TechnoКом

WINDOWS SOFTWARE

DOCUMENT VERSION 1.1

SOFTWARE VERSION 3.4.0-r5

GLONASS GPS

AutoGRAPH

[AG.GSMConf] SOFTWARE

SETUP AND CONFIGURATION

SMS

Table of contents

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Introduction

This User Manual describes how to configure the AutoGRAPH-GSM, AutoGRAPH-GSM+WiFi and AutoGRAPH-WiFi Series onboard controllers (hereinafter – device, controller) using the AG.GSMConf v.3.4.0-r5 program.

The AG.GSMConf software is designed to configure Wi-Fi and GSM modules of the device; modes of operation within a native network and while roaming; data recording and transmitting parameters; settings to enable interaction with external devices, connected to the device; as well as to troubleshoot modules of the device.

For proper operation it is sufficient to set up periods of data recording and transmission, select data recording mode, specify server settings which is used to transfer data and set up SIM settings. But for the experienced users, the program offers the advanced options intended to completely configure the device operation.

VERSION REVIEW

Given below is the review of this User Manual versions.

Program version	Document version	Version review	Data
3.4.0-r1	1.0	Added the «Remote configuration of AutoGRAPH device» section Added the «Reading data from the device» section	04/2017
3.4.0-r2	1.0	Updated the "Main menu" section	04/2017
3.4.0-r5	1.0	Added the "Software update" section Updated the "Photo" section Updated the "Records and transmission" section	06/2017
3.4.0-r5	1.1	Updated the "SD/MMC Browser" section	08/2017

System requirements

- **Recommended operating system:** Microsoft Windows XP / Vista / 7 (x32 / x64) / 8
- **Recommended minimum RAM capacity:** 1 GByte.
- **Processor requirements:** 1 GHz and higher.
- **Screen resolution:** minimum - 1024x768, recommended 1280x1024 and higher.

Installing the drivers for Microsoft Windows 7

To connect the AutoGRAPH-GSM to the PC, the device drivers must be installed. For AutoGRAPH-GSM+WiFi, AutoGRAPH-GSM/GSM+, AutoGRAPH-GSM/SL, AutoGRAPH-GSM/SL-2 devices, those support a new driver, install "AutoGRAPH AGUSB Driver" developed by TechnoKom. For other devices you should install legacy "AutoGRAPH_DRIVER_AND_GPS-MOUSE" drivers.
Starting from version 3.3.0 AG.GSMConf program supports both legacy USB driver and a new one.

DEVICES WITH NEW DRIVER

- New device will be automatically detected when the device is connected to the PC running MS Windows 7.
- When connecting the devices, those supports the new driver, system Device Manager detects two new devices: AutoGRAPH and AutoGRAPH CDC (Fig.1). If the automatic driver installation is enabled in the system settings and the Internet connection is available, the AutoGRAPH device drivers will be automatically downloaded from the Windows Update server and installed in the system. After the driver installation, the connected device will be recognized.

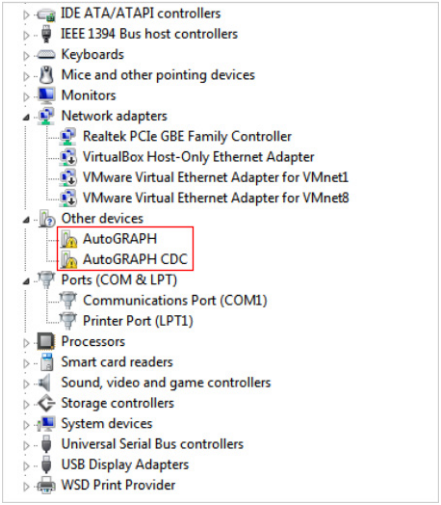


Fig.1. The device with new driver.

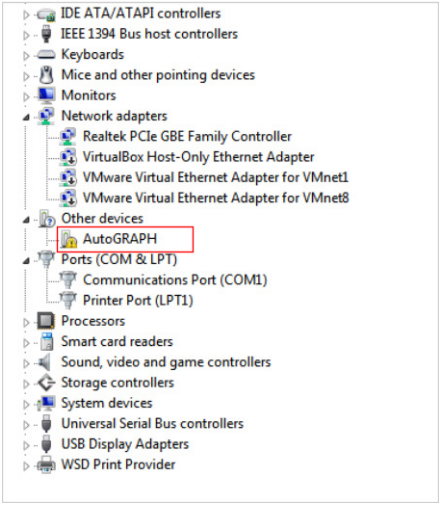


Fig.2. The device with old driver.

- If the automatic driver installation is disabled, you should install the drivers manually.
- To do it, download new driver (file AutoGRAPH AGUSB Driver.zip) from the official website of TechnoKom.
- Extract files to a temporary directory on a hard drive and install drivers for detected AutoGRAPH device.
- After successful driver installation, new device will be automatically identified by the system.

DEVICES WITH NONLINEAR FIRMWARE (OLD DRIVER)

- New device will be automatically detected when the device is connected to the PC.
- If the Internet connection is available, the drivers for AutoGRAPH-GSM devices will be installed automatically. If the Internet connection is unavailable, download the drivers from official web site of TechnoKom and install them manually.

DEVICES WITH LINEAR FIRMWARE

- Device will be automatically detected when it is connected to the PC running MS Windows 7. The Device Manager detects a new device – AutoGRAPH (Fig.2). Download drivers with MS Windows 7 support (AutoGRAPH_DRIVER_AND_GPS-MOUSE.zip) from official website of TechnoKom and install them manually.
- When drivers are installed you will see two new devices in Device Manager: USB Serial Converter (under "USB Controllers") and USB Serial Port (COMx) (under "Ports (COM and LPT)"), where "x" is the number of a port (may vary).
- To ensure normal operation of AutoGRAPH-GSM devices in Windows 7, disable the serial port created during installation of drivers. To do this, right-click the USB Serial Port (COMx) (under "Ports (COM and LPT)") and select "Disable" in a shortcut menu, the icon will change from  to  as displayed below:

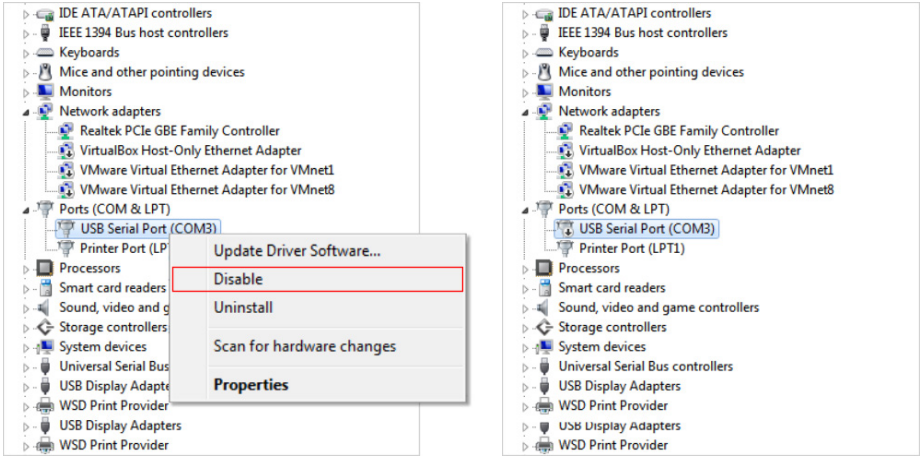


Fig.3. Installation of drivers for Microsoft Windows 7.

For devices with firmware till v. 4.0 (serial number up to 22000) it is recommended to install legacy driver for Windows 98/XP without GPS mouse support. You can download these drivers from Downloads section of the official web site of TechnoKom (www.tk-chel.ru).

Shortcut keys

When using the software, try these shortcut keys for convenience:

- **Ctrl+arrow keys, Alt+arrow keys** – to switch between tabs.
- **Ctrl+R, Alt+R, F5** – to read settings of the device.
- **Ctrl+Enter, Alt+Enter** – to save the settings to the device.
- **Ctrl+O, Alt+O** – to open .atg file or create a new one.
- **Ctrl+S, Alt+S** – to save as... .atg file.
- **Ctrl+Delete, Alt+Delete** – to delete records from the device.
- **Ctrl+L, Alt+L** – to load the settings from .atc file.

Program layout

Main screen of the AG.GSMConf 3.4.0-r5 program has following elements:

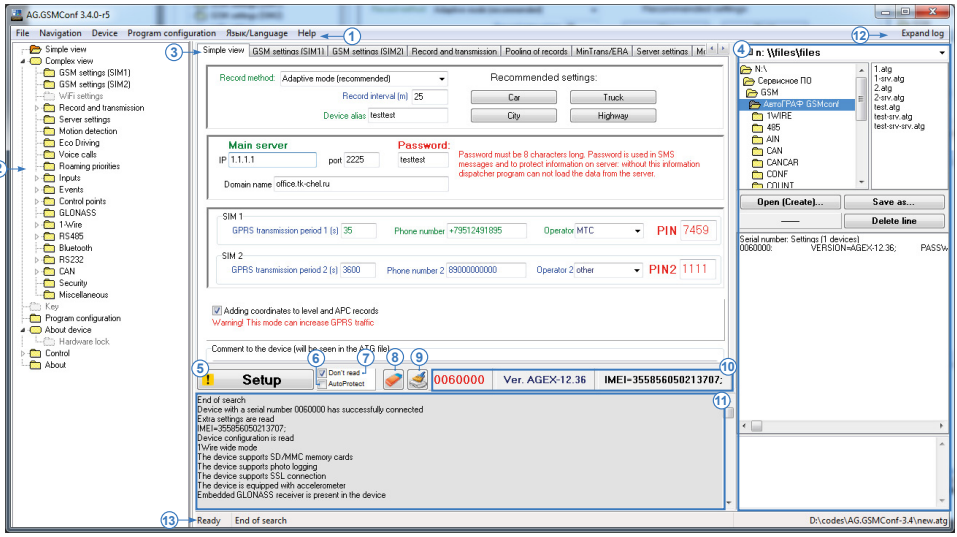


Fig.4. Program Layout.

1. Main menu provides an easy way to access the function of the software.

2. Dendrogram of the software sections is a list of program tabs, which allows to navigate the program quickly. It may be hidden if necessary.

3. Tabs. This bar includes the program tabs, used for configuring various settings of the device.

4. ATG Browser enables the user to create and edit .atg files.

5. "Setup" button saves the settings to the device. If "Don't read" option is selected, a warning sign ! will be displayed on the button.

6. AutoProtect – the option allows to automatically protect the settings when writing the settings into the device.

7. Don't read – the option prevents from reading the device's settings when it is connected to a PC.

8. "Clear fields (in program)" button clears the fields in the program.

9. Delete records from device button removes all records from the connected device.

10. Information about device. Serial number, firmware version and IMEI of a modem of the connected device are displayed on this panel.

11. Log – this window displays current state of the AG.GSMConf program. To review a large log file, press the "Expand Log" button (Fig.4, i.12). This button expands the full-screen status window to display the program operation log. To minimize the log press the button again.

13. Status Bar displays the current operation status of the AG.GSMConf program.

Main menu

FILE MENU

To enable the menu, select the File menu on the Main menu. Commands of the File menu allows the user to operate with the configuration files.

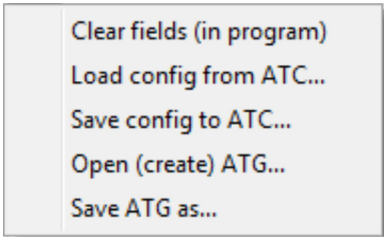


Fig.5. File menu.

Clear fields (in program)
Clears the fields in the program and restores default settings.

Load config from ATC . . .
Reads the settings from an external configuration file (.atc file).

Save config to ATC. . .
Saves the settings to the configuration file (.atc file).

Open (create) ATG (or Ctrl+O, Alt+O)
Opens an existing .atg file or creates a new one.

Save ATG as. . . (or Ctrl+S, Alt+S)
Saves the selected .atg file with a new name or in another directory.

NAVIGATION MENU

Menu is designed to quickly navigate between the tabs containing all principal settings of the device.
Options of the menu which are not supported by a firmware of the device (as well as the tabs) are automatically hidden, when connecting the device. Navigation menu is also shown in the dendrogram (see. Fig.4, item 2).

DEVICE MENU

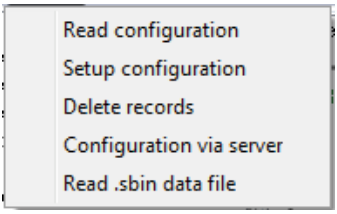


Fig.6. Device menu.

Read configuration (or Ctrl+R, Alt+R)
Reads the configurations from the connected device.

Setup configuration (or Ctrl+Enter, Alt+Enter)
Saves the configurations to the device.

Delete records (or Ctrl+Delete, Alt+Delete)
Removes records from the device.

The records could not be restored once deleted.

PROGRAM CONFIGURATION MENU

Menu options are also available on the "Program configuration" tab.

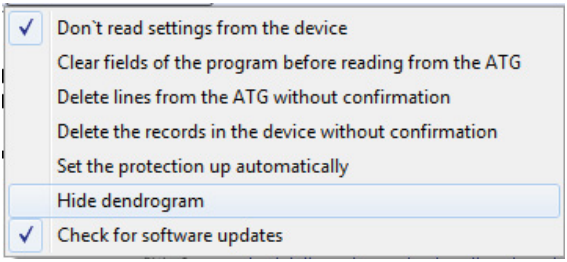


Fig.7. Program configuration menu.

Don't read settings from the device
This option prevents automatic reading of settings when connecting the device to a PC.

Clear fields of the program before reading from ATG
This option clears the fields in the program before reading new settings from .atg file.

Delete lines from the ATG without confirmation
When enabled, the program removes the strings from .atg file and does not ask the user to confirm the removal.
Delete the records in the device without confirmation
When enabled, the program removes the records from the device without the removal confirmation.

Set the protection up automatically (at least level 1)
Automatically enables protection of device's settings, when saving them to the device.

Hide dendrogram
Hides the dendrogram.

Check for software updates
Enables automatic search for a new version of the program on the server when opening.

LANGUAGE MENU

This menu is used to select the language of the program.

HELP MENU

This menu provides help information on the device and the AG.GSMConf software.

About
Displays copyright info and version of the AG.GSMConf software.

About device
Displays the information about the device currently connected to a PC.

Manufacturer's website
Takes the user to the manufacturer's website.

ATG browser

ATG browser is located on the right side of the window and is designed for creating and editing .atg files with the settings of one or more devices.

Fig.8. ATG browser.

In the upper part of the browser (see Fig.8, item 1), select the required file with settings. Double-click opens the file. Alternatively, use the "Open (create)" button to open the .atg file.

The contents of the opened .atg file is displayed in section 2 (see Fig.8). File may contain the settings of several devices. Settings of each device appear in a different line following the serial number of a relevant AutoGRAPH device.

Select the line to review the settings of required device. Its settings will appear in section 3 (see Fig.8).

To delete the line from .atg file, select the line (see section 2) and press the "Delete line" button. Remember that removed records can not be restored.

To apply the changes, press the "Save as…" button and type a name for a new file in the "Save as" window.

Getting started

- Run the AG.GSMConf program.
- When running, the program will automatically open the ATG file that has been used last time. If the file used previously isn't found due to any reasons (the file was deleted, moved, etc.), the program prompts the user to create a new file or select another configuration file.
- Select *File menu-> Open (create) ATG* (or press the "Open (create)" button in the ATG browser) to create a new file. In the dialogue box, type a name of a new file in the "File name" field, and press the "Open" button.
- The user can save settings of one or more devices within one file. The file is created in a text format. Thus, the user can easily check the content of the .atg file by opening it with any text editor (even without launching AG.GSMConf).
- When saving settings into the device, the program creates two files with passwords and settings: **[file_name].atg and [file_name]-srv.atg.**
- Furthermore, the program creates *\CONF* folder with **[device_no.].atg** and **[device_no.-date-time].atc files** and the *\dispatcher* folder with a file containing the device's serial number **[device_no.]**. The folders are created in the AG.GSMConf directory, and in the opened .atg file directory.
- **[device_no.]** file is used by the server software to include the device to the list of device serviced by the server.
- **[device_no.].atg** file contains the settings of only one device with the No. as indicated in the file name.
- When recording other settings to this device, a new file named [device_No.-date-time].atc is created. The file contains settings recorded to the device and the date and time of the settings recording. The file allows the user to track the changes as they are made in the device settings. The settings can be uploaded from .atc file to the program.
- [file_name]-srv.atg file must be submitted to server administrator to include the device to the list of devices serviced by the server. If the device has already been serviced by the server and its password hasn't been changed, there is no need to send this file. When the password of the device is changed, this file residing on server must be changed; otherwise, the server won't accept any data from that device.
- **[file_name].atg** file should be saved in *\dbf* folder which is located in the AutoGRAPH dispatch software installation directory on all dispatchers' PCs which will be used to monitor AutoGRAPH devices with serial numbers as indicated in [file_name].atg file.

If your devices are serviced by TechnoKom server, please submit your [file_name]-srv.atg files to mail@tk-chel.ru.

When the device is connected to a PC, the AG.GSMConf program automatically reads firmware version of this device and disables parameters and options if they are not supported by the firmware version.

Program configuration

Before starting the operation, go to the "Program configurations" tab and configure all applicable settings.

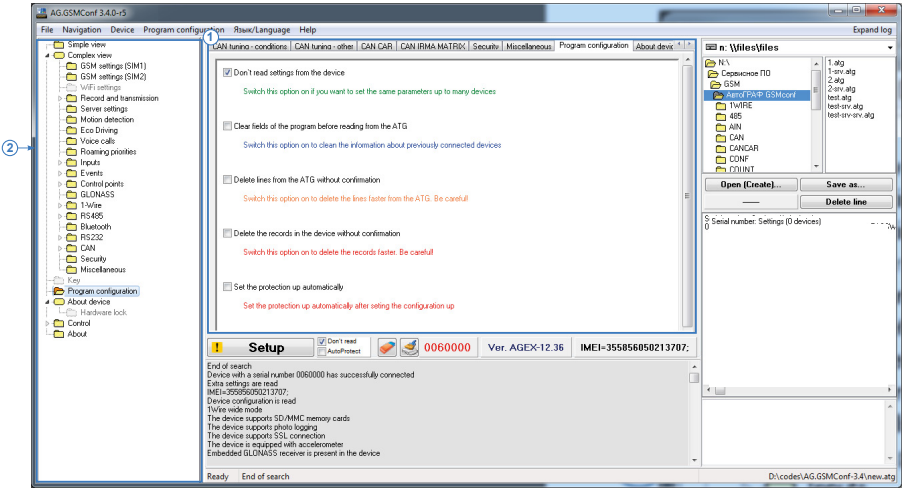


Fig.9. Program Configuration tab.

1. Settings. Options available on this tab can also be found in the "Program configuration" menu (see Fig.7).

- **Don't read settings from the device.** This option prevents automatic reading of the settings from the connected device. Switch this option on if it is necessary to setup the same parameters to multiple devices.
- **Clear fields of the program before reading from ATG.** When this option is enabled, the previous settings are removed from the fields in the program prior to reading new settings from .atg file.
- **Delete lines from ATG without confirmation.** This option enables quick removal of settings from .atg file.
- **Delete the records in the device without confirmation.** This option enables quick removal of records from connected device.
- **Set the protection up automatically.** The option allows automatic protection of the settings when saving them to the device. Protection is set according to protection settings specified on the "Security" tab.

Be careful when enabling the «Delete lines from ATG without confirmation» and «Delete the records in the device without confirmation» options. Removed record can not be restored!

- **Hide dendrogram.** This option hides the dendrogram (see Fig.9, item 2).

Software update

The AG.GSMConf program supports automatic updates check on server. This feature is enabled by default – after running the program checks for a new version on server and prompts a user to download it if necessary.

To disable the auto check, select Main menu – Program configuration and disable the "Check for updates" option.

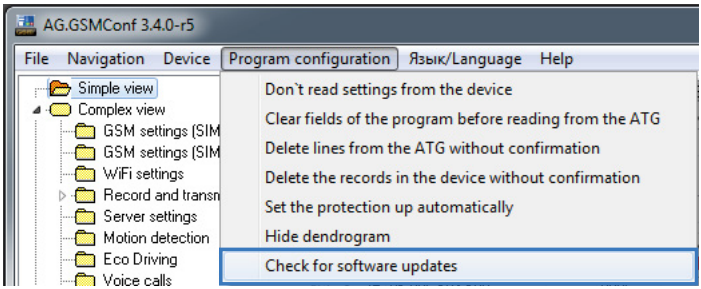


Fig.10. Check for software update.

Simple view

There are two type of configuration: Simple View providing device quick setup and Advanced View intended for advanced users and providing setup of the device serial buses, inputs, extended SIM settings, Wi-Fi setting and etc.

BASIC SETTINGS

To setup basic settings, go to the "Simple view" tab.

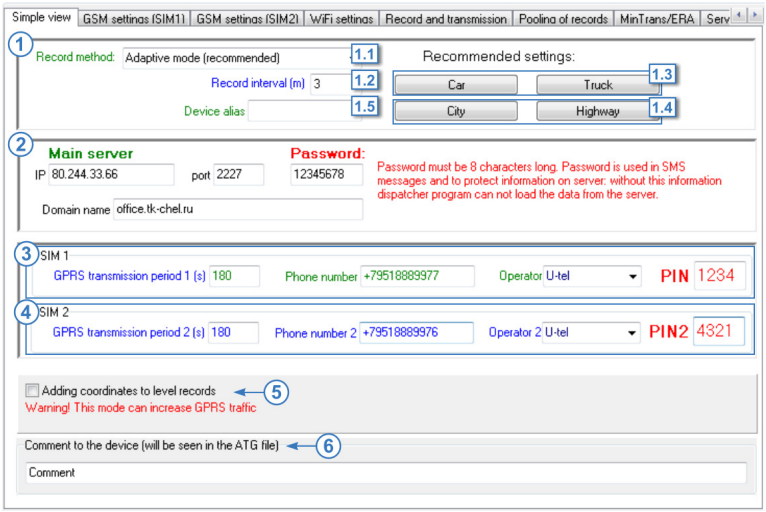


Fig.11. Simple View.

On this tab, you can configure data recording, server and SIM settings.

1. Data recording and transmission parameters. This set of settings is intended to configure period of position data recording.

1.1. Record method is the mode of recording coordinates of the asset to the device's memory. The user can select one of the two methods:

- **At the period of time.** In this mode the records are made at regular intervals equal to specified Record period, regardless of the status of inputs and motion characteristics.
- **Adaptive mode.** In the adaptive mode, the device analyses characteristics of the motion: the speed and direction of motion, acceleration, displacement, etc. and then concludes to record a point. This allows to describe the vehicle's track more accurately and to spend less time for data transmission due to the reducing outgoing traffic.

1.2. Specify following settings for the selected record method:

- **Record period (s).** Applies to the recording at the period of time and means an interval of recording the position data in the device's memory. Possible values range from 1 to 300 seconds.

- **Record interval (m).** Applies to the adaptive recording mode and means minimal distance after which the device may record the next coordinate point. This option prevents the device from recording track points too frequently (each time when a vehicle changes the way of its movement at short intervals). Recommended value for cars is 5…10 meters, for trucks – 10…20 meters. Possible values range from 1 to 600 meters.

Irrespective of this value, the current coordinates will be recorded not more than once a second and not less than once in five minutes.

1.3. Recommended settings for "Car" and "Truck". This option applies to the Record interval and is intended for auto complete of the field with recommended settings according to transport type.

1.4. Recommended settings for "City" and "Highway". This option applies to the GPRS transmission period for SIM1 and is intended to auto complete the fields with recommended settings according to speed limit in particular locality.

1.5. Device alias is a name of the device which will be displayed in SMS to identify the device. Device name should not include more than 8 characters which may be uppercase and lowercase letters of Latin alphabet and numbers from 0 to 9.

2. Main server settings. This is a set of settings intended to configure details of data server, which the device transfers data to.

- **IP** is an IP address of the server, which receives data from the device. The server should have a real static IP address.
- **Port** is the port designated for data transfer. The port number should match the values set within the server software. By default this value is 2225 for the server running Windows, and 2227 for the server running Linux.

The appropriate port of your server must be enabled in the firewall, otherwise the devices would not be able to transfer data to the server.

- **Password** is the password to access data on the server. Password must be 8 characters long and can consist of numbers from 0 to 9, uppercase and lowercase letters of Latin alphabet. Password is used to configure the device using SMS commands and to access the data on the AutoGRAPH server ver. 3.
- **Domain name** is a domain name of the data server.

Algorithm of connection to the server when using a domain name:

- If the domain name is specified, the device will send DNS request as soon as it establishes GPRS connection.
- If the specified domain name is resolved, the device receives a response (an IP address associated with the domain name), and updates the IP address specified in the server settings.
- If the request fails, data will be transferred to the server using the recently resolved IP address.

If the device is served by TecknoKom server, specify following details: IP address 78.46.216.154, port number 2225, domain name – auto.tk-chel.ru.

3. SIM 1 settings:

- **GPRS transmission period 1 (s)** is a period of transferring the collected data to the server using GPRS, when the device operates with SIM1.
  - Shorter interval means more recent data on the server but higher overhead associated with the data transfer. Recommended value is 60 seconds when traveling within the city (urban roads), and 120…180 seconds when traveling out of the city (highway). Maximum period of sending the data to the server is 86,400 seconds (24 hours).
  - Note that if the data transmission is failed due to no GSM connection, all missing data will be sent when the connected is restored. When GSM connection is lost, the device tries to send data 6 times and in case of no success waits until the next transmission period.
  - In case of receiving a call to a number of the device's first SIM card all data that has not yet been sent will be sent immediately upon calling not waiting for the next transmission period.
  - When the data transmission period is set to "0" (for AutoGRAPH devices with firmware ver. 3.7 or higher), the device will not transfer the data using GPRS automatically. In such a case the data will be transferred either after receiving a call to the device's SIM card or upon occurrence of an event which requires data transmission a via GPRS (e.g. digital input triggering, entering to or exiting from the control point). The device will break GPRS connection immediately after transfer of all collected data. This mode is useful when the device is roaming.

- **Phone number** is the telephone number associated with the first SIM card installed in the device.
- **Operator** – enables configuration of GPRS and USSD settings for the first SIM card using preset settings. Use the "Operator" field to select mobile network operator of the SIM card installed in the AutoGRAPH-GSM controller – all corresponding fields will be auto completed with the operator's settings. GPRS and USSD settings can be set up manually on the "GSM settings (SIM1) tab" of the Complex view.
- **PIN** – PIN code used by the device to register the first SIM card installed in it. If PIN code check is disabled for the SIM card, enter any four digits.

Be careful entering PIN. Wrong PIN (if it is not disabled for a SIM card) will block the SIM card!

4. SIM 2 settings. This set of options must be configured if the AutoGRAPH device operates with two SIM cards.

- **GPRS transmission period 2 (s)** is a period of data transmission to data server for SIM2.
  - Shorter interval means more recent data on the server but higher overhead associated with the data transfer. Recommended value is 60 seconds when traveling within the city (urban roads), and 120…180 seconds when traveling out of the city (highway). Maximum period of data transmission to the server is 43,200 seconds (12 hours). "0" means that the data should not be transferred to the server, in this case the data will be transferred either upon making a call to the second SIM card or upon occurrence of an event that requires data transfer.
- **Phone number 2** – telephone number associated with the second SIM card installed in the device.
- **Operator 2** - enables configuration of GPRS and USSD settings for the SIM2 using preset settings. Use the "Operator" field to select mobile network operator of the SIM card installed in the AutoGRAPH-GSM controller – all corresponding fields will be auto completed with the operator's settings. GPRS and USSD settings can be set up manually on "GSM settings (SIM2)" tab of the Complex view.
- **PIN 2** is the PIN code used by the device to register the second SIM card installed in it. If PIN code check is disabled for the SIM card, enter any four digits.

Be careful entering PIN. Wrong PIN (if it is not disabled for a SIM card) will block the SIM card!

5. Adding coordinates to level records is an option which is used when the data is transferred to TransNavigation server and enables to record additional coordinate data when recording readings from level sensors connected to the device.

This mode can increase GPRS traffic. Do not enable this mode, unless you need to transfer data to the TransNavigation's server.

6. Comment to the device – a field, where a user can type any comments applicable to the device. The comments will be seen in the .atg file.

Advanced settings

Settings on the "Simple view" tab are intended to configure basic settings of AutoGRAPH devices such as recording of position data, transmission of collected data and SIM settings. All tabs after the Simple view are intended for detailed configuration of AutoGRAPH devices and allow the user to set up data transmission in roaming, GSM networks priority, connection of external devices and sensors, Eco driving, settings protection and etc.

GSM settings (SIM1)

Go to the "GSM settings (SIM1)" tab to specify GSM settings of SIM1 for AutoGRAPH on-board controllers equipped with GSM modem. If the controller is equipped with only one SIM card, it must be configured on the "GSM settings (SIM1)" tab.
For AutoGRAPH controller supporting two SIM cards, SIM1 is the main SIM card which is installed at the bottom slot of the SIM holder.

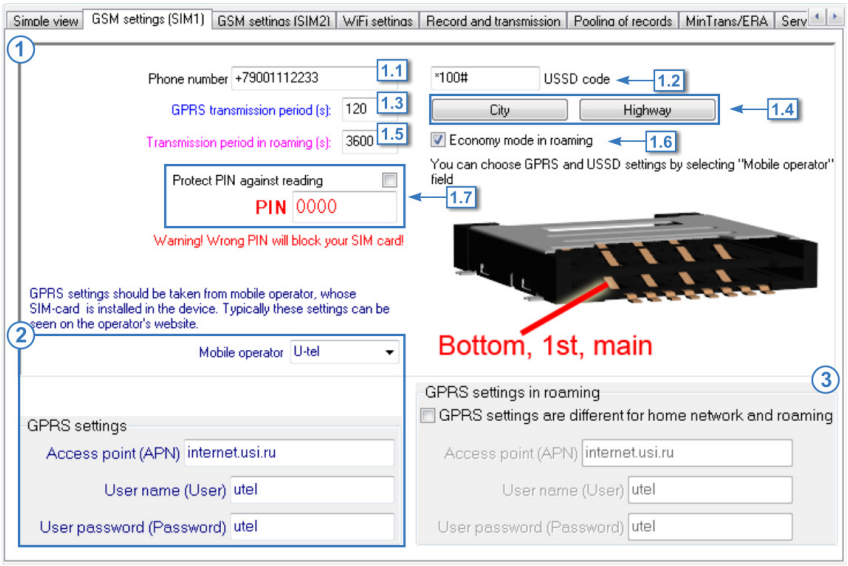


Fig.12. GSM settings (SIM1).

SIM1 settings specified on the "GSM settings (SIM1)" tab are duplicated on the "Simple view" tab.

1. GSM Settings. Description of SIM1 settings to be set up is given below.

1.1. Phone number – a telephone number associated with the first SIM card installed in the device.
1.2. USSD code – a USSD request code being applied within the network of a mobile operator to check the balance (e.g. *100#). This option is not available for all operators and is not applicable to all pricing plans especially when it comes to corporate pricing plans. Furthermore, the mobile network operator may generate a response to the request which would not be supported by the internal GSM modem of AutoGRAPH device. For convenience, a user can use Customer Care Internet Services provided by the mobile network operator to check SIM balance.

1.3. GPRS transmission period (s) is a period of transferring the collected data to the server using GPRS, when the device operates with SIM1.

- Shorter interval means more recent data on the server but higher overhead associated with the data transfer. Recommended value is 60 seconds when traveling within the city (urban roads), and 120…180 seconds when traveling out of the city (highway). Maximum period of sending the data to the server is 86,400 seconds (24 hours).

- Note that if the data transmission is failed due to no GSM connection, all missing data will be sent when the connection is restored. When GSM connection is lost, the device tries to send data 6 times and in case of no success waits until the next transmission period.
- In case of receiving a call to a number of the device's first SIM card all data that has not been sent will be sent immediately upon calling not waiting for next transmission period.
- When the data transmission period is set to "0" (for devices with firmware ver. 3.7 or higher), the device will not transfer data using GPRS automatically. In such case the data will be transferred either after receiving a call to the device's SIM card or upon occurrence of an event which requires data transmission via GPRS (e.g. a digital input triggering, entering to or exiting from a control point). When data transmission is initiated by a call or an event, the device will break GPRS connection immediately after the transmission. This mode is useful when the device is in roaming.

1.4. Recommended settings for "City" and "Highway". This option applies to the GPRS Transmission period for SIM1 and is intended for auto complete of the fields with recommended settings associated with the applicable speed limit when user presses the corresponding button.

1.5. Transmission period in roaming (s) is a period of transferring the collected data in roaming, when the device uses the first SIM card. Enabling this option provides significant reduction of data transmission costs when the device is in roaming.

1.6. Economy mode in roaming – an option enabling data transmission with "Transmission period in roaming", if the device is in roaming. Also when this option is enabled, GPRS connection will be disabled each time after data transmission. Minimum transmission period in roaming is 30 seconds, maximum period is 43200 seconds. If "0" period is specified, the data will be sent only after a voice call to SIM1 number.

1.7. PIN – a PIN code of the first SIM card installed in the device. If PIN code check is disabled for the SIM card, any four digits must be entered. To protect PIN code of SIM1 card against reading by the SMS command and the configuration software, enable the "Protect PIN against reading" option. If the option is enabled, PIN code will be hidden under asterisks in SMS messages and the configuration software.

Be careful entering the PIN, especially when it is hidden under asterisks. Wrong PIN (if it is not disabled for a SIM card) will block the SIM card!

2. GPRS settings – this set of settings is intended to configure an access point (APN), a user name (User) and a password (Password) to access GPRS services. GPRS settings should be taken from the mobile operator, whose SIM card is installed in the device. Typically these settings can be seen on the operator's website. To automatically apply preset GPRS settings, select mobile network operator which provides the SIM card installed in the device in the "Mobile operator" field.
Make sure that GPRS data transmission service is included in pricing plan of the SIM card that is installed in the device. The user can use the preset settings by selecting a mobile network operator in the corresponding field.

3. GPRS settings in roaming. Enable "GPRS settings are differ for home network and roaming" option to set other GPRS settings for roaming. The GPRS details can be taken from the mobile operator, whose SIM-card is installed in the device or seen on the official web site of the mobile network operator.

