



Vehicle tracker ADM333 GLONASS/GPS-GSM/GPRS

Operation manual

Edition 1.2

EAC

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This Operation manual relates to the vehicle tracker ADM333 (hereinafter referred to as tracker) and describes the procedure of its installation and connection as well as its function and settings.

The Operation manual is designed for professionals who have familiarized themselves with the rules of repair and installation works execution in vehicles and who have special professional knowledge in electronic and electric equipment used on various transport means.

The tracker proper work can be guaranteed if it is installed and set by qualified professionals. To use the tracker properly it is necessary to familiarize with the monitoring system work principles in general and to understand the function of all its components. For this reason, it is strictly recommended to get basic knowledge on GLONASS and GPS global navigation satellite systems functioning, GSM network, issues related to data transmission by means of short message service (SMS), GPRS and Internet.

1 Purpose and function

The tracker is intended for installation on a vehicle as an additional device that records the location of the vehicle, its speed, and travel direction.

Additionally, the voltage level at the analogue inputs and data received from supported devices connected via RS-485 and 1-Wire are recorded as well. All events and conditions fixed by the tracker are stored in its non-volatile memory.

The accumulated data is transmitted through the GSM 850/900/1800/1900 cellular network operator using packet data transmission technology GPRS to a dedicated server with a static IP address or domain name from which it can be received via the Internet for further analysis and processing in a monitoring center.

View of the tracker is shown in Figure 1.

The tracker can be configured in any convenient way: locally (via Bluetooth, using the ADM Configurator (hereinafter referred to as Configurator) or remotely (by sending commands via SMS or GPRS).

To ensure data security, when the external power is turned off and the GSM network is lost, the tracker has a non-volatile memory. Data transmission is possible only if there is a GSM 850/900/1800/1900 cellular network supporting a packet data service (GPRS).



Figure 1 – View of the tracker

The vehicle travel route is described in the form of separate points in time. The route point is saved when at least one event occurs, such as:

- travel direction changes by an angle which is greater than the pre-set one;
- the straight-ahead travel is performed at a distance, which is longer than the pre-set one;

- the pre-set acceleration limit is broken;
- the time for putting the point while traveling (parking) is expired;
- device status change (description is given in [Appendix A. Description of the bits of the field «STATUS»](#));
- an event occurs on analogue input.

In this way, route points might be saved with the time interval from one second to several minutes allowing for a quality routing, recording any changes without a surfeit of information saved in the “black box” and increase in GPRS traffic.

After being connected to the power supply, the tracker starts receiving data from GLONASS and/or GPS satellites, locating itself, identifying time, speed, travel direction, and in case of GSM network availability establishes connection with the server. After being connected to the server, the tracker transmits thereto the data packets with the pre-set frequency or when an event occurs. If for any reason the connection to the server fails, all the information will be saved in the tracker non-volatile memory and transmitted as soon as the connection is restored.

If there is no signal from GLONASS and/or GPS satellites and there is GPRS connection the time is synchronized via NTP protocol with one of the available public servers. The points will be recorded without data about location.

Data transmitted by the tracker:

- GMT date and time;
- coordinates (latitude, longitude, altitude);
- speed, acceleration and travel direction;
- number of satellites when fixing a navigation problem;
- precision loss factor in a horizontal plane;
- voltage values on analogue inputs
- data about events occurred;
- device status;
- data from the sensors connected to RS-485 and 1-Wire.

2 Technical specifications

- GLONASS/GPS receiver:
 - chipset: MT3333 (MediaTek);
 - frequency bands: GLONASS – L1 (CT-code), GPS - L1 (C/A code);

- sensitivity in cold start/tracking, dBm: - 149 dBm/- 167;
- number of tracking/picking-up channels: 33/99
- positioning precision, 95% of time, not worse: 3 m
- Connection standard: GSM 850/900/1800/1900, GPRS Multi-slot Class 12.
- GSM transmitter power: 2 W
- Number of SIM-cards, form factor: 2, nano-SIM (4FF).
- Number of analogue inputs: 2.
- Analogue inputs features:
 - voltage measurement range: 0..58,8 V
 - discreteness (sensitivity): 57,4 mV
 - input resistance: 200 kOhm.
- Number of discrete outputs of “open collector”: 1.
- Characteristics of discrete output of “open collector” type”:
 - maximum voltage – 45V;
 - maximum commutated current – 100mA.
- Interface RS-485: 1.
- Interface 1-Wire: 1.
- Acceleration meter: digital, triaxial
- Battery: Li-Pol 250 mA/h 3.7V (0,9 W/h).
- Number of stored root records: at least 30 000.
- PC connection interface: Bluetooth 3.0.
- Operation temperature:
 - with a battery: - 20...+60°C;
 - without a battery: - 40...+85°C.
- Power voltage: +8...+45 V of unregulated direct current
- Current consumption (at the supply voltage 12 V):
 - maximum: 200 mA
 - average: 30 mA
- Dimensions: 55x49x20mm;
- weight: not more than 39 g

3 Design

Functionally, the tracker consists of a microcontroller, non-volatile memory, a combined GLONASS/GPS-, GSM-, Bluetooth module, analog inputs, discrete output, digital interface RS-485, digital interface 1-wire, acceleration meter.

The GLONASS/GPS unit of the combined module is designed to receive signals from the GLONASS/GPS satellites and determine the geographical coordinates of the receiver antenna (latitude, longitude and altitude), as well as the exact time (GMT), speed and direction of travel.

GSM/GPRS unit of the combined module performs the following functions:

- establishment and maintenance of outgoing TCP/IP connection (data reception and transmission in GPRS mode);
- reception and sending SMS messages.

For information transmission, the GSM/GPRS unit of the combined module establishes and maintains a connection to the server, periodically transmitting information packets. The periods of data transmission to the server during the parking and during the movement of the vehicle are different and can be changed by user.

Bluetooth unit of the combined module provides connection to the PC, as well as wireless information exchange between the tracker and the ADM Configurator.

To display the operating status, the tracker has 2 LED indicators: green and blue

The green LED indicates the status of the GLONASS/GPS unit of the combined module:

- flashes three times— the GLONASS/GPS unit is on, but there is no data from it;
- flashes twice – data from the GLONASS/GPS unit received, but the coordinates are invalid;
- flashes once – the GLONASS/GPS unit has determined the time and the actual coordinates.

The blue LED indicates the status of the GSM/GPRS unit of the combined module:

- flashes three times - the GSM/GPRS unit is disabled for re-initialization;
- flashes twice - the GSM/GPRS unit is on, but there is no connection to the server;
- flashes once - the tracker has established connection to the server and successfully transmits the information packets;

— constantly shines, briefly turning off - SIM card is not available.

