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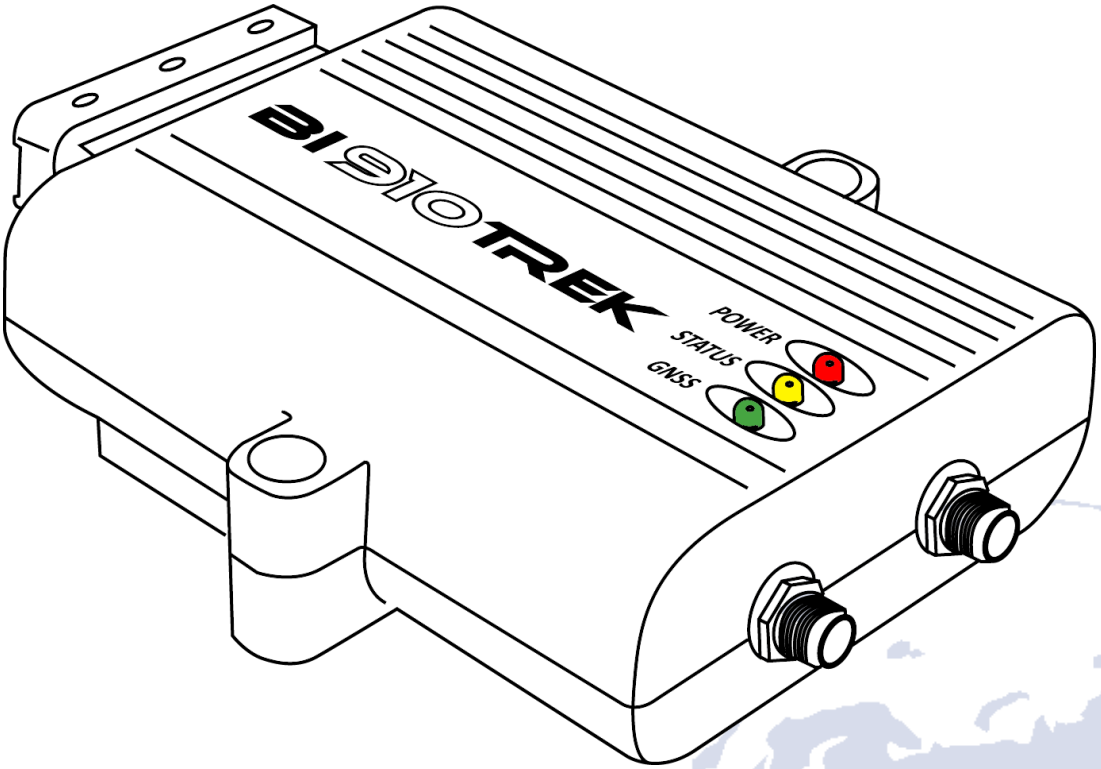
Vehicles tracking device

BI-910 TREK



Operating Manual

Version 2025.10.1B

Table of Contents

Introduction

Safety Requirements for Installation and Maintenance of Tracking Device "BI-910 TREK"

Compliance with the safety precautions is the responsibility of technical personnel installing the tracking device, as well as employees in charge of equipment on site.

To avoid damage to the device, please, keep it in a stress-resistant case. Before using the device, please, place it so that its status LED indicators are clearly visible. Prior to dismantling outputs of the device, please, disconnect its power supply unit.

Transportation and Storage

The tracking device in the manufacturer's package can be transported by any closed land and sea transport mode (in railroad cars, containers, closed trucks, cabins, etc.). It can also be transported in heated aircraft cabins.

When transporting and storing the device, the package instructions on the labels must be observed.

Warranty

The warranty period for the tracking device shall be 12 months of the date of commissioning. The commissioning date must be recorded per requirements set forth in the certificate for the tracking device; if no such data are available in the certificate, the warranty period shall be counted starting with the tracking device shipment to the customer.

Manufacturer's warranty shall only be valid provided that the customer complies with the requirements of this Manual. In the event of their violation, or in the presence of mechanical or electrical damage caused by the factors that are not covered in this Manual, the Warranty shall be deemed void.

Device

Intended Use of the Device

Tracking device BI-910 TREK is used for navigation tasks, remote control and monitoring of a vehicle or other remote object.

The tracking device is intended for installation to any mobile or remote stationary object in order to:

- determine geographical coordinates, speed and direction of movement;
- collect data coming from the external devices;
- control actuators;
- voice communication;

- transfer the data to a dispatch center.

GSM 900/1800 or GSM 850/900/1800/1900 mobile carrier network is used as a medium for data transfer. To determine the coordinates, NAVSTAR GPS system is used. To detect vehicle movement, the data obtained from GPS or GPS/GLONASS and internal acceleration meter are used.

The device must be installed in a spot unavailable to a driver.

Principle of Operation

In real time, the tracking device:

- using an in-built GPS or GPS/GLONASS receiver, determines the location and motion parameters of an object (time, geographical coordinates, speed, direction of travel);
- collects and processes information coming from analog and discrete sensors;
- controls actuators upon the command from the operator panel.

The data obtained are recorded and stored in the internal log that is based on a non-volatile memory chip. Records from this log are transferred to the operator panel through a GSM channel with a predetermined frequency or on an event basis. Information exchange is done via GPRS and SMS. Voice communication is also supported.

On-line terminal operation is only possible provided there is GSM coverage. Beyond the GSM network coverage area, the tracking device is in the mode of a "black box", i.e. it records all logged information to the non-volatile memory and transfers it when a vehicles enters into a GSM coverage area.

Specifications

Table 1. Device Specifications

No.	Item	Specifications
1	Data transfer standard	GSM 900/1800 or GSM 850/900/1800/1900
2	GSM network communication channel	GPRS, SMS, voice communication
3	GPRS grade	10
4	GPS and GSM antennas	External
5	Navigation system types	GPS or GPS/GLONASS
6	Auxiliary digital protocol	RS-485, 1Wire, CAN (FMS)
7	Motion sensor	Accelerometer
8	Secure power supply input	yes
9	Number of SIM cards	2

No.	Item	Specifications
10	Number of 0-active discrete inputs	4
11	Number of 1-active discrete inputs	2
12	Number of discrete outputs	2
13	Discrete inputs voltage range	from 0 V to 40 V
14	Type of discrete outputs	open collector
15	Full-load amperage of discrete outputs	0.5 A
16	Number of analog inputs	2
17	Analog input voltage range	from 0 V to 27 V
18	Power	DC
19	Voltage	from 9 V to 36 V
20	Normal current (12 V)	60 mA
21	Max. current (12 V)	300 mA
22	Microphone	Electrete
23	Microphone load resistance	2.2 kOhm
24	Outer speaker resistance	≥ 8 Ohm
25	Non-volatile memory capacity	2 MB (or 65,000 entries)
26	Internal battery Li-Ion	1,000 mAh
27	Operating temperature	from -30 °C to +80 °C
28	RH	80 % ± 15 %
29	Dimensions (W x L x H)	125 x 95 x 33
30	Weight	200 g
31	Body	IP 65 (plastic PA 6)
32	Connection (cable)	IP 68

Tracking device design

Fig. 1. Appearance and Dimensions of Tracking Device BI-910 TREK. (General view)

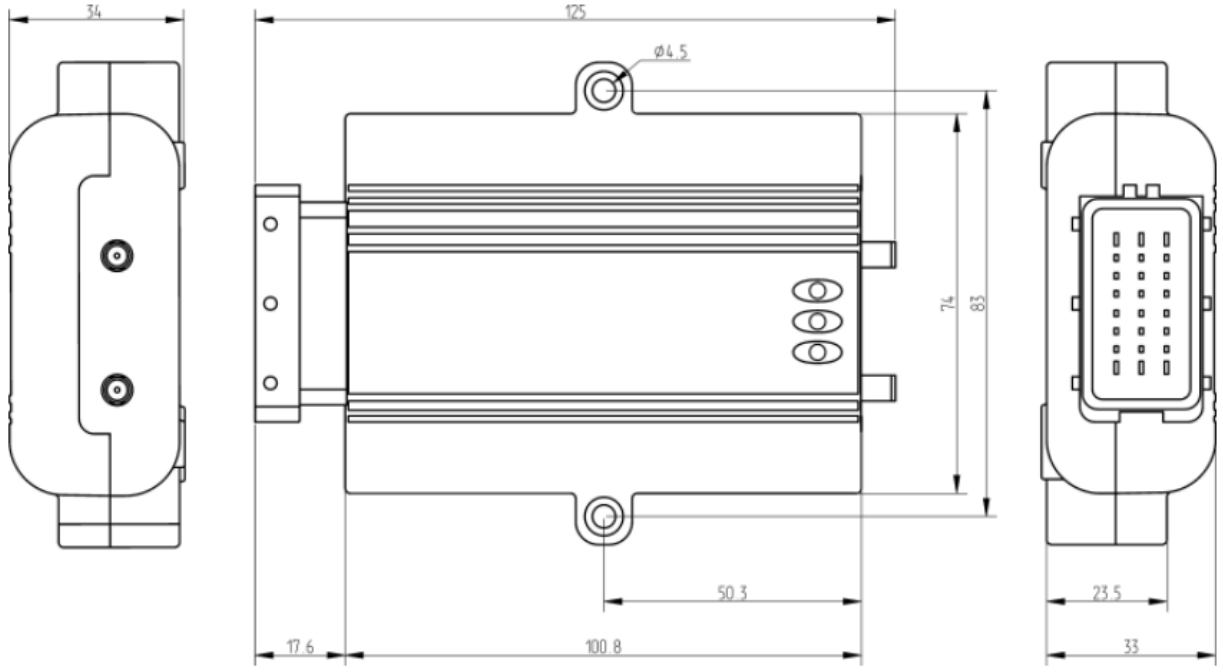
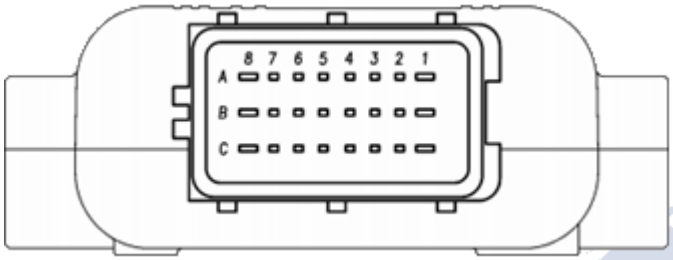


Fig. 2. Appearance and Dimensions of Tracking Device BI-910 TREK. (Rear view)



Scope of Delivery

1. Tracking Device BI-910 TREK - 1 pc.
2. GPS antenna – 1 pc.
3. GSM antenna – 1 pc.
4. Connection cable - 1 pc.
5. Certificate – 1 pc.
6. Warranty sheet – 1 pc.
7. Packing box – 1 pc.

Preparation for Operation

Inserting SIM–Card

To operate on a GSM network, at least one SIM-card has to be inserted into the device. The second SIM-card is optional and can be used for an alternative carrier network in areas with no primary carrier's coverage. Contacts of the SIM-card must not be saved, PIN-code must be

disabled (a SIM-card with an enabled PIN-code can be used provided that the PIN-code has been entered into the device settings).

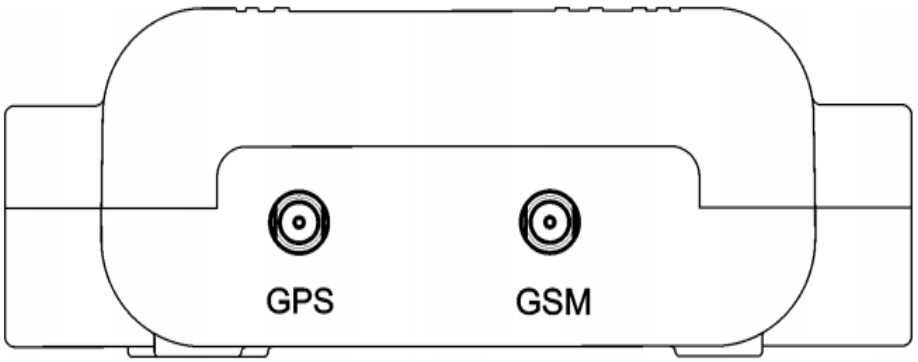
To insert a SIM-card all device connectors must be disconnected and its top cover must be removed. There are 2 slots on the top of the circuit board. The SIM-card selected by default shall be inserted to slot 1 (SIM1). Then the device has to be reassembled in the reversed order.

