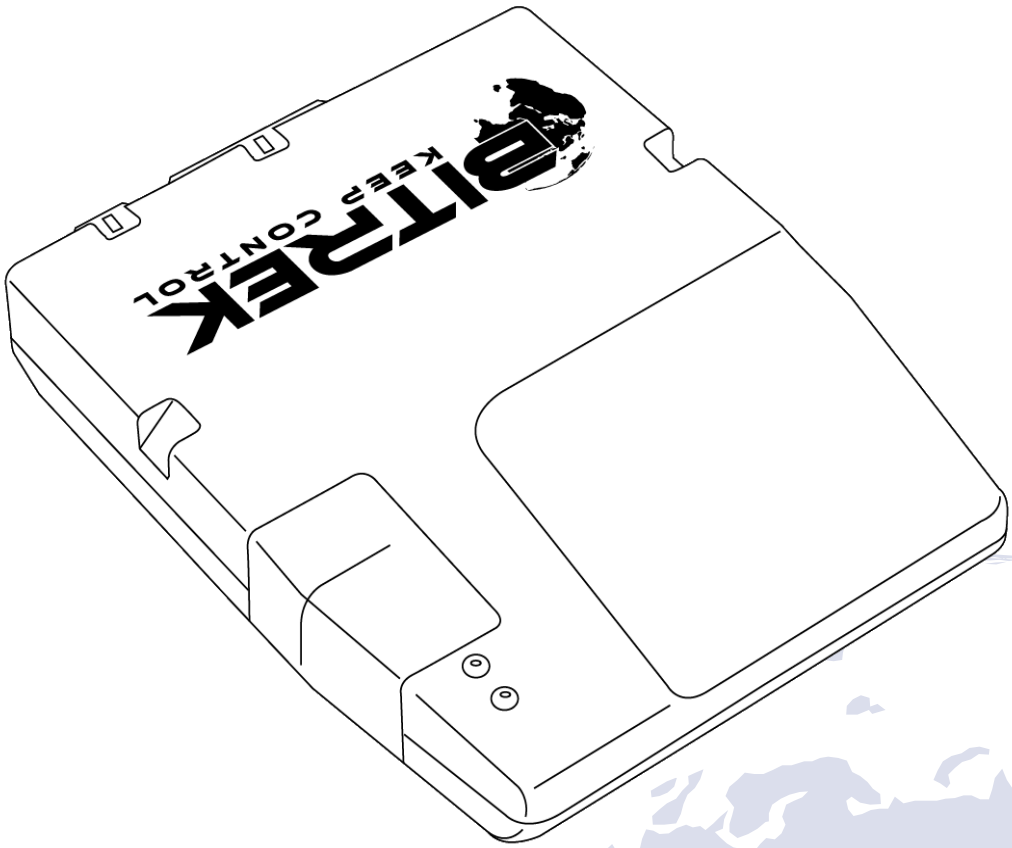
Research and Production Enterprise "DISC SYSTEMS" LTD
EDRPOU 16303375, a/c No.260075014037759
at PJSC "UKREXIMBANK" in c. Kyiv
MFO 380333, TIN 163033726585

03061, Ukraine, c. Kyiv, 95-S Otradny ave., Telephone +38044 507 02 07. Fax +38044 507 02 02. www.bitrek.eu, sales@bitrek.eu

Vehicles Tracking Device

BI-530C TREK



Operating manual

Version 2020.12.3

www.bitrek.eu
sales@bitrek.eu
+372 880 78 78

Introduction

Safety requirements within installation and maintenance of "BI-530C TREK" tracking device

Technical staff involved in installation of tracking device is in charge for compliance with security measures, as well as the staff responsible for equipment at the work area.

To prevent damage, device shall be stored in a shock-proof packaging. Before using, place the device so that you can see the indication display elements. Before connecting/disconnecting the power socket and inputs/outputs, turn off the power supply.

Transportation and storage

Transportation of tracking device in the transport packaging of the manufacturer is allowed by all kinds of enclosed land and sea transport (rail cars, containers, vehicles of closed type, bilges, etc.). Transportation in pressurized heated compartments of the aircraft is allowed.

Transportation and storage shall comply with requirements specified by the signs on the packages.

Warranty

Warranty period of operation of tracking device is 12 months from the date of sale of the device.

The warranty obligations of the manufacturer are valid if the consumer observes the requirements of this manual. In case of their violation, or at any mechanical or electrical damages caused by factors other than specified by this manual, the warranty shall be considered null and void.

Device

Purpose

Tracking device "BI-530C TREK" shall be applied to solve issues of navigation, remote control and monitoring of a vehicle or other remote object.

The tracking device is designed to be installed on any mobile or remote stationary object in order to:

- determine the geographical coordinates, speed and direction of movement;
- ensure data collection from external devices;
- control actuating mechanisms;
- transmit data to the control dispatching center.

Standart data communication channel is the network of mobile

communication operator with GSM standard 900/1800 or GSM 850/900/1800/1900. LBS, GPS or LBS, GPS/GLONASS are used to determine the coordinates.

Device shall be installed out of reach of the driver.

The device is not designed to run on water transport.

Operation principles

In real time mode the tracking device:

- determines location and movement parameters of the object (time, geographical coordinates, speed, and direction).
- collects and processes information from the analog, digital, and discrete sensors
- ensures control over actuating mechanisms upon command from the control dispatching panel.

Received data are recorded and stored in an internal log, which is implemented on microchip of nonvolatile memory. At specified intervals or according to event entries from this log are sent to the server of the dispatcher via the GSM network. Exchange of information is carried out by means of GPRS and SMS channels.

Operation of the device in "on-line" mode is possible only at presence of the network coverage. Outside GSM network coverage, the tracking unit operates in the "black box" mode, i.e., it records all information in the nonvolatile memory and sends it when the vehicle is entering a GSM coverage area.

Technical specifications

Table 1 – Technical specifications

No.	Parameters	Characteristics
1	Data transfer standard	GSM 850/900/1800/1900 MHz
2	Communication channels	GPRS, SMS
3	GSM-900 Transmitter power	888-915 MHz/933-960 MHz Up to 2 W
4	GSM-1800 Transmitter power	1710-1785 MHz/1805-1880 MHz Up to 1 W
5	GPS	1575,42 MHz (L1)
6	GPRS class	10
7	Navigation system	LBS, GPS or LBS, GPS/GLONASS
8	GSM antenna	Internal
9	GPS antenna	Internal (External – optional)
10	Digital interfaces	RS-485, j1708, RS-232, 1-Wire, CAN

No.	Parameters	Characteristics
11	Accelerometer	+
12	SIM-cards	1
13	Digital input with active "0"	1
14	Digital input with active "1"	1
15	Digital outputs	1
16	Analogue inputs	2
17	Voltage range of digital inputs	From 0 V to 40 V
18	Type of digital outputs	Open collector
19	Maximum load current of discrete outputs	0,5 A/0,01 A
20	Voltage range of analogue inputs	From 0 V to 27 V
21	Power type	Permanent
22	Internal battery	130 mAh
23	Power supply	From 9 V to 36 V
24	Average current consumption (12 V)	40 mA
25	Maximum current consumption (12 v)	200 mA
26	Volume of non-volatile memory	2 MB (65,000 records)
27	Operating temperature (without battery)	From -30 °C to +80 °C
28	Relative humidity	80 % at +30 °C
29	Dimensions (W x L x H)	96 x 77 x 14 mm
30	Net weight	75 g
31	Weight gross	140 g
32	Housing protection class	IP54
33	Body material	Plastic ABS UL94 V0

Design of tracking device

Appearance and dimensions of the tracking device "BI-530C TREK" are shown in Figure 1.

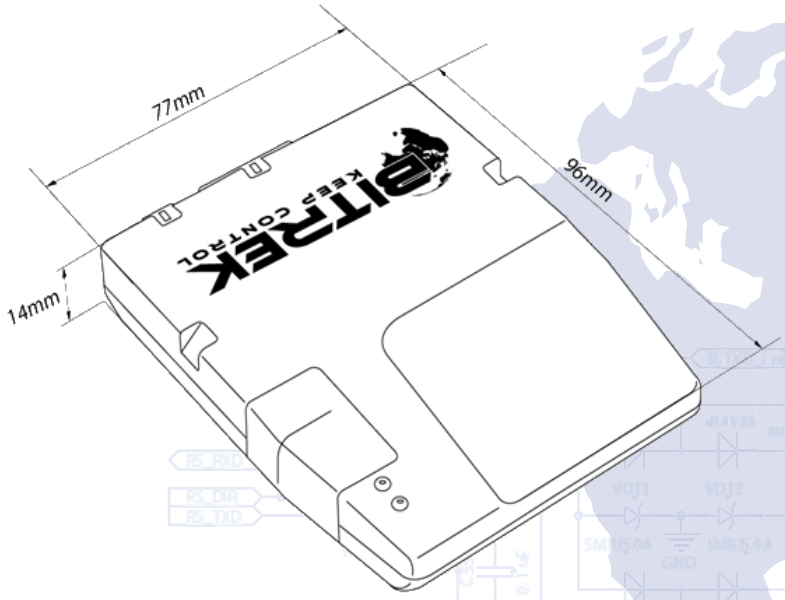


Figure 1 – Appearance and design of the device.

Supply package

The tracking device "BI-530C TREK" is provided with the following set:

1. Tracking device "BI-530C TREK" – 1 piece.
2. Connection cable – 1 piece.
3. Technical data sheet – 1 piece.
4. Warranty card – 1 piece.
5. Package box – 1 piece.

Preparation for operation, commissioning

SIM-card installation

To operate in GSM network device shall contain installed SIM-card of Micro-SIM format. Phone book of SIM-card shall remain empty, PIN-code shall be removed (use of SIM-card with PIN-code can be allowed subject to entering the PIN-code to the device settings).

To install the SIM-card disconnect the power socket from the device, remove the side cover and install the SIM-card into the slot (see Figure 2).

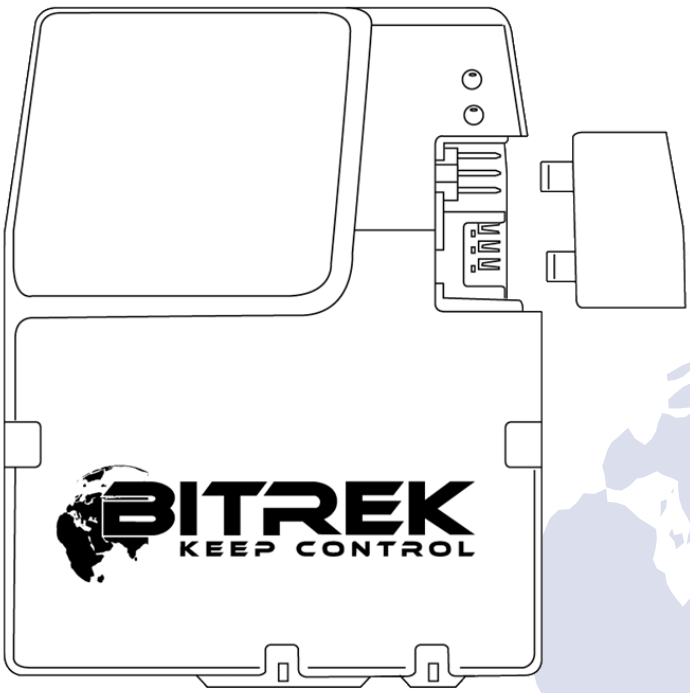


Figure 2 – Installation of SIM-card into the device.

