, an SMS with the current device settings will be sent in response.

The device automatically synchronizes settings with the WEB configurator, so the WEB configurator always contains the actual current settings of the device.

Table 3 – List of Setting Parameters for the SETP Command

Parameter number	Description
#1	Monitoring server 1 settings
#2	SIM card 1 mobile operator APN parameters
#3	Device access password
#4	PIN code of SIM card 1 (if activated)
#5	Track recording parameters
#6	Power-saving mode settings
#7	Mobile operator APN parameters of SIM card 2
#8	SIM card 2 PIN code (if enabled)
#9	Input/output operating modes
#10	Data from the CAN bus for transmission to the server
#11	Operating modes of digital interfaces
#12	External CAN reader program number
#15	Operating mode in roaming
#16	Analog input threshold
#19	LLS sensor filtering level
#20	Speed limit
#21	Motion sensor operating parameters
#26	Monitoring server 2 settings
#30	SIM card operation permission

Example of changing several parameters in one message:
 123456*SETP*#1=hosting.wialon.com,20623#5=400,18,20,150#9=F,D,D#11=0,30

123456*SETP*#1=193.193.165.165,20623,0,0#2=send.ee,,#4=#5=1000,15,50,150,1000,18,50,150#6=3,360,5#7=send.ee,,#8=#9=D,D,D#10=1#11=5,30#12=0#15=1,1#16=5000,0#19=0,0,0,0#21=10,0#26=,0,0,0

If you have difficulty composing the “SETP” command, use the response to the “GETP” command as a reference.

The main parameter settings are described below. For further information on configuration commands, contact support@edvado.com.

Monitoring server 1 settings - Parameter number: 1

Command format: #1=<server_address>,<server_port>,<protocol>,<ID>

Arguments:

<server_address> - A string of up to 32 characters containing the server DNS name or IP address.

<server_port> - a number from 1 to 65535. It is not a required parameter: if there is no need to change the port, the parameter can be omitted.

<protocol> - Protocol type. 0 – Arnavi, 4 – EGTS.

<ID> - identifier for the monitoring server. The default is IMEI. If an alternative identifier is required, set a value other than zero.

Examples:

123456*SETP*#1=193.193.165.165,20629,4 – set IP address, server port, protocol type - EGTS

123456*SETP*#1=hw.geliospro.ru,20144 – set the DNS name and server port

123456*SETP*#1=hw.geliospro.ru – change only the server address, leave the server port unchanged

SIM card cellular operator APN parameters - Parameter number: 2

Command format: #2=<APN>,<username>,<password>

Arguments:

<APN> - a string up to 32 characters long. Contains the access point name

<username> - a string up to 32 characters long. Contains the username of the access point

<password> - a string up to 32 characters long. Contains the access point password

Examples:

123456*SETP*#2=internet,gdata,gdata – set the APN parameters of the Megafon operator

123456*SETP*#2= , , – clear APN parameters

Device access password - Parameter number: 3

Command format: #3=<new_access_password>

Arguments:

<new_access_password> - A string of up to 8 characters containing the new device access password. An empty string disables password protection.

Examples:

123456*SETP*#3=13571 – set the access password 13571 SETP*#1=193.193.165.165,20629,4 – example of an SMS command when the password is disabled.

Track recording parameters - Parameter number: 5

Command format:
#5=<home_distance>,<home_angle>,<home_speed>,<home_interval>,<roaming_distance>,<roaming_angle>,<roaming_speed>,<roaming_interval>

Home – settings for operation on the home network. Roaming – settings for operation while roaming.

Arguments:

For a description of the arguments, see “Route point transmission”.

Examples:

123456*SETP*#5=400,18,20,150 – set all track recording parameters

123456*SETP*#5=,,35,300 – change only the speed and interval, leave the distance and angle unchanged

123456*SETP*#5=,15 – change only the angle, leave other parameters unchanged

123456*SETP*#5=400,18,20,150, 1000,25,40,360 – various modes for home and roaming.

SIM chip (SIM2) mobile operator APN settings - Parameter

number: 7

Command format: #7=<APN>,<username>,<password>

Arguments:

<APN> - a string up to 32 characters long. Contains the access point name

<username> - a string up to 32 characters long. Contains the username of the access point

<password> - a string up to 32 characters long. Contains the access point password

Examples:

123456*SETP*#7=internet,gdata,gdata – set the APN parameters of the Megafon operator

123456*SETP*#7= , , – clear APN parameters

Monitoring server 2 settings - Parameter number: 26

Command format: #1=<server_address>,<server_port>,<protocol>,<ID>

Arguments:

<server_address> - A string of up to 32 characters containing the server DNS name or IP address.

<server_port> - a number from 1 to 65535. It is not a required parameter: if there is no need to change the server port, the parameter can be omitted.

<protocol> - Protocol type. 0 – Arnavi, 4 – EGTS.

<ID> - identifier for the monitoring server. The default is IMEI. If an alternative identifier is required, set a value other than zero.

Examples:

123456*SETP*#1=193.193.165.165,20629,4 – set IP address, server port, protocol type - EGTS

123456*SETP*#1=hw.geliospro.ru,20144 – set the DNS name and server port

FUNCTIONALITY

3.1 Operating modes of inputs and outputs

Each input/output has several operating modes. List of available operating modes:

Table 4

No	Universal U0, U1, U2, U3	Analog A4, A5, A6, A7	Discrete D8, D9
1	Discrete	Discrete	Discrete
2	Pulse	Pulse	Pulse
3	Frequency	ADC	Frequency
4	Ignition	Ignition	Ignition
5	Take a photo	Take a photo	Take a photo
6	Non-zero pulse	Non-zero pulse	Non-zero pulse
7	Call button		Call button
8	Ground monitoring (U0 only)		
9	Mode 1 (Discrete output)		
10	Key-based deactivation (Output)		
11	Speed-based output (Output)		
12	Safe immobilization (Output)		
13	Wi-Fi reset (Output)		
14	Navigation status (Output)		
15	Modem Status (Output)		

Discrete inputs

Discrete inputs have an internal pull-up to 3.3 V. An input voltage below 1 V corresponds to logic “1”. The permitted input voltage range is 0-33 V.

“Discrete” mode indicates the input state. When connected to the negative supply, the input is active (logic 1); when disconnected, it is inactive (logic 0).

“Pulse” mode supports sensors with a pulse output (fuel flow sensors and various counters). It counts pulses since the previous packet was generated.

“Non-zero pulse” mode does not send a value to the server if 0 pulses have been counted since the previous packet was recorded, reducing data traffic.

“Frequency” mode supports fuel level sensors with a frequency output.

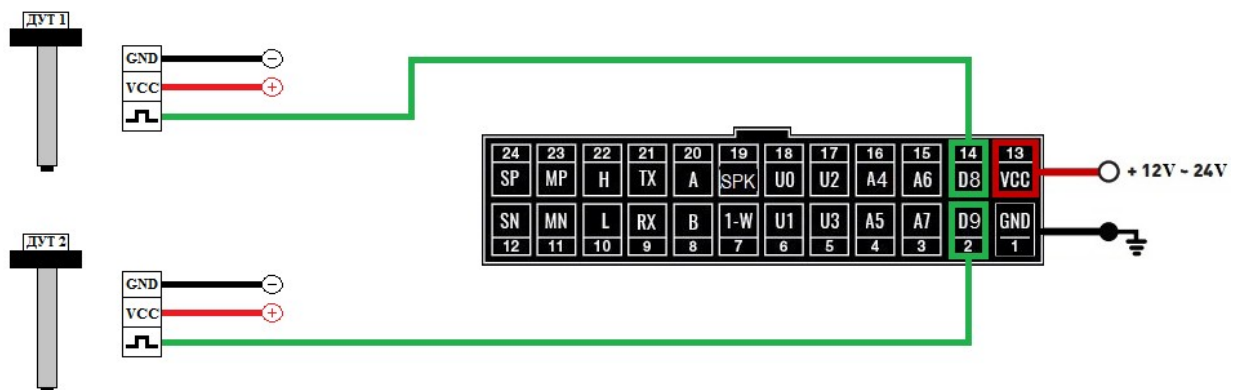


Figure 13 – Connection diagram for frequency-output fuel level sensors

Set the following parameters in the frequency-output fuel level sensor:

- Output signal type – frequency
- Frequency range: 30 – 4000 Hz
- Enable the pull-up resistor

Frequency-output fuel level sensors from other manufacturers may require a pull-up resistor to the supply voltage. Select the resistor value based on the vehicle supply voltage and the sensor's output specifications.