ATTENTION! The manufacturer does not supply a SIM-card necessary for connecting to a GSM network! You can purchase a SIM-card from a local GSM carrier!

Sockets for Power Supply, Antennas, and Periphery Devices

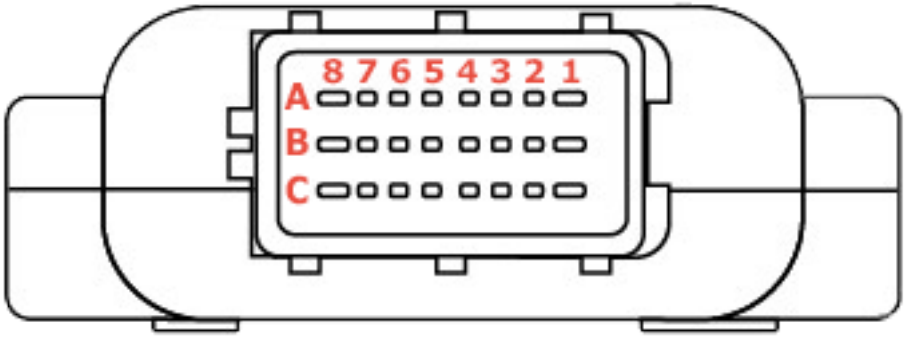
The front panel of the tracking device contains antennae connectors, while its rear panel contains power supply connector, discrete and analog sensors, actuators and headset connectors. For antennae connection, SMA inlets are used. The locations of the inlets is shown in Figure 3.

Fig. 3. Appearance and Antennas Connectors Legends on Tracking Device BI-910 TREK



To connect to the power supply socket, sensors and actuators, IP 68 connector socket is used. Location of power supply socket is shown in Figure 4.

Fig. 4. Location of the Socket and Numbers of Pins



Connection of the Power Supply, Discrete and Analog Sensors, as well as Extra Devices

Fig. 5. BI-910 TREK Contact Pins

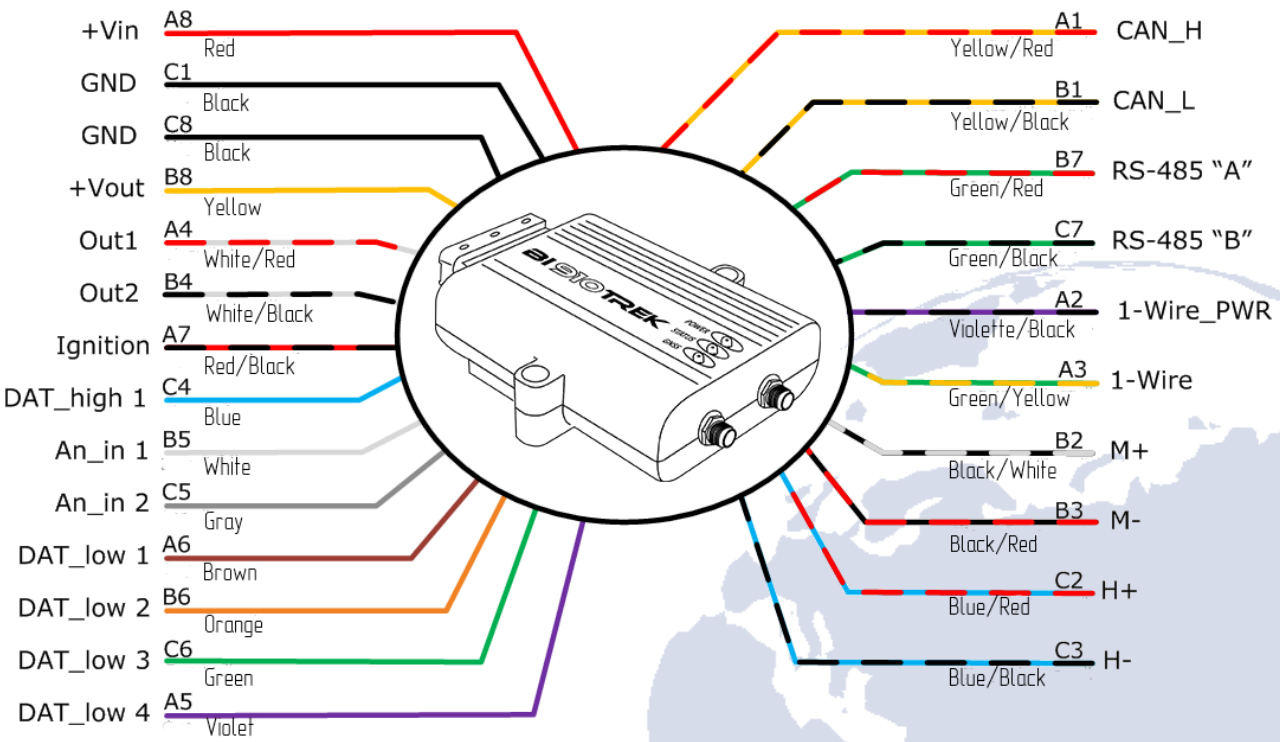


Table 2. Pin legends

No.	Color	Pin legend	Signal	Pin purpose
A1	Yellow/Red	CAN_H	Input/Output	*CAN_H* signal from the CAN bus
A2	Violet/ Black	1-Wire_PW R	Power	Output +3.3 V for device power supply "*1-Wire*" (15 mA max)
A3	Green/ Yellow	1-Wire	Input/Output	*1-Wire* interface data signal
A4	White/Red	DOut 1	Output	Discrete output No.1
A5	Violet	DAT_low 4	Input	0-active discrete input
A6	Brown	DAT_low 1	Input	0-active discrete input
A7	Red/Black	Ignition	Input	1-active discrete input - spared for ignition
A8	Red	+ Vin	Power	"+" on-board power terminal (nominal voltage is 12 VDC or 24 VDC)
B1	Yellow/ Black	CAN_L	Input/Output	*CAN_L* signal from the CAN bus
B2	Black/White	M +	Input	Mic "+" input
B3	Black/Red	M -	Input	Mic "-" input
B4	White/Black	DOut 2	Output	Discrete output No.2
B5	White	An_in 1	Input	Analog input No.1
B6	Oragnge	DAT_low 2	Input	0-active discrete input
B7	Green/Red	A	Input/Output	"A" signal RS-485
B8	Yellow	+ Vout	Power	Secure power output for extra sensors. Voltage is + Vin. Max. current is 300 mA.
C1	Black	GND	Power	Ground (earth)
C2	Blue/Red	H +	Output	Speaker output "+"
C3	Blue/Black	H -	Output	Speaker output "-"
C4	Blue	DAT_high 1	Input	1-active discrete input
C5	Gray	An_in 2	Input	Analog input No.2
C6	Green	DAT_low 3	Input	0-active discrete input
C7	Green/Black	B	Input/Output	"B" signal RS-485
C8	Black	GND	Power	Ground (GND)

Installation and Commissioning

Installation Guide

Tracking device location must ensure connections of sockets and avoid potential of accidental damage; it also must eliminate exposure to direct sunlight, moisture, etc. Recommended location of installation in a vehicle is the empty space under the dashboard inside a vehicle.

GPS and GSM antennas shall also be located in the empty space under the dashboard of a vehicle.

Antennas cables must be located and clamped along the entire length with straps clamped to the clamping sites. Cabling must be done so as to avoid any damage during the operation, when closing doors/hatches.

Electrical Connections

Power cable shall be passed through special ports in a vehicle body from the normal battery location to the location where the tracking device is to be installed. Power cables shall be connected to respective battery terminals.

ATTENTION! ***When performing welding operations during repairs of a vehicle, MAKE SURE to disconnect power cable and periphery cables!***

Discrete inputs with active "0" respond to connection of these inputs to GND (ground). This input is inactive when it is not connected (input is 'blank').

Discrete inputs with active "1" respond to the voltage of over 8 V on them (connection of the input to the "+" terminal of vehicle network). This input is inactive when it is not connected (input is 'blank').

Voltage on the analog input may vary from 0 to 24 VDC.

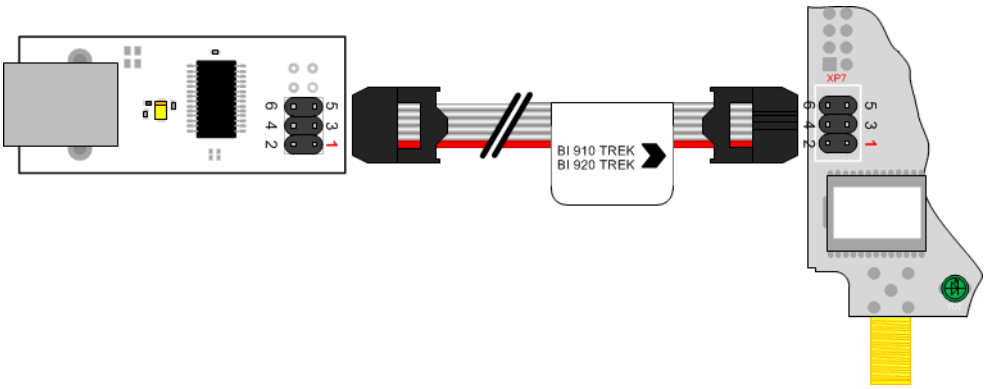
Discrete outputs are "open collector" type. Load must be connected into the open between the discrete output and power supply "+" terminal. When the output is activated it closes to the GND. Max. load current of the discrete output should not exceed 0.5 A! If high-amperage currents need to be switched, the discrete outputs must be connected using additional relay.

ATTENTION! ***Voltage on the discrete inputs and outputs should not exceed 30 V.***
Voltage on the analog inputs should not exceed 30 V.
Device input voltage should not exceed 36 V.
Otherwise, the device can be damaged.

Connection to a Computer

The tracking device can be connected to a computer for configuration and servicing. The device has UART output interface for that purpose. In order to connect the device to a computer a USB-UART adapter should be used that can be purchased from the dealer as an option.

Fig. 6. BI-910 TREK Connection Diagram



A terminal program can be used for data exchange with the device. Terminal configuration settings: bit rate – 115,200 bps, data bit – 8, stop bit – 1, without parity check, without stream control.

Once the link is up, the device will start sending its status data to the terminal. Using the terminal program, a user can send commands to the device and receive responses to them. But the device first needs to send access password to the terminal in the following format:

TPASS: password;

where *password* is an access password for the terminal (by default, 11111 is used).

Once sent, the password will be valid for 60 seconds. After this timeout, the password needs to be sent again so that the data can be exchanged with the device.

Indicators Description

The top panel of the tracking device has 3 LEDs that indicate current status of the device.

No.	LED mode	Red	Yellow	Green
1	Permanently on	External power is on	The devices is connected to the server and the data are transmitted	-
2	Off	No external power	-	No satellites available
3	Blinks once every 0.5 seconds	-	Trying to connect to the server	
4	Blinks once every 0.1 seconds	-	Failure to connect to the server, the attempt will be repeated in 2 minutes	-
5	Blinks once every 2 seconds	-	-	Satellites are available, coordinates have been established

List of SMS Commands

SMS commands are used for getting current state of the device, troubleshooting potential errors, configuring the settings, etc. An SMS command should be sent together with login and password; the sender's number must be included to the list of authorized contacts (when such list is used).

Structure of the SMS Commands

Any SMS with commands includes login/password pair (when configured) and a list of different commands. The commands are delimited with **semicolon** delimiter.

SMS commands entered to the tracking device should be of the following format:

<login><space><password><space><command1>;<space><command2>;<space><commandN>;

Example of an SMS command:
abcd 1234 getgps; getstatus;

ATTENTION! ***Total length of an SMS command string should not exceed 160 Latin characters. Number of commands per one SMS is only limited by the maximum length of an SMS.***

It is also essential to observe the order of the commands, when they are sent in one SMS message. The device reads and performs the commands in sequential order. E.g.: once the *cpureset;* command is received the device processor will reset and the commands will not be further performed.

Correct:
setparam 0242 <APN>;
setparam 0245 <HOST>;
setparam 0246 <PORT>;
cpureset;

Incorrect:
setparam 0242 <APN>;
cpureset;
setparam 0245 <HOST>;
setparam 0246 <PORT>;

When login and passwords pairs are configured for access using SMS, they must be included to each SMS with the commands. If a login/password pair is enabled, but not included to an SMS with the commands, such SMS will be ignored. If a login/password pair option is not enabled, it will not be checked.

In the event that one of the authorized phone numbers is enabled, SMS commands will only be performed provided that they have been sent from one of the authorized phone numbers (login/password is also required, if enabled). If there is no authorized phone number enabled, SMS with commands will be received from any phone number.