The scheme of tracker connector pins is given in Fig. 2

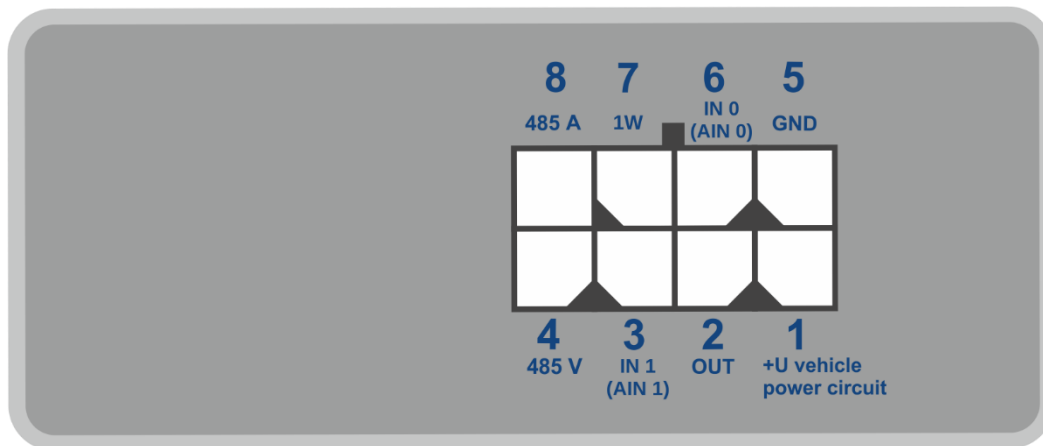


Fig.2 –Scheme of pins location

3.1 Disassembling and assembling of the housing

There are logo and LEDs on the upper part of the housing.

There is a sticker with marking on the lower part of the housing.

The disassembling should be done as follows:

1. Place the housing on a solid surface in such a way the logo to be upwards
2. Insert a card into the gap at the angle of 45 degrees until the housing starts splitting
Do not split two parts of the housing at this stage.
3. Insert a card into the gap from the other side of the housing at the angle of 45 degrees until the housing starts splitting.
4. Take off the lower part of the housing
5. Bending two latches on any side of the housing lift the scheme up and gently remove it without damaging the wires and the built-in battery.

The assembling should be done in the reverse order:

1. Make sure the wires of the battery are not squeezed and then install the scheme
2. Pressing to the scheme alternately from both the sides clamp the scheme holders
3. Install the upper part of the housing.

4 Installation

It is strongly recommended to carry out a preliminary check of the tracker before installation, using a power supply different from the vehicle on-board power, with an output voltage from 8 V to 40 V DC and a current of at least 1 A.

The tracker has got internal GLONASS/GPS and GSM antennas so can be installed almost in any place of the vehicle. However, it is not recommended to install it in the places where the received signals will be attenuated by the vehicle metallic housing, since this may affect the tracker working quality. For a proper function of the GLONASS/GPS receiver, put the tracker in such a way when its sticker is directed upwards.

Insert a SIM card with a deactivated PIN code request, activated data transmission service via GPRS, SMS and sufficient balance for these services into the holder SIM0 or SIM1.

Supply the power to the tracker according to the layout in Figure 3 and the scheme of pins location in Figure 2. When connecting the plus of the vehicle network to the tracker, install a 2A fusible as close as possible to the point of connection to the vehicle network, which is especially important when connecting directly to the battery clamp.

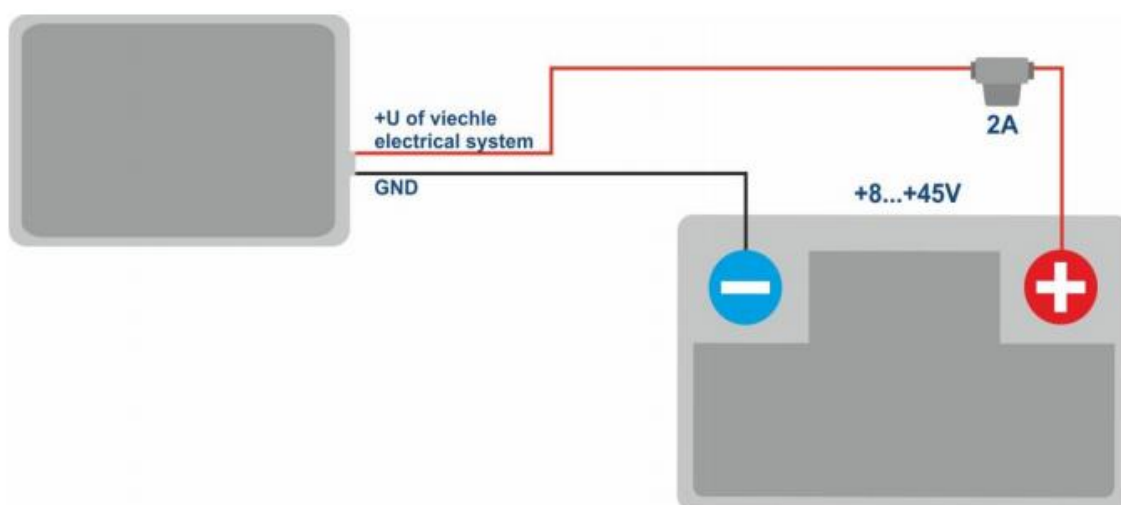


Figure 3 – Standard connection layout of the tracker

If there are valid satellite data and an established connection to the server, the tracker will catch the time, coordinates and transmit information packets to the server, which will be marked by a single flashing of the green and blue LEDs.

5 Tracker setting

5.1 Connection to ADM configurator

To connect the ADM333 tracker to a personal computer using Bluetooth wireless technology, you should do the following:

- 1) Bring the Bluetooth adapter of the PC to the working state;
- 2) Activate the ADM Configurator program of the version 2.4.3 or later (available for loading in website <http://neomatica.com>);
- 3) Switch the ADM Configurator to the Bluetooth radio connection mode. To do this, you need to select the way of device connection by clicking on the Bluetooth icon in the upper left corner of the ADM Configurator, as shown in Figure 4;



Select method of device connection

Figure 4 - ADMConfigurator: choosing how to connect the device

- 4) Supply power to the tracker;
- 5) If there are several active trackers within the reach of the Bluetooth adapter of the personal computer, select the "Select device" flag and enter the last 4 digits of IMEI as shown in Figure 5. If there is only one active tracker within the reach of the Bluetooth adapter of the personal computer it is possible to remove "Select device" flag. In such a case a random tracker from all the detected ones will be connected.



☒ Select the device

Waiting for device connection



Figure 5 – ADM Configurator waiting for device connection

- 6) After a few seconds the connection between the tracker and the ADM Configurator program will be installed and the settings window will be displayed;

- 7) After the device setting, if connection of another tracker is required, click "disable device" in the upper right corner of the ADM Configurator. The ADM Configurator will go into a standby mode as shown in the Figure 6.

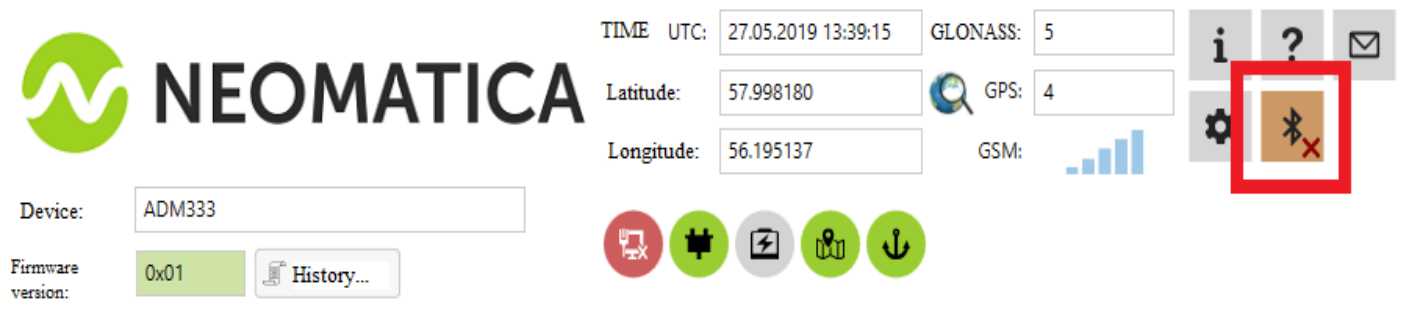


Figure 6 – ADM Configurator: "disable device button"

5.2 Configuration using commands

The tracker is managed by commands sent via SMS, GPRS or Bluetooth. Commands syntax is the same for any way of transmission.