“Call button” mode – the input works as a discrete input. After activating the input (including short-term), calls will be made to the numbers specified in the device settings, in order of priority (from 1 to 5). In the “phone numbers” section of the web configurator, you can adjust the microphone sensitivity and speaker volume level.

“Ground monitoring” mode is intended for vehicles equipped with a battery ground disconnect switch. Connect the input to the tracker's negative supply. Use this mode together with “Ignition” mode. When ground is disconnected, the ignition state is considered invalid (parameter v_in=0).

Discrete outputs

The outputs are open collector. When active, they connect to ground to switch on external devices. Each output supports a load of up to 540 mA.

To switch more powerful devices, they should be connected via external relays (the relay coil is connected between the on-board network and the device output, and the contacts are connected to the load).

Figure 14 shows an example of using the device outputs to control an engine immobilization relay.

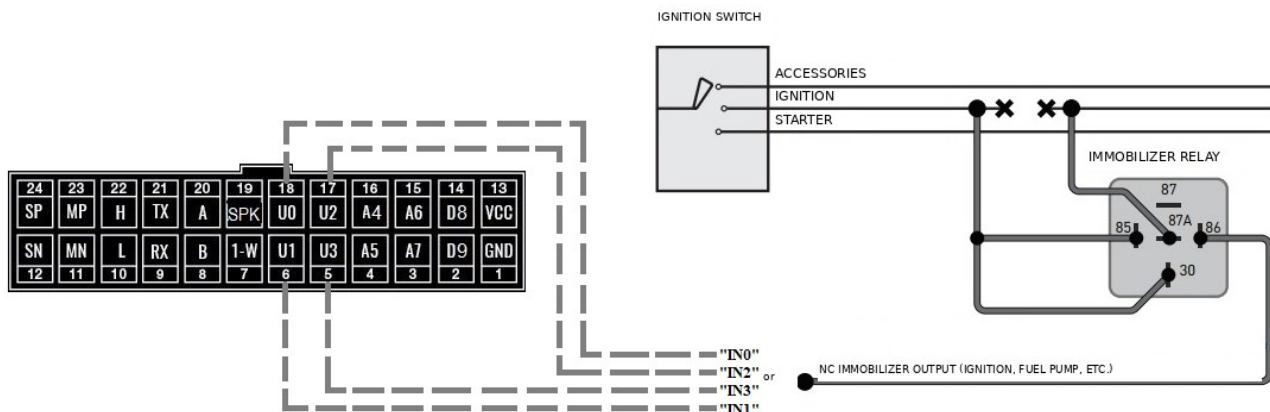


Figure 11 – Example of an engine immobilization relay connection

The relay is connected to one of the device outputs IN0 (U0), IN1 (U1), IN2 (U2), IN3 (U3).

For correct operation, you must set the output mode in the device settings.

“Output mode 1” mode is an operating mode in which the output is activated and deactivated manually. The output state is saved to non-volatile memory and restored after the device is restarted. The output is forcibly deactivated when the operating mode is changed.

The output status can be changed using an SMS command, a TCP command, or when configured using a local configurator via USB or Bluetooth.

<access_password>*SERV*8.x.y	Set output x to state y
<access_password>*SERV*24.x.y.k	Activate output x for y minutes and k seconds

“Wi-Fi reset” mode is used with an external Wi-Fi module. For details, see “RS-232 interface”, WIFI mode.

“Key-based deactivation” mode activates the output when the ignition is switched off. Presenting any 1-Wire key deactivates the output and sends the key code to the server. The output is reactivated when the ignition is switched off again, or 30 seconds after the key is presented if the ignition has remained off during that time.

“Speed-based output” mode activates the output when the speed threshold is exceeded and deactivates it when speed returns to the permitted range. Set <Speed-based output threshold, km/h> for correct operation.

“Safe immobilization” mode is similar to “Mode 1”, but the output is activated only after the vehicle has stopped completely.

“Navigation status” mode – the output will be activated at the moment GPS coordinates are detected and deactivated at the moment the coordinates are lost.

“GSM modem status” mode – the output will be activated if at least one of the SIM cards is registered in the GSM network,

Analog input modes

“Discrete” mode indicates the input state. When a positive voltage above the configured threshold is applied, the input is active (logic 1); otherwise, it is inactive (logic 0). Set <Analog input threshold, mV> for correct operation. Set the threshold separately for each analog input (A4, A5, A6, A7).

“ADC” mode measures voltage in millivolts over a range of 0-33 V. Sensors with an analog output can be connected (temperature sensors, analog fuel level sensors, factory-fitted fuel level sensors and ignition signals).

“Ignition” mode detects ignition status. For correct operation, configure

<Virtual ignition threshold, mV>

3.2 RS-485 interface

No. Digital interface mode

1 Universal mode (LLS + Arnavi CAN + ADM20)

2 Shtrikh tachograph (Shtrikh + LLS)

3 ModBUS RTU

4 ModBUS ASCII

“Universal (LLS + Arnavi CAN + ADM20)” mode - when connected in parallel, allows you to simultaneously use:

- up to 8 devices supporting the Omnicomm LLS protocol;
- external CAN reader “Arnavi CAN”;
- RFID reader “Neomatica ADM20” (network address 20 is used).

To monitor fuel consumption, refuelling and draining, the device supports external fuel level sensors (capacitive, ultrasonic, etc.) using the Omnicomm LLS protocol. Connect the sensors to pins “20” and “8” of the main connector:

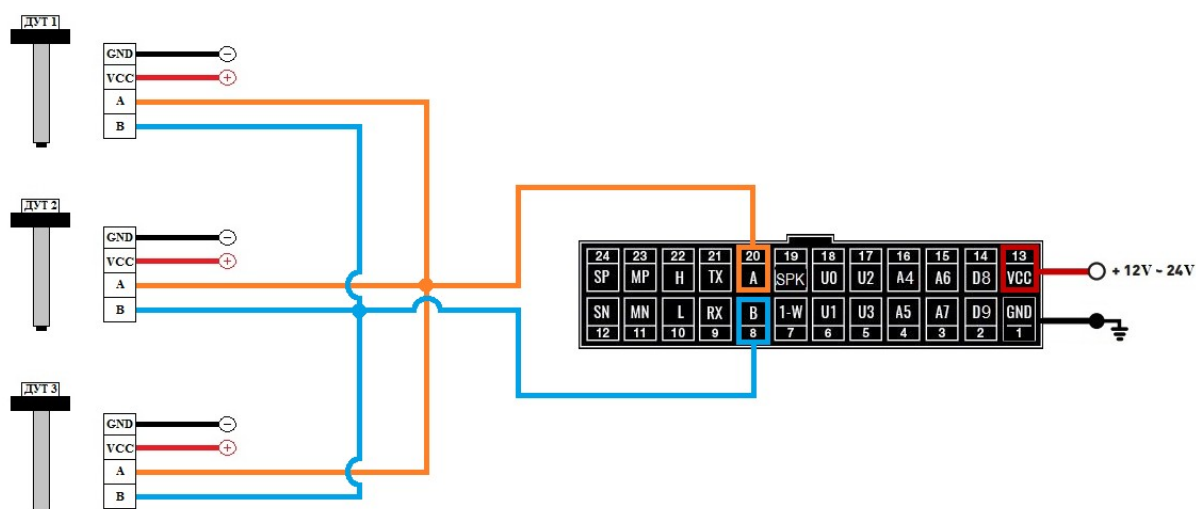
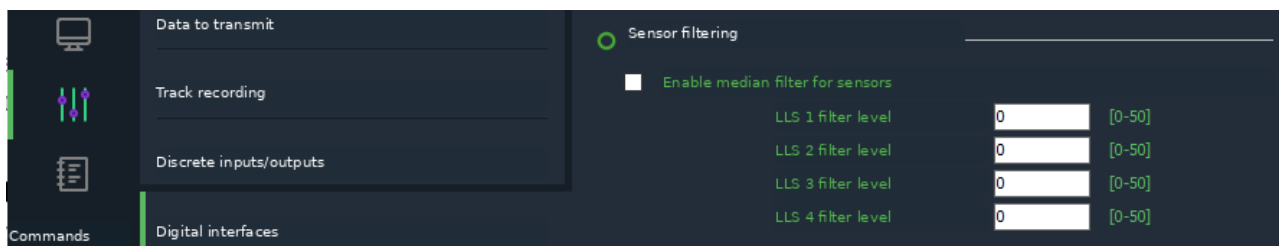