Configuring the Device

The BI-910 TREK Tracking Device can be configured by one of the methods below:

1. Using a direct connection between the device and a computer.
2. Remotely, using SMS commands.

Configuration of the device by any of the methods available only requires configuring necessary device parameters. Each parameter has its own unique ID. Special commands are used to read/record the values of a selected parameter.

In case of remote configuration of the device using SMS, one should bear in mind that the total length of an SMS should not exceed 160 Latin characters. Number of commands per one SMS is only limited by the maximum length of an SMS.

All commands for device manipulation can be divided into the controlling and information ones.

Table 3. List of Information Commands

No.	Command	Description	Response
1	getstatus	Information about current device status	yes
2	getgps	Current GPS coordinates and time of the device	yes
3	getmap	Request for the link with device coordinates	yes
4	getver	Request for device firmware version	yes
5	getio	Getting the readings from internal device sensors	yes
6	flush	Request for device profile parameters	yes
7	getparam ####	Get a parameter by its ID	yes
8	gettime	Request current NTP and GPS time	yes

Table 4. List of Controlling Commands

No.	Command	Description	Response
1	cpureset	Reset of the device CPU	none
2	rstallprof	Reset to default profile parameters	none
3	rstalltio	Reset to default the settings of I/O elements	none
4	deleterecords	Deletion of all records saved	none
5	setparam ####	Set a parameter by its ID	yes
6	boot #,#,#	Update of device firmware	yes
7	setdigout ##	Set operating modes for digital outputs Out 1 and Out 2	yes
8	ignitionoff	Disabling safety lock with the ignition	yes
9	ignitionon	Enabling safety lock with the ignition	yes

Detailed Description of Information Commands

Retrieval of current status of the device – getstatus;

No.	Parameter name	Description
1	Data Link	Current link status between the device and server: 0 – link down, 1 – link up
2	GPRS	GPRS status: 0 – not connected, 1 – connected
3	GPRS IP	IP address of the device when GPRS-connected
4	GSM	GSM signal level [0-5]
5	Roaming	0 – home network, 1 – roaming network

Example of a response:
Data Link: 1 GPRS: 1 IP: 46.133.143.201 GSM: 5 Roaming: 0

Retrieval of current location of the device – getgps;

No.	Parameter name	Description
1	GPS	Valid data - 1; Invalid data - 0
2	Sat	Number of visible satellites
3	Lat	Latitude (previous known latitude)
4	Long	Longitude (previous known longitude)
5	Alt	Altitude, m
6	Speed	Speed, km/h
7	Dir	Direction, degrees
8	Date	Date
9	Time	Current GMT time

Example of a response:
GPS: 1 Sat: 7 Lat: 50.2535 Long: 30.2622 Alt: 147 Speed: 0 Dir: 77 Date: 2018/4/30 Time: 12:33:45

Command of request for link with device coordinates – getmap;
Example of a response:
"www.biakom.com/maps/q=50.420209,30.428448,12,0"

Command of request of device firmware version – getver;
Example of a response:
BI-910 VER 3.16.7

Get device sensor readings – getio;

No.	Parameter name	Description
1	DI#	Digital input status
2	DO#	Digital output status
3	AI#	Analog input status

Example of a response:
DL1: 0 DL2: 0 DL3: 0 DL4: 0 DH1: 0 DH2: 0 DO1: 1 D02: 0 AIN1: 0 mV AIN2: 0 mV PSV: 12.234 mV VBAT:4.186 mV

Request for device profile parameters – flush;

No.	Parameter name	Description
1	IMEI	Modem ID number
2	APN	GPRS access point
3	LOGIN	GPRS access login
4	PASS	GPRS access password
5	IP	IP address of the server
6	PORT	Server port
7	MODE	Operating mode (always = 0 - TCP/IP)

Example of a response:
353976012555151, internet, none, none, 212.47.99.62, 12050, 0

Get the readings by parameter ID – getparam ####;
ID consists of 4 digits – the first digit is a profile number, the last three specify ID of a parameter.

Example of a command => request value of ID=242 parameter from profile 0: getparam 0242;

No.	Parameter name	Description
1	Param ID	Profile number and parameter ID
2	Value	Parameter value

Example of a response to the "getparam 0242" command:
Param ID 0242 Val: internet

Request current NTP and GPS time – gettime;
Returns current NTP and GPS time in the following format:

NTP TIME: 2025/02/04,12:07:31
GPS TIME: 2025/02/04,12:07:31

Detailed Description of Controlling Commands

Command of complete device CPU reset – cpureset;
There is no response to this command. Once the command is received, all processes of the device reset.
Restoration of profile parameters defaults – rstallprof;
There is no response to this command. Once the command is received, all profile parameters are restored to their default values.

Restoration of I/O elements settings – rstallio;
There is no response to this command. Once the command is received, all settings for tracker's I/O elements are restored to their default values.

Command for deletion of all records saved – deleterecords;
There is no response to this command. Once the command is received, all data packets are removed from the device memory.

Set parameter values by their ID - setparam #### #;
ID consists of 4 digits – the first digit is a profile number, the last three specify ID of a parameter (refer to Addendum 1).

Example of a command => set value of ID=242 parameter from profile 0:
setparam 0242 www.kyivstar.net

No.	Parameter name	Description
1	Param ID	Profile number and parameter ID
2	New Value	New value of a parameter

Example of a response to the "setparam 0242 www.kyivstar.net" command - setting an APN:
Param ID 0242 New Val: www.kyivstar.net

Device firmware update - BOOT #,#,#;
Command parameters:
HOST – IP address of the server containing the update;
PORT – Port of the server containing the update;
PATH – Path to the firmware update file on the server;

Example of the command:
BOOT fw.bitrek.ua,80,*.bin;
Where * is a version of the firmware, .bin – file format extension.

Options of response to the attempted update download:
BOOT: UPDATE DOWNLOAD OK – downloading was a success;
BOOT: WAITE ERROR – wait timeout was exceeded during update download;
BOOT: HOST CONNECT ERROR – failed to connect to the server;
BOOT: PAGE LOAD ERROR – failed to download the file;

BOOT: UPDATE DOWNLOAD ERROR – failed to update the firmware;

Setting operating modes of digital outputs OUT1 and OUT2 - setdigout ##;
Example for enabling Out 1: *setdigout 10;*
Example for enabling Out 2: *setdigout 01;*
The first digit in the command is Out 1 status, the second one is Out 2 status.
When the output needs to be enabled, its value must be set to "1".
When the output needs to be disabled, its value must be set to "0".

No.	Parameter name	Description
1	DOx New Val: y	When OUTx status changes
2	DOx Old Val: y	When OUTx status does not change

Example of an SMS response:
DO1 Old Val: 0 DO2 New Val: 1

Basic Device Configuration

Once a mobile carrier SIM-card is inserted and power supply is connected, the device needs to be configured for transferring data to the server. When the *Bitrek Configurator* is used, all configuration settings will be divided into groups:

- Server and GPRS
- Tracking
- Safety
- Service
- Voice communication
- Roaming

The settings required for the basic operation of the device include data transfer and tracking settings. They are included to the "Server & GPRS" and "Tracking" groups. Once the appropriate settings are configured, the device will start transmitting the data of its current location to the server.

All configurable settings are given in Addendum 1.

Security Settings

To comply with the security regulations, access to the device configuration settings may be restricted.

When connecting the device to a computer by means of USB-UART adapter, the device access password must be entered every time, when sending the commands to the device.

Default password is 11111. The password is valid for 60 seconds once sent. Once this time lapses, the password needs to be entered again. Access password can be changed by a user.

The default password must be sent to the device in the following format – *TPASS: 11111;*
Example of a response:

"TASK COM TERM: PASSWORD OK" – the password is correct;

"TASK COM TERM: INCORRECT PASSWORD" – the password is incorrect;

When sending the commands using SMS, access login and password can be enabled. To set login, the ID 0252 parameter is used, while for the password the ID 0253 is used.

When login and password are enabled, any SMS command should have the following structure before sending it:

<Login><Password><Command1>;<Command2>;<Command3>;

Example of a command: *abcd 1234 getgps; getstatus;*

Apart from setting a login and a password, authorized phone numbers can be used. To record phone number to the device memory, the ID 0261 – ID 0269 parameters are used (refer to Addendum 1). In total, up to 9 phone numbers are supported by the device. If this feature is used, the device will receive only SMS from the authorized phone numbers saved to its memory.

If SMS login and password are enabled, they must be included in each SMS with the commands.

Configuring I/O Components

The BI-910 TREK Tracking Device can collect, process and send data obtained from different sensors to the server. Each sensor is an I/O component and has a group consisting of 6 parameters for configuration.

E.g., to configure data transfer of voltage level from the power supply unit to the server the ID 0410/0411/0412/0413/0414/0415 parameter group is used. These parameters have the following structure:

0410/0411/0412/0413/0414/0415

The first three digits (highlighted with green) specify the number of the group of parameters for configuration of an I/O component.

The last digit (highlighted with gray) is a parameter number. There are 6 parameters (from 0 to 5) per an I/O component. Possible values for these parameters are shown in Table 5.

Table 5. List of Parameters for I/O Components

Parameter No.	Description	Possible values
0	Enabling / disabling an I/O component	0 – disabled; 1 - enabled
1	Priority of an I/O component during sending	0 – low; 1 - high
2	Upper threshold	(depends on I/O component type)
3	Lower threshold	(depends on I/O component type)
4	Setting the type of trigger event	0 – going within range; 1 – going beyond range; 2 – going back within/beyond range; 3 – monitoring; 4 – monitoring + going within range; 5 – monitoring + going beyond range; 6 – monitoring + going within/beyond range; 7 – event generation by change of an input by a preset value; 8 – event generation by change of an input by a preset value + monitoring.
5	Averaging constant	0 and higher

Clarifications to Table 5:
Parameter 0 – enabling / disabling I/O component transmission to the server.

Parameter 1 - Priority: low/high. When selecting the "Priority: low" option, the data from the sensor will be sent to the server with the next data packet. When selecting the "Priority: high" option, the data will be sent to the server whenever possible;

Parameter 2 - Upper threshold – setting the upper threshold of the I/O component;

Parameter 3 - Lower threshold – setting the lower threshold of the I/O component;

Parameter 4 – Setting the type of trigger event generated:

0 - Going back within range.

If a certain range is configured for the values of a sensor (sensor value ranges are set as follows: the lower range threshold is recorded to a respective parameter – *Lower Threshold*, the upper threshold is recorded to the *Upper Threshold* parameter respectively), then the event will be generated, when actual value of the sensor readings comes within such configured range. In all other cases the event will not be generated and no information will be sent to the server.

Example: Lower threshold of input voltage is set to 0 V, the upper threshold is 10 V (10,000 mV). If the input voltage decreases lower than 10 V, the event will be generated (Figure 7).

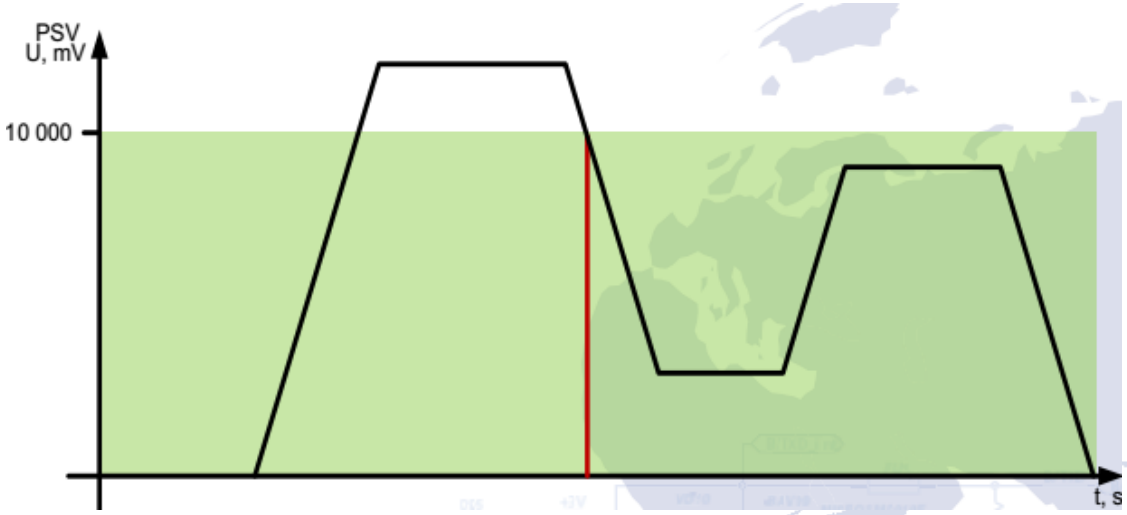


Fig. 7. Generation of the Event by Going Within Range.