General rules of writing and sending commands:

- only Latin characters and punctuation may be used in commands;
- character case does not matter;
- commands transmission syntax is the same for SMS, GPRS and Bluetooth;
- commands syntax: «CMD X1,X2,X3», where CMD is a command, X1..X3 are commands parameters;
- commands are separated by a SPACE. Commands are separated by a SPACE. Parameters are separated by commas, **except** for the **DNO** command which parameters are separated by a colon;

When receiving a command, the tracker performs it and sends a feedback.

If the command parameters extend beyond the acceptable range, the tracker changes them to the nearest acceptable values. If it is not possible to change parameters or parameters are not enough, the tracker will answer with an error message. A command without parameters returns the current settings.

- **Sending commands using ADM Configurator**

To send commands via Bluetooth you should use ADM Configurator. If earlier the tracker under configuration had a password different from 0, then ADM Configurator will ask for the password.

- **Sending commands using SMS**

To manage the tracker using SMS, it is necessary to send the SMS command "**ADD ME 0**" to the number of the SIM card installed in the tracker, where 0 (zero) is the default password (if the password has been changed, you should enter it instead of 0). The phone number from which this

command was sent will be authorized in the tracker. The authorization is done only once, afterwards the tracker saves the phone number in a non-volatile memory during the whole service life. Maximum quantity of saved phone numbers is 4. Resetting the settings to the factory ones clears all phone numbers.

- **Sending commands using TCP connection**

To configure via GPRS, authorization is not required. The tracker receives the commands from the server via TCP-connection that is used for data transmission.

5.3 Configuring SIM

Enter parameters of the access point name (APN) in the ADM Configurator graphic interface for the installed SIM cards or use commands **SETGPRS0** and **SETGPRS1**, the final digit in a command name corresponds to the phone number of a holder's SIM card.

If the installed SIM card/cards is/are with enabled PIN -code, then enter this PIN-code in the ADM Configurator graphic interface or use commands **PIN0** and **PIN1**, the final figure in a command name corresponds to the phone number of a holder's SIM card. This PIN-code will be automatically entered each time a Sim card initialization is required.

There is an opportunity to select a priority SIM card when using two Sim cards. If the priority is set, then the tracker connecting to the server using a non-priority SIM card, will work via it for 30 minutes, then will switch to the priority one and, if the connection to the server is established, will work via it without time limit. The priority is set in the graphic interface of the ADM Configurator or using **SIMPRIORITY** command. By default, priority is not set.

5.4 Setting connection to the server

Configure the IP address and port of the server (host) using «**SETHOST0**» or "**DN0**" command.

Change of these parameters is possible in the graphical interface of the program "ADM Configurator".

5.5 Setting data transmission

Navigation data and data received from different sensors being transmitted from the tracker to the server, are divided by data packets. Depending on the functionality used, it is necessary to activate the transmission of the necessary data packets.

The setting is done in the graphic interface of the ADM Configurator or by **PROTOCOL** command.

Table 1 shows the correspondence of data packets to the values of **PROTOCOL** command. If data transmission is required from several packets then calculate **PROTOCOL** command parameter by addition. To save the traffic it is recommended to set only the transmission of necessary data packets.

For example:

Main data(0)+analogue inputs(8)+fuel level sensors (32) = PROTOCOL 40

Table 1. Values of main PROTOCOL command parameters

Data packet name		Parameter value
Main data	NAVIGATION DATA	0
Outputs	OUTS	4
Analogue inputs	IN_A	8
Fuel level sensors	FUEL	32
Can	CAN	64

5.6 Setting route (track) drawing

5.6.1 Selecting presets of route drawing quality

To facilitate the process of setting the route drawing quality there are several factory presets. The preset can be selected in ADM Configurator (version 2.4.5 at least) or by **TRACKSET** command. The presets contain several sets of parameters. In total 5 presets are available. All presets allow to get a drawing of the movement path, the differences are in the degree of route details. The more detailed route is the more route points will be transmitted to the server, this increases the traffic consumption. Less detailed route reduces traffic consumption.

• **TRACKSET** command discription:

TRACKSET X

X –number of route drawing preset

X = 0..4

In response a total list of set parameters will be displayed.

Answer example: TRACK 4,1000,100; (1):3,5; (2):3,5; (3):3,5

Command without parameters displays current route settings.

- **Presets description:**

TRACKSET 0

A satisfactory tracking quality, money-saving variant as regards route points and traffic consumption. The quality is enough to monitor the movement path. The drawing of road turns is simplified. Slight route changes are not drawn (expected points per km are twice less than in preset 2).

TRACKSET 1

A good tracking quality. The drawing of slight changes of direction and road turns is simplified (expected points per km are 1.3 times less than in preset 2)

TRACKSET 2

Set by default. A good tracking quality. The variant suits to the most of tasks. Is an average variant as regards tracking drawing quality and traffic consumption. Slight direction changes and road turns are drawn with details.

TRACKSET 3

Slight changes in direction are drawn with more details (expected points per km are 1.3 times more than in preset 2)

TRACKSET 4

High tracking detalization. Slight changes in direction are drawn with many details. (expected points per km are 1.6 times more than in preset 2)

5.6.2 Expert setting of tracking parameters.

It is recommended to use this method of setting only if none of the presets fit the task. The change of these parameters can lead to an increase of traffic consumption or to a decrease of the route drawing quality.

- **Setting using TRACK command**

To set all the parameters send TRACK command twice. The degree of road turns detalization is set by sending TRACK command with three parameters. Command format: TRACK M,A,B

The threshold values of additional circumstances of route points drawing in movement are set by sending TRACK command with four parameters. Command format: TRACK 255,X,Y,Z

• **Setting the degree of road turns drawing detalization. Setting threshold values of angle change and deflection.**

A route point is drawn when the threshold values are exceeded.

TRACK M,A,B

M – number of speed mode.

M=255 – apply same parameters for all the modes

M=0 – slow movement

M=1 – medium -speed movement

M=2 – fast movement

A – angle for speed mode with M number.

B – deflection for speed mode with M number.

The threshold values of angle change and deflections are set separately for three speed modes. If same values should be set for all speed modes then the command should be sent once, M parameter in this case equals to 255. If different threshold values should be set for three speed modes then the command should be sent 3 times, choose speed mode using M parameter.

Example

• **Setting same parameters for all speed modes:**

TRACK 255,10,6 – Set 10 degrees for the threshold value of route change and 6 for deflection

• **Setting different parameters for all speed modes:**

TRACK 0,20,7 – Set 20 degrees for the threshold value of route change and 7 for deflection of slow speed mode.

TRACK 1,10,6 – Set 10 degrees for the threshold value of route change and 6 for deflection of medium speed mode.

TRACK 2,5,6 – Set 5 degrees for the threshold value of route change and 6 for deflection of fast speed mode.

• **Setting minimum speed, distance and acceleration.**

If the set threshold values are exceeded, a route point will be recorded.

TRACK 255, X,Y,Z – First parameter should always be equal to 255. For all speed modes these parameters are the same.

X – minimum speed

Y – distance (meters)

Z – acceleration (km/h per second)

- **Viewing set parameters**

TRACK – Display current settings.

