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MT-700 Fleet monitoring system

Operation manual

Version 1.0

Table of contents:

List of Abbreviations

Terminal – onboard monitoring system MT-700

Manual – operation manual

ID – tracker identification number

 – Capability

 – Possible restrictions/attention

 – Recommended/ is required

 – Not recommended/ restricted

 – «Caution!»

1. Introduction

❶ Overview

The following product manual (further - “Manual”) applies to an onboard monitoring unit MT-700 Lite, Mt-700 STD, MT-700 ENT, MT-700 PRO and MT-700 PRO 285(further-tracker) manufactured by the Limited Liability Company : Осовремененные технологии мониторинга (further - LLC “СТМ”).

The tracker is intended for vehicle operative control that uses vehicle-monitoring systems. The tracker must be supplied with 12 or 24 VDC onboard voltage. The tracker is able to control connected slave devices.

The tracker’s performance is based on using GPS/GLONASS navigation and GSM/UMTS cellular service channels.

The GSM channel is used for the following functions: transmission of data, imputing voice calls, and SMS commands. The SIM card must be serviceable, activated, non-locked and have the needed packages activated (GPRS general packet data, SMS, roaming and voice call must be activated for the MT-700 Pro) in order to guarantee the tracker’s smooth operation.

❷ *Hardware description*

The terminal has a form of a monoblock, with the GSM and GPS antennas jacks, power and I/O jack. There is an ID nameplate on the top of the enclosure, specifying the device version.

Available versions of the tracker are shown in Figures 1, 2, 3 и 4.

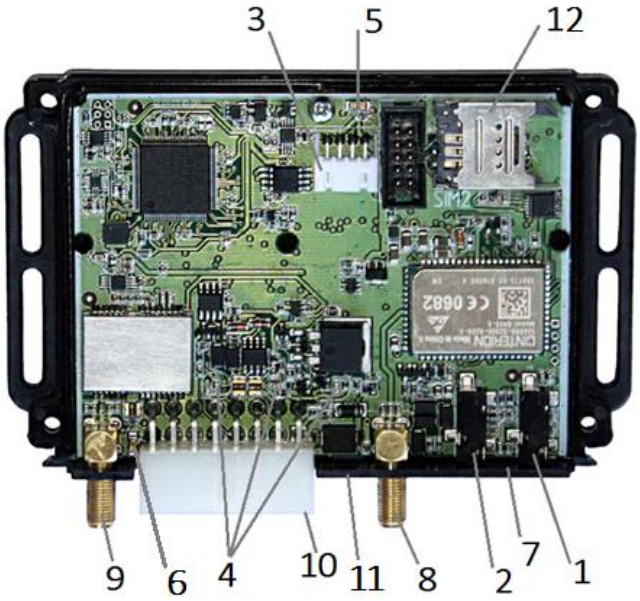
Figure 1. MT-700 PRO / MT-700 PRO 285

Figure 3. MT-700 STD / MT-700 ENT / MT-700 Lite

Figure 4. Terminal with the connectors’ lid

Figure 2. MT-700 Lite portable

MT-700 PRO 285 (Lid-off) (**Figure 5**).



1. Microphone jack
2. Dynamic jack
3. Internal battery jack
4. Indicator LEDs
5. Non-contact tamper-switch
6. Jack lid non-contact tamper switch
7. SIM1-card lot
8. GSM antenna connector
9. GPS/GLONASS antenna connector
10. USB(MICRO-B) port
11. SIM2-card lot

Figure 5. MT-700 PRO 285

MT-700 PRO 285 – is a fully functional monitoring module which uses a Hybrid GPS/GNSS module. It meets the requirements of Mintrans RF №285(31.07.2012)

MT-700 Lite/STD (Lid-off) (**Figure 6**).

1. Indicator LEDs
2. Internal battery jack
3. Internal battery mounting holes
4. Non-contact tamper-switch
5. SIM-card lot
6. GSM antenna connector
7. GPS/GLONASS antenna connector
8. Buzzer
9. Scoutnet/LLS jumper connector
10. Interface jack

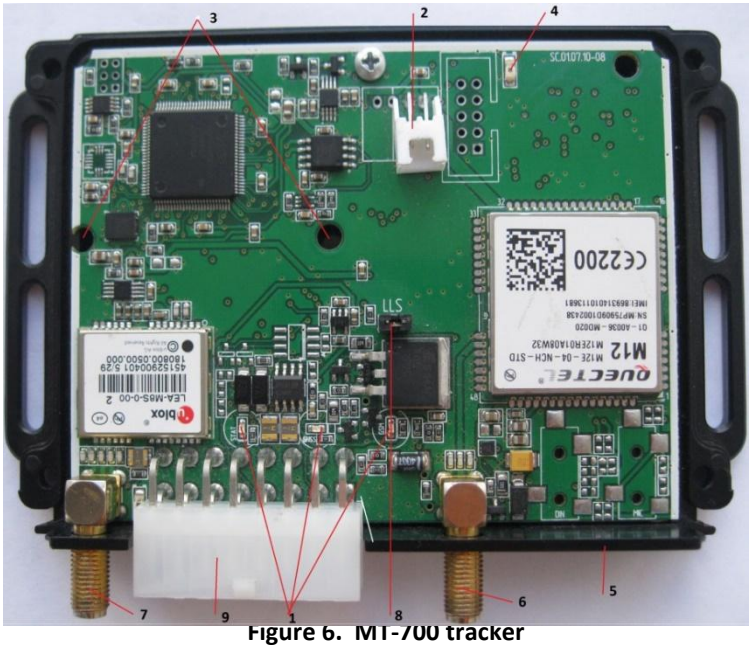


Figure 6. MT-700 tracker

MT-700 ENT (Lid-off) (**Figure 7**).

1 Indicator LEDs
2 Internal battery jack
3 Internal battery mounting holes
4 Non-contact tamper-switch
5 SIM-card lot
6 GSM antenna connector
7 GPS/GLONASS antenna connector
8 Buzzer.
9 Interface jack

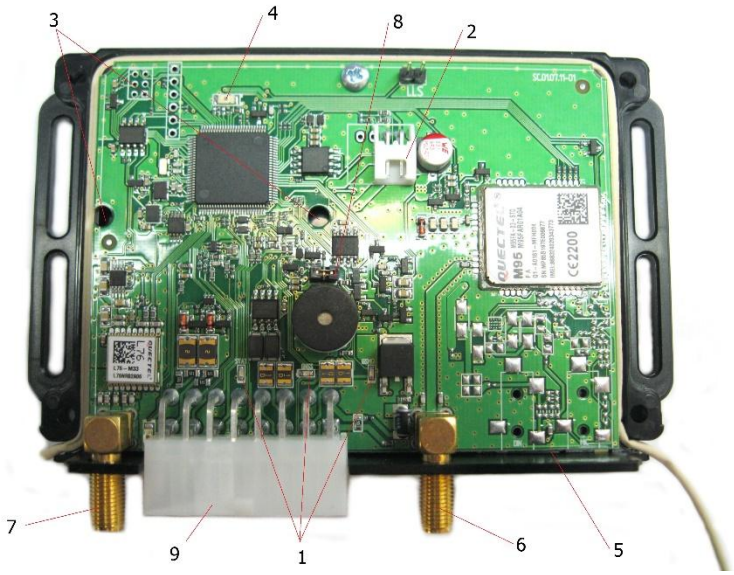


Figure 7. MT-700 ENT.

❸ Package contents

Table 1

Name of the item	Amount	Note
Standard components		
Tracker	1	
GPS/GNSS antenna	1	
GSM antenna	1	
Internal backup battery	1	
External harness	1	
Safety fuse 2A	1	
passport	1	
User Manual	1	Group
Cardboard box	1	Individual or group
Additional components		
Panic button	1	Optional
Voice call set(microphone and dynamic)	1	Optional

❹ *Device configuration*

Device configuration and mounting should be conducted by trained specialists. The specialists should conduct a training session on the installation of supplementary onboard electric equipment and a safety protection guide on installation and service work, as shown in chapters 3 and 4.

ⓘ This manual is written for a tracker; the most relevant software 19.X

❺ *Power source recommendations*

The tracker is constructed for vehicles with the onboard voltage of 12/24 VDC. The Internal overvoltage protection system will protect the device from voltage spikes up to 400 ms and 200 VDC. Also, the internal overvoltage protection system can provide temporary work from 60 VDC in; which may occur with the vehicles' power lines in the event of an emergency.

❗ *If the input voltage exceeds the permitted threshold (chapter - Specification) then the device will operate in the emergency mode. In the event that exceeding voltage causes a malfunction it will not be covered by the manufacturer.*

In the event that the voltage is below 8,5 V, the device will enter shutdown mode in order to protect its battery.

❻ Specification

Table 2

Parameter		Value				Note
Supply voltage						
Supply voltage , V		9 ÷ 36				
Current consumption at 24 V with out data transmission, mA		45				
Current consumption at 24 V with data transmission, mA		Up to 100				
Autonomous operation time		Up to 4 h				
Operational conditions						
Operational temperature conditions						
With data transmission, °C		-40 ÷ +85				
On a backup battery, °C		-20 ÷ +65				
Internal battery charging , °C		0 ÷ +45				
Ingress protection		IP51 / IP54				No connectors' lid/ Connectors' lid and cable glands are used
Size and mass						
Weight, g, not more		450				
Internal sensors and modules						
		PRO/PRO 285	**ENT/STD/Lite**			
Internal accelerometer		+				
Tamper switch		+				
Traffic encryption		+				
Built in Flash, Mb		16	4			
Historical playback entries		500 000	350 000			
Ports and interfaces						
		PRO/PRO 285	**ENT**	**STD**	**Lite**	
Universal inputs, amount		6	6	6	1	
Output (OC), amount		2	2	2	1	
RS-485 Port	ScoutNet	+	+	+	+	
	NMEA	+	-	-	-	
	LLS	+	+*	+	+	

	J1708	+	+*	-	-	
	RFID	+	+*	-	-	
RS-232 Port	LLS	+	-	-	-	
	CAN-Log	+	-	-	-	
	VDO Tachograph	+	-	-	-	
	NMEA	+	-	-	-	
CAN (J1939, Mobileye, OBD)		+	+	-	-	
USB port		1	-	-	-	

(*)MT-700 ENT contains two RS 485 ports, one for ScoutNET protocol and the other – for LLS(or J1708,RFID) protocol.

❼ LED indication modes

Table 3

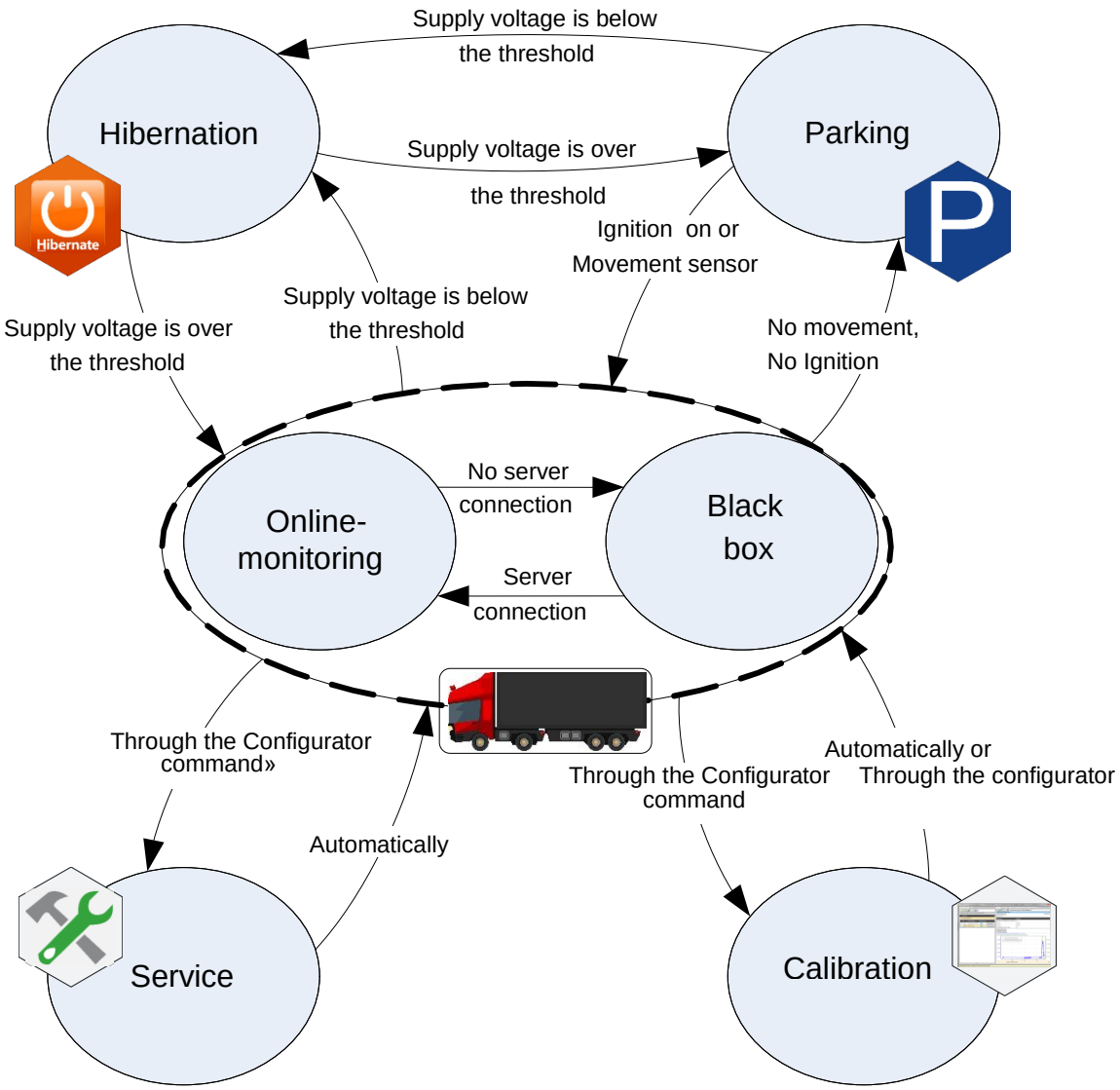
Indication mode	Terminal current state
«GSM» indicator	
Turned off	Tracker malfunction
Blinks once per second - - - - -	Modem is switching on, searching for the network
Blinks once every 5 seconds - - - -	The modem is powered, the network found
Constantly on ———	Data transmission
«GNSS» indicator	
Turned off	Tracker malfunction
Blinks once per second - - - - -	Sputnik search
Blinks once every 5 seconds - - - -	location determined
«STATUS» indicator	
Turned off	No supply power
Constantly on ———	Supply power is on
Blinks once every 10 seconds - - -	Hibernation mode
All three are constantly on	Tracker malfunction

2. Functional overview

❶ Tracker modes of operation

The tracker has several operational modes; transitioning between operational modes can be achieved either through universal Scout-Configurator or automatically.

The inscription is on the figure:



8. Tracker modes of operation scheme

Table 4

Mode	Gathering, accumulation and data processing	Data transmission	Description
Online-monitoring	Continuous state	Continuous state	Standard mode
Black box	Continuous state	On the following events: - schedule, - data accumulation, - panic button - etc.	**Automatically switches on during the server connection problems(no GPRS coverage, server is inaccessible, faulty SIM-card)** **Automatically switches off if the connection is restored**
Parking	Continuous state	Once every 15 min	**Power-safe mode is permitted in Energy-safe mode in common settings in "Configurator" software.** **The transition process occurs while the ignition is off and no vibration is detected for 5 minutes.** **The tracker transmits data to the server once every 15 minutes.**
Hybernation	Once per day	Once per day	**The tracker will enter a power-safe mode 5 min after the supply voltage descends the power-off threshold. The tracker will immediately power off if the supply voltage exceeds 65 V. The shut-off threshold is set in the tracker settings in "Configurator".The Output from this mode occurs automatically if the voltage is exceeded for 10 seconds consecutively, if the voltage exceeds by 0.5 V the terminal will exit hibernation mode.**
Calibration	Once per second All sensors	Continuous state	An analogue to the ***«Online-monitoring».*** Switches on by pushing the "Calibration" button in the "SCOUT-Configurator" software. Exits on the second push of the button.
Service	No	No	Special service mode, used for FW upgrade, settings changing, self-diagnostics. Exits on the mentioned commands' completion.

❷ I/O and interfaces

Universal inputs

MT-700 STD, MT-700 ENT, MT-700 PRO, MT-700 PRO trackers has 6(P0÷P5) tunable universal inputs, four (P0÷P3) of which have the voltage measuring function and 2 outputs (P6, P7); Each port can be programmed separately.

MT-700 Lite has only one output(P6) and one input(P2).

Table 5

PORTs	***P0, P1***	***P2, P3***	***P4, P5***	***P6, P7***
Port mode of operation	analogue input, digital input, peak detector.	digital input, countable entry (minimal pulse length 200 ms), differential flow meter, frequency input, PWM input, analogue input (for PRO only P2), peak detector (only P2), 1-Wire (for PRO only P3).	counting input (minimal pulse length 1 ms), differential flow meter, frequency input, PWM input	Digital out, Drive style, Current state indication, engine block function.
Input resistance	100 kOhm;	-	-	-
Input signal polarity	For digital input: positive(internal pull-down resistor).	Positive (internal pull-down resistor).	negative (internal pull up resistor).	-
Measurement range	For analogue input 0 ÷ 36 V	For analogue input:0 ÷ 36 V For frequency input: up to 30000 Hz.	For frequency input: up to 30000 Hz.	-
ADC discreteness	12 bit	12 bit	-	-
Other parameters	-	-	-	Output type: open collector; Maximal voltage: 65 V; Over current protection; Maximal output current: 200 mA.

CAN port

CAN port is supported in MT-700 PRO, MT-700 PRO 285, MT-700 ENT.

CAN port is used for the onboard CAN-bus connection and reading parameters, transmitted through J1939, OBD and MobilEye protocols.

If the vehicle CAN –bus supports specified protocol, those parameters can be read:

- **Vehicle manufacturer**
- **Model**
- **Year of manufacture**
- **Vehicle package**
- **Onboard controller settings**

 If the Vehicle manufacturer is using a modified CAN-protocol, data readout may be obstructed.

 Before connecting to a vehicle CAN-bus, it is recommended to check that the connection will not lead to any vehicle malfunction or the vehicle CAN-bus failure.

 Unlawful CAN-bus intervention can lead to the vehicle units' breakdown and/or CAN-bus failure. Be cautious while connecting the tracker to an onboard CAN-bus.

RS-485 port (ScoutNet/J1708/LLS/RFID/NMEA)

Port RS-485 is used in following regimes:

- For MT-700 Lite – ScoutNET protocol
- For MT-700 STD – ScoutNET and LLS protocols
- Mt-700 ENT encounters two RS485 ports, one can be used only for ScoutNET, and the other – for J1708, ДУТ LLS (Omnicomm), RFID, NMEA.

Up to 16 ScoutNET sensor can be connected to the RS-485 port.

 In order to correctly function, each connected ScoutNET device should have a unique ScoutNET address (0…7).

The master(usually the tracker) has the ScoutNET address of 8.

⊗ **It is strictly forbidden** for the scoutNET devices on the same bus to carry the same net number.

The Scout RS-485 "Configurator" automatically carries the net number of 9, and is configured as a Master on the bus. The tracker enters a slave mode when the "Configurator" is connected.

The RS-485 can be used to connect: fuel level sensors, tachograph, and other devices. It is only allowed to connect up to 16 Fuel level sensors simultaneously.

For MT-700 PRO, MT-700 PRO 285, MT-700 ENT the RS-485 port can be connected to a J1708 bus and the fuel consumption, fuel level, and other parameters can be read.

J1708 access dependents on:

- Vehicle manufacturer
- Model
- Year of manufacture
- Vehicle package
- Onboard controller settings

Before connecting to a vehicle J1708-bus it is recommended to check that connection will not lead to any vehicle malfunction or the vehicle J1708-bus failure.

Unlawful J1708-bus intervention can lead to the vehicle units' breakdown and/or CAN-bus failure. Be cautious when connecting the tracker to an onboard J1708-bus.

LLS *and* ***ScoutNet protocols*** *are* ***incompatible****.*
Connecting the LLS *on the* ***ScoutNet port*** *can lead to a malfunctioning device.*

The Omnicomm LLS fuel level sensors should be calibrated through the manufacturer's software.

For MT-700 PRO and MT-700 PRO 285, if RS-485 port is used for LLS, the configuration should be executed remotely or by using a USB-port.

For MT-700 PRO, MT-700 PRO 285, MT-700 ENT up to 16 RFID(using RFID protocol) scanners can be connected.

For MT-700 STD if the LLS mode for RS-485 is selected, and the jumper ScoutNet/LLS (fig.6) is not connected, then you can only remotely configure the devices.

RS-232 Port (LLS/Can-log/ VDO/NMEA)

RS-232 supported in MT-700 PRO, MT-700 PRO 285.
It can be used to connect to the following devices: digital fuel level sensors (LLS protocol), CAN-log scanner and VDO tachograph (using NMEA protocol).
Up to 16 devices can be connected simultaneously.

USB Port (ScoutNet)

Only supported in MT-700 PRO, MT-700 PRO 285.

A USB port is used for local configuration via micro USB cable.

❸ *Password protection*

Password protection is used against unauthorized local and remote access to the tracker. A password is required for changing common settings, ID and password changing.

By default, all trackers use an “empty’ password. Password setting can be achieved by sending a SMS – command **setpassword.**

The example of a command is the following:

setpassword. Qwerty123
Response SMS from the terminal –

id(setpassword): OK.

❹ *Traffic encryption*

Traffic encryption option can be applied.
All the data is being send using the **AES-128 encryption** .
The key – is a terminal password.
To enable the function:

- Enable «Traffic encryption» in terminal common settings.
- Create the encryption key, by changing terminal password. The default key is identical for all trackers, so it is not recommended to use it for traffic encryption.
- Enable «Use password for access» option is SCOUT-Server settings.
- Enter the key (tracker password) in the «password» in SCOUT Server settings.

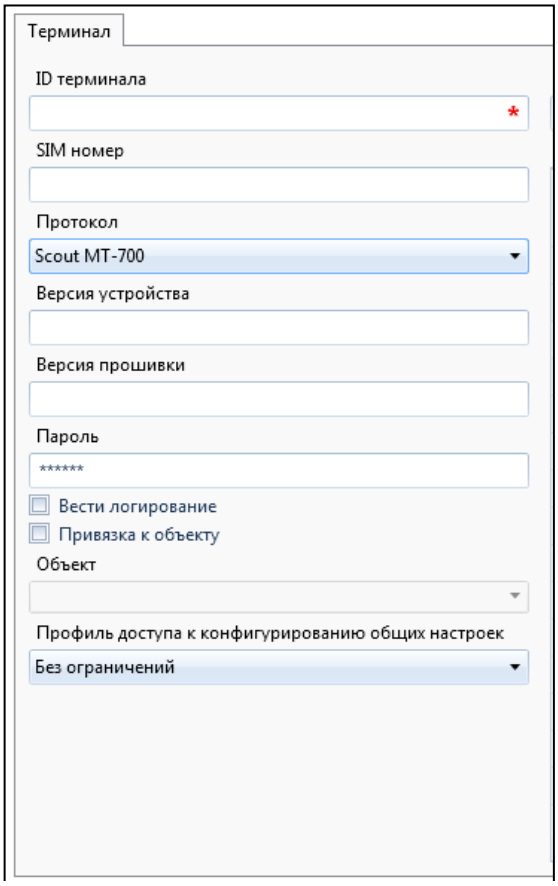


Figure 9. password enable

❺ *Using the Voice call*

MT-700 PRO / MT-700 PRO 285 provides speaker and microphone connection for voice calls.

❻ *SMS messages*

The tracker provides SMS sending using the SCOUT Configurator.
To send the SMS open the “Modem Settings” tab (**Figure 10**).

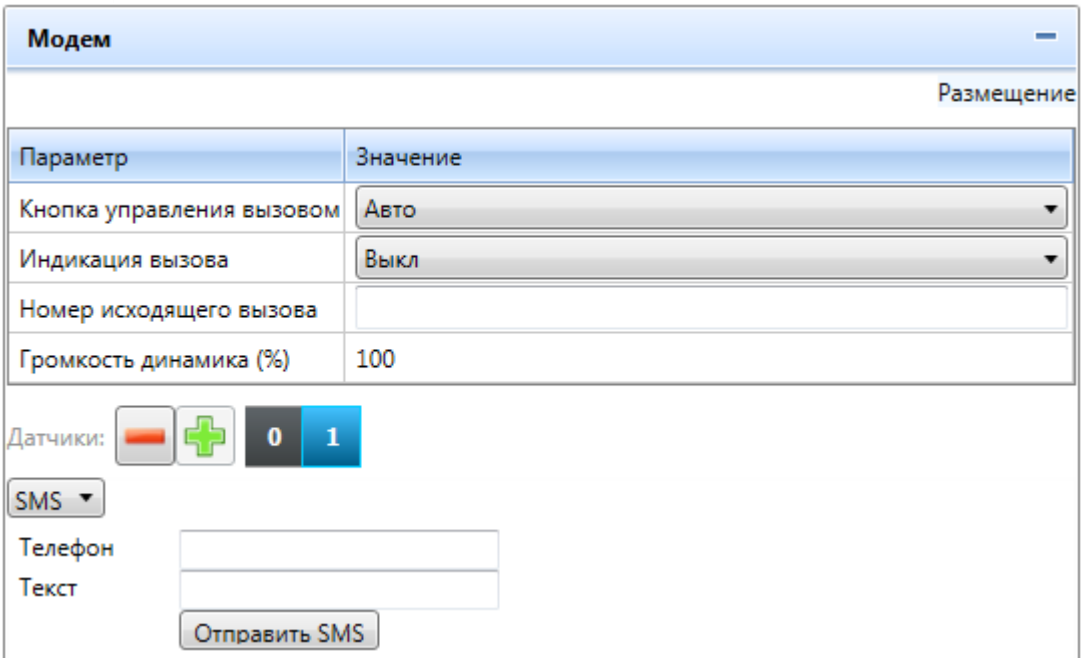


Figure 10. SMS sending mode

«Phone number» field is the addressee's number in the international format (+…….)

«Text» field detains the message. The messages should include only Latin symbols, digits, spaces and punctuation.

«Send SMS » button sends messages.

Note that using the remote configuration tracker will only send the message after the server connection.

Function can be used to restore the lost SIM card number of the tracker.

3. Tracker mounting order

❶ *The tracker pre-installation (SIM card and battery installation)*

All action including SIM-card installment, backup battery connection and antenna installment should be conducted only while ***the terminal powered is off.***

The manufacturer is not responsible for any malfunctions that are caused by not following these rules.

It is not recommended to install the terminal in places prone to high temperatures – these can lead to a backup battery failure.

Before powering on and configuring the device, you should:

– Take off the connectors' lid (if it is pre-installed) by tackling 2 screws and pushing the latches on the top side of the lid.

– Take off the top lid by unscrewing the four screws from the bottom side. (**Figure 11**).

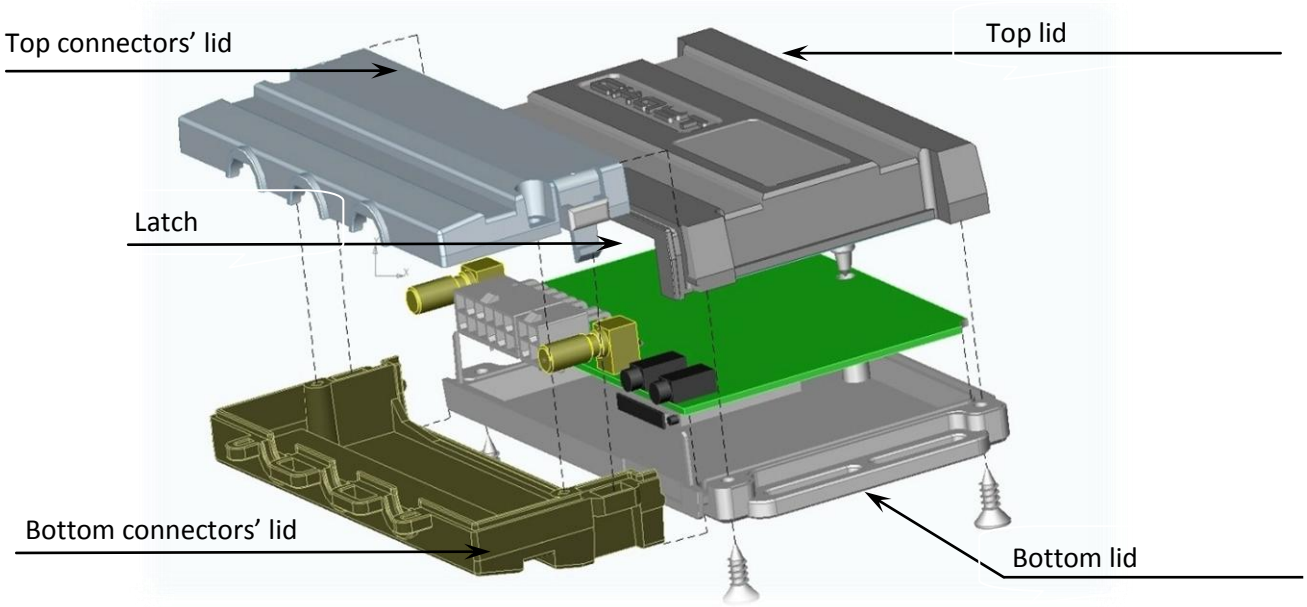


Figure 11. Tracker disassemble

– Plug in the backup battery connector(**Figure 12**). If needed, the battery can be unplugged to save the battery power during the tracker's service period.

– Screw the top and bottom lids together.

Figure 12

– Prepare the SIM-card: make sure that all the needed packages are activated (GPRS/HSDPA, SMS, voice calls, roaming, etc). Check the SIM's balance. Turn off PIN request if it is turned on.

– Push the SIM-card extraction button to extract the SIM-tray.

– Insert the SIM tray into the SIM-card aperture. Check if the tray has been fully inserted; you should not be able to pull out the tray without pressing a button.

Figure 13. Terminal view from the connector jack

❷ *Preliminary tracker settings*

You can configure the device using either local or remote "Configurator" or through SMS-commands (see further in chapter 4).

To properly install the tracker you have to specify these settings:

- GPRS settings:
  - login,
  - password,
  - access point.
- Modem settings:
  - Phone number for SMS-commands.
- Server connection:
  - IP-address,
  - Port.
- Connection condition settings and port settings – depending on the required operational mode and connected sensors and devices.

Terminals can be wirelessly configured and configured through SMS-commands. If the modem correct GPRS, modem and server settings were not implemented during the mounting process, then the remote configuration can only be accomplished through the SMS-commands.

The SCOUT employees' phone numbers are embedded in the terminal's white-list.

If white list phone numbers were not locally filled, the terminal configuration can be done only through SCOUT Tech Support.

❸ *Tracker mounting*

The terminal should not be mounted in direct sunlight or near heaters.

The best place to mount the terminal is under the dashboard, on central console or other elements inside the cabin.

The terminal can provide two ingress protection degrees, depending on an assembly:

- IP 51 – no connectors' lid ,
- IP 54 – using a connectors' lid and corrugated cable sleeve.

Recommended corrugated sleeves (aren't included) SLT-10/50 мм.

It is recommended to mount the tracker using a connectors' lid and corrugated sleeves.

A rubber burn can be installed to enhance the ingress protection. (**Figure 14**). The arrow shows the direction for the rubber burn.

You should not pull on the rubber burn while laying it on the slot. It should be mounted so that it does not hang out.

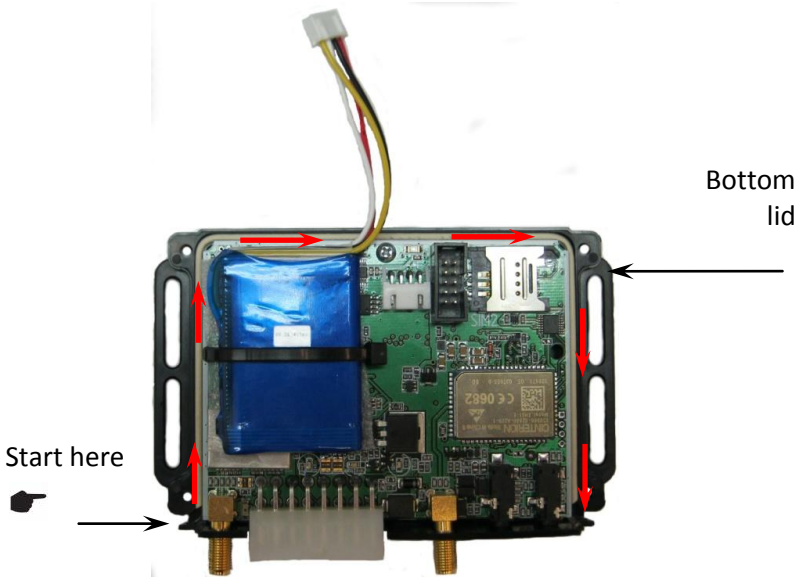


Figure 14. Rubber burn mounting

Also, if the connectors' lid is mounted, then the rubber burn should be installed under the protective lid.

In order to achieve this, take the burn's free tip and wrap the burn over the lid (anticlockwise) (**Figure 15a**). Put the rest of the burn in the nearest cavity (**Figure 15b**). Make sure that the burn goes all around the enclosure.

A **b**

Figure 15. Mounting the burn

If the tracker is installed with the connectors' lid :

- Use specified corrugated cable sleeve(10mm in diameter);
- Install them in the grooves on the bottom lid ;
- Pull the cable through the cable sleeve;
- Tie the sleeves with zip ties (**Figure 16**);
- Power on the device;

– Make sure that the terminal is working (based on the LED indication);
– Assemble the lids together (make sure that both latches are in place);
– If needed, screw the lids together.

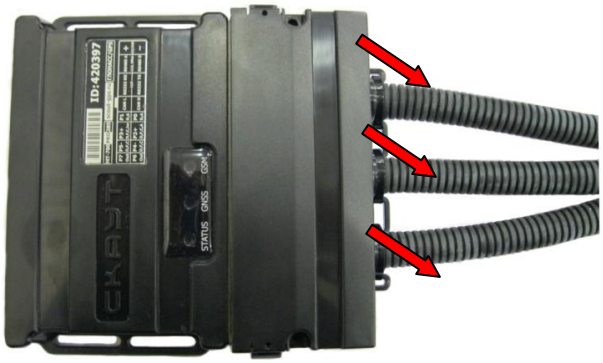


Figure 16. Cable sleeves mounting

Install the tracker on the vehicle. The terminal should be anchored to stationary parts of the vehicle. Also, the device should be mounted with the connectors facing down.

The operating position of the device is vertical, with the connector facing down. If not properly mounted, then the ingress protection lowers drastically.

The device should be attached to maximize the rigidity of the overall construction, there should be no displacement or vibrancy of the terminal during the operation. You can use fix ties, screws, bolts and sticky tape to fixate the terminal cable.

Recommended fixing options:

1. Bolts/screws.

1.1. Screw the terminal tightly on both sides using a screw or a bolt (**Figure 17**). Make sure that it is screwed tightly and does not dangle.

Figure 17

2. Sticky tape.

2.1. Stick the tracker using sticky tape onto the stationary car part. The tape should be put on the bottom lid (**Figure 18**).

Figure 18

3. Cable zip ties.

3.1. Another option to mount the terminal is by fixing it to a horizontal tube or a beam. In order to achieve this, the zip tie should be put through the lids' apertures and tied (**Figure 19**). Make sure that the tracker does not move on the zip tie.

Figure 19

3.2. Also, it is possible to tie a terminal to vertical parts (**Figure 20**). Make sure that the tracker does not move on the zip tie.

Figure 20

1.1. Other option is to anchor the tracker to two vertical objects. In that case, one zip tie should be used for each side of the tracker (**Figure 21**). Make sure that the tracker does not move on the zip tie.