1 - Going beyond range.

An event will be generated, when actual value of sensor readings goes beyond a configured range.

Example: Lower threshold of input voltage is set to 0 V, the upper threshold is 10 V (10000 mV). If the input voltage increases over 10 V, the event will be generated (Figure 8).

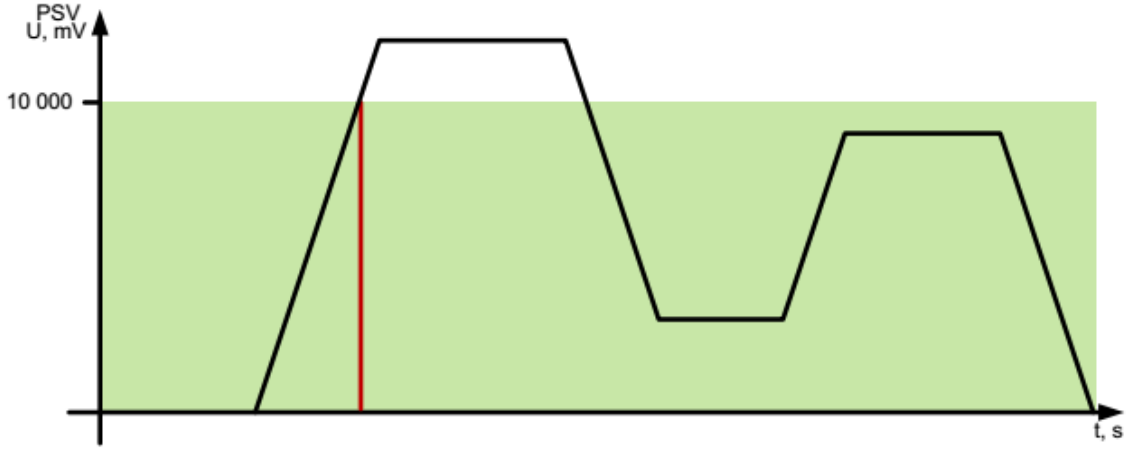


Fig. 8. Generation of the Event by Going Beyond Range.

2 - Going within/beyond range.

An event will be generated each time when actual value of sensor readings crosses the limits of a configured range.

Example: Lower threshold of input voltage is set to 5 V (5,000), and the upper threshold is 10 V (10,000 mV). When actual input voltage goes off the limits of a configured range, the event is generated (Figure 9).

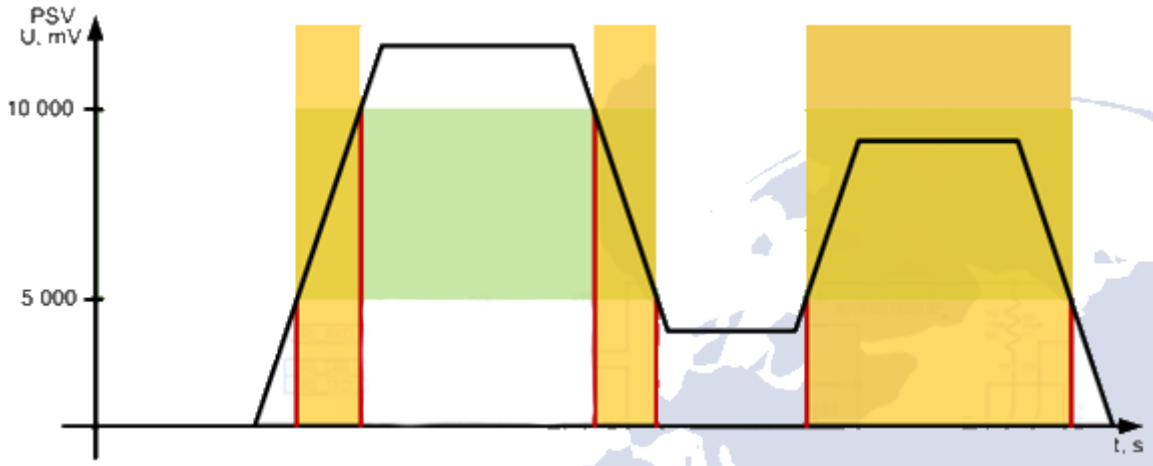


Fig. 9. Generation of the Event by Going Within/Beyond Range.

3 - Monitoring.

When this mode is selected, the data will be transmitted continuously, and no events will be generated.

4 - Monitoring + Going Within Range.

When a *Going Within Range* event is generated, actual value from the sensor starts to be transmitted to the server in the monitoring mode.

5 - Monitoring + Going Beyond Range.

When a *Going Beyond Range* event is generated, actual value from the sensor starts to be transmitted to the server in the monitoring mode.

6 - Monitoring + Going Within/Beyond Range.
When one of the events is generated, actual value from the sensor starts to be transmitted to the server.

7 - Change of Input by a Preset Value.
When an input value changes increasingly or decreasingly by a preset value, respective event will be generated. Value of the setting is specified by the *Upper Threshold* parameter.

8 - Monitoring + Change of Input by a Preset Value.
When the events is generated, actual value from the sensor starts to be transmitted to the server.

Parameter 5 – Averaging Constant.
It is the time during which an I/O component must be within a particular state in order to generate an event. This setting is specified in milliseconds (X*50 msec, i.e. when setting the value to 10, the constant will be 10*50=500 msec).

The list of all I/O components of the device available for configuration is given in Addendum 2.

Configuring Alarms

The device can be configured so as to make an outbound call if a particular condition is met. Activation of a particular I/O component constitutes such condition. Voice calls must be enabled in general configuration settings of the device. I/O component must be enabled, configured to one of the events (going within range, going beyond range, going within/beyond range), its ID must be set as a trigger for outbound calls, and an authorized phone number Phone0 must be configured.

Note
Outbound call can only be made or an SMS message can only be sent to a phone number specified in parameter 0261 (Phone0).

Additional prerequisites include device being within the GSM carrier coverage area and sufficient balance. In case the device is beyond the coverage area, the call will be postponed until such time when the device returns back to the coverage area. The device takes one attempt to make an outbound call per each trigger activation.

Alarm configuration settings are specified in the *Security* section of Addendum 1. Authorized phone number Phone0 is specified as the ID 0261 parameter.

Apart from the voice call, the device can send SMS messages to an authorized phone number, when events are triggered. The IDs of an I/O components by which SMS messages are sent should be configured as a trigger for outbound SMS messages. A user-defined text may be included with an SMS message, but it should not be more than 30 Latin characters.

Switching Between the Profiles

Description of Profile Switching

Switching between the profiles can be useful, when 2 SIM-cards are used in the device slots for SIM1 and SIM2. When the device is activated, it switches to current profile 0 and selects SIM1 slot. If a SIM-card is detected in the slot, the device tries to register on the GSM network. If the device fails to register within 3 minutes, it checks the value of the *Switch Profile Enable* setting. If its current profile value is 1, the device selects SIM2 slot. If the device fails to register within a particular time frame, its sets current profile to = 0, disables the modem and goes to sleep mode for 2 minutes. Once sleep time lapses the process is repeated.

If the profile switch is disabled, the device always selects SIM1 slot and uses profile 0 parameters. If no SIM-card is detected in the slot or if the device cannot register on the network, it switches off the modem for some time without switching between the profiles.

In case of successful registration on the network, the device will use configuration settings of the respective profile (profile 0 for SIM1 and profile 1 for SIM2).

Example of profile switch enabling.
setparam 0916 1;

ATTENTION! ***For correct operation of the profile switch option, roaming must be disabled for the SIM-card of local carrier.***

Description of Operator Selection Modes

1 - PARAM ID=0917=1

Both SIM cards are trying to register with the entire list of operators

2 - PARAM ID=0917=2

SIM1 tries to register with oper0 - oper19 only
SIM2 tries to register with oper20 - oper39 only

3 - PARAM ID=0917=3

SIM1 tries to register on the home network only
SIM2 tries to register with the entire list of oper0 - oper39

Mode 0 (Operator Selection Enable ID=0917 0)

In this mode, the device tries to register on the home network of the respective SIM card, the list of operators is not used. When the power is on, the device sets profile 0, selects SIM1 and waits for the SIM card to get up and ready as well as for the registration on the network. If the SIM-card has not been detected within a certain time, or it has been detected, but has failed to register on the network, the device checks if the profile switch (ID=0916) option is enabled. If the profile switch is

disabled, the device puts the modem into sleep for particular time. Once such timeout is reached the process is repeated.

If the profile switch is enabled, the device switches to profile 1, switches to SIM 2 and waits for presence and readiness of a SIM-card, and registration on the network. If the SIM-card has not been detected within a certain timeout, or it has been detected, but has failed to register on the network, the device switches to profile 0 and puts the modem to the sleep for a particular timeout. Once the timeout is reached the device selects SIM1 once again and the process is repeated. If the device registers on the home network, it uses the GPRS access settings of profile 0 for SIM1, and of profile 1 for SIM2.

Mode 1 (Operator Selection Enable ID=0917 1)

In this mode, the device tries to register on the enabled network set by the entire list of enabled networks (parameters ID = 0020-0059). When the power is on, the device selects profile 0, SIM1 and waits for it to appear and be ready. If the SIM-card is not detected or detected, but is not ready for a particular timeout, the device checks if the profile switch (ID=0916) option is enabled.

If the profile switch is disabled, the device puts the modem into sleep for particular time. Once such timeout is reached the process is repeated.

If the profile switch is enabled, the device switches to profile 1, selects SIM2 and waits for it to be up and ready. If during a particular timeout the SIM-card is not detected or it is detected, but not ready, the device switches to profile 0 and switches the modem to the sleep mode for a certain timeout. Once the sleep timeout is reached, the device selects SIM1 and the process is repeated.

If the SIM-card is detected and ready, the list of enabled operators is checked. If it is empty, the device behavior is similar to mode 0.

If the list is not empty, the device scans for available networks. If networks are detected that are included to the list of enabled ones, the device tries to register on one of the enabled networks. If the device has failed to register on any of the enabled networks detected with SIM1, the device checks if the profile switch (ID=0916) option is enabled, and if it is, then the device switches to profile 1, selects SIM2 and tries to register on one of the enabled networks.

If it has failed to register on any of the enabled networks detected with SIM2, or the profile switch option is disabled, or no enabled network has been detected in the list of available networks, the device switches to profile 0 and switches the modem to the sleep mode for a particular timeout. Once such timeout is reached the process is repeated.

If the device has managed to register on one of the enabled networks, it uses the parameters of profile 0 for SIM1, and profile 1 for SIM2, excluding GPRS connection parameters - APN/Usname/Uspass. These parameters are unique for each operator and have their own IDs for configuration.

If the device registers on the home network, it uses the GPRS access settings of profile 0 for SIM1, and of profile 1 for SIM2.

Mode 2 (Operator Selection Enable ID=917 2)

In this mode, the device tries to register on the enabled network, but for SIM1 networks with ID=0020-0039 are enabled, and for SIM2 – ID=0040-0059.

When the power is on, the device selects profile 0, SIM1 and wait for it to appear and be ready.

If the SIM-card is not detected or detected, but is not ready for a particular timeout, the device checks if the profile switch (ID=0916) option is enabled.

If the profile switch is disabled, the device puts the modem into sleep for particular time. Once such timeout is reached the process is repeated.

If the profile switch is enabled, the device switches to profile 1, selects SIM2 and waits for it to be up and ready. If the SIM-card has not been detected within a certain timeout, or it has been detected, but not ready, the device switches to profile 0 and puts the modem to the sleep for a particular timeout. Once such timeout is reached, the process is repeated.

If SIM1 is selected, the list of networks enabled for it is checked. If it is empty, the device tries to register on the home network of SIM1. If the list is not empty, the device scans for available networks.

If networks are detected that are included to the list of enabled ones, the device tries to register on one of the enabled networks. If the device has failed to register on any of the enabled networks detected using SIM1, or if there are no enabled networks in the list of available networks, the device checks if the profile switch (ID=0916) option is enabled.

If the profile switch is enabled, the device switches to profile 1 and selects SIM2. The list of networks enabled for SIM2 is checked. If it is empty, the device tries to register on the home network of SIM2.