Figure 15 – Connection diagram for multiple fuel level sensors

The tracker identifies connected fuel level sensors by their network addresses and polls addresses 01, 02, 03, 04, 05, 06, 07, 08. When connecting multiple sensors, assign each a unique network address from 1 to 8 (see the fuel level sensor user manual) and set the communication rate to 19200 baud.

Additional filtering in the tracker can be configured for fuel level sensors at addresses 01-04:



“Shtrikh tachograph (Shtrikh + LLS)” mode allows a Shtrikh tachograph and LLS fuel level sensors to be connected simultaneously via RS-485.

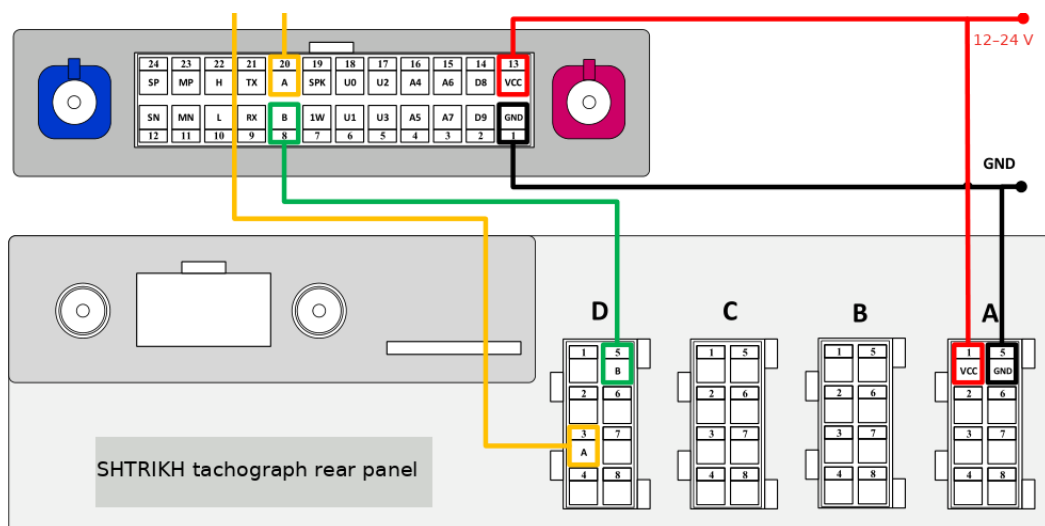
Commands for uploading a DDD file from the driver card to the server, and additional data on the current tachograph status:

<access_password>*SERV*20.0	Upload the tachograph DDD file from the driver card 1.
<access_password>*SERV*20.1	Upload the tachograph DDD file from the driver card 2.

Data transmitted to the server:

- Card type, authentication type, card number • Information on the first and second driver • Current type of activity • Time spent in the current mode • Accumulated driving time for the day • Time of continuous driving since the last rest • Vehicle speed, speeding • Travel distance

DOT i4B is connected to the tachograph via the RS-485 interface via the tachograph connector “D” on the rear panel:



“Modbus RTU”, “Modbus ASCII” modes - connection of external devices via the RS-485 interface that support the Modbus protocol.

DOT i4B operates via the Modbus protocol in data read mode only. Up to 20 registers (two or four bytes) can be read and transferred to the server.

Configuration:

Configuration is carried out in the Modbus registers section:

<Baud rate>: 9600, 19200, 38400, 57600.

<Polling interval, s>: 0-65535. Warning: each register polling cycle generates a packet for transmission to the server. A very short polling interval significantly increases data traffic.

<Read 2 registers>: used to read four-byte registers.

Set <Device network address>, <Parity> and <Stop bits> according to the technical documentation for the connected equipment.

<Modbus register number>: consider the following Modbus addressing rules when setting the register number:

- The address of the read register is written in decimal format and must be in the range from 0 to 10000. ⌚ If function 01 is used to read the register, in the “register number” field you must specify the register number without changes. ⌚ If function 02 is used to read a register, in the “register number” field you must specify the value “10001+register number”. ⌚ If function 03 is used to read a register, in the “register number” field you must specify the value “40001+register number”. ⌚ If function 04 is used to read a register, in the “register number” field you must specify the value “30001+register number”.

Example: to read register 769 using function 03, enter 40770 in the “Register number” field.