Figure 21

It is forbidden *to make holes in the terminal enclosure.*

It is forbidden *to mount the tracker on the vehicle's moving mechanisms.*

The terminal has an internal acceleration sensor, so mounting onto non-stationary objects may lead to incorrect tracker performance(motion and parking regimes, work regimes etc).

❹ *Sealing the tracker*

It is recommended to seal the device after assembling it in the enclosure.

If the tracker is mounted without a connectors' lid, then it is recommended to seal the connector (**Figure 22**). When sealing the connector make sure that unplugging it will cause a seal violation.

Figure 22

1. If the connectors' lid is installed, then sealing can be done in different ways:

1.1. Past the seal(26x60) on lid's junction. The seal should be put on the top lid. Make sure it does not cover the indication LEDs.

Figure 23

1.2. Thread the spiral wire through the connectors' lid 's apertures and the loose ends through the indicator seal and tighten them (**Figure 24**).

Figure 24

1.3. Thread the spiral wire through the connectors' lid 's apertures and the loose ends through the indicator seal and tighten them (**Figure 25**).

Figure 25

1.4. Thread the spiral wire through the connectors' lid 's apertures and make an additional rotation over the connectors' lid , then put the loose ends through the indicator seal and tighten them (**Figure 26**).

Figure 26

1.5. Connectors' lid can be sealed in four different ways, but make sure that the lid cannot be detached without damaging the seal.

❺ *Antenna connection*

It is forbidden to shorten, lengthen or conjoin the antennas!

Mounting the GSM antenna

GSM antenna should be mounted in a place with the best radiosignal propogation.

Appropriate options are: the inner side of the windshield or plastic interior parts.

It is not recommended to mount a GSM antenna onto the metal parts.

The distance between the antenna and the onboard wires should not be less than 5 cm.

Also it is recommended to distance the antenna from the built-in radio and other radio-emitting devices. Mount the antenna not more than the 30 cm from the device enclosure.

Mounting the antenna on the enclosure of the device is strictly forbidden!

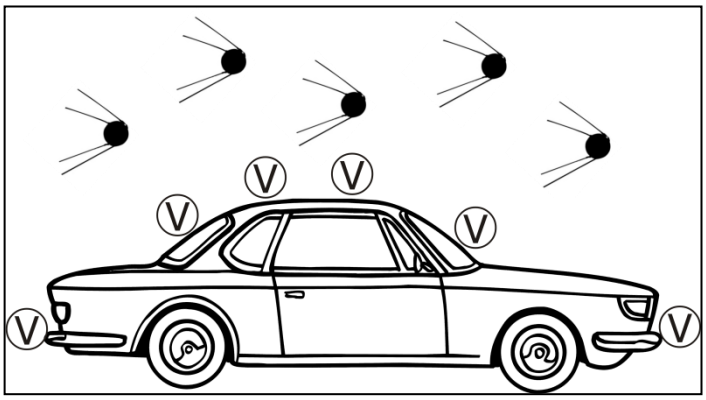


Figure 27. Mounting options for GPS/GNSS antenna

Mounting GPS/GNSS antenna

A *GPS/GNSS antenna should be mounted so that the best open sky view is achieved.*

Options for mounting the antenna:

- Under the windshield ,
- On the roof of the vehicle,
- Holes in the bumper,
- Plastic spoiler holes and other non-metal automotive upholstery parts;

Truck mounting options:

- Under the wind shield,
- On the roof of the vehicle.

The antenna should be mounted horizontally, or have a slight angle to the horizon, with the magnet facing down, as far as possible from the radioemmiting devices (emitting antennas, radio stations, ignition block, etc).

Above the antenna there should be no metal units or other entanglement parts. Possible options for mounting the GPS antenna are shown in **Figure 27**.

*If the vehicle is equipped with the windshield heating the GPS antenna should **NOT** be mounted under the windshield!*

Also, some automotive paint and varnishes may contain traces of metal, that may generate a EM-shield, which can cause problems for the GPS.

*Mounting the GPS antenna under these elements is **FORBIDDEN!***

Antennas should be plugged to corresponding jacks on the terminal.
While connecting the jack it should be properly tightened, so there is no slippage.

Connect and disconnect antennas only while the tracker is in power-off mode.
After connection the jack can be isolated using an electrical tape or a heat-shrink tube.

❻ *Power connection*

Power to the terminal is delivered on the wires 1 and 7 in the power connector (**Figure 28**).

For powering the device wires no less than 0,5 mm^2 should be used .

The vehicle's wiring should provide more then 10A current loads(cross-section of more than 0,75 mm^2), the voltage between the wires should be equal to the onboard system's voltage and constant over the ignition's on and off process, starter hit and other equipment .

The required positive wire should be wired through the fuse (package included). The safety fuse must be placed as close as possible to the entry point.

Powering the tracker from the ignition wiring system is strictly forbidden!

If the vehicle is equipped with the battery disconnect switch, make sure that the terminal has no connection to a vehicle's body, for example through the auxiliary sensors.

Incorrect connection may lead to the terminal failure.

Terminal failure caused by incorrect connection, configuration, negligent use or unintended conditions ***is not covered by a warranty***.

Interface jack schematic:

The schematic is shown in the **Figure 28**:

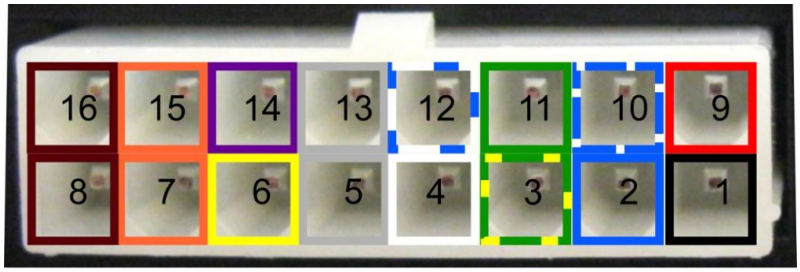


Figure 28. Interface jack

Table 6

Number on the scheme	PRO/PRO285		STD		ENT		Colour of the wire
	The wire's marking on the plate	classification	The wire's marking on the plate	Classification	The wire's making on the plate	Classification	
1	-	(-) Power	-	(-) Power	-	(-) Power	Black
2	RS-485 B	RS-485 B	RS-485 B	RS-485 B	RS-485 B	RS-485B (SCOUTNet)	Blue
3	RS-232 TX	RS-232 TX	-	-	RS-485 B	RS-485B(LLS, J1708, RFID)	Yellow-green
4	CAN H	CAN-H	-	-	-	-	White
5	P0 D,A	Universal input 0(with voltage measurement)	P0 D,A	Universal input 0(with voltage measurement)	P0 D,A	Universal input 0(with voltage measurement)	Grey
6	P2+ D,F,C,A	Universal input 2(with voltage	P2+ D,F,C,A	Universal input 2(with voltage measurement)	P2+ D,F,C,A	Universal input 2(with voltage	Yellow

		measurement)				measurement)	
7	P4- D,F,C	Universal input 4	P4- D,F,C	Universal input 4	P4- D,F,C	Universal input 4	Orange
8	P6 Out	OUT(OC)	P6 Out	OUT(OC)	P6 Out	OUT(OC)	Brown
9	+	(+) Power	+	(+) Power	+	(+) Power	Red
10	RS-485 A	RS-485A	RS-485 A	RS-485 A	RS-485 A	RS-485A (SCOUTNet)	Blue/white
11	RS-232 RX	RS-232 RX	-	-	RS-485 A	RS485A (LLS, J1708, RFID)	Green
12	CAN L	CAN-L	-	-	-	-	White/blue
13	P1 D,A	Universal input 1(with voltage measurement)	P1 D,A	Universal input 1(with voltage measurement)	P1 D,A	Universal input 1(with voltage measurement)	Grey
14	P3+(1w) D,F,C	Universal input 3	P3+(1w) D,F,C	Universal input 3	P3+(1w) D,F,C	Universal input 3	Purple
15	P5- D,F,C	Universal input 5	P5- D,F,C	Universal input 5	P5- D,F,C	Universal input 5	Orange
16	P7 Out	OUT(OC)	P7 Out	OUT(OC)	P7 Out	OUT(OC)	Brown

❼ *Auxilary sensors*

Universal and digital inputs allow for the auxiliary sensors to be connected. Optional sensors that can be connected are shown below:

Digital – movement sensors, ignition, door opening, passenger, incline and others:

- P0, P1, P2, P3 – positive polarity sensors,
- P4, P5 – negative polarity sensors,
- Digital fuel level sensors: RS-485, RS-232 (Appendix scheme 5).

Analogue:

- Fuel level, voltage: P0, P1, P2 (Appendix scheme 3),
- Temperature and others: P0, P1, P2.

Frequency:

- Fuel level, frequency, engine speed: P2, P3, P4, P5 (look Scheme 4),
- Temperature and others: P2, P3, P4, P5.

Pulse sensors:

- Fuel flow meter, passenger counting sensor: P2, P3, P4, P5.

Tachometer:

- P4, P5.

ⓘ When connecting the non-supported sensor, you can contact the SCOUT Technical support for clarification.

❽ *Sparkproof parameters*

Table 7

	Universal ports P0..P5	**MIC**
Ci, not more than, nF	0,5	5,5
Li ,not more than, mH	50	10,5
Sparkproof class	ia	Ia

Table 8

	C0, nF	L0, nH	Imax, mA	Umax, V	Sparkproof class
Out P6, P7	0,1	-	200	36	ic
SP	210	2,2	250	4	ic
USB	0.1	0.9		5	

To the power lines in the ia class of sparkproof, sensors or power can be directly connected.

To the power lines in the ia class of sparkproof, sensors or power can be connected through the 2A fuse and a sparkproof block.

❾ *Terminal function test*

During and after mounting the terminal, it is recommended to perform a function test as following:

1. LED indication control.

1.1. Make sure that STATUS LED is constantly on, GPS is blinking once every 5 sec, and GSM – once every 5 sec, or constantly on.

2. Control using a local Configurator (Detailed in chapter 4).

2.1. Connect the Configurator tie-in (subsection “local configuration”)

2.2. Launch the “SCOUT Configurator” on the laptop and go to the “Internal sensors” tab.

2.3. Check the network registration, satellites capture, power supply presence (**Figure 29**).

The signal reception can be hindered or inconceivable in the following locations: inside buildings (garage, metal box, hangar) or other places where the clear sky view is obstructed, radio-emitting devices.

In order to conduct the listed tests of the vehicle, it should be put in the open air, as far away as possible from radio-emitting devices and FM-transmitters.

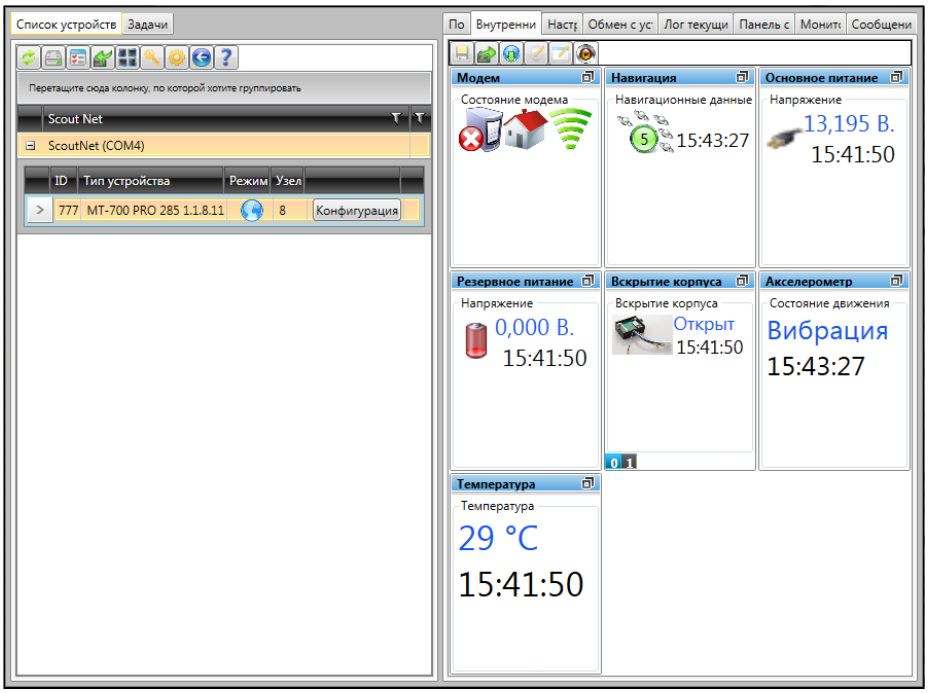


Figure 29. Function test using a local "SCOUT Configurator"

3. Remote control through sever (in case of a technical feasibility).

3.1. Remotely connect to the "SCOUT Configurator"

3.2. Control that the tracker is online and sending data with the actual time and captured the satellites (**Figure 30**).

№	ID терми	Статус			Тип протокола	Версия прошивки	Время подключения	Время сообщения	Время по GPS
5	500115		19	84	Scout MT-700	2.5.15.12	10.05.2016 12:09:55	10.05.2016 12:09:51	10.05.2016 12:09:51
6	800001		12		Scout MT-700	2.0.15.13	10.05.2016 12:13:48	10.05.2016 12:13:39	10.05.2016 12:13:39
7	800006		6		Scout MT-700	2.6.15.13	10.05.2016 12:13:47	10.05.2016 12:13:24	10.05.2016 12:13:24
8	231687		13		Scout MT-600	2.7.12.0	10.05.2016 11:54:38	10.05.2016 11:50:38	10.05.2016 11:50:38
9	800004		12		Scout MT-700	2.6.15.13	10.05.2016 11:22:27	10.05.2016 11:22:23	10.05.2016 11:22:23
10	400765		4		Scout MT-700	2.6.15.13	06.05.2016 15:09:46	06.05.2016 15:09:43	06.05.2016 14:25:50
11	422215		8		Scout MT-700 285	1.0.16.3	20.04.2016 9:36:27	20.04.2016 9:35:41	20.04.2016 9:35:41

Figure 30. Remote control using "SCOUT Configurator"

4. Verification through SMS-commands

4.1. Terminal performance check is conducted using command: `test.`

4.2. Responded SMS contains:

- Serial ID(version)
- Supply voltage;
- Backup battery voltage;
- Energy-safe configuration;
- APN settings;
- Server settings;
- Used protocol;
- Unsent data size.

Voltage is send multiplied by a factor of 10, so 11.8V will look like 118. Critical voltage for the backup battery is 3,5 Volts.

4.3. Response example: `ID(test): 1.1.1.1; Pwr:24.6,4.4; OFF:8.0; APN:internet,,; SRV:1.1.1.1:6600, SCOUTData;Unsent:0`

4. Terminal configuration and control

The terminal is configured with the “default” settings during manufacturing.

Before using the terminal the following parameters should be filled:

- Server name,
- GPS Settings,
- Connected devices settings,
- External sensors settings.

It is recommended to configure the terminal using a “485 Configurator”, manufactured by LLC“CTM” or through the USB-port (for the MT-700 PRO/MT-700 PRO 285).

For local and remote configuration the “SCOUT Configurator” should be used.

You can read more on installing and using the “SCOUT Configurator” in the operational manual for the software.

❶ *Local configuration*

For the local configuration of the tracker the “485 Configurator” “Universal 485 Configurator” is used (not included).

The system requirements for the software “SCOUT Configurator” and the installation order are shown in the “SCOUT Configurator” operational manual.

1 – Configurator
2 – USB-cable
3 ,4 – tie-in connector

Figure 31. Terminal – 485 configurator adapter

Figure 32. Tie in adapter

Figure 33. 485 Configurator

Figure 34. MT-700 – Universal 485 Configurator adapter

1 –Configurator
2 – USB cable jack
3 –MT-700 adapter jack

Figure 35. USB-cable

Figure 36. Universal 485 configurator

Both autonomous and tie-in connection for configuration are allowed.

The “MT Power Supply” or any other power supply 12-24 VDC can be used to supply the terminal in the autonomous connection.

If the external power supply is absent, then the terminal configuration can only be done with a charged backup battery and if plugged in.

The correlation between the terminal connector and the cable jack is shown in the appendix.

Connecting to the "Universal Scout Configurator" using the "Universal 485 Configurator"

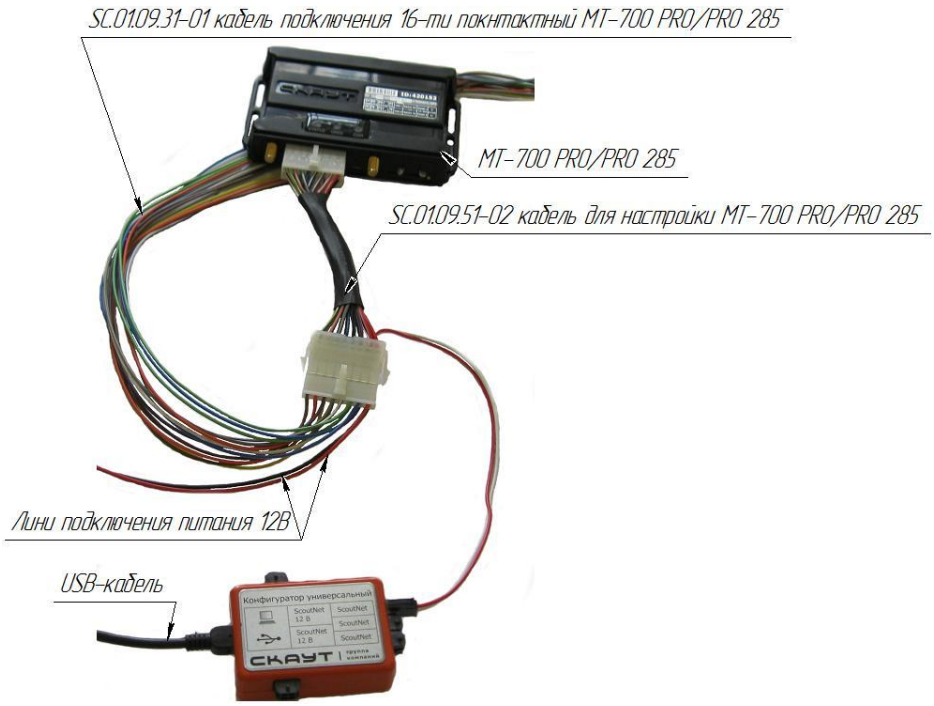


Figure 37. Universal Configurator

Connecting the terminal to the software "Universal SCOUT Configurator" should be carried out in the following order:

1. Prepare the tracker: insert a SIM card, then insert the backup battery plug, then connect the antennas.
2. Connect the 2-wire jack (**Figure 34**) to one of the three available sockets.
3. Connect the jack of the adapter (Figure 34) to the main terminal connector (***Figure 36***). The resulting connection is shown in (**Figure 37**).
4. Plug in the USB-cable (**Figure 35**) into the Configurator.
5. Plug in the USB cable into the computer's USB-port.
6. Launch the"SCOUT Configurator" software.
7. At the logging screen (**Figure 38**) choose the connection type (local, remote, 485 Configurator and the corresponding COM-port(COM41 at the figure).
8. Press the "OK" button to open the window.

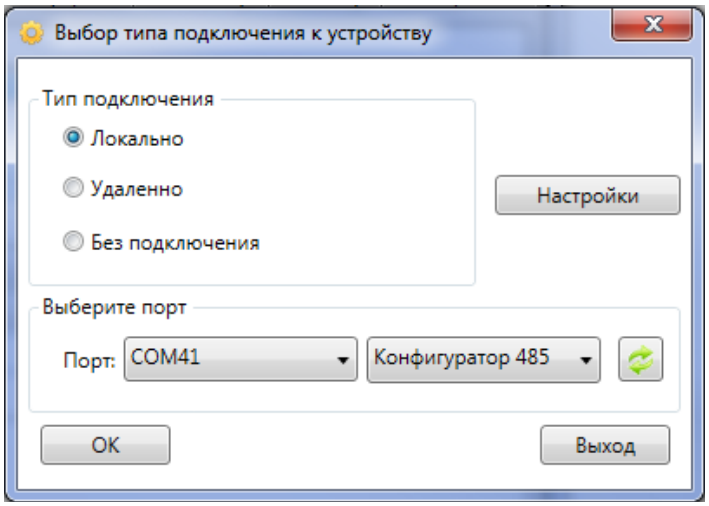


Figure 38. Launch Window of the "SCOUT Configurator"

Make sure that there is a device with the required ID  in the device panel , then press the "configuration" button 

.

Connecting the terminal to the software "Universal SCOUT Configurator" using the "Configurator 485 v2.0"

Connection the terminal to the software "Universal SCOUT Configurator" should be carried in the following order:

1. Prepare the tracker: insert a SIM card, then insert the backup battery plug, then connect the antennas.
2. Plug the main terminal connector (**Figure 33**) in the terminal-Configurator's adapter jack(4) (**Figure 31**).
3. In the tie-in connection, plug the jack's second adapter into the corresponding plug.
4. Plug in the USB-cable (**Figure 35**) into the Configurator (1).
5. Plug in the USB cable to the computer's USB-port.
6. Launch the "SCOUT Configurator" software.
7. At the logging screen (**Figure 38**) choose the connection type (local, remote, 485 Configurator and the corresponding COM-port (COM41 at the figure).
8. Press the "OK" button to open the window.
9. Make sure that there is a device with the required ID in the device panel , then press the "configuration" button.

❷ *Remote configuration*

The remote configuration is carried out through the “SCOUT-Server”, which is used to send data by the terminal.

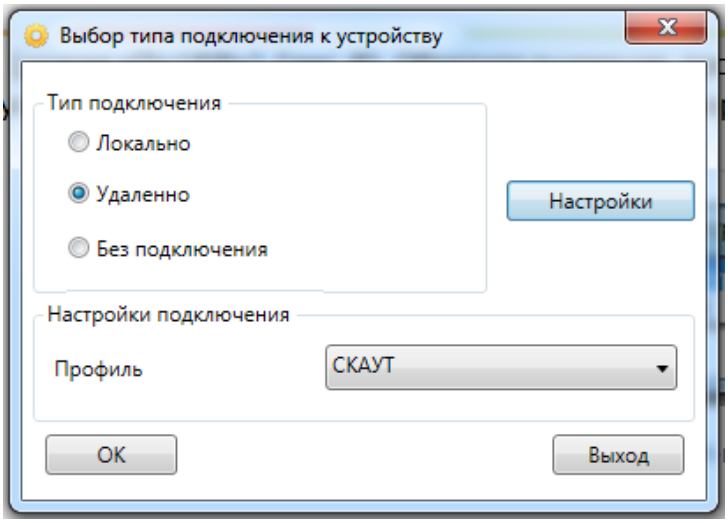


Figure 39 Launching window of the “SCOUT Configurator”. Remote connection

Software “SCOUT Configurator” connects to the “SCOUT-Server” and sends an assignment for the configuration or terminal state request. The server is waiting for the next communication session, after which, it sends the commands to the terminal and sends the execution result to the Configurator.

“SCOUT Server” does not initiate the connection with the terminal; therefore, the tracker’s has to connect to the server to remotely configure.

Correct settings (server name, APN settings, and others) should be specified.

If the tracker is inside an area with low GSM-signal, or has data accumulation settings, then the commands implementation can be delayed.

Remote connection to the tracker should be carried out in the following order:

1. Launch the “Universal SCOUT Configurator” software.
2. At the launch screen, choose the “Remotely” option.
3. In the dropdown list choose the required profile. If this is the first connection then click “Settings” to create a new profile.
4. Select the line with the needed terminal and click the “Settings” button.
5. The following configuration should be performed according to the instructions on the “SCOUT Configurator” operation.

❸ *Configuration through SMS-commands*

The SMS-channel is used when local and remote configuration cannot be achieved, and for remote control of the terminal's outputs without computer access.

The phone that you use to send the commands should be submitted in the white list of the terminal (Settings> Terminal White list).

All commands are made using **only LATIN** symbols; parameters should be separated with a space and separated by a comma.

❹ *General setting order*

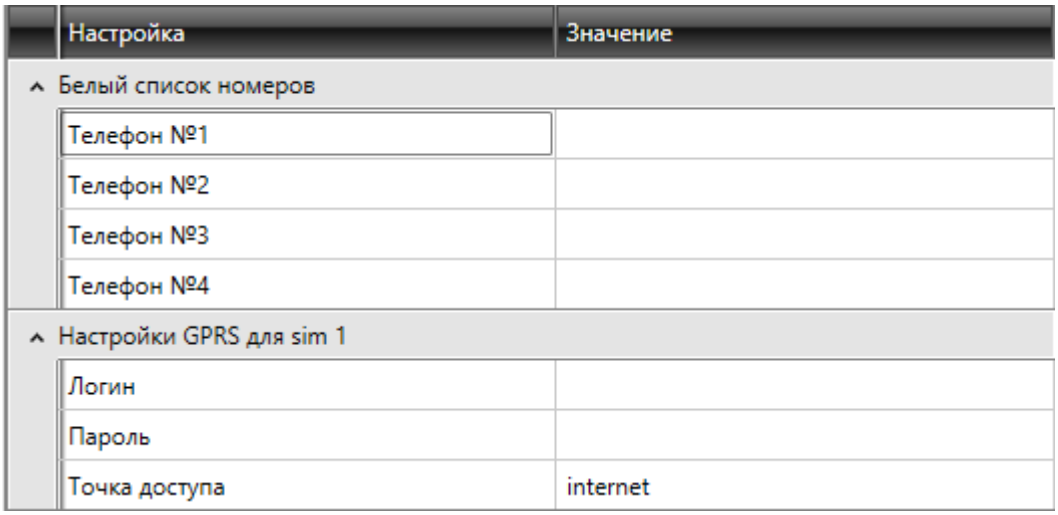


Figure 40. General settings. Part 1

White number list – List of the phone numbers from which the SMS-commands can be received.

The phone numbers should be put into the Phone 1 –Phone 4 column

Setting the white list can be achieved ***Using the SMS-command*** `setwhitelist`

An example of the command is following:

```
Setwhitelist +79211112233
```

Terminal reply:

```
id(Setwhitelist): OK.
```

GPRS Settings– APN settings, used by the tracker to connect to the internet.

Those settings should be provided by the cellular provider. If the provider uses several APNs, then you should choose the APN that provides internet access.

If you do not specify your APN settings to a specific terminal then you cannot connect to the server

Login – username for the AP.

Password – password for the AP.

«Access Point» – AP name.

GPRS can also be configure using a ***SMS-command*** `Setapn` with the following parameters: login, password, APN

Expample:

```
Setapn mts,mts,internet.mts.ru
```

Terminal's respond: `id(setapn): OK`.

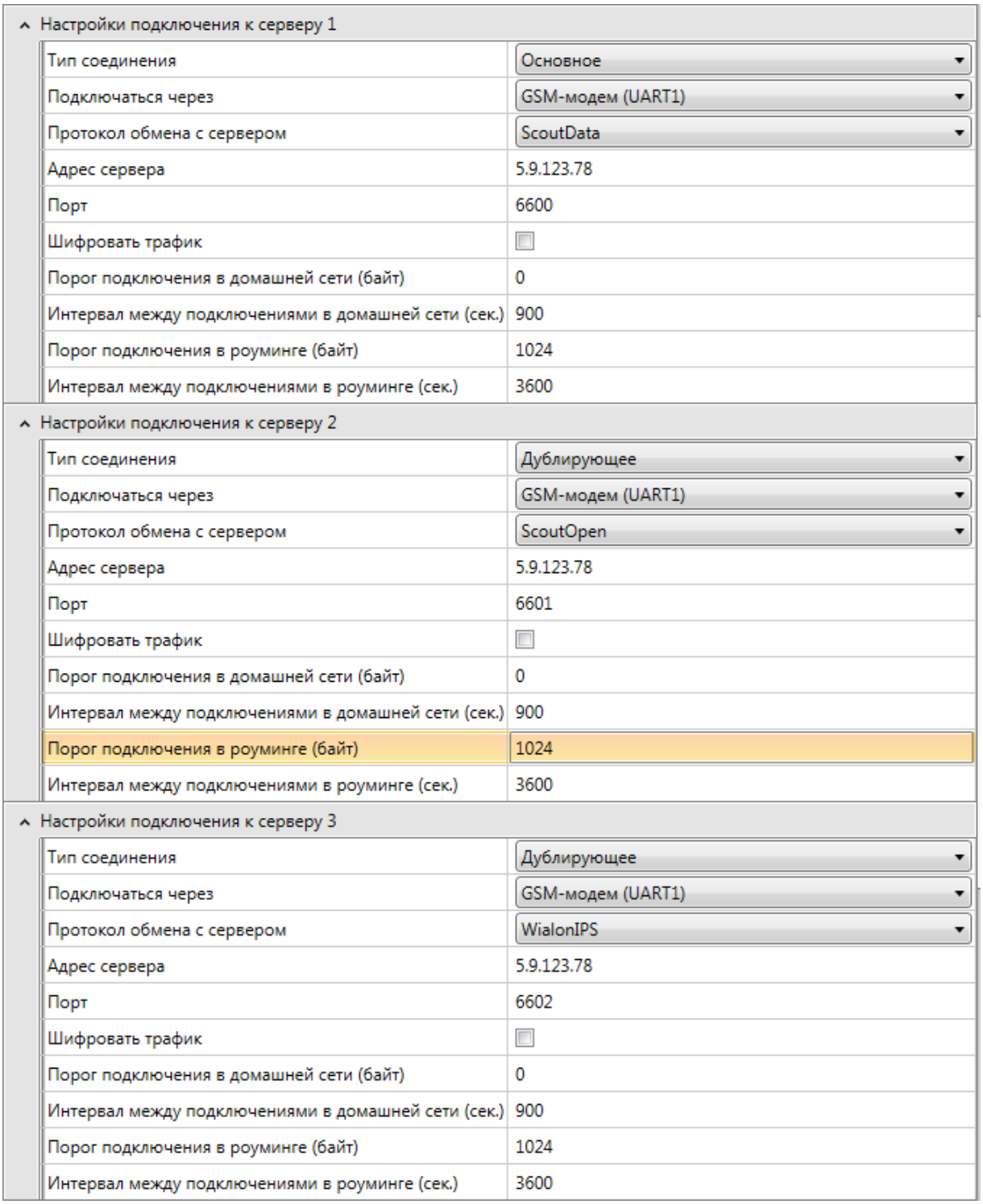


Figure 41 General settings, part 2

Server connection settings – parameters of the “SCOUT Server”. Terminal supports up to 3 connections, all of which can be individually configured.

Connection type – The connection type for server 2 and 3 can be changed using “Not in use” button, this will prohibit the connection to the selected server.

Connecting to a a reserved type is only conducted if the main connection has failed (server is off/ not responding). After a main connection failure, then the reserved

connection is activated and all the data will be transmitted until the main connection is restored.

The duplicative connection is carried alongside the main connection. Data is transmitted to both servers independently.

Sever Address – IP-address or domain name of the server.

PORT – Incoming port, configured in "SCOUT Server".

Traffic Encryption – enabling the terminal-server traffic encryption.

Disconnection threshold in Home Network (byte) –the terminal initiates a connection to the server and transmits data after the specified amount of data (in bytes) is accumulated. If the parameter = 0 – then the terminal connects to the server after generating the first entry.

Home network connection interval (sec)– the terminal initiates the connection after the specified timeout, regardless of the amount of data accumulated.

Roaming connection threshold (byte) – the terminal initiates connection to the server and transmits data after the specified amount of data (in bytes) is accumulated. If the parameter = 0 – then the terminal connects to the server after generating the first entry.

Roaming connection interval (sec) – the terminal initiates the connection after the specified timeout, regardless of the amount of data accumulated.

The terminal only separates presence in the gateway national or international roaming. While using the "native" operator, the terminal will use the home settings for the home network.

Server protocol – choosing the server's exchange protocol.

ⓘ 5 options are available for MT-700 PRO 285– ScoutData, ScoutOpen, EGTS, WialonIPS and ScoutOpen2.

ⓘ For MT-700 Lite/Std/ENT only one option– ScoutData, For MT-700 XXX Open - 5 options – ScoutData, ScoutOpen, EGTS, WialonIPS and ScoutOpen2.

The main parameters can be specified using the SMS-command `setserver` with the following parameters (1 main server, 2 и 3 duplication or reserved servers), protocol (`scoutdata`, `scoutopen`, `scoutopen2`, `wips`, `egts`), channel (`gsm`, `wifi`), IP-server address, port, encryption (1 - on, 0 –off), connection typr (m – main, d – duplicate, r - reserved).

The command example:
`setserver1 scoutdata,gsm,111.222.111.222,6700,crypto:1,m.`
Terminal response: `id(setserver1): OK`.

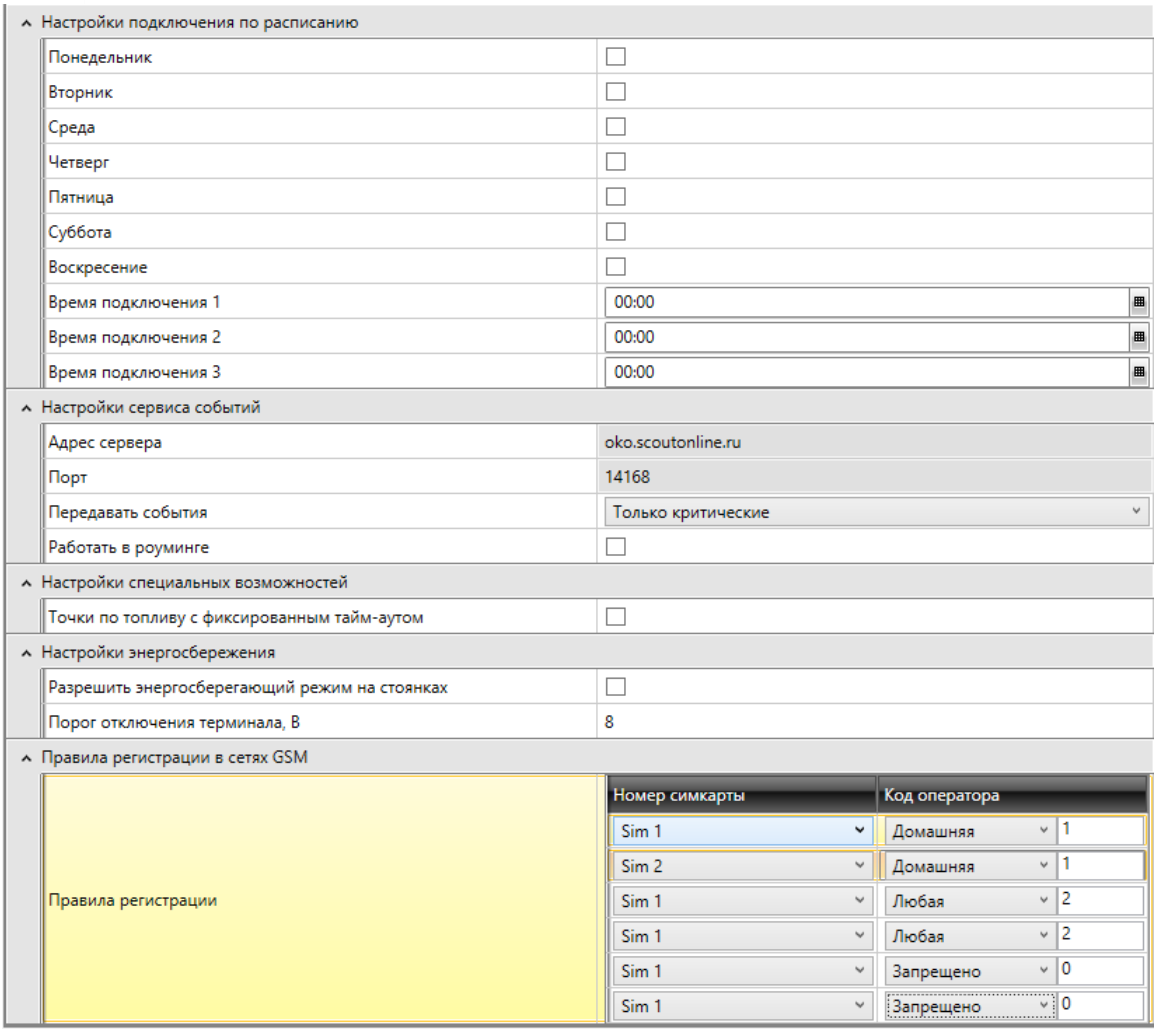


Figure 42. General settings, part 3

Scheduled connection – settings for scheduled connection, regardless of the amount of data.