GSM settings (SIM2)

Go to the "GSM settings (SIM2)" tab to configure GSM/GPRS parameters for the second SIM card (reserve SIM card installed on the top slot of the SIM holder).

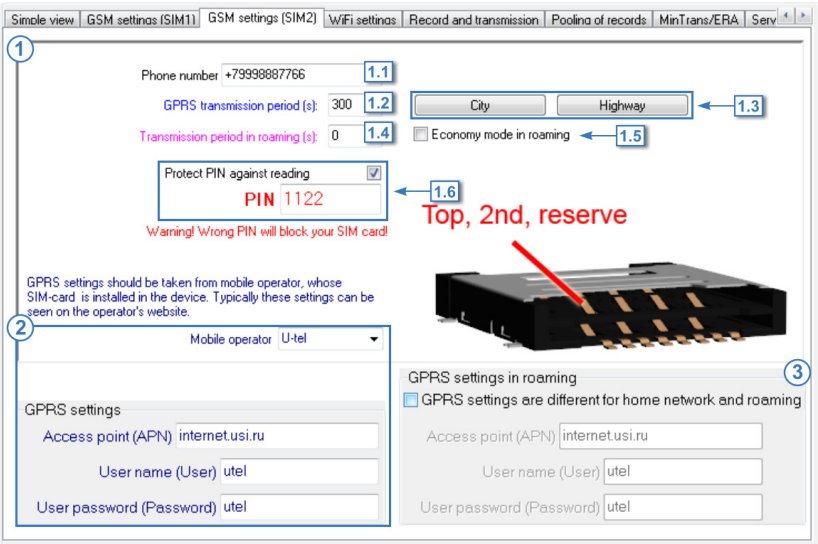


Fig.13. GSM settings (SIM2).

1. GSM Settings. Description of SIM2 settings to be set up is given below.

1.1. Phone number – a telephone number associated with the second SIM card installed in the device.

1.2. GPRS transmission period (s) – a period of transferring the collected data to server using GPRS, when the device operates with SIM2.

- Shorter interval means more recent data on the server but higher overhead associated with the data transfer. Recommended value is 60 seconds when traveling within the city (urban roads), and 120…180 seconds when traveling out of the city (highway). Maximum period of sending the data to the server is 86,400 seconds (24 hours).
- Note that if the data transmission is failed due to no GSM connection, all missing data will be sent when the connection is restored. When GSM connection is lost, the device tries to send data 6 times and in case of no success waits until the next transmission period.
- In case of receiving a call to a number of the device's second SIM card all data that has not been sent will be sent immediately upon the call not waiting for next transmission period.

- When the data transmission period is set to "0" (for devices with firmware ver. 3.7 or higher), the device will not transfer the data using GPRS automatically. In such case the data will be transferred either after receiving a call to the device's SIM card or upon occurrence of an event which requires data transmission via GPRS (e.g. a digital input triggering, entering to or exiting from a control point). When data transmission is initiated by a call or an event, the device will break GPRS connection immediately after the transmission. This mode is useful when the device is in roaming.

1.3. Recommended settings for "City" and "Highway". This option applies to the GPRS Transmission period for SIM2 and is intended for auto complete of the fields with recommended settings associated with the applicable speed limit when user presses the corresponding button.

1.4. Transmission period in roaming (s) – a period of transferring the collected data in roaming, when the device uses the second SIM card. Enabling this option provides significant reduction of data transmission costs when the device is in roaming.

1.5. Economy mode in roaming – an option enabling data transmission with "Transmission period in roaming" if the device is in roaming. When this option is enabled GPRS connection is disabled each time after data transmission. Minimum transmission period in roaming is 30 seconds, maximum period is 43,200 seconds. If "0" period is specified, the data will be sent only after calling to SIM1 number.

1.6. PIN – a PIN code of the second SIM card installed in it. If PIN code check is disabled for the SIM card, any four digits must be entered. To protect SIM2 PIN code against reading by the SMS command and the configuration software, enable the "Protect PIN against reading" option.

If the option is enabled, PIN code will be hidden under asterisks in SMS messages and the configuration software.

Be careful entering the PIN, especially when it is hidden under asterisks. Wrong PIN (if it is not disabled for a SIM card) will block the SIM card!

2. GPRS settings – a set of settings intended to configure an access point (APN), a user name (User) and a password (Password) to access GPRS services. GPRS settings should be taken from the mobile operator, whose SIM-card is installed in the device. Typically these settings can be seen on the operator's website. To automatically apply preset GPRS settings, select mobile network operator which provides the SIM card installed in the device in the "Mobile operator" field.
Make sure that GPRS data transmission service is included in pricing plan of the SIM card that is installed in the device. The user can use the preset settings by selecting a mobile network operator in the corresponding field.

3. GPRS settings in roaming. Enable "GPRS settings are differ for home network and roaming" option to set other GPRS settings for roaming. You can take the data from the mobile operator, whose SIM-card is installed in the device or see it on the official web site of your mobile network operator.

WiFi settings

The options on this tab are intended to configure Wi-Fi settings for AutoGRAPH devices with built-in Wi-Fi module: AutoGRAPH-GSM+WiFi and AutoGRAPH-WiFi.
The AutoGRAPH-GSM+WiFi device supports data transmission via both Wi-Fi and GPRS. Thus, if the data transfer via GPRS is disabled, the data will be transferred via Wi-Fi and vice versa.

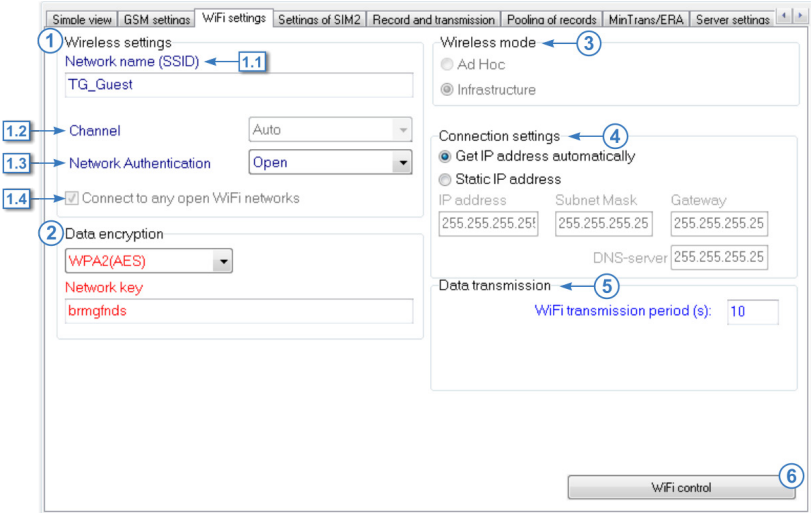


Fig.14. Wi-Fi settings.

1. Wireless settings. Specify the wireless access point which will be used by the controller to connect to Wi-Fi network in order to transfer data to the server.
1.1. Network name (SSID) – a name of wireless network used by the device to identify this network.
1.2. Channel – a channel used by the device to connect to the access point. It is recommended to select the "Auto" option which enables the device to select any available channel.
1.3. Network Authentication – a way of authentication for the wireless network. This option is available for WEP encryption (see Fig.14, i.2).

Open – a method without network authentication. To connect to a wireless network only the name of this network (SSID) is required to be set in the device.

Shared – an authentication method requiring an encryption key shared for the whole network. To access to a wireless network the device needs to be aware of SSID and the encryption key.

1.4. Connect to any open WiFi networks – an option which allows the device to connect to any open wireless network.

Checking the "Connect to any open WiFi network" option, remember that using unknown Wi-Fi access points and hotspots which do not require access password is associated with higher risks of loss or steal of confidential and personal data!

2. Data encryption. Encryption provides protection of transferred data from unauthorized access.

2.1. Encryption method. Select an encryption method matching the settings specified for the wireless network.

- **No encryption** – the encryption is not used.
- **WEP** – encrypts the transmitted data with RC4 method using a key of 5 to 13 characters. This encryption is commonly used for public networks and provides minimal security.
- **WPA (TKIP)** uses the same RC4 method, but WPA encryption is more secure than WEP. The key may be up to 32 ASCII characters long.
- **WPA2 (AES)** encrypts data using the cryptosecure AES method. WPA2 is known as the most secure encryption, however, it may not be supported by some Wi-Fi adapters. The key may be up to 32 ASCII characters long.

2.2. Network key – an encryption key of the wireless network. Length of this key will vary depending on the selected encryption method. The key should contain only ASCII characters.

DO NOT set the network key in HEX format when using WEP encryption. It is highly recommended to specify the key in any other format.

3. Wireless mode – a type of wireless network which the device will connect to. This option is not available for AutoGRAPH devices because it is not supported by the Wi-Fi module of AutoGRAPH devices.

4. Connection settings.

Depending on access point settings the device may either have a static IP address or get an IP address automatically. If the access point uses dynamic allocation of IP addresses, select "Get IP address automatically". If IP addresses of all devices in the network are specified in the access point settings, you should select "Static IP address" option and set up an IP address of the device, as well as a subnet mask, a gateway and DNS-server address.

5. WiFi transmission period (s) – a period of connection to access point (if available) by AutoGRAPH device to send collected data. If data transmission via wireless network is failed, the device delays the transmission till next period or transfers the collected data via GPRS in next period of data transmission via GPRS.

6. "WiFi Control" button – use the button to go to "WiFi control" tab on which you can perform step-by-step diagnostics of the device Wi-Fi module.

Data recording and transmission

Following tabs – "Record and transmission", "Pooling of records" and "MinTrans/ERA" are intended to configure in details parameters of data recording and transmission.

RECORD AND TRANSMISSION

Go to the "Record and transmission" tab to configure parameters of data recording and transmission.

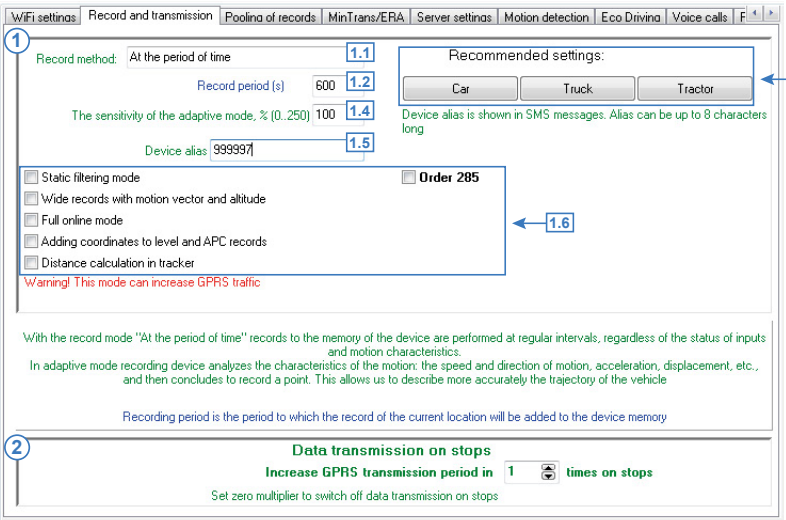


Fig.15. Record and transmission.

1. Data recording and transmission parameters. This set of settings is intended to configure period of position data recording. Given below are parameters to be set for correct operation of the controller.

1.1. Record method – a mode of coordinates recording to the device memory. You can select one of the two methods:

- **At the period of time.** In this mode the records are made at regular intervals equal to specified Record period, regardless of the status of inputs and motion characteristics.
- **Adaptive mode.** In the adaptive mode, the device analyses characteristics of the motion: the speed and direction of motion, acceleration, displacement, etc. and then concludes to record a point. This allows to describe the vehicle's track more accurately and to spend less time for data transmission due to the reducing outgoing traffic.

The adaptive mode of data recording can be configured in details using the remote configuration command "ADAPTIVESEN". Detailed information is given in the document "Control SMS and server commands".

1.2. Specify following settings for the selected record method:

- **Record period (s).** Applies to the "At the period of time" mode and means an interval of recording the position data in the device's memory. Possible values range from 1 to 300 seconds.
- **Record interval (m).** Applies to the adaptive recording mode and means minimal distance after which the device may record next coordinate point. This option prevents the device from recording track points too frequently (each time when a vehicle changes the way of its movement at short intervals). Recommended value for cars is 5…10 meters, for trucks – 10…20 meters. Possible values range from 1 to 600 meters.

Irrespective of this value, the current coordinates will be recorded not more than once a second and not less than once in five minutes.

1.3. Recommended settings for "Car", "Truck" and "Tractor". This option applies to the Record interval and the Sensitivity of the adaptive mode is intended for autocomplete of the field with recommended settings according to a transport type.

- **Car** – recommended settings for light vehicles.
- **Truck** – recommended settings for heavy vehicles.
- **Tractor** – recommended settings for agricultural or other low-speed machinery.

1.4. The sensitivity of the adaptive mode. Minimal value is 0, maximum value is 250, default value is 100.

- When the sensitivity is equal to 100, position is recorded if vehicle has travelled distance more than the specified recording interval (in meters) and deviation of movement direction exceeds 6 degrees or vehicle speed has increased more than 5 knots (about 9 km/h).
- If simultaneous deviations of speed and movement direction occur, total deviation amounts to superposition of both deviations. It means that data will be recorded even if deviation of movement direction is 3 degrees (50%) and vehicle speed increased 6 km/h (60%) because total deviation (50%+60%=110%) exceeds sensitivity level (sensitivity = 100).
- Thresholds of deviations depend on the selected sensitivity, e.g. when sensitivity is 50, threshold of movement direction deviation is 3 degrees and threshold of speed deviation is 2.5 knots; when sensitivity is 200, threshold of movement direction deviation is 12 degrees and threshold of speed deviation is 10 knots.
- In addition to movement direction and speed, the device evaluates other movement characteristics and can make addition record if it is necessary. Additional records provide high accuracy of vehicle track.

1.5. Device alias – a device name which is displayed in SMS to identify the device. Device alias can be up to 8 characters long and can consist of uppercase and lowercase letters of Latin alphabet and numbers from 0 to 9.

1.6. Additional data recording settings:

Static filtering mode – an option intended to filter minor movements of vehicle which result from inaccuracies of coordinates at stops to avoid excessive track jerks when vehicle is not in motion. This mode is not recommended for slowly moving vehicles (road rollers, etc.).

Order 285 – an option enabling the "Order 285" mode which implies that when vehicle voltage shuts down and the device switches to the backup power source, it makes an additional record and notifies the server about failure of the main power source. Also when the vehicle voltage shuts down, the device switches off within 1 minute. The device switches on again, when the vehicle voltage is restored.

Wide records with motion vector and altitude – an option enabling recording of a velocity vector (including direction and value) and height in addition to coordinates. This will boost GPRS traffic but can reduce the load of server if it is used to process data (used by some navigation software manufacturers).

Full online mode – an option enabling transmission of data as soon as it is recorded. This mode ensures that data on server is always up-to-date. This option may be useful for services which require real time monitoring of vehicles.

Adding coordinates to level and APC records – an option which is used when the data is transferred to TransNavigation server and enables recording of additional coordinate data when recording readings from level sensors connected to the device or data from IRMA MATRIX sensors.

Do not enable this mode in AutoGRAPH controllers, unless you need to transfer data to TransNavigation server. Using this mode can increase GPRS traffic.

Distance calculation in device – an option enabling calculation of vehicle distance and recording of this value to device memory. This option is used when the device transfers data to third party server.

2. Data transmission on stops. This option allows you to specify separate data transmission period at stops. "0" period disables the data transmission on stops.

POOLING OF RECORDS

Go to the "Pooling of records" tab to specify data to be grouped with coordinates.
Data pooling is intended to add additional records to the recorded data including coordinate data.

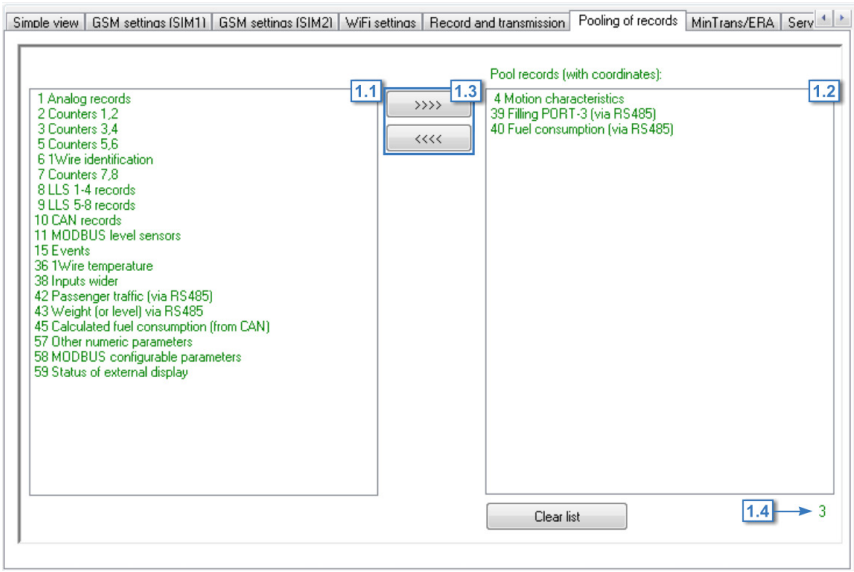


Fig.16. Pooling of records.

On the "Pooling of records" tab, the user can create a group of pooled data. When the device records any parameter from this group, it will record the states of all other parameters of this group, as well as current coordinates of vehicle.

To add data to the group of pooled records:

- select a record in the list on the left (Fig.16, i. 1.1)
- move the selected record to the group of pooled records (Fig.16, i. 1.2) using the button ">>>>" (Fig.16, i. 1.3);
- add all required records to the group of pooled records.

To delete a record from the group of pooled data, select this record and press the button "<<<<" (Fig.16, i. 1.3).

The "Clear list" button deletes all records from the group. A number of records in the group is displayed at the bottom of the list (i. 1.4).

MINTRANS/ERA

On this tab you can set up a communication protocol to transfer data to the MinTrans (Ministry of Transport) server.

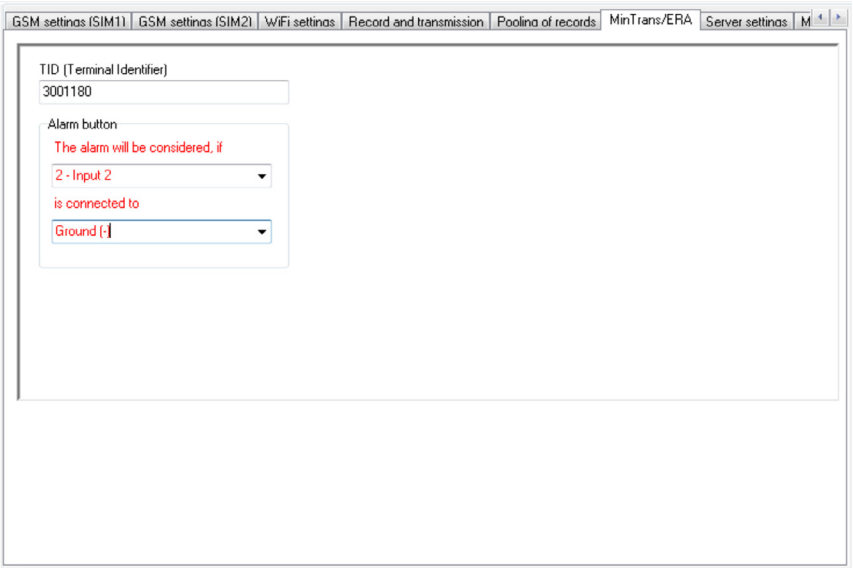


Fig.17. MinTrans/ERA options.

TID (Terminal Identifier) – a unique identifier of the device designed for identification of the device when it sends data to the MinTrans server (using the protocol pursuant to Order No. 285). By default TID corresponds to the serial number of AutoGRAPH device.

Alarm button. If an alarm button is connected to the device, set up its operation:

- select a digital input of the device, which the alarm button is connected to in the "The alarm will be considered, if" field.
- specify a state of selected digital input, which corresponds to pressed alarm button in the "is connected to" field.

Server settings

On the "Server settings" tab you can set up parameters of main and parallel servers which AutoGRAPH device transfers data to.

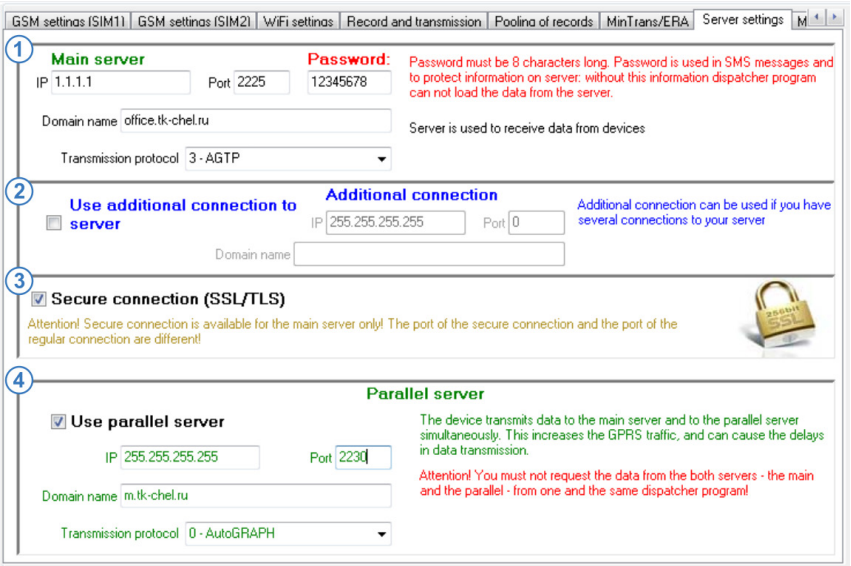


Fig.18. Server settings.

To receive data from the device, the following settings must be specified:

1. Mail server settings. The device sends collected data to main server if GPRS is enabled.

- **Server IP** – an IP address of the server which receives data from the controller. The server should have a real and static IP address.
- **Server port** – a number of the AutoGRAPH server port designated for data reception from AutoGRAPH controllers. This number should match the value set in the server software. By default this value is 2225 for the server running Windows.

The server port specified in the device must be enabled in the firewall settings of the server, otherwise the devices would not be able to transfer data to the server.

- **Password** – a password to access the data on the server. Password must be 8 characters long and can consist of numbers from 0 to 9, uppercase and lowercase letters of Latin alphabet. The password is used to configure the device using SMS commands and to access the data on the AutoGRAPH server of ver. 3.
- **Domain name** – a domain name of the server which receives data from the device.

Algorithm of connection to the server when using a domain name:

- If domain name is specified, the device will send DNS request as soon as it establishes GPRS connection.
- If the specified domain name is resolved, the device receives a response (an IP address associated with the domain name), and updates the IP address specified in the device.
- If the request fails, data will be transferred to the server using recently resolved IP address.

If the device is served by TecknoKom server, specify following details: IP address 78.46.216.154, port number 2225, domain name – auto.tk-chel.ru in your AutoGRAPH device.

- **Transmission protocol.** Select a protocol used be the device to transfer data to server.

  0 – AutoGRAPH – the closed AutoGRAPH protocol used to transfer data to the AutoGRAPH server. By default all AutoGRAPH-GSM series devices except AutoGRAPH-GSM/SL, AutoGRAPH-GSM/SL-2 and AutoGRAPH-GSM/SL-3 use AutoGRAPH protocol to transfer data. Listed devices require unlocking of AutoGRAPH protocol.

  1 – MinTrans (285) – the protocol used to transfer data to MinTrans server (pursuant to Order No. 285).

  2 – TKmonitoring.com – the closed AutoGRAPH protocol used to transfer data to TKmonitoring.com server.

  3 – AGTP – the closed AutoGRAPH Data Transfer protocol providing high transmission rate compared to AutoGRAPH protocol. AGTP protocol is supported with the AutoGRAPH server of ver. 5 and higher.

  4 – AGPP – the AutoGRAPH Public Protocol intended to transfer data to third-party servers.

2. Additional connection.

An additional connection can be used if there are several connections to one server.

If main connection to the server (specified on the main server settings) is unavailable, the device may use an additional connection to this server. To enable this option, check the "Use additional connection to server" box and specify following settings:

- **Server IP** – an IP address, which is used for additional connection to main server. The server should have a real and static IP address.
- **Server port** – a number of the port designated for data transmission. This number should match the value set in the server software. By default this value is 2225 for the server running Windows, and 2227 for the server running Linux. "0" value disables using of the additional connection.
- **Domain name** – domain name of the server for the additional connection.

The additional connection to the server is used only if the main connection is failed.

3. Secured connection (SSL/TLS) – this option enables using of the secured connection to server for data transmission.
The secure connection is supported by the controllers with firmware of ver. 10.45 and higher.
After updating the device firmware via USB, connect the device to an external power supply and wait until the device connects to GSM network.
This procedure is required to check if the device supports the secured connection. Then, if the device supports secured connection, the settings of SSL connection become available in the AG.GSMConf program (on the "Server settings" tab) when connecting the device to a PC.
If the firmware is updated remotely (via GPRS), support of SSL connection will be checked automatically. The support of secured connection can be check using 'GSSL' command. For more information on the command see the "Control SMS and server commands" document.
If the device supports the secured connection, the icon  is displayed on the "About" tab of the AG.GSMConf program.

Secured connection is available only for main server. A port of secured connection and a port of regular connection are different.

By default the AutoGRAPH server uses port 2443 for secured connection. Secured connection is supported by the AutoGRAPH server of ver. 4.1.0 and higher.

If any error occurs when the device is connecting to the server using secured connection, contact TechnoKom technical support. Some cases may require update of the device's GSM modem firmware.

4. Parallel server.
The device can transmit data to main server and to parallel server simultaneously. The device sends the same data to both servers but in different packages. For example, if the main server is not available, the data will be transferred only to the parallel server. When the main server restores, it will receive all collected data that have already been transferred to parallel server. Similarly, if the parallel server is not available, the data will be transferred only to main server. And when the parallel server restores, it will receive all collected data. To access to parallel server the device uses password of the main server.

To enable the parallel server, set up following parameters:

To enable data transmission to the parallel server and to be able to specify its parameters, check the "Use parallel server" box.

- **IP address** – an IP address of the parallel server. The server should have a real static IP address.
- **Server port** – a number of the parallel server port designated for data transfer. The port should match the values set within the server software. By default this value is 2225 for the server running Windows, and 2227 for the server running Linux.
- **Domain name** – a domain name of the parallel server.
- **Transmission protocol.** Select the protocol used to transfer data to the parallel server.

  0 – AutoGRAPH – the closed AutoGRAPH protocol used to transfer data to the AutoGRAPH server. By default all AutoGRAPH-GSM series devices except AutoGRAPH-GSM/SL and AutoGRAPH-GSM/SL-2 use AutoGRAPH protocol to transfer data. Listed devices require unlocking of AutoGRAPH protocol.

  1 – MinTrans (285) – the protocol used to transfer data to MinTrans server (pursuant to Order No. 285).

  2 – TKmonitoring.com – the closed AutoGRAPH protocol used to transfer data to TKmonitoring.com server. TKmonitoring.com protocol is supported by AutoGRAPH-GSM series devices with firmware of ver. AGXL-11.43 and higher.

  3 – AGTP – the closed AutoGRAPH Data Transfer protocol providing high transmission rate compared to AutoGRAPH protocol. AGTP protocol is supported with the AutoGRAPH server of ver. 5 and higher.

  4 – AGPP – the AutoGRAPH Public Protocol intended to transfer data to third-party servers.

To receive data from main and parallel servers, the different AutoGRAPH dispatch software must be used.

The data transmission to two servers increases the GPRS traffic and can cause the delays in transmission.

The parallel server can be used only for data transmission. The device will not process any commands being sent by the parallel server. The device cannot send any photos or messages to the parallel server.

Motion detection

On the "Motion detection" tab you can set methods of vehicle stops and motion detection.

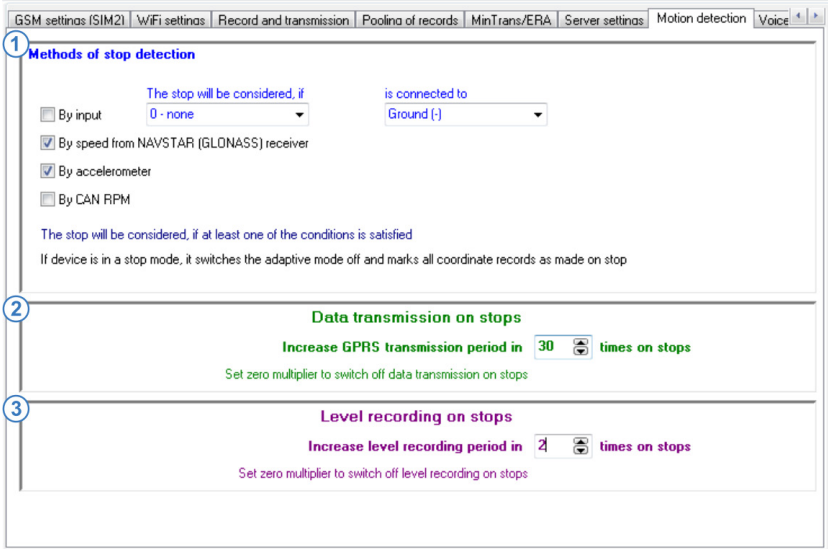


Fig.19. Motion detection settings.

AutoGRAPH device is able to detect vehicle stops and motion starts. To enable this function, specify following settings:

1. Methods of stop detection.

- **By input** – the stop is detected, if the selected input of the AutoGRAPH device switches to the specified state – "ground" or "power".
- **By speed from NAVSTAR (GLONASS) receiver** – the stop is detected on the basis of vehicle coordinates received from NAVSTAR (GLONASS) satellites.
- **By accelerometer** – the stop is detected according the readings of build-in accelerometer.
- **By CAN RPM** – the stop is detected on the basis of RPM, scanned from CAN bus of the vehicle.

2. Data transmission on stops. This option enables to specify the data transmission period on stops. Set "0" multiplier to switch off data transmission on stops.

3. Level recording on stops. This option enables to increase recording period of analog sensors and LLS sensors. Minimum value is 1, maximum value is 100. Set "0" multiplier to switch off level recording on stops.

The stop will be considered, if at least one of the conditions is true. If the vehicle stop is detected, the device turns off the adaptive mode of data recording and marks all coordinate records as made on stops. The data is recorded with the data transmission period or every 5 minutes on the stop.

Eco driving

AutoGRAPH on-board controllers provide control of a vehicle driving style according to data from the internal accelerometer. To enable this function, it is necessary to set up maximum thresholds of acceleration in the controller. The setup can be done in the AG.GSMConf software on the "Eco Driving" tab.

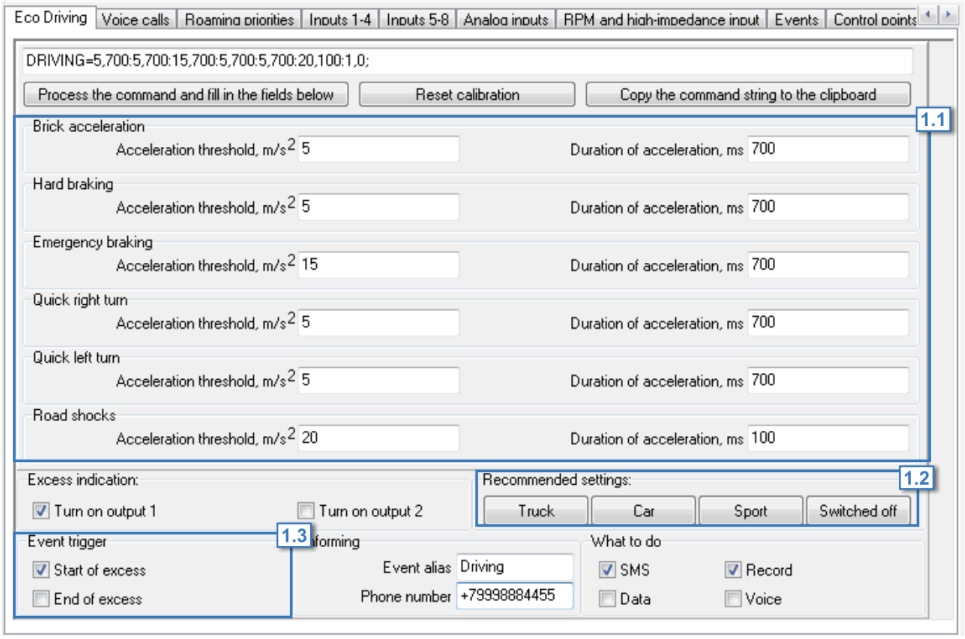


Fig.20. Acceleration threshold.

Given below is an instruction on how to set up AutoGRAPH controller to control driving style.

1. Acceleration thresholds.

1.1. AutoGRAPH controller uses several types of accelerations to analyse driving style. If at least one of the monitored parameters exceeds a threshold and the excess value of that parameter is remaining for specified duration or longer, the driving style is considered to be uneconomic.

The following parameters are used to control driving style.

- Brick acceleration.
- Hard braking.
- Emergency braking.
- Quick right turn.
- Quick left turn.
- Road shock.

The duration of excessive acceleration is configured in the "Duration of acceleration" field (in ms).

Sharp accelerations, braking and turns increase fuel consumption in effect of excessive engine rpm and produce an additional impact on the vehicle braking and clutch systems increasing their wear. Also such style of driving causes crash situations on roads. Eco driving mode allows you to analyse how accurate a driver uses a vehicle and generate different report on driving styles if driver in AutoGRAPH Dispatch Software.

1.2. Recommended settings. To setup AutoGRAPH device easily for Eco driving mode, you can use recommended settings intended for different type of vehicles: "Truck", "Car" (for light vehicles), "Sport" (for sport cars). To do it, press the appropriate button. The recommended settings will be filled in fields on the tab.

To disable the Eco driving mode, press the "Switched off" button.

1.3. Event trigger. You can set up triggering of the Eco driving event. Following options are available^

- **Start of excess** – an excessing is detected at the beginning of the high acceleration interval.
- **End of excess** – an excessing is detected at the end of the high acceleration interval.