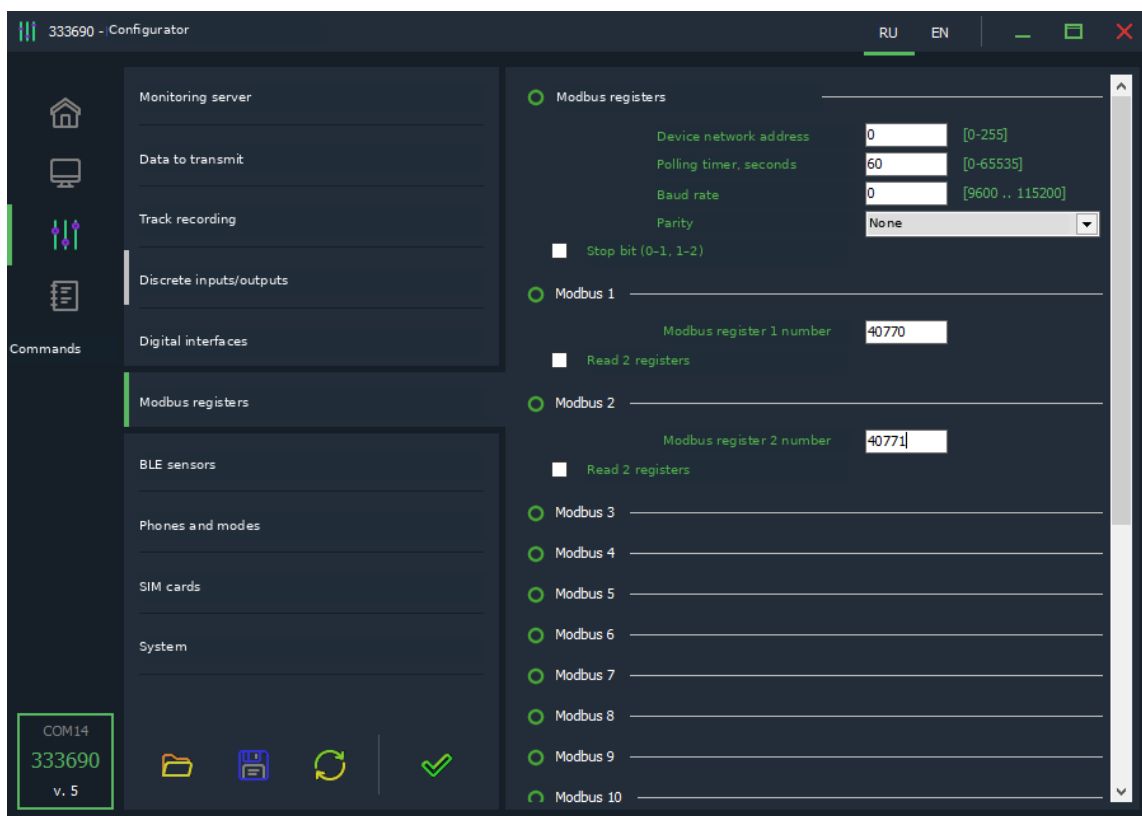
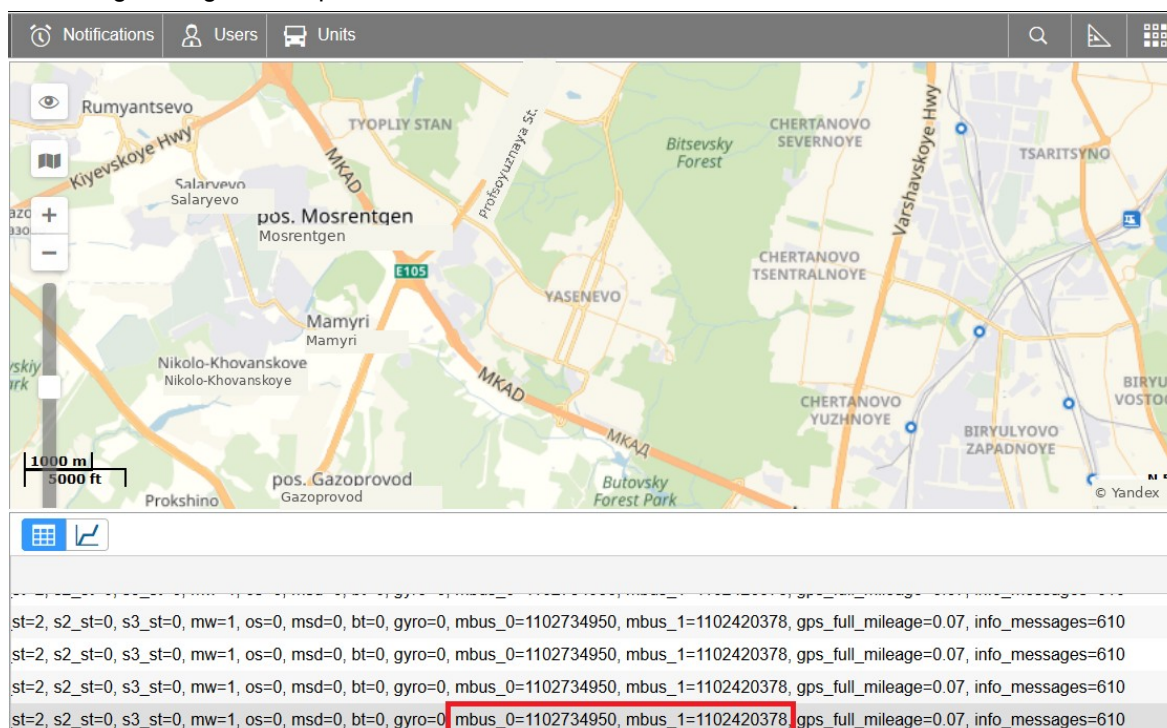


Figure 16 - Menu for setting up Modbus registers in the local configurator.

After reading the registers, a packet is formed and sent to the server:



In Wialon, the registers read are displayed as `mbus_X` parameters, where `X` is the register's sequence number minus 1. The first register is therefore `mbus_0`.

3.3 RS-232 interface

Table 6

No. Digital interface mode

- 1 CAN Log text protocol
- 2 CAN Log binary protocol
- 3 ModBUS RTU
- 4 ModBUS ASCII
- 5 Camera ZM
- 6 Camera OV0706
- 7 WIFI

“Modbus RTU”, “Modbus ASCII” modes - see RS-485 modes

“ZM Camera”, “OV0706 Camera” modes: connecting a camera that supports the “ZM” or “OV0706” protocol and operates via the RS-232 interface.

You can take a photo in several ways:

- Configure periodic photography;
 - Send an SMS or a command from the server;
 - Briefly activate one of the discrete inputs,
- preset to “take photo” mode.

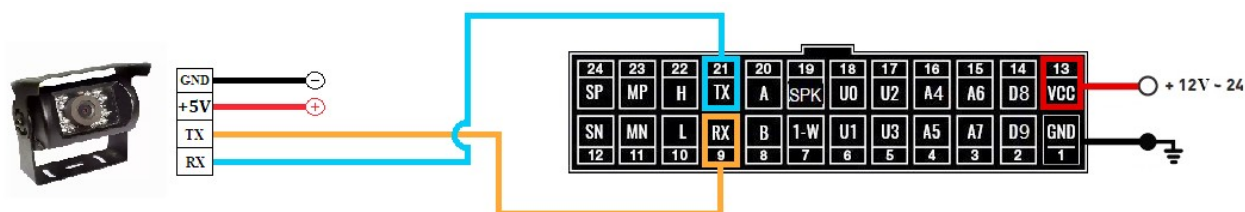


Figure 17 – Camera connection diagram via RS-232 interface

Warning! The camera supply voltage is 5 V.
DOT i4B does not supply power to the camera.

Configuration:

In the “digital interfaces” tab, you need to set the RS-232 interface mode corresponding to the installed camera (ZM or OV0706).

<Photo interval, minutes>: 1 to 65535 minutes. A value of 0 disables periodic photography. An interval of at least 5 minutes (no more than 1 photo per 5 minutes) is recommended to avoid data loss due to the limited GSM channel speed.

<Photo resolution>: 160×120, 320×240, 640×480.

To control shooting using a discrete input, you must switch the selected discrete input to the “take photo” mode in the “discrete inputs/outputs” section. The discrete input is shorted to the power supply minus, and if an analog input is used, it is shorted to the positive.

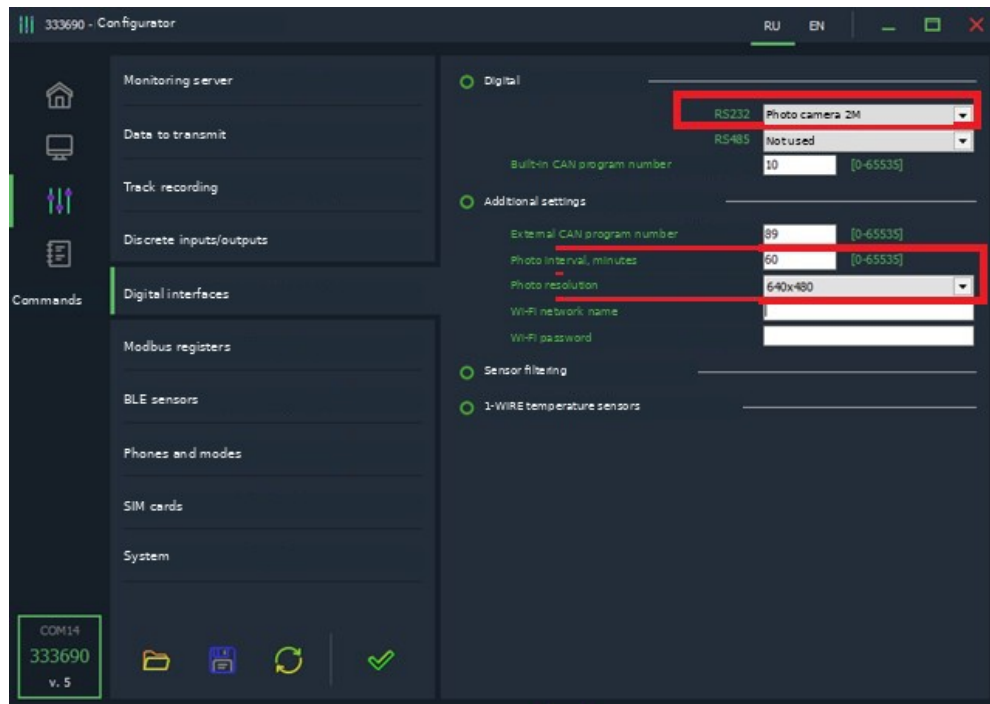


Figure 18 – camera settings

Command to send from server or via SMS:

'<access_password>*SERV*33.x.y', where x is the number of photos and y is the resolution (0 - 160x120, 1 - 320x240, 2 - 640x480).