The response displays minimum speed, distance, acceleration, angle and deflection for three speed modes.

Response format: TRACK X,Y,Z; (M) A1,B1; (M) A2,B2; (M) A3,B3

X – minimum speed

Y - distance (meters)

Z - acceleration (km/h per a second)

M=0 – slow movement

M=1 – medium speed movement

M=2 – fast movement

A – angle for speed mode with M number

B – deflection for speed mode with M number

5.7 Setting the fixation (freezing) of coordinates during the parking

The margin of error in coordinates determination might cause a slight coordinates dispersion (GPS drifts) during a long-term parking of the vehicle. To prevent this effect the coordinates freezing function might be applied in the beginning of the parking. This mode is activated automatically when the discrete level is changed at the analog input or when there is no vibration. Location fixation (freezing) according to the vibration values is chosen by default. It is impossible to use simultaneously two ways of coordinates fixation. The tracker fixes the coordinates according to the last set mode.

5.7.1 Coordinates fixation according to ignition

To enable the fixation coordinates function when the vehicle ignition is switched off, it is necessary to connect to the analogue input a circuit being under voltage when the ignition is on. For this analogue input it is necessary to activate a discrete working mode and set the values range of voltage level for the logical «1» **«INTRUE»** and the logical «0» **«INFALSE»**. Then choose the mode of coordinates fixation according to the ignition and the number of the input the ignition is connected to. In this way, when the ignition is off, an event will be formed at the input and the coordinates fixation will be initiated.

- **Examples of using INSTATIC command:**

Coordinates fixation at 0 on input AIN0 **INSTATIC 0,0**

Coordinates fixation at 0 on input AIN1 **INSTATIC 1,0**

The function is disabled by «**INSTATIC 255**» command.

5.7.2 Coordinates fixation according to vibration level

In such a mode coordinates fixation is done automatically at the absence of vibration. Current level of vibration (a sum of acceleration on three axes) is determined by the acceleration meter. If the vibration level is below the threshold within 10 seconds (by default) the coordinates are fixed.

The function is enabled by **ACCELSTATIC 10** command.

The function is disabled by **ACCELSTATIC 255** command.

5.8 Operation mode

The tracker has two modes of routes record: «Tracker» and «Beacon». The working mode is set by **BMODE** command. Mode “Tracker” is set by default.

BMODE X

X = 0-1

0 - «Tracker» mode.

1 - «Beacon» mode.

5.8.1 “Tracker” operation mode

This mode is used to create (draw) exact path of travel.

The routes record is done using all possible criteria:

- change of speed;
- acceleration threshold exceeding;
- distance passage;
- direction change;
- regarding the period of movement;
- regarding the period of parking;
- at tracker start up;
- change of discrete state at input;
- change of device status

5.8.2 “Beacon” operation mode

This mode is used to record routes at a given time period and is not suitable for the creation of exact path of movement. Time period of routes record equals to the period of routes record while parking.

The routes record is done only using the following criteria:

- at tracker start up;
- change of discrete state at input;
- regarding the parking period;
- regarding alarming period;
- at change of device status

6 Connection of extra devices

6.1 Analogue inputs

The analog inputs IN0 and IN1 can be used to connect analog type sensors and voltage measurement, and can also be interpreted as discrete.

Voltage measurement range: 0...58.8 V.

Discreteness (sensitivity): 57.4 mV.

Minimum input resistance: 200 kOhm.

It is forbidden to apply voltage exceeding the upper limit of the measuring range.

If it is necessary to record a certain voltage level, for example, in the ignition switching circuit, activate discrete operation mode and set values of voltage level for the logical "1" with the **INTRUE** and for the logical "0" with **INFALSE**

Description of the commands:

INFALSE IN,X0,Y0

IN - number of the analog input (always specify 0)

X0 - the lower limit of the logical "0" voltage range (fixed value 0mV)

Y0 – the upper limit of the logical "0" voltage range (variable value)

INTRUE IN,X1,Y1

IN - number of the analog input (always specify 0)

X1 - the lower limit of the logical "1" voltage range (variable value)

Y1 - the upper limit of the logical "1" voltage range (fixed value of 60000 mV). When entering these commands, the voltage must be specified in millivolts.

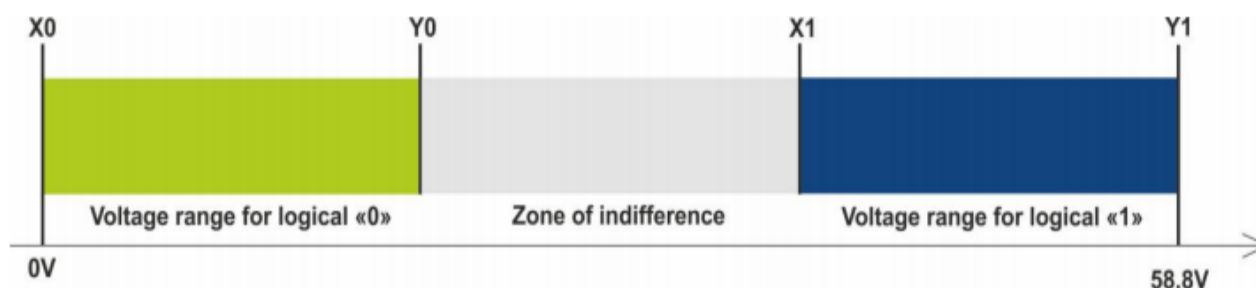


Figure 7 - Bands of discrete states

If the voltage level is in the zone of indifference, the previous discrete state is maintained until the level goes beyond the zone of indifference.

The measured voltage levels are registered by the tracker and transmitted to the server.

When changing the discrete state, an extraordinary packet is sent.

6.2 Discrete output

Output type – open collector

Maximum voltage – 45 V

Maximum commutated current – 100 mA.

Discrete output allows handling extra equipment. When switched on, the output is connected to the minus of the tracker external power supply. Connection should be done according to the scheme in Figure 8.

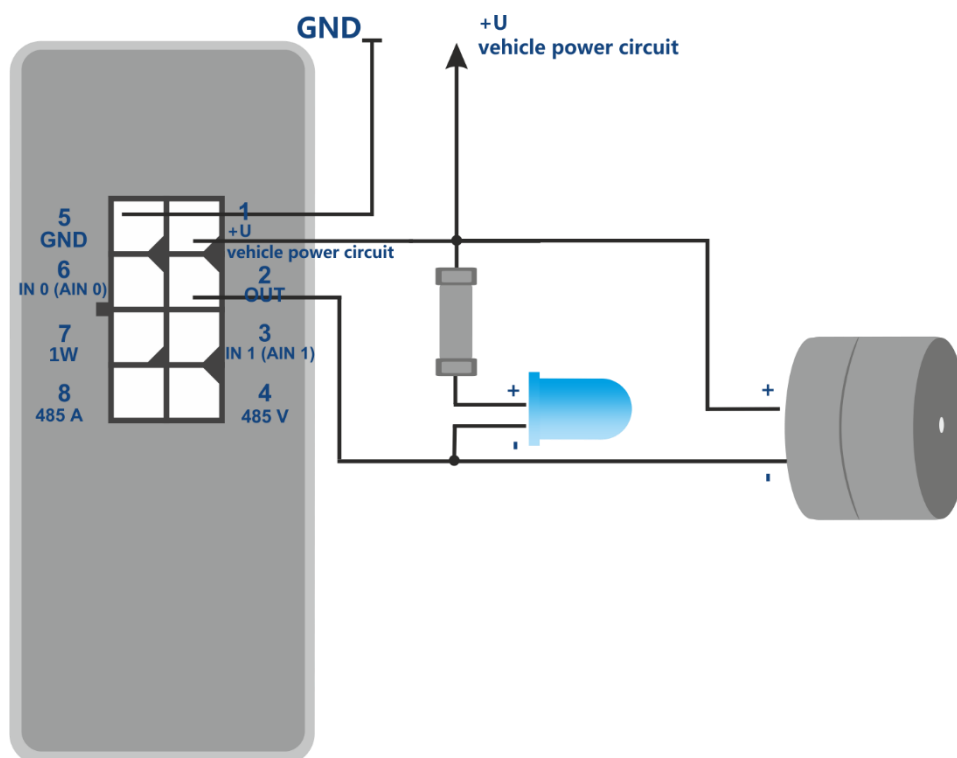


Figure 8 – Scheme of the load connection with the current consumption not more than 100mA.