Monday, …, Sunday – using those parameters will initiate the connection on the specified days.

Connection time 1 – Connection time 3 – Up to 3 values can be specified. The terminal will initiate a connection at a specified time. If no times were specified, then the function deactivates. Time is specified in the UTC (world time) format.

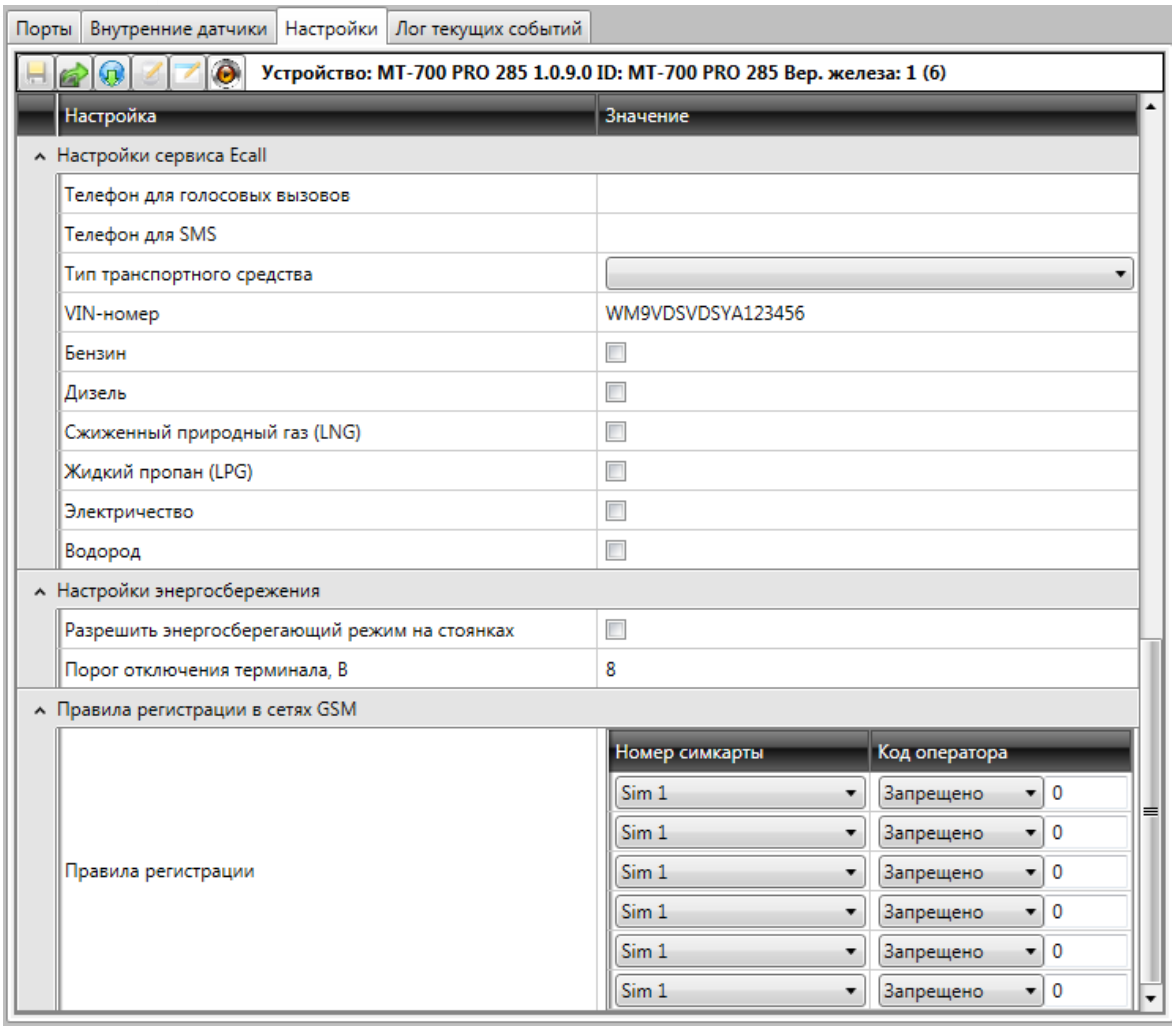


Figure 43. General settings, part 4

Ecall server settings

Ecall settings is only allowed on the MT-700 PRO 285.

ECall — European system of an automatic notification of a traffic accident.

The system activates in case of a traffic accident (automatically or in a manual mode and sends the data, so called ECall, which includes: date and time of the activation, location, data on the vehicle, cellular provider, eCall-Qualifier — data on the connection type(manual or automatic). A phone call to the vehicle is simultaneously established.

Voice call phone number – a phone number (supported format is MSISDN and short format for sending an in-band-message and voice call to an operator. If the connection is successful then a voice call on specified number is made and the incoming calls are anticipated for an hour starting after the current call.

SMS phone number –a phone number (supported format is MSISDN and short format for sending data using a reserved SMS-channel (used in case of the voice call failure). 5 attempts for sending data over SMS-channel is enshrined.

Vehicle type – the vehicle type out of the dropdown list should be specified (**Figure 43**).

VIN-number – VIN-number of the vehicle.

Fuel type – fuel type of the vehicle. More than one can be selected, in case of a hybrid vehicle.

theEGTS should be used to ensure the correct use of the features .

Energy saving settings (**Figure 43**) – a possibility of switching the terminal to a power-safe mode, disabling the modem, GPS receiver for energy saving of the vehicle accumulator battery.

Allow energy safe mode on parking – specifically, if the terminal enters a power-safe mode while parked(ignition – off and no vibration is detected for 5 min.)

In power-safe mode the modem is disabled (timeout connection settings are not followed) and GPS receiver (the last point on port NMEA is repeated). All other functions work as usual. Once every 15 minutes the terminal exits the power-safe mode and connects to the server and sends the stored data.

Terminal shutdown threshold – the supply voltage level, which specifies the voltage threshold below which terminal powers off and does not react on inputs/sensors state changing.

Power-off occurs every 5 min. if the supply voltage does not exceed the threshold value.

In that regime every second terminal checks the input supply voltage and if the voltage in 10 consecutive samples exceeds a threshold by the 0,5V,then the terminal is powered on.

Also, that regime the terminal connects once a day to a server to send data.

Power safe settings are intended to save the vehicle's accumulator. The following settings allows it to reduce the energy consumption and improve the vehicle's function after being parked for a long time.

It is recommended to use the power safe settings if the vehicle is not used regularly.

The power safe mode lowers the consumption to a minimum, but it does not protect the car battery from discharge during extended parking and does not start the vehicle start afterwards.
If the suggested parking time will be longer than a month or the accumulator is rather old and/or discharged it is recommended to disconnect the battery. Also, during the colder months disconnect the

device's internal battery.

It is necessary to regularly maintain and charge the car's battery if:

- The vehicle is used irregularly,
- Is regularly parked for long periods,
- The vehicle is used for short time-periods,
- All other cases, in which the battery cannot sustain the needed voltage using the generator.

Power consumption modes

The terminal has three power consumption modes: active, power-safe and minimal.

Active – all functions are available, including navigation and data sending.

Power-safe – navigation and data sending are off, sensors are being controlled and saved in the black box.

Minimal consumption – all functions are disabled, including the black box.

Entering the power-safe mode happens in the following cases:

- Backup battery voltage is lower than 3.8 V,
- Power supply voltage is higher than 45 B,
- The temperature is more than 85 °C,
- If power-safe mode is allowed and parking for more than 5 min. is fixated.

The power-safe mode is entered 5 minutes after any of the mentioned events has occurred. After the device has finished its connection then it will enter into power-safe mode.

Exiting the power-safe mode can be achieved in the following ways:

- Pushing the panic button.
- Battery voltage of the backup accumulator is restored.
- Supply voltage is lowered (if the transition was caused by the exceedance of the supply voltage).
- The temperature has lowered below 80 C (if the transition was caused by a temperature raise).
- Detecting vibration or the ignition.
- Once in 15 min, timeout-wise (if the transition was caused by extended parking, or a high supply voltage, or a high temperature).

Transition to minimal consumption can be caused if:

- The backup battery voltage is below 3.6 V.
- The supply voltage is over 65 V.
- If the supply voltage is lower than the specified threshold.

Transition in the minimal consumption regime will take place after any of the events described above.

Exiting the minimum consumption mode can be achieved if:

- The backup battery voltage is restored.
- The supply voltage dropped down.
- The panic button was pushed ignition was fixated, or the power was restored.

GSM connection rules:

Home – it is necessary that restoration for the for the GSM-network is in the home network.

Any – enabling roaming.

Restricted – network registration is forbidden.

ⓘ In the numeric field the operator code can be specified to allow registration using only the specified cellular operators.

ⓘ If the network registration cannot be achieved using the current method, then the next rule applies.

ⓘ Any rule stated above has the highest priority. The terminal will evaluate if it is operating on the highest priority rule, if not then it will automatically alternate rules from highest to lowest priority every 30 min.

***GSM* registration rules** can be set **using SMS-command** `setnetrule` with the following parameters:

- Rule number (1-6),
- SIM-card number (1),
- Operator code(0-99999).

ⓘ value 1 indicates the possibility of registering only at the home network, value 2 – in any network

Example of the command:

```
Setnetrule 1,1,25002
```

Terminal response: `id(setnetrule): OK`.

Event service settings

Event service "OEC" (Online Equipement Control) – is used for receiving and storing data on any devices failure messages.

After an event occurs which requires date to be sent, the terminal connects to the OEC server and transfers the data on all of the events that have occurred since the last data exchange.

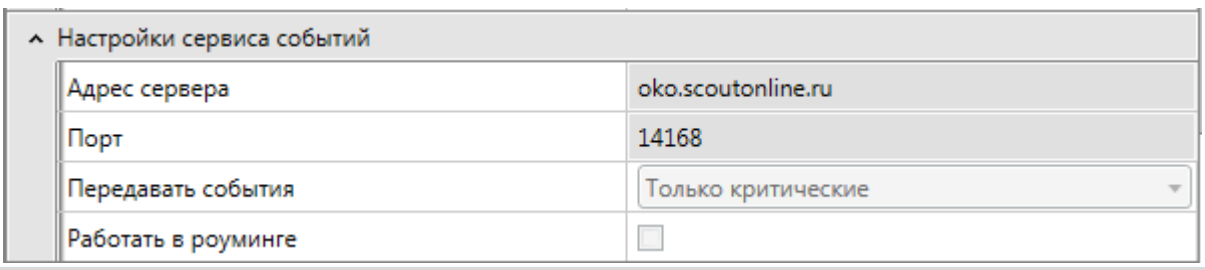


Figure 44. ***Event service settings***

In fields: “server address”, “Port” data on the OEC server is specified. Those parameters cannot be changed by a user.

In the field transferred events there are following settings:

Only critical – error that occur only on hardware glitches.

Critical and failures – adds the failed attempts of a server connection, finding location, network registration and GPRS activation.

All – adds the events of the terminal’s changing settings

Also, the option “work in roaming” can be added – in order to use roaming outside of the home region for sending OEC messages.

5. Ports and internal sensors configuration

❶ *Internal sensors configuration*

Internal sensors control is achieved through the “internal sensors” tab(**Figure 45**).

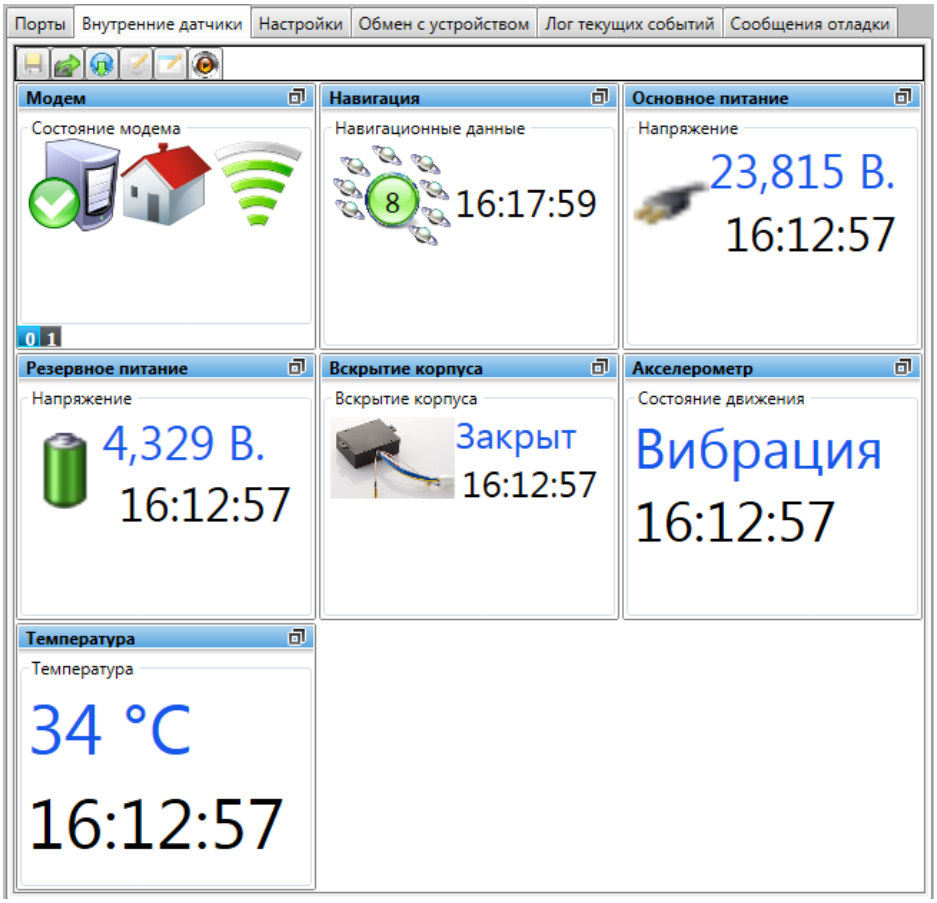


Figure 45. ***Internal sensors configuration***

The internal sensors panel can configure the following service devices: GPS receiver, modem, accelerometer, voltmeters. Work description of the panel can be found in the operational manual for the “Universal SCOUT Configurator” software. The following manual will review each of the devices parameters and recommended parameters.

GPS receiver settings («Navigation»)

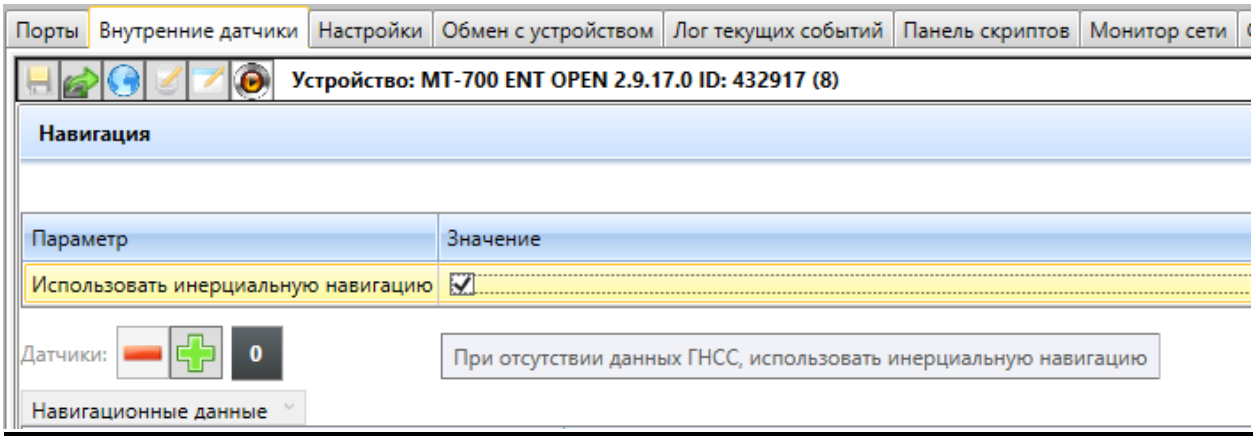


Figure 46. Inertial navigation

In order to enable calculating the track lengths using the inertial sensor, on the panel "internal sensors" allow checkbox "Use the internal navigation".

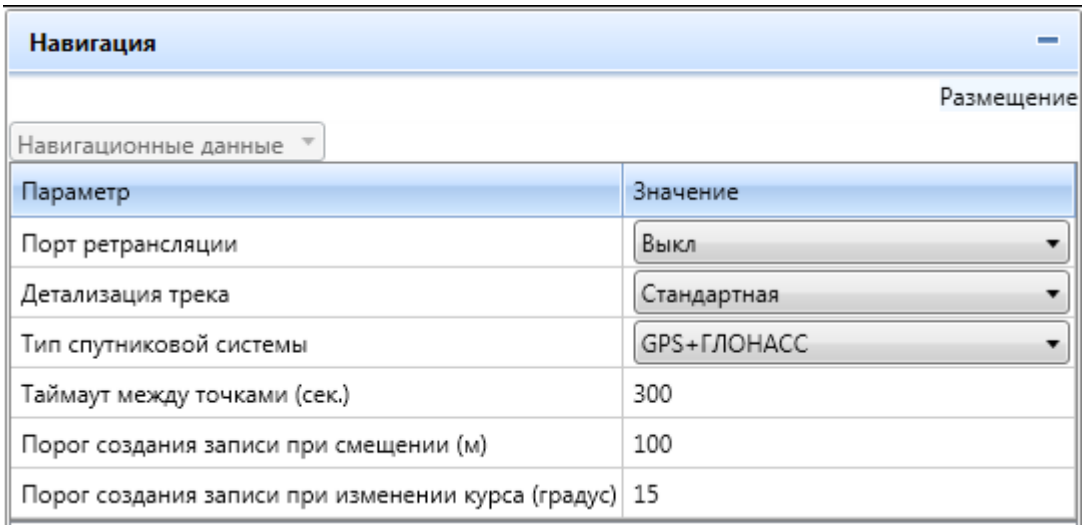


Figure 47. Navigation

Internal sensor "Navigation" has parameters: (**Figure 47**):

Track detailing (Figure 48) –choosing one of the five levels of the track detailing, defining track parameters.

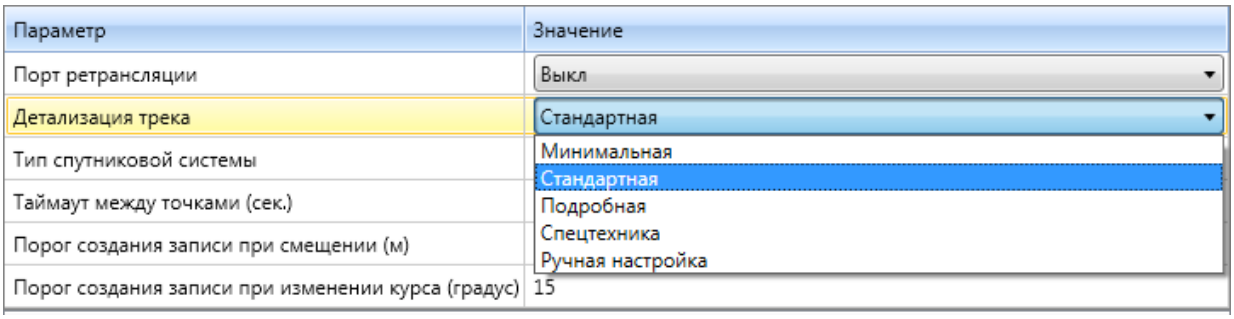


Figure 48. Track detailing

Minimal– city-to city carriage with the minimum time spent in the urban areas. Used for location tracking, with no mileage counting.

Standard – any auto transportation.

Detailed – for auto transportation, in case of tight urban development and special equipment.

Special equipment– for special equipment or if the highly detailed track is needed

Manual setting allows for manual setting of parameters:

Timeout between measurements (in seconds) – timeout between forced saving of the measurements.

Recommended value: 300-600 seconds. 0 stands for disabling the forced savings.

Displacement write threshold (in meters) – distance for the creation of the new entry

Course changing threshold – new log entry generated only on the course change more than .. degrees

Satellite system type (Figure 49) – GPS, GNSS, or combined.

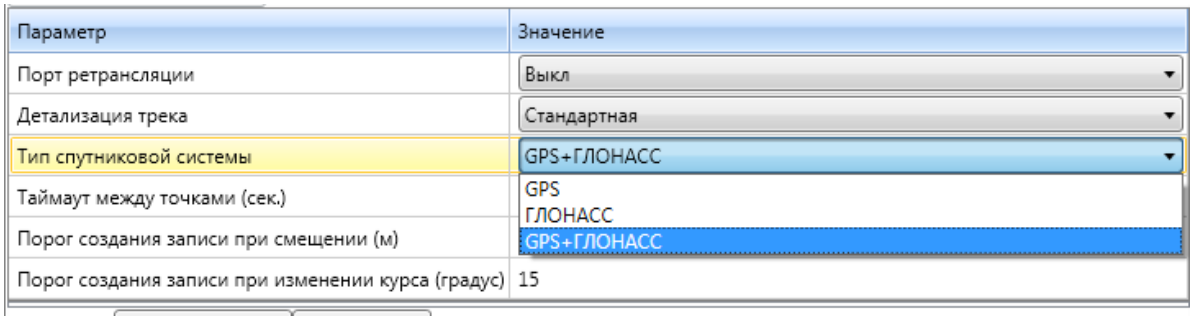


Figure 49. Satellite system type

Map source – choosing the map from suggested selection (**Figure 50**)

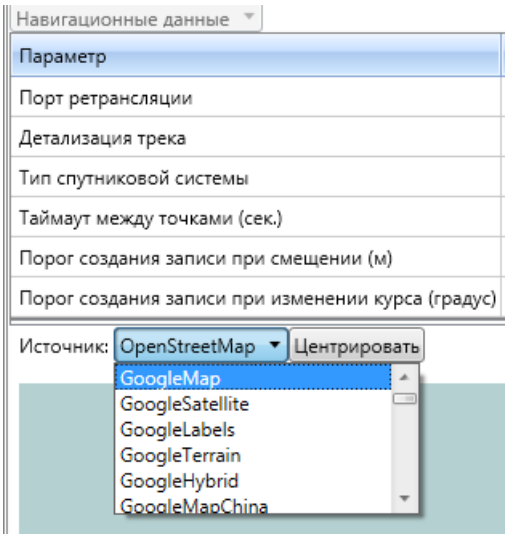


Figure 50. Map source

Navigation-based mileage can be calculated.

In order to count the mileage based on navigation, add the “Navigation mileage” sensor

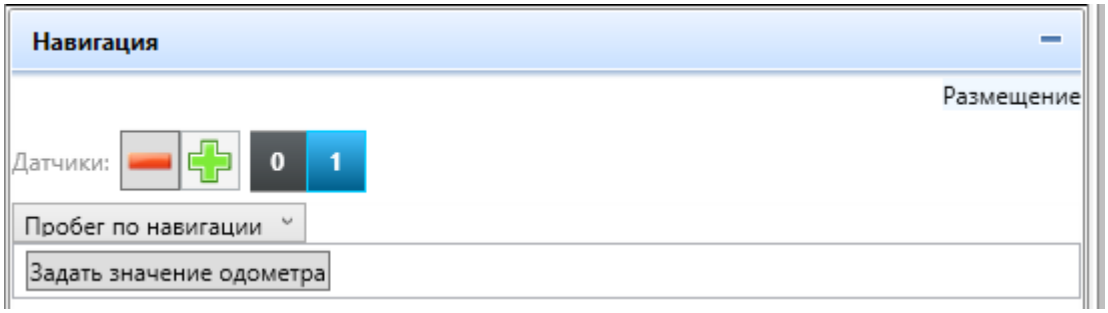


Figure 51. Millage based on navigation

“Odometer initial value” button – allows you to specify the initial odometer state (in meters) (**Figure 51**)

Modem settrings

MT-700 PRO 285 incorporates the embedded 3G-modem, terminals MT-700 PRO, MT-700 STD, MT-700 ENT, MT-700 Lite - 2G-modem.

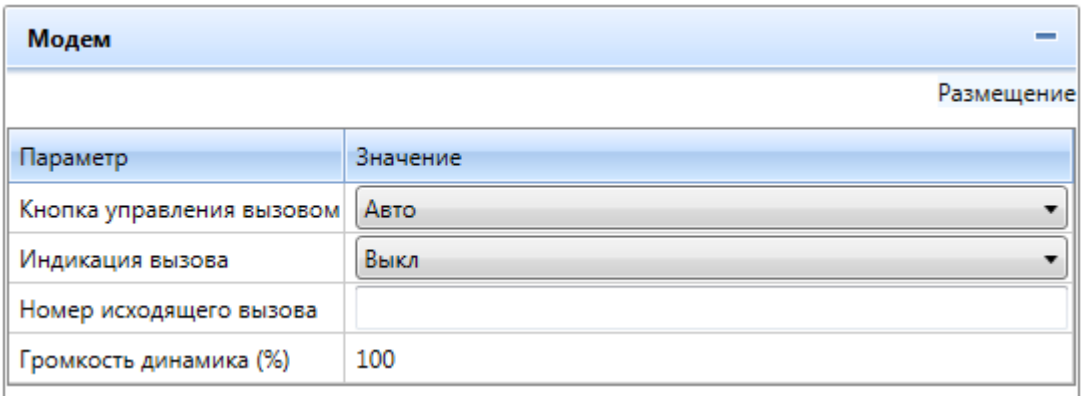


Figure 52. Modem parameters

The modem has the following parameters (**Figure 52**):

Call control button – defines the answering the call regime. Auto – means that incoming calls will be picked up automatically, port number – call will be picked up after the indicated port activation.

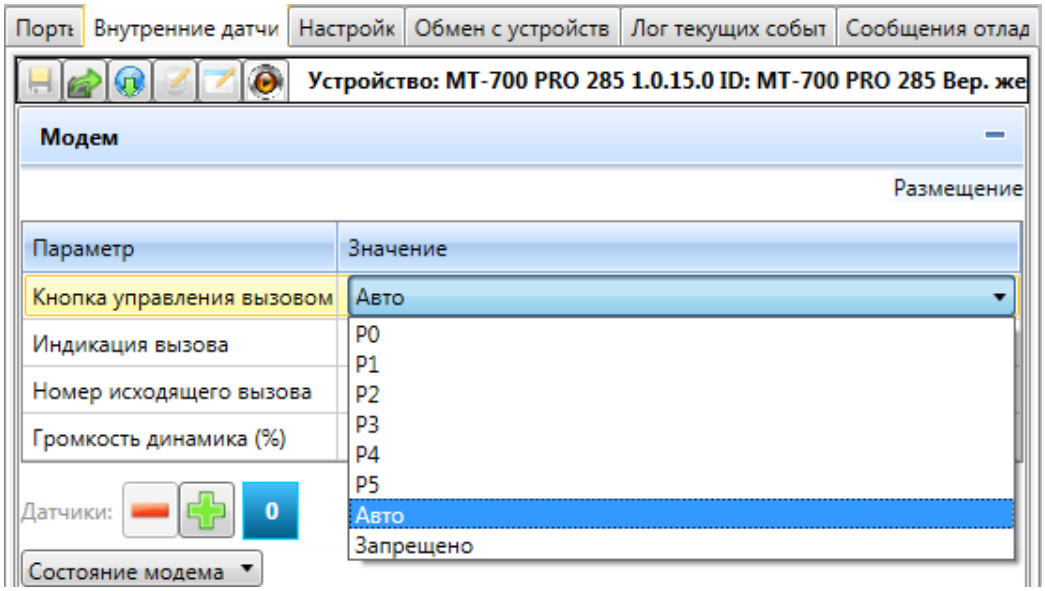


Figure 53. Call control button

Call indication – indicated ports (digital outputs) will be activated and at the incoming call will be activated. After picking up the call will be deactivated.

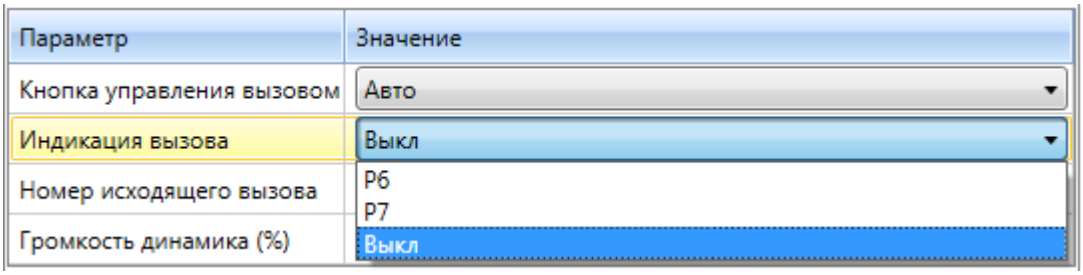


Figure 54. Call indication

Outgoing call number – a phone number which is used for outgoing calls if the call control button is pushed.

Speaker volume (%) –volume of the speaker during calls.

Supply voltage and backup battery voltage parameters

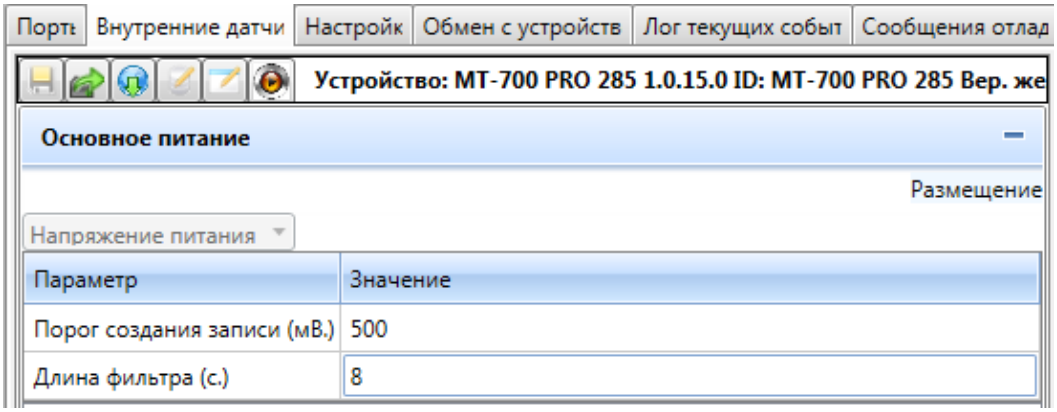


Figure 55. Основное питание

Write threshold (mV) – threshold for the voltage change to create a new entry.
Filter length, s – accumulation length (in seconds) which is used to average the data.

Tamper sensor parameters

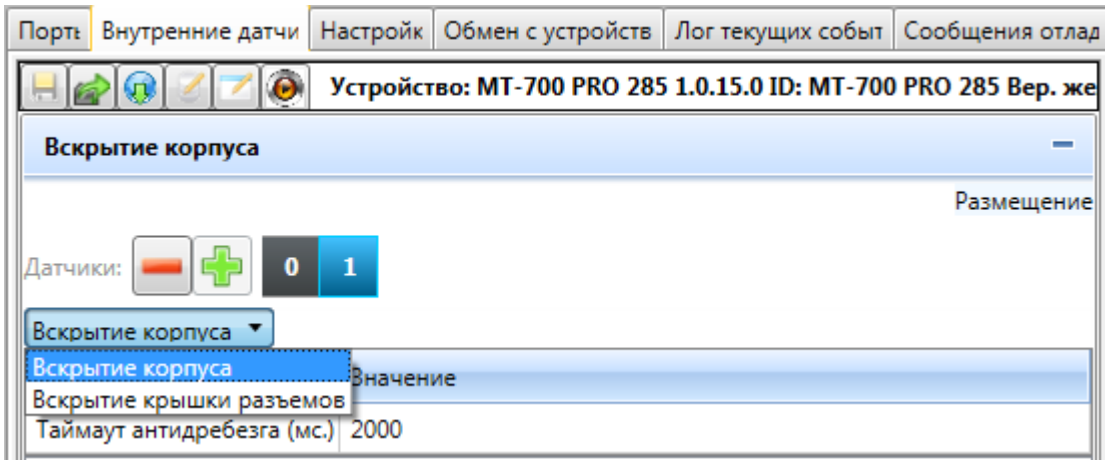


Figure 56. Tamper settings

Debouncing Timeout (ms)– threshold for a new state fixation.

Temperature sensor

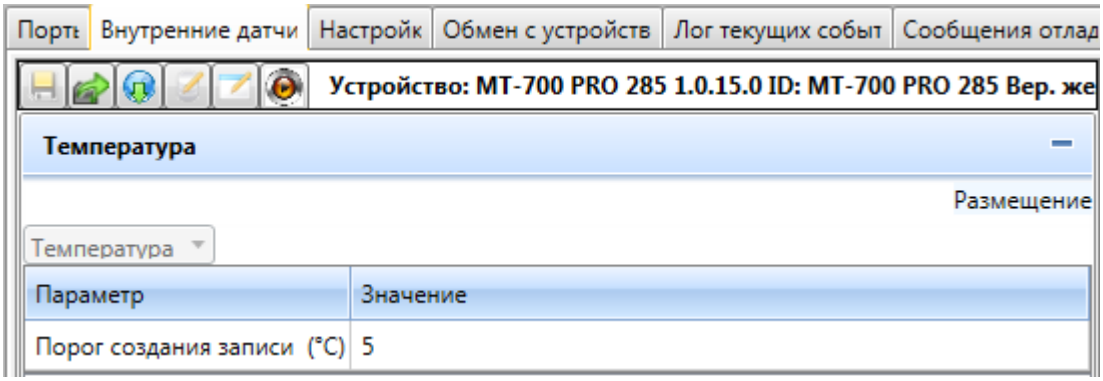


Figure 57. Датчик температуры

Write threshold, °C – value change, in **°C**, that will lead to the creation of a new entry.

Accelerometer settings

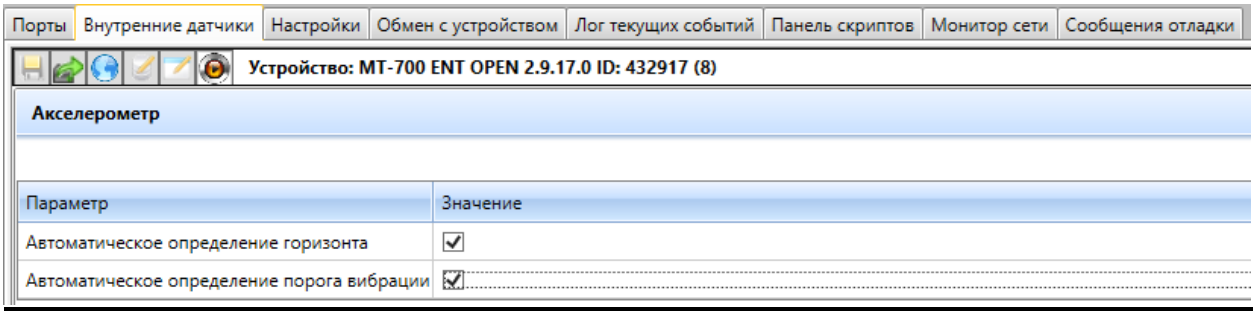


Figure 58. ***Accelerometer settings***

"Automatic horizoning" checkbox includes automatic determination of a vertical, linear and lateral vehicle's axes and refines them during the operation.

Checkbox "Automatic vibration threshold" enables automatic vibration threshold configuration.

- Sending SMS-command Set Accelgage to the terminal with the automatic calibration enabled will disable the automatic calibration and the threshold, specified by the SMS will be applied.

  If the SetAccelgage send with "0", accelerometer will enable the automatic calibration mode.