Connectors for power supply and peripherals

The rear panel of the tracking device contains sockets for connecting cables. Connecting cables in turn have outlets for power,

analog, digital, discrete sensors and actuating mechanisms. Location of sockets and numbering of contacts are shown in Figure 3.

Marking of connector pins for power supply, sensors and peripherals is shown in Table 2.

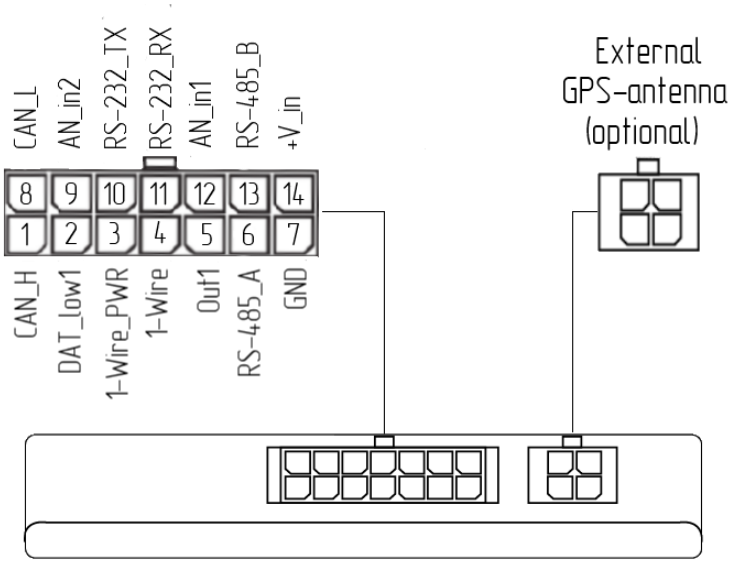


Figure 3 – Location of sockets and numbering of contact elements.

Table 2 – Designation of contact elements

No.	Color	Contact name	Signal type	Contact assignment
1	White	CAN_H	Input	Signal «H» of CAN interface
2	Brown	DAT_low 1	Input	Digital input with active "0"
3	Red/Black	1-Wire_ PWR	Power	1-Wire power
4	Yellow/ Green	1-Wire	In/Out	1-Wire data
5	Violet	Out 1	Output	Digital output No.1
6	Orange	RS-485A/ CAN j1708	Input	Signal "A" RS-485/CAN j1708 «A»
7	Black	GND	Power	Common cable (ground)
8	Blue	CAN_L	Input	Signal «L» of CAN interface
9	Black/ White	AN_in2/DAT _high	Input	Analogue input No.2
10	Yellow	RS-232_TX	In/Out	Signal "TX" RS-232
11	Pink	RS-232_RX	In/Out	Signal "RX" RS-232
12	Grey	AN_in1	Input	Analogue input No.1
13	Green	RS-485B/ CAN j1708	Input	Signal "B" RS-485/CAN j1708 «B»
14	Red	+V_in	Power	"+" onboard power supply (rated voltage 12 V or 24 V)

Assembly, commissioning

Assembly recommendations

Zone of installation of tracking device shall enable the connecting of the pin to it and disable the possibility of accidental damage to the device, moisture, impact of high temperature. Recommended location for installation in the vehicle is an empty space under the dashboard inside the vehicle; in addition, the device shall be placed in a way ensuring the upper side with LEDs to face up.

The body of the device contains grooves for easy fastening with plastic ties.

Electrical connections

Power supply wires are laid through the maintenance holes in the body of the vehicle from the regular battery location to the place of installation of the tracking device. Power wires are connected to the corresponding battery terminals.

Carrying out welding work during the repair of the vehicle necessarily requires disabling of power socket and peripherals.

The active state for discrete input with active "0" is a connection of this input with the negative of the power (ground). The passive state for this input is the lack of connection ("in the air" input).

Analog input voltage can range from 0 V to 27 V.

The discrete output of the device are made according to the scheme such as "Open collector". The load shall be connected to the gap between the discrete output and "+" power of the on-board network. When activated, the output gets ground switching. Maximum current of the discrete output load shall not exceed 0.5 A. If it is needed to switch higher currents, connect digital outputs via additional relay.

The voltage on the discrete inputs shall not exceed 40 V. The voltage on the analog inputs shall not exceed 27 V. The power supply voltage of the device shall not exceed 36 V. Otherwise, the device may be disabled.

Device to computer connection

The tracking device can be connected to a PC, in order to configure the device, as well as to perform maintenance works. For this purpose, the device is equipped with a service UART output. To connect to a computer, use an additional USB-UART converter, which can be purchased from a dealer for an additional fee.

UART service output socket is located on the board of the device next to the SIM-card slot. To access the socket, remove the side cover of the device. Procedure of connection of USB-UART converter cable is

shown in Figure 4.

Connect the cable of USB-UART converter to the tracking device so that the arrow on the cable socket to be located closer to the SIM-card slot (see Figure 4).

To work with the USB-UART converter, install the appropriate device drivers. They can be downloaded from the official website: http://www.ftdichip.com

To exchange data with the device, use a terminal program. Settings of the terminal: speed – 115200 bit/second, data bit – 8, stop bit – 1, no parity check, no flow control.

Figure 4 – Connection of the cable of USB-UART converter to the device "BI-530C TREK".

Once connected, the device will transmit data about its state to the terminal. In addition, the user is able to use a terminal program to send commands to a device and receive response to them. Send preliminary to device the password to access the terminal in the following format:

TPASS: password;

, where *password* is a password for access to the device terminal (default value is 11111).

Lifetime of access password after sending is 60 seconds. After this time, re-send the password to exchange data with the device.

Description of indication

Top panel of the tracking device contains two LEDs that indicate the current status of the device.

LED "STATUS" (**red**) is on for 0.5 seconds and is off for 0.5 seconds when GPRS connection is inactive; is constantly on when GPRS connection is active and the device is connected to a remote server; LED

slowly flashes for 0.2 seconds when GPRS connection is not active, and the modem is in sleep mode.

LED "GNSS" (**green**) flashes (or lights) when the device is receiving correct position coordinates and is off when the device is not receiving the coordinates, or the signal is too weak, and the data are not correct.

Adjustment of "BI-530C TREK" device

Basic information

The tracking device "BI-530C TREK" can be configured in following ways:

1. With a direct connection of the device to a computer.
2. Remotely, using SMS commands.
3. Remotely, using the configuration server.

Setting of the device through any of the available methods is limited with the setting of the required values of the device parameters. Each parameter has its own unique ID. Special commands are used to read/record the values of selected parameter.

At remote configuration via SMS take into consideration that the total length of the SMS shall not exceed 160 Latin characters. Number of commands in SMS is limited to a maximum length of SMS.

All commands for the device are divided into control and information commands.

List of information commands to operate the device

Table 3 – List of information commands to operate the device "BI-530C TREK"

No.	Command	Description	Availability of response
1	*getstatus*	Information about current state of the device	yes
2	*getgps*	Current GPS coordinates and time of device.	Yes
3	*getmap*	Request of device coordinates	yes
4	*getver*	Request of the version of the device software	yes
5	*getio*	Read the value of the device's internal sensors	yes
6	*flush*	Request of device profile parameters	yes
7	*getparam ####*	Read the value of the parameter by its ID	yes

Notes to Table 3.

Information about current state of the device
Command to be send – *getstatus;*

Example of response:
«Data Link: 1 GPRS: 1 IP: xxx.xxx.xxx.xxx GSM: 4 Roaming: 0»

, where:
Data link – current connection status (0 – not connected to the server, 1 – connected to the server);
GPRS – status GPRS (0 – not active, 1 – active);
IP – IP address of the device. With an active GPRS connection it is assigned by the operator (not to be confused with the IP address of the server);
GSM – level of GSM signal (1 – minimum, 5 – maximum);
Roaming – SIM-card in roaming (0 – home network, 1 – roaming).

Current GPS coordinates and time of device.
Command to be send – *getgps;*

Example of response:
"GPS: 1 Sat: 7 Lat: 50.2345 Long: 30.1652 Alt: 123 Speed: 0, Dir: 77 Date: 2020/4/15 Time: 14:37:32"

, where:
GPS – status of GPS data (1– valid, 0 – invalid);
Sat – number of satellites visible for the device;
Lat – latitude (last known latitude);
Long – longitude (last known longitude);
Alt – altitude, height above sea level;
Speed – speed (km/hour);
Dir – direction of motion (degrees);
Date – current date (1980/1/6 is transmitted in the absence of GPS-signal);
Time – current GMT time (in the absence of a GPS signal there is transmitted 00:00:00).

Request of device coordinates.
Command to be send – *getmap;*

Example of response:
«www.biakom.com/maps/q=50.420209,30.428448,12,0»

Request of the version of the device software
Command to be send – *getver;*

Example of response:
«BI-530C Ver: 1.3.5»

Read the values of the device's sensors.
Command to be send – *getio;*
Example of response:
«DL1: 0 DO1: 0 VPSV: 12996mV VBAT: 4290mV AIN1: 37mV AIN2: 38mV»

, where:
DL1: 0 – current state of the discrete input;
DO1: 0 – current state of the discrete output;
VPSV – external power supply, millivolts;
VBAT – power supply of device accumulator battery, millivolts;
AIN1: 37mV AIN2: 38mV – analog inputs voltage, millivolts.

Request of device profile parameters.
Command to be send – *flush;*

Example of response:
«xxxxxxxxxxxxxxx, gps.utel.ua, none, none, xxx.xxx.xxx.xxx, xxxxx 0»

, where:
IMEI (xxxxxxxxxxxxxxx) – identification number (IMEI) of the device;
APN (gps.utel.ua) – access point for GPRS connection (to be specified by the operator);
Login (none) – access login to GPRS (to be specified by the operator, usually, it is not required);
Password (none) – access password to GPRS (to be specified by the operator, usually, it is not required);
IP (xxx.xxx.xxx.xxx) – Server IP address for data transmission;
PORT (xxxxx) – PORT of server for data transmission;
MODE (0) – mode of device operation (0 – TCP/IP connection).

Read the value of the parameter by its ID
Command to be send – *getparam ####;*
Parameter ID (####) consists of four digits and indicates the number of the parameter. All configurable parameters are specified in the list of device parameters (see Appendix 1 and Appendix 2).

Example of response:
«Param ID #### Val: #»

, where:
Param ID – ID of requested parameters;
Val – current value of parameter.
Example of the command to request APN of the device (a parameter that contains the APN device has ID 0242) – *getparam 0242;*

Example of response:
«Param ID 0242 Val: gps.utel.ua».