If the list is not empty, the device scans for available networks. If networks are detected that are included to the list of enabled ones, the device tries to register on one of the enabled networks. If it has failed to register on any of the enabled networks detected with SIM2 or no enabled network has been detected in the list of available networks, the device switches to profile 0 and switches the modem to the sleep mode for a particular timeout. Once such timeout is reached, the process is repeated.

If the device has managed to register on one of the enabled networks, it uses the parameters of profile 0 for SIM1, and profile 1 for SIM2, excluding GPRS connection parameters - APN/Usname/Uspass. These parameters are unique for each operator and have their own IDs for configuration.

If the device registers on the home network, it uses the GPRS access settings of profile 0 for SIM1, and of profile 1 for SIM2.

Mode 3 (Operator Selection Enable ID=917 3)

In this mode, the device tries to register on the home network for SIM1 or one of the enabled networks set by the entire list of enabled networks ID=0020-0059.

When the power is on, the device selects profile 0, SIM1 and waits

for it to appear and be ready.

If the SIM-card is not detected or detected, but is not ready for a particular timeout, the device checks if the profile switch (ID=0916) option is enabled.

If the profile switch is disabled, the device puts the modem into sleep for particular time. Once such timeout is reached, the process is repeated.

If the profile switch is enabled, the device switches to profile 1, selects SIM2 and waits for it to be up and ready. If the SIM-card has not been detected within a certain timeout, or it has been detected, but not ready, the device switches to profile 0 and puts the modem to the sleep for a particular timeout. Once such timeout is reached, the process is repeated.

If SIM1 is selected, the device tries to register on the home network of SIM1. If the device has failed to register on the home network with SIM1, the device checks if the profile switch (ID=0916) option is enabled, and if it is, then the device switches to profile 1 and selects SIM2.

The list of networks enabled for SIM2 is checked. If it is empty, the device tries to register on the home network of SIM2. If the list is not empty, the device scans for available networks. If networks are detected that are included to the list of enabled ones, the device tries to register on one of the enabled networks. If it has failed to register on any of the enabled networks detected with SIM2 or no enabled network has been detected in the list of available networks, the device switches to profile 0 and switches the modem to the sleep mode for a particular timeout. Once such timeout is reached, the process is repeated.

If the device has managed to register on one of the enabled networks, it uses the parameters of profile 0 for SIM1, and profile 1 for SIM2, excluding GPRS connection parameters - APN/Usname/Uspass. These parameters are unique for each operator and have their own IDs for configuration.

If the device registers on the home network, it uses the GPRS access settings of profile 0 for SIM1, and of profile 1 for SIM2.

ATTENTION

From firmware version 5.0 and higher, critical changes have been made to the algorithm for working with operators, which allow you to speed up network connection. The main changes include:

- The possibility of selecting the home network operator's code and its priority use in operating modes with operators has been added;
- Added accounting for the presence of the code of the last operator with a successful connection when working with operators;
- Added profile parameter ID 0247 – the code of the last operator

with a successful connection;

- Parameter groups 0060-0099, 0100-0139, 0140-0179 have been deleted. Profile settings are used instead. For Profile 0 - 0242, 0243 and 0244; For Profile 1 – 1242, 1243 and 1244.

The operating mode of the device in the network (parameter 0917) can take the following values:

0917 value	SIM1 operating mode	SIM2 operating mode
0	Home-mode	Home-mode
1	Allowed 40	Allowed 40
2	Allowed 20L	Allowed 20H
3	Home-mode	Allowed 40
10	Home-mode	Home-mode
11	Excluded (30+10)	Excluded (30+10)
12	Excluded (15+5)L	Excluded (15+5)H
13	Home-mode	Excluded (30+10)

Explanation to table.

Home-mode – work in a home network. The list is not used.
Allowed 40 - a complete list of 40 allowed operators.
Allowed 20L - is the younger half of the list of allowed operators.
Allowed 20H - is the older half of the list of allowed operators.
Excluded (30+10) - the entire list of 40 prohibited operators, 30 of which are set by the user, and 10 are reserved for the dynamic part that can be changed by the program.
Excluded (15+5)L - is the lower half of the list of prohibited operators, 15 of which are specified by the user, and 5 are reserved for the dynamic part that can be changed by the program.
Excluded (15+5)H - the upper half of the list of prohibited operators, 15 of which are set by the user, and 5 are reserved for the dynamic part that can be changed by the program.
When working in the home network (0917=0), the search for operators is not performed and the modem is registered in the SIM card operator's network.
When working with the list of allowed operators (0917=1), a search for operators is performed and a list of available ones is formed, which will include only those operators that are included in the list with parameters 0020-0059.
When working with the list of prohibited operators (0917=11), a search for operators is performed and a list of available ones is formed, which will include only those operators that are NOT included in the list with parameters 0020-0049. At the same time, the list of prohibited operators is divided into two parts:

1. Static part, parameters 0020-0049. Set by the user;
2. Dynamic part, parameters 0050-0059. It is changed by the

program in the process of working with operators.

Recommended tracker settings for working with operator lists:

- ☐ setparam 4019 120;
- ☐ setparam 4020 240;
- ☐ setparam 0905 30;
- ☐ setparam 0906 30;
- ☐ setparam 0357 30;

In addition, changes have been made to the operation logic of parameter 0916 - profile switching. This parameter is used to allow switching of profiles, as well as to prohibit turning off the modem in the absence of critical errors (lack of SIM card, timeout errors waiting for a response when sending data to the main server) and no successful connection to the main server.

For this, a bit mask is applied to parameter 0916:

- Bit 0x1 determines permission to switch profiles (value 1 – allowed, 0 – prohibited);
- Bit 0x2 determines the prohibition of turning off the modem. If the bit is 0, then turning off the modem is allowed. If the bit is 1, the modem is disabled only if profile switching is also disabled (ie, 0916 is equal to 2).

An example of configuring a device to work with a list of allowed operators

For the device to work with the list of allowed operators, it is necessary to set the appropriate mode of its operation and fill in the list of allowed networks.

Fill in the list of allowed operators:

setparam 0020 MNC Code;
setparam 0021 MNC Code;
…
setparam 0099 MNC Code;

Set the APN, Usname, Uspass parameters of the main profile according to the settings of the SIM card that will be used:

setparam 0242 internet;
setparam 0243 ;
setparam 0244 ;

Set the appropriate operating mode:

setparam 0917 1;

Reboot the device with the *cpureset;* command.

Configuring the Device for Operation with RFID Readers

The BI-910 TREK Tracking Device is compatible with RFID readers via the RS-485 bus.

To configure the reader correctly, please, read its manual carefully first. To transfer the number of a card read to a server, respective I/O component needs to be configured.

Apart from transfer of the card number, there is also a feature for control of discrete outputs Out 1 and Out 2 depending on the cards being read. For this, the device is capable of storing up to 20 card numbers in non-volatile memory.

If a number of a card being read matches one of the card numbers saved to the memory, the device activates one of the discrete outputs.

Network addresses 3, 9, and 10 are reserved for operation with RFID readers. They cannot be changed, which is why a reader must be configured with one of these addresses to operate correctly.

Configuring the Device for Operation with Thermometers DS18B20

The BI-910 TREK Tracking Device is compatible with the DS18B20 thermometers. In total, up to five sensors may be connected.

Polling mode should be enabled in the device configuration settings for operation with thermometers (ID 0990, Addendum 1).

If a thermometer detected on line, the device polls them and retrieves current temperature readings. Given appropriate configuration of I/O components (Addendum 2), the readings of the meters can be transmitted to a monitoring server.

For correct detection of the thermometers, they have to be configured appropriately: each thermometer must be assigned a conventional number.

Note:
On firmware versions of BI910 ver.3.22/BI910V2 ver.4.5 and higher trackers, it is allowed to use one thermal sensor without the need to assign it a conditional number.

Meter numbering is, basically, entering special number string to the configuration registers of the meters.

Necessary values are given in Table 6.

Table 6. Numbers of configuration registers of thermometers DS18B20

Thermometer No.	Th	Tl	Configuration Register
0	0	172	127
1	1	157	127
2	2	206	127
3	3	255	127
4	4	104	127

For more details regarding entering values to thermometer configuration registers, please, refer to thermometer DS18B20 manual.

If the thermometers with the same number are detected, respective I/O component will record the readings from the meter polled the last.

Connection pattern between thermometer and BI-910 TREK tracker is given in Table 7.

Table 7. Connection of Thermometer to BI-910 TREK Using Parasite Power Pattern

Terminal No	Tracker conductor color	Signal type	Meter conductor color	Signal type	Purpose
A2	Violette / Black	1-wire PWR	White	Power	Output +3.3 V for device power supply "*1-Wire*" (15 mA max)
A3	Green / Yellow	1_wire	Green	Signal	*1-Wire* interface data signal
C1	Black	GND	Brown	Power	Ground (earth)

Configuration example:

Enabling thermometer servicing

setparam 0990 1;

Readings from thermometer 0, when transmitted to server ID 106

setparam 0630 1; setparam 0631 0; setparam 0632 0; setparam 0633 0; setparam 0634 3; setparam 0635 10;

Readings from thermometer 1, when transmitted to server ID 107

setparam 0640 1; setparam 0641 0; setparam 0642 0; setparam 0643 0; setparam 0644 3; setparam 0645 10;

Readings from thermometer 2, when transmitted to server ID 108

setparam 0650 1; setparam 0651 0; setparam 0652 0; setparam 0653 0; setparam 0654 3; setparam 0655 10;

Readings from thermometer 3, when transmitted to server ID 109

setparam 0660 1; setparam 0661 0; setparam 0662 0; setparam 0663 0; setparam 0664 3; setparam 0665 10;

Readings from thermometer 4, when transmitted to server ID 110

setparam 0670 1; setparam 0671 0; setparam 0672 0; setparam 0673 0; setparam 0674 3; setparam 0675 10;

Configuring the Device for Operation with Fuel Meter RS-485

The BI-910 TREK Tracking Device is compatible with fuel meter supporting RS-485 bus. In total, up to four fuel meters can be connected.

Respective I/O component must be enabled in the configuration settings of the device.

Besides, the fuel meters must be pre-configured with respective network address. Network addresses 1, 2, 5, and 6 are reserved on the BI-910 TREK Tracking Device for operation with fuel meters.

The tracking device has a feature of transmitting unprocessed (raw) data from the level meters, as well as the data processed with Kalman filter. Optimal filtration factors for Kalman filter are set by default.

Filtered and non-filtered values are transmitted by different I/O components.

Moreover, if the level meters are equipped with an in-built temperature sensor, data from it can be retrieved and transmitted to a server.

Also, when fuel level meters are used on special machinery with GND conductor that can be switched off, a situation may occur when fuel level readings are reset to zero if the chassis GND conductor is switched off, which results in false fuel level drop being registered in the monitoring software. In order to avoid this situation, the ID=0819 parameter must be enabled, which is disabled by default.

Enabling the use of values of the last valid fuel level:

setparam 0819 1;

If the cable length from the fuel meter to the tracker is over 12 meters, which, ultimately, results in failure to transmit the data from the sensor, the device circuit board has switch No.1 (Figure 10) that is intended for enabling pull-up resistor and 'A' & 'B' lines conditioning.

Switch No.2 is used for enabling the pull-up for CAN-bus.

Fig. 10. Line Conditioning Switch

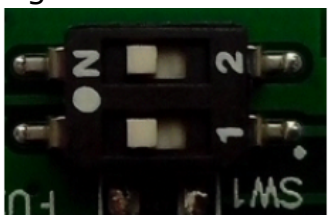
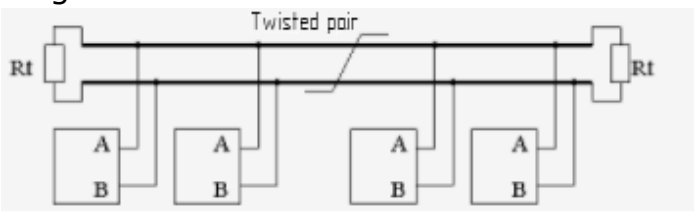


Fig. 11. A & B Communication Line Connection and Configuration Diagram.



Use of Backup Server

The BI-910 TREK Tracking Device supports the use of a backup server (Host2 Port2). The ID=0196 parameter is used for this case and by default is set to 0.

If 0196 is set to 0, only Host1 and Port1 are used.

If 0196 is set to 1, the device, at first, tries to connect to Host1 and Port1 several times. If it fails, then the device tries to connect to a backup server (Host2 Port2) when a configured timeout is reached.