It is allowed to connect devices with the maximum current consumption not exceeding 100mA, otherwise there is a risk to damage the tracker. When a more powerful load commutation is needed, it is necessary to use a relay.

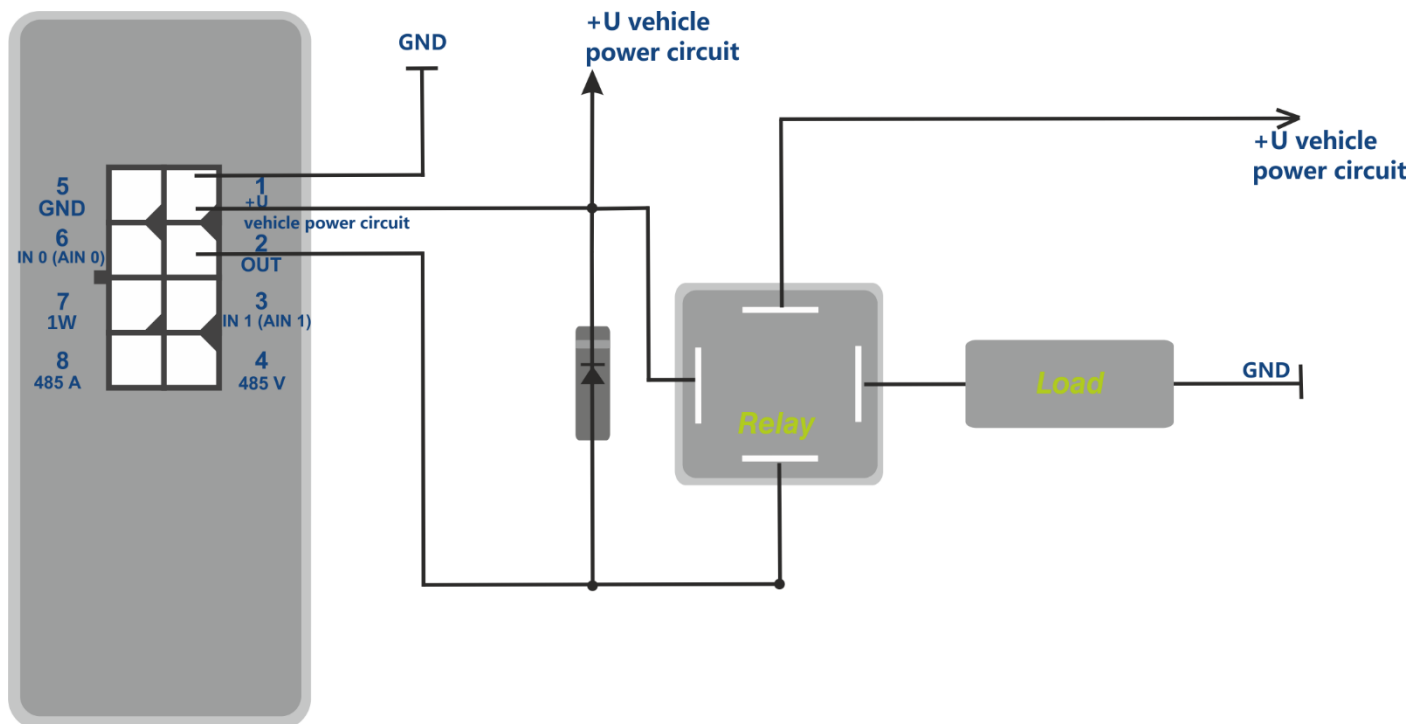


Figure 9 -Scheme of the load connection with the current consumption exceeding 100mA

To prevent the tracker output from self-induction pulses, which appear after switching off the inductive load, including the relay coil, it is necessary to connect a diode parallelly to the relay coil in the opposite direction.

It is possible to control the output condition with the **OUTPUT X,Y** command

Y=0 – number of discrete output (always 0),

X=1 – switch on (to short output to ground),

X=0 – switch off (to put output in a state of breakage).

6.3 RS-485

6.3.1 Connection of digital fuel level sensor

Up to three fuel level sensors can be connected simultaneously. The tracker alternately interrogates the sensors and transmits the values of fuel levels and temperature in the data packet "FUEL".