List of control commands to operate the device

Table 4 – List of control commands to operate the device

No.	Command	Description	Availability of response
1	*cpureset*	Reload of device processor	no
2	*rstallprof*	Restoring of original state of profile settings	no
3	*deleterecords*	Deletion of all saved records	no
4	*setparam ####*	Set the value of the parameter by ID	yes
5	*boot #,#,#*	Update of device software	yes
6	*setdigout ##*	Set the mode of operation of digital output Out 1	Yes
7	*ignitionoff*	Activation of the safety locking of ignition	yes
8	*ignitionon*	Deactivation of the safety locking of ignition	yes

Notes to Table 4.

Reboot of device processor.
Command to be send – *cpureset;*
No response is returned for this command. Receipt of the command initiates a complete restart of all device processes.

Restoring of original state of profile settings.
Command to be send – *rstallprof;*
No response is returned for this command. Receipt of this command initiates reset of profile parameters to default ones.

Deletion of all saved records.
Command to be send – *deleterecords;*
No response is returned for this command. Receipt of the command deletes all the data packets from the device memory.

Set the value of the parameter by ID
Command to be send – *setparam ####;*
Parameter ID (####) consists of four digits and indicates the number of the parameter. All configurable parameters are specified in the list of device parameters (see Appendix 1 and Appendix 2).

Example of response:
«Param ID #### New Val: #»

, where:
Param ID – ID of parameter to be set up;
New Val – assigned value of parameter.
Example of the command to set APN of the device (a parameter that contains the APN device has ID 0242) – *setparam 0242 gps.utel.ua;*

Example of response:
"Param ID 0242 New Val: gps.utel.ua».

Update of device software.
Command to be send – *BOOT #,#,#;*
Example of command to update the software:
*«**BOOT** **fw.bitrek.ua,80,*.bin;**»*

, where:

«HOST» - (fw.bitrek.ua,) is address of server locating the update files;
«PORT» – (80,) – port of server locating the update files;
«Firmware» - *(*.bin;)* – binary update file, where * is the firmware version, .bin is the file extension.

This command allows remote software update of the device via GPRS channel.

Note: Enable "download" for the SIM-card, and set the session timeout not less than 10 seconds.

There are following responses at attempt to update the device software:
«BOOT: UPDATE DOWNLOAD OK» - successful update;
«BOOT: WAITE ERROR» – exceeded timeout at downloading software update;
«BOOT: HOST CONNECT ERROR» – failure to connect to SW server;
«BOOT: PAGE LOAD ERROR» – failure to load the file;
«BOOT: UPDATE DOWNLOAD ERROR» – failure to update the file.

Set the mode of operation of digital output Out 1.
Command to be send – *setdigout #;*
Example of command for the activation of the output Out 1: *setdigout 1;*

When it is necessary to activate the output, set the output value must to "1". When it is necessary to deactivate the output, set the value to "0".

Activate/deactivate the safety locking of ignition.
Command to activate safe locking – *ignitionon;*
Command to deactivate safe locking – *ignitionoff;*

In case of activation of secure locking the discrete output Out 1 will be activated if the speed according to GPS is less than 5 km/h.

Examples of response:
«Set RQS To Ignition On» - ignition switch on;
«Set RQS To Ignition Off» - ignition switch off;

Basic configuration

After installing the SIM-card of the mobile operator and connection of the power supply, the device shall be configured to transmit data to the server.

All adjustable parameters of the device are divided into groups:

- Server and GPRS.
- Tracking.
- Security.
- Service.
- Voice communication.
- Roaming.

Setting required for basic operation of the device include data transmission and tracking. They are grouped in "Server and GPRS" and "Tracking". After setting up the necessary parameters the device will transmit data about its current location to the server.

All parameters available for configuration are specified in Appendix 1.

Security settings

To meet the safety conditions, access to the configuration of the device can be limited.

At connection your device to the PC using USB-UART converter, every time you send a command, the device requires the access password. Standard access code is 11111. Lifetime of password is 60 seconds. After this timeout the password shall be re-entered. Access password can be changed by the user (ID 0910, see Appendix 1).

Format of sending a standard password to the device is *TPASS: 11111;*

Examples of response:
«TASK COM TERM: PASSWORD OK» – correct password is entered;
«TASK COM TERM: INCORRECT PASSWORD» – incorrect password is entered;

When sending commands via SMS, set the login and password of SMS access. To set the login use ID 0252 parameter, to set the password use ID 0253.

To set the login and password, any SMS command shall have the following structure to be sent:

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

Example of the command to be sent: *abcd 1234 getgps; getstatus;*

In addition to the login and password, use the authorized phone numbers. To record the telephone numbers in the memory device use the parameters ID 0261 – ID 0269 (Appendix 1). Total up to 9 phone numbers can be applied. When using this function, the device will

respond to SMS from the stored in the memory authorized phone numbers only. If the login and password are set by SMS, they shall be specified in each SMS with commands.

Adjustment of I/O elements

The tracking device "BI-530C TREK" is able to collect, process and send to the server the data received from various sensors. Each sensor is an I/O element and has a group consisting of 6 parameters for setting. For example, to set the value of power supply voltage level to the server, use group of parameters of ID 0410/0411/0412/0413/0414/0415. These options have the following structure:

041**0**/041**1**/041**2**/041**3**/041**4**/041**5**

First 3 numbers (green) refer to parameter group number to configure the I/O element.

Last number (grey) is a parameter number. 6 parameters (from 0 to 5) are available for a single I/O element. Possible values of these parameters are presented in Table 5.

Table 5 – List of parameters of I/O elements

Parameter number	Description	Possible values
0	Enable/disable I/O element	0 – disabled; 1 – enabled
1	Priority of I/O element at transmission	0 – low; 1 – high
2	Upper limit	(depending on the type of I/O element)
3	Lower limit	(depending on the type of I/O element)
4	Setting of the type of the generated event	0 – entering the range; 1 – leaving the range; 2 – returning/leaving to/of the range; 3 – monitoring; 4 – monitoring + entering the range; 5 – monitoring + leaving the range; 6 – monitoring + return to/leaving the range; 7 – generation of the event to change the input value to a predetermined value; 8 – generation of the event to change the input value to a predetermined value + monitoring
5	Averaging constant	From 0 and higher

Notes to Table 5:

Parameter 0 – on/off of transmission of I/O element to the server.

Parameter 1 – Priority: low/high. While selecting "Priority:low" – data of the sensor will be sent to the server with the following data packet. While selecting "Priority: high" data of the sensor will be sent to the server at the earliest possible opportunity.

Parameter 2 – Upper limit – set the upper limit of the I/O element.

Parameter 3 – Lower limit – set the lower limit of the I/O element.

Parameter 4 – Set the type of the generated event:

0 – Returning to the range.

At a specific range of sensor values (range of values is specified as follows – lower limit of the range is recorded to the corresponding parameter – "Lower limit", upper limit of the range is recorded to the corresponding parameter "Upper limit"), the event will be generated when the actual value of the sensor gets within the specified range. In other cases, the event will not be created and the information will not be sent to the server.

Example: The lower voltage limit is set to 0, the upper limit is set to 10 V (10 000 mV). Lowering the voltage below 10 V will generate the event (see Figure 5).

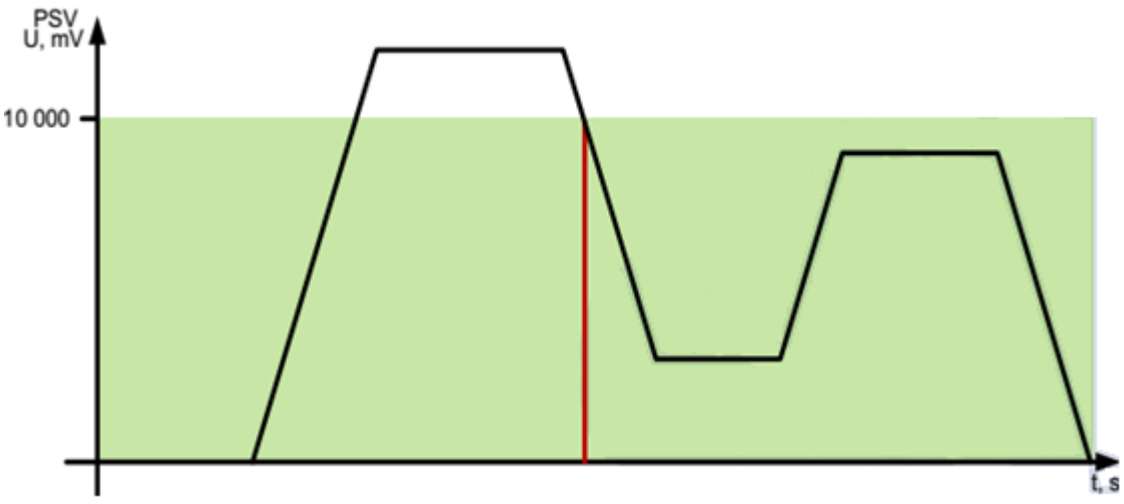


Figure 5 – Generation of event by returning to the range.

1 – Leaving the range.
The event will be generated if the actual sensor value is outside the predetermined range.

Example: The lower voltage limit is set to 0, the upper limit is set

to 10 V (10 000 mV). Rising of the voltage above 10 V will generate the event (see Figure 6).

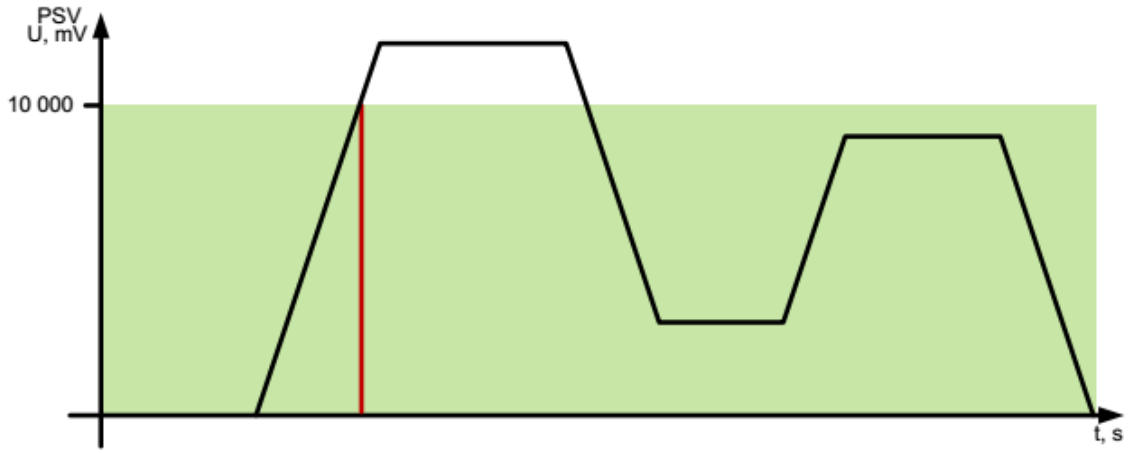


Figure 6 – Generation of event by leaving the range.