2. AutoGRAPH device behaviour.

AutoGRAPH controller can be configured to initiate different operations in case of excessive acceleration. The preset operations are started when at least one of accelerations exceeds a threshold. The starting time is determined by the Event trigger settings.

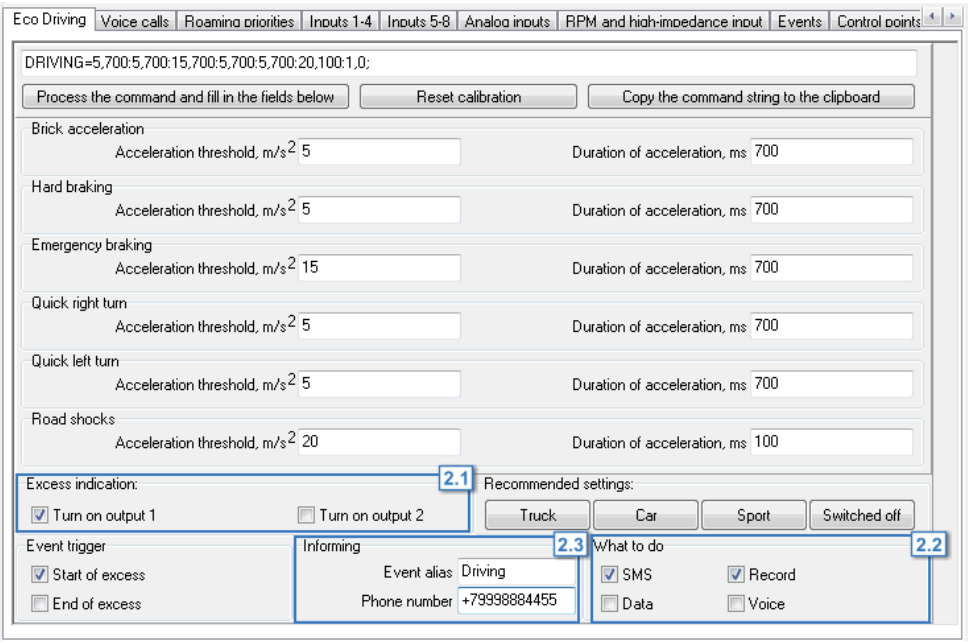


Fig.21. AutoGRAPH device behaviour.

2.1. Excess indication. AutoGRAPH controller can be configured to turn on digital outputs in case of excessive acceleration and keep the outputs turned on while the acceleration is over the threshold. This option can be used, when any warning device (sound unit, LED) is connected to a digital output of the device. This will provide immediate notification of a driver about a violation of the appropriate driving style.

- **Turn on output 1** – allows turning on of the digital output 1 in case of excessive acceleration. The output is held turned on while the acceleration is over than preset threshold.
- **Turn on output 2** – allows turning on of the digital output 2 in case of excessive acceleration. The output is held turned on while the acceleration is over than preset threshold.

2.2. What to do. Additional operations performed by AutoGRAPH tracker in case of excessive acceleration. Select required actions:

- **SMS** – to send SMS with notification to a phone number specified in the "Phone number" field.
- **Data** – to transfer data to server not waiting for the next data transmission period.
- **Record** – to record extra coordinate data.
- **Voice** – to call a phone number specified in the "Phone number" field.

2.3. Informing. This section of settings are intended to specify details of informing a dispatcher or other responsible person about violation of Eco driving mode.

- **Event alias** – a name of the excessive acceleration event which is sent in SMS notification along with coordinate data. The alias can contain only characters of Latin alphabet. The maximum length of the alias is 8 characters.
- **Phone number** – a phone number which the device sends notifications (SMS) and makes voice calls in case of excessive acceleration. The number must be entered without spaces and with a prefix for national call (+7 and 8).

3. Command of remote configuration.

While entering settings on the "Eco Driving" tab, the "DRIVING" command intended for remote configuration of the AutoGRAPH device is filled with selected settings (Fig.22). The composed command displayed at the top of the tab and can be sent to AutoGRAPH device via data server or by means of SMS. To copy the command from the command line, press the button "Copy the command string to clipboard" or use Ctrl+A and Ctrl+C key combinations.

Also it is possible to get settings from prepared command in the command line and fill with them field on the tab. To do it, press the button "Process the command and fill in the fields below". It can be useful to restore settings in the AG.GSMConf software according to the command which has been prepared earlier or e.g requested from the device.

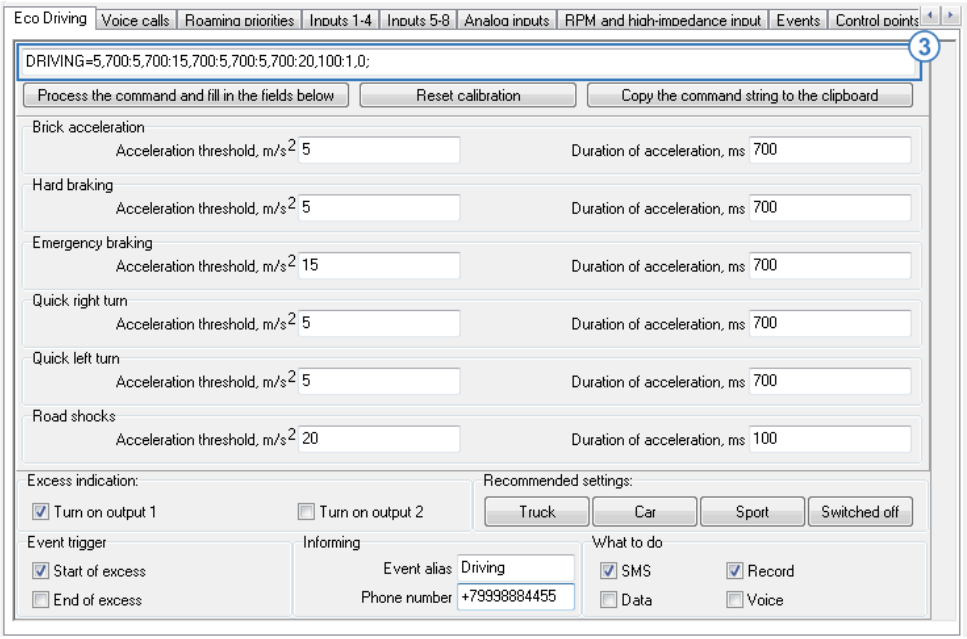


Fig.22. Remote configuration command.

4. How to start Eco driving mode.

After configuring all setting of Eco driving mode, AutoGRAPH tracker must be mounted on a vehicle and securely fastened. To avoid false triggering of an excessive acceleration event, it is recommended to mount the device closer to the center line of the vehicle.

Turned on, AutoGRAPH controller performs the calibration for 15 minutes after the motion start. During the calibration it does not record the acceleration state. The calibration is performed only on the move and is required only after update of the device firmware. Periodically the device checks the calibration data and initiates new calibration procedure if it is necessary.

The calibration data can be deleted manually by the command of remote configuration "RECALIBRATION;" or in the AG.GSMConf Software by pressing the "Reset calibration" button on the "Eco Driving" tab. After the reset of calibration data the device will initiate new procedure of the calibration.

Voice calls

On the "Voice calls" tab the user can configure voice communication parameters.

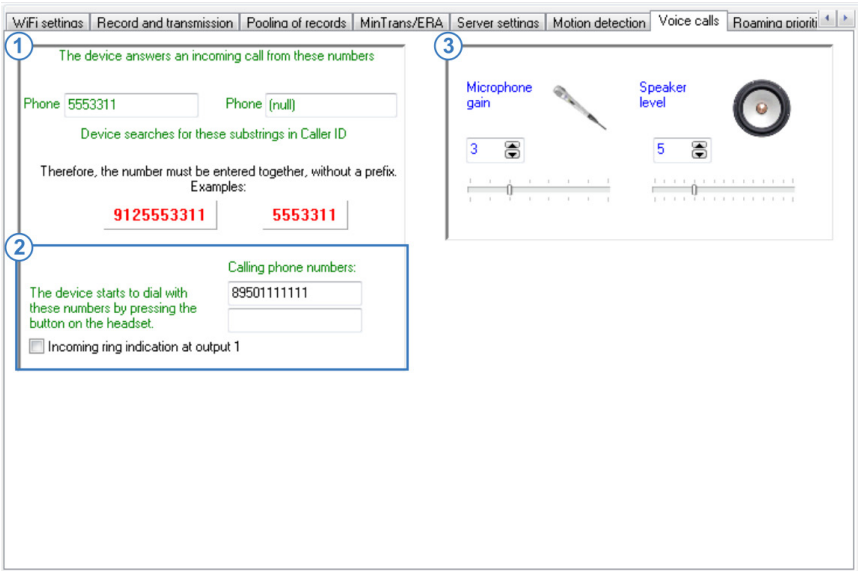


Fig.23. Voice communication settings.

AutoGRAPH-GSM+ and AutoGRAPH-GSM+WiFi devices support voice communication. To be able to make and receive voice calls devices must be properly configured.

1. Incoming call settings.

The device automatically answers an incoming call from the specified numbers. Up to 2 numbers for automatic answering can be saved in the device. The phone numbers must be entered without spaces and prefixes for national calling. The incoming call is answered automatically if the phone number from which the call is sending contains a sub-line of either first or second phone number saved in the controller.

Example: The first number is 50044, the second number is 9005554433. The device will automatically answer calls coming from any phone numbers containing line 50044 (e.g. +79005004433, +79005004434, +79005550044), as well as calls coming from number +79005554433. All other calls will be answered only by pressing the "Answer" button on the headset connected to the device.

2. Calling phone numbers – phone numbers which the device calls by pressing the "Call" button on the headset. Up to two number of automatic dialling can be set. The phone numbers must be entered without spaces and use prefixes for national calling (8 or +7).

The incoming call can be indicated at the digital output 1 of the AutoGRAPH device. It make possible to connect different acoustic radiators, LEDs and lamps and etc. to the device input which will notify a driver about an incoming call. To enable the incoming call indication at output 1, check the option "Incoming ring indication at output 1".

First and second phone numbers of auto dialling are similar to the phone numbers which the device sends SMS messages to when first and second digital inputs trigger.

3. Microphone gain and speaker level settings.

- **Microphone gain** – set microphone gain. Possible values range from 1 to 8. "1" is a minimum value, "8" is a maximum value.
- **Speaker level**– set volume of the speaker. Possible values range from 1 to 15. "1" is minimal volume, "15" is maximum volume.

Roaming properties

On the "Roaming properties" tab the user can customize device operation in roaming and home networks.

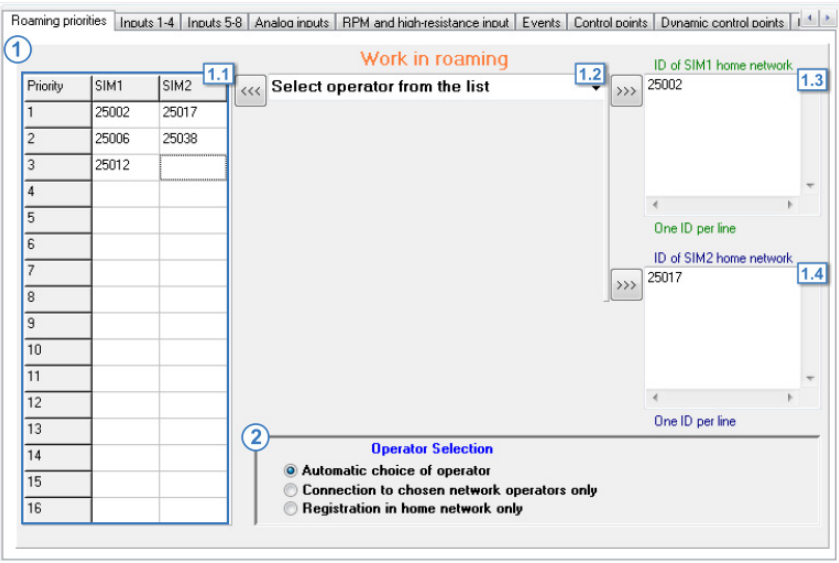


Fig.24. Roaming priorities.

1. Work in roaming.

1.1. Priorities – the table consists a list of networks for SIM1 and SIM2 in roaming, sorted in descaling order of priorities.

1.2. List of operators – select an operator in the list and add it to the list of priorities or lists of home network. Use "<<<" and ">>>" buttons to move selected item to necessary list.

1.3. ID of SIM1 home network – list of operators of home networks for the first SIM card. Select an operator from the list of available operators and add it to the list of home network using navigation buttons.

1.4. ID of SIM2 home network – list of operators of home network for the second SIM card. Select an operator from the list of available operators and add it to the list of home network using navigation buttons.

The device select necessary SIM card as follows:

1. When switched on, the device will operate with the main SIM card.

2. The device scans the network regularly to search for identifiers of networks available around the device.

3. After resuming information, the device selects SIM card as follow:

- If SIM1 home network (item 1.3) is available, the device switches to the main SIM card (or if it is already in use, continues operation with this card) and connects to this network.

- If SIM2 home network (item 1.4) is available, the device switches to the second SIM card (or if it is already in use, continues operation with this card) and connects to this network.
- If no home networks are available, the device checks for identifiers of other operators from the priority list (item 1.1). The device first checks identifiers of the first priority, then passes on to identifiers of the second priority, then third priority and so on. When some identifier from the list matches the one detected by the device during scanning, the device switches to the corresponding SIM card to use the services of its operator.

2. Operator selection. Select one of the following options:

- Automatic choice of operator – the device connects to any available operator to transfer the data regardless of the specified network priorities.
- Connection to chosen network operators only – when this option is selected the device transfers data only when connected to the operators with identifiers listed in list of priorities and lists of home network operators (see items 1.1, 1.3, and 1.4 for applicable SIM card).
- Registration in home network only – when this option is selected the device connects only to the operators of the home network (see items 1.3 and 1.4 for applicable SIM card).

Inputs settings

The "Inputs 1-4" and "Inputs 5-8" tabs are intended to configure digital inputs of the AutoGRAPH on-board controller. On this tabs inputs 5 and 6 match the controller's analog inputs 1 and 2 turned to digital inputs mode. The analog inputs options are displayed on the "Analog inputs" tab.
If the connected controller has inputs less than 8, options of unused inputs will be hidden. Likewise, when connecting the AutoGRAPH-GSM/SL controller, the inputs which are not supported by the controller is hidden. An inverted state of the controller's digital input 2 is displayed as the input 2 on "Inputs 1-4" tab and an inverted state of the digital input 3 (high-impedance input) is displayed as the input 3 on "Inputs 1-4" tab. Direct states of inputs 2 and 3 are displayed correspondingly as inputs 7 and 8 on the "Inputs 5-8" tab.

INPUTS 1-4

Go to "Inputs 1-4" tab to configure parameters for digital inputs 1-4 (active low) of the device. When AutoGRAPH-GSM/SL is connected, all inputs those are not supported will be hidden automatically.

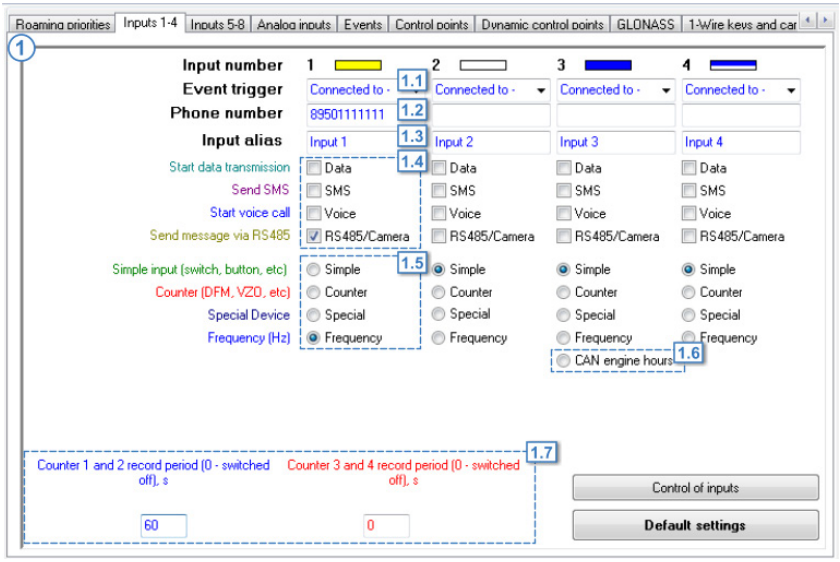


Fig.25. Inputs 1-4.

Settings of the digital inputs are described below:

1.1. Event trigger – select a state of input that initiates data sending ("supply (+)" or "ground (-)"). When the device's input switches to the specified state, the selected operation will be performed.

NOTE

If an active low input is open-circuit it denotes logical "1".

1.2. Phone number – the device will send SMS message to specified number, when the input is triggered. Enter numbers without spaces and use prefixes for national calling (8 or +7).

Phone numbers of the first and the second inputs are similar to phone numbers of dialling (see chapter "Voice Calls"). Specifying phone numbers for the inputs 1 and 2 automatically changes the phone numbers of dialling.

1.3. Input alias – name of digital input displaying in messages which are sent by the device to notify about the input triggering. The input alias can consist of only the characters of LATIN alphabet, e.g. "ALARM BUTTON", "INPUT 1".

1.4. Operations. The device can be set up to perform following operations when the input triggers. The digital input can trigger in Simple mode (see below).

- **Start data transmission** – transfer collected data via GPRS immediately after the device's input triggering not waiting the next data transmission period. The device will perform a coordinate record, when the input triggers.
- **Send SMS** – send SMS message to the specified phone number, when the device's input switches to the state specified in the "Event trigger" field.
- **Start voice call** – make the voice calls to the specified number when the input triggers.
- **Send message via RS485 (RS485)/Camera** – transfer the data to an external device connected to the device via RS-485 when the input triggers (for example, to external display). This operation is available for all modes of digital input. The input will be considered triggered if there are any readings at the input, e. g. in the Counter mode the input is considered triggered if the input receives any pulses.

When the device input is used to connect an alarm button, it is recommended to check the "Start data transmission" box to enable immediate data transmission to the server upon the alarm button press not waiting for the next data transmission period. As a result, the data will be transferred to the server much faster and the operator will be notified about alarm situation.
If necessary, enable sending the warning SMS to inform a dispatcher or any other responsible person on an alarm situation in time (if provided that the mobile operator delivers messages in time).

1.5. Mode of digital input. Digital inputs can operate in following modes:

- **Simple (A).** In this mode, digital inputs are monitored. When the input's state changes, the time and location data is stored into the device memory. Simple mode is useful for recording the time of different sensors' activation and for monitoring the performance of equipment and mechanisms, such as an alarm button, oil pressure sensor, ignition system, passenger presence sensor, security alarm triggering, opening of doors, limit switches of various special-purpose and construction machinery mechanisms, etc. This mode also enables the device to perform unscheduled transmission of data to the server via GPRS upon input state changes, as well as to send an SMS message to the specified phone number.

- **Counter (B).** This mode is intended to monitor the input switching states and to count various events. This may include counting of pulses from fuel-flow pulse output sensor (of DRT-5 or VZO type), passenger count, speed sensor, tipper body lift sensor, etc. In storage counter mode, the number of pulses from each sensor is stored in memory. The location data is not stored.
- **Special (C).** This mode is intended for counting of pulses within one minute. Periodic counter mode is used for taking the readings of sensors, which transmit measured values in pulse bursts in amounts proportional to the measured value. This mode is used, for example, for fuel level, temperature and engine speed sensors with pulse outputs. This mode does not involve recording of a track point into the storage memory when the input state changes.
- **Frequency (F).** This mode is intended for sensors with frequency outputs. The device is capable of measuring frequencies of 0 – 1,500 Hz. Frequency measurement mode is used, for example, for fuel level sensors with frequency outputs, engine and shaft speed sensors, proximity sensors and etc.

1.6. CAN engine hours – select the option to use the third digital input to filter engine hours. When the option is enabled, the third input triggers if there engine RPM readings from CAN bus. In this mode other functions of the third input are not available. "CAN engine hours" option is also available on CAN tab.

1.7. Counter record period – if input is in Counter or Frequency mode the parameter specified the period of recording the pulses collected for this period. If the input is in Special mode parameter specified the period of recording the pulses collected within one minute. Minimum period is 5 seconds; maximum period is 3,600 seconds (1 hour). Specify "0" here to disable the recording of counters readings.

"Control of inputs" button – press the button to go to Control (Inputs and Outputs) tab to test operation of digital inputs of the connected device.

"Default settings" button – use this button to restore the default settings of digital inputs.

INPUTS 5-8

Go to the "Inputs 5-8" tab (Fig.26) to configure parameters for digital inputs 5-8 (active high) of the device.

The settings of the device's digital inputs are described below:

1.1. Event trigger – select a state of input that initiates data sending ("supply (+)" or "ground (-)"). When the device's input switches to the specified state, the selected operation will be performed.

If an active high input is open-circuit it denotes logical "0".

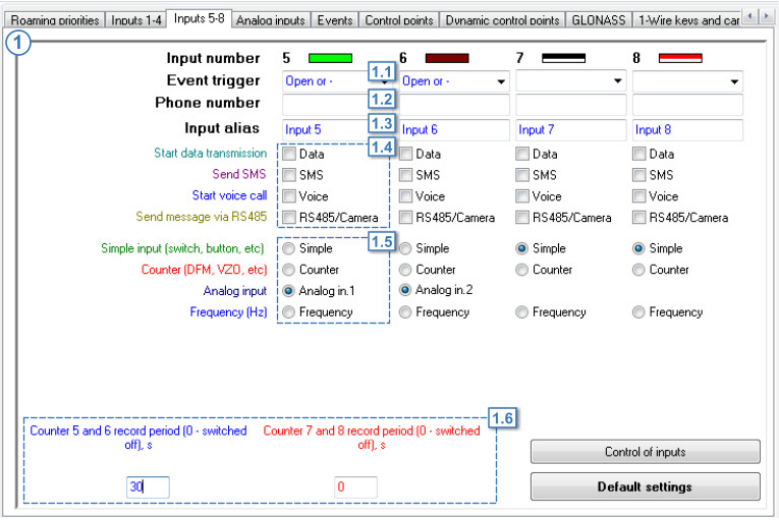


Fig.26. Inputs 5-6.

1.2. Phone number – the device sends SMS message to specified number, when the input triggers. Enter numbers without spaces and use prefixes for national calling (8 or +7).

1.3. Input alias – a name of a digital input which will be displayed in messages which are sent by the device to notify about the triggering of the digital input. The input alias can consist of only the characters of LATIN alphabet, e.g. "ALARM BUTTON", "INPUT 1".

1.4. Operations. The device can be set up to perform following operations when the input triggers. The digital input can trigger in Simple mode (see below).

- **Start data transmission** – transfer collected data via GPRS immediately after the device's input triggering not waiting the next data transmission period. The device will perform a coordinate record, when the input triggers.
- **Send SMS** – send SMS message to the specified phone number, when the device's input switches to the state specified in the "Event trigger" field.
- **Start voice call** – make the voice calls to the specified number when the input triggers.
- **Send message via RS485 (RS485)/Camera** – transfer the data to an external device connected to the device via RS-485 when the input triggers (for example, to external display). This operation is available for all modes of digital input. The input will be considered triggered if there are any readings at the input, e. g. in the Counter mode the input is considered triggered if the input receives any pulses.

When the device input is used to connect an alarm button, it is recommended to check the "Start data transmission" box to enable immediate data transmission to the server upon the alarm button press not waiting for the next data transmission period. As a result, the data will be transferred to the server much faster and the operator will be notified about alarm situation.
If necessary, enable sending the warning SMS to inform a dispatcher or any other responsible person on an alarm situation in time (if provided that the mobile operator delivers messages in time).

1.5. Mode of digital input. Digital inputs can operate in following modes:

- **Simple (A).** In this mode, digital inputs are monitored. When the input's state changes, the time and location data is stored into the device memory. Simple mode is useful for recording the time of different sensors' activation and for monitoring the performance of equipment and mechanisms, such as an alarm button, oil pressure sensor, ignition system, passenger presence sensor, security alarm triggering, opening of doors, limit switches of various special-purpose and construction machinery mechanisms, etc. This mode also enables the device to perform unscheduled transmission of data to the server via GPRS upon input state changes, as well as to send an SMS message to the specified phone number.
- **Counter (B).** This mode is intended to track the input switching states and to count various events. This may include counting of pulses from fuel-flow pulse output sensor (of DRT-5 or VZO type), passenger count, speed sensor, tipper body lift sensor, etc. In storage counter mode, the number of pulses from each sensor is stored in memory. The location data is not stored.
- **Analog in 1 (2)** digital input of the device functions as an additional analog input: fifth digital input is used as the first analog input, sixth one is used as the second analog input.
- **Frequency (F).** This mode is intended for sensors with frequency outputs. The device is capable of measuring frequencies of 0 – 1,500 Hz. Frequency measurement mode is used, for example, for fuel level sensors with frequency outputs, engine and shaft speed sensors, proximity sensors and etc.

1.6. Counter record period – a period of recording the data from digital inputs 5-6 and 7-8. Minimum period is 5 seconds; maximum period is 3,600 seconds (1 hour). If you specify "0" here, the counters records won't be performed.

"Control of inputs" button – press the button to go to Control (Inputs and Outputs) tab to test operation of digital inputs of the connected device.
"Default settings" button – use this button to restore the default settings of digital inputs.

ANALOG INPUTS

Go to the "Analog inputs" tab to configure parameters for analog inputs of the device.

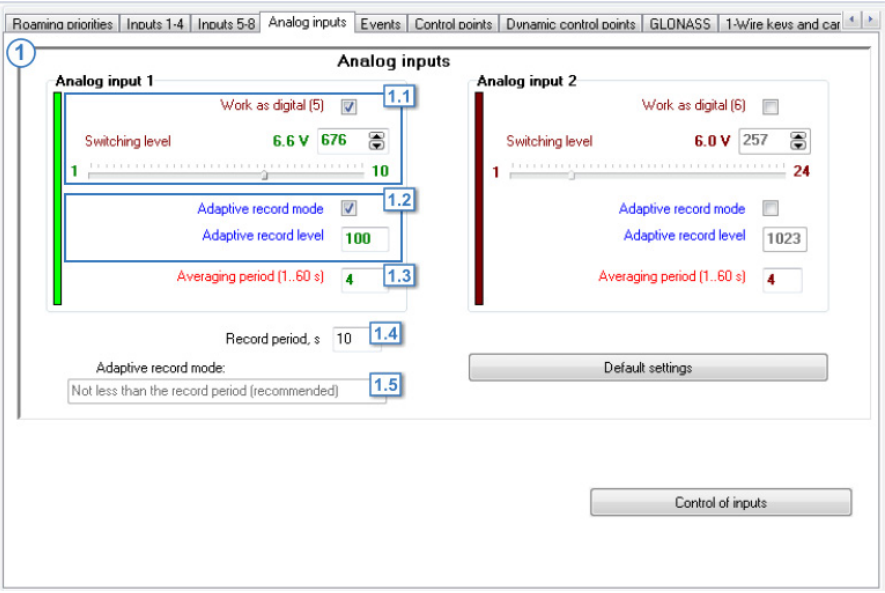


Fig.27. Analog input.

1. Analog input 1 (2). The settings of the analog inputs are described below:

1.1. Work as digital – enables to use analog input of the device as additional digital input (first analog input is used as the fifth digital input, second one is used as the sixth digital input). When you use the analog input as a digital one, it reserves its functionality of analog input: it records not only switching events, but also ADC readings.

Switching level – use this option to change the level of voltage for switching of input when analog input functions as a digital one.

1.2. Adaptive record mode – (adaptive record level) – in this mode, the device will perform an additional record of readings of analog input, if the voltage level on this input changes greater than the specified adaptive record level reflected in the ADC readings.

Measuring range of the first analog input is 0 V to 10 V, second analog input is 0 V to 24 V (but not to exceed supply voltage level). Both measuring ranges are divided by 1024 ADC levels (from 0 to 1023).

1.3. Averaging period – is an averaging period of the analog input readings. Longer period provides more smoothing of analog input readings, but can cause missing of a short-term voltage spike on the input.

Recommended value of averaging period is 1 second, when using analog input as digital input on simple mode.

1.4. Record period (s) – period of recording of analog input readings to the devices memory.
1.5. Adaptive record mode settings – select one of two options (not available for AutoGRAPH devices of hardware version 3.0):

- **A –** Not less than the record period – record of the analog input readings is performed at least as frequent as record period or is done as soon as the voltage variation on analog input (reflected in the ADC reading) exceeds the value specified in "Adaptive record level".
- **B –** Not more than the record period – record of analog input readings is performed as soon as the voltage change on analog input (reflected in the ADC reading) exceeds the value specified in "Adaptive record level", but not so frequent as the record period.

This mode implies that when another voltage values on analog inputs are recorded within the time equal to the record period, NO more voltage will be measured on any analog input.

Long averaging period and settings the analog input as a digital one provide the input operation as digital input passing short pulses and triggering only by long-term switching of the logical state.

"Default settings" button – use this button to restore the default settings of analog inputs. When applying these settings, the analog inputs function similar to analog inputs of the device with firmware of version under 4.0.
"Control of inputs" button – press the button to go to the "Control (Inputs and Outputs)" tab to test operation of digital inputs of the connected device.

RPM AND HIGH-IMPEDANCE INPUT

On the RPM and high-impedance input you can configure the operation of the digital high-impedance input and the RPM input of the AutoGRAPH on-board controller. The high-impedance input and the RPM input intended to count revolutions of different rotating mechanism are available in the AutoGRAPH controller of hardware version 3.0: AutoGRAPH-GSM+, AutoGRAPH-WiFi+, AutoGRAPH-WiFi GSM+. Also the AutoGRAPH-SL controller is equipped with a high-impedance input, but configuration of AutoGRAPH-SL high-impedance input must be done on the tabs "Inputs 1-4" and "Inputs 5-8".

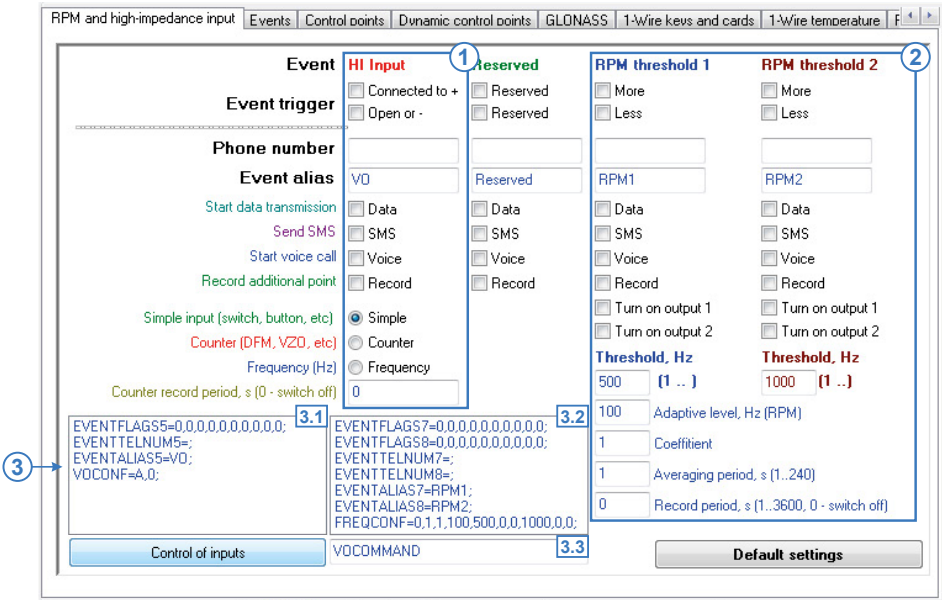


Fig.28. RPM and high-impedance input.

1. High-impedance input settings. For proper operation of high-impedance input, you need to set following options for the "HI input" event on the tab (Fig.28, i.1):

1.1. Event trigger – an input state considered to be active. When the high-impedance input switches to an active state, AutoGRAPH device performs preset operations. Both or one of the following states can be selected:

- **Connected to +.** The input triggers when the input voltage is higher than 7 V.
- **Open or –.** The input triggers when the input voltage is lower than 3 V or the input is disconnected.

1.2. Phone number – the device sends SMS message to specified number, when the input triggers. Enter numbers without spaces and use prefixes for national calling (8 or +7).

1.3. Event alias – a name of event which is displayed in messages transferred by the device to specified phone number in order to notify of the high-impedance input triggering. The event alias can consist of only the characters of LATIN alphabet, e.g. "ALARM BUTTON", "INPUT 1".

1.4. Operations. The device can be set up to perform following operations when the input triggers:

- **Start data transmission (Data)** – enables collected data transmission via GPRS immediately after the device's input triggering not waiting next data transmission period. The device will also perform a coordinate record, when the input triggers.
- **Send SMS (SMS)** – enables transmission of SMS to the specified phone number, when the device's input switches to the state specified in the "Event trigger" field.
- **Start voice call (Voice)** – enables voice call to the specified number when the input triggers.
- **Record additional point (Record)** – enables extra record of the high-impedance input value, when the input triggers. If this option is disabled, the input value is recorded by the specified Counter record period.

1.5. Mode of high-impedance input. Digital inputs can operate in following modes:

- **Simple (A).** In this mode, when the input's state changes within a second, the time and location data is recorded into the device memory. Simple mode is useful for recording the time of different sensors' activation and for monitoring the performance of equipment and mechanisms.
- **Counter (B).** This mode is intended to track the input switching states and to count various events. This may include counting of pulses from fuel-flow pulse output sensor, speed sensor, and etc. In the counter mode, the number of pulses from each sensor is stored in memory. The location data is not stored.
- **Frequency (F).** This mode is intended for sensors with frequency outputs. The device is capable of measuring frequencies of 0 – 1,500 Hz.

1.6. Counter record period, s – a period of recording the high-impedance input readings – pulses accumulated for the record period (in the Counter mode) and frequency measured for the record period (in the Frequency mode). Minimum period is 5 seconds, maximum value is 3600 seconds (1 hour), 0 period disables recording of counter value (in the Counter mode) and frequency readings (in the Frequency mode). The current state of the input is recorded along with coordinate data regardless of the record period settings.

2. RPM input settings (Fig.28). Up to 2 thresholds of RPM input triggering can be set up in AutoGRAPH device – RPM threshold 1 and RPM threshold 2 (Fig.28).