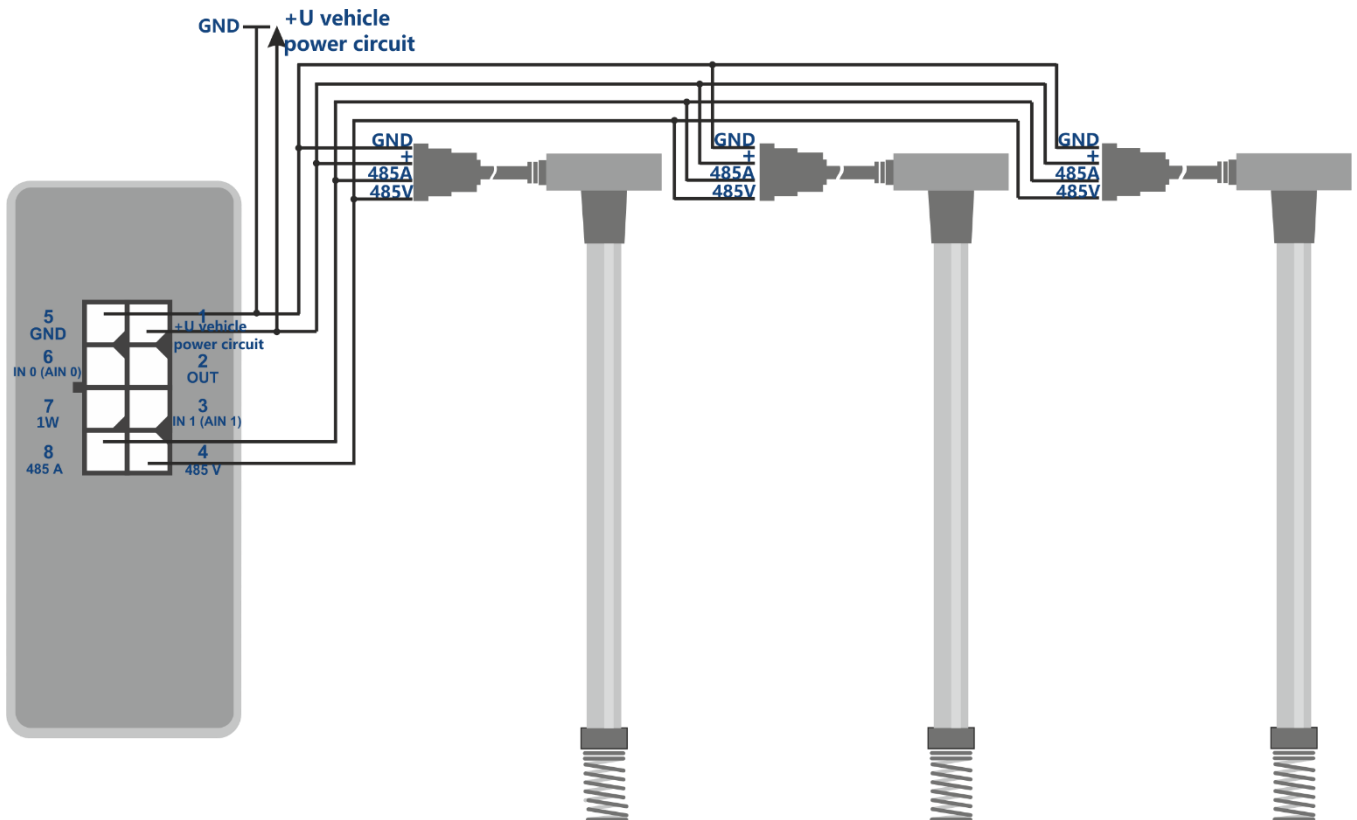


Figure 10 – Scheme of fuel level sensors connection

Connection and setting order:

- Before connecting to the tracker, it is necessary to set the sensors:
 - set network address (addresses 0,1,2 are requested by default);
 - choose interface speed of 19200 bauds;
 - disable automatic data output
- Connect lines A and B to the tracker connector pins 8 and 4. The connection scheme is given in figure 10.
- Activate “FUEL” data packet transmission in the graphic interface of the ADM Configurator or use **PROTOCOL** command.

In case of necessity, the addresses of the sensors under request can be changed by **LLS485 X,Y,Z** command, X,Y,Z – addresses of the sensors under request. Addresses 0,1,2 are requested by default. The addresses sequence corresponds to the sequence of the FUEL fields transmitted to the server. Use **FUEL** command to request the last data received by the tracker from fuel level sensor

6.4 1-Wire

Up to 8 temperature sensors DS18B20 and one DS1990 iButton can be connected simultaneously.

6.4.1 Connection of temperature sensors

Connection and setting order:

- Connect temperature sensors to the CAN of 1-Wire using the scheme in figure 11.
- Configure the CAN using **OWCONFIG 1** command. As soon as **OWCONFIG 1** command is applied each device connected to 1-wire receives its sequence number (the sequence number does not correspond to the order of the sensors physical location on the CAN)
- Use **PROTOCOL** command to activate CAN data packet transmission.

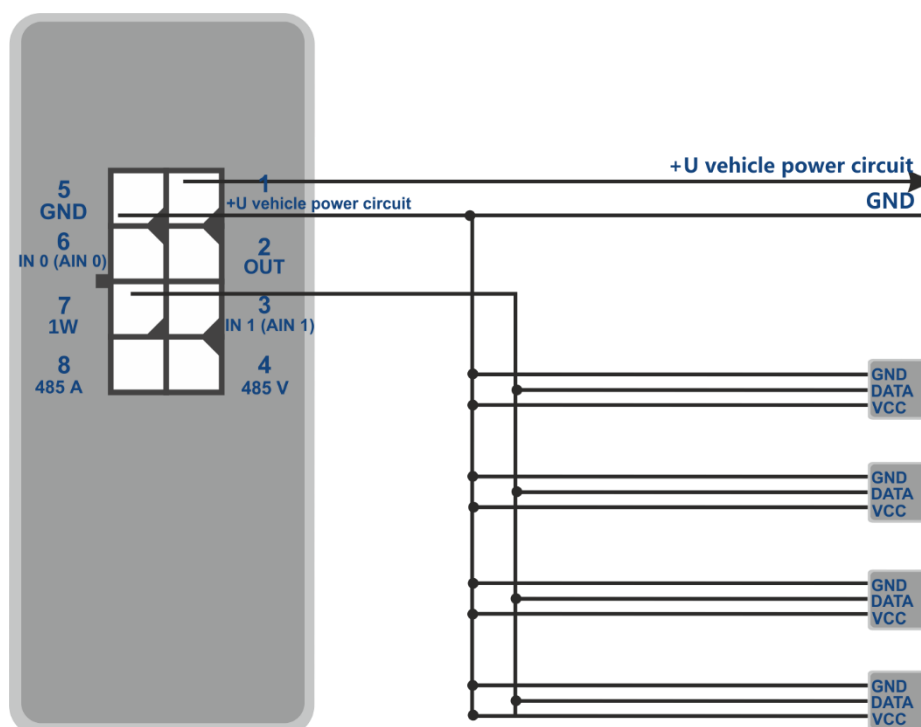


Figure 11- Connection scheme of the sensors and iButton DS18B20 to CAN of 1-wire

Transmission of temperature sensors data is done via CAN data packet.

OWCONFIG 0 command erase all the sensors list.

OWCONFIG command shows the number of connected (bound) sensors.

To see the data from any sensor connected to 1-Wire CAN use **OWTEMP X** command, where X- sensor sequence number (0...7).

6.4.2 Connection of iButton

Connection and setting order:

- connect the reader of iButton DS1990 to the CAN of 1-wire;

- use **OWCONFIG 1** command to configure CAN. As soon as **OWCONFIG 1** command is used each device connected to 1-Wire CAN receives its sequence number;
- use **IBUTTON 1** command to activate request of the reader;
- use **IBUTTON 1,1** command to activate the discrete output upon detection of iButton. (Not obligatory. The previous clause in such a case can be ignored, since this command activates the reader request and activates discrete output)
- use **PROTOCOL** command to activate “CAN” data packet transmission.

7 Commands description

Table 2. Commands description

	Command	Answer	Parameters	Description
1	Name X Example: Name bus8	Device Name 'X' Example: Device Name 'bus8'	X – tracker name	Set the name of the tracker. The name can contain only letters of the Latin alphabet and numbers. The name cannot exceed 10 digits in length. The tracker name is added to the alarm SMS messages.
2.1	ADD ME X,Y (only by SMS) Example: ADD ME 1234 ADD ME 1234,2	PHOES (0)= (1)= (2)= (3)= Example: PHONES (0)= +7xxxxxxxxxx (1)= (2)= (3)= PHONES (0)= (1)= (2)= +7xxxxxxxxxx (3)=	X – password, the default is "0". Y=0..3 – number of the memory location to store the number. Optional parameter.	Authorize the phone number from which the SMS was received and write it to the memory cell Y. The command is needed only to create a list of numbers for controlling the tracker via SMS.
2.2	ADD ME X,Y (only via Bluetooth and GPRS) Example: ADD ME +7xxxxxxxxxx,1	PHOES (0)= (1)= (2)= (3)= Example: PHOES (0)= (1)= +7xxxxxxxxxx (2)= (3)=	X – phone number Y=0...3 – number of the memory location for storing the number	Adding a phone number from which you plan to manage the tracker via SMS.