2 – Returning/leaving to/of the range.
Event is generated every time when the actual value of the sensor is out of the limits of the predetermined range.

Example: The lower voltage limit is set to 5 V (5 000 mV), the upper limit is set to 10 V (10 000 mV). When the actual voltage crosses limits of the specified range, then event is generated (see Figure 7).

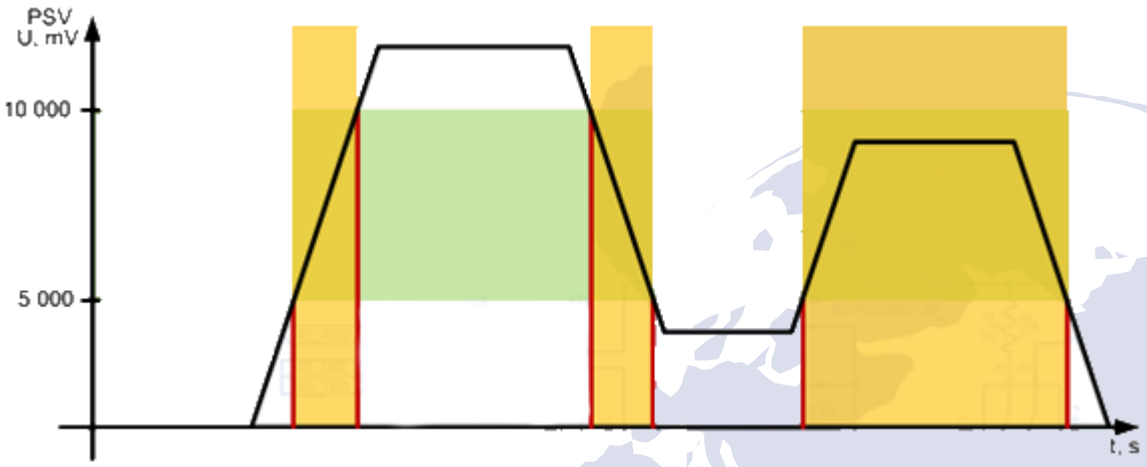


Figure 7 – Generation of event by returning/leaving to/of the range.

3 – Monitoring.
When this mode is selected, data will be transmitted continuously, the events will not be generated.

4 – Monitoring + entering the range.
When there is generated the event after entering the range, the actual value of the sensor starts to be transmitted to the server in the monitoring mode.

5 – Monitoring + leaving the range.
When there is generated the event after leaving the range, the actual value of the sensor starts to be transmitted to the server in the monitoring mode.

6 – Monitoring + returning/leaving to/of the range.
When one of the events is generated, the actual value of the sensor starts to be transmitted to the server.

7 – Change of the input value to a predetermined value.
Changing of the input value to the predetermined value in either direction will cause the event generation. The value is recorded to the parameter "Upper limit".

8 – Monitoring + change of the input value to a predetermined value.
When the event is generated, the actual value of the sensor starts to be transmitted to the server.

Parameter 5 – Averaging constant.

It is time required for I/O to be in a certain state in order to generate an event. It is measured in milliseconds (X*50 ms, i.e., while setting 10, the constant will be equal to 10*50=500 ms).

List of all I/O components of the device, available for configuration, is provided Appendix 2.

Notifications

Device can be configured to perform an outgoing voice call at occurrence of certain conditions. Such a condition is a triggering of predetermined I/O element. Voice calls shall be enabled in the general settings of the device. I/O element shall be enabled, configured for one of the events (entry to the range, exit out of the range, entry/exit in/out of the range), its ID shall be defined as a trigger of outgoing call; Phone0 authorized phone number shall be defined.

An additional condition includes finding of the device in the coverage area of GSM-operator and sufficient funds in the account. At the absence of coverage the pursuant outgoing call will be postponed until the moment when the device gets into the coverage area. The device performs one attempt to make a voice call, per each trigger.

Setting to configure alerts are provided in the "Security" section in Appendix 1. Authorized phone number Phone0 is recorded in the parameter ID 0261.

In addition to a voice call, the device can send SMS to the authorized phone number when the events occur. ID of I/O element, which is used to send SMS, shall be defined as a trigger for outgoing SMS messages. In addition to the SMS message you can add customized text, where the text length shall not exceed 30 characters in the Latin alphabet.

Roaming options

The tracking device "BI-530C TREK" is able to operate in two modes: in the home network mode and in the operating mode with a predetermined list of authorized operators. Operation mode is set with ID 0917 parameter.

In the home network mode (ID 0917 = 0), the device makes attempts to register in a home network of installed SIM-card. List of authorized operators is not used.

Operating with a predetermined list of operators (ID 0917 = 1), the device checks the list of approved operators.

If the list is empty, the device acts like in a mode of operation in a home network. If the list is not empty, the device scans for available networks. If there are any networks, included in the list of authorized ones, the device makes an attempt to register in one of the authorized networks. After successful registration, the device will be connected to the selected network until it is available. At the loss of network signal the process will be repeated. If the device does not detect the allowed networks enabled in the list, or it is not able to register within the network, device module will go to sleep mode within a certain timeout, after which the process will be repeated.

Configuring the device for working with the RFID reader by RCS SOVA protocol on RS-485 bus

"BI-530C TREK" tracking device enables work with RFID reader using RCS SOVA protocol via RS-485 bus.

By default, the device is programmed to poll RFID reader at the 9th address. To correctly configure the reader, please first familiarize with the device technical documentation.

To transfer the number of approached card to the server, configure I/O element of RFID Ekey (see Appendix 2), and set for RFID Ena parameter (ID 0915, see Appendix 4) the appropriate value.

In addition to the transmission of card number, there is an ability to manage the discrete output Out 1 depending on the approached cards. For this purpose, the device has the ability to store in the nonvolatile memory up to 20 card numbers. If the number of the approached card coincides with the number of one of the cards stored in the memory, the device activates the discrete output. ID 0920 – 0939 are used for the storage of valid card numbers (Appendix 1).

Line with electronic card value shall contain exactly 10 characters – numbers 0-9 or uppercase A-F. Each pair of symbols encodes one byte in ASCII representation. The lowest byte of the electronic card is recorded first, and so on in ascending order. In the pair of characters, the first character is the senior, the second is the younger half-byte.

Sample of setting:

At approaching RFID-card the device transfers its number (ID 157 at the transmission) to the server – 8597874069. Then we convert this number into the HEX and get 200792595.

Further record the card number into the memory of the device from the high-order byte to the low-order byte. The command will be as follows:

setparam 0920 9525790002;

Configuring the device for working with fuel level sensors by RS-485

"BI-530C TREK" tracking device enables work with fuel level sensors via RS-485. Up to four fuel level sensors can be connected in total.

To work with fuel level sensors, enable in the device settings the corresponding I/O element (see Appendix 2). In this case the fuel level sensors shall be preset. Information on configuration of fuel level sensors can be found in sensor relevant documentation.

The tracking device is able to transmit unprocessed ("raw") data from level sensors, as well as data processed by Kalman software filter.

Filtered and unfiltered values are passed by different I/O elements (see Appendix 2).

In addition, if fuel level sensors are equipped with a built-in temperature sensor, it is possible to obtain these data and transfer them to the server (see Appendix 2).

Setting the device for temperature sensors

The tracking device "BI-530C TREK" is able to work with temperature sensors DS18B20. There can be connected up to five temperature sensors.

To work with the temperature sensors turn on polling mode (ID 0990, Appendix 1) in the device settings.

At detection of temperature sensors the device polls them and obtains the current temperature values. When setting up the corresponding I/O elements (Appendix 2), the sensor values can be transferred to the monitoring server.

For correct detection of temperature sensors, they must be properly configured: each temperature sensor shall get a code number. Numbering of sensors includes recording of special sequence of numbers to the configuration registers. Necessary values are specified in Table 6.

Table 6 – Values of configuration registers of temperature sensors DS18B20

Number of temperature sensor	Th register value	Tl register value	Configuration value register
0	0	172	127
1	1	157	127
2	2	206	127
3	3	255	127
4	4	104	127

Details of the recording of values in registers of the temperature sensor are provided in the documentation for DS18B20 temperature sensor.

If the line contains sensors with the same numbers, the appropriate I/O element will record values of the last polled temperature sensor.

Important: sharing of temperature sensors and electronic keys that do not fully support the iButton protocol is not allowed (for example, some CP-Z2L readers)

Setting the device for electronic keys

The device can work with electronic keys iButton or RFID cards of EM-Marin standard. Data transfer is carried out using 1-Wire interface.

The device has the ability to work with RFID card readers that do not support full iButton protocol. Such devices can operate on the 1-Wire interface only in the absence of other devices (for example, thermal sensors) on the bus. An example of such devices is some CP-Z2L readers. Operation mode is set with ID 0991 (Appendix 1).

If I/O element of Ekey (Appendix 2) is set up, its number will be sent to the server when the electronic key is brought to.

In addition to the transmission of key number, there is an ability to manage the discrete outputs Out 1 and Out 2 depending on the brought keys. For this purpose, the device has the ability to store in the nonvolatile memory up to 20 key numbers. If the number of a brought key coincides with the number of one of the keys stored in the memory, the device activates one of the discrete outputs. Selection of specific discrete output to be activated depends on the value of ID 0991 parameter.

Storage of keys applies ID 0920 – 0939 (Appendix 1).

Line with electronic key value shall contain exactly 10 characters – numbers 0-9 or uppercase A-F. Each pair of symbols encodes one byte in ASCII representation. The first to be recorded is the low-order byte of

electronic key, and etc. in ascending order, where in a pair of characters the first character is a high-order half-byte, the second is a low-order half-byte

Sample of setting:

At bringing the electronic key the device transfers its number (ID 105 at the transmission) to the server – 8597874069. Then we convert this number into the HEX and get 200792595.

Further record the key number into the memory of the device from the high-order byte to the low-order byte. The command will be as follows:

setparam 0920 9525790002

Take into consideration that in the case of setting the device to operate with the reader CP-Z2L (value of parameter ID 0991 – 15 or 16), use of DS18B20 temperature sensors is impossible.

Only one reader CP-Z2L can be connected to the device.

Configuring the device for working with CAN-LOG

The device "BI-530C TREK" has the ability to work with the CAN-LOG device via the RS-232 interface. To enable the work, you must send the appropriate command:

setparam 5007 1; - CAN-LOG V1
setparam 5007 3; - CAN-LOG V4

List of all I/O components of the CAN-LOG device is provided in Appendix 3.

Configuring the device for working with fuel level sensors via RS-232

"BI-530C TREK" tracking device enables work with fuel level sensor via RS-232.

To work with fuel level sensors, enable in the device settings the corresponding I/O element (see Appendix 2) and allow working with fuel level sensors via RS-232 (*setparam 5007 2*;).

The tracking device is able to transmit unprocessed ("raw") data from level sensors, as well as data processed by Kalman software filter.