In order for AutoGRAPH device to detect RPM threshold crossing correctly, you need to set up following settings:

2.1. Event trigger – an event which occurrence forces AutoGRAPH device to perform operations preset for the configured threshold. You can enable both events:

- **More**. The RPM input triggers when RPM readings exceed the specified threshold.
- **Less**. The RPM input triggers when RPM readings lower the specified threshold.

2.2. Telephone number – a phone number which the device sends SMS to, when the RPM input triggers. Enter number without spaces and use prefixes for national calling (8 or +7).

2.3. Event alias a name of the RPM input event which is displayed in messages transferred by the device to specified phone number in order to notify of the RPM threshold crossing. The event alias can consist of only the characters of LATIN alphabet, e.g. "ALARM BUTTON", "RPM input".

2.4. Operations. The device can be set up to perform following operations when the RPM input triggers:

- **Start data transmission (Data)** – enables collected data transmission via GPRS immediately after the device's RPM input triggering not waiting next data transmission period. The device will also perform a coordinate record, when the input triggers.
- **Send SMS (SMS)** – enables transmission of SMS to the specified phone number when the device's RPM input switches to the state specified in the "Event trigger" field.
- **Start voice call (Voice)** – enables voice call to the specified number when the RPM input triggers.
- **Record additional point (Record)** – enables extra record of the high-impedance input value when the RPM input triggers. If this option is disabled, the input value is recorded by the specified Record period.
- **Turn on output 1 (2)** – when the option is enabled, the device digital output 1 (output 2) will turn on while RPM readings are higher than the specified threshold. When the RPM readings lower the threshold, the device output turns off. This option is commonly used to notify about high engine RPM using LED connected to the device output.

2.5. Threshold, Hz – threshold value of RPM readings. Depending on the "Event trigger" setting the RPM input can trigger when the readings either exceeds the threshold or lower it.

2.6. Adaptive level, Hz (RPM) – minimum threshold of RPM readings change per one minute exceeding that forces AutoGRAPH device to make an extra record of RPM readings not waiting next Record period. Zero adaptive level disables adaptive record of RPM readings providing that RPM data is recorded only with regular period.

2.7. Coefficient – a numeric coefficient multiplying raw RPM readings before recording them in the device memory. The coefficient can be used to convert raw RPM data to other units. E.g. if the device RPM input is connected to a rotating mechanism the way that it measures a rotation frequency, the coefficient 60 will provide final readings as a number of revolutions per a minute.

2.8. Averaging period – an interval of RPM readings averaging. Minimum value is 1 second, maximum value is 240 seconds.

2.9. Record period, s – an interval of RPM data recording. The record period is to be specified in seconds. Minimum value is 1 second, maximum value is 3600 seconds, 0 period disables periodic RPM data recording. When the periodic recording is disabled, RPM data can be recorded adaptively, if non-zero adaptive level is specified.

3. Control commands. This list contains control commands used to configure high-impedance input (Fig.28, i. 3.1) and RPM input of AutoGRAPH controller remotely via data server or by means of SMS (Fig.28, i. 3.2). When you change settings on the tab "RPM and high-impedance input", control commands are filled with the specified settings. Then prepared commands can be sent to AutoGRAPH device from data server or by means of SMS.

In order to copy a command in clipboard, left click the command. This will move the command in the editing line (Fig.28, i. 3.3), where you can change the command values. To copy the command from the editing line in clipboard, use hot keys Ctrl+A and Ctrl+C.

Press the "Control of inputs" button to go to the "Inputs and outputs" tab of the AG.GSMConf intended to troubleshoot the device inputs and outputs.

Events

On the "Events" tab users can specify the parameters of events and configure response behaviour of the device on the events.

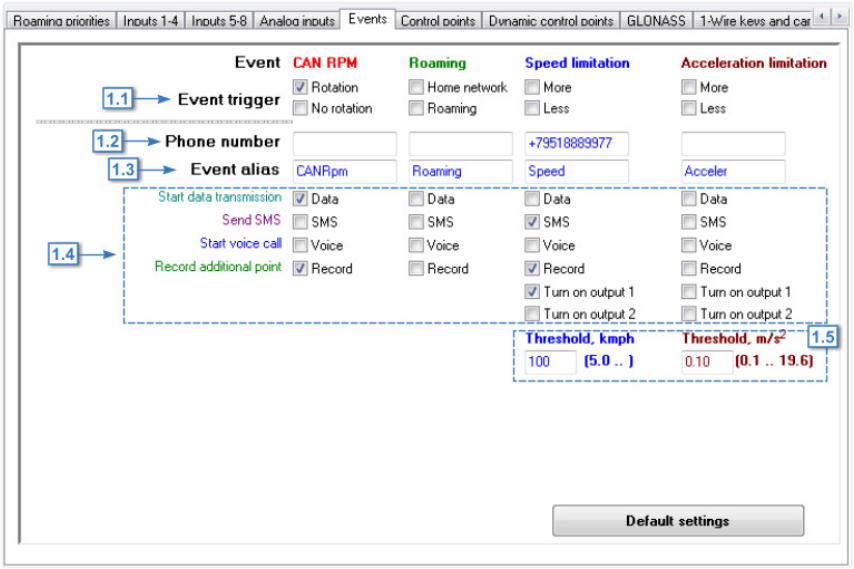


Fig.29. Events settings.

1.1. Event trigger. Select event, those initiate specified operation.

- CAN RPM: check "Rotation" or "No rotation".
- Roaming: check "Home network" or "Roaming".
- Speed limitation: check "More" or "Less".
- Acceleration limitation: check "More" or "Less".

1.2. Phone number – specify the telephone number that the device will use for notifying about the event: sending SMS or making a voice call (depending on settings). Enter number without any spaces and use prefixes for national calling (8 or +7).

1.3. Event alias – a name of an event which will be displayed in SMS messages to identify the event.

1.4. Operations. Select an operation that will be performed when selected event is triggered.

1.4.1. Start data transmission – check this box to transfer collected data to the server when selected event occurs.

1.4.2. Send SMS – check this box to send SMS notification to the specified phone number (item 1.2) when selected event occurs.

1.4.3. Start voice call – check this box to make a voice call to the specified telephone number (item 1.2) when selected event occurs.

1.4.4. Record additional point – check this box to make an additional record of coordinates when selected event occurs.

Furthermore, the user can specify following operation for “Speed limitation” and “Acceleration limitation” events:

1.4.5. Turn on output 1 – check this box to turn on output when selected event occurs.

1.4.6. Turn on output 2 – check this box to turn on output 2 when selected event occurs.

1.5. Threshold. Specify thresholds of speed (km/h) and acceleration (m/sec^2), which will be used on handling of events.

Default settings button – press this button to restore default settings: each event will be assigned a default name (alias).

Control points

STATIC CONTROL POINTS

On the "Control Points" tab the user can set up parameters for static control points and configure the response behaviour when the device enters to / exits from these points. There are three control points in total.

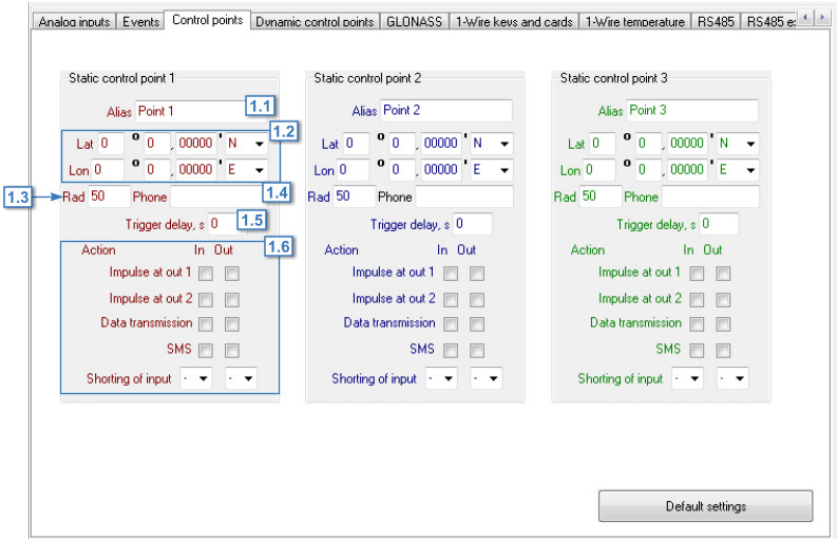


Fig.30. Control Points settings.

Use the following options to set up each control point:

1.1. Alias – a name of the control point which will be displayed in SMS messages to identify the point.

1.2. Coordinates of the control point center – latitude (Lat) and longitude (Lon) of the control point center. The coordinates must be specified in the following format: DD MM,ssss, where DD – degrees, MM – minutes, and ssss – seconds. Use drop-down lists to select the hemisphere and part of world: Northern (N – northern latitude) or Southern (S – southern latitude), Eastern (E – eastern longitude) or Western (W – western longitude)

1.3. Rad – radius of the control point. When the device becomes closer to the center of the control point than the specified radius, the event of entering to the control point is recorded. When the device becomes farther to the center of the control point than the specified radius, the event of exiting from the control point is recorded. You can specify an action to be performed when the device enter to the control point or out from it.

1.4. Phone – number used by the device to send SMS message when the device enters to or exits from the control point. Enter numbers without spaces and use prefixes for national calling (8 or +7).

1.5. Trigger delay, (s) – period of time for which the device should be inside or outside the control point to consider entering or exiting, respectively.

1.6. Action. Select operations which are performed by the device when entering to (In) and exiting from (Out) the control point:

- **Impulse at out 1** – to send a pulse to the first output of the device;
- **Impulse at out 2** – to send a pulse to the second output of the device;
- **Data transmission** – to start data transmission to the server via GPRS immediately.
- **SMS** – to send SMS message to the specified telephone number immediately.
- **Shorting of input** – select the input, that closes when the device enters to or exits from the control point. The device will perform a record of input state. This option is available for inputs 1-6.

"Default settings" button – press this button to restore default settings.

DYNAMIC CONTROL POINTS

Go to "Dynamic Control Points" tab to set up the parameters of control points in the device and to configure actions to be performed when the device enters to/exits from these control points. Dynamic point is a control point which is set by an event or SMS command at the point of a vehicle position. Likewise the point can be reset by an event or remote command. The dynamic point can be used as a vehicle alarm system which requires the point set up at the end of motion (route/trip/working day) and the point reset before driving.

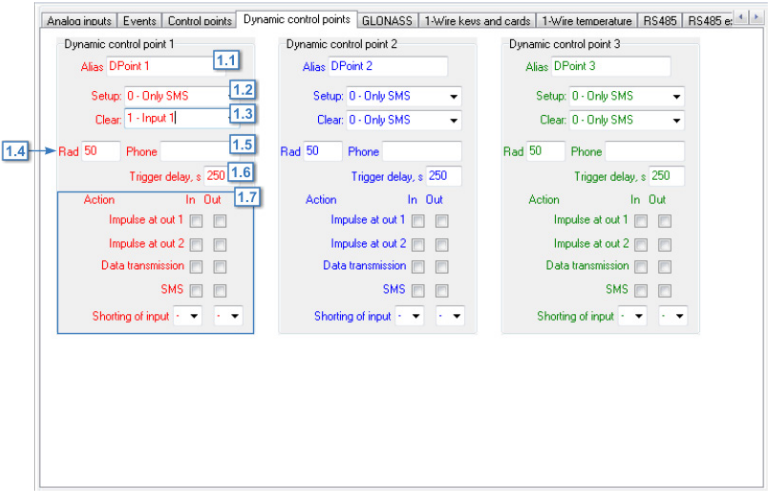


Fig.31. Dynamic Control Points settings.

Use following options to set up each control point:

1.1. Alias – name of the control point which will be displayed in SMS messages to identify the point.

1.2. Setup – select an event occurrence of which will setup a dynamic control point.

1.3. Clear – select an event occurrence of which will clear a dynamic control point.

- **Only SMS** – the option enables control point setup by the SMS command "DCPoint" used for remote configuration.
- **Input 1 (or 2-8)** – control point will be set, when selected input is triggered.

- **Can RPM** – control point will be set, when the device performs record of RPM scanned from CAN Bus.
- **Roaming mode** – control point will be set, when the device is in roaming.
- **Speed limitation** – control point will be set, when the overspeed occurs.
- **Acceleration limitation** – control point will be set, when the current acceleration of vehicle is over specified threshold.

1.4. Rad – radius of the control point. When a vehicle becomes closer to the center of the control point than the specified radius, the event of entering to the control point is recorded. When a vehicle becomes farther to the center of the control point than the specified radius, the event of exiting from the control point is recorded. You can specify an action to be performed upon occurrence of each event associated with the control point.

1.5. Phone – a phone number used by the device to send SMS message when the device enters to or exits from the control point. Enter numbers without spaces and use prefixes for national calling (8 or +7).

1.6. Trigger delay (s) is a period of time for which the device should be inside or outside the control point to consider entering or exiting, respectively.

1.7. Action. Select operations which will be performed by the device when entering to (In) and exiting from (Out) the control point:

- **Impulse at out 1** – to send a pulse to the first output of the device;
- **Impulse at out 2** – to send a pulse to the second output of the device;
- **Data transmission** – to start data transmission to the server via GPRS immediately.
- **SMS** – to send SMS message to the specified telephone number immediately.
- **Shorting of input** – select the input, that to be closed when the device enters to or exits from the control point. The device will perform a record of input state. This option is available for inputs 1-6.

GLONASS

Go to the "GLONASS" tab to configure operation of GNSS receiver.

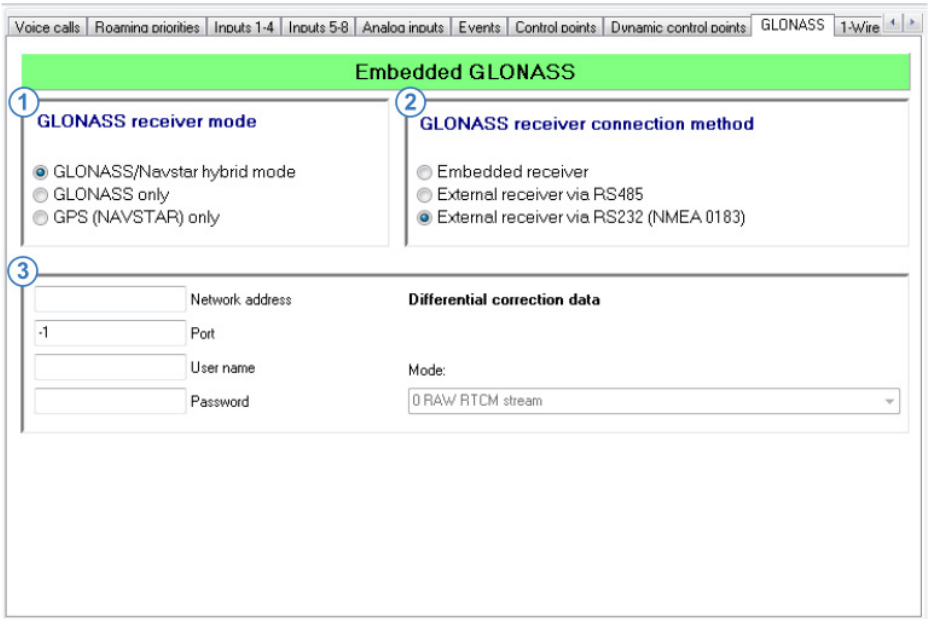


Fig.32. GNSS receiver settings.

1. Select GLONASS receiver mode:

- **GLONASS/Navstar hybrid mode** – select the option to use GLONASS and GPS (NAVSTAR) satellites for the position fix.
- **GLONASS only** – select the option to use only GLONASS satellites for the position fix.
- **GPS only** – select the option to use only GPS (NAVSTAR) satellites for the position fix.

2. Set up GLONASS receiver connection method:

- **Embedded receiver** – select the option to use the device's embedded GLONASS/GPS receiver for the position.
- **External receiver via RS485** – select the option to use for the position fix an external GLONASS receiver being connected to the device via RS-485.
- **External receiver via RS232 (NMEA 0183)** – select the option to use for the position fix an external receiver being connected to the device via RS-232 and supported NMEA 0183 protocol.

3. Differential corrections.

To improve accuracy of position fixing using GLONASS and GPS satellites, the AutoGRAPH onboard controller provides downloading of differential correction data relating to GSM base stations. The data is downloaded by means of GPRS:

In order to receive differential corrections, the AutoGRAPH device must be configured:

- **Network address** – address of the server from which the AutoGRAPH device downloads differential corrections.
- **Port** – port of the server from which the AutoGRAPH device downloads differential corrections.
- **User name** – user name (if required) to get access to differential correction data.
- **Password** – user password (if required) to get access to differential correction data.

To download differential corrections, GPRS is used. This feature is available only for AutoGRAPH-GSM devices equipped with Telit GSM modem and u-blox MAX-M8 GNSS receiver.

1-Wire bus settings

1-WIRE KEYS AND CARDS

Go to the "1-Wire keys and cards" tab to set up the AutoGRAPH controller operation with 1-Wire keys which can be used e.g. for a vehicle driver identification.

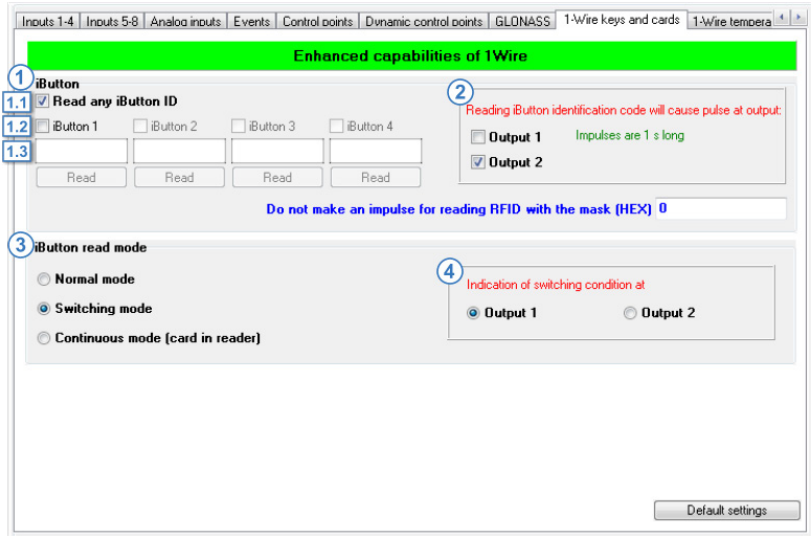


Fig.33. 1-Wire Keys and Cards.

1. iButton is a tool intended for identification the owner of 1-Wire device by reading the unique code programmed in that device. iButton is commonly used in systems intended to control access to equipment and devices.
Connected to the AutoGRAPH-GSM device, iButton allows to identify a vehicle driver and group trips performed by that driver in Dispatch software. 1-Wire bus of the AutoGRAPH device can be set up to read and record IDs of any iButton keys or only IDs preset in the device.

1.1. Read any iButton ID – if the option is selected the device will fix connection of any iButton key.
1.2. iButton 1 (2, 3, 4) – this option allows to save iButton IDs (up to 4 numbers) to the devices settings. If the option is enabled, the device will read and record only specified IDs. Key connection will be ignored if its IDs is not specified in the device.
1.3. iButton IDs – specify iButton IDs in this field to save them in the device. To make it easy, connect iButton tool to the device and press the "Read" button to read the ID of connected key.

2. Set up a response of the device on connection of iButton keys:

- **Reading of iButton identification code will cause pulse at outputs:** Output 1 and / or Output 2. Impulses are 1 second long. This option applies to both normal and switching modes of iButton.
- **Do not make an impulse for reading RFID with mask (HEX)** – specify a mask of RFID card here in hexadecimal system.

3. iButton read mode.

- **Normal mode** – in this mode the device records iButton ID and time of its registration.
- **Switching mode** – in this mode rereading of the card's or key's ID causes completion of the trip that has begun during initial reading. Reading of keys or cards with different IDs automatically completes the current trip and begins a new one.
- **Continuous mode (card in reader)** – this mode implies continuous reading of card's ID by the device. For the purposes of reducing traffic the ID is recorded to the device's memory once a minute. Trip will continue until the card is in the reader.

4. Indication of switching condition at:

- In switching mode, Output 1 (2) switches on when the trip begins (card is being read for the first time), and switches off when the trip ends (card is being read for the second time).
- In continuous mode, LED connected to one of outputs is on while the card is in the reader.

"Default settings" button – press this button to restore default settings.

1-WIRE TEMPERATURE

Go to the "1-Wire Temperature" tab to configure operation of 18B20 thermometers. AutoGRAPH devices equipped with 1-Wire bus support simultaneous connection of up to 8 temperature sensors.

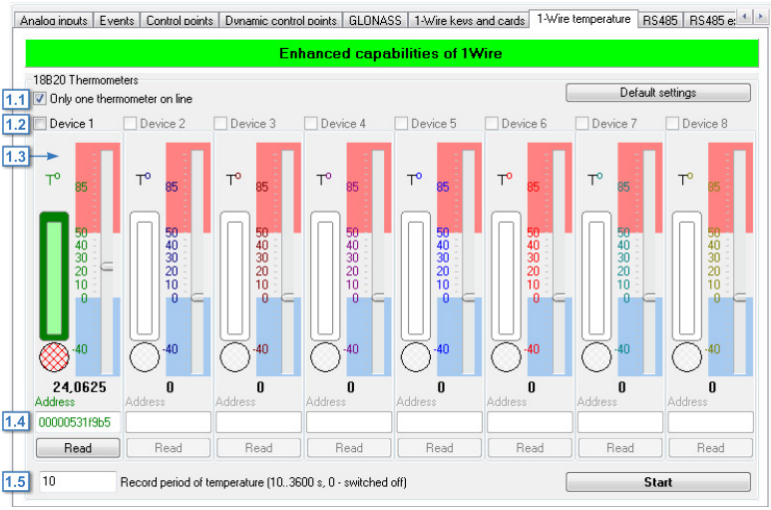


Fig.34. 1-Wire Temperature.

1. 18B20 thermometers. 1-Wire bus of the AutoGRAPH device can be set up to operate only with one 1-Wire temperature sensor (with unknown address) or with up to 8 temperature sensors which addresses are preset in the device.

1.1. Only one thermometer on line – check this box to record readings of only one thermometer connected to the device via 1-Wire. This option does not require address of 1-Wire sensor.

1.2. Device 1 (2,3,4…8) – select thermometers to enable recording of their readings to the device's memory and set their addresses in the "Address" field (see below).

1.3. The sensor operation test. The diagram indicates the sensor operation. To start the test, press the "Start" button.

1.4. Address – specify ID's of enabled thermometers. To set up the AutoGRAPH device to operate with multiple sensors, the ID of each connected sensor must be specified in the device settings. To do it, connect one sensor to the device and then read its address using the "Read" button to the required filed. Readings of 1-wire sensor which address is specified for Device 1 in the AG.GSMConf will be recorded as readings of 1-wire temperature sensor 1. Described is applicable for other sensors.

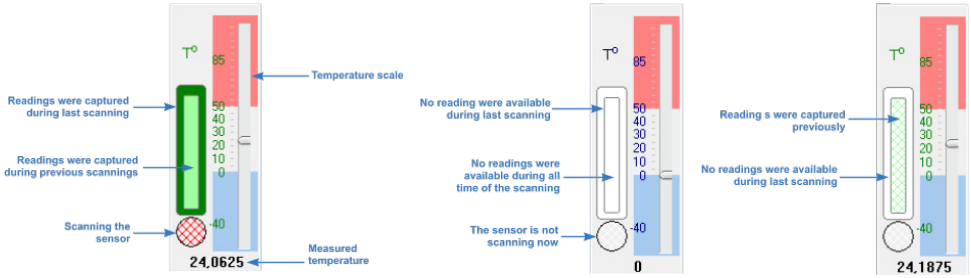
1.4. Record period of temperature (s) – is an interval of time with which the data from thermometers will be recorded. Possible values range from 10 to 3600, "0" value disables recording of temperature readings.

"Default settings" button – press this button to restore default settings.

Simultaneous connection of 1-Wire readers and 1-Wire thermometers is supported by AutoGRAPH-GSM devices with serial number 200 000 or higher.

To make diagnostic of the sensors operation:

- Configure the sensors addresses connecting them alternately and reading their address to the "Address" fields. To read correct address connect only one sensor, read its address, then disconnect it. Make such configuration for each sensor operating with the device.
- If the device operates with one temperature sensor via 1-Wire, it is recommended to enable the "Only one thermometer on line" option.
- Press the "Start" button to start the diagnostics. The program test only those sensors which addresses has been specified.
- A state of scanning of each temperature sensor indicates using three indicators. When scanning the sensor, the red round indicator turns on. If the program captures temperature reading from the sensor, the outer bar switches to green. If no reading has been captured during the current scanning, the outer bar stays white.
- Inner bar indicates state of scanning in common. If the program has captured readings just for once during all period of scanning, the inner bar switches to light green. Pre-scanning allows to troubleshoot sensors before installation and check settings of the device. If no readings have been captured from any sensor during the scanning it can means the sensor failure or wrong settings.



RS-485 bus settings

This section covers instruction on the AutoGRAPH controller RS-485 bus configuration. In order to provide proper operation of the AutoGRAPH controller with peripheral devices via RS-485 you need to set up network addresses of those devices in the controller, configure an interval of data recording from RS-485 bus and other available settings. Setting up network addresses, pay special attention to provide an offset of connected devices addresses. Otherwise, correct operation of peripheral devices with same addresses is not guaranteed. Network address of connected device specified in the controller must be the same as the address which is set in that device. If any connected device has fixed address, try to assign addresses to other connected device in a such manner that they are differ from the fixed one. The AutoGRAPH controller firmware provides a specific range of addresses for each type of supported devices (detailed information given in following sections).

RS-485

Go to the RS-485 tab to configure and test the device's operation when using RS-485 interface. Before test connect the fuel level sensors to the device.

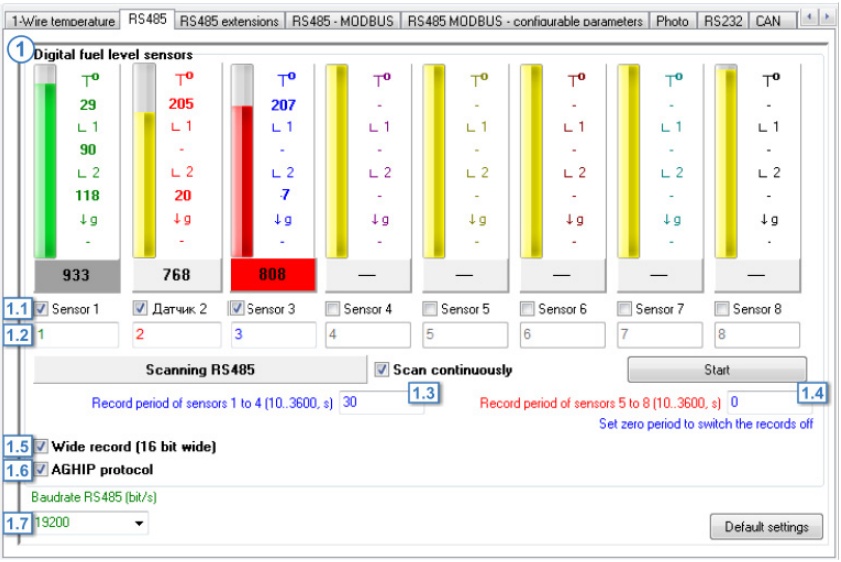


Fig.35. RS-485.

For the AutoGRAPH-GSM devices equipped with two RS-485 buses, settings on the RS485 tab are applied to the RS-485-1 bus.

1. Setting RS-485 bus. RS-485 bus of AutoGRAPH device can be used to connect up to 8 the TKLS fuel level sensors and third party sensors supporting LLS and ModBus formats. For proper interfacing of AutoGRAPH controller and fuel level sensors, RS-485 bus of the controller must correctly be set up.

- Before connecting a fuel level sensor to AutoGRAPH device, set it address in the device. To do it, enable an "Sensor 1" option on the RS485 tab (Fig.35, i. 1.1) and specify network address of the connected sensor on the field below (Fig.35, i. 1.2). The sensor with the specified address will be denoted as Sensor 1 in the device settings and it readings will be recorded as readings of LLS1.
- set up addresses of all connected sensors.
- set up a period of recording the sensor readings in the "Record period of sensors 1 to 4" (Fig.35, i. 1.3) and "Record period of sensors 5 to 8" fields (Fig.35, i. 1.4). Minimum period is 10 seconds, maximum period is 3600 seconds, 0 period disables recording of fuel level data.
- if the AutoGRAPH device receives temperature of fuel from a fuel level sensor, enable the "Wide records" option (Fig.35, i. 1.5). Enabling this increases width of data till 16 bits.
- if the TKLS sensor is connected to the AutoGRAPH device, enable the "AGHIP protocol" option (Fig.35, i. 1.6). This protocol allows reading of additional data along with fuel level: angles of sensor inclination and slope, and acceleration of the force, applied to the sensor. The AGHIP protocol is intended only for communication with TKLS fuel level sensors.
- set up baudrate of RS-485 (Fig.35, i. 1.7). Default value is 19200 bit/s. Selecting the baudrate, make sure that all devices connected to the AutoGRAPH are set up to this baudrate.
- save settings in the AutoGRAPH device.

The "Default settings" button clears all specified settings on the RS485 tab.

2. Sensor diagnostics. The AG.GSMConf program allows diagnostics of fuel level sensors connected to AutoGRAPH controller via RS-485. The diagnostics can be used to check settings before installation of the AutoGRAPH device and sensors on a vehicle.

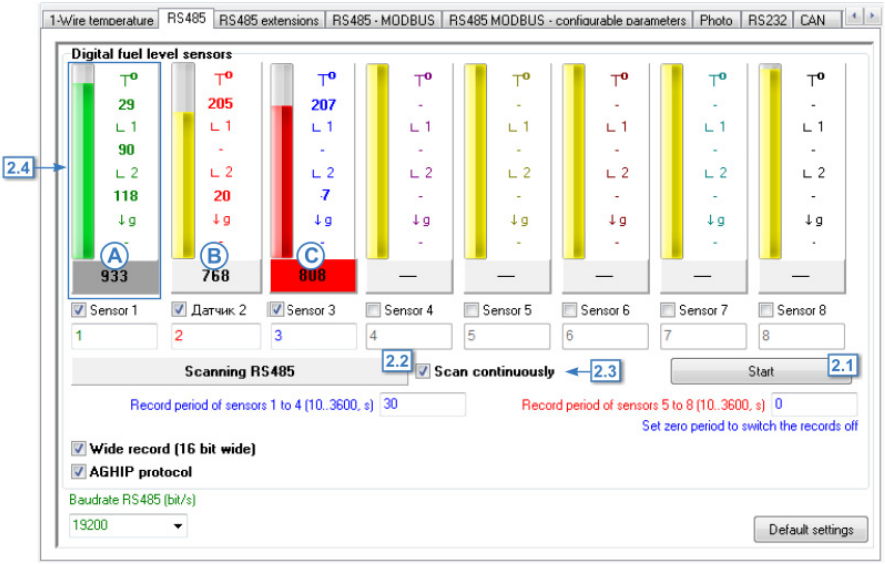


Fig.36. Diagnostics of RS-485.

To do a test of fuel level sensors operation:

- Connect fuel level sensors to AutoGRAPH device and connect the AutoGRAPH device to a PC.
- Set up all sensors connected to AutoGRAPH device following the instruction described below.
- Start test pressing the "Start" button on the RS485 tab (Fig.36, i. 2.1). When the scanning is on the "Scanning RS485" message is displayed (Fig.36, i. 2.2). By default the scanning continues 20 seconds and automatically stops. To scan RS-485 bus continuously, check the "Scan continuously" option (Fig.36, i. 2.3).
- State of each sensor is indicated on level scale. During the scanning each bar displays level of fuel measured by each sensor. Addition to fuel level, the program displays temperature (°C) on the right of the bar. If the AGHIP communication protocol is enabled in the AutoGRAPH device, it is able to capture angles of slope and inclination of the sensor.
- Sensor readings are displayed under level scale. Level scale and readings are highlighted with different colour depending of scanning state;

Scale / readings	Status	Example
Green / gray	Data reading is in progress	Fig.36, i. «A»
Yellow / white	Data has been successfully read	Fig.36, i. «B»
Red / red	Data has not been read and it is more than 20 seconds since last successful reading	Fig.36, i. «C»

- To stop scanning, press the Stop button (displayed instead of the Start button when scanning is on).

RS-485 EXTENSIONS

Go to the RS-485 extensions tab to configure operation of weight sensors, passenger traffic sensors and digital input wider which are connected to the device via RS-485.

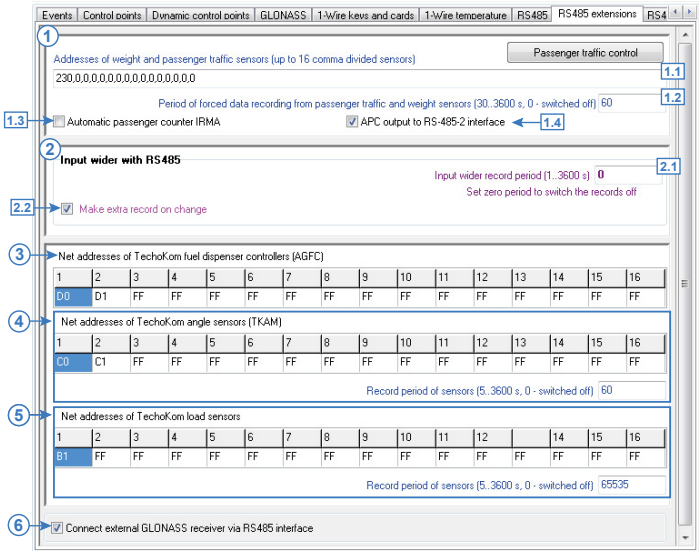


Fig.37. RS-485 extensions.

For the AutoGRAPH-GSM devices equipped with two RS-485 buses, settings on the "RS485 extensions" tab, besides the "APC output to RS-485-2 interface" option, are applied to the RS-485-1 bus.