It should be taken into account that each subsequent photograph will be taken after the previous one is uploaded to the server. Depending on the resolution and quality of the Internet connection, uploading photos via GSM can take up to 5 minutes.

DOT i4B can store up to 5 photos in the internal memory if there are problems with the Internet connection.

“WIFI” mode: connecting the external “Arnavi Wi-Fi” module.

Connects to one or two servers via a Wi-Fi access point. Wi-Fi transmission takes priority over GSM: when an access point is within range, data is sent over Wi-Fi first. The Arnavi Wi-Fi module supports Wi-Fi 802.11 b/g/n.

Connection:

The WIFI module has RS-232 interface outputs and an EN input. Connecting EN to ground activates the module. EN can be permanently connected to the negative supply or connected to an available DOT i4B universal output (U0, U1, U2, U3). The latter arrangement allows the tracker to control the external module and restart it if necessary.

The connection diagram using output U0 is shown in the figure:

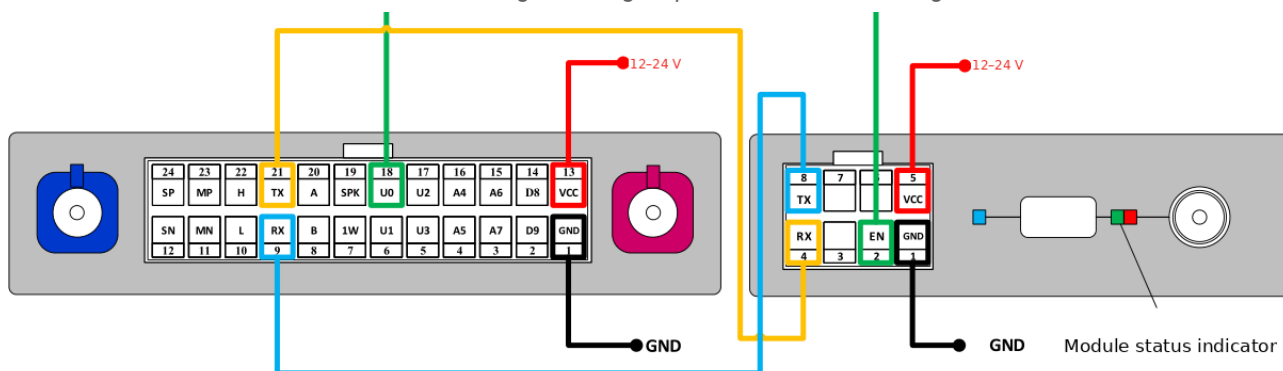


Figure 19 – WIFI module connection diagram

The Wi-Fi module has the following indicators:

- green – module power supply is normal
- green and red – power supply is normal and the module is activated (input “EN” shorted to ground)

Configuration:

To configure the WIFI module, you need to configure the selected fields in the “Input/Output Operation Mode” tab:

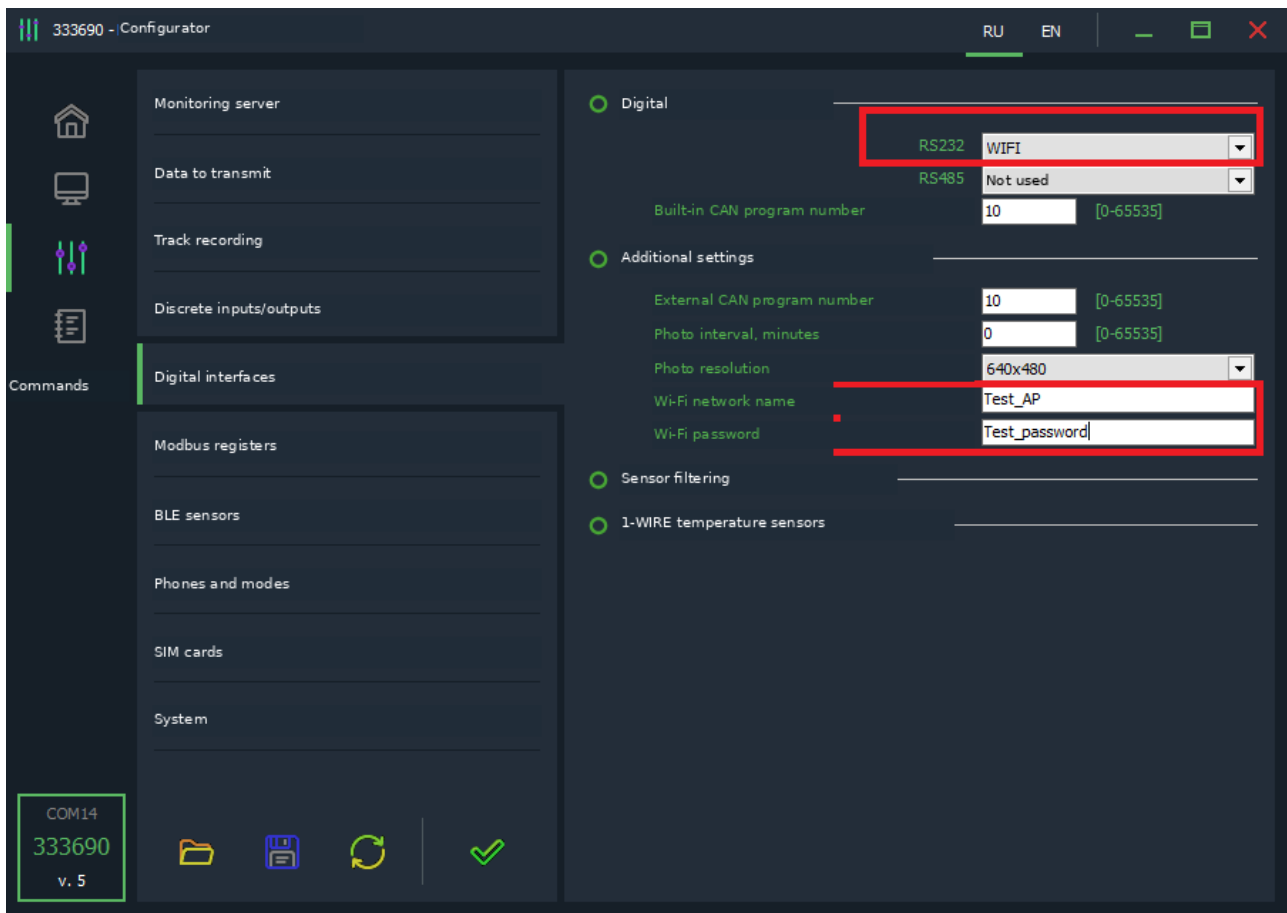
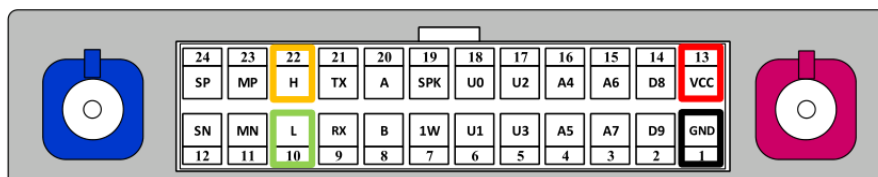


Figure 20 - “Digital Interfaces” tab

- Select the “WIFI” mode of the “RS-232” interface;
- Enter the access point name and password;
- If the connection is made using output U0-U3, the selected corresponding output must be switched to the “WIFI Reset” mode (Attention! Only one output at a time must be configured in this mode).