Filtered and unfiltered values are passed by different I/O elements (see Appendix 2).

In addition, if fuel level sensors are equipped with a built-in temperature sensor, it is possible to obtain these data and transfer them to the server (see Appendix 2).

Configuring the device for working with tires pressure sensors via RS-232

«BI 530C TREK» tracking device has the ability to work with tires pressure sensors (CUB TPMS) via RS-232 interface. In total, up to 23 sensors can be connected simultaneously. The tracker can collect and transmit information about the current value of pressure and air temperature for each of the sensors to the server. A list of all available I/O-elements for working with pressure sensors is provided in Appendix 5.

To enable work with pressure sensors it is necessary to set the appropriate mode of operation for RS-232. To do this, send the command:

setparam 5007 5;

Receiver connector pinout is discribed at Figure.8.

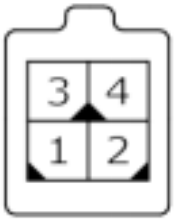


Figure 8. CUB receiver connector pinout

No.	Contact name	Signal type	Description
1	TX	Input/output	Signal «TX» RS-232
2	RX	Input/output	Signal «RX» RS-232
3	N\C	-	Not connected
4	GND	Power	Common wire (ground)

Configuring the device for working with the LP Speed Limiter

«BI 530C TREK» tracking device has the ability to work with the LP Speed Limiter device via RS-232 interface. This device allows you to set the boundary limit of the vehicle speed.

To work with this device, you must switch the operating mode of the RS-232 interface of the tracker to the value 4:

setparam 5007 4;

The speed limit is set by sending a command to the tracker:

setspeedevt XXX;

,where:
XXX – speed limit (for example 050 = 50 km/h).

To disable the movement, you must send the command:

vehiclestop;

To enable the movement, you must send the command:

vehicletart;

Configuring the device for working with a CAN bus

«BI 530C TREK» tracking device has the ability to read data directly from the CAN bus of the vehicle. When connecting the device to the vehicle's CAN bus, it is recommended to use a Bitrek CANReader contactless reader to prevent violation of the insulating sheath of wires.

The device can be configured to read and transfer to the server up to 10 variables simultaneously. You can read both short 11-bit identifiers and long 29-bit ones. At the same time, 4 separate tracker parameters are used to configure reading of one such variable:

- PGN
- Start Bit
- Length (number of bits)
- Data reset timeout

A list of all available parameters for CAN settings is presented in Appendix 1.

Please note that for the device to successfully receive data from the vehicle's CAN bus, you must set the tracker bus speed that corresponds to the vehicle's CAN bus speed. The parameter for setting the speed ID 5038 is turned off by default (equal to zero) and if it is connected to the vehicle's CAN bus, its mandatory setting is required. Possible parameter values are given in Appendix 1.

An example of setting the tracker to read fuel consumption data is given below.

Using the description of the FMS standard, we determined that the necessary data on fuel consumption are broadcast in the last four bytes of PGN FEE9 (Fig. 9)

IMPORTANT!
On devices with firmware version 1.4.9 and higher, the speed of the CAN bus is set in bits (setparam 5038 250000).
On devices with firmware version 1.4.7 and below, the speed of the CAN bus is set in kilobits (setparam 5038 250).

1.1.1 Fuel Consumption: LFC

0x00FEE9								PGN Hex
65,257								PGN
1000 ms								Rep. Rate
Data Byte 1	Data Byte 2	Data Byte 3	Data Byte 4	Data Byte 5	Data Byte 6	Data Byte 7	Data Byte 8	Byte No
				8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1	Bit No
Not used for (Bus) FMS-Standard	Not used for (Bus) FMS-Standard	Not used for (Bus) FMS-Standard	Not used for (Bus) FMS-Standard	Engine total fuel used 0,5 L / Bit gain 0 L offset SPN 250	Engine total fuel used 0,5 L / Bit gain 0 L offset SPN 250	Engine total fuel used 0,5 L / Bit gain 0 L offset SPN 250	Engine total fuel used 0,5 L / Bit gain 0 L offset SPN 250	Name values values values SPN

Description acc. SAE J 1939:

Total Fuel Used: Accumulated amount of fuel used during vehicle operation.

Figure 9 - PGN which transmits fuel consumption information

But we do not know the address of the module broadcasting this message and the priority of this message. In order to determine them, it is necessary to conduct a full scan of the vehicle's CAN-bus. An example of the result of one of these scans is presented in Fig. 10.

```
   Message Number
   |         Time Offset (ms)
   |         |        Type
   |         |        |        ID (hex)
   |         |        |        |     Data Length Code
   |         |        |        |     |   Data Bytes (hex) ...
   |         |        |        |     |   |
---+--   ----+----  --+--  ----+---  +  -+ -- -- -- -- -- -- --
    1)       169.5  Rx      18F00503  8  FF FF FF FF FF FF FF FF
    2)       177.7  Rx      0CF00400  8  F0 7D 8C 42 11 00 F4 FF
    3)       188.2  Rx      18FE5CC8  8  FF FF FF FF 10 44 0C FF
    4)       188.9  Rx      18F00029  8  C0 7D 7D FF 29 7D 00 57
    5)       189.7  Rx      0CF00400  8  F0 7D 8C 42 11 00 F4 FF
    6)       190.6  Rx      0CF00300  8  F1 00 1D FF FF FF FF FF
    7)       197.3  Rx      0CF00400  8  F0 7D 8C 42 11 00 F4 FF
    8)       202.8  Rx      0CFE6CEE  8  00 10 C0 C1 00 00 00 00
    9)       203.4  Rx      18FEE900  8  00 00 00 00 D7 26 00 00
   10)       207.7  Rx      0CF00400  8  F0 7D 8C 2A 11 00 F4 FF
   11)       213.2  Rx      18FEF100  8  F7 00 00 04 01 00 E0 FF
```

Figure 10 – CAN-bus scanning result

Thus, it was established that the full message (PGN) has the form 18FEE900 and, having all the necessary information, you can configure the tracker to receive data from this PGN.

To configure this variable on CAN1 CAN sensor (ID_Send 90), you need to send the following commands to the device:

Setting the CAN bus speed that corresponds to the vehicle bus speed (e.g. 500 kBit / s):

setparam 5038 500;

Activation of the transfer to the server of the I/O element CAN1, ID_Send 90:

setparam 3600 1;
setparam 3604 3;

Variable setting:
setparam 7002 18FEE900; - PGN
setparam 7003 32; - start bit of data message
setparam 7004 32; - data message length
setparam 7005 5; - timeout of data reset in seconds

Important!
The variables "Bit depth" and "Address of the module transmitting the message" are reserved parameters of the tracker and their configuration is not required.

After sending the above commands, the device will transmit fuel consumption data received from the vehicle's CAN bus to the server. To convert the transmitted data into the volume in liters, it is necessary to convert the obtained values taking into account the discreteness specified in the FMS protocol. In our case, it is 0.5 L / Bit.

Configuring the device for working with the J1708 bus

«BI 530C TREK» tracking device has the ability to read data from the vehicle bus according to the J1708 standard. For this, the operating mode of the RS-485 bus of the tracker must be switched to the corresponding mode using parameter 5008 (setparam 5008 2;).

The device can be configured to read and transfer to the server up to 10 variables simultaneously. At the same time, 4 separate tracker parameters are used to configure reading of one such variable:

- PID
- Start Bit
- Length (number of bits)
- Data reset timeout

A list of all the parameters for setting J1708 is presented in Appendix 1.

The setting is performed similarly to the setting of the device for working with the CAN bus - PID, start bit, data length and data reset timeout must be configured. Setting the "Bit depth" variable is also not required.

Please note that using devices with a digital RS-485 interface and simultaneously reading data from the J1708 bus is not possible.

Setting the priority for the GPS data source definition

The monitoring device "BI 530C TREK" has the ability to connect an external GPS antenna to it, which allows the tracker to automatically switch to the source with the best GPS signal reception during its operation. The signal quality is assessed by comparing the permissible error in the horizontal plane (HDOP) of the internal receiver and the external GPS antenna. The receiver, whose error will be smaller, is selected as the main source of GPS data. Moreover, if the permissible error of the currently active source lies within the specified value (the default is 300), then switching to another signal source with a lower error will not occur.

By default, priority is set for the internal receiver of the device. To change the priority there is a new special parameter ID_Conf 5017 (Appendix 1).

Possible values:

- 0 - priority of the internal receiver (by default);
- 1 - priority of the external receiver;
- 2 - source selection based on HDOP level.

To determine the type of source currently used (internal receiver or external antenna), the GPS Power I/O-element is used (bit mask, ID_Send 69). The bit width of this parameter is 1 byte.

The bit mask is calculated as follows: zero nibble - for the internal receiver, the first nibble - for the external receiver. Byte order - from low to high (little-endian, right to left):

- Bit 0 - the receiver is configured;
- Bit 1 - GPS signal present;
- Bit 2 - signal source activity;
- Bit 3 - the bit is not used;

For example:

The value of param69 = 115 is transmitted to the server. We convert the number 155 from DEC to BIN and get the value 0111 0011.

For 0011 (zero nibble):
1 - the receiver is configured;
1 - there is a GPS signal;
0 - the source is not active;
0 - the bit is not used;

For 0111 (first nibble):
1 - the receiver is configured;
1 - there is a GPS signal;
1 - the source is active;
0 - the bit is not used;

Based on this data, it can be established that the external antenna is currently used as a source for determining GPS data.