1. Weight and passenger traffic sensors. To set up connection of weight and passenger traffic sensors, specify following settings:

Addresses of weight and passenger traffic sensors (Fig.37, i.1.1) comma separated. Possible values range from 1 to 254. The AutoGRAPH device supports connection of up to 16 sensors.

Period of forced data recording from passenger traffic and weight sensors (Fig.37, i.1.2) – a period of recording the readings of passenger traffic and weight sensors. Possible values range from 30 seconds to 3600 seconds. Set 0 period to switch the records off.

Automatic passenger counter IRMA (Fig.37, i.1.3) – check this box to connect automatic passenger counter IRMA to the device. When connecting IRMA system to the device, the device would not be able to interact with other devices via RS-485. To set up connection of IRMA MATRIX go to the CAN IRMA MATRIX tab.

AutoGRAPH device supports interaction with IRMA Basic, IRMA Advanced, and IRMA 3D counters being connected by means of two-wire RS485 interface using IBIS protocol.

APC output to RS-485-2 interface (Fig.37, i.1.4) – check this box to enable transmission of data collected with passenger counting sensors to external device, connected to the AutoGRAPH device via RS-485-2 bus.

"Passenger traffic control" button allows to go to the «Passenger traffic control» tab to do a test of passenger traffic sensors operation.

2. Input wider with RS485. The input wider[1] is an electronic device designed by TechnoKom Ltd. and intended to multiply a number of digital inputs of the AutoGRAPH device. The Input wider is connected to the AutoGRAPH device via RS-485. For proper operation of the wider, configure following settings:

Input wider record period (s) (Fig.37, i.2.1) – period of recording the data from the input wider. Possible values range from 1 second to 3600 seconds, zero period switches the record off.

Make extra records on change (Fig.37, i.2.2)– check this box to enable to make an additional record on change of input state. The record will be registered even if the record period is not elapsed.

1 Under the specific order.

3. Net addresses of TechnoKom fuel dispenser controller (AGFC) – this table is intended to set up addresses of AGFC fuel dispenser controllers connected to the AutoGRAPH controller. The AGFC device produced by TechnoKom Ltd. is intended to control fuel dispensing at filling stations by means of a driver and a refuelling operator identity cards. Up to 8 AGFC devices can be connected to the AutoGRAPH controller simultaneously. Addresses of AGFC devices must be in HEX format and within the range D0-D7. The address of all connected devices must be entered in table cells 1,2,...16. Random order is acceptable.

If the AGFC device has the address F9, setup of this address in the AutoGRAPH controller is not required due to that the AutoGRAPH controller automatically recognizes a device with the address F9.

4. Net addresses of TechnoKom angle sensors (TKAM) – addresses of the TKAM angle sensors of TechnoKom production which are connected to AutoGRAPH controller. Totally up to 8 TKAM sensors can be connected to the controller via RS-485 bus. A range of possible addresses – C0... C7. The address of all connected devices must be entered in table cells 1,2,...16. Random order is acceptable.

Also it must be taken into account that the sensor which address is specified in the cell 1 is denoted as Angle sensor 1 in the controller and in AutoGRAPH 5 PRO dispatch software.

For recording of data from TKAM sensors in AutoGRAPH controller, a non-zero "Record period of sensors" must be set up. Possible values – 5...3600 sec, 0 value disables angle readings recording from connected sensors.

5. Net addresses of TechnoKom load sensors – addresses of TechnoKom load sensors connected to AutoGRAPH controller. The load sensor consists of a central unit and 16 load sensors connected to this unit. Up to 8 central units can be connected simultaneously to the controller. A range of possible addresses – B0...B7. The address of all connected devices must be entered in table cells 1,2,...16. Random order is acceptable. Also it must be taken into account that the sensor which address is specified in the cell 1 is denoted as Angle sensor 1 in the controller and in AutoGRAPH 5 PRO dispatch software.

For recording of data from load sensors in AutoGRAPH controller, a non-zero "Record period of sensors" must be set up. Possible values – 5...3600 sec, 0 value disables angle readings recording from connected sensors.

6. Others.

- **Connect external GLONASS receiver via RS485 interface** – check this box, an external GLONASS/GPS receiver is connected to the device via RS485. This option is also available on GLONASS tab.

RS485-MODBUS

On the RS485-MODBUS tab users can configure the device to operate with devices connected to the device via MODBUS.

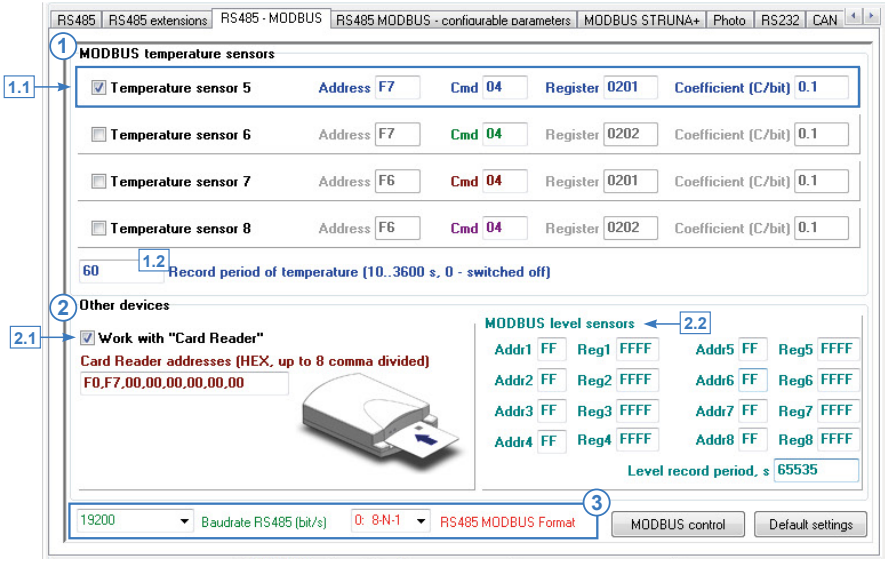


Fig.38. RS485 – MODBUS.

1. MODBUS temperature sensors.

MODBUS can be used to connect multiple temperature controllers to the device. Each temperature controller provides operation with multiple temperature sensors. Readings of each sensor are recorded into the certain registers of the controller.

By default, settings of EVCO temperature controllers are displayed in the AG.GSMConf software. The user can set up the device to operate with other temperature controller. Detailed information on the controller setting is usually given in technical documentation supplied with the controller.

Configure following parameters for each temperature sensor (Fig.38, i.1.1):

- **Temperature sensor 5 (6-8)** – number of temperature sensor connected to the device. Data acquired from temperature sensor (for example, sensor 5) will be recorded to the readings of a corresponding 1-Wire sensor (1-Wire 5th sensor).
- **Address** is a bus address of the controller to which the sensor is connected. By default this value is A7 for EVCO controllers. When connecting several temperature sensors, their addresses may be other than A7.
- **Register** – register of controller which stores temperature reading. By default (for EVCO controllers) this value is 0201 for the first sensor, and 0202 for the second sensor.
- **Coefficient (C/bit)** – a coefficient to convert register value to degrees. Coefficient should be specified in C°/bit. By default this value is 0.1 C°/bit for EVCO controllers.

Record period of temperature (Fig.38, i.1.2)– specify the record period of temperature, measured by EVCO sensors. Minimum period is 10 seconds, maximum period is 3600 seconds. Set zero period to disable the data record. This option is also available on the 1-Wire Temperature tab.

2. Other devices.

Work with "Card Reader" (Fig.38, i.2.1) – check this box to enable interaction of the AutoGRAPH device with AutoGRAPH-CR device manufactured by TechnoKom Ltd and specify the card readers addresses in HEX format and comma separated. The address must be within the range F0-F7. Up to 8 card readers can be connected to the device simultaneously. If only one card reader is connected to the device, its address is F0 by default.

MODBUS level sensors (Fig.38, i.2.2)– specify the bus address of the controller (Addr) to which the level sensor is connected. Also a register of the controller (Reg) used to capture data from sensor should be specified. AutoGRAPH-GSM device supports connection of up to 8 sensors via MODBUS bus. For the connected ModBUS temperature sensors, also set up the **Level record period** – an interval of time at which the device will record data from level sensors connected with MODBUS bus. The period should be specified in seconds.

3. MODBUS settings:

Baudrate RS485 – set up a baudrate of RS485 interface. Recommended rate for EVCO controllers is 9,600 bit/s, however you can customize this value. This option is also available on "RS485" and "RS485 MODBUS – configurable parameter" tabs. If you need to connect several different devices to the device concurrently, for example fuel level sensors (LLS) and temperature sensors, these devices should support the same baudrate.

RS485 MODBUS Format – select data format. Format specified in AutoGRAPH-GSM controller should comply with the format specified in the device being connected to the controller via RS-485 MODBUS bus:

- 8-N-1 – 8 data bits, no parity check, 1 stop bit.
- 8-N-2 – 8 data bits, no parity check, 2 stop bits.
- 8-O-1 – 8 data bits, odd parity, 1 stop bit.
- 8-E-1 – 8 data bits, even parity, 1 stop bit.

MODBUS control button – allows to go to the «MODBUS control» tab to control operation of MODBUS sensors.

Default settings button – restores default settings on the tab.

RS-485 MODBUS – CONFIGURABLE PARAMETERS

On the "RS485 MODBUS – configurable parameters" tab users can configure different sensors connected to the AutoGRAPH-GSM device with RS485 MODBUS bus.

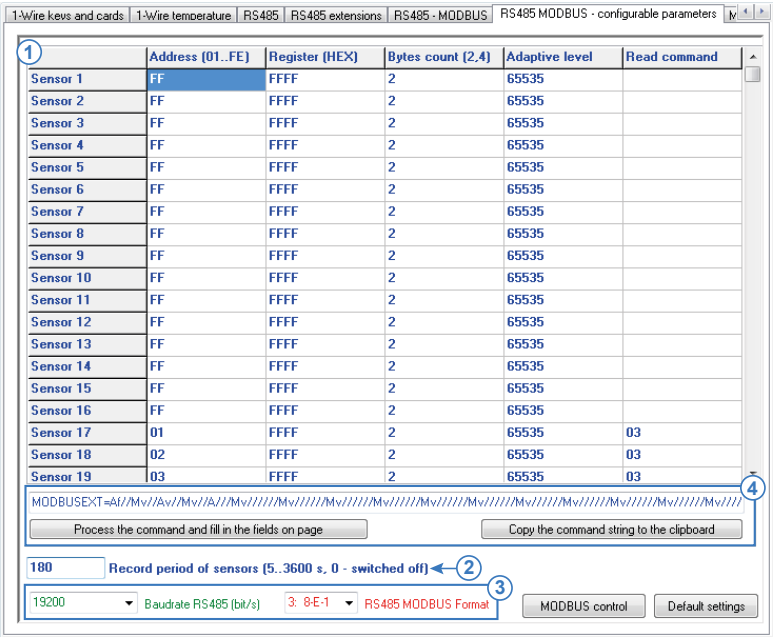


Fig.39. RS485 – RS485 MODBUS – configurable parameters tab.

1. MODBUS sensor 1-16 – configurable sensors connected to the controller via RS485 MODBUS bus. Configure following parameters for each sensor:

- **Address (HEX)** – specify a MODBUS address of the controller to which the concerned sensor is connected. Specify address in HEX format.
- **Register (HEX)** – specify a register of the controller which is used to capture data acquired from the concerned sensor. Specify number of the register in HEX format.
- **Bytes count (2, 4)** – specify number of data bytes to be read from the bus: 2 or 4 bytes. By default one MODBUS register is 2 bytes wide. The device can read 1 or 2 registers at a time.
- **Adaptive level** – when the sensor's reading reflected in ADC readings changes greater than the value specified in Adaptive level field, the device makes an additional record of readings not waiting for the next record period.
- **Read command** – a registry reading command. This parameter depends on a registry type and can be 3 (Read Holding Registers) or 4 (Read Input Registers). By default for AutoGRAPH controllers the read command is – 3.

2. Record period of sensors – an interval of time at which the device will record data from the sensors to its internal memory. Specify this period in seconds, possible values range from 5 to 3600, zero period switches records off.

3. Common options of RS485-MODBUS bus

- **Baudrate RS-485 (bit/s)** – a baudrate of RS-485 interface. This option is also available on "RS485" and "RS485 MODBUS" tabs. If you need to connect several different devices to the device concurrently, e.g. fuel level sensors (LLS) and temperature sensors, these devices must be support the same baudrate.
- **RS485 MODBUS Format** – select a data format. The format specified in AutoGRAPH-GSM controller should comply with the format specified in the device being connected to the controller via RS-485 MODBUS bus:
  - 8-N-1 – 8 data bits, no parity check, 1 stop bit.
  - 8-N-2 – 8 data bits, no parity check, 2 stop bits.
  - 8-O-1 – 8 data bits, odd parity, 1 stop bit.
  - 8-E-1 – 8 data bits, even parity, 1 stop bit.

4. Remote configuration command.

The AutoGRAPH on-board controller can be configured remotely using SMS commands or commands via data server. Settings available on the "RS485 MODBUS – configurable parameters" tab also can be set remotely using the commands MODBUSSENCONF и MODBUSEXT.

To set up sensors 1-16, the command MODBUSSENCONF is used. To set up sensors 17-100, the command MODBUSEXT is used.

Formats of these commands are different. The MODBUSEXT command has HEX format and is automatically generated on the "RS485 MODBUS – configurable parameters" tab when editing settings of the sensors 17-100.

Then this command can be sent to AutoGRAPH controller via server or by means of SMS. To copy prepared command, press "Copy the command string to the clipboard" button.

Also parameters of the MODBUSEXT command can be read in the AG.GSMConf program, e.g. in order o use settings remotely requested from the controller.

To do it, paste the filled command in the program, then press "Process the command and fill on the fields on page". The command settings will be entered in fields on the "RS485 MODBUS – configurable parameters" tab.

MODBUS control button – allows to go to the «MODBUS control» tab to test operation of MODBUS sensors.

Default settings button – allows to set default MODBUS settings in the device.

MODBUS STRUNA+

The AutoGRAPH on-board controller supports interaction with the STRUNA+ measuring systems via RS-485 bus in MODBUS protocol. The STRUNA+ is a system intended to measure level, temperature, density, and pressure of light-oil products and liquefied petroleum gas (LPG) in single and double-shell tanks, as well as to calculate volume and weight of those products, alarm about bottom water, increase the rate of fire and environmental safety, automate oil products metering procedures at fuel filling stations, gas filling stations and petroleum-storage depots.

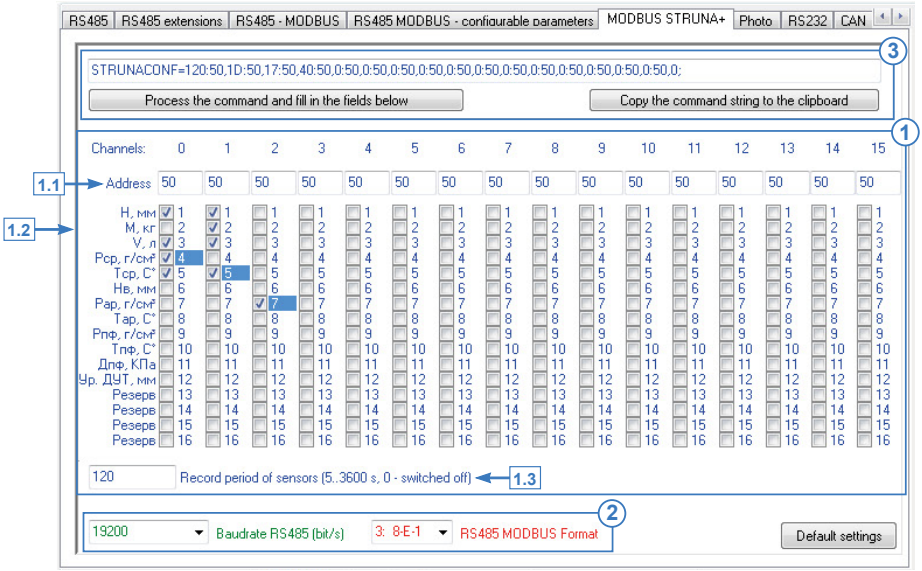


Fig.40. MODBUS STRUNA+ tab.

In order to set up the AutoGRAPH controller to receive data from the STRUNA+ measuring system, go to the "MODBUS STRUNA+" tab (Fig.40). Follow the step below to configure the controller to operate with the STRUNA+ system.

1. STRUNA+ system settings.

The STRUNA+ system provides 16-channel measuring of a wide range of parameters.

On the "MODBUS STRUNA+" tab channel numbers from 0 to 15 are specified in the "Channels" field. In order to set up the AutoGRAPH controller to receive data from a channel of the STRUNA+, you need to set an address of the channel and select data to receive:

1.1. Address – an address of measuring channel, in HEX format. Default address is 50. For more detailed information on how to set an address of measuring channel in the STRUNA+ see the User Guide on the measuring system.

1.2. Data received from measuring channel (check the box opposite to the required data in order for the AutoGRAPH controller to record this data):

1 – H, mm – fuel level value.
2 – M, kg – product weight.
3 – V, l – product volume.
4 – P_{aver}, г/см³ – product average density.
5 – T_{aver}, C° – product average temperature.
6 – H_b, mm – bottom water level.
7 – P_s, g/cm³ – product surface density.
8 – T_s, C° – product surface temperature.
9 – P_{vp}, g/cm³ – product vapour-phase density.

10 – T_{vp}, C° – product vapour-phase temperature.
11 – P_{vp}, kPa – product vapour-phase pressure.
12 – Level by FLS, мм – fuel level sensor (FLS) readings – level data and temperature (multiplied by 10), C°.
13-16 – Reserved.

1.3. Record period of sensors – an interval of data recording from the STRUNA+ system. Minimal value is 5 seconds, maximum value is 3600 seconds, 0 period – disables data recording from the STRUNA+.

2. Common options of RS485-MODBUS bus

- **Baudrate RS-485 (bit/s)** – a baudrate of RS-485 interface. This option is also available on "RS485" and "RS485 MODBUS" tabs. If you need to connect several different devices to the device concurrently, e.g. fuel level sensors (LLS) and temperature sensors, these devices must be support the same baudrate.
- **RS485 MODBUS format** – select data format. Format specified in AutoGRAPH-GSM controller should comply with the format specified in the device being connected to the controller using RS-485 MODBUS bus:
  - 8-N-1 – 8 data bits, no parity check, 1 stop bit.
  - 8-N-2 – 8 data bits, no parity check, 2 stop bits.
  - 8-O-1 – 8 data bits, odd parity, 1 stop bit.
  - 8-E-1 – 8 data bits, even parity, 1 stop bit.

3. Remote configuration command.

The AutoGRAPH on-board controller can be configured remotely using SMS commands or commands via data server. Settings available on the "MODBUS STRUNA+" tab also can be set remotely using the command STRUNACONF=.
In order to simplify the command preparation, specify required settings in the AG.GSMConf program (on the "MODBUS STRUNA+" tab) then use the command being entered automatically on the field at the top of the tab 3 (Fig.40, i.3) while you change settings on the tab. This command can be sent to the AutoGRAPH controller in SMS or via data server. To copy the command press the "Copy the command string to the clipboard" button.

Also you can fill in fields on the tab with the configuration specified in the command string. Due to this you can check manually prepared command before sending it to the controller or to configure several controllers similarly in the basis of available command with settings, e.g. previously requested from other controller. To unpack the command, enter it in the command string (Fig.40, i. 1.6) and press the "Process the command and fill in the fields below" button.

The "Default settings" button clears all specified settings on the tab.

PHOTO

On the "Photo" tab the customer can configure cameras, connected to the device via RS-485 bus. Interaction with camera is supported by the AutoGRAPH-GSM devices equipped with additional memory for storing photos. The AutoGRAPH-GSM device is equipped with the slot for connecting microSD card, the AutoGRAPH-GSM+ device is equipped with internal eMMC memory. Up to 16 cameras can be connected to the device simultaneously.

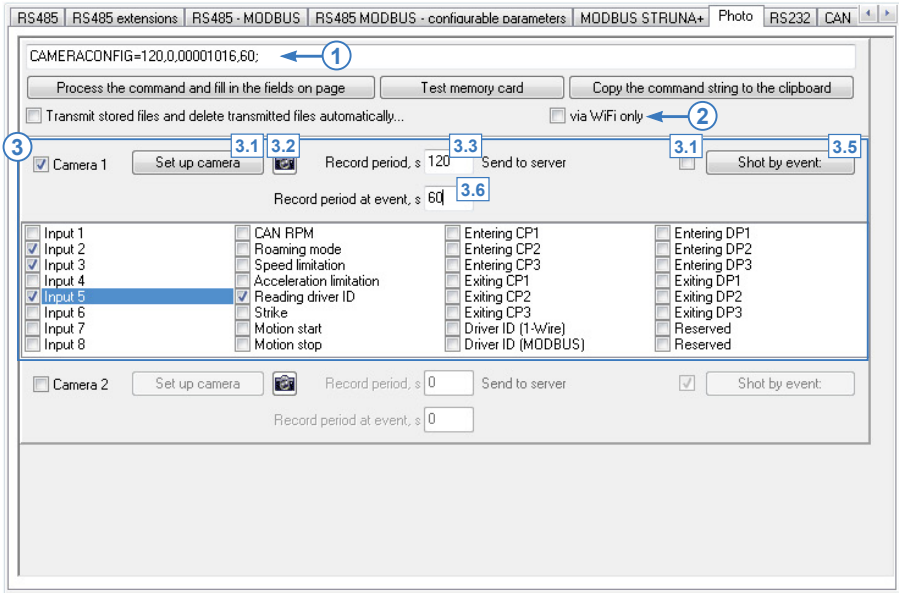


Fig.41. Photo settings.

1. Control command. CAMERACONFIG command provides remote configuration of cameras connected to the device. When changing settings in the tab, corresponded parameters of the command are automatically specified. The specified command can be sent to the device via server or SMS. To copy the command, press "Copy the command string to the clipboard" button. To get cameras' configuration from the device, send the GCAMERACONFIG; command. To fill the fields in the tab with the requested settings, paste the reply in the program and press "Process the command and fill in the fields below" button.

Photos are stored in the additional memory of the device. To troubleshoot the memory and copy photos to local folder, the customer can on the "SD/MMC Browser" tab. To go to this tab, press "Test the memory card" button.

2. Transmission of files and logs from SD-card/eMMC memory.

Transmit stored files and delete transmitted files automatically – the option allows transmission of data and logs collected in SD-card/eMMC memory of the device. Logs and files are send immediately as they are recorded into SD-card/eMMC. After the transmission all transmitted files are deleted from the device memory. If the allowed network is not available at the moment of transmission, files will be stored in the device SD-card/eMMC until the network becomes available. If the option is

disabled logs and files of the device are transmitted to server by the request from AutoGRAPH 5 PRO dispatch software.

via Wi-Fi only – enables files and logs transmission only via Wi-Fi. If the option is disabled, logs and files are transmitted via any available network – Wi-Fi or GSM. The high-priority network is Wi-Fi.

3. Camera's settings.

Before connection, all cameras must be configured. To enable camera, check the box of this camera and then:

- set a network address of the camera. To assign an address, connect only one camera to RS-485-2 bus of the device and press the"Set up camera" button (Fig.41, i.3.1). The address equal to the camera index will be assigned to connected camera;
- make a test shot to ensure that a correct address is assigned to the camera. Use the "Make shot" button (Fig.41, i.3.2) to make a shot. The shot will be recorded in additional memory of AutoGRAPH controller. The recording status is displayed on status window of the AG.GSMConf program;
- specify a period of photo recording to the device memory in the "Record period, s" field (Fig.41, i.3.3). The period must be set in seconds;
- enable the "Send to server" option in order for the controller to send a photo immediately after its recording (Fig.41, i.3.4). If the option is disabled, photos will be stored in the device's memory and sent to the server by request. ;
- if necessary, set up photo recording from the camera by events. To do it, press the "Shot by event:" button (Fig.41, i.3.5) and select the events which triggering will initiate a new photo recording. Ensure that selected events are configured correctly in the controller;
- specify a regular period of photo recording to the device memory while the selected events are in triggered state. Zero period disables photo recording when the events are in triggered state. Also the record period at events can be equal to the regular record period;
- save settings in the controller.

Photo cameras must be connected to RS-485-2 bus of AutoGRAPH controller.

Bluetooth settings

AutoGRAPH onboard controllers of hardware version 3.0 and higher starting from serial number 0367042 are equipped with Bluetooth module intended to connect external devices to controllers via Bluetooth. The current version of the AutoGRAPH firmware supports connection of up to 8 TKLS fuel level sensors, designed by TechnoKom Ltd., via Bluetooth.

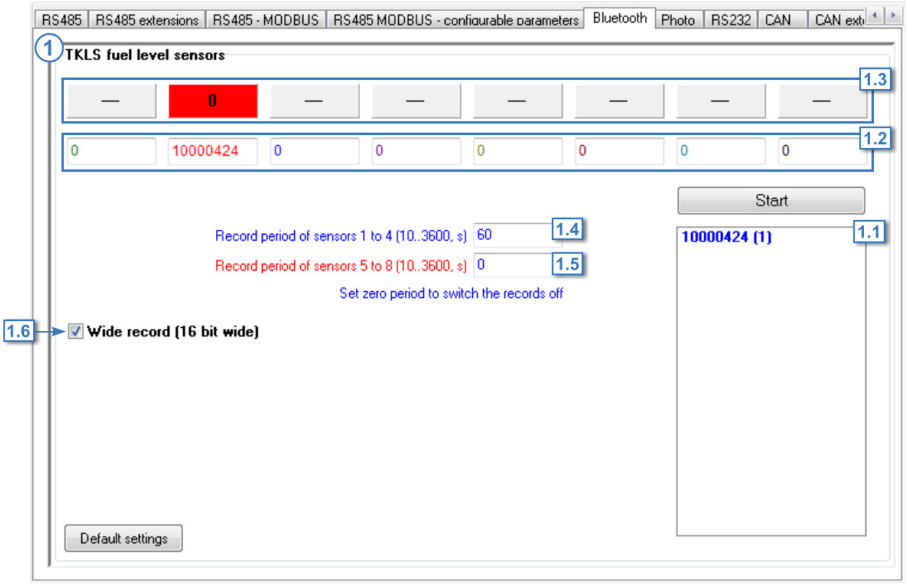


Fig.42. Bluetooth tab.

To set up the AutoGRAPH-GSM device to operate with TKLS fuel level sensors via Bluetooth, go to the "Bluetooth" tab of AG.GSMConf program and then:

- connect the AutoGRAPH-GSM to the AG.GSMConf program;
- press the Start button on the "Bluetooth" tab. The AutoGRAPH-GSM device will start searching for TKLS sensors. Serial number of TKLS sensors which have been found during the scanning are appear on the "Bluetooth" tab (Fig.42, i. 1.1);
- when all required sensors are found, press the Stop button.
- drag and drop a serial number to address bar of the required virtual sensor (Fig.42, i. 1.2). The address bars are displayed in the right order – first bar is an address of Sensor 1, second bar is an address of Sensor 2 and etc. Up to 8 addresses of fuel level sensors can be set. Readings of the sensor which address is specified in the address bar of Sensor 1 will be recorded as LLS1 readings in the AutoGRAPH device.

When configuring sensor address, it should be noted that readings of the Sensor 1 connected via Bluetooth and readings of the Sensor 1 connected via RS485 are recorded as readings of LLS1 sensor in AutoGRAPH-GSM device. For this reason, if any sensor connected via RS485 has been specified as Sensor 1 in the device already already, it is highly not recommended to use Sensor 1 to set address of a fuel level sensor connected via Bluetooth. Otherwise, the manufacturer cannot guarantee validity of fuel level readings.

- to test operation of configured sensors, start the scanning again. Readings of fuel level sensors which addresses are set on the Bluetooth tab will appear on the tab. A colour of readings varies depending of the scanning state (Fig.42, i. 1.3):

Grey	Data reading is in progress
White	Data has been successfully read
Red	Data has not been read and it is more than 20 seconds since last successful reading

- when the sensor addresses are correctly configured, specify period of sensor readings recording.
- the recording period of sensors 1-4 is set in the "Record period of sensors 1 to 4" field (Fig.42, i. 1.4). The recording period of sensors 5-8 is set in the "Record period of sensors 5 to 8" field (Fig.42, i. 1.5). Minimum period is 10 seconds, maximum period is 3600 seconds, 0 period disables recording of sensor readings. The Record period of sensors is duplicated on the RS485 tab of the AG.GSMConf program.
- if it is required to record fuel temperature in the AutoGRAPH-GSM device, enable the option "Wide record". Enabling this option increases data width till 16 bits.
- save setting in the sensor.

Connection to AutoGRAPH-GSM device via Bluetooth is supported by TKLS fuel level sensors with firmware version of TKLS-01.38 and higher.

RS232 IRIDIUM

AutoGRAPH on-board controller support connection of Q-Puck satellite modem providing data transmission via IridiumSBD network. This functionality is supported by the firmware version AGEX-12.34 or higher.
To set up AutoGRAPH controller to operate with Q-Puck modem, enable the "Iridium" mode of the RS-232 bus then go to the "RS232 Iridium" tab of the AG.GSMConf firmware.
The controller can be set up data via satellite modem depending from different events and conditions.

COMMON CONFIGURATION

At first step, set up basic options of Iridium mode on the "Common configuration" tab (Fig.43).

1. Output 1 (2) mode.

The Q-Puck modem is equipped with On/Off control input (Pin 6 on the interface connector). Connecting of this input of the modem to a digital output of AutoGRAPH controller makes possible for the controller to manage the modem turning On and Off as well as its restart in case of the modem failure.

In order for AutoGRAPH controller to be able to control the modem operation connect correctly the modem input to one of the digital outputs of the controller then select a mode of used output:

- **Not used** – the output is not used to control the modem operation.
- **Turn on output to turn on modem** – the modem is turned on when the controller's output switches to active mode.
- **Turn on output to turn off modem** – the modem is turned off when the controller's output switches to active mode.

2. Server check period.

AutoGRAPH controller can be set up to connect to a remote server via IridiumSBD satellite network to receive data from the server, e.g. remote configuration commands.

To enable the controller connection to the server via satellite network, set non-zero value in the "Server check period, min" field. The period must be specified in minutes.

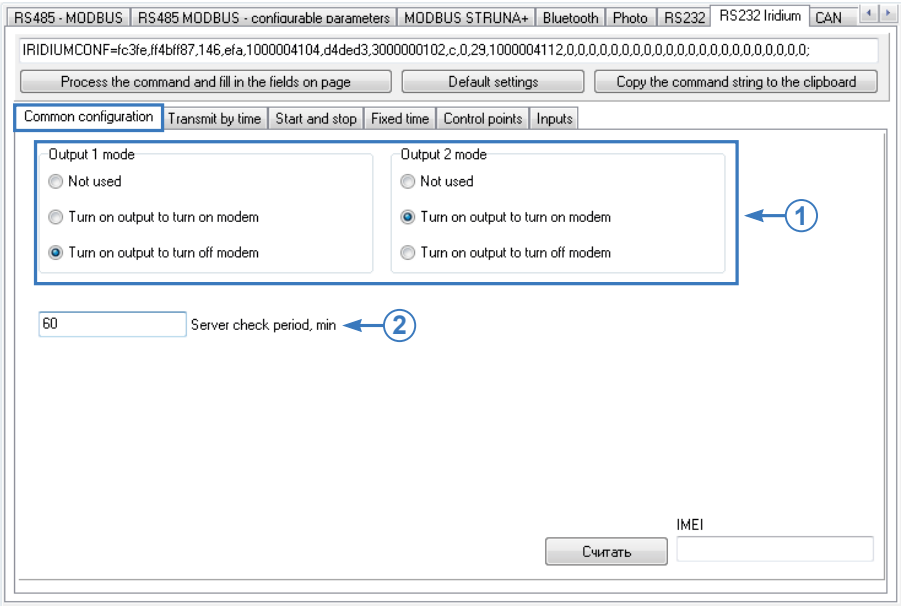


Fig.43. "Common configuration" tab (RS232 Iridium).

DATA TRANSMISSION BY REGULAR PERIOD

AutoGRAPH controller can transfer data via satellite network with a regular period. The controller firmware allows data transmission with different period at vehicle stops and while moving. To enable periodic data transmission via IridiumSBD network and set up the periods, go to the "Transmit by time" tab and set up following parameters (Fig.44):

1. Transmission period in motion, min. To disable data transmission via satellite network when vehicle is moving, set 0 in this field.

2. Transmission period at stops, min. To disable data transmission via satellite network at vehicle stops, set 0 in this field.

3. Data to send. Select data to transmit via satellite network with regular period in the given list.

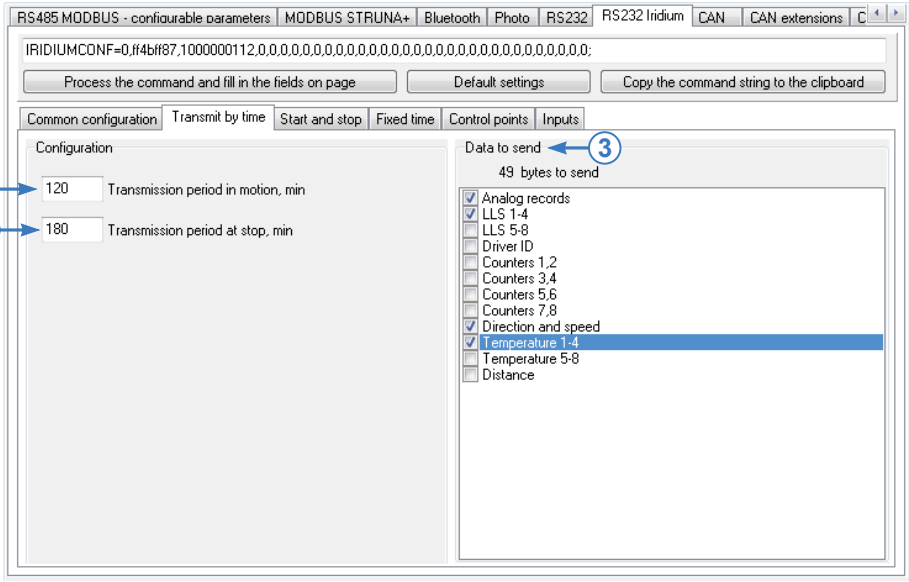


Fig.44. "Transmit by time" tab (RS232 Iridium).