3.4 CAN interface

DOT i4B has a built-in CAN interface for direct connection to the vehicle. The connection is made to pins 10 (L) and 22 (H) of the main connector of the device.



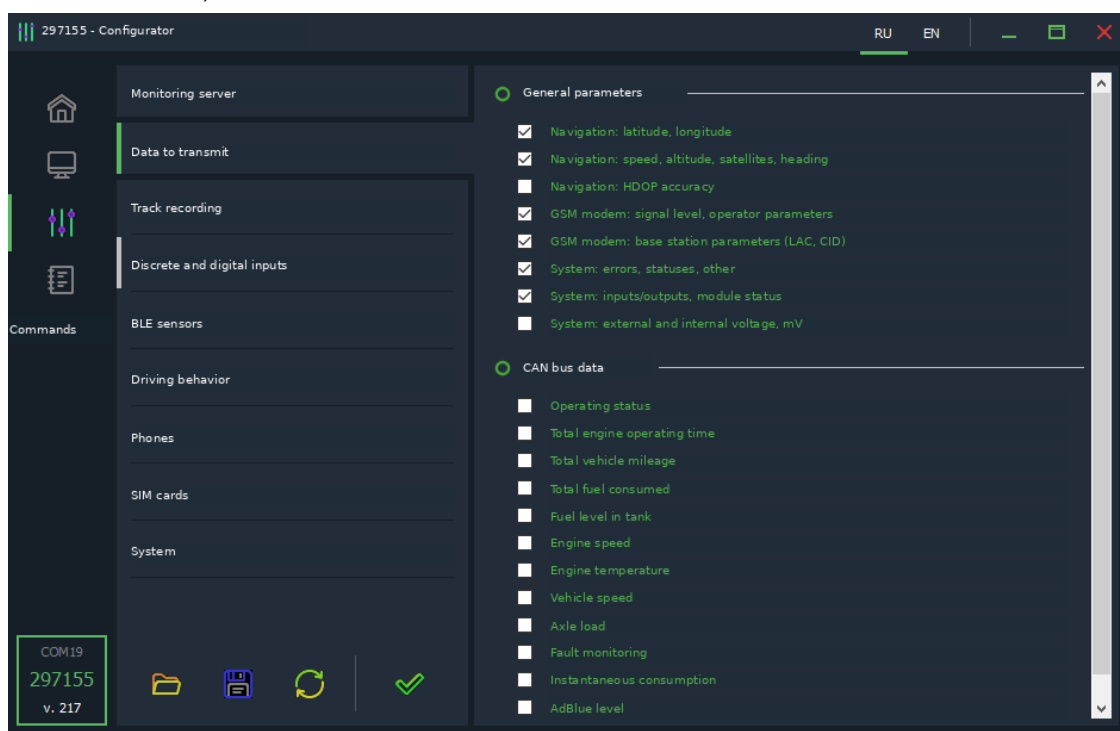
The list of supported cars and the corresponding CAN programs are available at the link:

<https://docs.google.com/spreadsheets/d/1vkZuc5tkFOzLz65n0fcsKZFY8zkNIbo9sCM5zfpq6f8/edit#gid=1624217125>

If the required car model is not in the list, please contact support@edvado.com support service.

To use the built-in CAN interface, enter the program number corresponding to the vehicle in the list in <Built-in CAN program>. After saving the settings, allow 1-2 minutes for the device to load the additional software module.

To reduce data traffic, select the <CAN bus data> to be sent to the server in “Data for transmission”:



3.5 1-Wire interface

Connecting digital sensors via 1-WIRE interface.

To monitor the temperature of various devices or objects, temperature sensors operating via a 1-wire interface are used (up to 8 sensors can be connected simultaneously on one data bus).

The figure below shows a diagram of connecting several temperature sensors of various types.

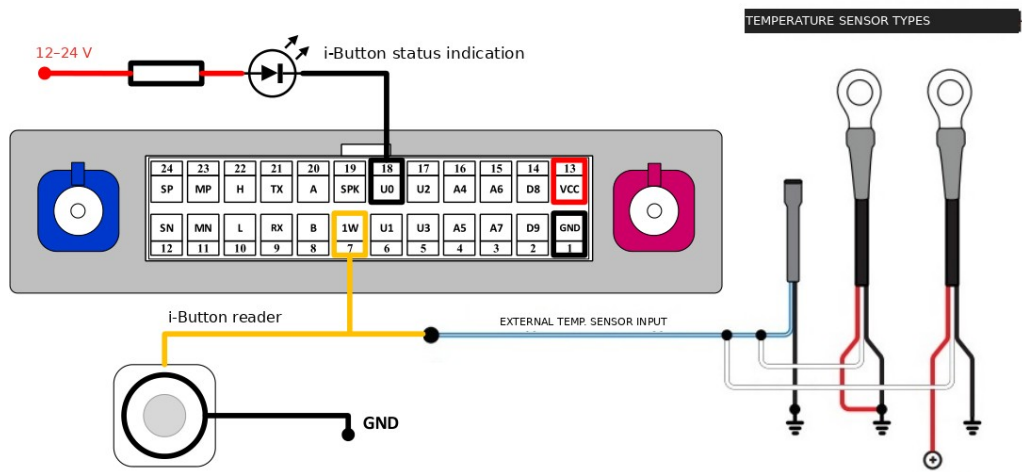


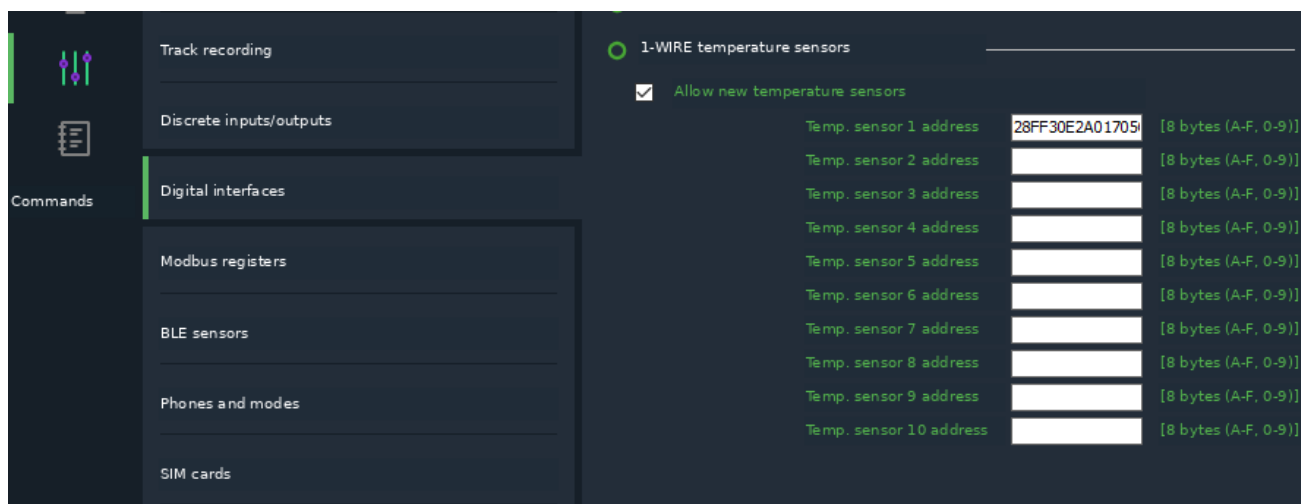
Figure 21 - Connection diagram for temperature sensors

<Allow saving new temperature sensors> - Newly connected temperature sensors are automatically assigned indices from 0 to 10, which identify them in data sent to the server. The sensor list is saved in the settings and synchronized with the web configurator. Warning! If this option is disabled, new temperature sensors not already listed are ignored.