Appendix 1 – Device parameters

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
Server and GPRS					
ipsHost0	0245	string	IP or DNS of primary server	-	193.193.165.165
ipsPort0	0246	2 byte	PORT of primary server	-	20127
ipsPass	0211	string	Password IPS of primary server	-	1111
ipsHost1	0188	string	IP address of backup server	-	193.193.165.165
ipsPort1	0189	2 byte	PORT of backup server	-	20127
ConfServEna	0908	1 byte	Operation with the configuration server (0 – disabled, 1 – enabled)	-	1
settingsHost	0220	string	IP or DNS of WEB configuration server	-	configurator. bitrek.com.ua
settingsPort	0221	2 byte	PORT of WEB configuration server	-	55755
settingsTimeOut	0222	2 byte	Period of connection to WEB configuration server	second	900
settingsPass	0223	string	Access password to WEB configuration server	-	1111
APN	0242	string	Access point of GPRS	-	gps.utel.ua
Usname	0243	string	Access login of GPRS	-	none
Uspass	0244	string	Access password of GPRS	-	none
Connect Try Amount	0904	1 byte	Number of attempts in the series of connection to the server	pcs	3

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
Connect Try Interval	0905	2 byte	Waiting period between the attempts in the series	second	60
Connect Serial Interval	0906	2 byte	Period to wait between attempts series	second	300
Switching Host 2 Port 2	0196	1 byte	Permission to use backup server	-	0
ProtocolType	0241	1 byte	Type of data transfer protocol to the server (0 – Teltonika; 1 – IPS)	-	0
GPRSRegTimeout	4018	2 byte	GPRS network registration timeout	second	120
GSMRegTimeout	4019	2 byte	GSM network registration timeout	second	120
Tracking					
Enable Time Period	0900	1 byte	Permission to record by time	-	1
Enable Dist Period	0901	1 byte	Permission to record by distance	-	1
Enable Angle Period	0902	1 byte	Permission to record by azimuth	-	1
Day Period	0903	2 byte	Period of readout by time at ignition on	second	30
Night Period	0011	2 byte	Period of readout by time at ignition off	second	30
Dist Period	0012	2 byte	Period of readout by distance	m	500
Angle Period	0013	2 byte	Period of readout by azimuth	degree	10
Send Period	0270	2 byte	Period of data transfer to the server	second	35

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
Record Amount	0232	1 byte	Number of entries in the package	pcs	0
Send Amount Del	0356	1 byte	Number of attempts to send data to the server before deletion	pcs	3
Send Confirm Time	0357	1 byte	Time to wait for a response from the server	second	60
Delta X	0281	1 byte	Angle of deviation of the accelerometer by X axis	degree	3
Delta Y	0282	1 byte	Angle of deviation of the accelerometer by Y axis	degree	3
Delta Z	0283	1 byte	Angle of deviation of the accelerometer by Z axis	degree	3
Start Move Timeout	0284	2 byte	Timeout of movement start according to the accelerometer	0.1 * sec	50
Stop Move Timeout	0285	2 byte	Timeout of movement stop according to the accelerometer	0.1 * sec	200
Min_GPS_Speed	0918	1 byte	Minimum GPS speed for motion detection	km/hour	5
Axel Sleep Enable	0911	1 byte	Sleep mode by accelerometer (0 – disabled; 1 – enabled)	-	0
Wait_sleep_ timeout	4007	2 byte	Timeout to go to sleep mode by accelerometer	min	15
Sleep timeout	4008	2 byte	Timeout of sleep mode by accelerometer	min	720

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
GNSS_select	4016	1 byte	Selection of positioning system **0** or **3** – GPS+GLONASS; **1** – GPS only; **2** – GLONASS only;)	-	3
GPS Source Priority	5017	1 byte	Priority of GPS-data source **0** –internal receiver; **1** – external GPS antenna; **2** – HDOP source selection;	-	0
Security					
Phone0	0261	string	Authorized telephone number 0	-	-
Phone1	0262	string	Authorized telephone number 1	-	-
Phone2	0263	string	Authorized telephone number 2	-	-
Phone3	0264	string	Authorized telephone number 3	-	-
Phone4	0265	string	Authorized telephone number 4	-	-
Phone5	0266	string	Authorized telephone number 5	-	-
Phone6	0267	string	Authorized telephone number 6	-	-
Phone7	0268	string	Authorized telephone number 7	-	-
Phone8	0269	string	Authorized telephone number 8	-	-

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
SMS Login	0252	string	Access login by SMS	-	-
SMS Password	0253	string	Access password by SMS	-	-
Device_PIN	0910	string	Access password to the device	-	11111
SIM_PIN	0818	1 byte	Installation of PIN-code of SIM-card operator	-	-
Jamming					
Jamming Level	0806	1 byte	Level of detection of jamming event	c.u.	80
JammingEna	0807	1 byte	Permission to send SMS about jamming (0 – disabled, 1 – enabled)	-	0
Service					
Reboot Per	0186	1 byte	Period of the regular reboot of the device	hour	24
Reboot Type	0187	1 byte	Type of device reboot (0 – complex; 1 – modem only)	-	0
ErrSatNum	0992	1 byte	Authorization to set the number of satellites at the loss of GPS signal	pcs	0
ringNum	0912	1 byte	Number of rings before automatic response (to check the SIM-card)	pcs	3
NTP_Ena	0909	1 byte	Time synchronization via NTP (1 – enabled, 0 – disabled)	-	0
NTP_Port	0348	2 byte	NTP-server port	-	123

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
NTP_Host	0247	string	NTP-server IP-adress	-	0.ua.pool.ntp.org
NTP_sync_period	0347	2 byte	NTP server synchronization period	min.	0
GPRS_stayalive	0907	2 byte	GPRS-session lifetime	min.	480
IgnInput	5006	string	Software switching of the ignition between the analog inputs 1 – AIN1 2 - AIN2	-	1
Notifications					
RingEnable	0913	1 byte	Authorization of outgoing voice calls	-	0
OutCallTrigger	0914	2 byte	ID of I/O element – trigger of an outgoing voice call	-	-
SMSTrigger	0816	2 byte	ID of I/O element – trigger to send an SMS to authorized phone number when the events occur	-	-
SMSText	0817	string	Text added to the SMS (no more than 30 characters in the Latin alphabet)	-	-
Roaming					
Operator selection	0917	1 byte	Operator selection mode	-	0
UsipTable	0020...0059	string	List of codes of authorized operators	-	-

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
UsAPNTable	0060...0099	string	List of APN of authorized operators	-	-
UsLoginTable	0100...0139	string	List of GPRS logins of authorized operators	-	-
UsPassTable	0140...0179	string	List of GPRS passwords of authorized operators	-	-
Parameters for I/O elements setting					
RFID Ena	0915	1 byte	Service authorization RFID reader (via RCS SOVA protocol by RS-485 bus at 9 network address) or iButton and control of digital output (check Appendix 4)	-	0
Ekey_num	0920…0939	8 byte	ID of allowed RFID-cards or iButton keys	-	-
MinDuration	0349	1 byte	Filter of discrete inputs (Duration less than the predetermined levels will be filtered)	10 msec	5
Max_HDOP	0998	1 byte	The permissible error in the horizontal plane	0.01 c.u.	300
iButtonEna	0991	1 byte	Mode of operation: 0 – disabled; 1 – iButton; 2 – CP-Z2L	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
TsensEna	0990	1 byte	Authorization of temperature sensor operation (0 – disabled, 1 – enabled)	-	0
K_AIN1	0957	2 byte	Kalman rate for the analog input No. 1 filtering (1 – off; filtration range is 2 – 65535)	c.u.	19
K_AIN2	0958	2 byte	Kalman rate for the analog input No. 2 filtering (1 – off; filtration range is 2 – 65535)	c.u.	19
ValidFuelLevel	0819	1 byte	Permission to use the last valid level of fuel level	-	0
Polling_period_ fuel	0197	1 byte	Polling period for 4 fuel level sensors	sec	10
Ekey_period	0208	2 byte	The period of polling the identifier keys	1 sec	5
Factor F	0950	4 byte	F coefficient for Kalman filter	c.u.	1000000
Factor Q	0951	4 byte	Q coefficient for Kalman filter	c.u.	1000000
Factor H	0952	4 byte	H coefficient for Kalman filter	c.u.	1000000
Factor Rs	0953	4 byte	R coefficient for Kalman filter at motion absence	c.u.	20000000
Factor Rm	0954	4 byte	R coefficient for Kalman filter at motion	c.u.	400000000
Ain1Per	0959	1 byte	Coefficient of median filtering for analog input No. 1 (from 1 to 256)	c.u.	19

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
Ain2Per	0980	1 byte	Coefficient of median filtering for analog input No. 2 (from 1 to 256)	c.u.	19
CanLog program_num	0406	2 byte	Set program number of the CAN LOG	-	0
canLogTM	0407	2 byte	CAN LOG polling period	sec.	5
RS232 Ena	5007	1 byte	Configuration of RS-232 mode: (0 – off; 1 – CAN-LOG v1; 2 – RS-232 DUT; 3 – CAN-LOG v4 4 – LP Speed Limiter 5 – CUB TPMS)	c.u.	0
dh1MedSize	4017	1 byte	Median filtering depth for dHigh1F (from 1 to 256)	c.u.	30
AutoSetIO_Ena	0408	1 byte	Autosetting of CAN LOG I/O elements 0 – disabled 1 - enabled	c.u.	0
CAN J1939					
CANBaudRate	5038*	2 byte	CAN-bus speed: 0 - OFF;	bps/kbps	0
canPGN_1	7002	4 byte HEX	PGN	-	0
canBitStart_1	7003	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_1	7004	1 byte	Data message length to read (from 0 to 64)	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
canDataTM_1	7005	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_2	7008	4 byte HEX	PGN	-	0
canBitStart_2	7009	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_2	7010	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_2	7011	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_3	7014	4 byte HEX	PGN	-	0
canBitStart_3	7015	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_3	7016	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_3	7017	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_4	7020	4 byte HEX	PGN	-	0
canBitStart_4	7021	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_4	7022	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_4	7023	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_5	7026	4 byte HEX	PGN	-	0
canBitStart_5	7027	1 byte	Start Bit position (from 0 to 64)	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
canBitLength_5	7028	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_5	7029	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_6	7032	4 byte HEX	PGN	-	0
canBitStart_6	7033	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_6	7034	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_6	7035	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_7	7038	4 byte HEX	PGN	-	0
canBitStart_7	7039	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_7	7040	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_7	7041	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_8	7044	4 byte HEX	PGN	-	0
canBitStart_8	7045	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_8	7046	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_8	7047	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_9	7050	4 byte HEX	PGN	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
canBitStart_9	7051	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_9	7052	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_9	7053	1 byte	Data reset timeout (from 0 to 255)	sec.	0
canPGN_10	7056	4 byte HEX	PGN	-	0
canBitStart_10	7057	1 byte	Start Bit position (from 0 to 64)	-	0
canBitLength_10	7058	1 byte	Data message length to read (from 0 to 64)	-	0
canDataTM_10	7059	1 byte	Data reset timeout (from 0 to 255)	sec.	0
J1708					
j1708PID_1	7061	1 byte	PID	-	0
j1708BitStart_1	7062	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_1	7063	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_1	7064	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_2	7066	1 byte	PID	-	0
j1708BitStart_2	7067	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_2	7068	1 byte	Data message length to read (from 0 to 64)	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
j1708DataTM_2	7069	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_3	7071	1 byte	PID	-	0
j1708BitStart_3	7072	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_3	7073	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_3	7074	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_4	7076	1 byte	PID	-	0
j1708BitStart_4	7077	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_4	7078	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_4	7079	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_5	7081	1 byte	PID	-	0
j1708BitStart_5	7082	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_5	7083	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_5	7084	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_6	7086	1 byte	PID	-	0
j1708BitStart_6	7087	1 byte	Start Bit position (from 0 to 64)	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
j1708BitLength_6	7088	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_6	7089	1 byte	Data reset timeout (from 0 to 255)	сек	0
j1708PID_7	7091	1 byte	PID	-	0
j1708BitStart_7	7092	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_7	7093	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_7	7094	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_8	7096	1 byte	PID	-	0
j1708BitStart_8	7097	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_8	7098	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_8	7099	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_9	7101	1 byte	PID	-	0
j1708BitStart_9	7102	1 byte	Start Bit position (from 0 to 64)	-	0
j1708BitLength_9	7103	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_9	7104	1 byte	Data reset timeout (from 0 to 255)	sec.	0
j1708PID_10	7106	1 byte	PID	-	0

Name of parameter	ID at configuration	Grade of parameter	Parameter purpose	Measurement unit	Default value
j1708BitStart_10	7107	1 byte	Start Bit position (from 0 to 64)	-	0
j1708Bit Length_10	7108	1 byte	Data message length to read (from 0 to 64)	-	0
j1708DataTM_10	7109	1 byte	Data reset timeout (from 0 to 255)	sec.	0

*Note
On devices with firmware version 1.4.9 and higher, the speed of the CAN bus is set in bits (setparam 5038 250000).
On devices with firmware version 1.4.7 and below, the speed of the CAN bus is set in kilobits (setparam 5038 250).