Configuration example:
Enabling the use of a backup server:
setparam 0196 1;

IP Host2:
setparam 0188 111.1.111.11;

Port2:
setparam 0189 11;

Configuring Engine Lock

The BI-910 TREK Tracking Device together with a normally-closed relay can be used to lock the engine of the vehicle. Lock is enabled by sending an SMS message to the device.

Example of the SMS command for locking engine DOUT2: **setdigout 01;**

Example of the SMS command for locking engine DOUT1: **setdigout 10;**

To unlock the engine, the following command needs to be sent:

setdigout 00;

The device also has a feature of secure ignition lock.

Controlling commands: **ignitionoff; ignitionon;**

Controlled output: **DOut 1**

To lock the ignition, the ***ignitionon;*** command needs to be sent. This

command will be performed only when minimum vehicle travel speed according to GPS is less than 5 km/h.

When the lock is enabled, the device will send the response: *ignitionon;*

To disable the ignition lock, the following command is used: **ignitionoff;**

When the lock is disabled, the device will send the response: *ignitionoff;*

ATTENTION! ***The ignitionon; ignitionoff; commands will be performed by the device provided that they have been received via SMS message.***

Control of digital outputs Out 1 and Out 2. Description of control modes.

On devices "BI-910 TREK V2" with firmware version 4.6 and higher, the control of digital outputs Out 1 and Out 2 has been optimized, while maintaining full compatibility with the previously implemented control options.

The priority of output control has been introduced depending on the operating mode, as well as the output control modes. The output state control modes are presented in descending order of control priority:

1. EKEY;
2. ALARM BY GPS SPEED;
3. TSENS PWR;
4. NORMAL;

At the same time, for Out 1 control modes EKEY, TSENS PWR, NORMAL are supported;

All control modes are supported for Out 2 - EKEY, ALARM BY GPS SPEED, TSENS PWR, NORMAL.

For each of the outputs, only one control mode can be used at a time. For example, you cannot control Out 1 with the ALARM BY GPS SPEED mode while the EKEY mode is in use and active.

Description of control modes

1. **EKEY** mode is set when parameter 0915 is configured accordingly.

That is:

- Control of one of the outputs is activated (bits 1-0 set to 1 or 2);
- The EKEY type is selected, which provides for control of the outputs (bits 4-2 in the value: 2- iButton, 3 - RFID SOVA 9, 4 and more - RFID SOVA 10).

In this mode, the output is set/reset according to the presence/absence of the card (key) in the reader. The last output state is saved to the non-volatile memory.

To control the outputs via iButton, adding the key number to the tracker's internal memory is mandatory (parameters 0920-0939).

To control the outputs via RFID SOVA 9 or 10, you do not need to add the card number to the tracker's internal memory.

Possible values of parameter 0915 for operation in EKEY mode are represented in table 8.

Table 8. Operating in EKEY mode

ID	Value	Controlled output	Control source
0915	9	Out 1	iButton
	10	Out 2	iButton
	13	Out 1	RFID SOVA 9
	14	Out 2	RFID SOVA 9
	17	Out 1	RFID SOVA 10
	18	Out 2	RFID SOVA 10

The value accepted by parameter 0915 is calculated as a 5-bit bit mask. The high 3 are responsible for the EKEY type, the low 2 for the DOUT type.

The DOUT masks are as follows:
0b01 == 1 - DOUT 1
0b10 == 2 - DOUT 2

Masks of EKEY types are as follows:
0b010 == 2 - iButton
0b011 == 3 - RFID SOVA 9
0b100 == 4 - RFID SOVA 10

0b01001 == 9 - iButton/DOUT 1
0b01010 == 10 - iButton/DOUT 2
0b01101 == 13 - RFID SOVA 9/DOUT 1
0b01110 == 14 - RFID SOVA 9/DOUT 2
0b10001 == 17 - RFID SOVA 10/DOUT 1
0b10010 == 18 - RFID SOVA 10/DOUT 2

2. The **ALARM BY GPS SPEED** mode is set if parameter 5008 has a value greater than or equal to 5 km/h. In this mode, the output is set to active if the GPS speed is at least 5 km/h and more or equal to parameter 5008.

The minimum time for keeping the output active is 5 seconds. If the speed continues to meet the previously described conditions, the timeout is reset again to 5 seconds. Upon expiration of the specified timeout, the output is deactivated and the transition to waiting for overspeeding by GPS is performed.

The last state of the output is NOT stored in non-volatile memory.

3. **TSENS PWR** mode is set when parameter 0990 is set to 2 (control of Out 1) or 3 or more (control of Out 2). This operating mode provides a short-term de-energization of the temperature sensors in the event of their loss on the 1-Wire bus.

To enable and correct operation in this mode, it is necessary to activate any of the I/O-elements responsible for storing the temperature sensors data (setting groups 0630, 0640, 0650, 0660, 0670, 5040).

In this mode the corresponding output is set to active state and data from any of the included temperature sensors is expected for 10 seconds.

If data is received, the output continues to be active and the wait timeout is extended again by 10 seconds.

If there is no data and the waiting timeout expires, the output is deactivated for 2 seconds, after which it is reactivated and the waiting process is performed according to the previously described algorithm.

The last state of the output is NOT stored in non-volatile memory.

When using this operating mode, the minus power supply of the temperature sensors is connected to the discrete output of the tracker, and not to the common wire (GND).

4. The **NORMAL** mode is set if there are no conditions for operation in any higher priority mode of operation.

In this mode, the outputs can be controlled using the setdigout, ignitionon, ignitionoff commands. The set state of the output is stored in the non-volatile memory.

GPS data filtering and pedestrian mode

In devices "BI 910 TREK" with firmware version 3.21 and higher, as well as in devices "BI 910V2 TREK" with firmware version 4.4 and higher, a GPS data filter has been added to cut off distorted or unreliable data, as well as the so-called "Pedestrian mode"(slow motion mode).

Pedestrian mode is determined by the GPS speed value and is activated if the speed in km/h is greater than or equal to the value of parameter 0918 and less than the value of parameter 0997.

To validate the current set of GPS data and control the creation of records, the following parameters have been shared:

- ID = **0918** - minimum speed in km/h for GPS motion detection. Default 5, range 0 - 10 km/h;
- ID = **0997** - GPS speed in km/h for fast movement detection. The default is 10, the range is 0 - 255 km/h, but if it is less than the value of parameter 0918, then it is equal to it;
- ID = **0992** - the minimum number of satellites to determine the validity of the current GPS data set. Default 0, range 0 - 255;
- ID = **0998** - maximum HDOP value for determining the validity of the current GPS dataset. Contains the HDOP value multiplied by 100. Default 500 (HDOP = 5.00), range 50 - 9999 (HDOP = 0.50 - 99.99);
- ID = **0999** - maximum distance in meters for creating records in

pedestrian mode. The default is 25, the range is 10 - 200 m.

The following criteria are used to validate the current GPS dataset:

- The number of satellites must be greater than or equal to the value of parameter 0992;
- HDOP must not be greater than the value of parameter 0998 divided by 100.

To determine the current mode of movement, the value of parameter 0918 (hereinafter **minGPSSpeed**) and the value of parameter 0997 (hereinafter **fastGPSSpeed**) are used, as well as movement along the accelerometer and the presence of ignition as validators of the presence of movement.

Depending on the ratio between minGPSSpeed and fastGPSSpeed, 3 motion modes are defined:

- Mode 1 – minGPSSpeed > 0 and fastGPSSpeed > minGPSSpeed
- Mode 2 – minGPSSpeed > 0 and fastGPSSpeed == minGPSSpeed
- Mode 3 - minGPSSpeed == 0 and fastGPSSpeed == 0

~ Mode 1 ~

Used to unambiguously divide into:

- parking state when the speed is < minGPSSpeed;
- the state of slow movement with validation of movement by the accelerometer, when the speed is ≥ minGPSSpeed and less than fastGPSSpeed and the accelerometer detects the presence of movement;
- state of movement with validation of movement by the accelerometer or the presence of ignition, when the speed ≥ fastGPSSpeed and the accelerometer indicates the presence of movement or the ignition is turned on.

This mode is mainly used on cars and trucks that travel on public roads.

~ Mode 2 ~

Used to unambiguously divide into:

- parking state when speed < minGPSSpeed;
- state of movement with validation of movement by the accelerometer, when the speed is ≥ minGPSSpeed and the accelerometer detects the presence of movement.

This mode is recommended for vehicles that perform operations at a low speed (for example, agricultural machinery). At the same time, the value of the fastGPSSpeed and minGPSSpeed parameters should be set to 2-3 km/h.

~ Mode 3 ~

Used to unambiguously divide into:

– state of movement with validation of movement solely by the accelerometer, when the accelerometer detects the presence of movement regardless of the current speed.

In addition, changes were made to the logic of creating records depending on the state of movement:

- In the stationary state, records are created only by the time of data record (available in all modes);
- In pedestrian mode (available only in mode 1), records can be created by time or if the device moved away from the coordinate from the last record at a distance not less than set by parameter 0999 (in meters);

In motion state, recordings are created by time/distance/azimuth (available in all modes).

Cumulative fuel consumption based on SPN183

On V1 and V2 devices, from firmware version 5.0, the function of calculating fuel consumption based on SPN183 Fuel Rate has been added. The count is performed in milliliters and stored in non-volatile memory of V1 devices every 10 minutes and V2 devices every 2 minutes, as well as when the device is rebooted by command or reboot period.

An I/O element with ID_Send 142 has been added to transfer fuel consumption in liters to the server.

To request the current value of the fuel consumption meter, the *fuelvolume*; command is provided, the answer to which contains the current value.

Example answer:

fuelvolume: x.yyy

,where:
x – value in liters;
yyy - value in milliliters. Always 3 characters.

GPRS commands

On V1 and V2 devices, from firmware version 5.0, support for GPRS commands from the configuration IPS server has been added. Commands are sent in the form of #M packets according to the Wialon IPS 1.1 protocol and have the following structure:

TPASS: 11111;Command1;CommandN;

,where:

TPASS: 11111; - tracker terminal password. The factory value is 11111;
Command1; CommandN; – any valid tracker commands.

For each valid command received, the tracker sends a response as described in the relevant sections of this document.

Switching the device operation mode with SIM or USIM cards

On V1 and V2 devices, starting with firmware version 5.8, the ability to switch between SIM and/or USIM card modes has been added.

The parameter 4035 has been added, which defines the mode of operation, with the factory default value of 0. Valid values for this parameter are 0 or 3. A value greater than 3 will be interpreted as 0. The current value of the parameter is stored in the device's non-volatile memory and is NOT reset to the factory value by the rstallprof; command.

Valid values of the parameter 4035 are:

- 0 - the modem interacts with the SIM card in SIM mode (factory default);
- 3 - the modem interacts with the SIM card initially in the USIM mode, but in case of impossibility to work in this mode, it automatically switches to the SIM mode.

IMPORTANT

The operating mode should be changed only when directly connected to the device via UART. Switching modes remotely by sending SMS or GPRS commands is not allowed.

When selecting the operating mode, the following recommendations should be followed:

- After each change of the value in parameter 4035, the device must be rebooted;
- If the tracker works properly with a SIM card and is registered in the network at 4035=0, then there is no need to change this value;
- If the tracker does NOT work with the value 4035=0, then you should select the operating mode 3;
- If the tracker does not work with a SIM card and does not register in the network at any valid value of the 4035 parameter, then you need to replace the SIM card with one that is compatible with the device's modem.