	Command	Answer	Parameters	Description
3	PHONES X Example: PHONES 1234	PHONES (0)= (1)= (2)= (3)= Example: PHONES (0)= (1)= +7xxxxxxxxxx (2)= (3)=	X –password,the default is "0".	Request a list of authorized phone numbers.
4	PASS X,Y Example: PASS 0,86974543	Pass=X,Y Example: Pass=86974543	X – old password, the default X=0. Y – new password.	Change the password from the old X to the new Y. The password is a number from one to eight digits.
5	STATUS	Example: ID=1 Soft=0x1A GPS=9291 Time=11:21:39 25.02.10 Nav=0 Lat=57.2359 Lon=56.2593 Speed=0.0 SatCnt=5 Stat=0x0000	Command without parameters.	Query the current state of the tracker. ID - the number of the tracker, Soft - the software version, GPS - the current number of the information packet, Time - current time and date according to Greenwich Mean Time, Nav – coordinates validity, Lat - latitude, Lon - longitude, Speed - speed, SatCnt - number of satellites, Stat - status.

	Command	Answer	Parameters	Description
6	IMEI Example: IMEI	IMEI Example: IMEI 359587013832624	Command without parameters	Request IMEI of GSM-module installed in the tracker. The command runs 20 seconds after the tracker is switched on or restarted.
7	SN X Example: SN 123456789	SN X Example: SN 123456789	X – settable tracker ID	Set the tracker ID
8	PIN0 X Example: PIN0 1234	PIN0 X Example: PIN0 1234	X – pin code of sim card	Set the PIN code of the SIM card No “0”.
9	PIN1 X Example: PIN1 1234	PIN1 X Example: PIN1 1234	X – pin code of sim card	Set the PIN code of the SIM card No.“1”.
10	SIMPRIORITY X Example: SIMPRIORITY 0	SIMPRIORITY X Example: SIMPRIORITY 0	X=0 – no priority. X=1 – priority SIM0. X=2 – priority SIM1.	Set the priority of SIM cards.
11	ICCID	ICCID	Command without parameters.	Request of ICCID of installed SIM cards.

	Command	Answer	Parameters	Description
12	SETGPRS0 X,Y,Z Example: SETGPRS0 internet.mts.ru,mts,mts	GPRS0: APN=X, user=Y, pass=Z Example: GPRS: APN=internet.mts.ru, user=mts, pass=mts	X – access point, by default X=internet.beeline.ru; Y - login, by default Y=beeline; Z – password, by default Z=beeline.	Set APN parameters for the SIM card. A command without parameters returns the current GPRS settings for the SIM card No“0”
13	SETGPRS1 X,Y,Z Example: SETGPRS0 internet.mts.ru,mts,mts	GPRS1: APN=X, user=Y, pass=Z Example: GPRS: APN=internet.mts.ru, user=mts, pass=mts	X – access point, by default X=internet.beeline.ru; Y - login, by default Y=beeline; Z – password, by default Z=beeline.	Set APN parameters for the SIM card. A command without parameters returns the current GPRS settings for the SIM card No“1”
14	SETHOST0 X,Y Example: SETHOST0 134,236,21,2,12300	HOST0=X,Y Example: HOST0=134.236.21.2:12300	X - IP adress, Y - server port. Five dijits separated by commas	Configuring the IP address and port of the server to which the tracker connects for information transmission. A command without parameters returns the current server address and port.
15	DN0 X:Y Example: DN0 www.test.ru:1000	HOST0=X:Y Example: HOST0= www.test.ru:1000	X - domain name of the server, Y - server port	Configure the domain name and port of the server to which the tracker connects for information transmission. A command without parameters returns the current server address and port
16	PROTOCOL X	PROTOCOL X	X – number determining the data set to be transmitted	Setting the data to be transmitted to the server (detailed description see in 5.4)

	Command	Answer	Parameters	Description
17	BMODE X	BMODE X	X=0 – mode "Tracker" X=1 – mode "Beacon"	Select the tracker working mode (mode of points/routes record)
18	TRAFFIC X	TRAFFIC X	X=0..60- time in seconds. By default is X=6	Set the delay time before sending information packet to the server to group the points.
19	ERASE FLASH	ERASE FLASH	Команда без параметров.	Erase all information packets stored in memory. After executing this command, the current information packet number is erased, the tracker reboots
20	ERASE EEPROM	ERASE EEPROM	Command without parameters	Restore the tracker factory settings and restart the tracker.
21	PERIOD X,Y Example: PERIOD 30,300	PERIOD X,Y Example: PERIOD 30,300	X – the recording period during the movement in seconds, by default X=30. Y – the recording period during parking in seconds, by default Y=300. The value of X must be less than Y.	Set the recording period in the memory of information packets during driving and parking. A command without parameters returns current settings.
22	TRACKSET X	The response displays a detailed configuration of all set parameters of the route drawing.	X= 0...4	Set the quality of routes drawing More details in clause 5.6.1 Selecting presets of route drawing quality

	Command	Answer	Parameters	Description
23	InTrue X,Y,Y Example: InTrue 0,10000,60000	InTrue X,Y,Y Example: InTrue 0,10000,60000	X=0 – input number (always 0); Y – minimum range limit in mV; Y=60000 – maximum range limit in mV (unchanged value).	Set the voltage range of the logical “1” on the analog input.
24	InFalse X,Y,Y Example: InFalse 0,0,4000	InFalse X,Y,Y Example: InFalse 0,0,4000	X=0 – input number (always 0). Ymin – minimum range limit in mV; Ymax – maximum range limit in mV.	Set the voltage range of logical zero at the analog input.
25	InInfo X Example: InInfo 0	Example: Input 0: InTrue 8000..15000, InFalse 0..3000	X=0 – input number (always 0).	Request information about the input settings.
26	INPUT	INPUT0 = 12000	Command without parameters	Query the current measured voltage level in the analog input (mV).
27	INSTATIC X,Y Example: INSTATIC 1,0	INSTATIC X,Y Example: INSTATIC 1,0	X=0 – input number, Y=0, 1 –activation by zero or one. X=255 –disabled function;	Set the input number to enable coordinates fixation mode. A command without parameters returns current setting. By default, no one input is set to enable the coordinates fixation mode.

	Command	Answer	Parameters	Description
28	ACCELSTATIC X,Y,Z Example: ACCELSTATIC 10	ACCELSTATIC X,Y,Z Example: ACCELSTATIC 10	X – timeout to enable static mode (in seconds) X=255 -disabled function Y – acceleration threshold to get out from static mode (mg) Z – timeout to get out from static mode in counting	Enabling and disabling coordinates fixation as regards the vibration level. Setting the coordinates fixation parameters as regards vibration level.
29	OUTPUT X,Y Example: OUTPUT 1	OUTPUT X,Y Example: OUTPUT 1	X=1 – output is active X=0 – disabled output.	Control of tracker output. Command without parameters returns the current output settings.
30	RESET	reset...	Command without parameters	Reboot the device
31	UPDATE	start update...	Command without parameters	Firmware renewal
32	LLS485 X,Y,Z Example: LLS485 3,20,55	LLS485 X,Y,Z Example: LLS485 3,20,55	X,Y,Z – addresses of LLS sensors, requested via RS-485 interface.	Setting LLS sensors addresses. Addresses 0,1,2 are set by default.
33	FUEL	FUEL F0=1457,T0=27; F1=0,T1=0; F2=0,T2=0	Command without parameters	Shows current readings of fuel level sensors, connected to RS-485 interface.