Appendix 2 – List of I/O elements

No.	Name of parameter	ID at transmission	ID at configuration	Purpose
1	PSV	66	0410/0411/0412/0413/0414/0415	Power supply voltage
2	VBAT	67	0420/0421/0422/0423/0424/0425	Battery power
3	PCB_Temp	70	0440/0441/0442/0443/0444/0445	Device temperature
4	GPSSpeed	24	0490/0491/0492/0493/0494/0495	Speed by GPS
5	Movement	240	0510/0511/0512/0513/0514/0515	State of motion Possible values: 0, 1, 2, 3 0 - no movement; 1 – motion detected by accelerometer; 2 - motion detected by GPS (more than 10 km/h speed detected over 10 sec); 3 – motion detected by accelerometer and GPS.
6	realOdometr	199	0500/0501/0502/0503/0504/0505	Relative odometer
7	Odometr	200	0710/0711/0712/0713/0714/0715	Absolute odometer
8	GPSPower	69	0450/0451/0452/0453/0454/0455	Availability of GPS-signal Bits: 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 Internal receiver: 0 - enabled; 1 - configured; 2 - active data; 3 - reserved. External receiver: 4 - enabled; 5 - configured; 6 - active data; 7 - reserved.

No.	Name of parameter	ID at transmission	ID at configuration	Purpose
9	GSMCSQ	21	0470/0471/0472/0473/0474/0475	Level of GSM signal
10	OperCode	111	0680/0681/0682/0683/0684/0685	Operator code
11	ModemStat	117	0750/0751/0752/0753/0754/0755	Modem status
12	GSM Stat	118	0760/0761/0762/0763/0764/0765	Registration status in the GSM network
13	GPRS net stat	119	0770/0771/0772/0773/0774/0775	Registration status in the GPRS network
14	GPRS content stat	120	0780/0781/0782/0783/0784/0785	Activation status of GPRS content
15	SIM stat	121	0790/0791/0792/0793/0794/0795	Transfer of SIM-card status
16	dLow 1	1	0340/0341/0342/0343/0344/0345	Discrete input with active “0” No.1
17	Dhigh1	5	0540/0541/0542/0543/0544/0545	Discrete input with active “1”
18	AIN 1	9	0300/0301/0302/0303/0304/0305	Analog input No. 1
19	AIN 2	10	0310/0311/0312/0313/0314/0315	Analog input No. 2
20	Jamming	141	0940/0941/0942/0943/0944/0945	Status of GSM signal jamming
21	axesX	114	0720/0721/0722/0723/0724/0725	Value of acceleration by X axis
22	axesY	115	0730/0731/0732/0733/0734/0735	Value of acceleration by Y axis
23	axesZ	116	0740/0741/0742/0743/0744/0745	Value of acceleration by Z axis
24	Tsens0	106	0630/0631/0632/0633/0634/0635	Temperature value of temperature sensor 1
25	Tsens1	107	0640/0641/0642/0643/0644/0645	Temperature value of temperature sensor 2
26	Tsens2	108	0650/0651/0652/0653/0654/0655	Temperature value of temperature sensor 3
27	Tsens3	109	0660/0661/0662/0663/0664/0665	Temperature value of temperature sensor 4
28	Tsens4	110	0670/0671/0672/0673/0674/0675	Temperature value of temperature sensor 5
29	fuelLevel232	188	5430/5431/5432/5433/5434/5435	Polling of filtered fuel level sensor RS-232
30	fuelLevel1	100	0580/0581/0582/0583/0584/0585	Polling of filtered fuel level sensor (1 network address)

No.	Name of parameter	ID at transmission	ID at configuration	Purpose
31	fuelLevel2	101	0590/0591/0592/0593/0594/0595	Polling of filtered fuel level sensor (2 network address)
32	fuelLevel5	129	0850/0851/0852/0853/0854/0855	Polling of filtered fuel level sensor (5 network address)
33	fuelLevel6	130	0860/0861/0862/0863/0864/0865	Polling of filtered fuel level sensor (6 network address)
34	fuelLevel Unfilt232	187	5420/5421/5422/5423/5424/5425	Polling of unfiltered fuel level sensor RS-232
35	fuelLevel Unfilt1	112	0690/0691/0692/0693/0694/0695	Polling of unfiltered fuel level sensor (1 network address)
36	fuelLevel Unfilt2	113	0700/0701/0702/0703/0704/0705	Polling of unfiltered fuel level sensor (2 network address)
37	fuelLevel Unfilt5	131	0870/0871/0872/0873/0874/0875	Polling of unfiltered fuel level sensor (5 network address)
38	fuelLevel Unfilt6	132	0880/0881/0882/0883/0884/0885	Polling of unfiltered fuel level sensor (6 network address)
39	fuelTemp1	102	0600/0601/0602/0603/0604/0605	Fuel temperature per fuel level sensor (1 network address)
40	fuelTemp2	103	0610/0611/0612/0613/0614/0615	Fuel temperature per fuel level sensor (2 network address)
41	fuelTemp5	127	0520/0521/0522/0523/0524/0525	Fuel temperature per fuel level sensor (5 network address)
42	fuelTemp6	128	0530/0531/0532/0533/0534/0535	Fuel temperature per fuel level sensor (6 network address)
43	fuelTemp232	186	5410/5411/5412/5413/5414/5415	Fuel temperature per fuel level sensor RS-232
44	ecoAccel	44	0960/0961/0962/0963/0964/0965	Value of acceleration of motion
45	ecoBrake	45	0970/0971/0972/0973/0974/0975	Value of acceleration of braking
46	ecoCrn	47	5450/5451/5252/5453/5454/5455	Value of corner acceleration

No.	Name of parameter	ID at transmission	ID at configuration	Purpose
47	FrqVal	25	0830/0831/0832/0833/0834/0835	Frequency value of dl_Low 1 discrete input
48	fuelCounter 1	136	0180/0181/0182/0183/0184/0185	dl_Low 1 pulse counter
49	HDOP	122	0800/0801/0802/0803/0804/0805	Reduced accuracy in the horizontal plane
50	EKEY	105	0620/0621/0622/0623/0624/0625	Value of the identifier key
51	RFID Ekey	157	3800/3801/3802/3803/3804/3805	ID of approached RFID-card
52	iMCC	mcc	4010/4011/4012/4013/4014/4015	Positioning by base stations*
53	iMNC	mnc	4020/4021/4022/4023/4024/4025	Positioning by base stations*
54	iLAC	lac	4030/4031/4032/4033/4034/4035	Positioning by base stations*
55	iCellID	cell_id	4040/4041/4042/4043/4044/4045	Positioning by base stations*
56	Rx_level	rx_level	4050/4051/4052/4053/4054/4055	Positioning by base stations*
57	Socket_stat	139	5030/5031/5032/5033/5034/5035	Status of server connection socket
58	rebootCnt	46	5010/5011/5012/5013/5014/5015	Device reboot counter
59	FuelCounter 2	137	0190/0191/0192/0193/0194/0195	dl_Low 2 pulse counter
60	Can_stat	218	5510/5511/5512/5513/5514/5515	CAN BUS connection status
61	iButton	78	0400/0401/0402/0403/0404/0405	iButton key value
62	CAN_1	90	3600/3601/3602/3603/3604/3605	Activation of I/O-element No. 1 for CAN
63	CAN_2	91	3610/3611/3612/3613/3614/3615	Activation of I/O-element No. 2 for CAN
64	CAN_3	92	3620/3621/3622/3623/3624/3625	Activation of I/O-element No. 3 for CAN
65	CAN_4	93	3630/3631/3632/3633/3634/3635	Activation of I/O-element No. 4 for CAN
66	CAN_5	94	3640/3641/3642/3643/3644/3645	Activation of I/O-element No. 5 for CAN
67	CAN_6	95	3650/3651/3652/3653/3654/3655	Activation of I/O-element No. 6 for CAN
68	CAN_7	96	3660/3661/3662/3663/3664/3665	Activation of I/O-element No. 7 for CAN

No.	Name of parameter	ID at transmission	ID at configuration	Purpose
69	CAN_8	97	3670/3671/3672/3673/3674/3675	Activation of I/O-element No. 8 for CAN
70	CAN_9	98	3680/3681/3682/3683/3684/3685	Activation of I/O-element No. 9 for CAN
71	CAN_10	99	3690/3691/3692/3693/3694/3695	Activation of I/O-element No. 10 for CAN
72	J1708_1	80	3500/3501/3502/3503/3504/3505	Activation of I/O-element No. 1 for J1708
73	J1708_2	81	3510/3511/3512/3513/3514/3515	Activation of I/O-element No. 2 for J1708
74	J1708_3	82	3520/3521/3522/3523/3524/3525	Activation of I/O-element No. 3 for J1708
75	J1708_4	83	3530/3531/3532/3533/3534/3535	Activation of I/O-element No. 4 for J1708
76	J1708_5	84	3540/3541/3542/3543/3544/3545	Activation of I/O-element No. 5 for J1708
78	J1708_6	85	3550/3551/3552/3553/3554/3555	Activation of I/O-element No. 6 for J1708
79	J1708_7	86	3560/3561/3562/3563/3564/3565	Activation of I/O-element No. 7 for J1708
80	J1708_8	87	3570/3571/3572/3573/3574/3575	Activation of I/O-element No. 8 for J1708
81	J1708_9	88	3580/3581/3582/3583/3584/3585	Activation of I/O-element No. 9 for J1708
82	J1708_10	89	3590/3591/3592/3593/3594/3595	Activation of I/O-element No. 10 for J1708
83	HDOP_ext	123	0810/0811/0812/0813/0814/0815	Reduced accuracy in the horizontal plane (external GPS antenna)
84	Sat_int	208	5520/5521/5522/5523/5524/5525	Number of satellites (internal receiver)
85	Sat_ext	209	5530/5531/5532/5533/5534/5535	Number of satellites (external GPS antenna)

Note:*

Function to determine the location by the base stations is available only when devices operate by IPS protocol.