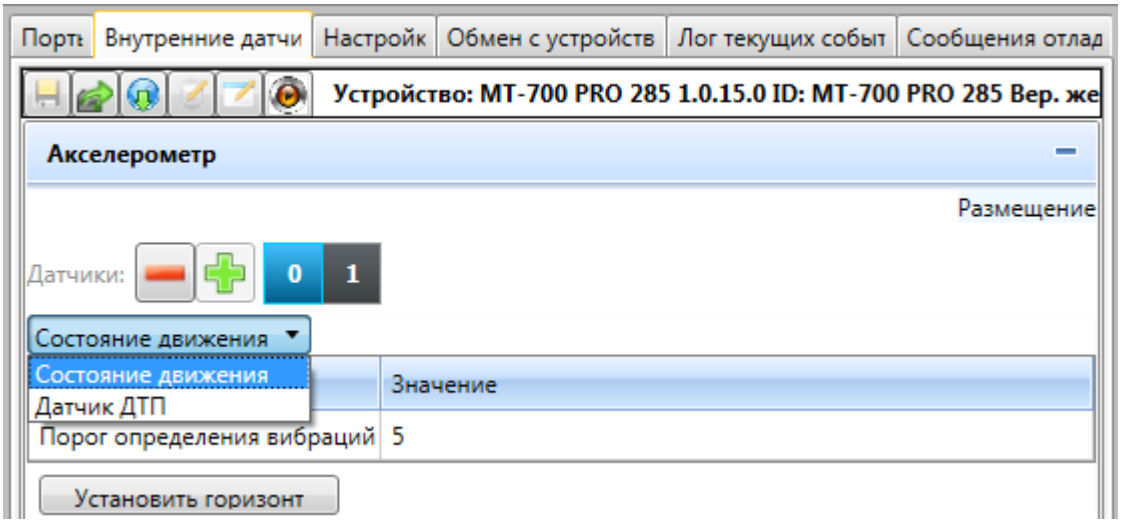


Figure 59. Moving state

«**Moving state**» sensor (**Figure 59**) incorporates the following parameters:

Vibration threshold – all values below the threshold indicate parking.

The "Horizon" button stands for setting the 0 point.

Remote accelerometer configuration

Accelerometer can be configured using SMS-commands.

Accelerometer calibration check is executed using the `CheckCalibration.`

Terminal response:

`ID(CheckCalibration): horizon: resultH (causeH); linear: resultL (causeL)`

Where `resultH, resultL` – are the results of the horizon setting and linear calibration:

`ok` – calibration is OK

`warning` – calibration is on the edge of the allowable range

`fault` - calibration is over the allowable range

`causeH` – horizon calibration cause:

`not calibrated` – calibration was not achieved

`out of range` – horizon vector is over the allowable range

`angle A` – angle between the horizion vector and current vector

`line L, side S` – false additive to the linear and lateral acceleration added by the gravity (if linear calibration was conducted)

`causeL` – linear calibration cause:

`not calibrated` – calibration was not conducted

`angle A` – angle between the linear calibration vector and linear statistic vector

Response: `ID(CheckCalibration):horizon: fault (not calibrated); linear: fault (not calibrated)`

Accelerometer state indication is conduction through the SMS=command `getacceleration`

Response from the terminal:

`Id(getacceleration):accel(acc), angle(ang),current(Xc,Yc,Zc), horizon(Xh,Yh,Zh),line(Xl,Yl,Zl)`

ID – is the tracker ID

`acc` – current linear acceleration (no value if the linear calibration was not conducted)

`ang` – angle to the horizon (0, if horizon is not set)

`Xc,Yc,Zc` – current “raw” data for the 3 axes

`Xh,Yh,Zh` – horizon calibration vector (3 axes); if it’s not calibrated – not calibrated

`Xl,Yl,Zl` – calibration vector(3 axes). If not calibrated = not calibrated (no horizon or not calibrated)

Terminal’s response: `ID(getacceleration): angle(4), current (-59,52,1039), horizon(14,-22,1044), line(not calibrated)`

Value of the parameter “accelerometer port threshold” can be requested using the following SMS-command: `getaccelgage`

Response: `id(getaccelgage): OK`

Setting the value for the **accelerometer vibration threshold is** conducted using the following command: `setaccelgage`

Response: `id (setaccelgage): OK`

Accelerometer check can be conducted using: `testaccelgage`

Responded SMS:

`ID(TestAccelgage): State (x1, y1, z1); (x2, y2, z2); (x3, y3, z3)`

Response: `ID(testaccelgage): Ok (-58,42,1049); (571,-550,1540); (-640,671,442)`

где `State` – accelerometer state

`not detected` – not detected

`Ok` – accelerometer is working

`Fault` – accelerometer failure

`(x1, y1, z1); (x2, y2, z2); (x3, y3, z3)` – values of 1 (gravity), 2-nd и 3-rd test vectors

Horizon can be set using the SMS-command: `Horizon`

Response: `ID(horizon): OK`

Also, the traffic accident sensor can detect if the vehicle has been through an accident.

During the sensor's work, it analyses the data from the built-in accelerometer. If the parameters exceed the threshold during the timeout , then the sensor will generate an entry in the journal.

Linear accelerometer calibration is conducted using the `LinearCalibrate angle, where:`

angle – angle in the static coordinate system. If the angle was not set – then the terminal will drop the linear calibration, if it was set – then a new linear calibration is set in accordance.

Response:

`ok` - done,

`impossible` – impossible to conduct. Accelerometer does not reply to a command or the horizon was not set.

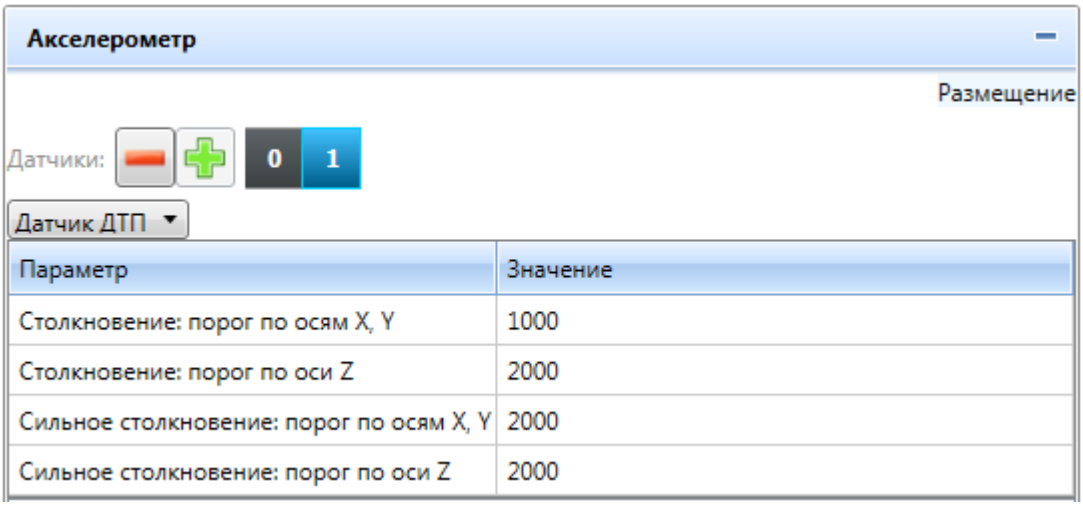


Figure 60. Traffic accident sensor

Traffic accident sensor (**Figure 60**) incorporates the following settings:

Collision: X, Y threshold – acceleration value (in mg), determined as the acceleration vector projection on the X and Y axes, after exceeding which, the event is fixated.

Collision: Z threshold – acceleration value (in mg), determined as the acceleration vector projection on the X and Y axes, after exceeding which, the event is fixated.

Strong collision on X, Y axes – look: collision: X, Y threshold.

Strong collision on Z axe – look: collision: Z threshold.

If a collision took place, then data is being send to the server, and the dispatcher can see it in the “SCOUT Configurator”.

Also, the SMS-notification can be set up. In order to achieve this – turn on the option in (SMS-Settings > SMS-notifications) in SCOUT –Configurator.

❷ *Ports configuration*

The Settings of the connected auxiliary devices are shown in the “PORTS” tab of the configurator. The common view of it is shown in **Figure 61**.

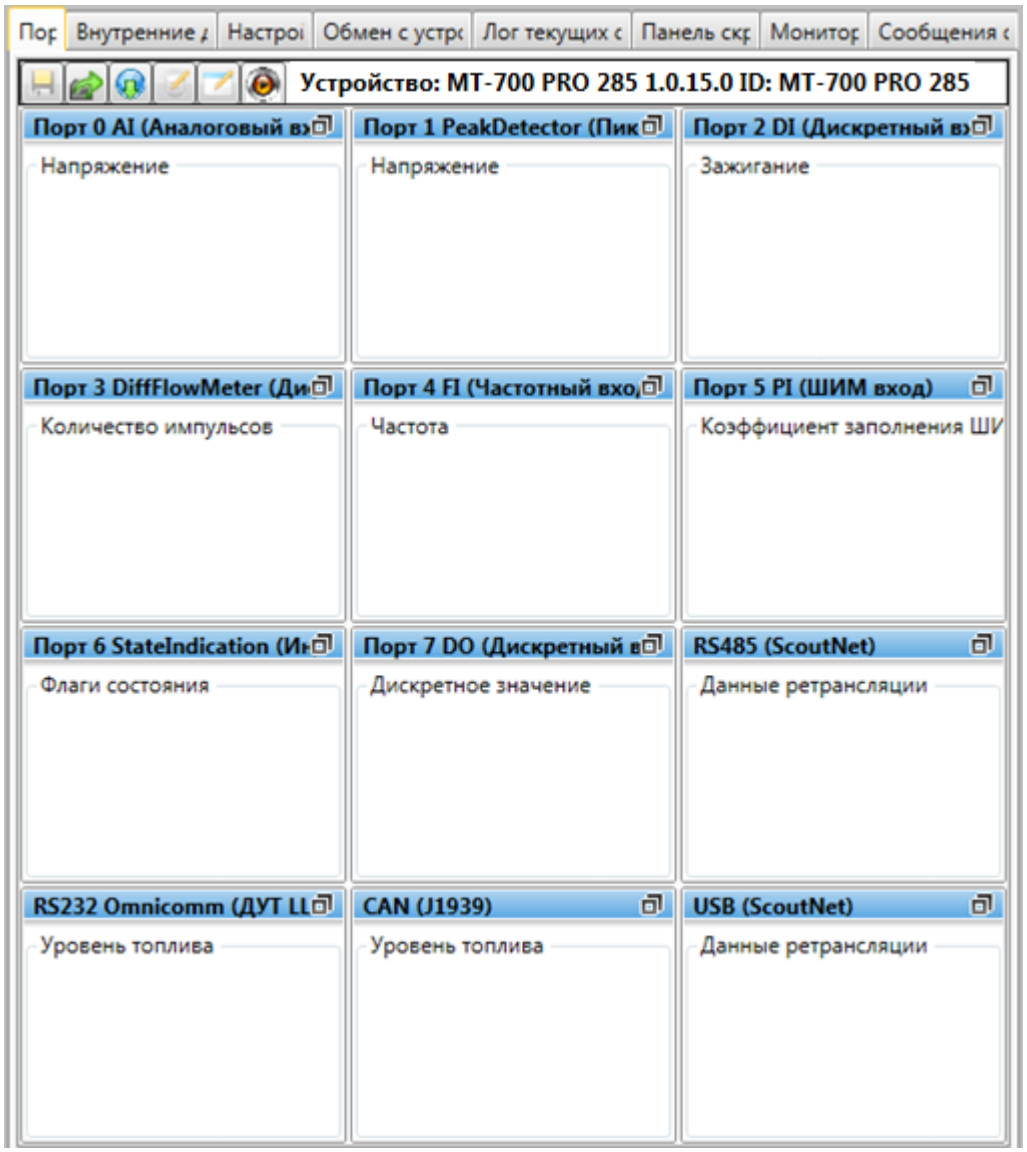


Figure 61. Ports

- STD and Lite versions do not have the RS232, CAN and USB.
- For ENT version the RS485_2 and CAN are available.

"PORTS" panel sets up the terminal i/o. Each port has personal settings.

Choosing the port's mode of operation

All inputs can work in one of the selected modes. To change the work mode you should push the dropdown list button at the top of the window. For some modes additional configurable sensors are available.

In order to change the work mode, open the port window and click the work mode dropdown list, and choose the needed option (**Figure 62**).

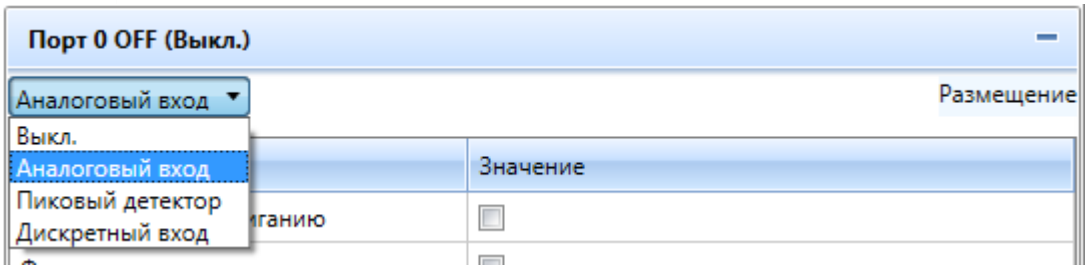


Figure 62. Selecting port working mode

Working modes for MT-700 PRO/ MT-700 PRO 285 in the 19.x software version are shown in the **Table 9**.

Table 9

Port/function	P0-P1	P2-P5	P6-P7	RS-485	RS-232	CAN
Off	+	+	+	-	+	+
Digital input	+	+	-	-	-	-
Analogue input	+	OnlyP2	-	-	-	-
Peak detector	+	OnlyP2	-	-	-	-
Counting input	-	+	-	-	-	-
Differential flow-meter	-	+	-	-	-	-
Frequency input	-	+	-	-	-	-
PWM-input	-	+	-	-	-	-
1-Wire	-	Only P3	-	-	-	-
Digital out	-	-	+	-	-	-
Current state indication	-	-	+	-	-	-
ScoutNet	-	-	-	+	-	-
J1708	-	-	-	+	-	-
J1939	-	-	-	-	-	+
LLS FLS(Omnicomm)	-	-	-	+	+	-
Drive Style	-	-	+	-	-	-
RFID	-	-	-	+	-	-
CAN-LOG	-	-	-	-	+	-
VDO Tachograph	-	-	-	-	+	-
Mobileye	-	-	-	-	-	+
OBD Protocol	-	-	-	-	-	+

Working modes for MT-700 STD/MT-700 ENT in the 19.x software version are shown in **Table 10**.

Table 10

Port/Function	P0-P1	P2-P5	P6-P7	RS-485	RS-485_2*	CAN*
Off	+	+	+	-	-	-
Digital input	+	+	-	-	-	-
Analogue input	+	Only P2, P3	-	-	-	-
Peak detector	+	Only P2, P3	-	-	-	-
Counting input	-	+	-	-	-	-
Differential flow-meter	-	+	-	-	-	-
Frequency input	-	+	-	-	-	-
PWM-input	-	+	-	-	-	-
1-Wire	-	Only P3	-	-	-	-
Digital out	-	-	+	-	-	-
Current state indication	-	-	+	-	-	-
ScoutNet	-	-	-	+	-	-
LLS FLS(Omnicomm)	-	-	-	+**	+	-
Drive Style	-	-	+	-	-	-
J1708	-	-	-	-	+	-
VDO Tachograph	-	-	-	-	-	+
Mobileye	-	-	-	-	-	+
OBD Protocol	-	-	-	-	-	+

* - Only for the MT-700 Ent

**- not for the MT-700 Ent

MT-700 Lite working modes are shown in the **Table 11**.

Table 11

Port/Function	P0-P1	P2-P5	P6-P7	ScoutNet	RS-485_2*	CAN*
Off	-	+	+	-	-	-
Digital input	-	Only P2	-	-	-	-
Analogue input	-	-	-	-	-	-
Peak detector	-	-	-	-	-	-
Counting input	-	-	-	-	-	-
Differential flow-meter	-	-	-	-	-	-
Frequency input	-	-	-	-	-	-
PWM-input	-	-	-	-	-	-
1-Wire	-	-	-	-	-	-
Digital out	-	-	Only P6	-	-	-
Current state indication	-	-	-	-	-	-
ScoutNet	-	-	-	+	-	-
LLS FLS(Omnicomm)	-	-	-	-	-	-
Drive Style	-	-	Only P6	-	-	-
J1708	-	-	-	-	-	-
VDO Tachograph	-	-	-	-	-	-
Mobileye	-	-	-	-	-	-
OBD Protocol	-	-	-	-	-	-

Digital inputs P0-P5 setting

Digital inputs are intended to connect logic sensors, which operate in two different states – on and off, which correspond accordingly to high and low voltage levels. Such sensors are: “Ignition state”, “Panic button”, movement sensor and others.

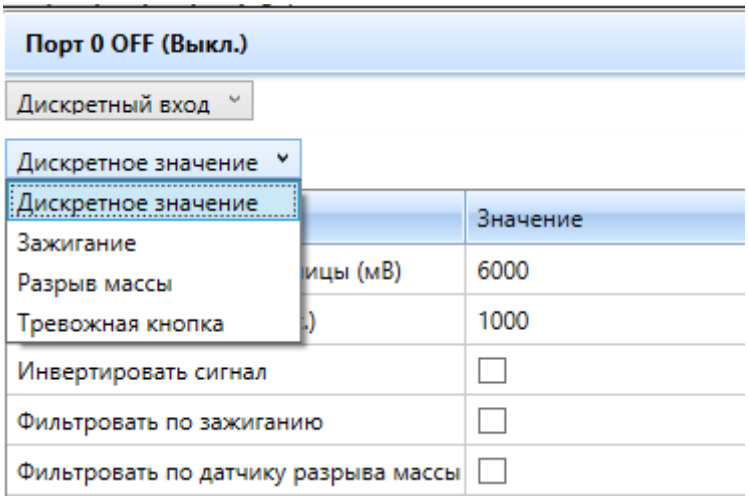


Figure 63. Digital input parameters

Available sensors are: («Digital value», «Ignition», «Battery disconnect switch», «panic button») they only differ by the icon picture in the PORTS tab. The settings are identical

Digital input has the following parameters:

Ports P0-P1:

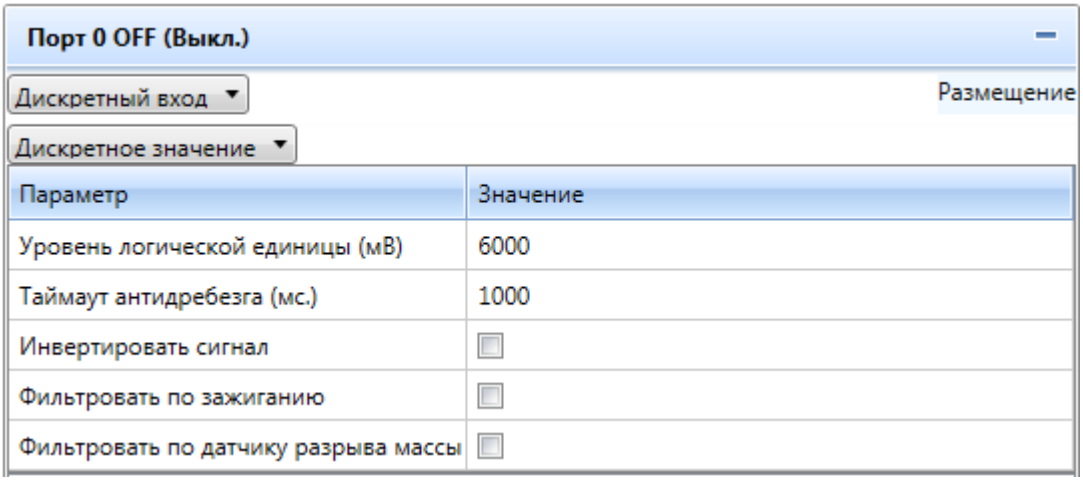


Figure 64.

Ports P0-P5:

Debounce timeout (мс) – minimal pulse length, which can be fixated. The parameter is used to protect against false actuation.

Recommended value – 1000, for the panic button – 100.

Invert the signal – Inverts the logic of work. By default, the High voltage on the input corresponds to a value “1”. After inverting the “1” is corresponding to a low level of signal.

Ignition filtering– if the parameter is on, all of the sensor’s changes are not counted until the ignition is “ON”.

Battery disconnect switch – – if the parameter is on, all the changes of the sensor is not counted until the battery disconnect switch is off.

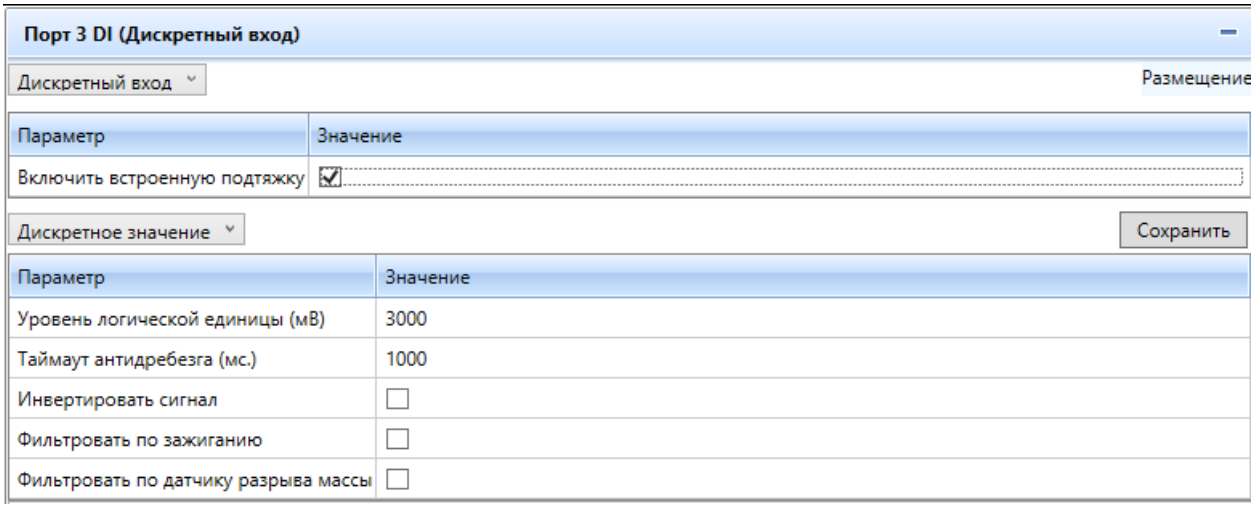


Figure 65. Digital input settings

If the checkbox “enable the pull-up” on the P3 is enabled – then the internal pull-up is enabled.

Analogue inputs settings on P0-P2

Analogue inputs are designed to measure sensors, which correspond to the change in measuring parameter to the output voltage change. Those sensors are: fuel level sensors, temperature sensors, etc.

Analogue ports can be configured as follows:

Ignition filtering– if the parameter is on, then the changes in the sensor are not counted until the ignition is “ON”

Battery disconnect switch – – if the parameter is on, then the changes in the sensor are not counted until the battery disconnect switch is off.

On the analog inputs the following sensors can be added:

«Fuel sensor» – filtration algorithm for fuel level sensors.
«Voltage» – for the arbitrarily sensors.

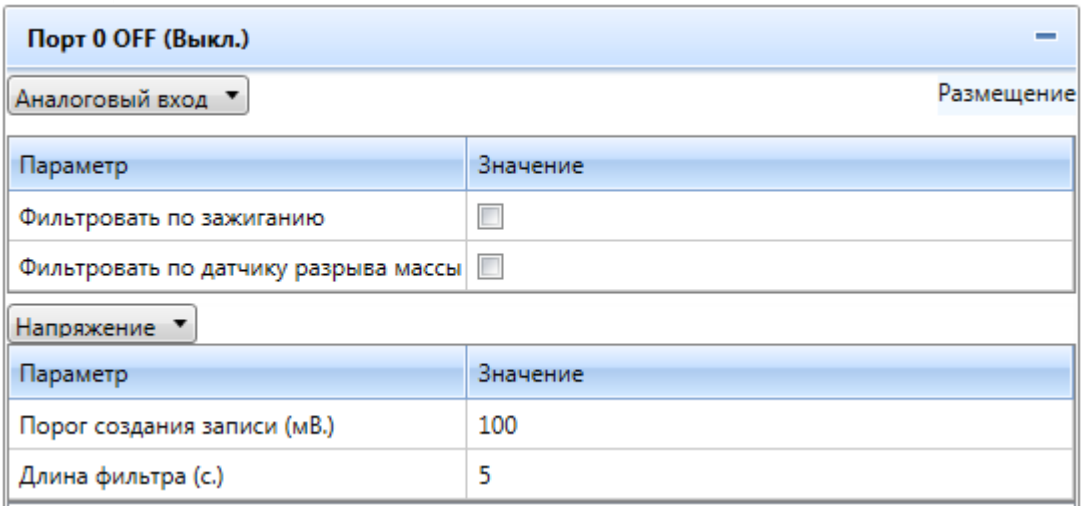


Figure 66. «Voltage» sensor parameters

Using "Voltage" sensor (**Figure 66**) the following parameters can be changed:
Write threshold (mV) – threshold for the voltage change to create a new entry.

Filter length, s – accumulation length (in seconds)to average the data.

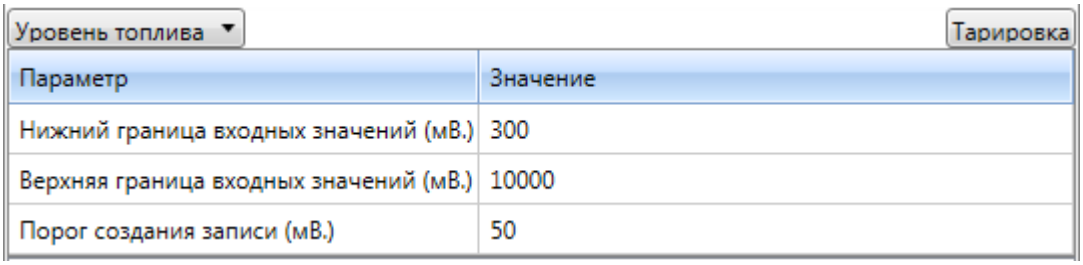


Figure 67. «Fuel level» parameters

Using «**Fuel level**» (**Figure 67**) the following parameters are available:
Minimal value for the input (mV) – the minimal value of the Output voltage of the sensor
Maximal value for the input (mV) – the maximal value of the Output voltage of the sensor

If the Voltage will be below or above the listed borders, then the terminal will not send data to the server.

New entry threshold –a new entry will only be written if the differences between current and previous values are greater than the threshold.

Recommended value – is the1% of the working range of the sensor. For the capacity tumbled sensors – 0,5%.

Counting sensors on the P2, P3 ports

Counting inputs are used to connect the pulse sensors, which are the following: fuel consumption sensor, passenger flow sensor and others.

The interpretation of the counting input is the same as the one for the Analogue input (**Figure 66**)

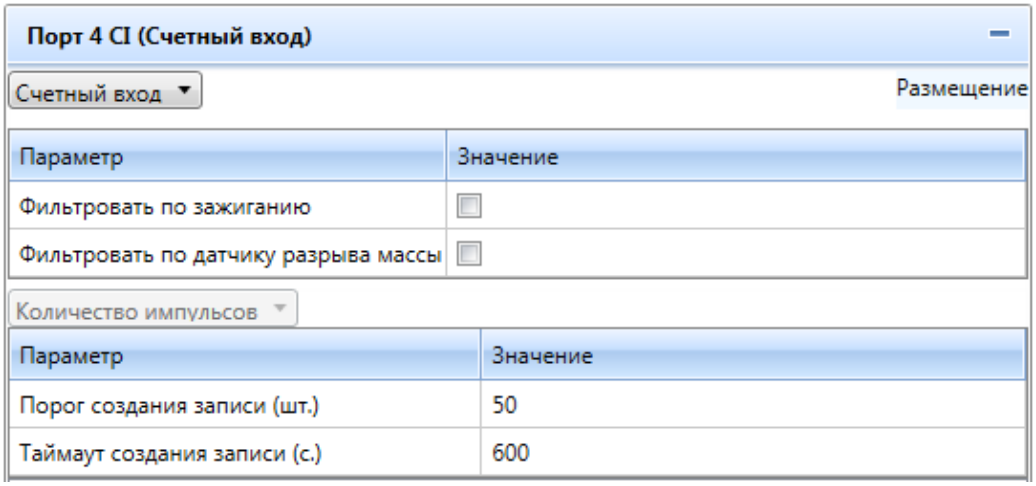


Figure 68. «Pulse count» sensor

On the P2 and P3 for the counting inputs only one data type is allowed – “Pulse count”, which has the following parameters:

Entry threshold (amount) – the amount of pulses that leads to a log entry generation.

Timeout (s) – timeout, which leads to counting the value on the sensor and resetting the counter.

If one of these conditions is met then the data will be saved.

- P2 and P3 can only count the pulses longer than 200 ms.

Setting the counting sensor on the P4, P5 ports.

On the P4, P5 for the pulse counter the «**Vehicle Speed**» sensor is available (**Figure 69**).

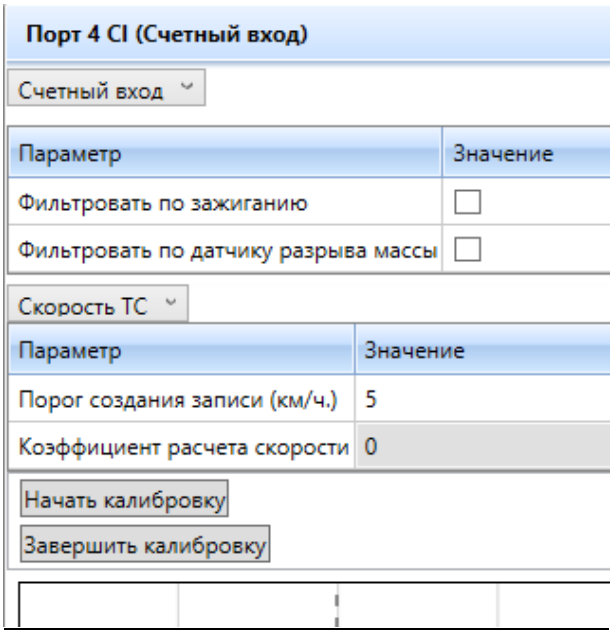


Figure 69

For the sensor the following settings are available:

Write threshold (kmph) – a new entry will only be created if the difference from the previous value is bigger than the threshold.

Speed conversion coefficient (c) – the coefficient that is used to converse amount of pulses to a speed.

Frequency counter on the P2-P5 ports

Frequency inputs are used for the sensors which convert parameter change in frequency change on its output. Examples are – fuel level sensors and temperature sensors.

Interpretation of the allowed parameters is equal to the analogue input (**Figure 66**).

Frequency sensors can be divided into the following categories:

«Frequency» – any sensor using the frequency output.

«Fuel level» – special filtration for the fuel level sensors.

«Engine speed» – tachometer connection.

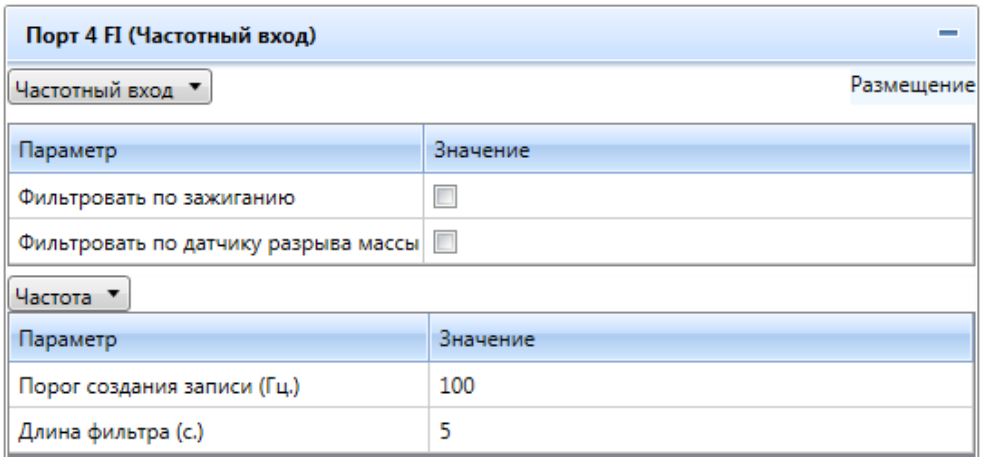


Figure 70. «Frequency» settings

Using the «Frequency» sensor (**Figure 70**) the following parameters are available:

Write threshold (mV) – threshold for the voltage change to create a new entry.

Filter length (s) – accumulation length (in seconds) to average the data.

Уровень топлива | Тарировка

Параметр	Значение
Нижняя граница входных значений (Гц.)	500
Верхняя граница входных значений (Гц.)	1500
Порог создания записи (Гц.)	5

Figure 71. «Fuel Level» parameters

Using the «Fuel level» sensor (**Figure 71**) the following parameters are available:

Minimal value for the input (Hz) – the minimal value of the frequency of the sensor,

Maximal value for the input (Hz) – the maximal value of the frequency of the sensor.

If the frequency will be above or below the listed borders, then the terminal will not send data to the server.

New entry threshold (Hz)– new entry will only be written if the differences between the current and the previous values are greater than the threshold.

Recommended value for the fuel sensor – 0,3% from the working range.

Обороты двигателя

Параметр	Значение
Коэффициент Гц => об/мин ((об./мин.)/Гц.)	100
Порог заведенного двигателя (об./мин.)	200
Порог холостых оборотов (об./мин.)	800
Порог критических оборотов (об./мин.)	6000
Величина гистерезиса (об./мин.)	100

Figure 72. «Engine speed» parameters

Using the «Engine speed» sensor (**Figure 72**) the following parameters are available:

Coefficient (Hz) => RPM – coefficient, specifying the conversion between frequency and RPM.

Running engine threshold – the minimal frequency for the motor to be considered running.

Idle speed threshold –the minimal frequency that corresponds to a running engine (not in idle mode).

Critical RPM – minimal frequency, considered dangerous in the long run.

Hysteresis – the hysteresis value for the frequency.

ⓘ Using the «Engine speed» sensor, a new entry will only be created if one the parameters exceeds the threshold. This provides the engine control while saving the internet traffic.

PWM inputs on the P2-P5 ports

PWM (PWM – pulse width modulation, pwm signal) is used for the that sensor. Interpretation for the PWM is the as to one for the analogue port (**Figure 66**)

For PWM input those sensors can be set:

«PWM occupation rate» – non-specified PWM sensor.
«Fuel level» – special filtration for the fuel level sensors.

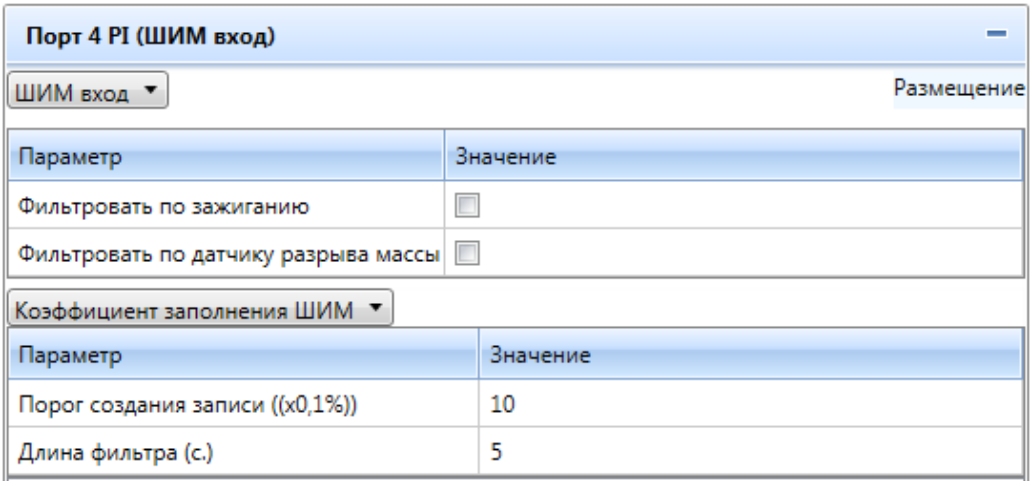


Figure 73. «PWM occupation rate» sensor settings

Sensor «**PWM occupation rate**» (**Figure 73**) has the following settings:
Write threshold (%) – threshold for the value change to create a new entry.