	Command	Answer	Parameters	Description
34	OWCONFIG X	OWCONFIG started OWCONFIG sensors:5	X=0 – erase of sensors list X=1 – automatic configuration of 1-wire CAN	Configuration of 1-wire CAN. All devices connected to 1-wire CAN receive sequence numbers.
35	OWTEMP X	OWTEMP X=28.31	X=0...7 – sequence number	Viewing current data of the temperature sensor connected to 1-Wire.
36	IBUTTON X,Y		X=0..1–disabling/enabling of iButton readings Y=0..1– Activation/disabling of the output to detect iButton.	Disabling/enabling iButton readings. Activation/disabling of the output to detect iButton.

8 Updating tracker software

The tracker software (firmware) can be updated via Bluetooth radio channel using ADM Configurator program or via a GPRS channel.

8.1 Updating tracker software via ADM Configurator

The ADM Configurator program, if the computer has access to the Internet, checks the current firmware version on the update server, and, if necessary, downloads the firmware file.

To update the firmware, do the following:

- 1) establish connection between the tracker and the ADM Configurator program using the procedure described in. [5.1 «Connection to ADM Configurator»](#);
- 2) If the tracker has got not up-to-date firmware the ADM Configurator will inform about the availability of the later version - a notification will be displayed in the lower left corner.
- 3) click "Update available";
- 4) in the opened "Notifications" tab, click "Update";
- 5) after the update, the tracker will reboot and become available for configuring

. **ATTENTION!** Do not switch off the tracker during the firmware upgrade until the tracker is detected by the setup program. Otherwise, it is possible to damage the software, which must be restored in the service center of the manufacturer.

8.2 Updating tracker software via ADM Configurator using a firmware file

The firmware file must be requested from the technical support.

To update the firmware via Bluetooth using the firmware file, do the following:

- 1) establish connection between the tracker and the ADM Configurator program using the procedure described in. [5.1 «Connection to ADM Configurator»](#);
- 2) open the "Settings" section in the "Device" tab, click - "Flash file";
- 3) click «Update» in the pop-up window;
- 4) drag the firmware file to the appropriate field in the ADM Configurator window;
- 5) after updating the firmware, the tracker will reboot and become available for operation

ATTENTION! Do not switch off the tracker during the firmware upgrade until the tracker is detected by the setup program. Otherwise, it is possible to damage the software, which must be restored in the service center of the manufacturer

8.3 Updating the tracker software via GPRS

To update the tracker software via GPRS, install the active SIM card into the tracker, enter the APN, user, pass of the cellular operator.

Otherwise, the tracker will be in the firmware download mode from the update server until all connection attempts are exhausted. The update process starts after the tracker receives the **"UPDATE"** command via one of the possible channels: Bluetooth, GPRS, SMS. After receiving the **"UPDATE"** command the tracker connects to the update server and downloads the current firmware. After a successful upgrade, the tracker switches to the basic mode of operation with the access point settings and server addresses that were installed before the update. The remaining settings after the update should be checked and, if necessary, reinstalled. Depending on the status of the GSM network, the upgrade process takes on average 2 to 10 minutes. If there is no possibility to download the update, the tracker will return to work with the available software.

9 Handling and transportation regulations

Trackers should be stored in a warehouse at a temperature of +5°C to +40°C and relative humidity at most 85 %.

After tracker transportation in sub-zero temperatures they should be stored at room temperature within 24 hours.

10 Warranty obligations

The manufacturer guarantees the tracker proper function within 12 months from the day of its sale if consumer meets all the requirements and follows all the rules of transportation, storage, installation and handling.

The warranty does not cover:

- a tracker with mechanical damages and defects (cracks and chips, dents, signs of impacts, etc.) caused by consumer as a result of handling, storage and transportation rules violation. When there are signs of oxidation or other proofs of liquid penetration in the device housing;
- a tracker without housing;
- a tracker with signs of repair performed beyond the manufacturer's service center;
- a tracker with signs of electrical and/or other damages caused as a result of unacceptable changes in external power network parameters or improper use of the tracker;
- a tracker disabled because of an unauthorized software upgrade.

The device software is licensed, terms related to the manufacturer's limited liability in the framework of the License Agreement are provided at the web https://neomatica.com/upload/docs/license_en.pdf

11 Marking and packaging

Marking is placed on the tracker housing. The tracker is packed in an individual box, which protect them during transportation and storage. Multipack is possible.

12 Disposal

Device recycling is performed according to national and local norms and requirements.

13 Scope of supply

Table 3. Scope of supply

Device name	Quantity	Serial number	Comments
Tracker ADM333	1		
MF3-8F connector with cables	1		
Datasheet	1		

14 Acceptance certificate

Trackers ADM333 GLONASS/GPS-GSM/GPRS SHAI.464512.001-10 in quantity of _____ pcs. correspond to SHAI.464512.001 TC and are valid for use.

Manufacture date:



Manufacturer: «Neomatica» LLC
24a Malkova Str., office 6, 614087, Perm, Russia
Tel: +7 (342) 2-111-500.
E-mail: sale@neomatica.ru
website: <http://neomatica.ru>

Appendix A. Description of the bits of the field «STATUS»

Table A.1. Description of the field bits «Status»

Bits	Field description «Status»	Mask value
0	Sign of tracker reboot	1
1	Number of active SIM card (0 – SIM0, 1 – SIM1)	2
2	No connection with server	4
3	-	8
4	Sign of low voltage of the battery	16
5	Sign of invalidity of coordinates (validity)	32
6	Coordinates are fixed at the absence of movement	64
7	External power supply of the tracker is switched off	128
8	-	256
9	Sign of GNSS jamming	512
10	GNSS jamming	1024
11	-	2048
12	-	4096
13	-	8192
14	Time is synchronized according to GSM	16384
15	-	32768

Appendix B. Description of transmitted parameters in Wialon

Parameter	Description
acc	Current point acceleration module, km/h/s
sats_glonass	Number of GLONASS satellites involved in fixing a navigation problem
sats_gps	Number of GPS satellites involved in fixing a navigation problem
hdop	Precision reduction on a horizontal plane
pwr_ext	External power voltage value, mV
pwr_int	Voltage in built-in battery, mB
adc1	Analogue input voltage value, A_IN0, mB
adc2	Analogue input voltage value, A_IN0, mB
adc3	GSM signal level, %
adc4	
adc5	
adc6	
fuel1	Fuel level value in sensor No. 0
fuel2	Fuel level value in sensor No. 1
fuel3	Fuel level value in sensor No. 2
temp1	Temperature value in sensor No. 0
temp2	Temperature value in sensor No. 1
temp3	Temperature value in sensor No. 2
I/O	Value of device status
vib	
in1	Discrete state on input AIN0
in2	Discrete state on input AIN1
in3	
in4	
in5	
in6	
in7	
in8	
in9	Sign of tracker restart
in10	Number of active SIM card (0 – SIM0, 1 – SIM1)
in11	No connection to server
in12	
in13	Sign of low voltage in in-built battery

in14	Sign of invalidity of coordinates
in15	Coordinates are fixed at the absence of movement
in16	External power supply of the tracker is switched off
in17	
in18	Suspicion of GNSS jamming
in19	GNSS is revealed
in20	
in21	
in22	
in23	Time synchronized by GSM
in24	
Can50	Values of temperature sensor connected via 1-wire
Can51	Values of temperature sensor connected via 1-wire
Can52	Values of temperature sensor connected via 1-wire
Can53	Values of temperature sensor connected via 1-wire
Can54	Values of temperature sensor connected via 1-wire
Can55	Values of temperature sensor connected via 1-wire
Can56	Values of temperature sensor connected via 1-wire
Can57	Values of temperature sensor connected via 1-wire
Can63	Number of IBUTTON