When using the Wialon IPS protocol, the values of the parameters id_Send 44, 45, 47 are transferred in "g"

*When using the Teltonika protocol, the values of the parameters id_Send 44, 45, 47 are transferred in "g * 100"*

Appendix 3 – List of CAN-LOG I/O elements

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition	Resolution
1	Total running time of the engine	5060/5061/5062/5063/5064/5065	sec	151	1 sec
2	Total running time of the engine (since the reset of the counter)	5070/5071/5072/5073/5074/5075	sec	152	1 sec
3	Total vehicle mileage	5080/5081/5082/5083/5084/5085	km	153	0,005 km
4	Total vehicle mileage (since the reset of the counter)	5090/5091/5092/5093/5094/5095	km	154	0,005 km
5	Total fuel consumption	5100/5101/5102/5103/5104/5105	liter	155	0,05 L
6	Instant fuel consumption	5110/5111/5112/5113/5114/5115	liter/h	156	0,05 L/h
7	Fuel level (in percents)	5120/5121/5122/5123/5124/5125	%	195	0,1 %
8	Fuel level (in liters)	5130/5131/5132/5133/5134/5135	liter	158	0,1 L
9	Engine speed	5140/5141/5142/5143/5144/5145	rpm	159	0,25 rpm
10	Engine temperature	5150/5151/5152/5153/5154/5155	°C	160	-60 °C offset
11	Vehicle speed	5160/5161/5162/5163/5164/5165	km/h	161	1 km/h
12	Load on axle 1	1600/1601/1602/1603/1604/1605	kg	162	0,5 kg
13	Load on axle 2	5180/5181/5182/5183/5184/5185	kg	163	0,5 kg
14	Load on axle 3	5190/5191/5192/5193/5194/5195	kg	164	0,5 kg

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition	Resolution
15	Load on axle 4	5200/5201/5202/5203/5204/5205	kg	165	0,5 kg
16	Load on axle 5	5210/5211/5212/5213/5214/5215	kg	166	0,5 kg
17	Total fuel consumption (since the reset of the counter)	5220/5221/5222/5223/5224/5225	liter	167	0,05 L
18	Level of AdBLUE fluid (in percents)	5230/5231/5232/5233/5234/5235	%	168	0,1 %
19	Level of AdBLUE fluid (in liters)	5240/5241/5242/5243/5244/5245	liter	169	0,1 L
20	State flags for agricultural vehicles (0x1050)	5670/5671/5672/5673/5674/5675	D3 D2 D1 D0	222	Bit mask
21	State flags for agricultural vehicles (0x1050)	5680/5681/5682/5683/5684/5685	D7 D6 D5 D4	223	Bit mask
22	State flags for agricultural vehicles (0x1050)	5690/5691/5692/5693/5694/5695	D11 D10 D9 D8	224	Bit mask
23	State flags for agricultural vehicles (0x1050)	5700/5701/5702/5703/5704/5705	D15 D14 D13 D12	225	Bit mask
24	State flags for agricultural vehicles (0x1050)	5710/5711/5712/5713/5714/5715	D19 D18 D17 D116	226	Bit mask
25	State flags for agricultural vehicles (0x1050)	5720/5721/5722/5723/5724/5725	D20	227	Bit mask
26	Harvesting time	5260/5261/5262/5263/5264/5265	min	171	1 min

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition	Resolution
27	Harvested area	5270/5271/5272/5273/5274/5275	ha	172	1/10000 ha
28	Mowing efficiency	5280/5281/5282/5283/5284/5285	ha/h	173	1/100000 ha/h
29	Mown grain volume	5290/5291/5292/5293/5294/5295	kg	174	1 kg
30	Grain moisture	5300/5301/5302/5303/5304/5305	%	175	0,1 %
31	Threshing drum RPM	5310/5311/5312/5313/5314/5315	rpm	176	1 rpm
32	Gap under treshing drum	5320/5321/5322/5323/5324/5325	mm	177	1 mm
33	Accelerator position	5330/5331/5332/5333/5334/5335	%	178	0,4 %
34	Engine load	5340/5341/5342/5343/5344/5345	%	179	1 %
35*	Rear fog lights	5500/5501/5502/5503/5504/5505	**0** - off **1**- on **2** - info is available, data is not ready **3** - info is unavailable	206	Bit mask
36	State flags (0X1030)	5460/5461/5462/5463/5464/5465	D3 D2 D1 D0	202	Bit mask
37	State flags (0X1030)	5470/5471/5472/5473/5474/5475	D7 D6 D5 D4	203	Bit mask
38	State flags (0X1030)	5480/5481/5482/5483/5484/5485	D8	204	Bit mask
39	Security state flags (0x1020)	5640/5641/5642/5643/5644/5645	D3 D2 D1 D0	219	Bit mask

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition	Resolution
40	Security state flags (0x1020)	5650/5651/5652/5653/5654/5655	D7 D6 D5 D4	220	Bit mask
41	Security state flags (0X1020)	5660/5661/5662/5663/5664/5665	D11 D10 D9 D8	221	Bit mask

**Note:*
No. 35 - for a vehicle Toyota Hilux 2017 this parameter is describes a status of 4-wheel drive (4WD).
The number of readable parameters depends on the vehicle equipment. Some options may not be available.

Appendix 4 – Selecting a discrete output control source

ID at configuration	Grade of parameter	Description
0915	1 byte	This parameter allows you to select the control source of the digital output Out 1, depending on the set value. **iButton** 36 – monitoring iButton, without key validation; 100 – monitoring iButton+RFID, without key validation; 52 – monitoring iButton, key validation is active; 116 - мониторинг iButton+RFID, key validation is active; **RFID** 72 – monitoring RFID, without key validation; 104 – monitoring iButton+RFID, without key validation; 88 – monitoring RFID, key validation is active; 120 - monitoring iButton+RFID, key validation is active; **Without control source, RFID and iButton monitoring mode only** 96 – monitoring RFID+iButton, without key validation, without Out1 control

Appendix 5 – List of TPMS I/O elements

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition
1	Air pressure of wheel No.1	5160/5161/5162/5163/5164/5165	kPa	195
2	Air temperature of wheel No.1	5330/5331/5332/5333/5334/5335	°C	158
3	Air pressure of wheel No.2	5340/5341/5342/5343/5344/5345	kPa	159
4	Air temperature of wheel No.2	5120/5121/5122/5123/5124/5125	°C	160
5	Air pressure of wheel No.3	5130/5131/5132/5133/5134/5135	kPa	162
6	Air temperature of wheel No.3	5140/5141/5142/5143/5144/5145	°C	163
7	Air pressure of wheel No.4	5150/5151/5152/5153/5154/5155	kPa	164
8	Air temperature of wheel No.4	1600/1601/1602/1603/1604/1605	°C	165
9	Air pressure of wheel No.5	5180/5181/5182/5183/5184/5185	kPa	166
10	Air temperature of wheel No.5	5190/5191/5192/5193/5194/5195	°C	168
11	Air pressure of wheel No.6	5200/5201/5202/5203/5204/5205	kPa	169
12	Air temperature of wheel No.6	5210/5211/5212/5213/5214/5215	°C	170
14	Air pressure of wheel No.7	5230/5231/5232/5233/5234/5235	kPa	173
15	Air temperature of wheel No.7	5240/5241/5242/5243/5244/5245	°C	175
16	Air pressure of wheel No.8	5250/5251/5252/5253/5254/5255	kPa	176

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition
17	Air temperature of wheel No.8	5280/5281/5282/5283/5284/5285	°C	177
18	Air pressure of wheel No.9	5300/5301/5302/5303/5304/5304	kPa	180
19	Air temperature of wheel No.9	5310/5311/5312/5313/5314/5315	°C	181
20	Air pressure of wheel No.10	5320/5321/5322/5323/5324/5325	kPa	182
21	Air temperature of wheel No.10	5350/5351/5352/5353/5354/5355	°C	183
22	Air pressure of wheel No.11	5360/5361/5362/5363/5364/5365	kPa	184
23	Air temperature of wheel No.11	5370/5371/5372/5373/5374/5375	°C	185
24	Air pressure of wheel No.12	5380/5381/5382/5383/5384/5385	kPa	206
25	Air temperature of wheel No.12	5390/5391/5392/5393/5394/5395	°C	207
26	Air pressure of wheel No.13	5400/5401/5402/5403/5404/5405	kPa	208
27	Air temperature of wheel No.13	5520/5401/5402/5403/5404/5405	°C	209
28	Air pressure of wheel No.14	5530/5531/5532/5533/5534/5535	kPa	210
29	Air temperature of wheel No.14	5540/5541/5542/5543/5544/5545	°C	211
30	Air pressure of wheel No.15	5550/5551/5552/5553/5554/5555	kPa	212
31	Air temperature of wheel No.15	5560/5561/5562/5563/5564/5565	°C	213

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition
32	Air pressure of wheel No.16	5570/5571/5572/5573/5574/5575	kPa	214
33	Air temperature of wheel No.16	5580/5581/5582/5583/5584/5585	°C	215
34	Air pressure of wheel No.17	5590/5591/5592/5593/5594/5595	kPa	216
35	Air temperature of wheel No.17	5600/5601/5602/5603/5604/5605	°C	217
36	Air pressure of wheel No.18	5610/5611/5612/5613/5614/5615	kPa	150
37	Air temperature of wheel No.18	5620/5621/5622/5623/5624/5625	°C	151
38	Air pressure of wheel No.19	5630/5631/5632/5633/5634/5635	kPa	152
39	Air temperature of wheel No.19	5050/5051/5052/5053/5054/5055	°C	153
40	Air pressure of wheel No.20	5060/5061/5062/5063/5064/5065	kPa	154
41	Air temperature of wheel No.20	5070/5071/5072/5073/5074/5075	°C	155
42	Air pressure of wheel No.21	5080/5081/5082/5083/5084/5085	kPa	156
43	Air temperature of wheel No.21	5090/5091/5092/5093/5094/5095	°C	167
44	Air pressure of wheel No.22	5100/5101/5102/5103/5104/5105	kPa	171
45	Air temperature of wheel No.22	5110/5111/5112/5113/5114/5115	°C	172
46	Air pressure of wheel No.23	5220/5221/5222/5223/5224/5225	kPa	174

No.	Name of parameter	ID at configuration	Measurement unit	ID at transmition
47	Air temperature of wheel No.23	5260/5261/5262/5263/5264/5265	°C	202
48	Sensors bitmask	5270/5271/5272/5273/5274/5275	-	203

Document version

Date	Document version	Note
06.05.2020	2020.05.1	Basic document
25.02.2020	2020.05.2	Changed id number of I/O-element 157 to 195. Added ability to select GPS data source
04.06.2020	2020.06.1	Fixed units of measurement for parameter ID_Conf 0197
07.09.2020	2020.09.1	Figure 3 is modified, technical characteristics are modified
08.09.2020	2020.09.2	Added a description for I/O-elements ID_Send 208, 209, 123
09.09.2020	2020.09.3	Added a description for ID_Conf 5006 (Appendix 1)
26.11.2020	2020.11.1	Added ability to read status flags (0x1030) from CAN log (ID_Send 202, 203, 204)
01.12.2020	2020.12.1	Appendix 3 is edited
04.12.2020	2020.12.2	Fixed ID_Send number from 104 to 162 for the CAN log variable "Axle load 1"
10.12.2020	2020.12.3	Changed the bit depth of the ID_Conf 5038 parameter