Filter length (s) – accumulation length (in seconds) to average the data.

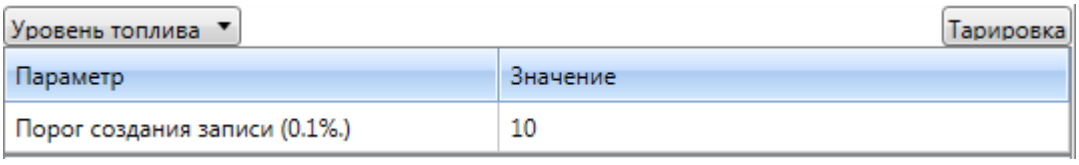


Figure 74. «Fuel sensor» parameters

«Fuel sensor» (**Figure 74**) has the only parameter:
Write threshold (0.1%) – change of the value that will create a new entry.

Setting the «Peak detector» for P0-P2 ports

Peak detector is used to connect the analogue sensors, which provide the pulse signals on the output.

Interpretation for the PWM are the same as on the analogue port (**Figure 66)**

On the «peak detector» the following sensors may be set:
«Voltage» – non-specified analogue-modulated signal sensor
«Fuel level» – special filtration for the fuel level sensors.

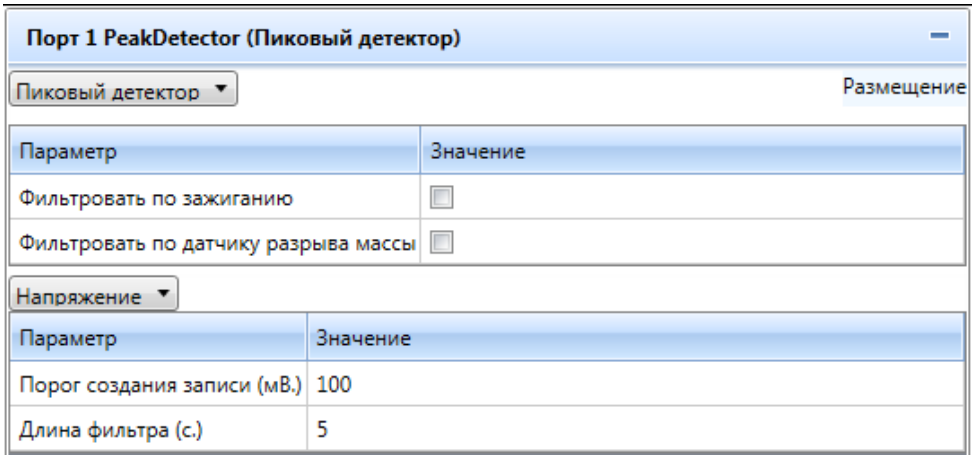


Figure 75. «Votage» peak detector settings

When using «Voltage» sensor (**Figure 75**) the following parameters are available:
Write threshold – threshold for the value change to create a new entry.

Recommended value – not less than 10 mV

Filter length (s) – accumulation length (in seconds) to average the data.

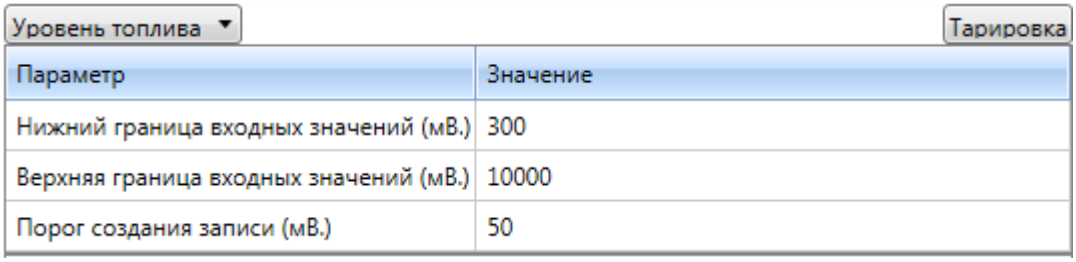


Figure 76. «Fuel level» peak detector

Using the «Fuel level» sensor (**Figure 76**) the following parameters are available:
Minimal value for the input – the minimal value of the voltage of the sensor.

Maximal value for the input – the maximal value of the voltage of the sensor.

If the voltage will be above or below the listed borders, then the terminal will not send data to the server.

New entry threshold – a new entry will only be written if the differences between current and previous values are greater than the threshold.

Recommended value for the Fuel level sensor – 1% of the working range

Differential flow meter on P2-P5 ports

«***Differential flow meter***» input is used to connect two and more paired outputs of the flow-meter

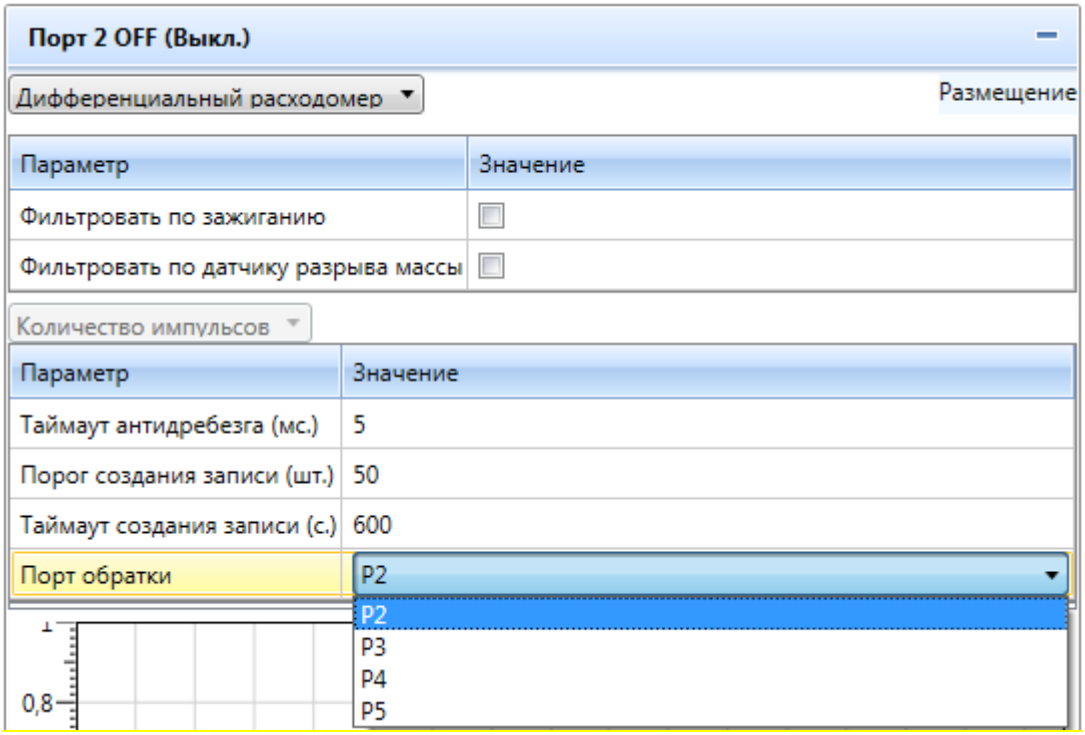


Figure 77. Differential Flow meter

1-Wire sensor setting on the P3 port

1-wire is used for sensors «Driver identification» and «Temperature».

1-Wire protocol used for sensors “Driver identification”, which provides the driver identification using the iButton reader (Dallas DS-1990A protocol) (reader mounting order is shown in scheme 9B).

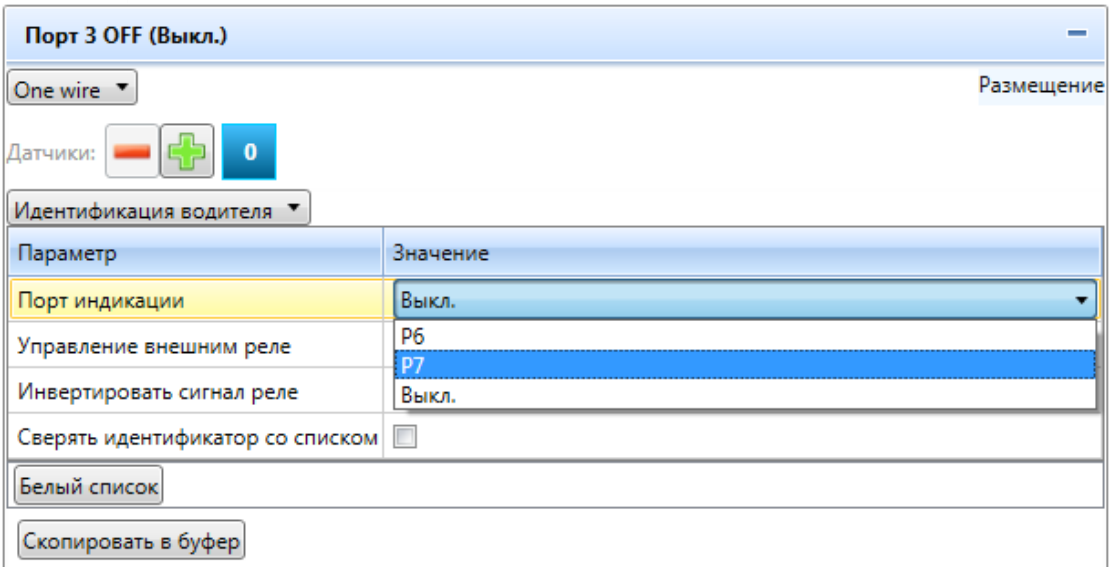


Figure 78. 1-Wire on the P3

The buzzer can be activated by setting the «indication port» in the 1-Wire settings (**Figure 78**). The buzzer is connected to the specified port.

Once the ignition is on, the buzzer generates a signal once every 10 seconds and the sensor signal: «Identification has not been made».

After the key has been attached, the buzzer stops the indication and the signal «Successful identification» and driver ID is sent.

If the key code was not recognized, then the sensor will send the “Identification has not been made” value and the buzzer indication will continue.

After the ignition is off, the sensor will send « Identification has not been made ». When the ignition is off, the buzzer will stop the indication.

Outside relay control – allows you to change the specified output state if successful identification has occurred.

Inverting signal – allows you to change the specified output state of the digital output if the identification was NOT successful.

Reconcile the driver ID – allows you to reconcile the identification with the white list, written in the terminal.

«White list» button – opens the white list dialogue (**Figure 79**), which provides the opportunity to administrate the white list.

«Copy to buffer» button – is used to save the buffer of the captured ID.

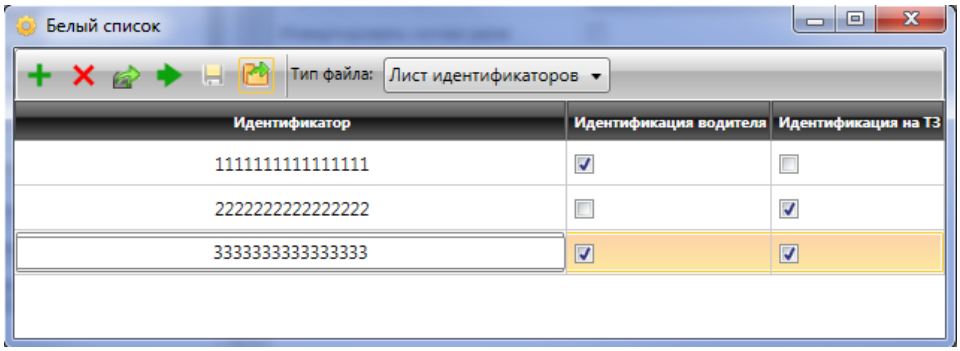


Figure 79. White list set up

«Temperature» sensor (**Figure 80**) allows you to read the data from the Dallas DS-18b20 and DS-1820 temperature sensors.

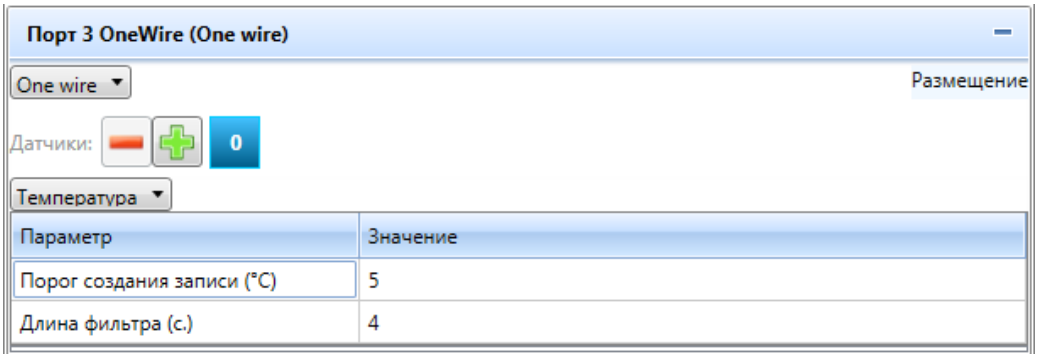


Figure 80

The following parameters for the sensor are can be used:

Write threshold – threshold for the value change to create a new entry.

Filter length (s) – accumulation length (in seconds) to average the data.

Digital outputs P6-P7 settings

Digital outputs of the tracker allow you to control the external slave devices. Output is activated on the SMS-command or command from the SCOUT-Configurator.

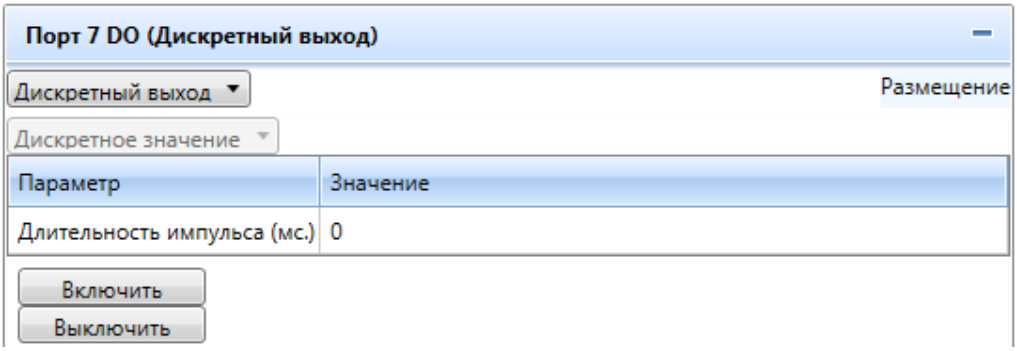


Figure 81. Digital output parameters

Using the «Digital value» the following parameters can be configured: (**Figure 81**):

ON – activates the output (after the command execution).

OFF – deactivates the output (after the command execution).

Pulse length – if specified, the output will be active for the specified time. If the value is «0» then the output will be activated on the next "ON" command.

Digital outputs can be set ***using the SMS-command*** `Setport` with the following parameters:

Example:

```
setport 6,1
```

Terminal response : `id(setport): OK`

Indication on P6-P7 ports

The tracker possesses a wide range of self-diagnostics instruments(including event log, debug journal, and state indication on the digital output).

For indication of the malfunction the external indicator can be connected on the output.

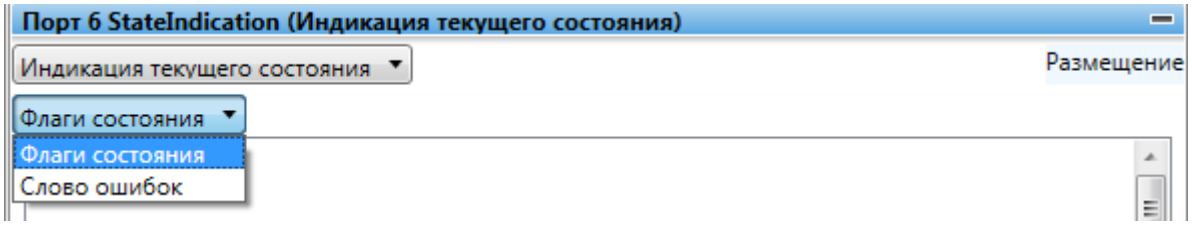


Figure 82. State indication

In order to achieve that «Current state indication» it should be configured on one of the P6, P7 ports (**Figure 82**). Two functions can be activated:

Sensors «Status Flag» and «error word» are send to the server.

If any error occurs, then the output is activated.

Port value send to server is a bitwise error word, which can be used to decoded, if needed.

Drive style on the P6-P7 ports

«Drive Style» sensors are used for speed controlling, sharp acceleration and high deceleration of the vehicle.

The tracker should be properly mounted to the vehicle's body. The linear calibration and horizon establishment should be conducted.

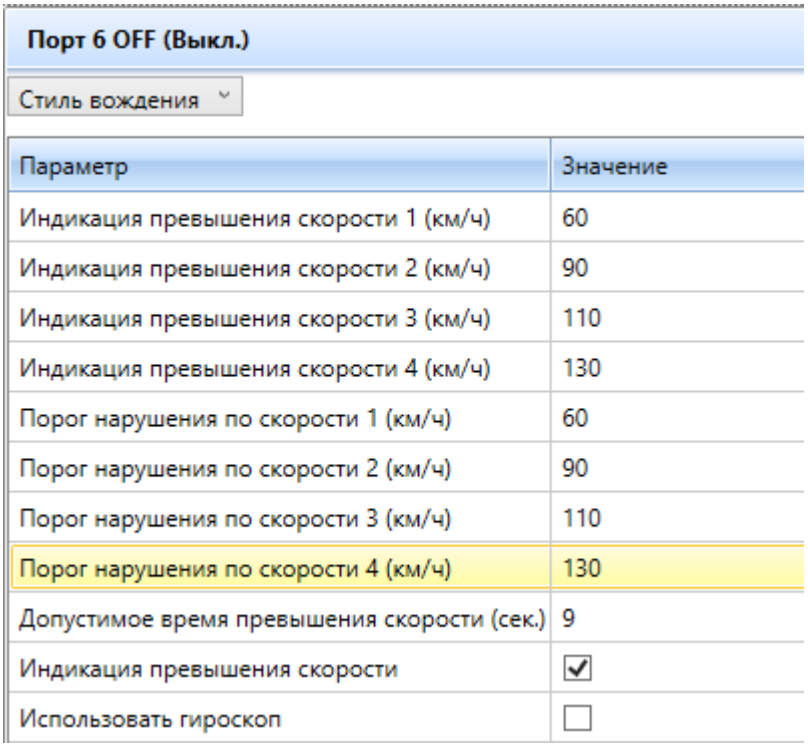


Figure 83. Drive style port

For the «Drive Style» sensor the following parameters can be specified:

Maximal permitted speed 1 (km/h) – the speed value, exceeding which will lead to a one long buzzer signal.

Maximal permitted speed 2 (km/h) – the speed value, exceeding which will lead to two long buzzer signals.

Maximal permitted speed 3 (km/h) – the speed value, exceeding which will lead to three long buzzer signals.

Maximal permitted speed 4 (km/h) – the speed value, exceeding which will lead to a buzzer signal that will not stop until the speed will be lower than the threshold.

Speed exceed threshold 1 (km/h) – a speed limit, which, when exceeded causes the timer to «Permitted speed exceed time». At the end of the timeout, the other entry will be created, containing the current speed. If the violation duration is more than «Permitted speed exceed time», then the other entry will be created, when the speed limit is below the threshold

Speed exceed threshold 2,3,4 (km/h)– see «Speed exceed threshold 1 (km/h)».

Permitted speed exceed time (sec) – time, used for the fixation of the speed limits violation.
Speeding indication – parameter, allowing buzzer indication on the speeding events.

Default parameters are: 60, 90, 120 and 130 km/h accordingly.

For the «Drive style» the following sensors can be set:

- «Acceleration/deceleration» (**Figure 84**),
- «lateral acceleration» (**Figure 85**),
- «Suspension bump » (**Figure 86**),
- «Body bump» (**Figure 87**).

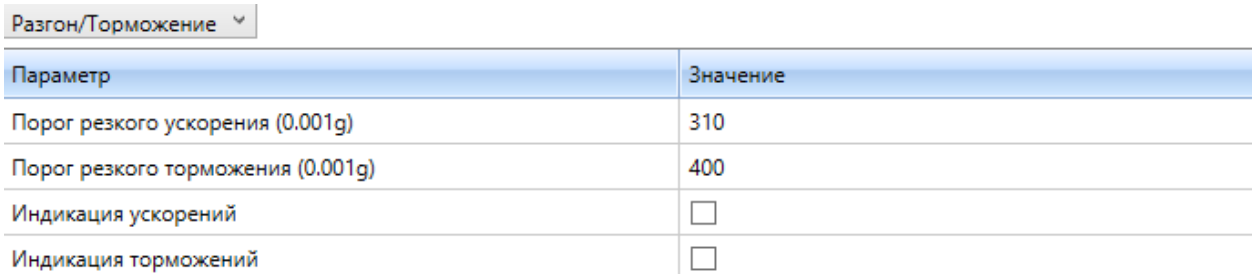


Figure 84. Acceleration/deceleration sensor

«Acceleration/deceleration» sensor has the following parameters:

Sharp acceleration threshold (0,001g) – acceleration threshold, exceeding which will generate 3 short buzzer signals

High deceleration (0,001g) – deceleration threshold, exceeding which will generate 3 short buzzer signals

Acceleration indication – allowing the checkbox will implement the indication on acceleration events.

Deceleration indication – allowing the checkbox will implement the indication on deceleration events.

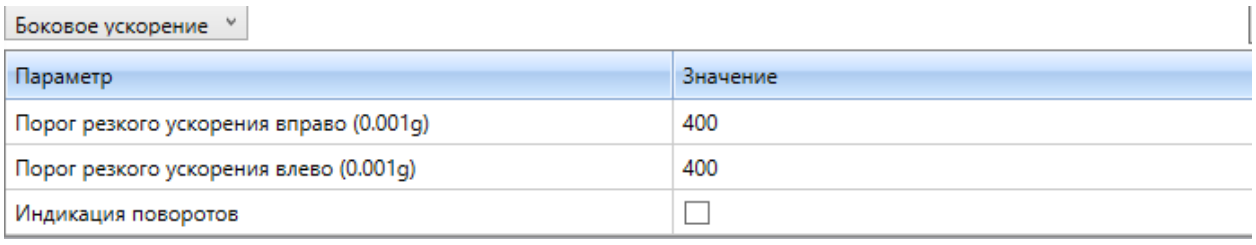


Figure 85. Lateral acceleration sensor

The «Lateral acceleration» sensor has the following parameters:

Rightward acceleration threshold (0,001g) – acceleration threshold, exceeding which will generate 5 short buzzer signals

Leftward acceleration threshold (0,001g) – acceleration threshold, exceeding which will generate 5 short buzzer signals

Turns indication – allowing checkbox will implement the indication on turns acceleration events

Удар по подвеске

Параметр	Значение
Порог вертикального ускорения, mg (0.001g)	400
Скорость нарастания ускорения, 0.1 mg / ms (0.1 mg/ms)	250
Индикация ударов по подвеске	☐

Figure 86. Suspension bump

The « **Suspension bump** » has the following parameters:

Vertical acceleration threshold, mg (0,001g) – acceleration threshold, exceeding which will generate 2 short buzzer signals.

Acceleration slew rate, 0,1 mg/ms (0,1mg/ms) – threshold exceeding length.

Suspension bump indication - allowing checkbox will implement the indication on turns acceleration events.

Удар по корпусу

Параметр	Значение
Порог амплитуды ускорения по оси X, mg (0.001g)	400
Порог амплитуды ускорения по оси Y, mg (0.001g)	400
Порог амплитуды ускорения по оси Z, mg (0.001g)	400
Скорость нарастания ускорения по оси X, 0.1 mg / ms (0.1 mg/ms)	250
Скорость нарастания ускорения по оси Y, 0.1 mg / ms (0.1 mg/ms)	250
Скорость нарастания ускорения по оси Z, 0.1 mg / ms (0.1 mg/ms)	250
Индикация ударов по корпусу	☐

Figure 87. Body bump

Acceleration threshold on the X axis, mg (0,001g) - exceeding the threshold on the X-axis will generate 2 short buzzer signals.

Acceleration threshold on the Y axis, mg (0,001g) - exceeding the threshold on the Y-axis will generate 2 short buzzer signals.

Acceleration threshold on the Z axis, mg (0,001g) - exceeding the threshold on the Z-axis will generate 2 short buzzer signals.

Acceleration slew rate on the X axis, 0.1 mg/ms (0.1 mg/ms) – threshold exceeding length (X axis). **Acceleration slew rate on the Y axis, 0.1 mg/ms (0.1 mg/ms) –** threshold exceeding length (Y

axis). **Acceleration slew rate on the Z axis, 0.1 mg/ms (0.1 mg/ms) –** threshold exceeding length(Z axis).

Exceeding any threshold will cause data to be send to the server. The exceedance events can be seen in the SCOUT-Studio

Drive Style on the P6-P7 ports ***can be also configured through*** `SetDriveStyle` with the following parameters:

`port, spd1, spd2, spd3, spd4, Accel, Brake`

Where:

`port` – port name

`spd1, spd2, spd3, spd4` – maximal permitted limits 1, 2, 3, 4

`Accel` – acceleration threshold

`Brake` - deceleration threshold

Request example: `SetDrivestyle 4,60,90,120,135,250,300`

Response: `Id(setdrivestyle): Ok`

Ports P6-P7 current settings can be obtained using the **SMS-command:** `GetDriveStyle`

Request example: `GetDrivestyle 7`

Response:

`Id(getdrivestyle): P7: DriveStyle: 60,90,110,120,250,300`

Where `id` – terminal ID

`spd1, spd2, spd3, spd4` – maximal permitted speed limits 1, 2, 3, 4

`Accel` - acceleration threshold

`Brake` - deceleration threshold

Engine lock function for the P6-P7 ports

The following mode is used for safe engine block in the event of vehicle theft (**Figure 88**).

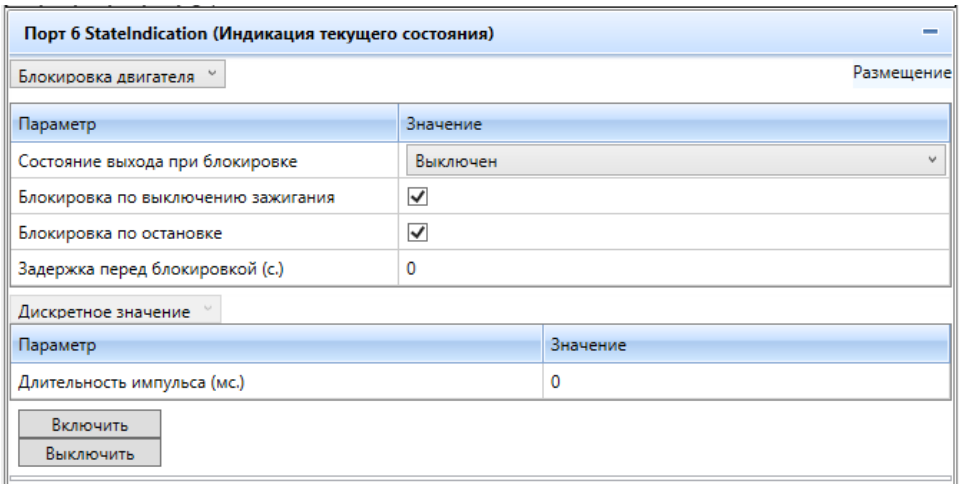


Figure 88. “Engine block” sensor

The sensor has the following parameters:

Output blocking state – terminal output state after the blocking command. High level corresponds to a «ON».state, low level – «OFF».

Engine block on ignition off – activating the block on the disabled ignition.

Parking block– output activation on parking.

Block timeout (s) – time delay before activating the output after the blocking message acquisition.

Engine block length (ms) – If specified, the output will be activated for the stated time. If the value=0, output will be activated on the blocking command acquisition.

ON – activates the output (after execution by the terminal).

OFF- deactivates the output (after execution by the terminal).

Engine can be blocked using the SMS-command Setport with the following parameters

Command example:

```
setport 6,1
```

Response:

```
id(setport): OK.
```

Port status request for the P0-P7 ports

Port status can be requested using the SMS-command `getport`, the parameter – is the port number.

Example:

```
getport 0
```

Response:

```
Id(getport): P0: PeakDetector=0
```

RS-485 port settings

RS-485 (ScoutNet) is used for local configuration of the tracker and external sensors connection. Up to 8 sensors can be connected

In the MT-700 PRO 285/ MT-700 PRO RS-485 interface supports LLS, ScoutNet, J1708, RFID, NMEA protocols.

In the MT-700 ENT RS-485_1 interface supports ScoutNET protocol, RS-485_2 interface supports LLS, J1708, RFID protocols.

In the MT-700 Lite RS-485 interface supports ScoutNET protocol.

In the MT-700 STD RS-485 interface supports LLS and ScoutNet protocols.

Protocols are not compatible. For the ENT version the ScoutNet protocol is supported on the RS-485_1 and every other protocol can be used for the RS-485_2.

Data can be retransmitted to the server.

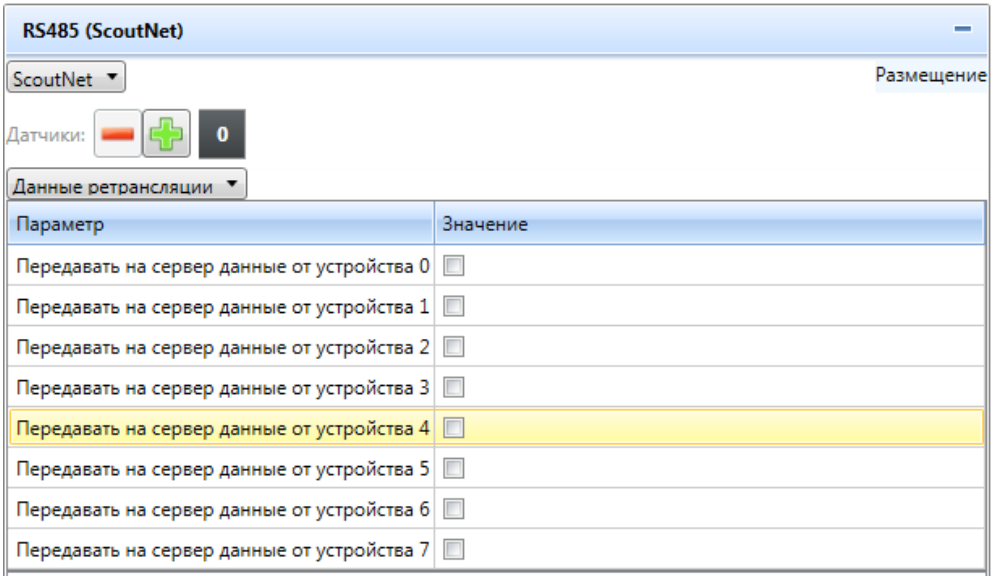


Figure 89. Data retransmission

In the **Data Retransmission** settings (**Figure 89**) the device's net number, which data will retransmit, can be specified.

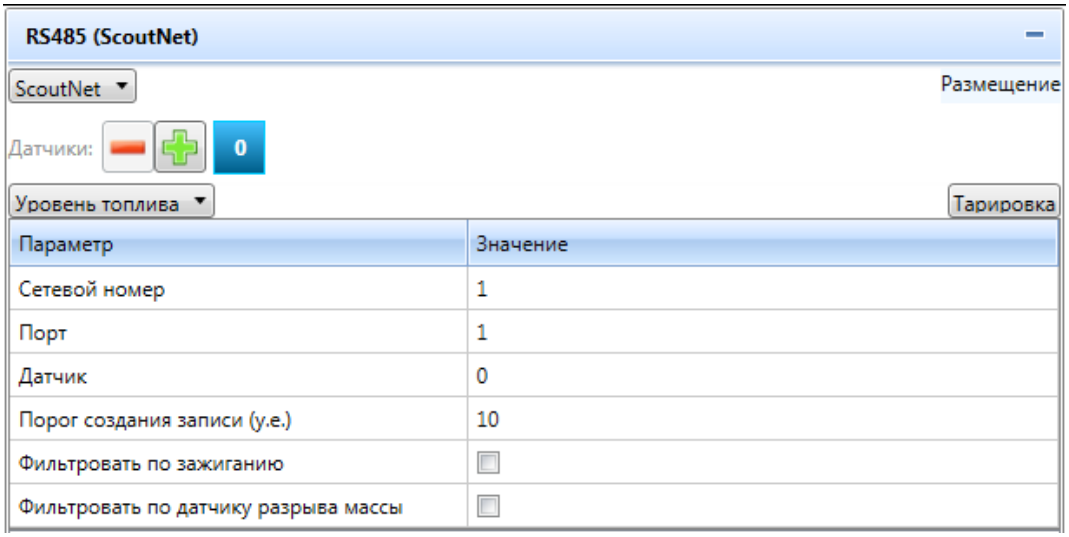


Figure 90. Fuel Level sensor

«Fuel Level» sensor (**Figure 90**) has the following parameters:

Net number – sensor net number in ScoutNet (0 o 7).

Port – PetrolX port number (default number = 1), or extension board net number (if Fuel level sensor is using the RS485/RS232 port number – 9).

Sensor – sensor number, which contains the needed "Fuel sensor" data

Write threshold – threshold for the value change to create a new entry.

Recommended value – 0,3% of the working range.

Ignition filtering– if the parameter is on, all the changes of the sensor is not counted until the ignition is "ON"

Battery disconnect switch – if the parameter is on, all the changes of the sensor is not counted until the battery disconnect switch is off.

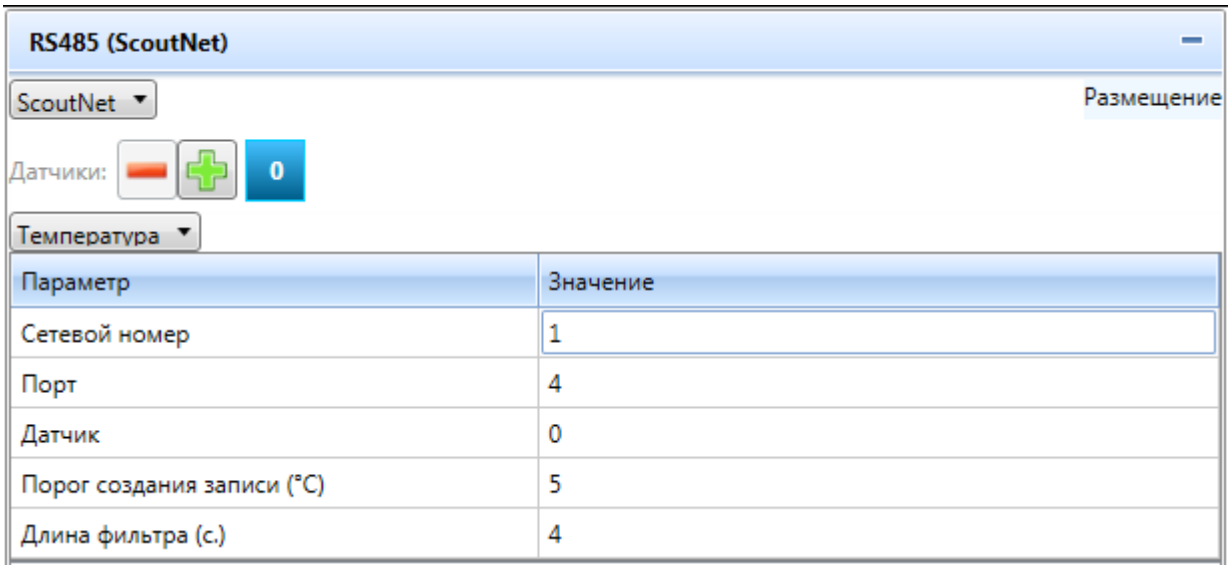


Figure 91. temperature sensor

«Temperature» sensor (**Figure 91**) has the following parameters:

Net number – sensor net number in ScoutNet (0 o 7).