DATA TRANSMISSION AT STOPS AND MOTION START

AutoGRAPH controller can be set up to start data transmission via IridiumSBD network when a vehicle starts motion or stops. To enable this functionality, go to the "Start and stop" tab and set up following options (Fig.45):

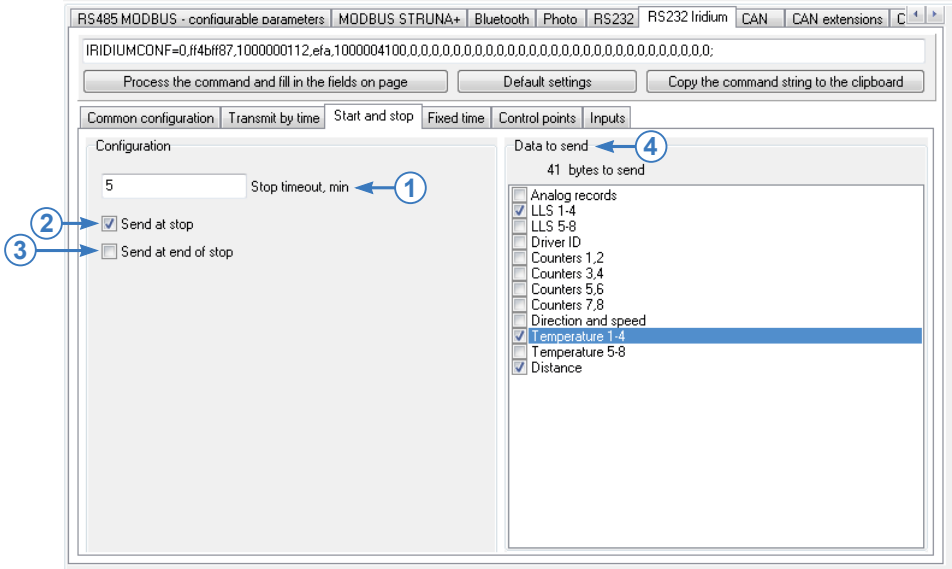


Fig.45. "Start and stop" tab (RS232 Iridium).

1. Stop timeout, min – minimum stop duration after that AutoGRAPH controller can determine the stop and start data transmission via satellite network if this function is enabled. The timeout must be specified in minutes and cannot be 0. This timeout is applied only to stop starting, the motion start is detected without delay.
2. Send at stop – the option enables data transmission via IridiumSBD network when vehicle stops. The transmission starts only after the Stop timeout elapsing.
3. Send at end of stop – the option enables data transmission via IridiumSBD network when vehicle starts moving.
4. Data to send. Select data to transmit via satellite network at motion and stops starts of the monitored vehicle.

Motion start and vehicle stops are detected according to settings of AutoGRAPH controller, specified on the "Motion detection" tab.

DATA TRANSMISSION AT FIXED TIME

AutoGRAPH controller can be set up to transfer data to a remote server via satellite network at fixed time. To set data transmission time, go to the "Fixed time" tab (Fig.46). Up to 4 different time can be selected.
On the "Fixed time" tab enable the "Send at fixed time" option (Fig.46, i.1) then specify a time of data transmission (Fig.46, i.2). The time must be set in 24-hour format. Set up other times of data transmission.

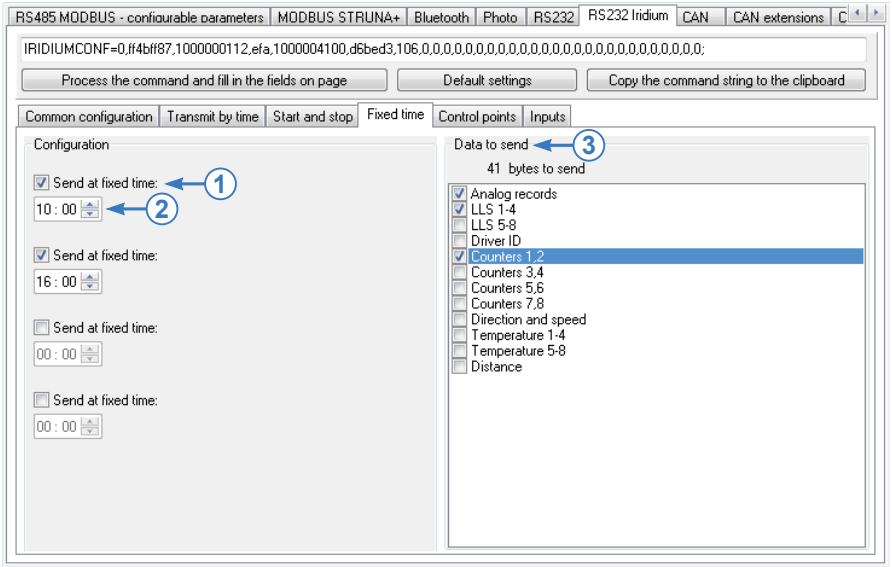


Fig.46. "Fixed time" tab (RS232 Iridium).

Then select data to transfer at specified time in the "Data to send" list (Fig.46, i.3).

DATA TRANSMISSION AT CONTROL POINTS

AutoGRAPH controller can be set up to send data via satellite network when vehicle enters to a control point or exits from it.

This functionality is provided for bot static and dynamic control points of AutoGRAPH controller. Totally up to 3 control points of each type can be set in AutoGRAPH device.

To set up data transmission at control points, go to the "Control points" tab (Fig.47) and configure following parameters:

1. Control point 1 (2,3). To send data to server via satellite network at a static control point, select a condition of the transmission starting – **Enter** to the point and/or **Exit** from the point. The vehicle arriving to the point and departure from it are detected according to the settings of that control point in AutoGRAPH controller. All used static control points must be correctly configured on the "Control points" tab of the AG.GSMConf program.

2. Dynamic point 1 (2,3). To send data to server via satellite network at a dynamic control point, select a condition of the transmission starting – **Enter** to the point and/or **Exit** from the point. The vehicle arriving to the point and departure from it are detected according to the settings of that dynamic control point in AutoGRAPH controller. All used dynamic control points must be correctly configured on the "Dynamic control points" tab of the AG.GSMConf program.

3. Data to send. Select data to transmit via satellite network at control points.

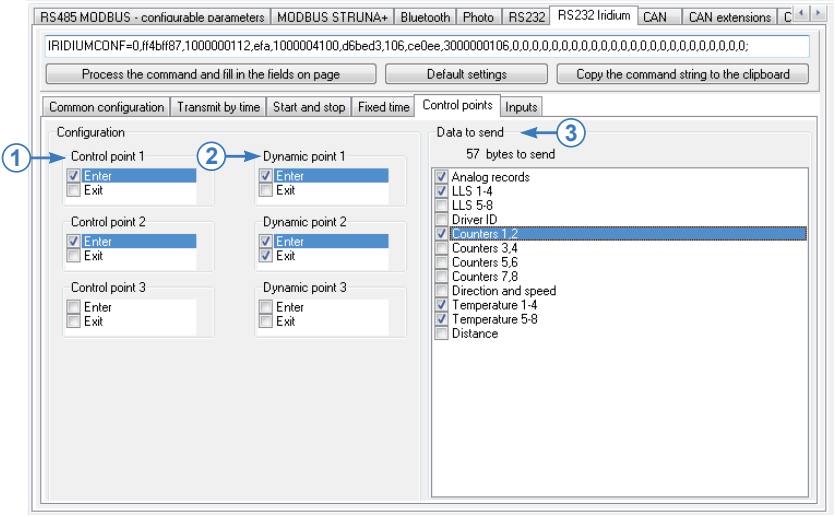


Fig.47. "Control points" tab (RS232 Iridium).

DATA TRANSMISSION BY INPUTS TRIGGERING

Data transmission via satellite network can be initiated by triggering the digital inputs of AutoGRAPH controller. Triggering states of the inputs are set up on the "Inputs 1-4" and "Inputs 5-8" tabs of the AG.GSMConf program.

To enable data transmission by inputs triggering in AutoGRAPH controller, go to the "Inputs" tab and set up following parameters (Fig.48):

1. Send if inputs is turned on. Select digital inputs which switching to active states will initiate data transmission to server via IridiumSBD network.

2. Data to send. Select data to transmit via satellite network in case of digital inputs triggering in AutoGRAPH controller.

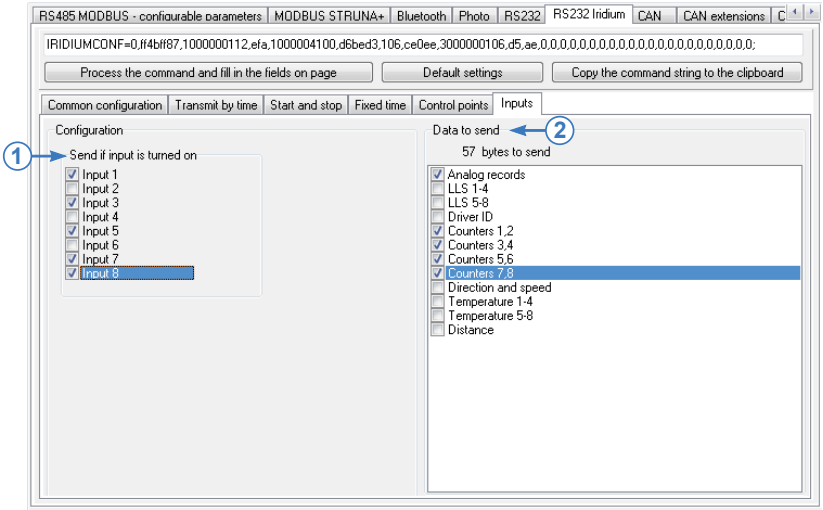


Fig.48. "Inputs" tab (RS232 Iridium).

REMOTE CONFIGURATION COMMAND

AutoGRAPH on-board controller can be configured remotely using SMS commands or commands via data server. Settings available on the "RS232 IRIDIUM" tab also can be set remotely using the command IRIDIUMCONF=.

In order to simplify the command preparation, the command IRIDIUMCONF with selected settings is generated automatically in the AG.GSMConf program when you change settings of the "RS232 IRIDIUM" tab (Fig.49, i. 1). This command can be sent to the AutoGRAPH controller in SMS or via data server. To copy the command press the "Copy the command string to the clipboard" button.

Also you can fill in fields on the tab with the configuration specified in the command string. Due to this you can check manually prepared command before sending it to the controller or configure several controllers similarly in the basis of available command with required settings, e.g. previously requested from other controller. To unpack the command, enter it in the command string (Fig.49, i. 1) and press the "Process the command and fill in the fields below" button.

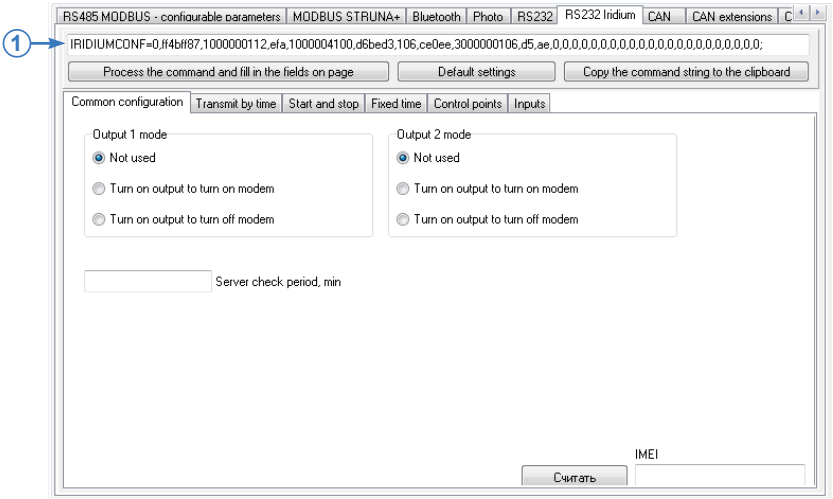


Fig.49. The command for configuration of Iridium mode settings.

RS-232 bus

This section contains instruction on how to set up RS-232 bus of AutoGRAPH controller. Net addresses of all connected devices must be set up in AutoGRAPH controller to allow data recording from those devices.

MODE OF RS-232 BUS

On the "RS-232" tab you can select mode of RS-232 operation.

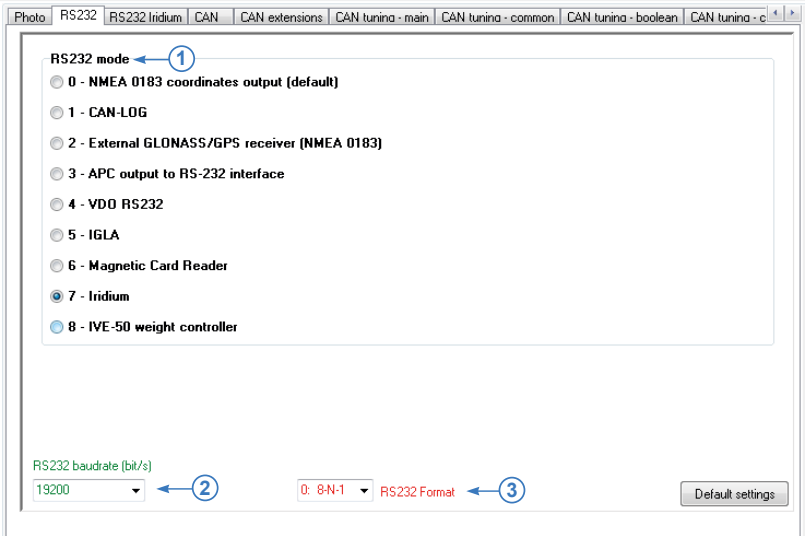


Fig.50. RS-232 tab.

1. RS-232 mode:

- **0 – NMEA 0183 coordinates output (default)** – select the option to configure the device to send coordinates in NMEA 0183 protocol to external device via RS-232. This mode is set by default. To operate with AutoGRAPH-Navigator device via RS-232 interface, this mode of RS-232 must be selected.
- **1 – CAN-LOG** – select the option to configure the device to work with CAN-LOG device using RS-232 interface.
- **2 – External GLONASS/GPS receiver (NMEA 0183)** – select the option to configure the device to use the external GLONASS/GPS receiver which supports NMEA 0183 protocol.
- **3 – APC output to RS-232 interface** – select the option to configure the device to send passenger traffic data to an external device via RS-232 bus.
- **4 – VDO RS232** – select the option to configure the device to receive .ddd files from the VDO tachograph and send them to data server.
- **5 – IGLA** – select the option to configure the device to receive data from SI IGLA Measurement System via RS-232.

- **6 – Magnetic Card Reader** – select the option to configure the device to receive data from the Magnetic card reader, equipped with RS-232 interface.
- **7 – Iridium** – select the option to configure the device to operate with the Q-Puck satellite modem providing data transmission via IridiumSBD network.
- **8 – IVE-50 weight controller** – select the option to configure the device to operate with IVE-50 weight measuring system. Also set up an address of the connected IVE-50 system and a period of data recording for this mode of RS-232 bus (Fig.51). The address must be specified in HEX format and the period – in sec.

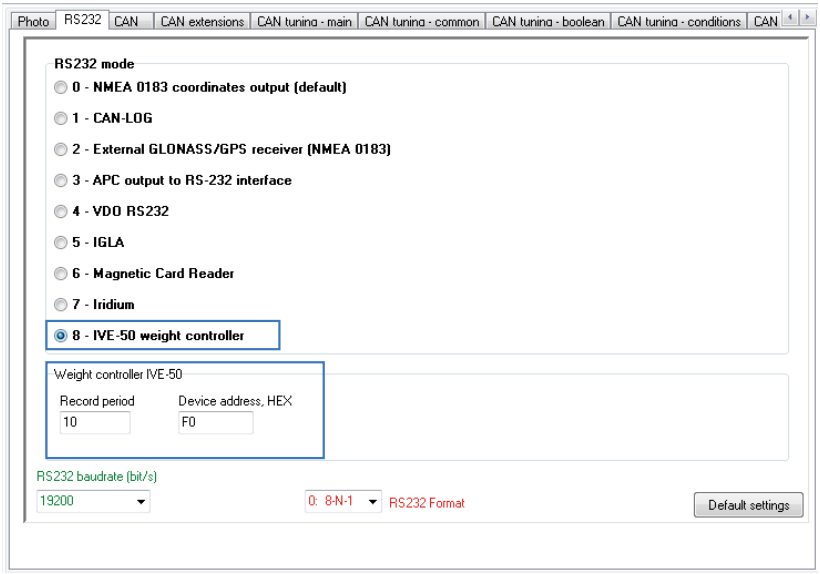


Fig.51. IVE-50 system setup.

- **2. RS-232 baudrate** – specify RS-232 interface baudrate in bit/s. Default rate is 115,200 bit/s.

3. RS232 Format – select data format. Format specified in AutoGRAPH-GSM controller should comply with the format specified in the device being connected to the controller using RS-232 bus:

- 8-N-1 – 8 data bits, no parity check, 1 stop bit.
- 8-N-2 – 8 data bits, no parity check, 2 stop bits.
- 8-O-1 – 8 data bits, odd parity, 1 stop bit.
- 8-E-1 – 8 data bits, even parity, 1 stop bit.

Default settings button – press this button to restore default settings.

RS232 IGLA

AutoGRAPH on-board controller supports interaction with SI IGLA Measurement System via RS-232 bus. The IGLA is a system intended to measure and control level, temperature and density of light-oil products, as well as alarm about bottom water.

In order to set up AutoGRAPH controller to receive data from the IGLA measuring system, go to the "RS232 IGLA" tab (Fig.52) and follow the steps given below.

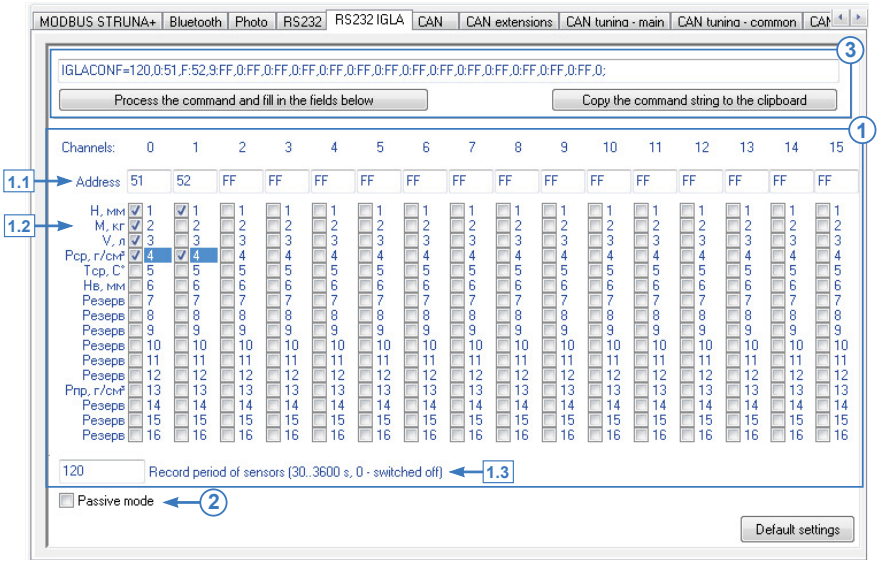


Fig.52. RS232 IGLA tab.

1. SI IGLA Measurement System settings.

The IGLA system provides 16-channel measuring of a wide range of parameters.

On the "RS232 IGLA" tab channel numbers from 0 to 15 are specified in the "Channels" field. In order to set up AutoGRAPH controller to receive data from a channel, you need to set an address of the channel and select data to receive:

1.1. Address – an address of measuring channel, in HEX format. For more detailed information on how to set an address of measuring channel in the IGLA, see the User Guide on the measuring system.

1.2. Data received from measuring channel (check the box opposite to the required data in order for the AutoGRAPH controller to record this data):

1 – H, мм – fuel level value.
2 – M, кг – product weight.
3 – V, л – product volume.
4 – Pcp, г/см^3 – product average density.
5 – Tcp, C° – product average temperature.
6 – Hв, мм – bottom water level.
13 – Рпр, г/см^3 – product reduced density.
7-12, 14-16 – Reserved.

1.3. Record period of sensors – an interval of data recording from the IGLA system. Minimal value is 5 seconds, maximum value is 3600 seconds, 0 period – disables data recording from the IGLA.

2. Passive mode – a mode intended only to receive data from transferred between control units of the IGLA systems. In this mode AutoGRAPH device doesn't send any data to the measuring system.

3. Remote configuration command.
AutoGRAPH on-board controller can be configured remotely using SMS commands or commands via data server. Settings available on the "RS232 IGLA" tab also can be set remotely using the command IGLACONF=.
In order to simplify the command preparation, specify required settings in the AG.GSMConf program (on the "RS232 IGLA" tab) then use the command which is entered automatically on the field 3 (Fig.52) while you change settings on the tab. This command can be sent to the AutoGRAPH controller in SMS or via data server. To copy the command press the "Copy the command string to the clipboard" button.

Also you can fill in fields on the tab with the configuration specified in the command string. Due to this you can check manually prepared command before sending it to the controller or to configure several controllers similarly in the basis of available command with settings, e.g. previously requested from other controller. To unpack the command, enter it in the command string (Fig.52, i. 3) and press the "Process the command and fill in the fields below" button.

The **"Default settings" button** clears all specified settings on the tab.

CAN bus settings

CAN

Go to "CAN" tab to configure operation of the device when using CAN bus. Use this tab CAN bus of a vehicle uses SAE J1939 format. If the vehicle uses other format, go to the "CAN tuning" tab to set required protocol parameters.

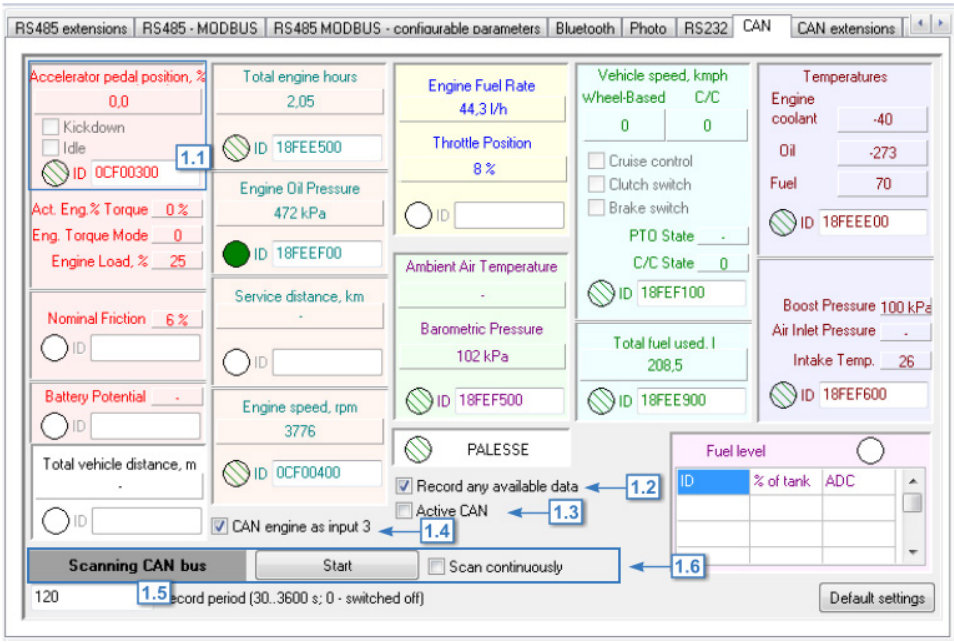


Fig.53. CAN.

Enable the "Use simple CAN settings" option on the "CAN" tab if it is disabled. Then specify following settings:

1.1. ID – use this field to specify an identifier of CAN record. The device will record data from CAN bus, if its identifier specified in the device settings.

1.2. Record any available data – check this box to record all CAN data with identifiers known to the device.

1.3. Active CAN – in this mode the device constantly requests data from CAN Bus. When this mode is enabled the device not only receives data from CAN bus but also sends messages to the bus. It is recommended to enable this mode only when it is necessary.

1.4. CAN engine as input 3 – select the option to use the third digital input of the device to filter engine hours. If there are engine hour readings from CAN bus, the third input will be triggered. In this case other functions of the third input are not available.

1.5. Record period (s) – specify a record period of readings from CAN bus to the device's memory. Possible values range from 30 to 3600, 0 value switches the record off.

CAN bus scanning.
To test operation of the device CAN bus, connect the device to a vehicle CAN bus and run the scanning pressing the Start button on the CAN tab (Fig.53, i.1.6).
When the scanning is on, the "Scanning CAN bus" message is displayed. By default the scanning continues 20 seconds and stops automatically after that. To scan CAN bus continuously, check the "Scan continuously" option.
Data received from vehicle CAN bus during the scanning will be displayed on the CAN tab in corresponding fields.

"Default settings" button – restores default settings on the CAN tab.

CAN EXTENSIONS

On the CAN Extensions tab you can configure additional parameters of CAN bus of the device.

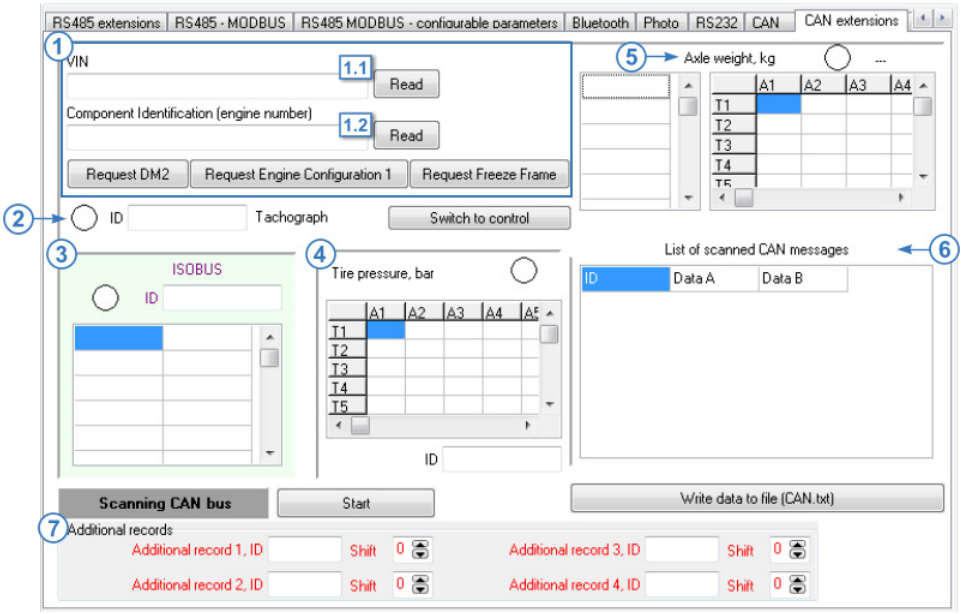


Fig.54. CAN Extensions.

Connect the device to CAN Bus of vehicle. Also connect the device to a PC. On the "CAN Extensions" tab, enable the "Use simple CAN settings" option, if it is disabled. After that, the menu for customizing extension CAN records will be displayed. Specify IDs of available CAN records and start the scanning. All data received by the device will be displayed on this tab.

1. Request data from CAN Bus. Options on this sections intended to receive vehicle engine parameters from CAN bus.

1.1. VIN – VIN code of a vehicle will be displayed in this field when requested. Press the "Read" button to request VIN.
1.2. Component Identification – engine number of a vehicle will be displayed in this field when requested. Press the "Read" button to request an engine number from CAN Bus.

- Use the "Request DM2 " button to receive passive faults from CAN bus.
- Use the "Request Engine Configuration 1" button to receive BCX from vehicle CAN bus.
- Use the "Request Freeze Frame" button to receive Freeze Frame from CAN bus.
- The requested data will be recorded in the device.

2. Tachograph – specify ID of a tachograph's records to enable recording of data, received from tachograph. The "Switch to control" button allows to go to the "Tachograph" tab to check the device operation with tachograph.

Run scanning of vehicle CAN bus pressing the Start button. Data received from CAN bus will be displayed on the CAN extensions tab. Received data also can be saved in text file CAN.txt. To do it, press the "Write data to file (CAN.txt)" button.

3. ISOBUS data.
- Specify ID of ISOBUS data in AutoGRAPH device if it is necessary to receive ISOBUS parameters from CAN bus.
- When scanning CAN bus, ISOBUS records will be displayed on the table in the ISOBUS section.

4. Tire pressure, bar.
Run the scanning of CAN bus to receive tire pressure data. All acquired data will be displayed in the form of table where A1..A15 are axles of a vehicle, T1..T15 are wheels attached to these axles.

5. Axle weight, kg.
- To read axles weight from CAN bus, run scanning of CAN bus. Received data will be displayed in the form of the table, where 1..A15 are axles of a vehicle, T1..T15 are wheels attached to these axles.
- The list on the left contains CAN identificators of axle weight records.

6. List of scanned CAN messages – all messages received from CAN bus will be displayed in this table: Data A, Data B – CAN record, ID an identifier of the record.

7. Additional records.
To receive additional data from CAN bus, specify its identifier in the "Additional records" section. Up to 4 identifiers can be specified. If necessary, set up a record shift in bits.

CAN TUNING

Tuning of CAN protocol is available for devices with firmware ver. 10.30 and higher and allows to tune any required protocol in the device if it is differ from SAE J1939 . To tune the protocol go to the "CAN tuning – main" tab (or "CAN tuning – common", "CAN tuning – boolean", "CAN tuning – common" and "CAN tuning – other") and enable the "Use tune CAN settings" option.

Main, common and boolean data received from CAN bus in the configured protocol is recorded in the AutoGRAPh controller as ordinary CAN record, i.e. as data received in SAE J1939 protocol which IDs have been specified on the "CAN" and "CAN extensions" tabs. Other parameters which IDs are specified on the "CAN tuning – other" tab are recorded as PALESSE data. This must be taken into account when configuring data handling options in the AutoGRAPH 5 PRO dispatch software.

CAN TUNING – MAIN

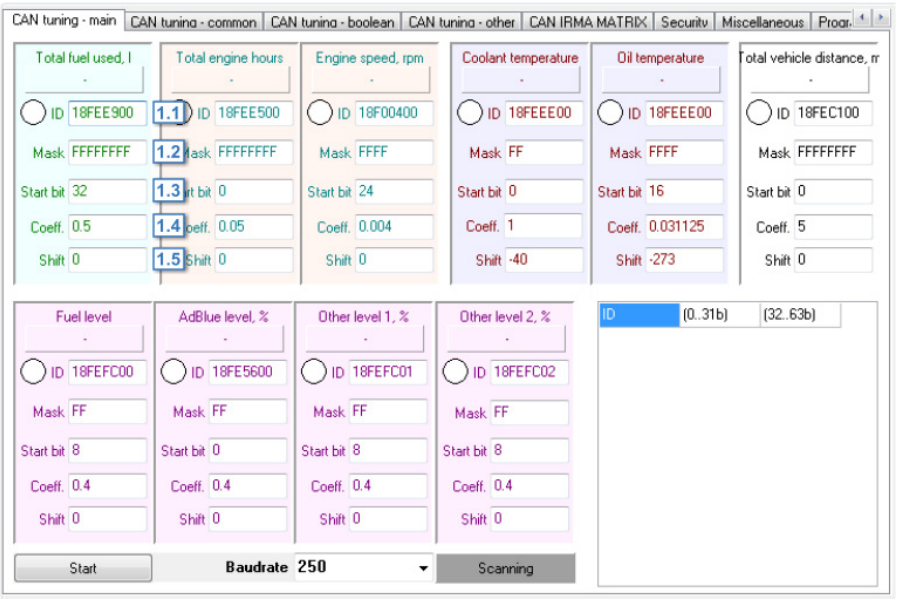


Fig.55. CAN tune – main.

In order for the AutoGRAPH controller to receive main records from CAN bus in a protocol differ from SAE J1939 you need to specify following options for every required record:

1.1. ID – an identifier of record from CAN bus. Specify identifier in HEX format, use only uppercase letters.

1.2. Mask – a mask that determines number of bits to be read for the required parameter. Specify mask in HEX format, use only uppercase letters.

1.3. Start bit – a start bit which is the beginning of the set of data. Data (Data A and Data B) is represented as a single 64 bit number. Start bit is represented as a decimal number.

1.4. Coeff. – dimension of a parameter. It is determined by the used protocol of CAN.
1.5. Shift – initial value of a parameter which corresponds to "0" value in CAN bus.

Set up CAN baudrate and run scanning of CAN bus pressing the Start button. All received data will be displayed on the tab.

CAN TUNING – COMMON

Settings on the "CAN tune – common" tab are similar to settings on the "CAN tune – main" tab.

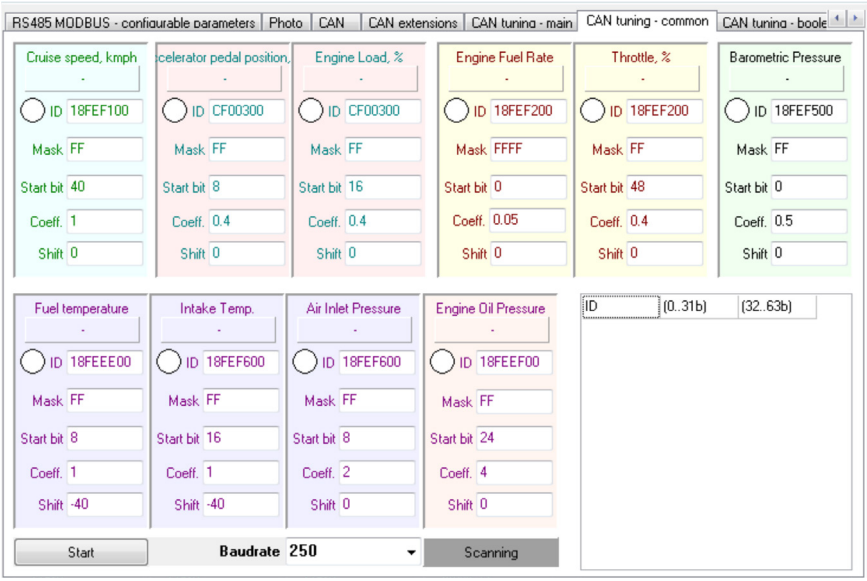


Fig.56. CAN tune - common.