The temperature sensor list can be edited manually at any time: enter a new sensor address or delete an existing one in <Temperature sensor address>.

List of commands for working with temperature sensors:

<access_password>*SMSW Get an SMS listing the connected temperature sensor numbers <access_password>*SERV*37 Delete all registered temperature sensors



Attention: With a two-wire connection scheme (via parasitic power), operation is guaranteed under the following conditions:

- up to 3 sensors on the bus
- wire length up to 10m

While temperature sensors are operating, DOT i4B can also recognize 1 identification key and send its code to the server when connected.

Warning: do not connect to the 1-Wire input equipment with a pull-up to the supply voltage.

3.6 Bluetooth

DOT i4B supports external wireless fuel level sensors and temperature sensors, including the Escort TD BLE wireless sensor.

Warning! Bluetooth sensors can be connected only to devices with ID 300000 or higher.

To connect a wireless sensor (fuel level or temperature sensor), you need to enter its MAC address in one of the cells for wireless sensors (the “Bluetooth sensors” settings section):

The cell number coincides with the network address under which data will be transmitted to the server. The Bluetooth sensor is displayed in the same way as wired sensors:

Warning! Wired and wireless sensors share the same address space. When selecting a slot for a wireless sensor, ensure that no wired sensor with the same network address will be connected to the device.

3.7 Phone numbers and hands-free calling

When calling from a specified phone number, DOT i4B can perform a specific function. Up to 5 phone numbers are supported with their corresponding functions:

- Sending an informational SMS to a specified number – Sending an SMS with a location and a link to a map
- Rebooting the device – Updating the software – Updating the settings – Activating the microphone and speaker – Activating the microphone

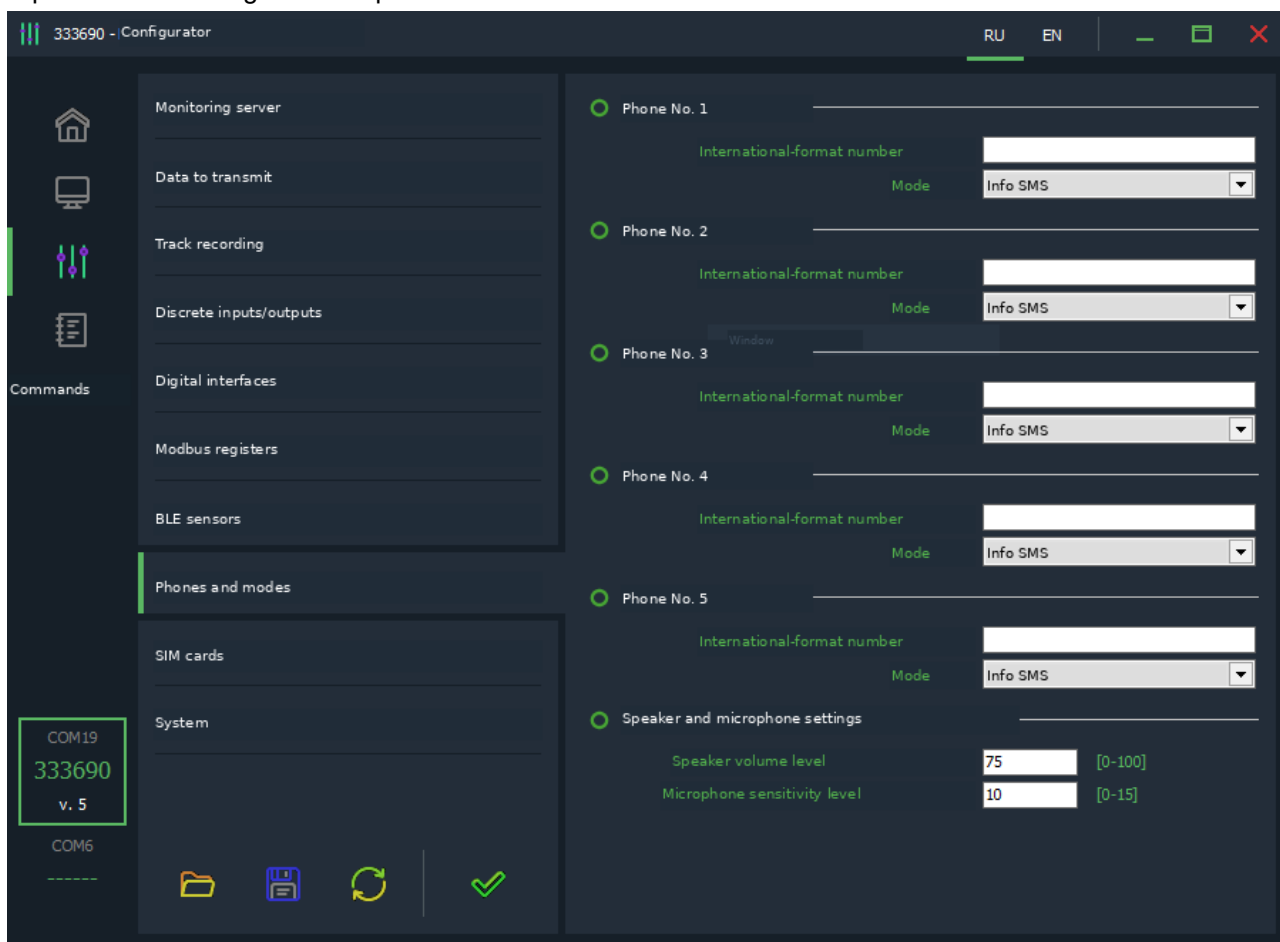


Figure 22 - “Phones and modes” tab



Figure 23 – Microphone and speaker connection diagram

Use an external electret microphone with a balanced output for a balanced connection. The GSM modem supplies power to the microphone.

Microphone sensitivity and volume level can be adjusted when configuring the device - section "Phone numbers".

☐ Speaker and microphone settings

Speaker volume level

75

[0-100]

Microphone sensitivity level

10

[0-15]

If you need to obtain a more powerful (louder) sound, you should use an external amplifier and a loudspeaker corresponding to its output power.