Port – PetrolX port number (default number = 4), or extension board net number (if Fuel level sensor is using the RS485/RS232 port number – 9).

Sensor – sensor number, which contains the needed “Temperature” data.

Write threshold – threshold for the value change to create a new entry.

Filter length – time(s), for averaging the values

«Refueller Identification» sensor (**Figure 92**) provides the driver identification using the RFID-reader SCOUT-DriverID.

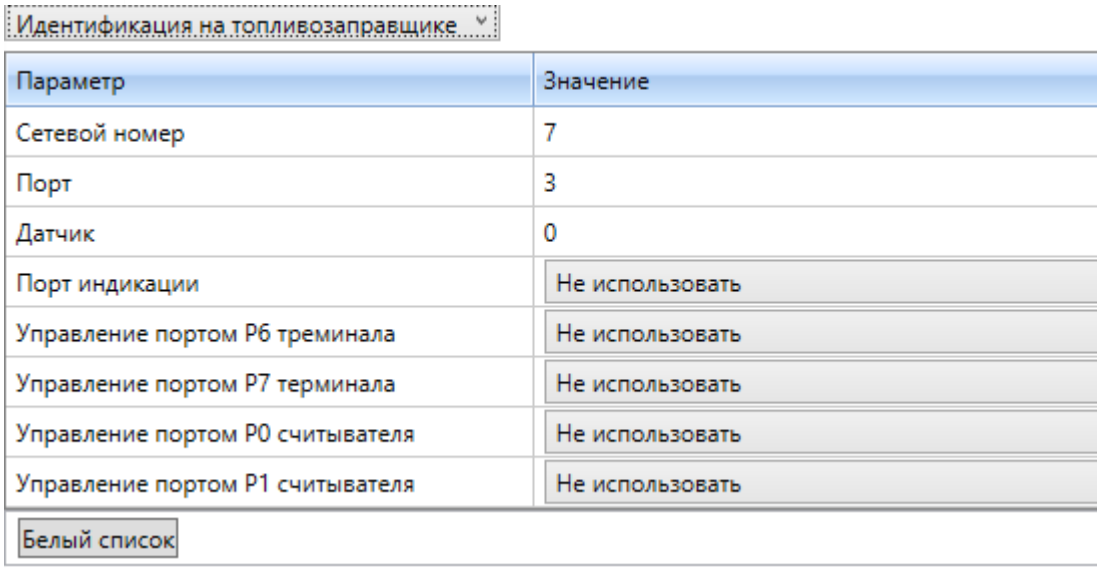


Figure 92. Refueller Identification sensor

The sensor has the following parameters:

Net number – sensor net number in ScoutNet (0 o 7).

Indication port – port, used for the sound indication.

P6 control – on successful identification the P6 is used for fuel shipment.

P7 control – on successful identification the P7 is used for fuel shipment.

P0(Driver ID) control– on successful identification the internal P0 of the device is used for fuel shipment.

P1(Driver ID) control – on successful identification the internal device P1 of the device is used for fuel shipment.

«White list» button– dialogue window for setting the white list (**Figure 94**).

«Driver identification» (**Figure 93**) provides the driver identification using the SCOUT-DriverID.

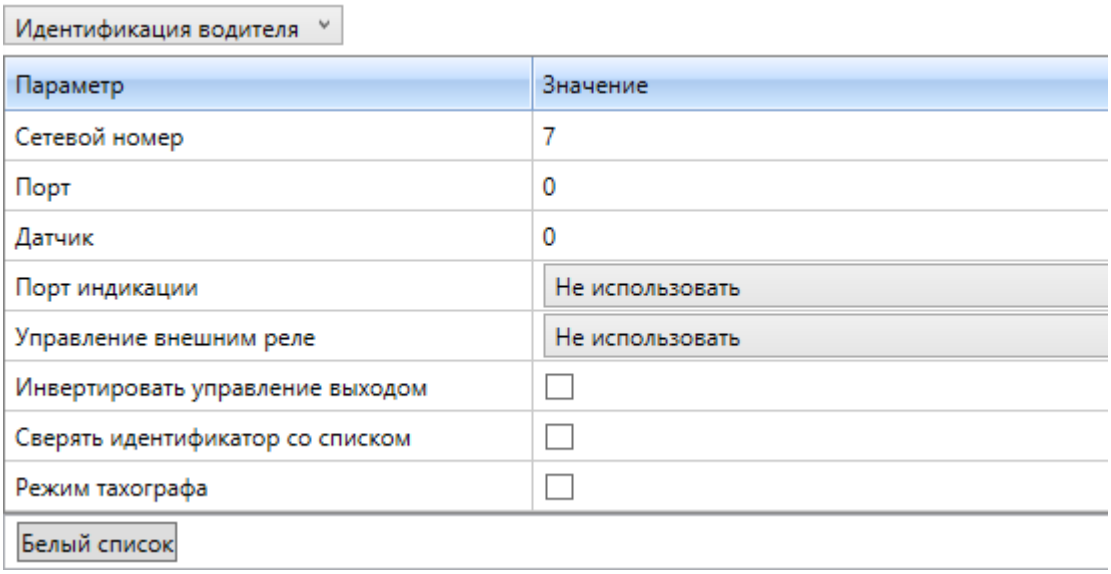


Figure 93. Driver identification sensor

Net number – net number in ScoutNet (0 o 7).

Outside relay control – allows you to change the specified output state if the identification was successful.

Inverting signal – allows you to change the specified output state of the digital output in case identification was NOT successful.

Reconcile the driver ID – allows you to reconcile the identification with the white list, as written in the terminal.

«White list» button – opens the white list dialogue (Figure 79), which provides the opportunity to administrate the white list.

«Copy to buffer» button – is used to save the buffer of the captured ID.

Tachograph mode – using that mode, output control, ignition state control and indication are not performed.

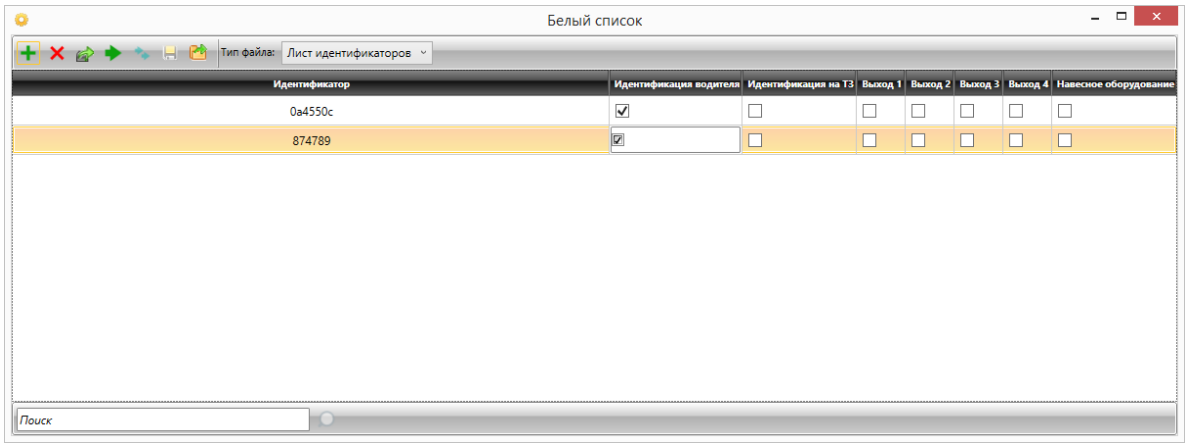


Figure 94. «White list» window

«Engine speed», «Distance travelled», «Passing beam», «High beam», «Seat belt» and «Vehicle speed» can be obtained using the ScoutCAN. Those sensors have the following settings:

Net number– net number in ScoutNet (0 o 7).

Port – port number for the sensor**.**

Sensor – sensor number, providing the needed data.

Settings for the sensors are typical and can be set the same as the other sensors, as mentioned in the manual.

«Mechanism position» and «Mechanism movement» sensors are used to set the data obtained from the (Mechanism position sensor), to gather data. The settings are analogue to the «Seat belt» settings,.

For the J1708 protocol the following sensors are created: «Fuel sensor», «Fuel consumption» and «Engine speed».

For «Fuel level» there is only one parameter – **write threshold** - threshold for the changed value to create a new entry.

Default value – 10 uu.

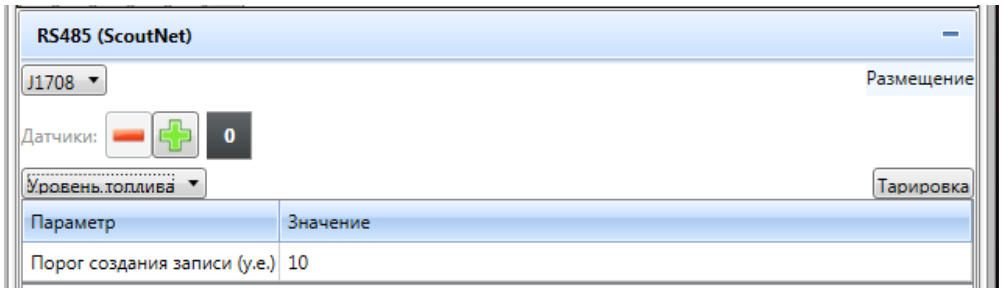


Figure 95. Fuel level

For the «Fuel consumption» only one parameter – **write threshold (ml)**.

Default value – 200 ml.

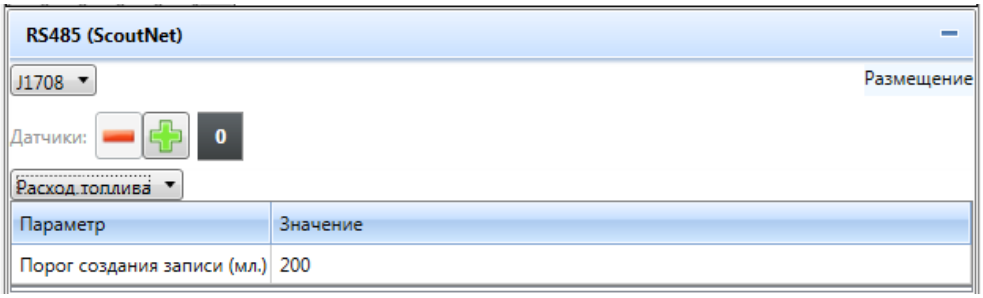


Figure 96. Расход топлива

«Engine speed» is in the (**Figure 97**).

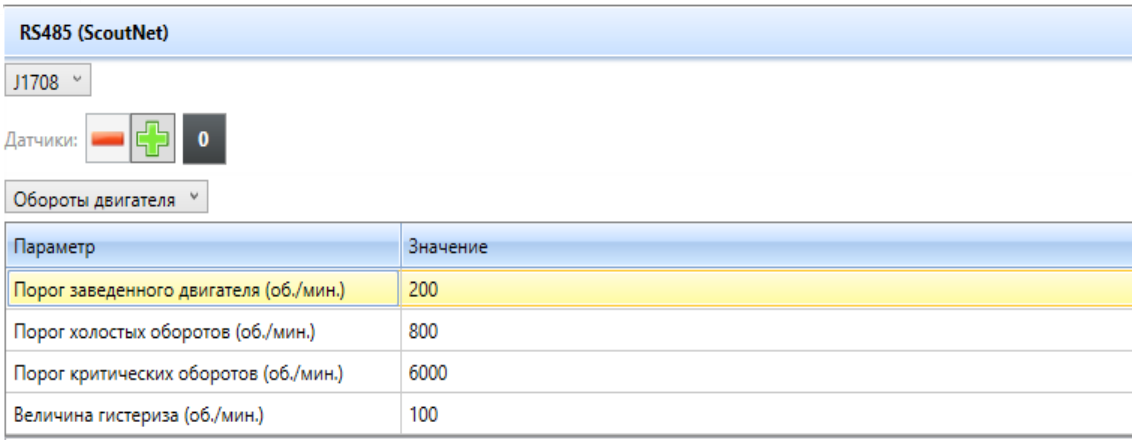


Figure 97. Engine speed

For the «Engine speed» sensor the following parameters can be set:

Running engine threshold (RPM) – minimal RPM for the motor to be considered running.
Default value – 200 RPM

Idle speed threshold (RPM) – minimal RPM that corresponds to a running engine (not in idle mode).
Default value – 800 RPM

Critical RPM – minimal RPM, considered dangerous on the long run.
Default value – 6000 RPM

Hysteresis (RPM) – the hysteresis value for the RPM.
Default value – 100 RPM

ⓘ Using the «Engine speed» sensor, a new entry will only be created if one of the parameters exceeds the threshold. That provides the engine control while saving the internet traffic.

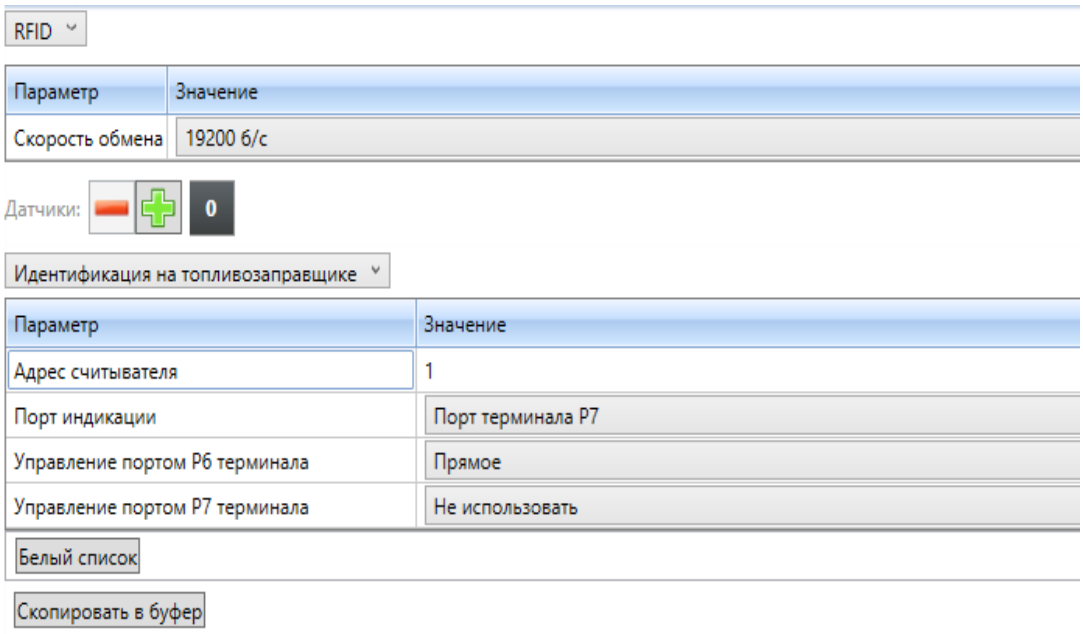


Figure 98.

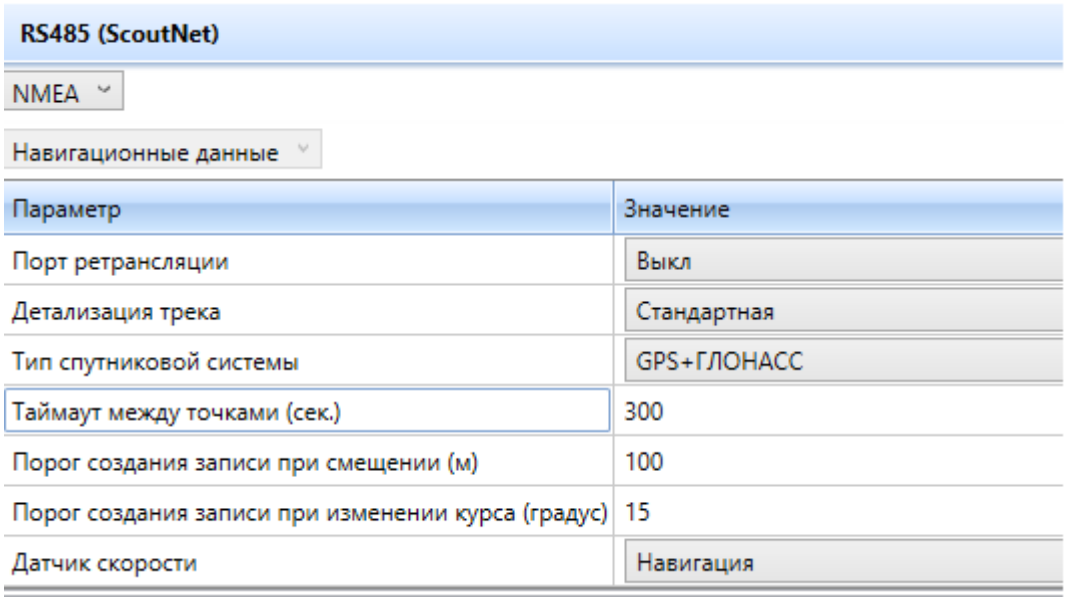


Figure 99. Navigation

NMEA input has the following parameters:

Minimal– city-to city carriage with the minimum time spent in urban areas. Used for location tracking, with no mileage counting.

Standard **–** any auto transportation.

***Detailed* –** for auto transportation in the event of tight urban development and special equipment.

***Special equipment*–** for special equipment or if the highly detailed track is needed

***Manual setting* is giving the opportunity for a manual setting of parameters:**

Timeout between measurements (in seconds) – timeout between forced saving of the measurements.

Course changing threshold – new log entry generated only on the course change more than.. degrees

Satellite system type (Figure 49) – GPS, GNSS, or combined.

CAN interface settings

MT-700 PRO, MT-700 PRO 285, MT-700 ENT support CAN interface with the following protocols: J1939, OBD and Mobileye.

The main **J1939** protocol setting CAN-bus speed.

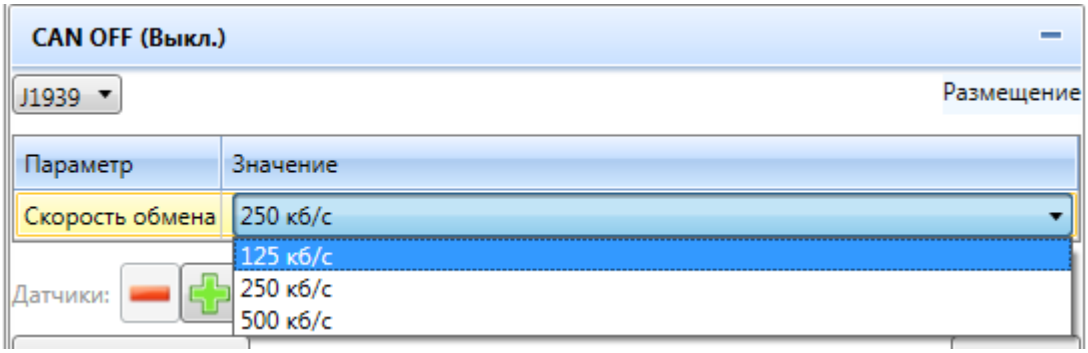


Figure 100.

For the J1939 protocol the following sensors are available: «Fuel level», «Fuel consumption», «Engine speed», «Machine hours (overall) », «Axle load», «Trailer mass», «Cargo weight» and «Distance travelled».

The settings are analogues to the ones stated in the J1708 settings.

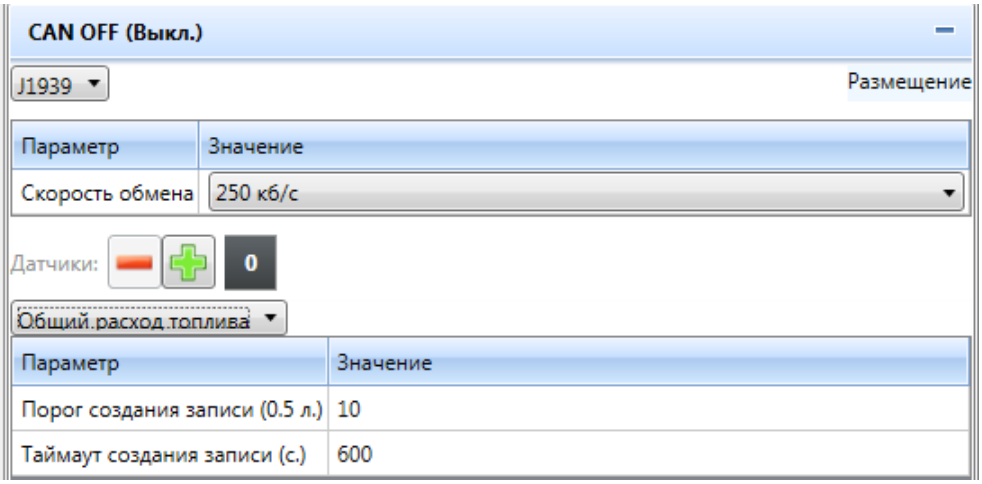


Figure 101.

For the «Fuel consumption» the following parameters are available:

Write threshold (l) – threshold for the voltage change to create a new entry.

Default setting – 10*0,5 l.

Entry timeout length, s – default – 600s.

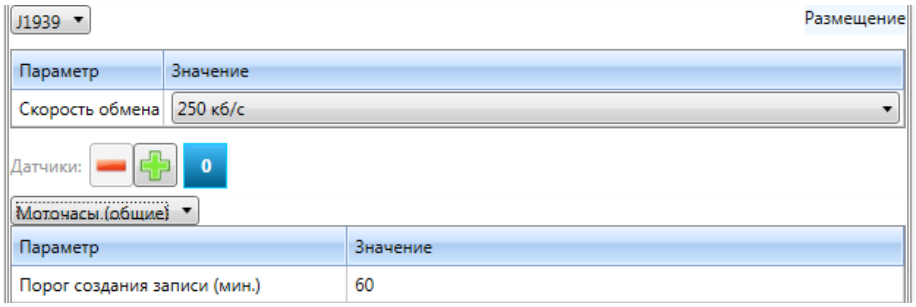


Figure 102. Machine hours (overall)

For the «**Machine hours** (overall)» only one parameter **write threshold (min)**. Default – 60 min.

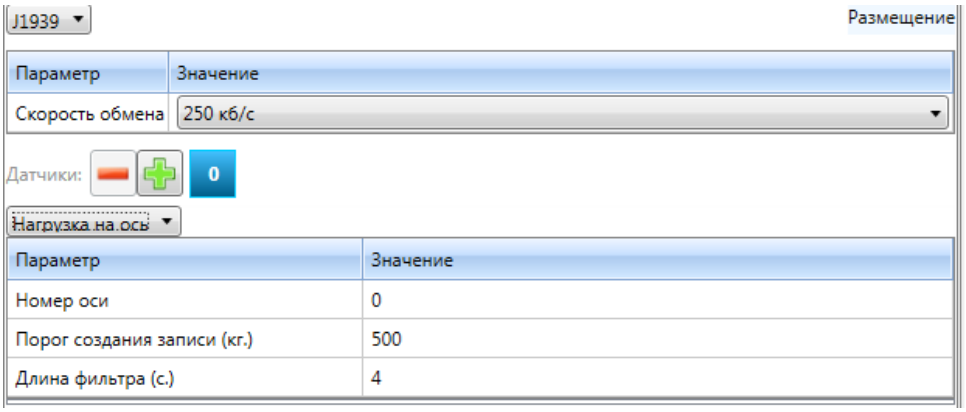


Figure 103. Axle load

«Axle load» has the following parameters:

Axle number - 0 – frontal axis.

Write threshold (kg)– threshold for the change in mass required to create a new entry.

Entry timeout length, s

Default setting – 4s.

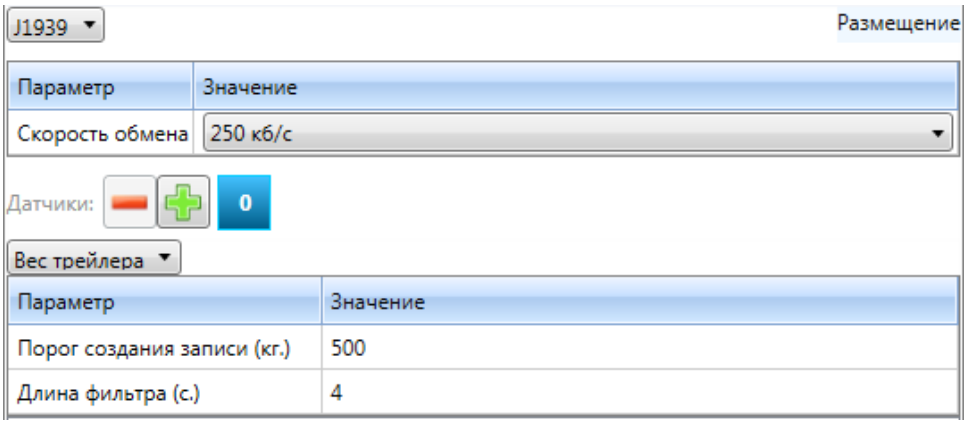


Figure 104.

For the «Trailer mass» and «Cargo weight» the following parameters are available:

Write threshold (kg)– threshold for the change in mass required to create a new entry.

Entry timeout length, s. Default – 4s

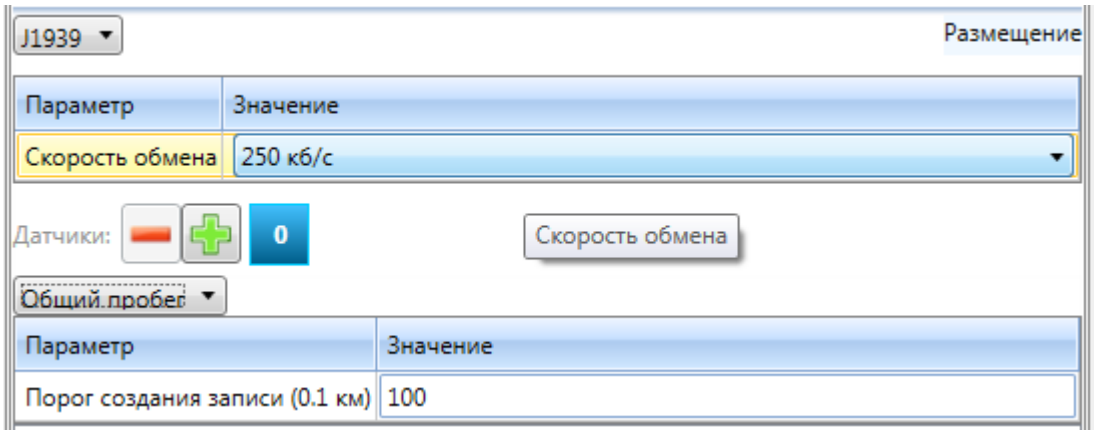


Figure 105. Параметры датчика Общий пробег

For the «Distance travelled» only one parameter can be changed **write threshold**
Default – 100*0,1 km

Mobileye protocol settings

Mobileye is the protocol for the traffic accident preventing:

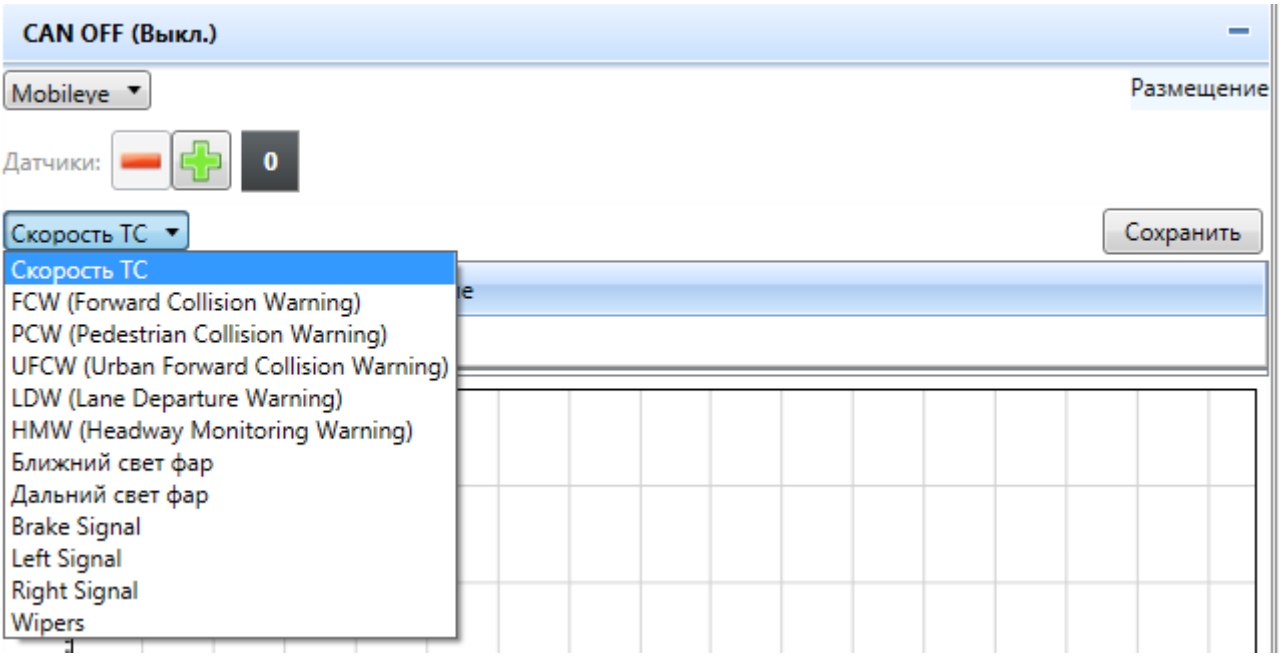


Figure 106. Mobileye protocol parameters

Mobileye (**Figure 106**) supports the following data with no settings :

- **Vehicle speed**
- **FCW (forward collision warning)**
- **PCW (pedestrian collision warning)**
- **UFCW (urban forward collision warning)**
- **LDW (lane departure warning)**
- **HMW (headway monitor warning)**
- **Passing beam**
- **High beam**
- **Brake signal**
- **Left signal**
- **Right signal**
- **Wipers**

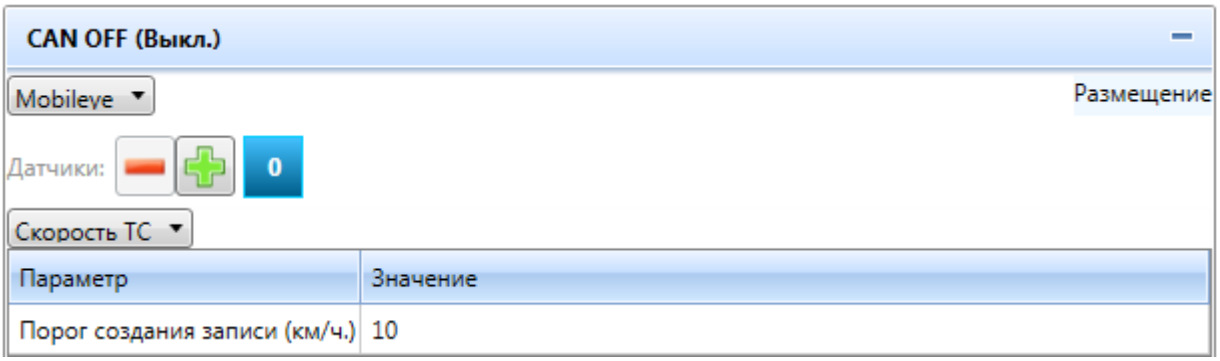


Figure 107. Vehicle speed sensor

For the **"Vehicle speed"** (**Figure 107**) only one parameter is available:

Write threshold (kmph) *– threshold for the change in velocity required to create a new entry.*

OBD protocol settings

OBD protocol is used for obtaining information through the vehicle CAN-bus.

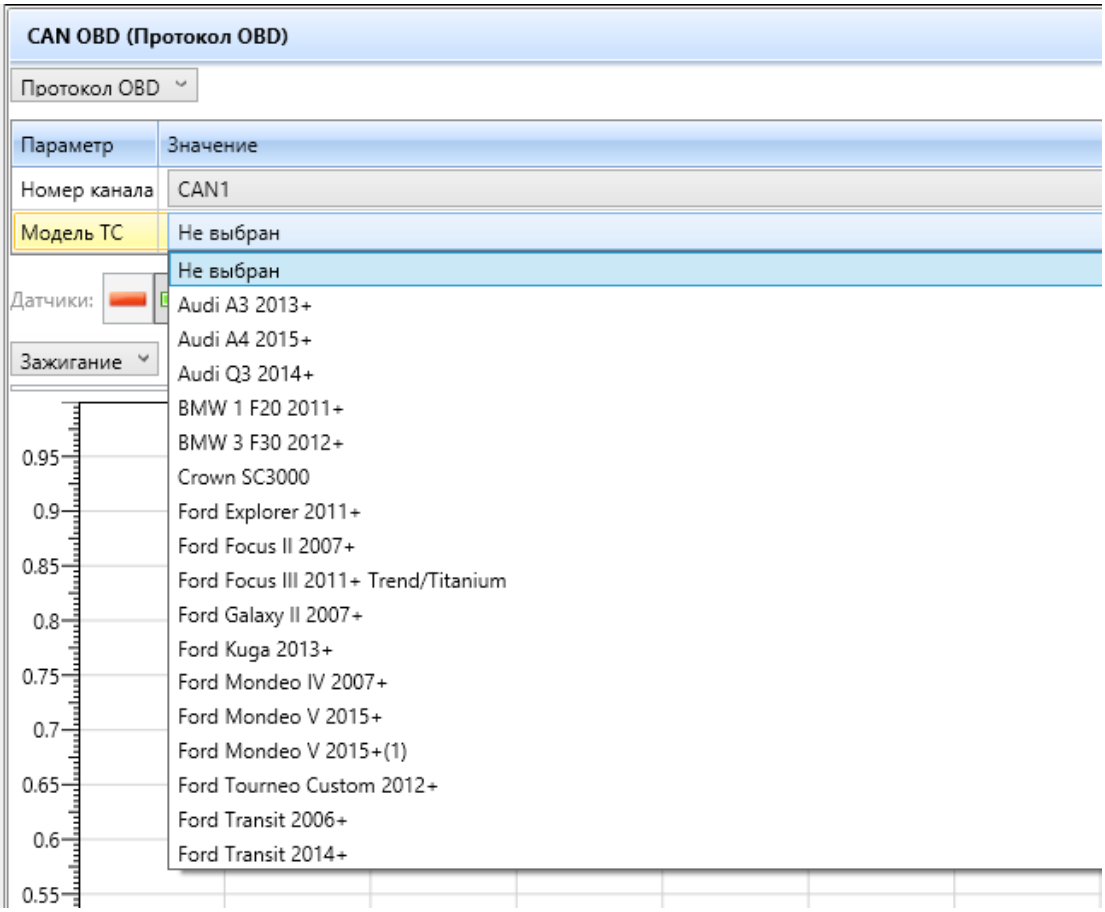


Figure 108

The OBD protocol has the following parameters:

Channel number – should correspond the required CAN-bus (data in the busses defers in drastic way).

Vehicle model – selection from the dropdown list of the supported vehicles.

OBD protocol supports the following sensors: Ignition, , , , , , , , Check Engine.