Set up CAN baudrate and run scanning of CAN bus pressing the Start button. All received data will be displayed on the tab.

CAN TUNING – BOOLEAN

On the "CAN tune – boolean" tab users can customize digital records of CAN: cruise control state, brake switch, clutch switch, parking brake, kickdown state, idle and 10 additional records. To set up records, specify following parameters: IDs (ID, item 1.1), mask (Mask, item 1.2), and start bit (Start bit, item 1.3) for the records.
Set up CAN baudrate and run scanning of CAN bus pressing the Start button. All received data will be displayed on the tab.

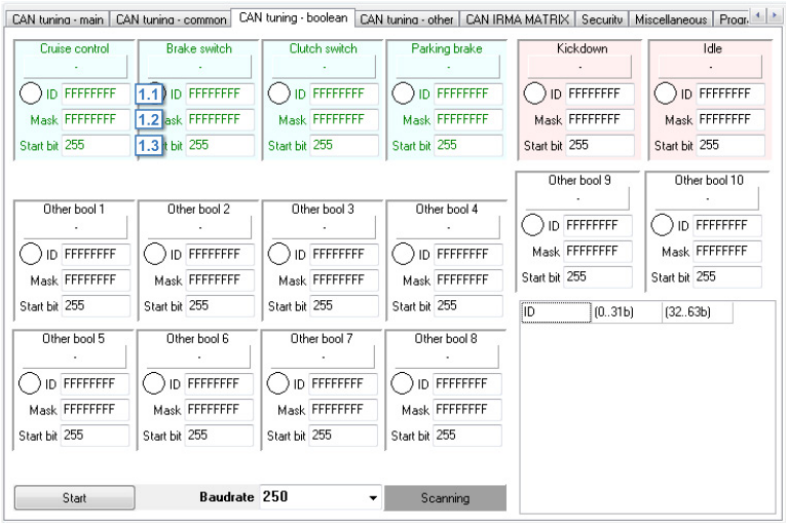


Fig.57. CAN tune - boolean.

CAN TUNING – OTHER

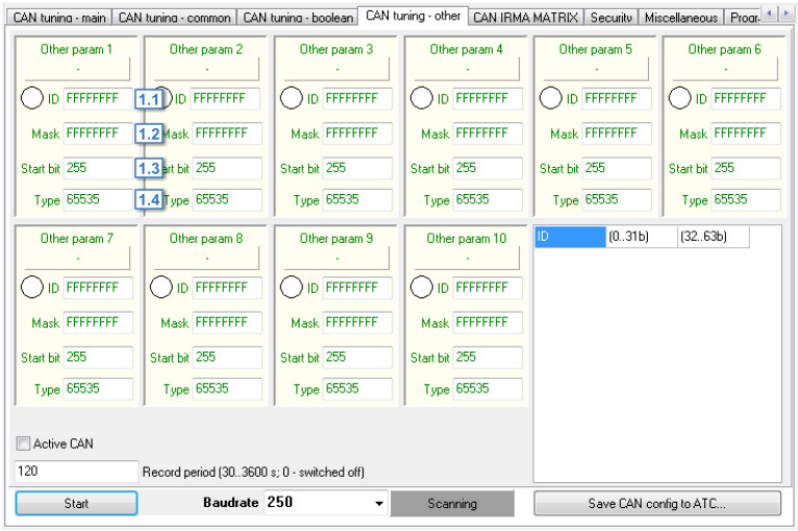


Fig.58. CAN tune - other.

On the "CAN tune – other" tab, user can customize additional records of CAN.
Configure following parameters for each record:

1.1. ID – an identifier of record from CAN bus. Specify the ID in HEX format, use only uppercase letters.

1.2. Mask – a mask that determines number of bits to be read for the required parameter. Specify mask in HEX format, use only uppercase letters.

1.3. Start bit – a start bit which is the beginning of the set of data. Data (Data A and Data B) is represented as a single 64 bit number. Start bit is represented as a decimal number.
1.4. Type – a type assigned to each record to identify this record. Type of CAN parameter recording may range from 1 to 65524. "0" and "65525" disable recording of this parameter.
Active CAN – in this mode the device constantly requests data from CAN Bus.
Record period – specify a record period of readings from CAN bus to the device's memory. Possible values range from 30 to 3600, 0 value switches the record off.

Set up CAN baudrate and run scanning of CAN bus pressing the Start button. All received data will be displayed on the tab.

To save CAN settings in external ATC file, press the "Save CAN config to ATC..." button. The ATC file with CAN settings can be used to set similar CAN settings to several devices.

CAN – CONDITIONS (VEHICLE STATUSES AND FLAGS)

In order for AutoGRAPH controller to receive vehicle statuses from CAN bus the protocol of which is different from SAE J1939, you need to set up recording of the required data in that protocol on the "CAN tuning – conditions" tab.
CAN records on this tab are denoted with marks which are commonly used in automotive industry. To enable recording of a parameter in the controller's internal memory, specify CAN identifier of the record containing that parameter and set a bit number associated with the parameter.
Given in Fig.59 are settings to record vehicle ignition state which is read from 12th bit of CAN record with «18FEEF00» identifier.

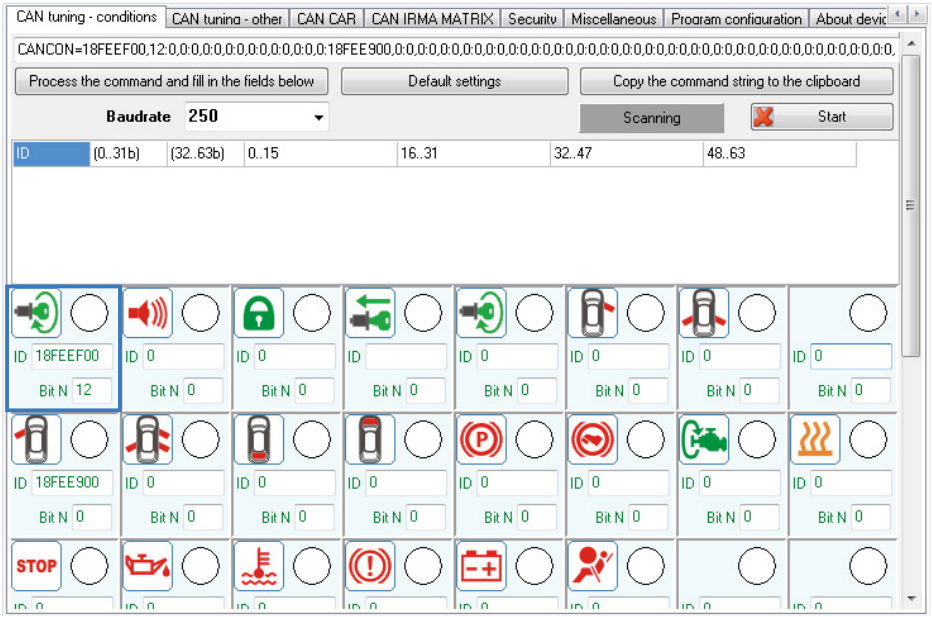


Fig.59. "CAN tuning – conditions" tab.

Description of statuses and flags available on the "CAN tuning – conditions" tab is given in the Appendix 1 to this document. Empty cells on the tab are reserved.

Test CAN bus scanning

After the setup of all parameters, it is recommended to check the setting by test scanning of CAN bus. **To do the test:**

- specify required settings on the "CAN tuning – conditions" tab;
- press the "Start" button to run the scanning;
- all data received from vehicle CAN bus, which AutoGRAPH controller is connected to, is displayed on the AG.GSMConf program during the test (Fig.60, i.1). Also the program indicates vehicle parameters according to received data (Fig.60, i.2).

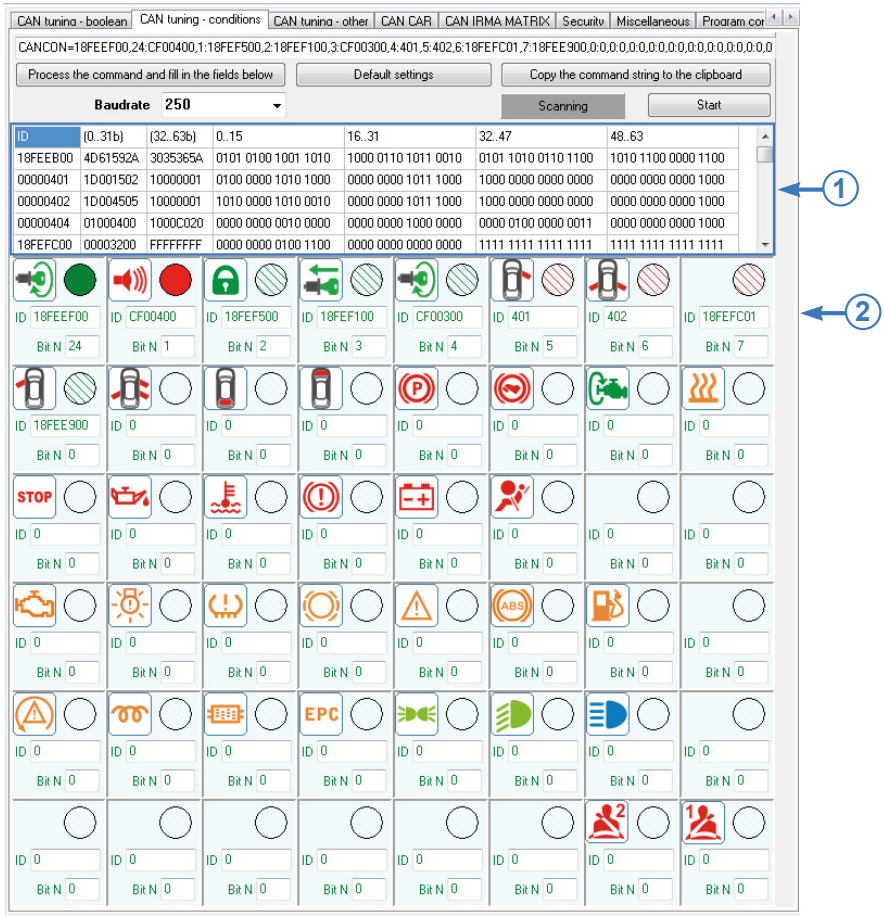


Fig.60. CAN bus scanning.

Depending on parameter reading status, its indicator changes the fill colour.

Parameter is successfully read at instant period.

Parameter is not read.

Parameter was read at previous scanning period and is not available currently.

Parameter wasn't read at previous scanning period and is not available currently.

Remote configuration command

AutoGRAPH on-board controller supports remote configuration by SMS and server commands. Similarly recording of vehicle statuses and flags from CAN bus can be set up remotely using the "CANCON" command.

When setting parameters on the "CAN tuning – conditions" tab in the AG.GSMConf program, the "CANCON" command is generated automatically with selected settings (Fig.61).

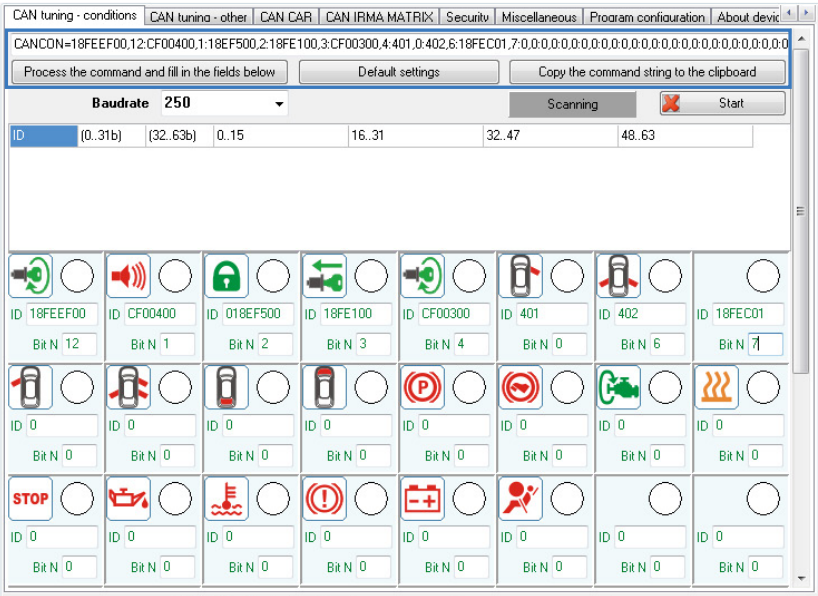


Fig.61. CANCON remote configuration command.

Then this command can be copied from the AG.GSMConf program and sent to AutoGRAPH device. To copy the command into clipboard, press the "Copy the command string to the clipboard" button. To empty the command as well as fields on the tab, press the "Default settings" button.
Also you can fill in fields on the "CAN tuning – conditions" tab by settings from the "CANCON" command, e.g. to use settings which have been requested from AutoGRAPH controller by the server command. To read the command in the AG.GSMConf program, enter this command in the field at the top of the tab (Fig.61), then press the "Process the command and fill in the fields below" button.

DATA FROM LIGHT VEHICLE CAN BUS

AutoGRAPH controllers with firmware of version AGEX-12.31 and higher (h/w version 3.0 and higher) support direct data reading from CAN bus of light vehicles. For older controllers, special CAN-LOG adapter is required.

When data recording from light vehicles CAN bus is enabled in AutoGRAPH controller, data reading in other CAN protocols as well as operation with IRMA Matrix APC system via CAN bus is not available.

To set up CAN bus of AutoGRAPH controller in order to read data from CAN bus of light vehicles, special configuration file of .atc format requested from the manufacturer (TechnoKom Ltd.) is used. The configuration file contains identifiers of CAN records for certain light vehicle model.

To set up AutoGRAPH controller to read data from CAN bus of a light vehicle:

- Send the request by e-mail to technical support of TechnoKom Ltd. (support@tk-nav.com) with the "CAN CAR test" subject and containing a model and a production year of your vehicle. The connection description and CAN bus configuration file will be sent in reply.
- Connect AutoGRAPH controller to a PC with AG.GSMConf program.
- Run AG.GSMConf program of version 3.3.8-r0 and higher, then go to the "CAN CAR" tab.
- Enable the "Use CAN CAR configuration" option on the "CAN CAR" tab (Fig.62, i.1.1).
- Copy the ATC-file received from the manufacturer in the \CANCAR folder of AG.GSMConf program.
- Press the "Update vehicle list (folder CANCAR)" button on the "CAN CAR" tab (Fig.62, i.1.2). The list of ATC-files available in the \CANCAR folder will be displayed on the tab (Fig.62, i.1.3).
- Select required file and press the "Read configuration from file" button (Fig.62, i.1.4). Parameters of CAN protocol from the selected file will be displayed in the program (Fig.62, i.1.5). Also you can drag and drop any ATC file in the program window.
- The file content is displayed as the list of remote configuration commands. Currently open file is displayed on the upper right of the list of available files (Fig.62, i.1.6).
- Specify a period of data recording from CAN bus in internal memory of AutoGRAPH controller in the "Record period" field (Fig.62, i.1.7). The period must be set in seconds. Minimum period is 30 seconds, maximum period is 3600 seconds. Zero period disables data recording from CAN bus.
- Save settings in the controller.

Fig.62. "CAN CAR" tab.

The file of .atc format containing CAN bus settings of a light vehicle can be used for remote configuration of AutoGRAPH controller via data server. Copy this file in the \Conf folder of AutoGRAPH controller on server which is configured.

CAN IRMA MATRIX

This tab is used to configure parameters of IRMA MATRIX automatic passenger counting (APC) system connected to the device via CAN interface.

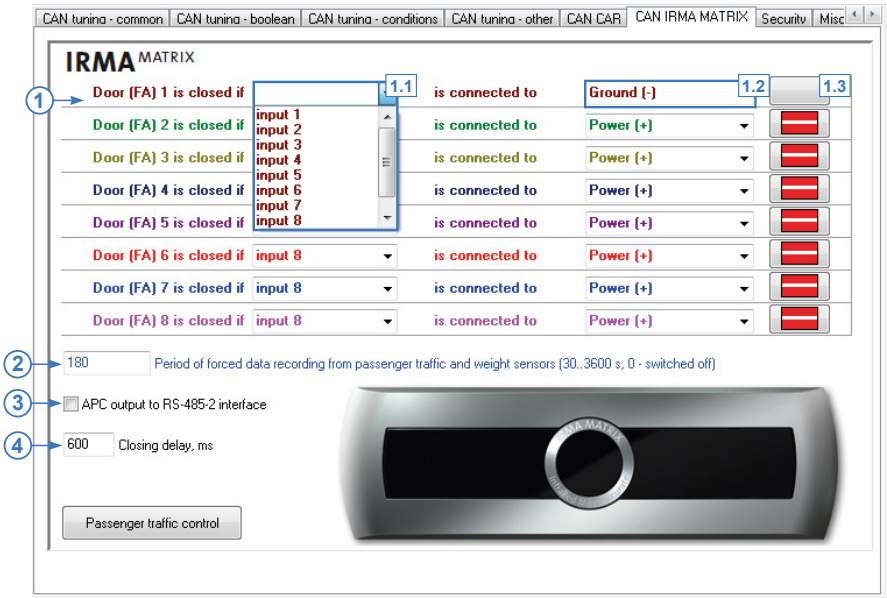


Fig.63. "CAN IRMA MATRIX" tab.

Go to the "CAN IRMA MATRIX" tab and enable CAN IRMA MATRIX option, if it is disabled. After that you will see menu for customizing of sensor operation (Fig.63).
Connected to IRMA MATRIX APC system, AutoGRAPH controller detect vehicle stop and then starts counting of boarding and alighting passengers.

1. To set up AutoGRAPH controller to detect door opening and closing:

- select a digital input of AutoGRAPH controller which a limit sensor of the selected door is connected to (Fig.63, i.1.1) or select the "vehicle is moving" option providing that the vehicle door is considered closed always when the vehicle is moving. The vehicle motion start is determined by vehicle speed and acceleration calculated at the basis of navigation data;
- if door closing is detected by digital input state of AutoGRAPH controller, select a state of the input associated with the closed door (Fig.63, i.1.2). When door is closed, a number of passengers passing through that door is considered zero;
- also it is recommended to set up digital inputs of AutoGRAPH controller used for detection of vehicle door opening and closing. To go to the tab intended to set up the device digital inputs, use the shortcut button (Fig.63, i.1.3);

Then set up following parameters of IRMA MATRIX operation:

- **Period of forced data recording from passenger traffic and weight sensors (Fig.63, i.2).**
- Any change of the APC system state is captured by AutoGRAPH device and recorded to the memory. If there is no data to record, the device scans the sensor with the specified period and makes a forced record. **Period of forced data recording** must be specified in seconds, minimum value is 30 seconds, maximum value is 3600 seconds, zero period switches the record off.
- **"APC output to RS-485-2 interface" option (Fig.63, i.3)**. This option provides transmission of data collected with passenger counting sensors to external device, connected to the AutoGRAPH device via RS-485-2 bus.
- **Closing delay (Fig.63, i.4).** This a delay of detecting the vehicle door closing by AutoGRAPH controller intended to filter short triggering of door limit switches. The closing delay must be specified in milliseconds.

"Passenger traffic control" button provides quick access to the "Passenger traffic control" tab to troubleshoot passenger counting sensors connected to the AutoGRAPH device.

Security

Go to the "Security" tab to configure protection of the device against unauthorized alteration of its settings (for firmware 4.2 and higher, starting from serial number 26500).

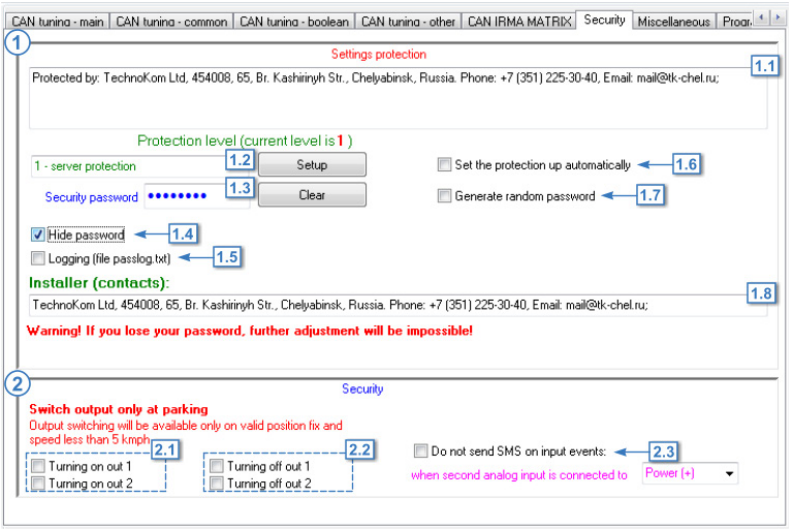


Fig.64. "Security" tab.

1. Settings protection.

1.1. When the device is connected to a PC this field displays details on the company that provides protection of settings.

1.2. Protection level – the device supports following levels of protection:

- **0 – no protection** – data can be configured and saved without a password.
- **1 – server protection** – enable protection of all server settings. Changing of the settings will be available neither by the configuration software nor using the commands of remote configuration.
- **2 – full protection** – all of settings of the device will be protected. Changing of them neither by the configuration software nor by the commands of remote configuration will be available.
- **3 – USB firmware protection** – protection of the device firmware update via USB.

1.3. Security password – this field is intended for a password to protect settings. Password should contain EXACTLY 8 CHARACTERS. Password may contain numbers from 0 to 9, and letters of Latin alphabet. Letters may be upper- or lowercase. The user can choose a word and add necessary number of characters to its end. For example "avto0000".

1.4. "Setup" button – press the button to set up protection with the specified password to the settings.

1.5. "Clear" button – press the button to cancel the protection.

1.6. "Hide" password – hide password under the asterisk when entering. Be careful typing a password, when it is hidden. If you make a mistake, further adjustment will be impossible!

1.7. Logging (file passlog.txt) – when you check this box a file (passlog.txt) is automatically generated and saved in AG.GSMConf directory. This file consists of following parameters:

- Device's serial number.
- State of protection, its level and password.
- Date and time of all operations concerning protection.

1.8. Set the protection up automatically – the option allows to set up settings protection automatically when saving the configuration. If the option is disabled the password typed in the "Security password" field will apply. If the password is not specified, the program will show error message.
1.9. Generate random password – when you check this box, the software generates a random password containing 8 characters.
1.10. Installer (contacts) – use this field to specify details of the company which provided the protection. This option is supported only by devices with firmware ver. 10.20 and higher.

How to set the protection:
1. Launch AG.GSMConf software.
2. Connect the device to a PC using USB cable.
3. Configure parameters of the device.
4. Go to the "Security" tab of complex view.
5. Type the security password in "Security password" field (password has to contain 8 characters which may be Latin letters and numbers).
6. Select necessary protection level in field 1.2.
7. Press "Setup" button (item 1.4). Protection will be set to the device.
8. Connect the device again and ensure that the protection is enabled. You should see the selected protection level in "Protection level" field.

How to clear the protection:
1. Launch AG.GSMConf software.
2. Connect the device to a PC using USB cable.
3. Go to "Security" tab of the complex view.
4. Type a security password that has been set to the device previously.
5. Press "Clear" button (item 1.5). Protection will be disabled.
6. Connect the device again. Make sure that the protection is disabled. You should see "0" level in "Protection level" field.

If the "Logging (file passlog.txt)" option is enabled, the program generates [device_No.]pass.txt file in the \PASS\[device_No.] folder where the device password is stored. When connecting the device to PC, the program check the log-file for the device password and apply it, if it is found.

2. Security. For the avoidance of incidents the output switching is available only on valid position fix and speed less than 5 km/h!
2.1. Turning on out 1(2) – to turn on output 1(2) ONLY at parking.
2.2. Turning off out 1(2) – to turn off output 1(2) ONLY at parking.
If the device's firmware supports motion detection (the "Motion detection" tab is available), the stop is detected according the device's settings. The motion detection is supported by the devices with firmware ver. 9.67 and higher.

2.3. Do not send SMS on input events:
- **when second analog input is connected to "Power (+)"/"Ground (-)"** – if the 2nd analog input is in the specified state, SMS message on input triggering will not be sent.

Miscellaneous

Go to the "Miscellaneous" tab to configure additional options of the device.

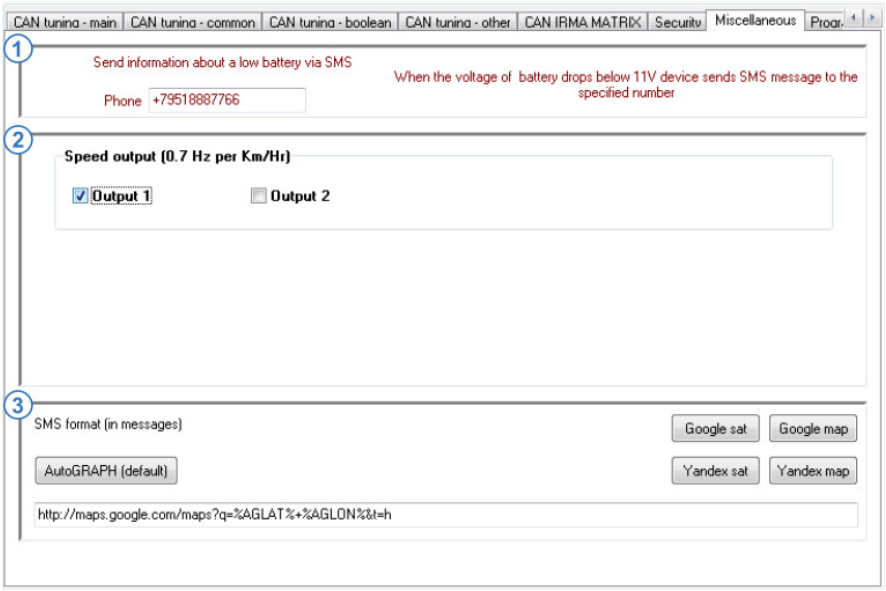


Fig.65. "Miscellaneous" tab.

1. Notification of backup battery discharging. When voltage of backup battery drops below 11 V, the device can be set up to send SMS message to the telephone number, specified in "Phone" field. Enter number without spaces and use prefixes for national calling (8 or +7).

2. Speed output (0.7 Hz per km/Hr) option enables to use Output 1 or Output 2 of the AutoGRAPH device as a frequency output to connect electronic speedometer with frequency output.

3. SMS format in messages – select one of available options. Coordinates will appear in SMS messages as a link to the selected web mapping service. The setting will apply to all SMS messages being sent by the device. Following formats are available:

- **AutoGRAPH (default)** – in this format coordinates are sent in the form of latitude and longitude. This format is used by default. Press this button to use this format in SMS messages.
- Google sat ;
- Google map;
- Yandex sat;
- Yandex map.

Specify the link to the required web mapping service in the field under the AutoGRAPH button and change latitude to %AGLAT% and longitude to %AGLON% variables.

Program key

The "Key" tab is available for software of AG.GSMConf_key version.

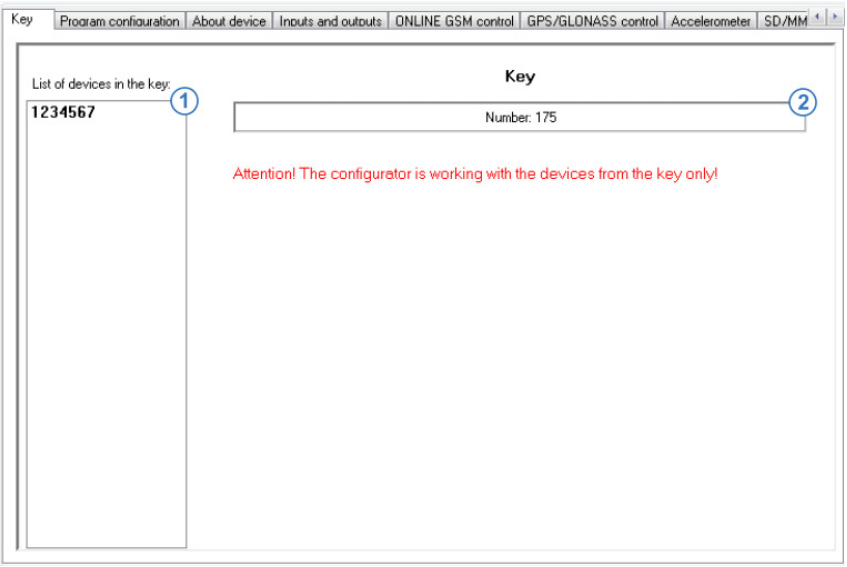


Fig.66. "Key" tab.

The AG.GSMConf_key version is intended to operate with AutoGRAPH devices specified in a key file. The key is a file of the .confkey format containing a list of devices which are available for the user to configure using the AG.GSMConf software. Key should be located in a folder with AG.GSMConf.exe. After running the AG.GSMConf_key program, it checks whether any key file is in the program folder. If the key file is found, the program loads the list of devices from that file and enables their setting. On the "Key" tab the user can view the key file content. The list of devices specified in the key file is displayed in the "List of devices in the key" filed (Fig.66, i.1). If the connected device is not specified in the key file, an error message will be displayed (Fig.67).

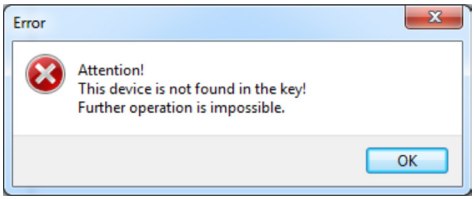


Fig.67. Error message.

The key identificator is displayed in the "key" field (Fig.66, i.2).

About device

On the "About device" tab you view the structure diagram of the connected device. Diagram varies according to hardware version of the device connected to a PC.

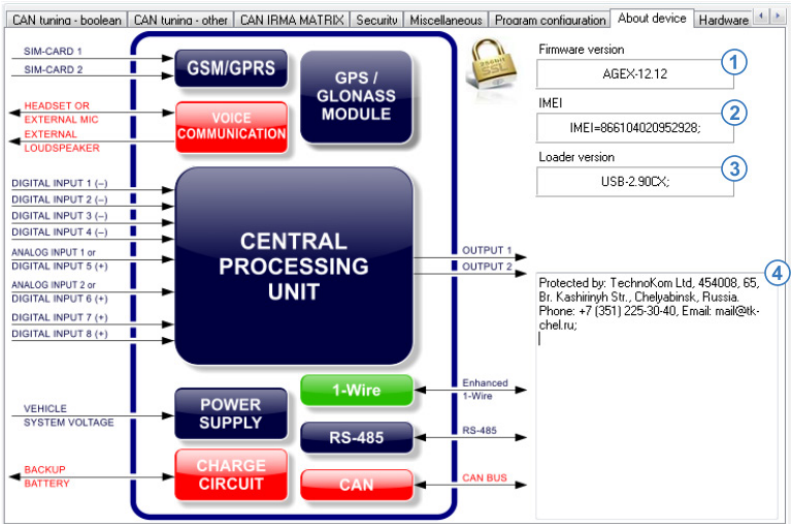


Fig.68. "About device" tab.

In addition to the structure diagram, general information on the connected device is displayed on the tab:

1. Firmware version.
2. IMEI of device's modem.
3. Loader version.
4. Protection installer – details of the company which provided the settings protection.

If the connected device supports secured connection with the server, the icon  is displayed on the "About device" tab.

Hardware lock

Go to the "Hardware lock" tab to enable functions of the AutoGRAPH-GSM/SL or AutoGRAPH-GSM/SL-2 device if it is supplied with disabled functions. To unlock device's functions, special password is required. Each function requires an individual password.

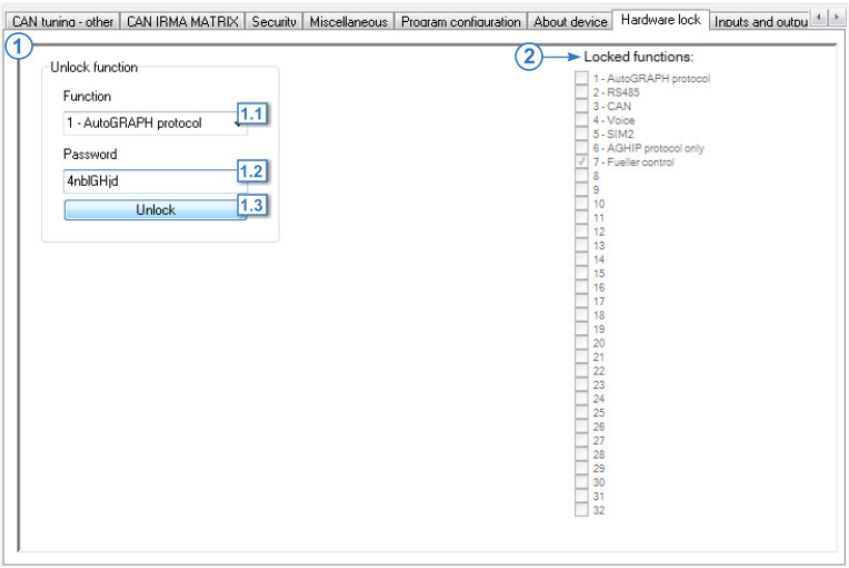


Fig.69. "Hardware lock" tab.

1. Unlock function.

1.1. Function – use this drop-down list to select a function that you want to unlock:

- **1 – AutoGRAPH protocol** – check this item to be able to transmit data to the server via AutoGRAPH protocol. This protocol is required to transfer data to the AutoGRAPH server and to further process data by the AutoGRAPH dispatch software.
- **2 – RS-485** – unlock RS-485 interface.
- **3 – CAN** – unlock CAN interface.
- **4 – Voice** – enable voice communication function.
- **5 – SIM2** – unlock support of the second SIM.

By default AutoGRAPH protocol is disabled in AutoGRAPH-GSM/SL and AutoGRAPH-GSM/SL-2. These devices can transfer data to AutoGRAPH server using AutoGRAPH-Transcoder service.

1.2. Password – eight-digit password provided on a paid basis to unlock one function of the device.
1.3. "Unlock" button – press the button to unlock chosen function of the device.