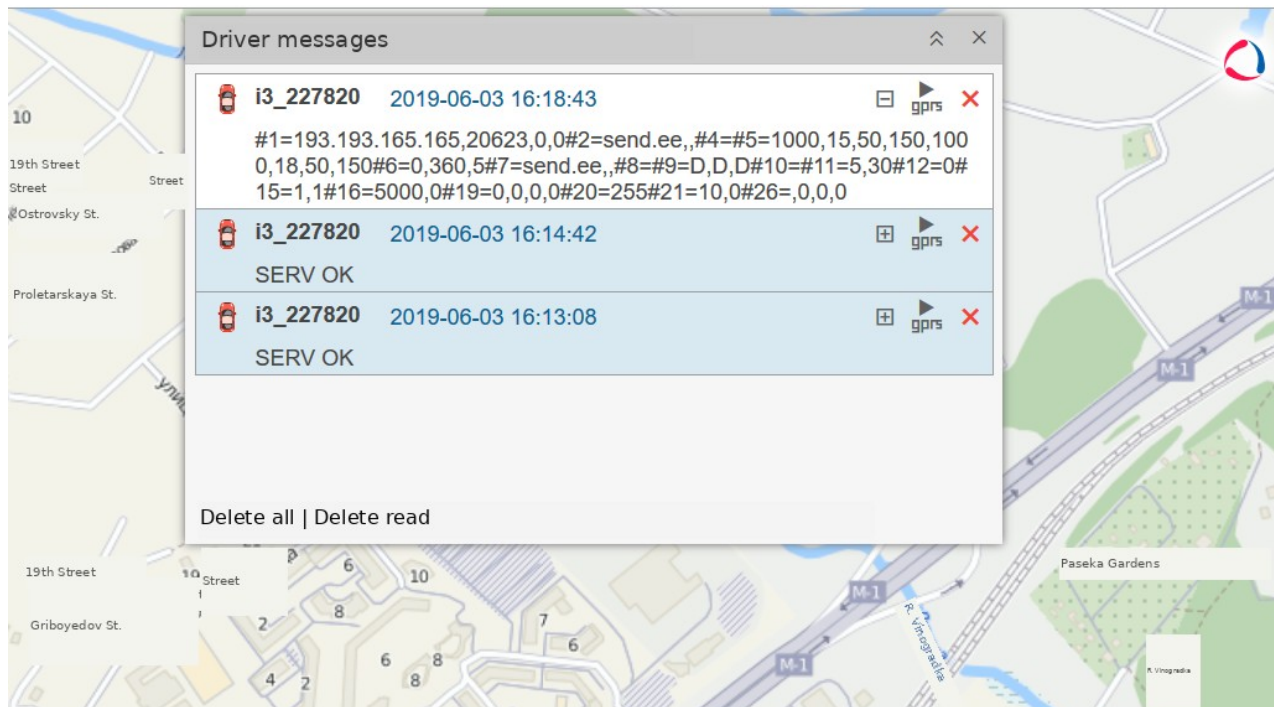
4. FULL LIST OF SMS AND TCP COMMANDS

Table 7 – SMS and TCP text commands:

Format	Command Description
<access_password>*SETP* <parameters_to_change>	Tracker configuration command. A detailed description of the command is in the “Configuration via SMS” section.
<access_password>*ODOM*x	Set the internal odometer value in meters
Control commands	
<access_password>*SERV*1.1	Send a packet with coordinates to the server immediately.
<access_password>*SERV*1.4	Update software via the web configurator, even if the assigned and current versions are the same.
<access_password>*SERV*1.5	Update the software via the web configurator if the assigned version is different from the current one.
<access_password>*SERV*1.6	Clear black box
<access_password>*SERV*1.7	Reboot
<access_password>*SERV*1.8	Download settings from the web configurator
<access_password>*SERV*1.9	Send current settings to the web configurator
<access_password>*SERV*8.x.y	Set output x to state y
<access_password>*SERV*24.x.y.k	Activate output x for y minutes and k seconds
<access_password>*SERV*37	Delete all registered temperature sensors
<access_password>*SERV*48.x	Idatalink command (x – command code)
<access_password>*SERV*49.x.y.k	Webasto command
<access_password>*SERV*50.x	Remote engine-start command (x – command code)
<access_password>*SERV*20.0	Upload the tachograph DDD file from the driver card 1.
<access_password>*SERV*20.1	Upload the tachograph DDD file from the driver card 2.
<access_password>*SERV*33.x.y	Take photos: x – number of photos; y – resolution.
<access_password>*SERV*1.48	Forced update of the built-in CAN component

Format	Command Description
<access_password>*GETP	Get the current tracker configuration
<access_password>*GETT	Get current phone book configuration
<access_password>*SMSI	Get an SMS with the IMEI, ID and address of monitoring server 1
<access_password>*MSK	Receive an SMS with coordinates and a link to the map
<access_password>*MSW	Receive an SMS with the numbers of connected temperature sensors

All information, configuration and control commands above can be sent via SMS or as TCP text commands (the “driver message” function in Wialon). The device response is also returned to the server:



In the case where the request contains the recipient's phone number and is sent as a TCP command, the response to the request will be sent to the specified phone number.

There are also short binary TCP commands (the “custom message” function in Wialon), listed in Table 8.

Table 8 – TCP commands from the server.

Format	Command Description
0101	Send a packet with coordinates to the server immediately
0104	Update software via the web configurator, even if the assigned and current versions are the same
0105	Update software via the web configurator if the assigned version is different from the current one
0106	Clear black box
010550	External CAN reader software update
0107	Restarting the device
0108	Download settings from the web configurator
0109	Send settings to web configurator
2000	Upload the tachograph DDD file from the driver card 1.
2001	Upload the tachograph DDD file from the driver card 2.
080X0Y(ZZ)	Activate / Deactivate output X – output number (0 – IN0 (U0), 1 – IN1 (U1), 2 – IN2 (U2), 3 – IN3 (U3)), Y – new state (1 – activate, 0 – deactivate), ZZ – (optional) activation of the input for a time in seconds from 01 to 99 (01 – 1 second, 10 – 10 seconds)

5. DESCRIPTION OF PARAMETERS IN THE WIALON SYSTEM

Table 9

Wialon parameter	Description	Comments
pwr_ext	External supply voltage	
pwr_int	Internal battery voltage	
hdop	Horizontal error	
cell_id	GSM base station code	
lac	GSM location area code	
mnc	GSM mobile network code	
mcc	GSM mobile network code	
gsm	GSM signal strength	Range from 1 to 31 (99 – no GSM network)
gsm_st	GSM chip operation status	0 – not running, 1 – running, 2 – AT OK, network search, 3 – GPRS test, 4 – GPRS OK
nav_st	GPS/GLONASS chip status	0 – not running, 1 – running, 2 – searching for satellites, 3 – satellites acquired
mw	Motion sensor status	0 – no movement, 1 – movement
sim_t	SIM card/SIM chip	0 – SIM card, 1 – SIM chip
sim-in	SIM presence	
st0	Tamper sensor	
st1	1-Wire discrete input	
st2	Ignition	
freq_0	Frequency sensor IN0	
freq_1	Frequency sensor IN1	
info_messages	Service value	Indicates the reason for recording a new packet
lls1_val	RS-485 fuel level	
lls1_temp	RS-485 temperature from the fuel level sensor	
adc3	IN2 voltage value	
I/O	Bitwise parameter (inX/outX)	
ID		
text		
balance_sim1		
balance_sim2		
gps_full_mileage		
avl_driver		
wln_brk_max		
wln_accel_max		
wln_crn_max		
can_eng_full_time	CAN engine hours	
can_full_mileage	CAN mileage	
can_fuel_level_cons	CAN fuel consumed	
can_fuel_level	CAN fuel level (%)	
can_fuel_level	CAN fuel level (liters)	
can_rpm	CAN engine speed	
can_eng_temp	CAN engine temperature	

6. WARRANTY

The warranty period for equipment is 2 years (except for batteries) and starts from the date of initial installation, provided it is carried out by an installer authorized by the equipment manufacturer. The date of initial installation and information about the installer must be indicated on the warranty card and certified by the installer's seal.

Warranty obligations do not apply to batteries.

To ensure the specified characteristics of the tracker, it is recommended to replace the battery every 2 years.

THE PRODUCT IS NOT ELIGIBLE FOR WARRANTY REPAIR / REPLACEMENT IN THE FOLLOWING CASES:

- violations of product operating rules;
- presence of mechanical damage (external or internal);
- malfunctions caused by the ingress of foreign objects, insects, liquids;
- presence of chemical, electrochemical, electrostatic, extreme thermal damage;
- damage caused by non-compliance with state standards of power supply, communication, and cable networks;
- damage caused by the installation of components that do not meet the manufacturer's specifications;
- if repair or maintenance work during the warranty period was carried out by person(s) not authorized by the manufacturer;
- if the manufacturer's seals on the equipment are broken;
- in cases of deficiencies in the operation of equipment due to external influences on the equipment and the electrical circuit to which the equipment is connected;
- in case of violations caused by the actions of third parties or other unforeseen circumstances not related to the obligations of the equipment manufacturer.

7. PACKAGE CONTENTS

The tracker is supplied with the items listed in Table 10.

Table 10 – Tracker package contents

No	Name	Qty.	Note
1	Navigation controller “DOT i4B”	1	monitoring device
2	Main harness	1	
4	Product data sheet	1	

All the latest technical information and software can always be found on the corresponding page of the manufacturer's website:

<http://www.edvado.com>

Note: the manufacturer reserves the right to change the package contents without degrading the product's performance characteristics.