Addendum 1. Device parameters

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
Server and GPRS						
ipsHost0	0245	String	Primary server IP address	none	IP or DNS	31.28.163.20
ipsPort0	0246	2 bytes	Primary server PORT	none	PORT	20127
Switching Host 2 Port 2	0196	1 byte	Enabling backup server	none	0 - disabled; 1 - enabled;	0
ipsHost1	0188	String	Backup server IP address	none	IP or DNS	31.28.163.20
ipsPort1	0189	2 bytes	Backup server PORT	none	PORT	20127
Switchig Conf Host***	**4021**	1 byte	Permission to use the configuration server	none	0 – prohibited; 1 – allowed;	0
ConfigHost***	**4022**	string	IP or DNS of the configuration IPS server	none	IP or DNS	193.193.165.165
ConfigPort***	**4023**	2 bytes	PORT of the configuration IPS server	none	PORT	20332
IPSPassword***	**4009**	string	IPS password	none	string	IPS
IPSPingPeriod***	**4011**	2 bytes	Ping timeout of the configuration IPS server	sec	5 - 600	60
ProtocolType***	**0241**	1 byte	Type of data transmission protocol	none	0 – Bitrek 1 – Wialon IPS	0
APN	0242	String	GPRS access point	none	APN	gps.utel.ua
Usname	0243	String	GPRS access login	none	User Name	none

Parameter name	ID for configu ration	Bit depth	Parameter purpose	Units	Possible values	Default values
Uspass	0244	string	GPRS access password	none	User Password	none
Send Period	0270	2 bytes	Transmission to server time	sec.	0 - 65535	60
Connect Try Amount	0904	1 byte	Number of attempts to connect to server	pcs.	-	3
Connect Try Interval	0905	2 bytes	Time between connection attempts	sec.	0 - 65535	60
Connect Serial Interval	0906	2 bytes	Time between serial attempts to connect	sec.	0 - 65535	300
Send Amount Del	0356	1 byte	Number of attempts to send data to the server before deletion	pcs.	1 - 256	3
Send Confirm Time	0357	1 byte	Time to wait for a response from the server	sec.	1 - 256	60
Enable Time Period	0900	1 byte	Enabling time of retrieval	none	0 - disabled; 1 - enabled;	1
Enable Dist Period	0901	1 byte	Enabling distance of retrieval	none	0 - disabled; 1 - enabled;	1
Enable Angle Period	0902	1 byte	Enabling azimuth of retrieval	none	0 - disabled; 1 - enabled;	1
Day Period	0903	2 bytes	Enabling time of retrieval with the ignition on	sec.	0 - 65535	30
Night Period	0011	2 bytes	Enabling time of retrieval with the ignition off	sec.	0 - 65535	30

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
Dist Period	0012	2 bytes	Retrieval period by distance	m	0 - 65535	500
Angle Period	0013	1 byte	Retrieval period by azimuth	deg.	1 - 180	10
Record Amount	0232	2 bytes	Number of records per packet	pcs.	0 - 65535	0
Delta X	0281	1 byte	Acceleration meter X-direction deviation angle	c.u.	1 - 256	5
Delta Y	0282	1 byte	Acceleration meter Y-direction deviation angle	c.u.	1 - 256	5
Delta Z	0283	1 byte	Acceleration meter Z-direction deviation angle	c.u.	1 - 256	5
Start Move Timeout	0284	2 bytes	Timeout for movement start by acceleration meter	0.1 sec.	0 - 65535	50
Stop Move Timeout	0285	2 bytes	Timeout for movement stop by acceleration meter	0.1 sec.	0 - 65535	200
Axel Sleep Enable	0911	1 byte	Enabling sleep by acceleration meter	none	0 - disabled; 1 - enabled;	0
WAIT_SLEEP_ TIMEOUT	4007	2 bytes	Timeout for sleep by acceleration meter	min.	5 - 65535	15
SLEEP_ TIMEOUT	4008	2 bytes	Sleep timeout by acceleration meter	min.	0 - 65535	720
min_GPS_ speed**	**0918**	1 byte	Minimum speed according to GPS for movement detection	km/h	1 - 256	5

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
GPS Source Select	4016	1 byte	Selecting geopositioning system	c.u.	0 or 3 - GPS+GLONASS; 1 - GPS only; 2 - GLONASS only;	3
FastGPS Speed**	**0997**	1 byte	GPS speed for fast movement detection	km/h	0 - 255	10
MinSats**	**0992**	1 byte	The minimum number of satellites to determine the validity of the current GPS dataset	pcs.	0 - 255	0
MaxHDOP**	**0998**	2 bytes	Maximum HDOP for determining the validity of the current GPS dataset	HDOP* 100	50 – 9999	500 (HDOP=5.00)
MaxDist**	**0999**	1 byte	Maximum distance in meters for recording in slow motion (pedestrian) mode	m	10 – 200	25
Safety						
Phone0	0261	string	Authorized phone number 0	-	+xxxxxxxxxxxx	-
Phone1	0262	string	Authorized phone number 1	-	+xxxxxxxxxxxx	-
Phone2	0263	string	Authorized phone number 2	-	+xxxxxxxxxxxx	-

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
Phone3	0264	string	Authorized phone number 3	-	+xxxxxxxxxxxx	-
Phone4	0265	string	Authorized phone number 4	-	+xxxxxxxxxxxx	-
Phone5	0266	string	Authorized phone number 5	-	+xxxxxxxxxxxx	-
Phone6	0267	string	Authorized phone number 6	-	+xxxxxxxxxxxx	-
Phone7	0268	string	Authorized phone number 7	-	+xxxxxxxxxxxx	-
Phone8	0269	string	Authorized phone number 8	-	+xxxxxxxxxxxx	-
SMS Login	0252	string	SMS access login	-	Login	-
SMS Password	0253	string	SMS access password	-	Password	-
Terminal Password	0910	string	Device access password	-	-	11111
SIM_PIN	0818	1 byte	Enabling SIM-card carrier's PIN-number	-	-	-
Service						
Reboot Per	0186	1 byte	Period of regular device reboot	hour	1 - 256	24
Reboot Type	0187	1 byte	Type of device reboot	-	0 - complete; 1 - modem only;	0

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
ErrSatNum	0992	1 byte	Enabling configuration of satellite number when GPS signal is lost	pcs.	1 – 256	0
GPRS_stay alive	0907	2 bytes	GPRS session lifetime	min.	1 - 65535	480
Modem_ switch	0916	1 byte	Permission to switch profiles and prohibition to turn off the GSM modem	c.u.	0, 1, 2, 3	0
ENAUSIM	4035	1 byte	SIM or SIM/USIM mode for SIM1 slot	-	0 or 3	0
ENAUSIM1	4036	1 byte	SIM or SIM/USIM mode for SIM2 slot	-	0 or 3	0
USIMSWITCH	4037	1 byte	Enable automatic SIM/USIM mode switching for SIM1 and SIM2 (bit mask: bit0 - SIM1; bit1 - SIM2)	-	0, 1, 2, 3	3
NTP_Ena	4038	1 byte	Enable NTP synchronization	-	0 or 1	0
Alarms						
InputCall Trigger	0994	1 byte	Response to incoming call with digital inputs	-	0 - disabled; 1 - 6 - ID of I/O component (digital input) used for response to incoming call	0

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
ringNum	0912	1 byte	Number of rings prior to auto phone pickup	pcs.	1 - 256	3
Microphone Level	0995	1 byte	Headset mic level adjustment	c.u.	0 - 7	4
speakerLevel	0996	1 byte	Headset speaker level adjustment	c.u.	0 - 14	7
RingEnable	0913	1 byte	Enabling outbound voice calls	-	0 - disabled; 1 - enabled;	0
OutCall Trigger	0914	2 bytes	ID of I/O component triggering outbound voice call	-	ID	-
SMSTrigger	0816	2 bytes	ID of I/O component triggering SMS to be sent to an authorized phone number in cases of event generation	-	ID	-
SMSText	0817	string	Text added to SMS (NMT 30 Latin characters)	-	Text	-
Roaming						
Operator Selection Enable	0917	1 byte	Device's operating mode	-	0, 1, 2, 3, 10, 11, 12, 13	0
UsipTable	0020… 0059	string	List of operator codes	-	MCC MNC Code	-
UsAPNTable	0060… 0099	string	List of APN operators (parameters removed from firmware version 5.0)	-	APN	-

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
UsLoginTable	0100… 0139	string	List of GPRS logins (parameters removed from firmware version 5.0)	-	Login	-
UsPassTable	0140… 0179	string	List of GPRS passwords (parameters removed from firmware version 5.0)	-	Password	-
LastOperCode	0247	string	Code of the last operator with a successful connection (read only)	-	MCC MNC Code	-
Parameters for I/O component configuration						
FuelCounter Mode	0993	1 byte	Fuel meter mode	none	0 - absolute fuel economy; 1 - instantaneous fuel economy;	0
AIN1_filter_ period	0959	2 bytes	Period of data retrieval by AIN1 median filtering	(X+1)* 50mS	-	19
AIN2_filter_ period	0980	2 bytes	Period of data retrieval by AIN2 median filtering	(X+1)* 50mS	-	19
MIN_duration_ of_fuel	0349	1 byte	Filter of digital inputs dlow3/dlow4. Levels below the specified one will be filtered	10 mS	1 - 20	5

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
ValidfuelLevel	0819	1 byte	Enabling the use of last valid fuel level (filtered and non-filtered levels)	none	0 - disabled; 1 - enabled;	0
polling_period_fuel	0197	2 bytes	Polling period for four RS485-based fuel meters	0.1 sec.	-	100
polling_period_RFID	0198	2 bytes	Polling period for RS485-based RFID	0.1 sec.	-	15
polling_period_radio_module	0199	2 bytes	Polling period of RS485-based wireless sensor of tailing equipment	0.1 sec.	-	100
polling_period_iButton	0208	2 bytes	Polling period for RS485 iButton	0.1 sec.	-	100
polling_period_tsens	0206	2 bytes	Polling period for RS485 Tsens	0.1 sec.	-	100
polling_period_RFID_RKS	0201	2 bytes	Polling period for RS485 RFID RKS (SOVA)	0.1 sec.	-	15
FactorF	0950	4 bytes	F factor for Kalman filter	c.u.	-	1000000
FactorQ	0951	4 bytes	Q factor for Kalman filter	c.u.	-	1000000
FactorH	0952	4 bytes	H factor for Kalman filter	c.u.	-	1000000
FactorRs	0953	4 bytes	R factor for Kalman filter with no movement	c.u.	-	20000000

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
FactorRm	0954	4 bytes	R factor for Kalman filter with movement	c.u.	-	400000000
switchFilters	0209	1 byte	Switching between filter types for filtered fuel meters	none	1 - Kalman filter;	1
Ekey_num	0920… 0939	8 bytes	ID of enabled electronic keys	none	ID	0
GSM_Reg_ Timeout	4019	2 bytes	Timeout for registration on the GSM network	sec	60 – 300	120
GPRS_Reg_ Timeout	4020	2 bytes	Timeout for registration on the GPRS network	sec	60 - 300	120
GPS_Speed_ Alarm**	**5008**	1 byte	GPS speed to activate the ALARM BY GPS SPEED mode (speed ≥ 5 km/h - the mode is active)	km/h	5 – 255	0
Coords_MSG_ Send***	**4025**	1 byte	Allow sending a message with coordinates in Google Maps format when an incoming call	c.u.	0 - sending is prohibited; 1 - allowed for authorized numbers; 2 - allowed for any numbers;	0
EkeyEna*	**0915**	1 byte	Permission of electronic key maintenance, setting of EKEY operating modes and control of outputs.	none	9, 10, 13, 14, 17, 18	0

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
iButtonEna	0991	1 byte	Enabling electronic ID key	none	0 – disabled; 1 – enabled;	0
TsensEna*	**0990**	1 byte	Enabling thermometer support, setting TSENS PWR mode	none	0 - disabled; 1 - enabled; 2 - control Out 1 *; 3 or more - Out 2 control *.	0
RadioMod Ena	0808	1 byte	Enabling wireless sensor of tailing equipment	none	0 – disabled; 1 - enabled	0
CAN						
CANSpeed	0216	1 byte	CAN bus speed	c.u.	0: = 125000 1: = 250000 2: = 500000 3 and 7: = 83333 4: = 33333 5: = 50000 6: = 83000 other index: = 100000	1
canID1	3326	4 bytes	IDs of CAN-messages received	none	ID	0
canID2	3327	4 bytes	IDs of CAN-messages received	none	ID	0

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
canID3	3328	4 bytes	IDs of CAN-messages received	none	ID	0
canID4	3329	4 bytes	IDs of CAN-messages received	none	ID	0
canID5	3330	4 bytes	IDs of CAN-messages received	none	ID	0
canID6	3331	4 bytes	IDs of CAN-messages received	none	ID	0
canID7	3332	4 bytes	IDs of CAN-messages received	none	ID	0
canID8	3333	4 bytes	IDs of CAN-messages received	none	ID	0
canID9	3334	4 bytes	IDs of CAN-messages received	none	ID	0
CAN_ DMASK_ID1	0326	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID2	0327	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID3	0328	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID4	0329	2 bytes	Mask of bytes received	c.u.	0 - 255	0

Parameter name	ID for configuration	Bit depth	Parameter purpose	Units	Possible values	Default values
CAN_ DMASK_ID5	0330	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID6	0331	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID7	0332	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID8	0333	2 bytes	Mask of bytes received	c.u.	0 - 255	0
CAN_ DMASK_ID9	0334	2 bytes	Mask of bytes received	c.u.	0 - 255	0
PROP_CAN_ ID	3335	4 bytes	The full ID of the proprietary CAN message containing instantaneous fuel consumption data	HEX	0x0 - 0x1FFFFFFF	0
PROP_DATA_S WAP	4031	1 byte	Byte order (little-endian or big-endian)	-	0 - little-endian 1 - big-endian	0
PROP_DATA_S HIFT	4032	1 byte	Offset in bits (StartBit)	-	0 - 63	0
PROP_DATA_M SK	4033	4 bytes	Mask (length)	-	0x0 - 0xFFFFFFFF	0
PROP_DATA_D IV	4034	4 bytes	Coefficient of division of instantaneous fuel consumption	-	1 - 4294967295	1

Parameter name	ID for configu ration	Bit depth	Parameter purpose	Units	Possible values	Default values
CANDRV	5047	1 byte	CAN driver version selection 0 – V1 version 1 – V2 version	-	0 or 1	1

*Note:
This extended functionality applies only to BI-910V2 TREK devices with firmware version 4.6 and higher.