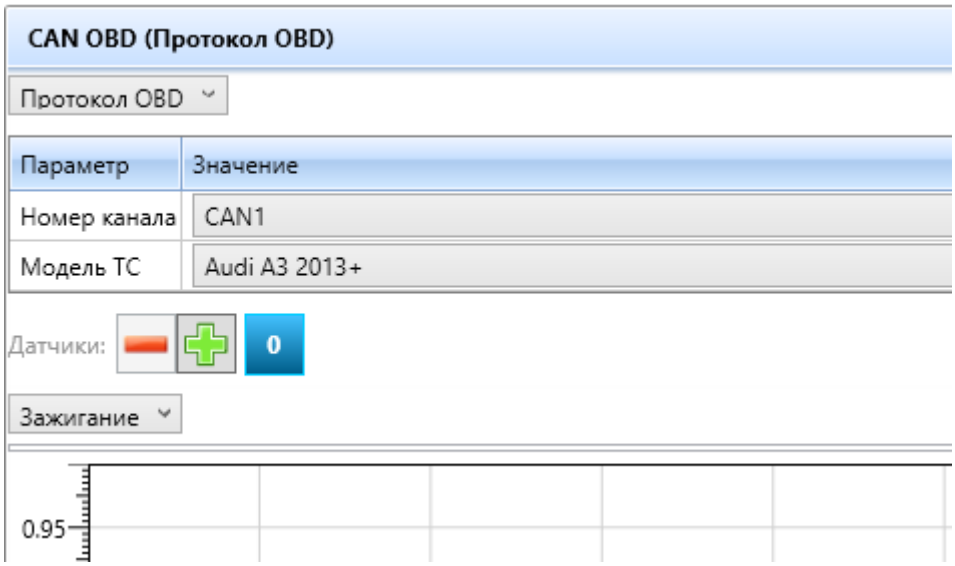
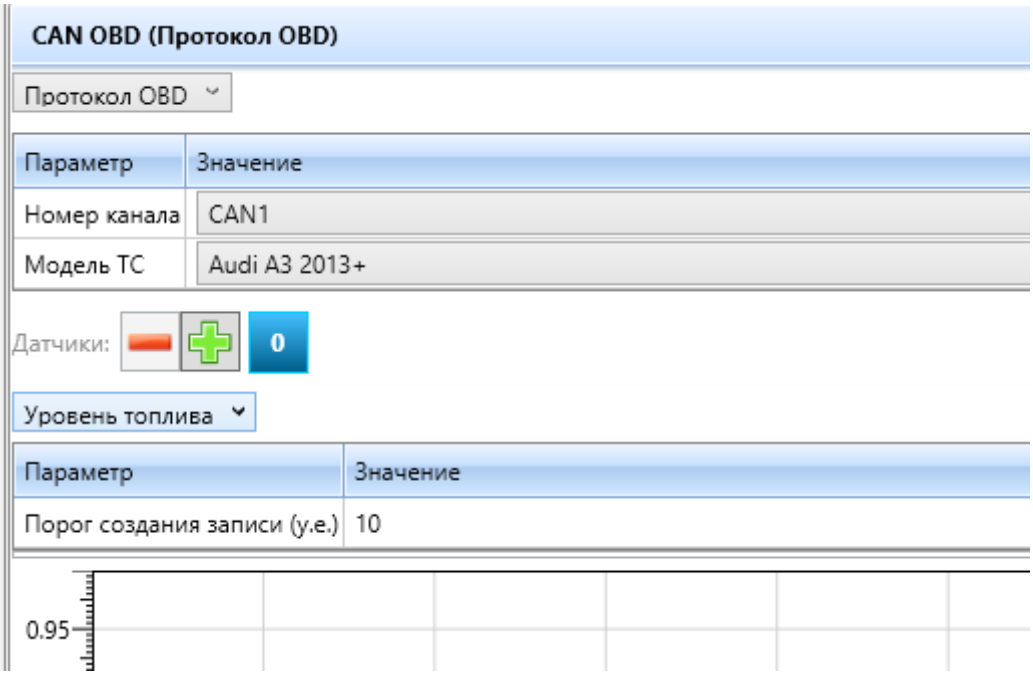


Figure 109

Fuel level



Write threshold (unified units) *– threshold for the value(in uu)change to create a new entry.*

Engine speed

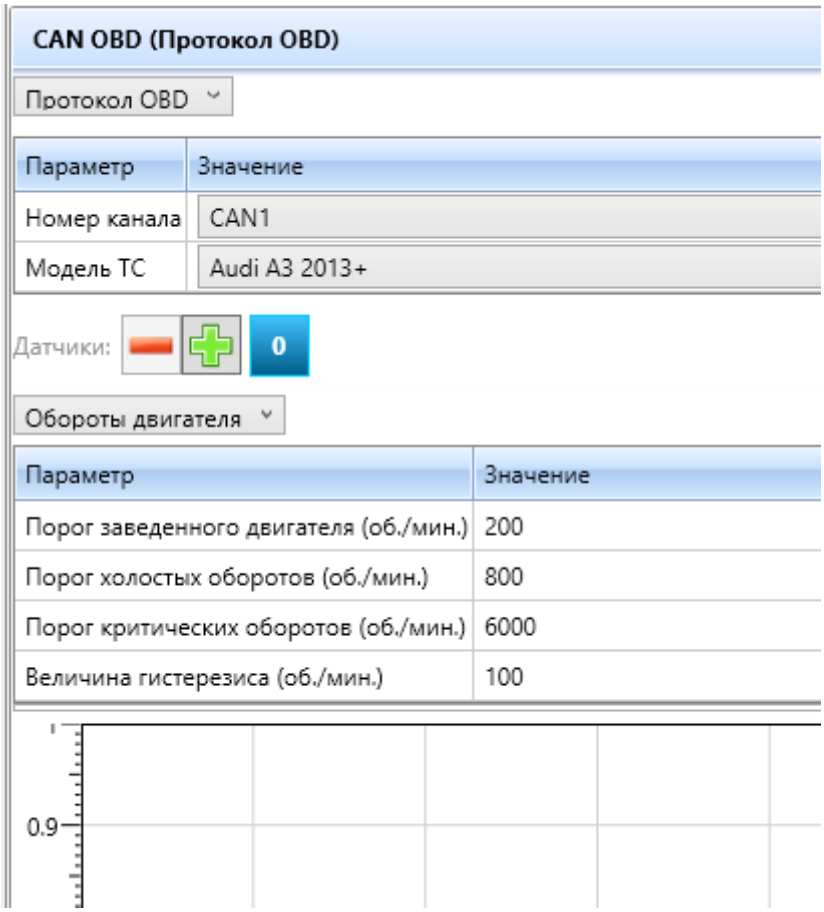


Figure 110

The following parameters are available for the sensor:

Running engine threshold (RPM) – minimal RPM for the motor to be considered running.

Idle speed threshold (RPM) – minimal RPM that corresponds to a running engine (not in idle mode).

Critical RPM – minimal RPM, considered dangerous on the long run.

Hysteresis (RPM) – the hysteresis value for the RPM.

Temperature

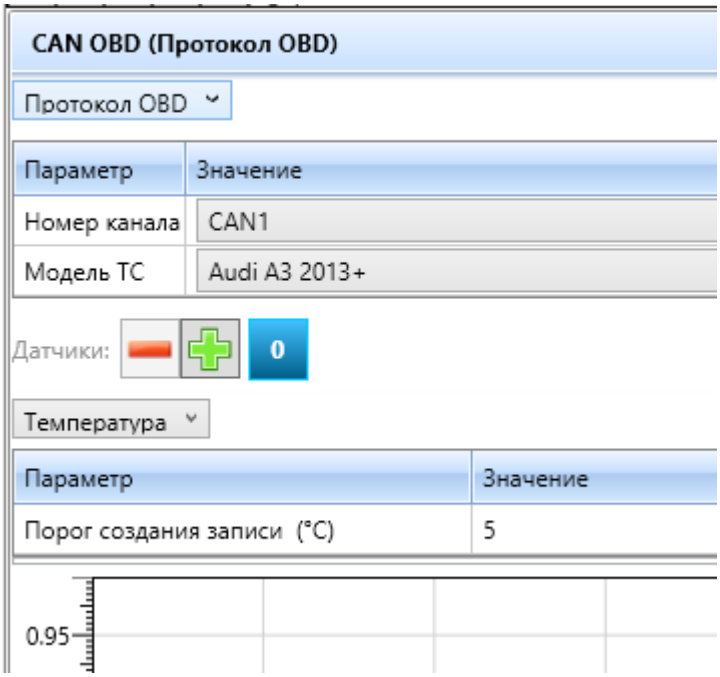


Figure 111

The following parameters are available:

Write threshold (C) – *threshold for the value (in C)change to create a new entry.*

Total distance

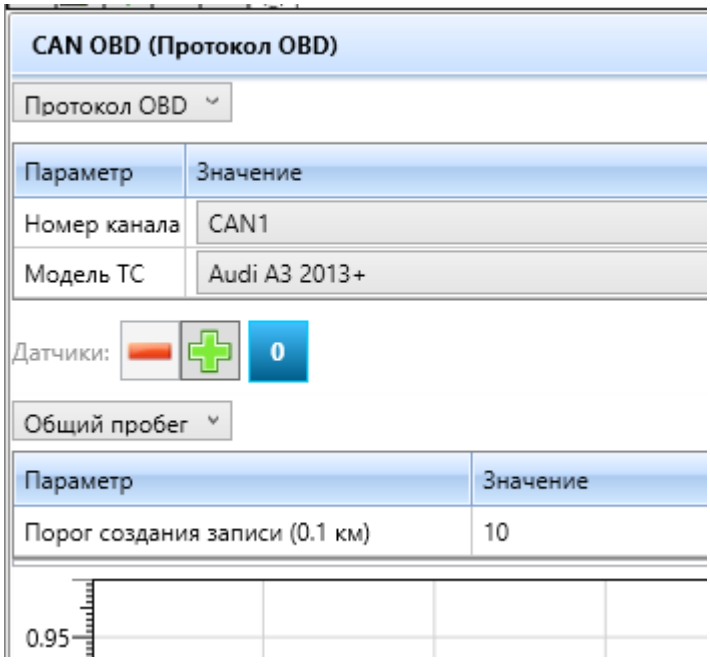


Figure 112. *Total distance*

The following parameters are available:

Write threshold (100m) – *threshold for the value (in m)change to create a new entry.*

Passing beam **–** no parameters can be configured (**Figure 113**).

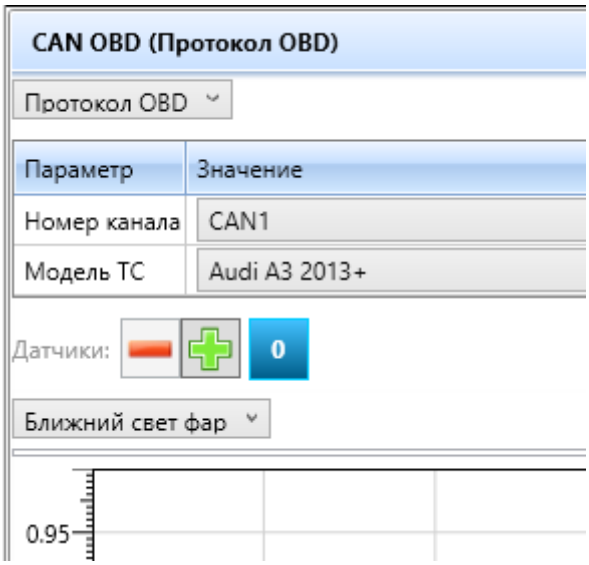


Figure 113. Pasing beam

High beam **–** no parameters can be configured (**Figure 114**).

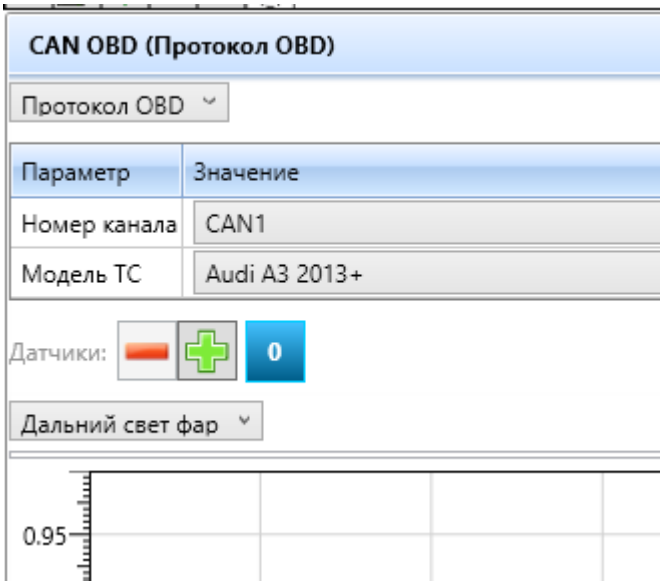


Figure 114. *High beam*

Seat belt **–** no parameters can be configured (**Figure 115**)

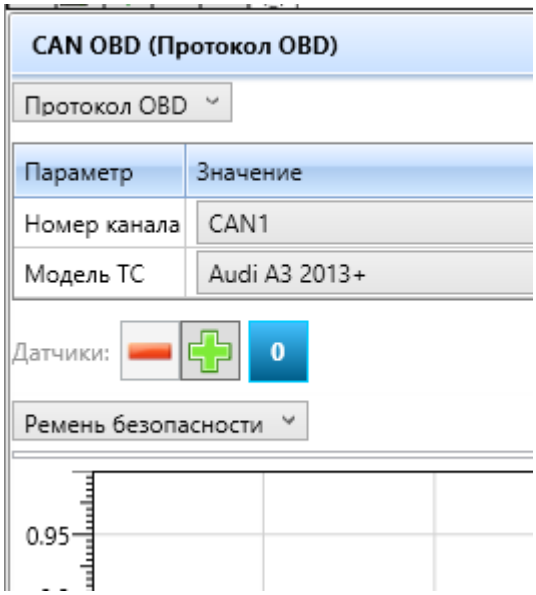


Figure 115. Seat belt

Vehicle speed **–**one parameter can be configured (**Figure 116**)

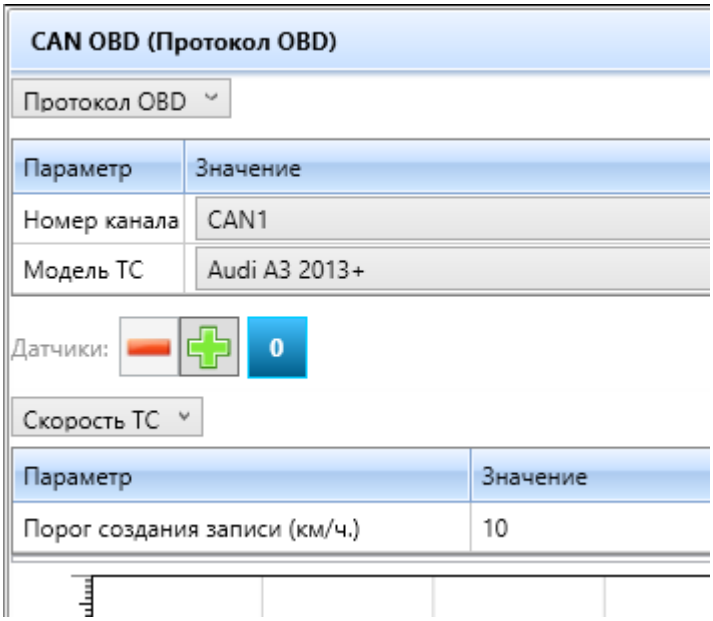


Figure 116. Vehicle speed

Write threshold (kmph) – *threshold for the value (in mpph) change required to create a new entry.*

Check Engine **–** no parameters can be configured (**Figure 117**).

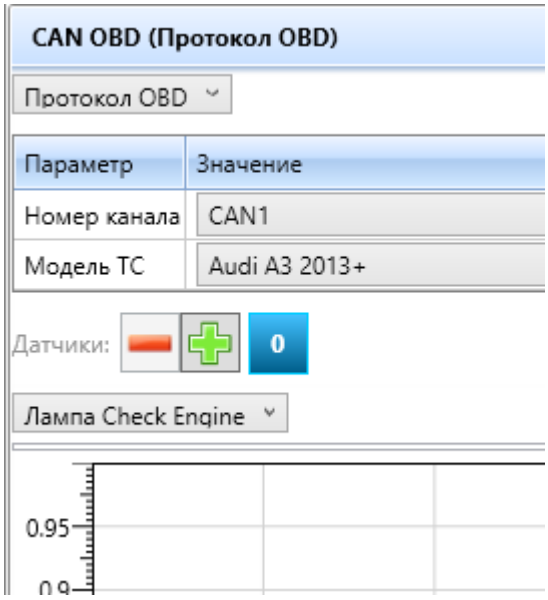


Figure 117. Check Engine

RS-232 settings

LLS fuel level sensors settings will be discussed in the following chapter.

Can-log settings

MT-700 PRO, MT-700 PRO 285 support on the RS232 universal CAN-LOG M444 connection.

CAN-bus controller CAN-LOG M444 (CAN-LOG P145) is intended to control the technical parameters of the vehicles, equipped with CAN-bus and sending data through the RS232.

The module is connected to the vehicle CAN-bus.

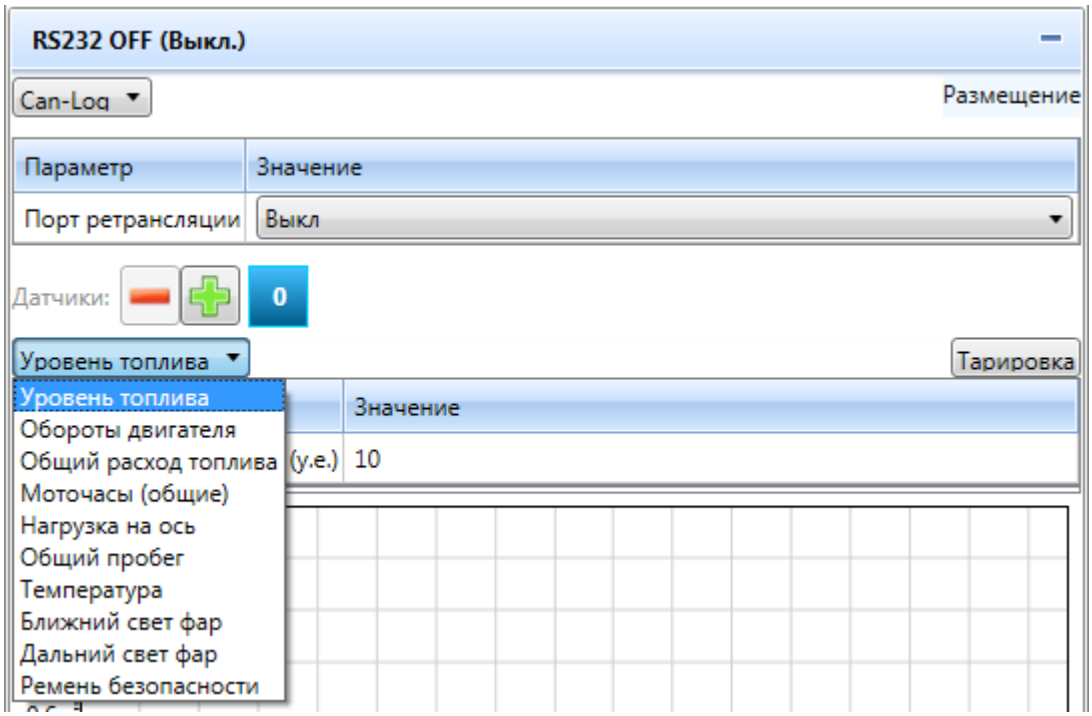


Figure 118. CAN-LOG port parameters

CAN-LOG has the only sensor – «Retransmission port» :

By adding sensors, you can add more supported sensors to poll.

VDO Tachograph settings:

Tachograph VDO is used for receiving data from the VDO DTCO 3283.

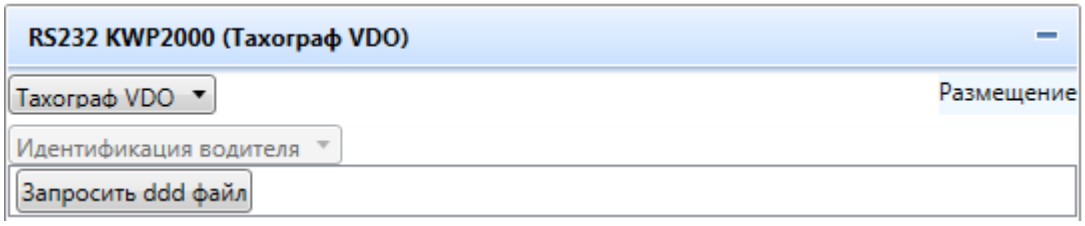


Figure 119. VDO Tachograph settings

Only supported sensor – Driver identification

«ddd-file request» button allow you to receive the constructed records.

To check the tachograph you can use *CheckVDO* SMS-command.

❸ *LLS digital level sensors set up*

RS-485 supports up to 16 digital fuel level sensors.

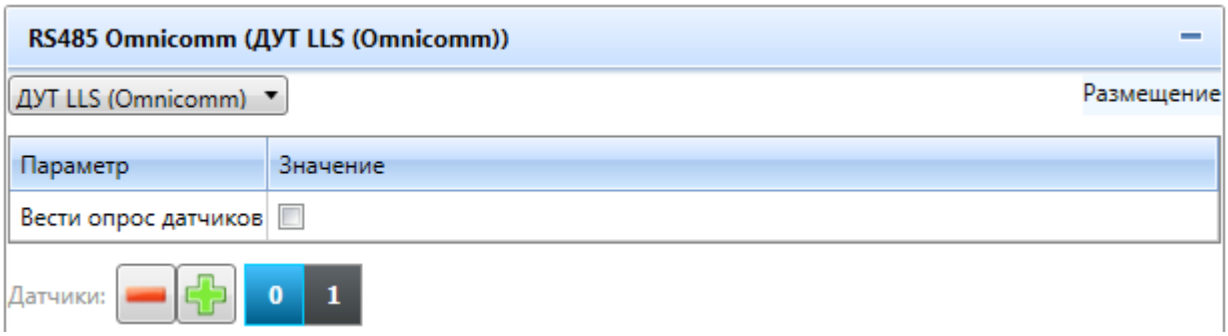


Figure 120. « LLS Fuel Level Sensor»

Common parameters of the «LLS Fuel level sensor» (**Figure 120**) are:

Conduct sensor poll – sensor poll type. If the checkbox is on, the sensors are being polled by the master (terminal).

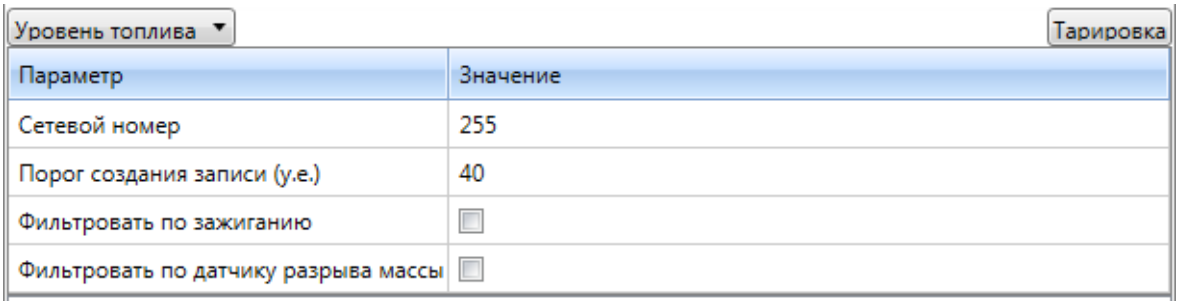


Figure 121. «Fuel level» LLS sensor

For the «Fuel level» (**Figure 121**) the following parameters are available:

Net number – sensor net number in LLS (0 to 255).

Write threshold – threshold for the value change to create a new entry.

Ignition filtering– if the parameter is on, then the changes in the sensor are not counted until the ignition is “ON”.

Battery disconnect switch – if the parameter is on, then the changes in the sensor are not counted until the battery disconnect switch is off.

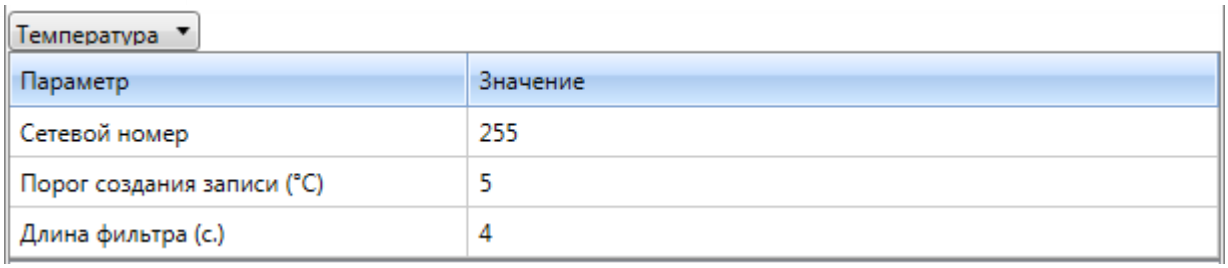


Figure 122. «Temperature» LLS sensor

For the **"Temperature"** sensor the following parameters are available:

Net number – sensor net number in LLS protocol (0 o 255).

Write threshold – threshold for the value change to create a new entry.

Recommended - 1

Filter length – time(s), for averaging the values. Default value - 8

Fuel level sensors SPAN

The terminal and Configurator support the span table saving to ease the SPAN procedure of the Fuel level sensors. Table is saved in the settings profile and during the data transition is send to the server.

The SPAN mode includes the procedure in which the petrol tank drains and refuels with the small fixated portions.

To start the SPAN push the «SPAN» button in the «Fuel level» window (**Figure 123**).

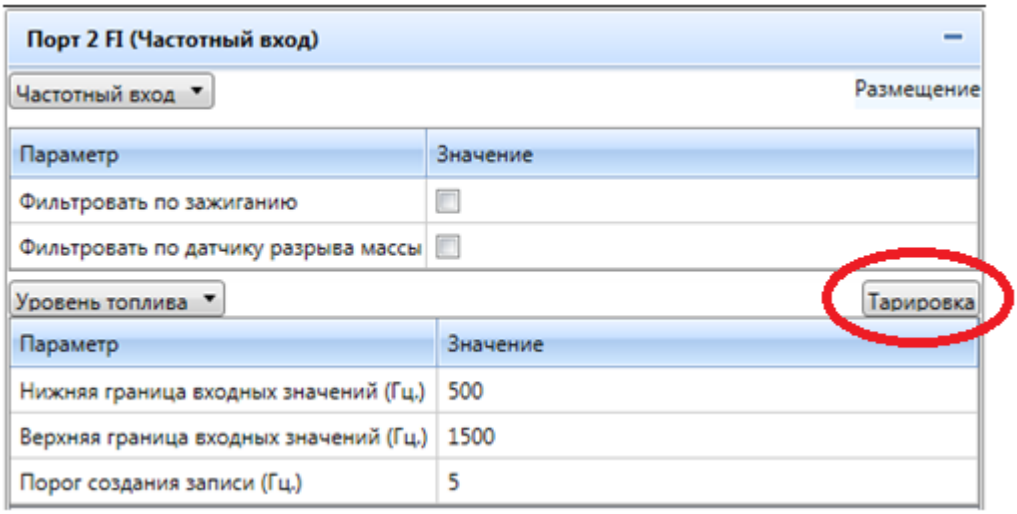


Figure 123. «Span» button

After pressing the button, the following window is opened: (**Figure 124**).

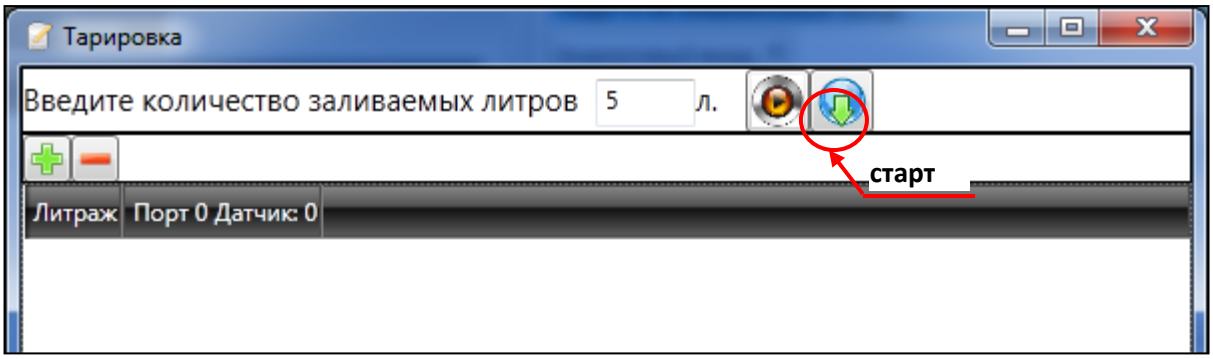


Figure 124. Span window

To start the SPAN, you need to indicate the fuel portions(in l) and push the ”start” button. The table should be filled in the following order:

1. Fill the fuel portion (l).
2. Push the start button «Start».
3. Fill the fuel portion
4. Wait for the fuel to even up (fuel level is fixated).
5. Push the «Add» button.
6. Repeat the previous three for the every portion.
7. Push the «Stop» button.

Span window is shown in **Figure 125**:

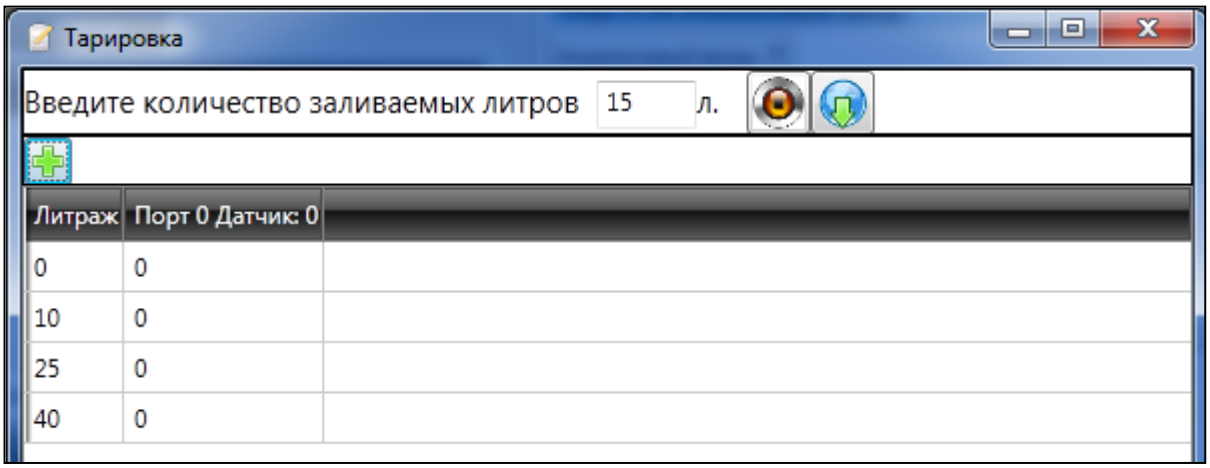


Figure 125. Span procedure

If the terminal during the SPAN stopped working (reboot of power loss), then push “Calibration mode on” to continue the SPAN.

After finishing, the SPAN table can be edited in the hand mode.

The table is saved automatically after the SPAN window is closed. In order to download the SPAN table onto the “SCOUT-Explorer” you need to open the analogue sensor settings and push the “get span table” button (**Figure 126**):

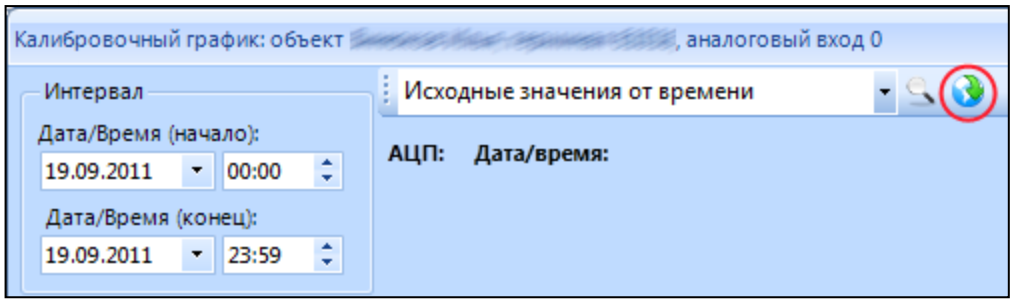


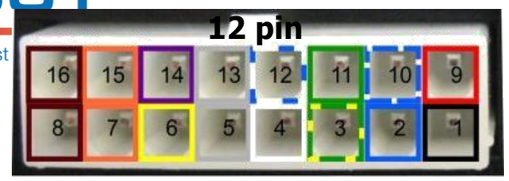
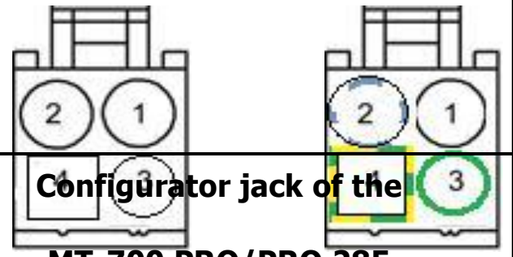
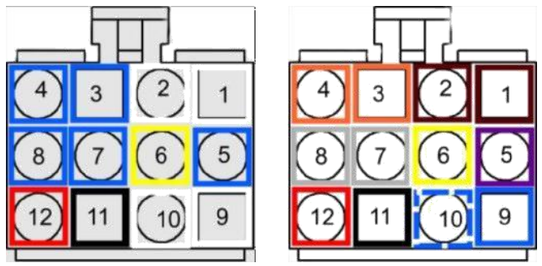
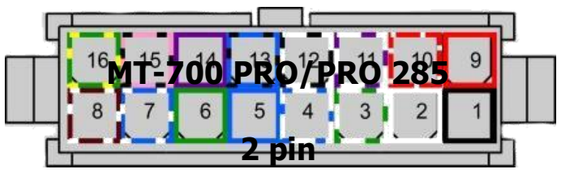
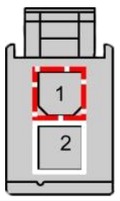
Figure 126. Uploading the Span table to the SCOUT-Explorer

- If the table was saved in the terminal profile, then it will be uploaded for the corresponding input.

Appendix A. MT-700 PRO/PRO 285 Jack and cable Jack acco

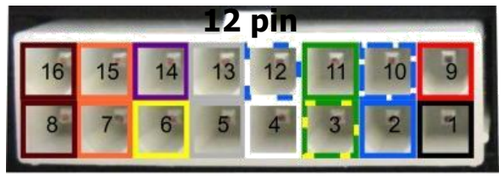
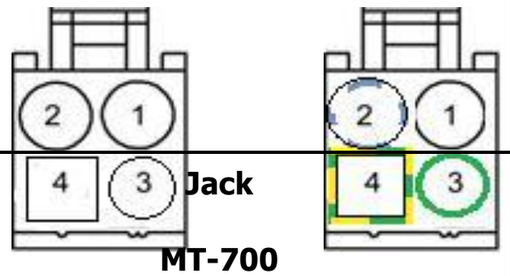
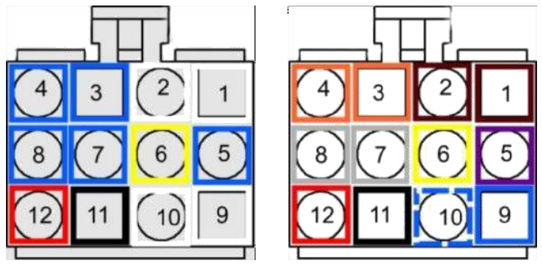
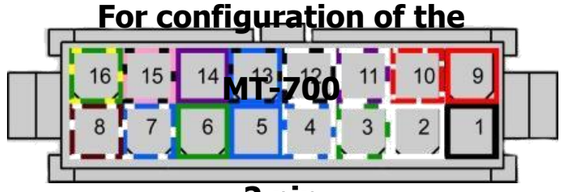
№ contact in Jack/wire color											
Contact	Power (-)	RS-485 B	RS-232 TX	CAN H	P 0	P2	P4	P6	Power (+)	RS-485 A	RS-23 RX
MT-700 PRO 285 Jack **16 pin**	1 black	2 blue	3 yellow green	4 white	5 grey	6 yellow	7 orange	8 brown	9 red	10 blue white	11 green
MT-700 PRO 285 Configurator Jack **4 pin**			4	1							3

SCOUT
ensuring the best

12 pin 	10 Black	12 white/ blue			5 blue/ grey	7 Yellow	1 blue/ orange	3 white/ brown	9 Red	white/ blue white	
 **Configurator jack of the MT-700 PRO/PRO 285** **16 pin** 	16 желто- green	15 черно- розовый	14 blue- grey	13 сине- black	12 black-white	11 white - purple	10 white - red	9 red	8 white - brown	7 сине- white	6 green
 	RS-485A						10 white- red				

Appendix B. MT-700 STD/ENT Jack and cable Jack accordance

Pin № in the Jack /wire color											
Contact	Power (-)	RS-485 B	RS-232 485_ 2 TX B*	CAN H	P 0	P2	P4	P6	Power (+)	RS-485 A	RS-23 485_ 2 RX A*
Jack MT-700 **16 pin**	1 black	2 blue	3 white/ yellow- Green	4 white	5 grey	6 Yellow	7 orange	8 brown	9 red	10 blue white	11 white/ green

Jack for the **MT-700** **12 pin**   	10 Black	12 white/ blue			5 blue/ grey	7 Yellow	1 blue/ orange	3 white/ brown	9 Red	11 white/ blue White	
Jack **MT-700** **16 pin**  	16 yellow- green	15 black purple			12 black-white	11 white -purple	10 white - red	9 red	8 white - brown	7 blue- White	
Jack **For configuration of the MT-700** **2 pin**  	RS-485A						10 white -				

Appendix C. Typical Connection schematics

❶ *Basic schematic connection*

The simpliest connection is:

Power(-) to the Battery (-).