**Note:
These parameters take effect only for BI-910 TREK devices with firmware version 3.21 and higher, as well as for BI-910V2 TREK devices with firmware version 4.4 and higher.

***Note:
This parameter is available only for BI-910 TREK devices with firmware version 3.20 and higher.
ID_Conf parameters 3335, 4031, 4032, 4033, 4034, 4022, 4023, 4009, 4011, 0241, as well as parameter groups 6090...6095, 7000...7005, 7010...7015 are only available from firmware version 5.0 and higher (for V1 and V2).
ID_Conf 5047 is only available for BI-910V2 devices with firmware version 4.9 and later.
The ID_Conf 4038 parameter is only available from firmware version 5.95 and higher (for V1 and V2).

Addendum 2. List of I/O components

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
dlLow1	0340… 0345	1	1 byte	Digital input responding to log 0	none	0 – enabled, 1 – disabled
dlLow2	0350… 0355	2	1 byte	Digital input responding to log 0	none	0 – enabled, 1 – disabled
dlLow3	0360… 0365	3	1 byte	Digital input responding to log 0	none	0 – enabled, 1 – disabled
dlLow4	0370… 0375	4	1 byte	Digital input responding to log 0	none	0 – enabled, 1 – disabled
dlHigh1	0540… 0545	5	1 byte	Digital input responding to log 1	none	0 – disabled, 1 – enabled
dlHigh2 (Ignition)	0550… 0555	6	1 byte	Digital input responding to log. 1 (reserved for ignition connection)	none	0 – disabled; 1 - enabled
GSMCSQ	0470… 0475	21	1 byte	GSM signal level	none	0 - 5
Profile	0480… 0485	22	1 byte	Profile number	none	-
Movement	0510… 0515	240	1 byte	Movement status	none	1/0

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
AIN1	0300…0305	9	2 bytes	Analog input 1	V	-
AIN2	0310…0315	10	2 bytes	Analog input 2	V	-
VBAT	0420…0425	67	2 bytes	Battery voltage	V	-
PSV	0410…0415	66	2 bytes	Power supply voltage	V	-
GPSSpeed	0490…0495	24	2 bytes	Speed per GPS	km/h	-
GPSPower	0450…0455	69	1 byte	Availability of GPS signal	pcs.	-
pcbTemp	0440…0445	70	4 bytes	Device temperature	C	-
Real Odometr	0500…0505	199	4 bytes	Relative virtual odometer	km	-
Odometr	0710…0715	200	4 bytes	Absolute virtual odometer	km	-
fuelCounter	0460…0465	76	4 bytes	Fuel meter (pulse difference between dlLow3 and dlLow4 meter inputs)	c.u.	-

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
fuelLevel1	0580…0585	100	2 bytes	Polling filtered fuel meter (network address 1)	c.u.	-
fuelLevel2	0590…0595	101	2 bytes	Polling filtered fuel meter (network address 2)	c.u.	-
fuelLevel5	0850…0855	129	2 bytes	Polling filtered fuel meter (network address 5)	c.u.	-
fuelLevel6	0860…0865	130	2 bytes	Polling filtered fuel meter (network address 6)	c.u.	-
fuelLevel Unfilt1	0690…0695	112	2 bytes	Polling non-filtered fuel meter (network address 1)	c.u.	-
fuelLevel Unfilt2	0700…0705	113	2 bytes	Polling non-filtered fuel meter (network address 2)	c.u.	-
fuelLevel Unfilt5	0870…0875	131	2 bytes	Polling non-filtered fuel meter (network address 5)	c.u.	-
fuelLevel Unfilt6	0880…0885	132	2 bytes	Polling non-filtered fuel meter (network address 6)	c.u.	-
fuelTemp1	0600…0605	102	1 byte	Fuel temperature per fuel meter (network address 1)	°C	-
fuelTemp2	0610…0615	103	1 byte	Fuel temperature per fuel meter (network address 2)	°C	-

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
fuelTemp5	0520…0525	127	1 byte	Fuel temperature per fuel meter (network address 5)	°C	-
fuelTemp6	0530…0535	128	1 byte	Fuel temperature per fuel meter (network address 6)	°C	-
TSens0	0630…0635	106	2 bytes	Thermometer 0 readings	°C	-
TSens1	0640…0645	107	2 bytes	Thermometer 1 readings	°C	-
TSens2	0650…0655	108	2 bytes	Thermometer 2 readings	°C	-
TSens3	0660…0665	109	2 bytes	Thermometer 3 readings	°C	-
TSens4	0670…0675	110	2 bytes	Thermometer 4 readings	°C	-
TSens_Zero	5040…5045	161	2 bytes	Unconfigured Thermometer readings	°C	-
fuelCounter1	0180…0185	136	4 bytes	Direct flow pulse counter (dlLow3)	c.u.	-
fuelCounter2	0190…0195	137	4 bytes	Reverse flow pulse counter (dlLow4)	c.u.	-

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
1_Wire	0400…0405	78	8 bytes	iButton identifier electronic key	none	-
OperCode	0680…0685	111	4 bytes	Transmission of carrier's code	none	-
modemStat	0750…0755	117	1 byte	Transmission of device modem status	none	0 - not active; 1 - active;
SIM_Stat	0790…0795	121	1 byte	SIM card status	none	0 - no SIM detected; 1 - SIM detected; 2 - SIM detected, but not ready; 3 - SIM detected and ready
GSM_Stat	0760…0765	118	1 byte	GSM network registration status	none	0 - not registered and not searching for carriers; 1 - home network; 2 - not registered, but searching for carriers; 3 - registration disabled; 4 - status unknown; 5 - roaming;

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
GPRS_net_Stat	0770…0775	119	1 byte	GPRS network registration status	none	0 - not registered and not searching for carriers; 1 - home network; 2 - not registered, but searching for carriers; 3 - registration disabled; 4 - status unknown; 5 - roaming;
GPRS_content_stat	0780…0785	120	1 byte	GPRS content activation status	none	0 - not activated; 1 - activated;
count_dLow1	0830…0835	125	4 bytes	Frequency input (transmission of number of pulses per 5 sec)	c.u.	-
fast_dlLow1	0320…0325	155	4 bytes	Instantaneous pulse counter (minimum measurement is 1mS)	c.u.	-
pulseCount_dlLow3	3810…3815	158	4 bytes	Pulse counter saving the values to non-volatile memory. (dlLow3)	c.u.	-

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
pulseCount_dlLow4	3820… 3825	159	4 bytes	Pulse counter saving the values to non-volatile memory. (dlLow4)	c.u.	-
Trailer Module4	0390… 0395	135	8 bytes	Module of identifier of tailing equipment (network address 4)	none	-
RFID_3	0620… 0625	105	8 bytes	RFID identifier (network address 3)	none	-
RFID_RKS_9	3800… 3805	157	8 bytes	RFID identifier (SOVA) (network address 9)	none	-
RFID_RKS_10	3830.. 3835	160	8 bytes	RFID identifier (SOVA) (network address 10)	none	-
TimeSaving	5000… 5005	190	4 bytes	Device operation time	min.	-
axesX	0720… 0725	114	1 byte	Actual value of X-direction elevation angle	deg	0 - 255
axesY	0730… 0735	115	1 byte	Actual value of Y-direction elevation angle	deg	0 - 255
axesZ	0740… 0745	116	1 byte	Actual value of Z-direction elevation angle	deg	0 - 255
HDOP	0800… 0805	122	2 bytes	Horizontal accuracy determination	c.u.	0 - 9999

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
setIO_CAN 1	3620… 3625	145	8 bytes	Activation of I/O component CAN1	c.u.	-
setIO_CAN 2	3630… 3635	146	8 bytes	Activation of I/O component CAN2	c.u.	-
setIO_CAN 3	3640… 3645	147	8 bytes	Activation of I/O component CAN3	c.u.	-
setIO_CAN 4	3650… 3655	148	8 bytes	Activation of I/O component CAN4	c.u.	-
setIO_CAN 5	3660… 3665	149	8 bytes	Activation of I/O component CAN5	c.u.	-
setIO_CAN 6	3670… 3675	150	8 bytes	Activation of I/O component CAN6	c.u.	-
setIO_CAN 7	3680… 3685	151	8 bytes	Activation of I/O component CAN7	c.u.	-
setIO_CAN 8	3690… 3695	152	8 bytes	Activation of I/O component CAN8	c.u.	-
setIO_CAN 9	3700… 3705	153	8 bytes	Activation of I/O component CAN9	c.u.	-
SPNFuel Counter*	6090… 6095	142	4 bytes	Fuel consumption meter in liters (cumulative, based on calculation according to SPN183)	liters	-

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values
PropFuel Counter*	7000… 7005	143	8 bytes	Fuel consumption meter in relative values, taking into account the division factor (cumulative, based on the calculation of the proprietary PGN)	c.u.	-
PROP_DATA_DIV*	7010… 7015	144	4 bytes	Current value of the division factor	c.u.	-
REC_NUM	4090… 4095	249	2 bytes	The sequence number of the record that was transferred to the server	-	0 - 65535

*Note:
ID_Send parameters 142, 143, 144 are available only from firmware version 5.0 and higher.
ID_Send 249 parameter is available only from firmware version 5.95 and higher.

Addendum 3. Operating parameters for Profile 1

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values	Default values
Night Period	1011	none	2 bytes	Enabling time of retrieval with the ignition off	sec.	0 - 65535	30
Dist Period	1012	none	2 bytes	Retrieval period by distance	m	0 - 65535	500
Angle Period	1013	none	1 byte	Retrieval period by azimuth	deg	1 - 180	10
Record Amount	1232	none	2 bytes	Number of records per packet	pcs.	0 - 65535	0
APN	1242	none	string	GPRS access point	none	APN	gps.utel.ua
Usname	1243	none	string	GPRS access login	none	User Name	none
Uspass	1244	none	string	GPRS access password	none	User Password	none
Send Period	1270	none	2 bytes	Transmission-to-server time	sec.	0 - 65535	60
Delta X	1281	none	1 byte	Acceleration meter X-direction deviation angle	c.u.	1 - 256	5
Delta Y	1282	none	1 byte	Acceleration meter Y-direction deviation angle	c.u.	1 - 256	5
Delta Z	1283	none	1 byte	Acceleration meter Z-direction deviation angle	c.u.	1 - 256	5
Start Move Timeout	1284	none	2 bytes	Timeout for movement start by acceleration meter	0.1 sec.	0 - 65535	50
Stop Move Timeout	1285	none	2 bytes	Timeout for movement stop by acceleration meter	0.1 sec.	0 - 65535	200
Enable Time Period	1900	none	1 byte	Enabling time of retrieval	none	0 - disabled; 1 - enabled;	1
Enable Dist Period	1901	none	1 byte	Enabling distance of retrieval	none	0 - disabled; 1 - enabled;	1

Parameter name	ID for configuration	ID for transmission	Bit depth	Parameter purpose	Units	Possible values	Default values
Enable Angle Period	1902	none	1 byte	Enabling azimuth of retrieval	none	0 - disabled; 1 - enabled;	1
Day Period	1903	none	2 bytes	Enabling time of retrieval with the ignition on	sec.	0 - 65535	30
Connect Try Amount	1904	none	1 byte	Number of attempts to connect to server	pcs.	-	3
Connect Try Interval	1905	none	2 bytes	Time between connection attempts	sec.	0 - 65535	60
Connect Serial Interval	1906	none	2 bytes	Time between serial attempts to connect	sec.	0 - 65535	300

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Date	Version	Note
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