Power(+) – through the 2A fuse to the battery (+) (pin № 30).

P2 – to the wire, which provide the power only after the ignition is on (pin № 15).

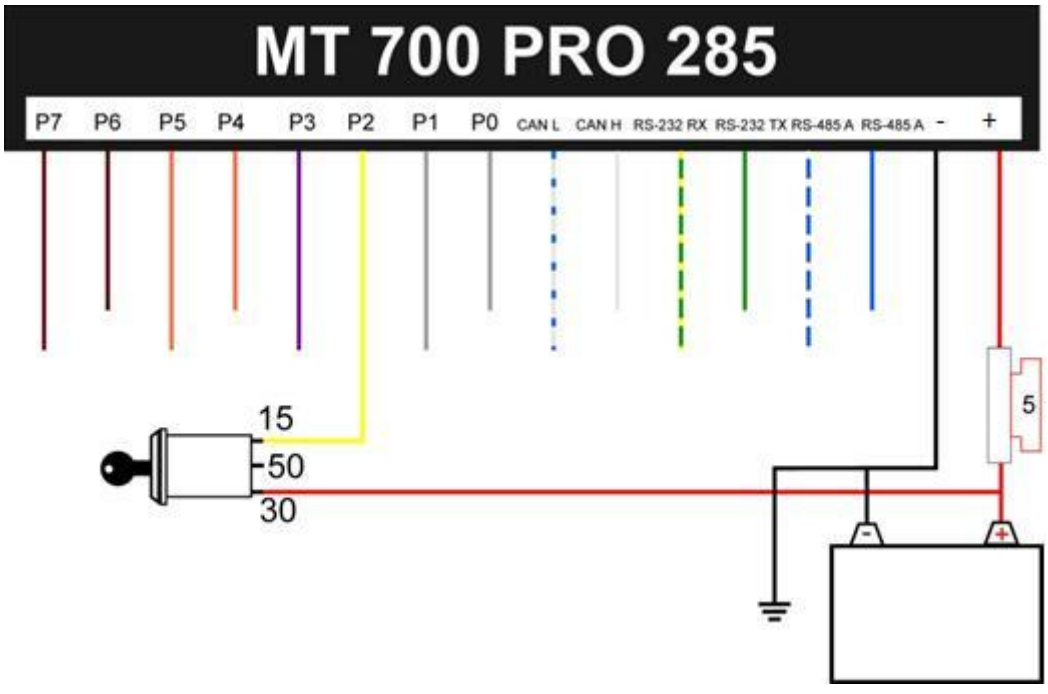


Figure . 1 – Basic scheme

❷ ***Disconnectable battery schematic***

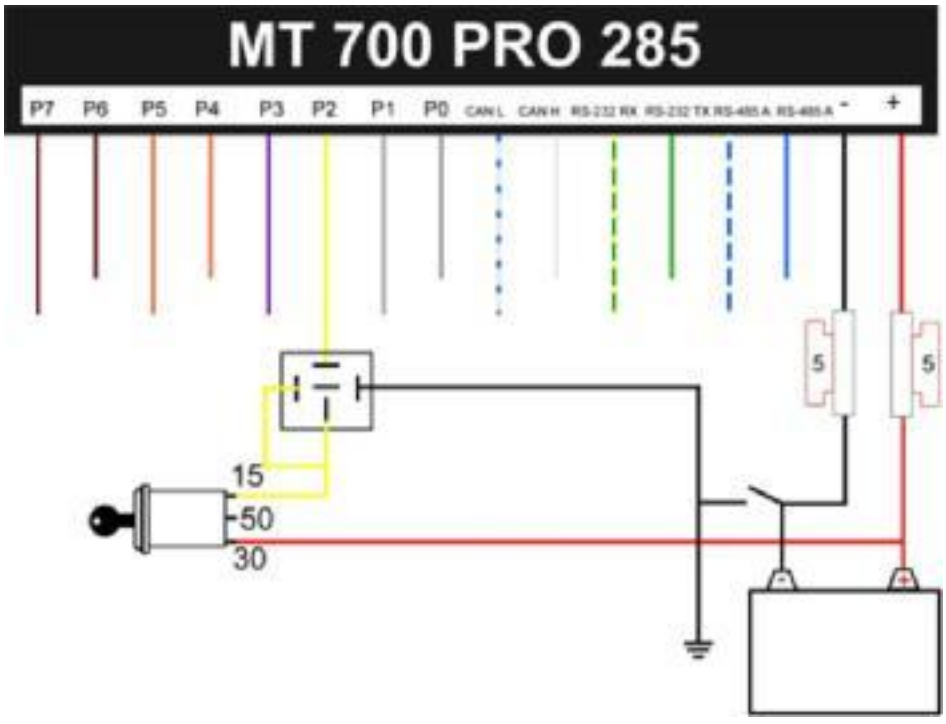


Figure . 2 – ***Disconnectable battery schematic***

Power(-) to the Battery (-) through the 3-5 A fuse.

Power(+) – through the 2A fuse to the battery (+) (pin № 30).

P2 – to the wire, which provide the power only after the ignition is on (pin № 15).

❸ *Analogue fuel level sensor*

Signal wire goes to the P0.

If needed, other sensor can be connected to the 1 and 2 ports

Power the sensor from the same power lines as the terminal.

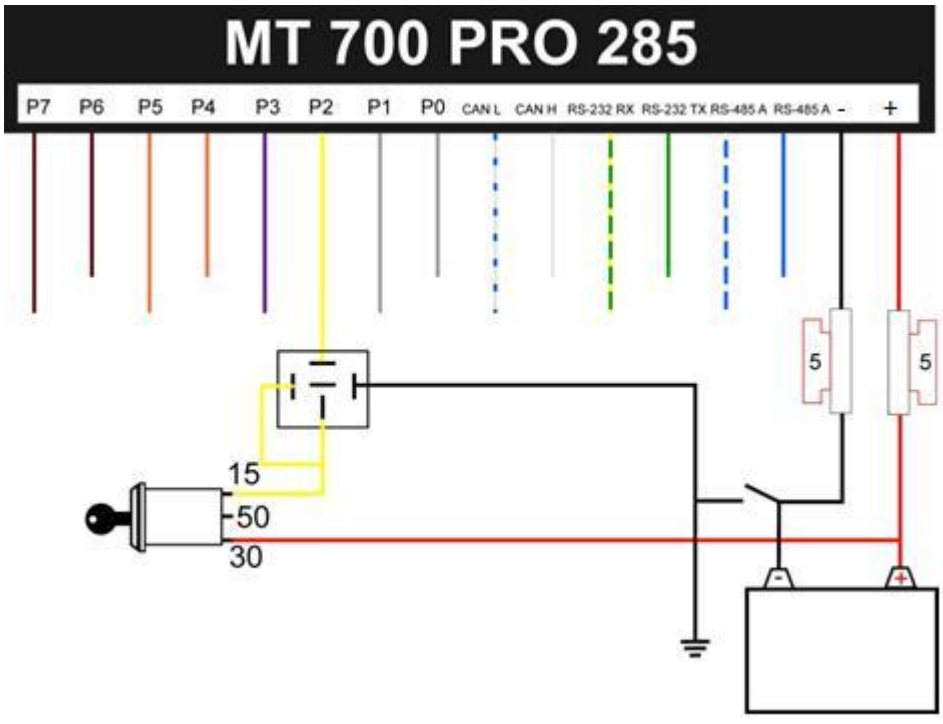
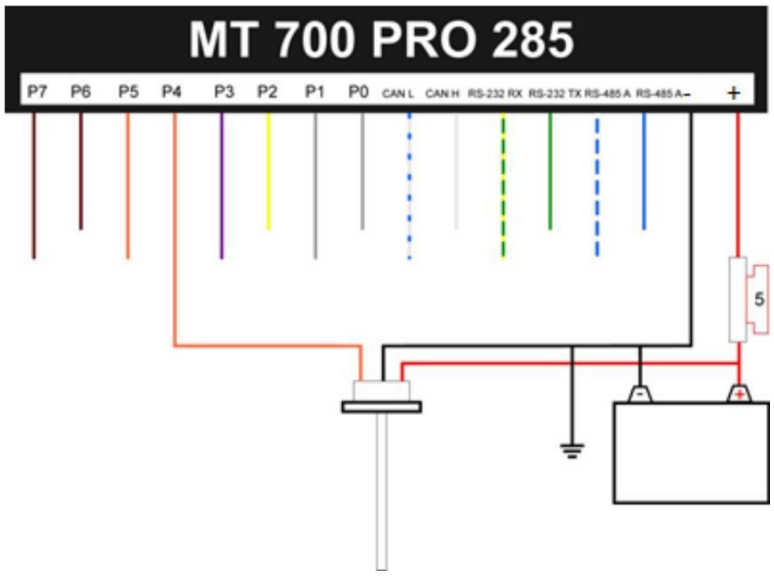


Figure 3 - *Analogue fuel level sensor*

❹ *Frequency fuel level sensor*

Figure 4 – Frequency fuel level sensor



❺ *Digital LLS fuel level sensor*

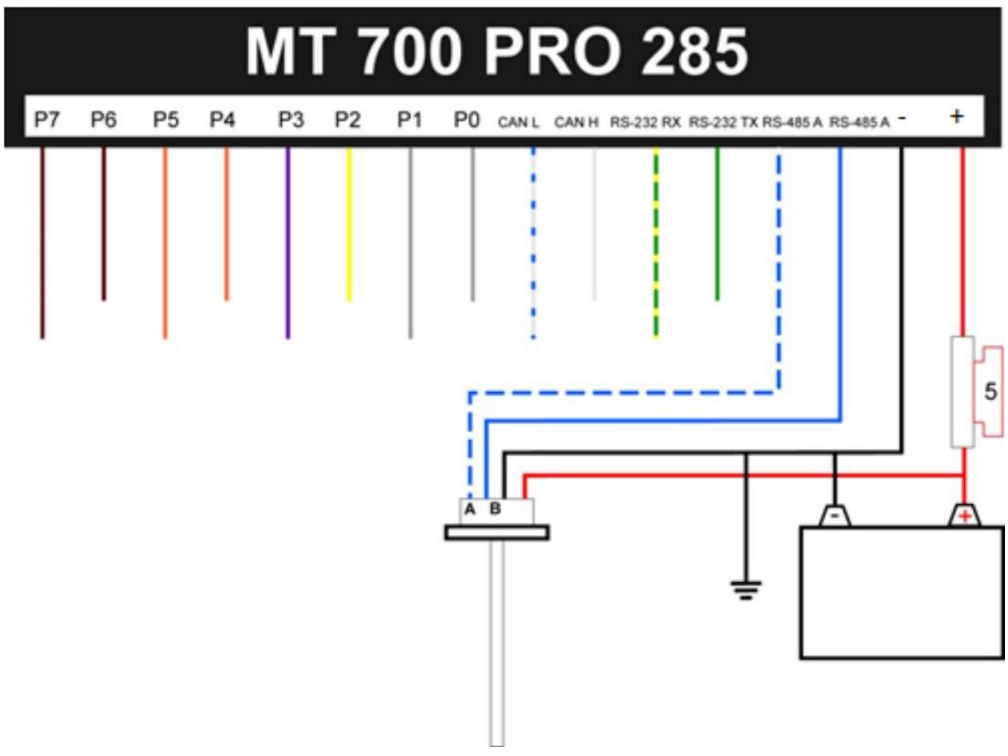


Figure 5 – digital LLS fuel level sensor

❻ *Buzzer connection*

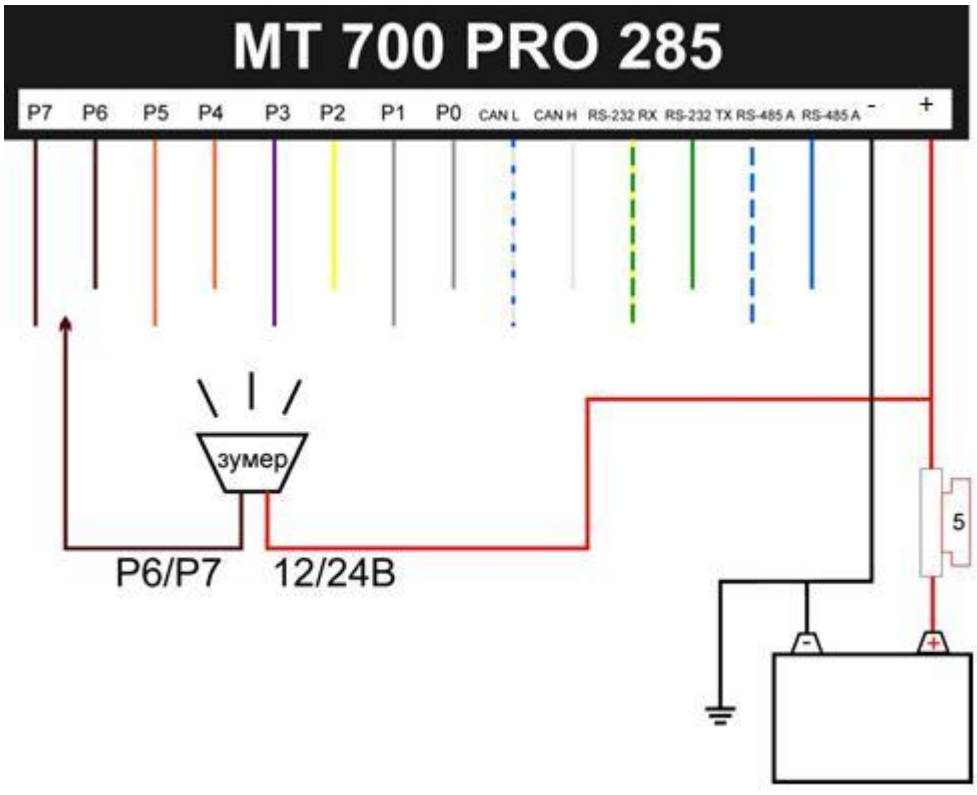


Figure 6 – Buzzer connection

❼ *J1708 and CANJ1939 connection*

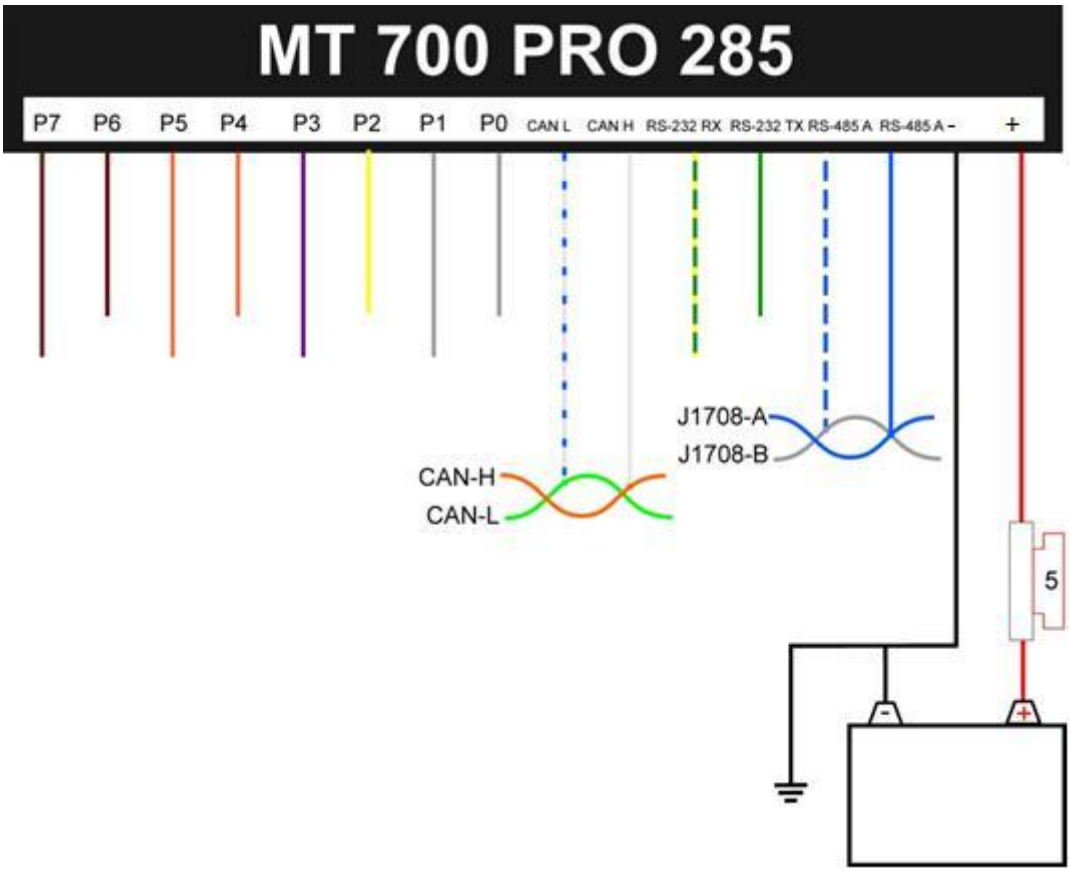
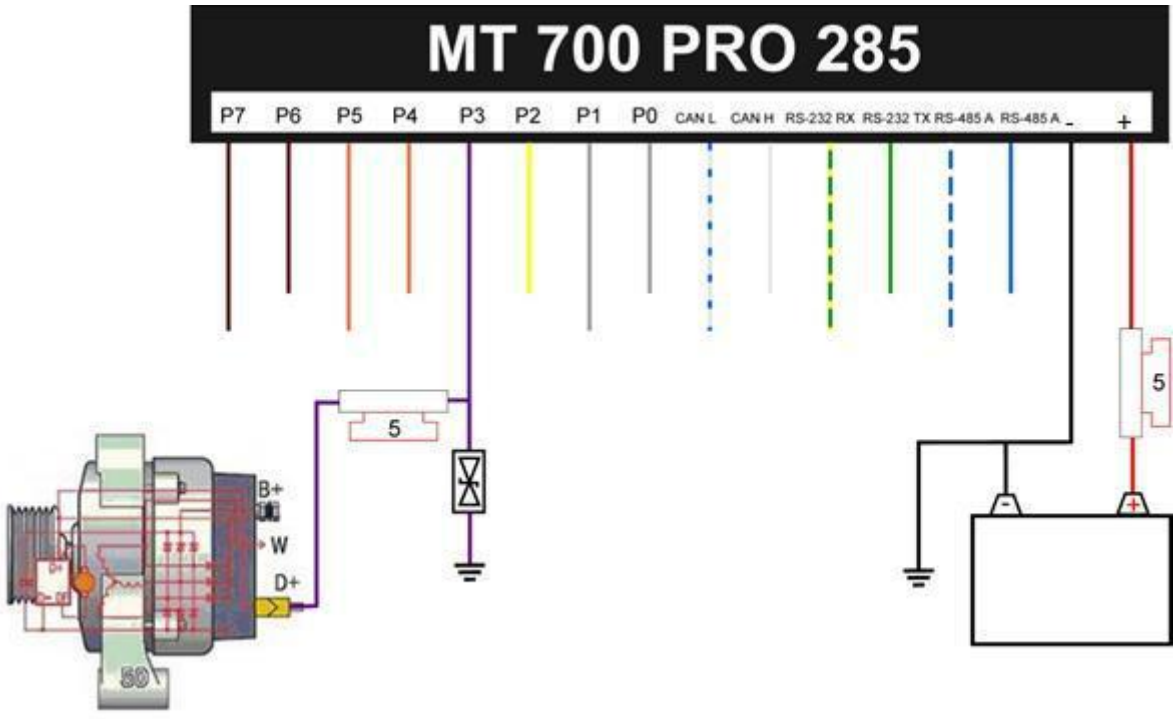


Figure 7 –J1708 and CAN J1939 connection

❽ *Engine speed sensor connection*



▪ **Figure 8 -** ***Engine speed sensor connection***

❾ *iButton*

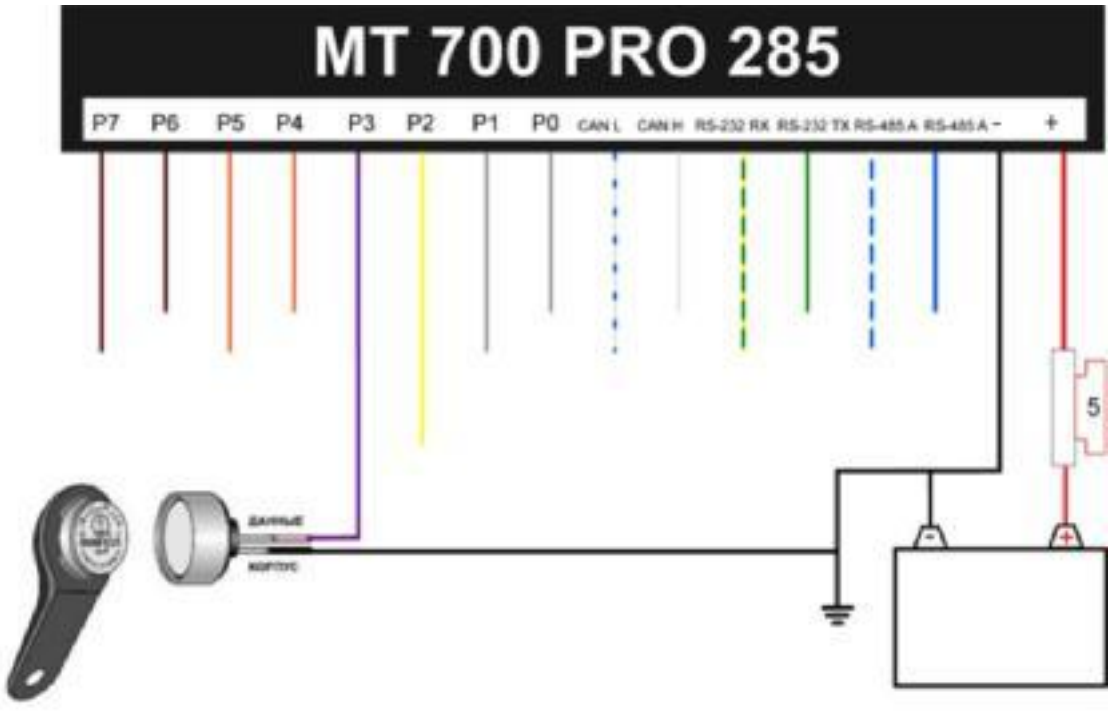


Figure 9 – iButton connection

Minus – to the common wire, data – to the P3

Appendix D. SMS-commands

Command	Function	Parameters	Terminal response	Request example	Response example	Note
Test	Terminal test	no	ID(version) Power supply voltage Battery voltage Power-off threshold APN settings Used server protocol Unsent data	test	id(test): 1.1.1.1; Pwr:24.6,4.4; OFF:8.0; APN:internet,,; SRV:1.1.1.1:6600, ScoutData;Unsent:0	Voltage is multiplied by the Factor of 10

Reboot	force reboot	no		`reboot`	`id(reboot): OK`	
Portconfig	Port configuration request	Port number	Port()	`portconfig 0`	`id(portconfig): P0: PeakDetector (VLT)`	
Getport	Port state request	Port number	порт: состояние порта (значение)	`getport 0`	`Id(getport): P0: PeakDetector=0`	
Setport	Port state setting	Port number	OK*, Invalid params**	`setport 6,1`	`id(setport): OK`	*in case the change is available ** change is not

						available
						124

Setdefault Settings	установка заводских значений	no	OK	setdefaultsettings	id(setdefaultsettings): OK	
Setserver1	Parameter setting For server 1	protocol, channel (gsm, wifi), IP-address Port, encryption, Connection type		Setserver1 111.222.111.222,6600,password		*Parameters are changed ** Parameters incorrect
Setserver2	Parameter setting For server 2	protocol, channel (gsm, wifi), IP-address		Setserver2 111.222.111.222,6600,passwor		Protocol - scoutdata,

		Port, encryption, Connection type protocol, channel (gsm,	OK* Imposible to Execute **	d	id(setserver): OK	scoutopen, scoutopen2, wips, egts; Channel - gsm, wifi; encryption - 1 - on, 0 – off; Connection type- m – main, d – doubling, r - reserve.
Setserver3	Parameter setting For server 3	protocol, channel (gsm, wifi), IP-address Port, encryption, Connection type protocol, channel (gsm,		Setserver3 111.222.111.22 2,6600,passwor d		
Testserver1	Server 1 parameters	no	ID	Testserver1	id(testserver1): WIFI,SRV1:1.1.1.1:	Protocol - scoutdata,

	request		Data channel Server, protocol Encryption, Unsent data		6600,ScoutData,cry pto:0,m,Unsent:0	scoutopen, scoutopen2, wips, egts; Channel - gsm, wifi; Encryption - 1 - on, 0 – off
Testserver2	Server 2 parameters request			Testserver2	id(testserver2): WIFI,SRV1:1.1.1.2:	

					6605,ScoutData,cry pto:0,d,Unsent:0	Connection type - m – main, d – doubling, r - reserve.
Testserver3	Server 3 parameters request			Testserver3	id(testserver3): WIFI,SRV1:1.1.1.3: 6608,ScoutData,cry pto:0,r,Unsent:0	
Setid	Terminal ID set	Terminal ID	OK	setid 123456	id(setid): OK	
Setcalibration	Set calibration Mode for 5 min	no	OK	Setcalibration	Id(setcalibration) :OK	

Setapn	установка параметров точки доступа GPRS	Login, password, APN	OK	setapnmts,mts, internet.mts.ru	id(setapn): OK	
Connect	Immediate Server connection And data sending	no	processing OK failed via …	connect	Id(connect): SRV1 : processing, SRV2: processing, SRV3: off Id(connect): SRVx, connect OK Id(connect): SRVx, connect failed Id(connect): SRVx, connect via SRVy	
SetNetRule	Remote GSM rules set	Rule number, SIM card number Operator code	OK	setnetrule1,1, 25002	id(setnetrule): OK	Rule number (1-6), SIM card number (1), Operator code (0-99999)

						,
Clearlog	Clear the Telemetry log	no	OK	`ClearLog`	`id(Clearlog): OK`	
GetImei	запрос Imei- номера модема терминала	no	id(getimei): imei	`GetImei`	`id(getimei):` `123456789012345`	

GetDriveStyle	Settings request
	For the drive style
	port
		Port number	port (data type):
			spd1,spd2,spd3,spd4,Ac
			CelBrake
				`GetDriveStyle`
				`4`
					`Id(getdrivestyle):`
					`P4: DriveStyle:`
					`60,90,110,130,250,`
					`300`
						port – port number
						spd1,spd2,spd3 -

						Maximal speed limits 1, 2, 3 Accel - acceleration threshold Brake – deceleration threshold
SetDriveStyle	Dryve style port configuration	Port number spd1,spd2,spd3, Accel,Brake	OK	`SetDrivestyle 4,60,90,120,25 0,300`	`Id(setdrivestyle): Ok`	
LinearCalibrate	accelerometer linear	*Angle in* Static coordinates If empty - linear Calibration is	OK Impossible	`LinearCalibrate 0`	`Id(linearCalibrate): Ok Id(linearCalibrate):`	

impossible

	Accelerometer		Id(getacceleration):accel(acc),		ID(getacceleration): angle(4), current	ID – tracker ID Acc – current acceleration Ang – angle to the horizon Xc,Yc,Zc – current “Raw” Data on the 3 axes Xh,Yh,Zh – calibration vector Xl,Yl,Zl – linear acceleration calibration

GetAcceleration	current state request	no	angle(ang),current(Xc,Yc,Zc), horizon(Xh,Yh,Zh),line(Xl,Yl,Zl)	getacceleration	(-59,52,1039), horizon(14,-22, 1044), line(not calibrated)	

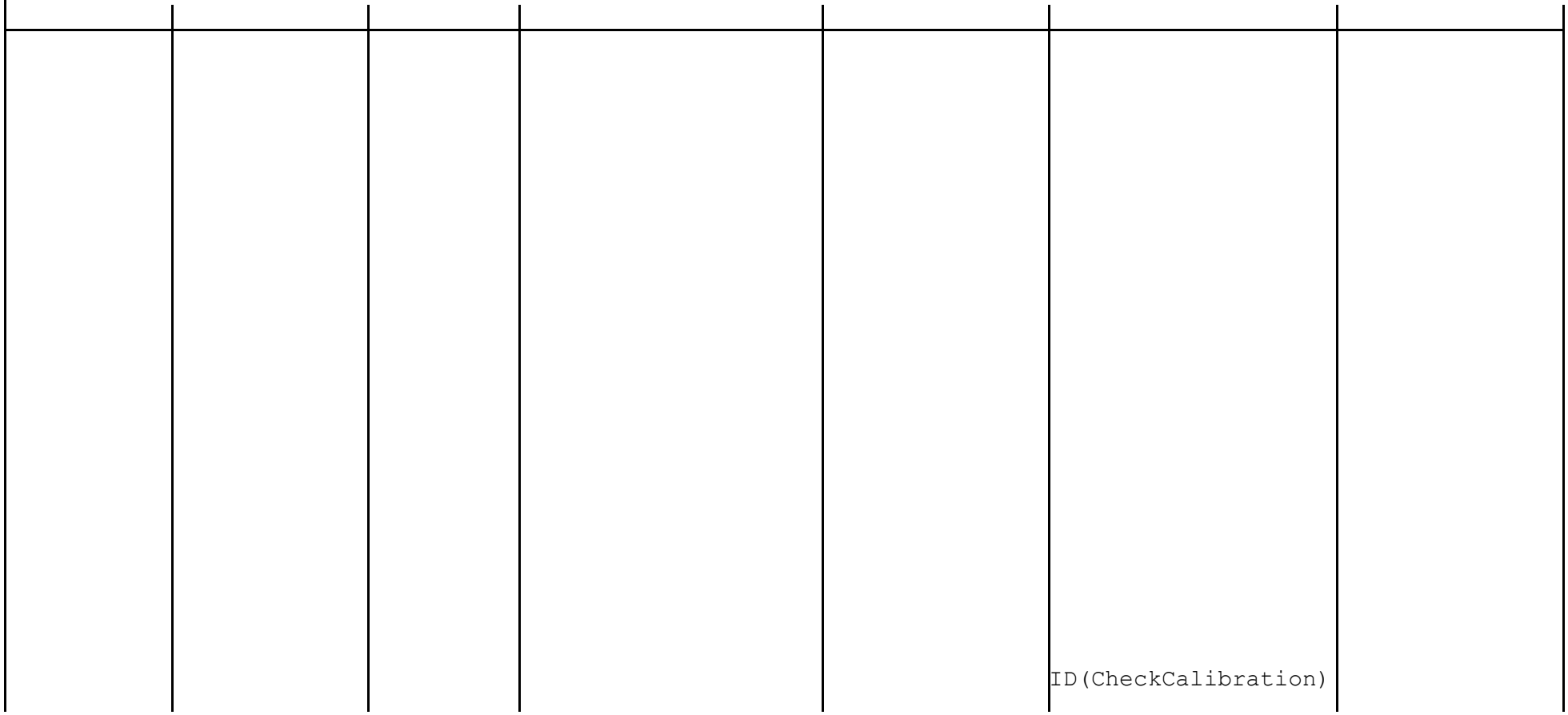
Command	Function	Parameters	Terminal response	Request example	Response example	Comment

GetAccelgage		no	ID(GetAccelgage) state,
			
			threshold
				`getaccelgage`	`ID(getaccelgage):`
					
					`line detect, 5`
						state – calibration state
						
						not calibrate – no horizon
						
						line detect – horizon - OK
						
						Threshold – vibration threshold

SetAccelgage	settinng accelerometer Vibration threshold	значение порога	OK	`SetAccelgage 15`	`id(setaccelgage): OK`	
GetStatistics	statistics request	no	Statistics not ready horizon: (gravity); linear: angle A , vectors V (P%), (lineVector)	`GetStatistics`	`horizon: (0, 10, 1030); linear: angle 40, vectors 120(58%), (149, 23, 1)`	gravity – 3D vector A – liner statistics vector

	Linear calibration Statistics reset					

ResetStatistics		no	OK	ResetStatistics	id(ResetStatistics): OK	
Setwhitelist	Adding the number to the terminal's white list	Phone number	OK FAIL	Setwhitelist +79997170944	id(setcalibration):OK Id(setcalibration):fail	
TestAccelGage	проверка работоспособности акселерометра	no	ID(TestAccelgage): State (x1, y1, z1); (x2, y2, z2); (x3, y3, z3)	TestAccelgage	ID(testaccelgage): Ok (-58,42,1049); (571,-550,1540); (-640,671,442)	


ID(CheckCalibration)

CheckCalibration	accelerometer calibration check	no	ID(CheckCalibration):horizon: resultH (causeH); linear: resultL (causeL);	CheckCalibration	: horizon: ок (line 22, side 27); linear: ок(angle 3.25)	

Horizon	horizon set	no	OK	Horizon	ID(horizon): OK	
					ID(testmemory): Processing…	

Testmemory	Memory test	no	ID(testmemory): Checked pages X, errors Y, times Z sek	testmemory	ID(testmemory): Checked pages 1024, errors 0, times 150 sek
Setodm	установка показаний одометра	Целевые показания одометра	OK	Setodm 167,7	Id(setodm): OK
		Enable/disiable Power-off mode			
Voltagesafety	Power-off enable		OK	voltagesafety 1,12.9	id(voltagesafety): OK

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Getregstat	Network registration Status request	no	Operator code, registration status, lac, cid	getregsat	id(getregstat): 25002;GSM:home,lac:0 x1E7D,cid:0x16CB;GPR S:home,lac:0x1E7D,ci d:0x16CB	

Setpassword	Password setting For the tracker	password	OK	setpassword qwerty123	id(setpassword): OK	
ScoutData	Protocol change to ScoutData	IP address port password	OK	scoutdata 111.222.111.222, 6600,password	id(scoutdata): OK	

ScoutOpen	Protocol change to ScoutOpen	IP address port password	OK	scoutopen 111.222.111.222, 6600,password	id(scoutopen): OK	
		IP address port		egts		

Egts	Protocol change to EGTS	password	OK	111.222.111.222, 6600,password	id(egts): OK	
WIPS	Protocol change to WIPS	IP address port password	OK	wips 111.222.111.222, 6600,password	id(wips): OK	

AutoHorizon	Autohorizon setting enable	no	OK	`AutoHorizon`	`id(AutoHorizon): OK`	

SendLogAgain	Log sending request	no	OK	`sendlogagain`	`id(sendlogagain): OK`	
CheckVdo	VDO tachograph Connection test	no	Disconnect No connection Connect OK	`CheckVdo`	`id(CheckVdo): Disconnect`	
GetModem	Modem identification check	no	Modem identification	`getmodem`	`id(getmodem): Quectel_Ltd`	
Getcellpos	Approximate terminal location (based on cell ID	no	Map hyperlink	`getcellpos`	`id(getcellpos): http://www.open-electronics.org/cell`	

Location)					track/cell.php?hex=0&mcc=250&mnc=99&lac=14756&cid=10212	