2. Locked functions – a list of disabled functions of the connected device.

Unlocking with password:

1. Connect "AutoGRAPH-GSM/SL" device to a PC using data cable.
2. Launch AG.GSMConf of version 3.2.6 or higher. Go to Hardware lock tab.
3. Use Function dropdown list to select a function you want to enable.
4. Specify the eight-digit password to unlock selected function in Password field.
5. Press Unlock button.
6. If you entered correct password, the function will be enabled and available for further use.
7. To refresh settings of AG.GSMConf software after unlocking disconnect the device from PC and connect it again.

To unlock device's functions the unlocking files can be used. Unlocking file is a special file which contains password for enabling the certain function of the device.
Unlocking file has following name: ***function-serial_number.unlk***, where ***function*** is two-digit (obligatory!) number of the device's function which may be enabled with this unlocking file; ***serial_number*** is a seven-digit (obligatory!) serial number of the device for which the unlocking password can be applied.
For example, 02-1222390.unlk file contains a key to unlock function 2 (RS-485 interface) of the device with serial number 1222390.
Unlocking file should be located in *\UNLOCK* folder in the AG.GSMConf program directory.

Unlocking with unlocking file:

1. Create the *\UNLOCK* folder in the AG.GSMConf program directory.
2. Copy the unlocking keys to the *\UNLOCK* folder.
3. Launch the AG.GSMConf of version 3.2.6 or higher.
4. Connect the device which functions must be unlocked.
5. After connection and loading the device settings, the program check the *\UNLOCK* folder for the unlocking files for the connected device. If the files are available and passwords indicated in these files comply with unlocking passwords specified in the device, the applicable functions of the device will be enabled automatically. There is no need to re-connect the device in this case.

Unlocking file and unlocking password are provided only by TechnoKom.

Using the unlocking files provide quick unlocking of the device functions, and allows to unlock easily a great number of functions. Unlocked functions are immediately become available in the AG.GSMConf for configuration.

Control

The AG.GSMConf allows to make the device diagnostics. Diagnostic functions are available in the "Control" section of the program. There are several tabs in this section providing the troubleshooting of device's different modules: GSM and Wi-Fi modules, GNSS receiver, inputs and outputs and etc.

INPUTS AND OUTPUTS

On the "Inputs and Outputs" tab the user can test operation of inputs and outputs of the device. Follow these steps to test an input or an output:

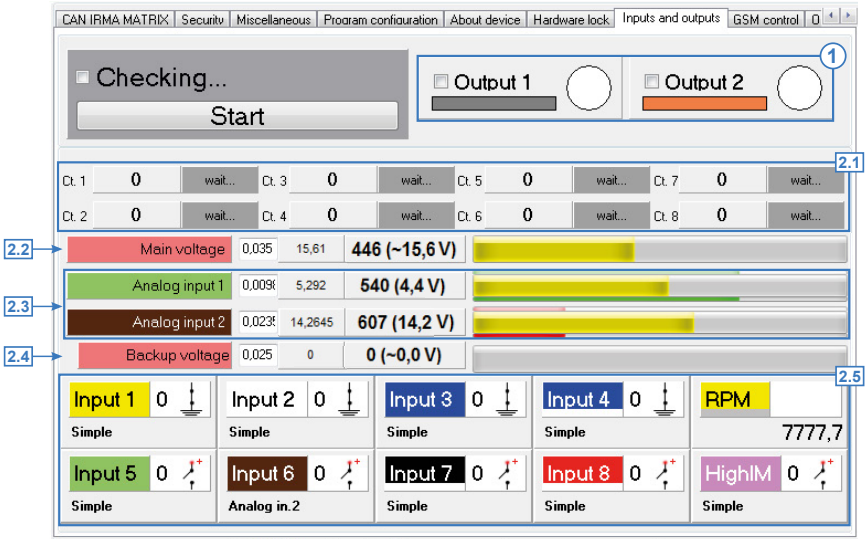


Fig.70. "Control tab. Inputs and Outputs" tab.

- Connect your device to a PC.
- Launch AG.GSMConf version 3.2.7 or higher.
- Go to "Inputs and Outputs' tab and press Start / Stop button.

When checking is in progress you will see the status on the top of screen (Checking). Uncheck the "Checking…" box or press Start / Stop again to stop the process.

The program scans states of inputs and outputs, receive readings of logical counters and displays results in the usable form.

1. State of outputs.

AutoGRAPH-GSM controllers (except the AutoGRAPH-GSM/SL and AutoGRAPH-GSM/SL-2) have two open drain digital outputs: Output 1 and Output 2 in the program.

Output state should be tested manually. Before test ensure that the external device is connected to the AutoGRAPH device output, e.g. a LED.

To test the output state:

- Connect the device to a PC.

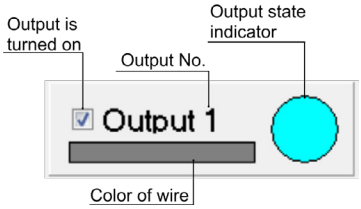


Fig.71. The output test.

- Launch the AG.GSMConf and go to the "Inputs and Outputs" tab. Press the "Start" button to start checking.
- Switch on the output by checking the box associated with this output. After that the output indicator is highlighted in colour (Fig.48) and the output switches to active state.
- Uncheck the box to switch the output off.
- By switching the output in the AG.GSMConf and the user can watch the response of a device connected to the checking physical output of the device.

2. Checking the input states.

AutoGRAPH devices (except the AutoGRAPH-GSM/SL and AutoGRAPH-GSM/SL-2) have 6 digital inputs and are able to fix change of the inputs state, count pulses and measure frequency.
In addition to digital inputs, devices also have 2 analog inputs. Analog input is designed to measure parameters which values proportional to the voltage. Analog inputs may be set up to operate as additional digital inputs.

The device's output will respond to switching (performed in the program) only if the checking is started ("Checking" box is checked). If checking is stopped, the output will not change its state upon switching the output in the program.

2.1. Counters 1..8.

- Connect the device to a PC.
- Go to the "Inputs and Outputs" tab and start input test by pressing the "Start / Stop" button.

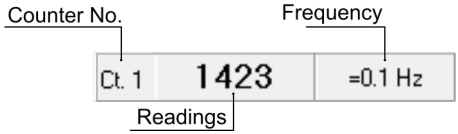


Fig.72. Counter reading.

- Device will start count pulses on the checking input. The program displays number of pulses on input and frequency of input signal.

- Wait until the input signal frequency is measured by the device. When frequency is being measured, the "wait" message is displayed.
- If the frequency is measured accurately, the value is preceded with "=" sign. If the frequency is measured approximately, the value is preceded with "~" sign. The accurate frequency measurement is supported by devices with firmware ver. 7.38 and higher.

2.2. Supply voltage.

The supply voltage of the AutoGRAPH device varies from 10 to 30 V. While testing, the program displays voltage level reflected in ADC readings and in Volts. The status bar displays variations of voltage level. Specify a coefficient to convert ADC readings to another value.

2.3. Analog inputs.

AutoGRAPH controller has two analog inputs. The measurable voltage of the first analog input

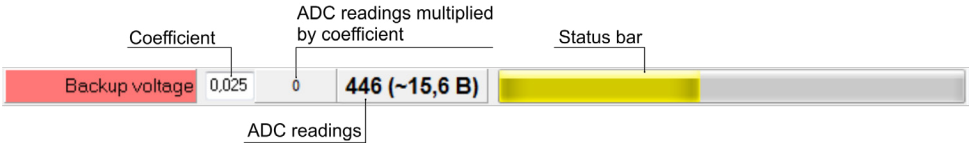


Fig.73. Main voltage of the device.

ranges from 0 to 10 Volts, but it does not exceed the supply voltage.

The measurable voltage of the second analog input ranges from 0 to 24 Volts, but it does not exceed the supply voltage.

The AG.GSMConf measures voltage on analog input and displays the result in Volts and ADC readings: both true and multiplied by a coefficient.

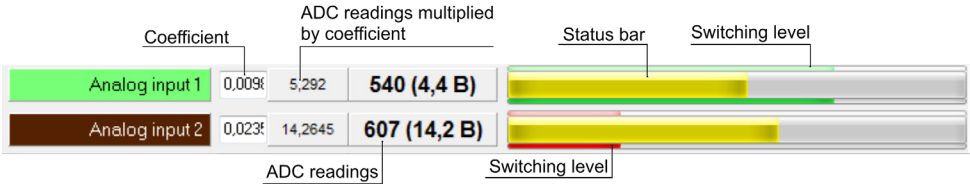


Fig.74. States of analog inputs.

The coefficient is required to convert the ADC readings to another value. Before starting the test, specify the coefficient.

Any change in analog input voltages is displayed on a status bar of the program. Status bar may indicate following states:

Yellow	Input current state
Green	Switching level of analog input when analog input operates as a digital input
Red	Switching level of analog input when analog input operates as a digital input and if the input has switched.

Use shortcut buttons (Analog input 1, Analog input 2) to switch to analog input settings, i.e. to "Analog Inputs" tab.

2.4. Backup power supply.

When the main power supply shuts down, to prevent the turning off the device switches to a backup power. Switching between the main power and the backup power is performed automatically.

2.5. Digital inputs and RPM input.

AutoGRAPH devices have 4 active low digital inputs (1..4), 2 active high digital inputs (7, 8), and

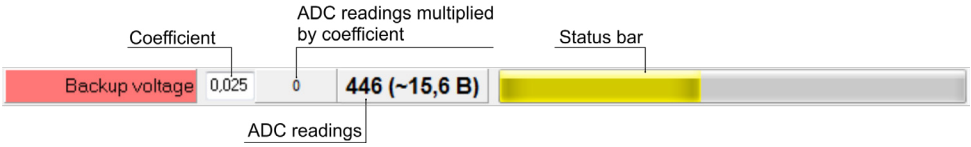


Fig.75. Backup power supply of the device.

1 active high high-impedance digital input (HighIM). Furthermore, analog inputs can be used as additional digital inputs (5,6) operated by "+". AutoGRAPH-GSM/SL and AutoGRAPH-GSM/SL-2 have one active low digital input, one active high digital input, and one active high high-impedance input. The high-impedance input of AutoGRAPH-GSM/SL is displayed as the digital input 8. The high-impedance input on the "Inputs and outputs" tab (HighIM) is used to display operation of the input of AutoGRAPH controller of h/w version 3.0.

Each digital input is designated with a colour in compliance with the colour of its connecting wire. When input switches to an active state, it is highlighted red. Internal diagram of an input displays its

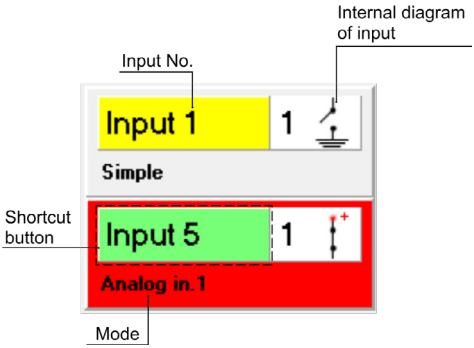


Fig.76. Digital Inputs.

operation logic and changes according to the digital input current state (0 or 1). Mode of operation can be selected on the "Input 1-4", "Input 5-8" or "RPM and high-impedance input" tabs of the software. The input modes are described below:

- Analog input 1 (2) – analog input 1 (or 2) is configured to be used as a digital input.
- Simple – digital input functions on simple mode.
- Counter – digital input functions as a storage counter.
- Special – digital input functions as a special counter.
- Frequency – digital input measures frequency.

The user may quickly switch to settings of an applicable input (to "Inputs 1-4", "Inputs 5-8", "RPM and high-impedance input" tabs) by left click that input diagram.

The RPM input diagram is used to indicate operation of the RPM input which is available in AutoGRAPH on-board controller of version 3.0. When the device is connected to a PC and the checking is ON, final RPM readings, multiplied by coefficient, are displayed (Fig.60).
Left click the RPM input diagram moves to the "RPM and high-impedance input" tab.

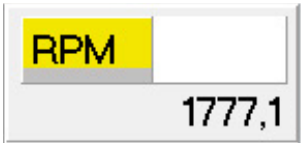


Fig.77. RPM input.

GSM CONTROL

On this tab you can test operation of GSM modem.

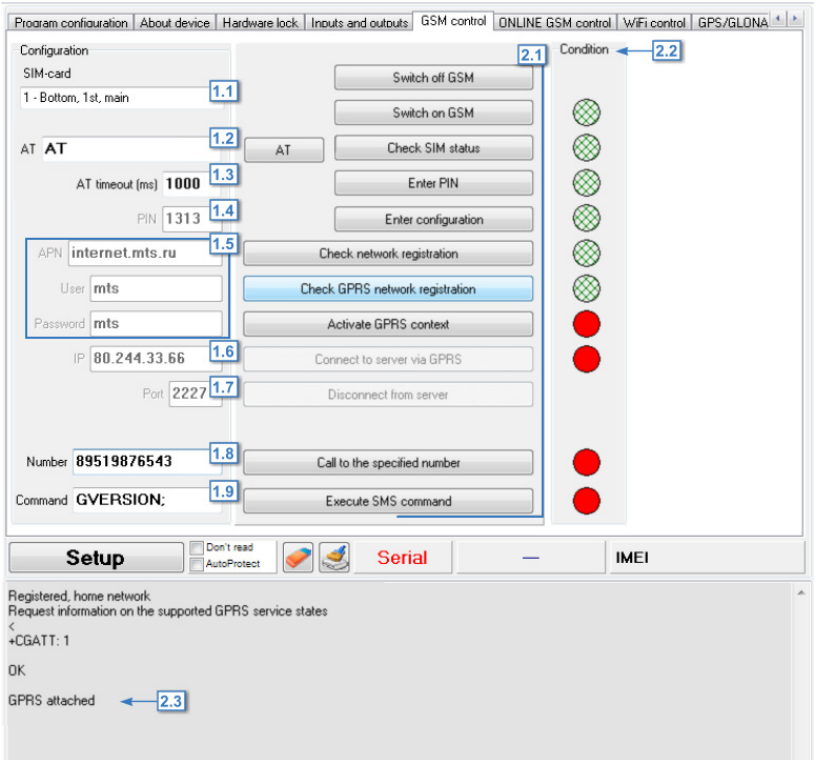


Fig.78. Control tab. GSM Control.

1. Configuration. This section displays GSM/GPRS settings scanned from the connected device. The user can change network settings on the "GSM Settings" tab of a corresponding SIM card.

1.1. SIM-card – select a SIM card to test GSM modem.

1.2. AT – type an AT command in field to send it to the modem. Press the "AT" command to send specified AT command to the modem.

1.3. AT timeout – period of waiting a response for GSM modem to respond to AT command upon elapsing of which the modem is deemed to be failed to respond. Specify timeout in ms.

1.4. PIN– use this field to specify PIN code of tested SIM card. If PIN code is disabled for this SIM card, leave this field blank.

1.5. GPRS Settings – settings of GPRS access point: access point (APN), user (User), password (Password).

1.6. IP is a real and static IP address of the server which receives data from the device.

1.7. Port is the number of the port of the server designated for data transfer.

1.8. Number – phone number used for making a call when the modem is being tested. Enter number without spaces and use prefixes for national calling (+7 or 8).

1.9. Command – use this field to specify command for remote configuration. All commands should be in appropriate format and have only uppercase Latin letters.

Make sure that the processed command is supported by firmware of your device.

For more information on format of SMS and server command refer to the "SMS and server commands for AutoGRAPH-GSM" document.

2. GSM modem testing. Before testing select a SIM card used to test the modem.
Press buttons (Fig.78, item 2.1) one by one from the top downward to test the modem. It takes some time to process each command. Indicators (Fig.78, item 2.2) are used to display state of command processing:

Operation is completed successfully

Operation has failed.

Also state of processing the command is displayed on the status window (Fig.78, item 2.3).

Test procedure:

1. Connect the device to a PC.
2. Read settings from the device, unless they are scanned automatically.
3. Select SIM card to test the modem.
4. Restart the GSM modem. To do this switch the modem off by pressing the "Switch off GSM" button. Status window will display message on switching the GSM module off.
5. Switch the modem on by pressing the "Switch on GSM" button. It may take the modem some time to switch on and initialization, wait until it initializes. Modem is on when GSM LED flashes ones a second.
6. Press the "Check SIM status" button to inquire status of SIM card. If PIN code is already specified or disabled, skip step 7, otherwise specify PIN code (see step 7).
7. Specify PIN code by pressing the "Enter PIN" button. Make sure that the specified PIN code is correct.
8. Apply settings to the device by pressing the "Enter configuration" button.

9. Press the "Check network registration" button to test whether the modem is being connected to the network. If modem has registered within the network, GSM LED flashes once in 3 seconds.

10. Check if a mobile base station supports GPRS by pressing Check GPRS network registration button.

11. If a mobile base station supports GPRS, connect the device to GPRS by pressing the "Activate GPRS context" button.

12. Connect to the server by pressing the "Connect to server via GPRS" button.

13. Disconnect from the server by pressing the "Disconnect from server" button.

14. Make a call to telephone number specified in field 1.8 (Fig.78) (use the "Call to the specified number" button). When making a voice call, GSM LED is continuously ON.

15. Send test SMS command. Specify the command in field 1.9 (Fig.78) and press the "Execute SMS command" button.

When modem is tested the status window displays a message on successful test or failure after each step. The user can use these statuses to identify failures of the GSM modem.

AutoGRAPH-GSM devices with firmware of version AGTK-10.63 and AGXL-11.45 and higher do not support GSM modem diagnostics on the "GSM control" tab. To test GSM modem of these device, use "Online GSM control" tab.

ONLINE GSM CONTROL

On this tab the user can test GSM modem during its operation.

1. Current – the slider moves to display the current step of a test.

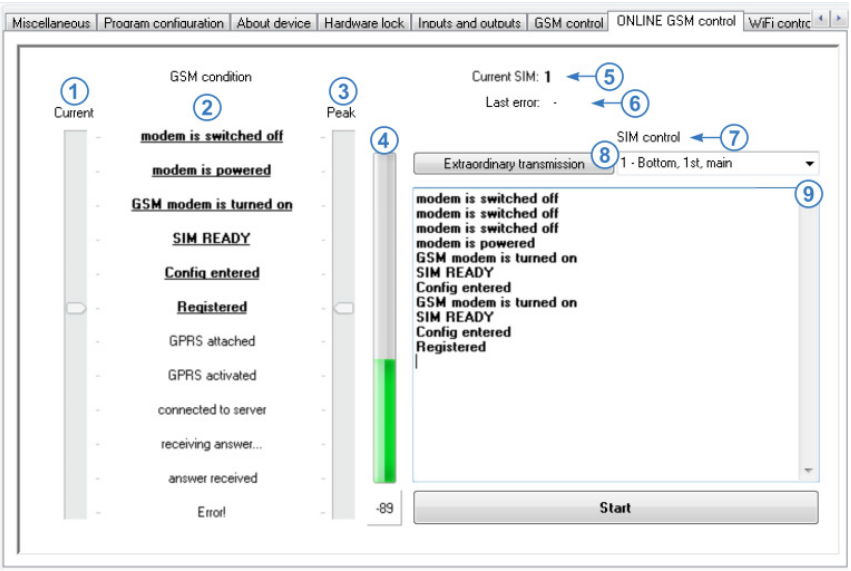


Fig.79. ONLINE GSM control.

2. GSM condition – steps to test the GSM modem. You can troubleshoot the GSM modem according current condition of it.
3. Peak – the slider displays the peak step achieved by GSM modem for the period of its operation. The peak step will be reset when the device is completely reset: by restarting, upon RESET command or once in a day. The peak step will be reset when restarting the GSM modem.
4. Level of GSM signal – during the test status bar indicates the current level of GSM signal. A decibel level of GSM signal is displayed under the status bar.
5. Current SIM – a number of active SIM-card.
6. Last error – an error, detected in previous test.
7. SIM control – select a SIM-card, that will be used to test the modem. If you select "Not managed" item, the GSM modem will select a SIM-card autocratically according the settings on "Roaming Priority" tab. If one of the SIM-cards is not available at instant, the modem will switch to another one.
8. "Extraordinary transmission" button – provides an extraordinary data transmission to server, do not wait the next GPRS transmission period.
9. Status window – details of process of testing the GSM module are displayed here. These details are also available in status window of the program at the bottom of the screen.
10. Start / Stop button – press the button to start the test. Press the button again to stop the current test.

To test GSM modem:
- Connect the "AutoGRAPH-GSM" device to a PC using Data-cable. Online control of GSM modem is supported by the device with firmware of version AGTK-10.63 and AGXL-11.45 or higher.
- Make sure that GSM antenna and SIM-cards are connected to the tested device.
- Turn on the power of the device.
- Launch the AG.GSMConf software of version 3.3.0-r6 or higher. Go to "ONLINE GSM control" tab.
- You should select an active SIM-card if necessary.
- Start test of GSM modem pressing the "Start" button. The program will start testing of GSM modem.
- While in test the "Current" slider indicates current state of GSM modem. The "Peak" slider displays a state of the GSM modem achieved as a result of previous tests.
- If GSM modem of the tested device is fault free and correct GSM settings are specified, the test will stop on "answer received" step.
- If GSM modem is faulty the program will display a massage about an error of testing.

WI-FI CONTROL

On "WiFi Control" tab the user can test the operation of Wi-Fi module.

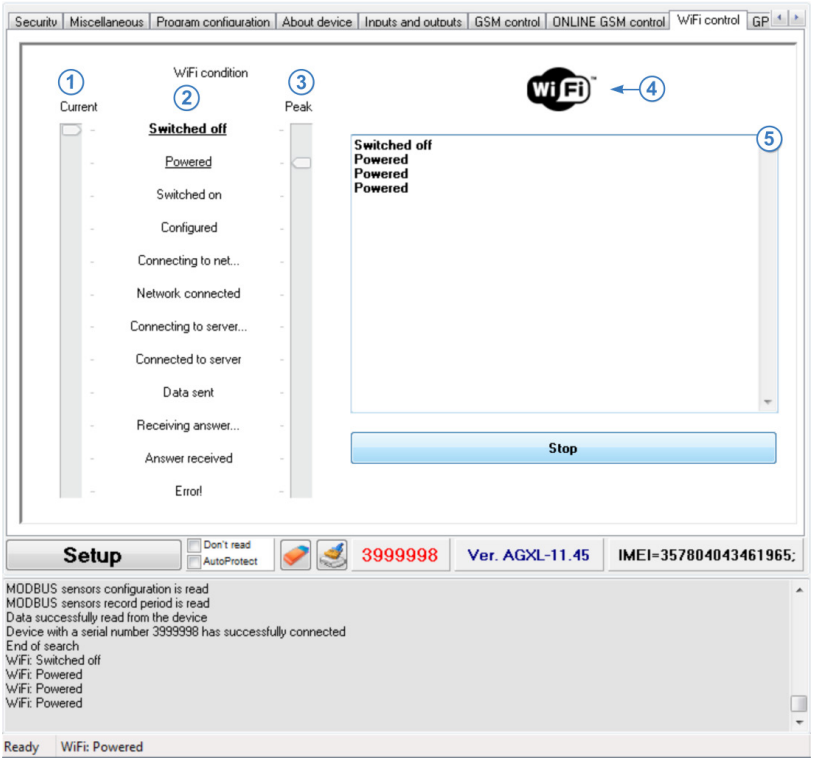


Fig.80. Control tab. WiFi Control.

1. Current operation – the slider moves to display the current step of a test.
2. WiFi condition – steps to test the WiFi module.
3. Peak – the slider displays the peak step achieved by WiFi module for the period of its operation. The peak step will be reset when the device is completely reset: by restarting, upon RESET command or once in a day.
4. "WiFi Settings" button – press WiFi symbol to switch to configuration of WiFi module on WiFi Settings tab.
5. Status window – details of process of testing the WiFi module are displayed here. These details are also available in status window of the program at the bottom of the screen.
6. Start / Stop button – press to start or stop test of WiFi module of the connected device.

To test WiFi module:

- Connect the AutoGRAPH-WiFi-GSM+ to a PC using data cable. Make sure that Wi-Fi antenna is connected to the device.

- Launch the AG.GSMConf program of version 3.3.0 or higher. Go to the "WiFi Test" tab.
- Press the "Start" button on the tab to start testing of Wi-Fi module. The program will start step-by-step testing.
- Monitor the testing process. The slider will move in the course of testing to display the current state of Wi-Fi module. "Peak" slider displays the state of Wi-Fi module achieved as a result of previous tests.
- Wi-Fi module is fault free if all testing steps are completed successfully. After completion the test will start once again.
- The failure of Wi-Fi module can be identified on the basis of the step where the current state slider stops.

GPS/GLONASS TEST

Use "GPS/GLONASS Test" tab to test operation of the GPS/GLONASS receiver.

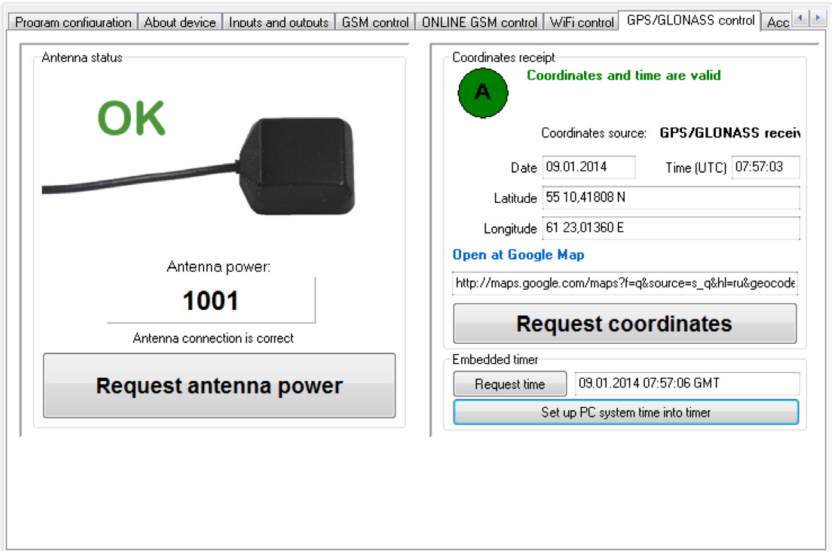


Fig.81. Control tab. GPS/GLONASS Control.

To test GPS/GLONASS antenna:

- Connect GPS/GLONASS antenna to the device.
- Connect your device to a PC.
- Check the status of GPS/GLONASS antenna (see Antennas status section). Press Request antenna power button.
- Antenna status is illustrated with a symbol:

OK – antenna is in good order and is connected correctly;
Fault – antenna is probably disconnected or failed.
Short Circuit – ground short circuit.

- **Antenna power** – this f is used for identifying problems.
  - If receiver's antenna is faultless, proceed with testing the receiver (Coordinates receipt section).
  - Press Request coordinates button. Status of receiving the coordinates is displayed by indicators as follows:

Coordinates have not been requested yet

Data on coordinates and time have been received from satellite and are reliable

Coordinates and time are invalid

- If coordinates are received and valid, the window will display data on the source of coordinates (GPS, GLONASS, mixed mode), date and time of receipt (in UTC) latitude and longitude and a link to the web mapping service. Press Open at Google Map link to see the device's location at Google Map.
- Check an embedded timer of the device.
- Press the "Request time" button to request the time from the device's timer.
- The user can set up PC time into timer. To do this, press the "Set up PC time into timer" button.

ACCELEROMETER

AutoGRAPH-GSM device is equipped with accelerometer which could be used to detect when the vehicle (with the device) starts moving or stops.

To make test of the accelerometer:

- Connect the device to a PC.
- Press Start / Stop button on "Accelerometer" tab.
- Move the device. While testing the program displays acceleration directions identified by the accelerometer along X, Y, Z axes with the arrows. Red arrow denotes direction of maximal acceleration.
- The program is also able to display rate of acceleration along three axes and modulus of a sum vector.

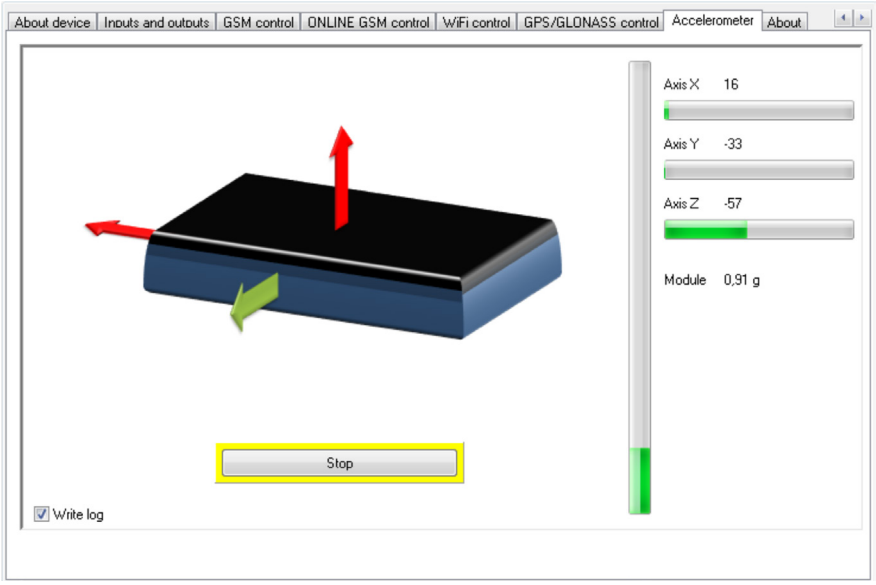


Fig.82. Control tab. Accelerometer.

SD/MMC BROWSER

On this tab, the user can test and browse SD card or eMMC of the AutoGRAPH devices. SD card and eMMC memory are intended to store photos from cameras connected to the device and log files. Depending on the device modification it can be equipped with either an SD card or eMMC memory. Also some modifications of controllers don't have an additional memory.
To do the memory test, connect the device to a PC. Make sure that the SD card is inserted. Then, press the "Test the memory card" button (Fig.83). After finishing, the test status will be displayed in the status window of the program.

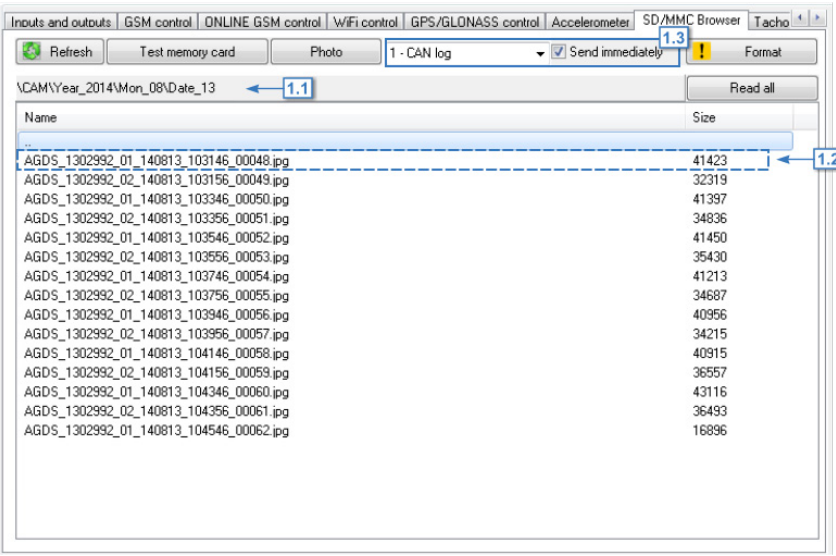


Fig.83. "SD/MMC Browser" tab.

The memory content (Fig.83, i.1).
When connecting the device to a PC, the AG.GSMConf program reads content of the device additional memory. To update the list of files, press the Update button.
The "Read all" button allows to read the list of files stored in SD card / eMMS of the device. The reading time depends on data size stored in the device memory.
After the reading, the list of file will be displayed in the program. The path to the opened folder of the memory is displayed above the list (Fig.83, i.1.1). Pressing the path opens the folder on local hard drive containing photos files from the device memory to the hard drive.

The AutoGRAPH device additional memory is intended to store following type of files:

1. Photos from camera (Fig.83, i. 1.2).
The photos are stored in the \CAM folder and sorted to nested folders by year, month and day of recording.
The photos are stored in the .jpg file. The file name has the following format ***AGDS_serial_cam_data_***

time_num, where ***cam*** – camera number, ***data*** – the photo recording date, ***time*** – the photo recording time, ***num*** – the photo number.
To copy photo from the device memory to hard drive, double click the photo. To copy all photos from the opened folder, press the "Read all" button.
The copy of the photo will be loaded in the \SD folder in the AG.GSMConf program folder. The \SD folder has nested internal folders like the \CAM folder on the device memory. To open the \SD folder, press the path above the list of files (Fig.83, i. 1.1).

Press the "Photo" button to go to the cameras settings.

2. Device logs

Device operation logs are also stored in additional memory. Log are stored in the \LOG folder.
To copy a log file from the device memory on hard driver, double click the file. To copy all photos from the opened folder, press the "Read all" button. The copy of the files will be loaded in the \SD folder in the AG.GSMConf program folder. To open the \SD folder, press the path above the list of files (Fig.83, i. 1.1).

To enable the device to write log files, select the required log to write in a drop-down list on the right of the "Photo" button (Fig.83, i. 1.3):

- **0 – no debug log** – disables logging.
- **1 – CAN log** – enables logging of CAN bus.
- **2 – accelerometer log** – enables logging of accelerometer.
- **3 – NMEA log** – enables logging of accelerometer.
- **4 – tacho log** – enables recording of tachograph logs. The option is available only for AutoGRAPH-GSM-Drive devices intended to connect to Atol Drive tachograph.
- **5 – APC out log** – enables recording of APC (automatic passenger counting) sensors logs.
- **6 – RS-485 log** – enables logging of RS-485 bus.
- **7 – GSM log** – enables logging of GSM-modem.
- **8 – Eco Driving log** – enables logging of Eco driving mode.
- **9 – RS232 log** – enables logging of RS-232 bus.
- **10 – Camera log** – enables logging of photo cameras.
- **11 – WiFi log** – enables logging of Wi-Fi module.

The option "Send immediately" enables immediate transmission of logs to data server as soon as they have been written.
To troubleshoot additional memory, press the "Test memory card" button.
To erase memory, press the "Format" button.

Be careful pressing this button. The formatting will delete all files stored in the device memory (SD card or eMMC).

TACHOGRAPH

On this tab you can perform diagnostics of a tachograph connected to the AutoGRAPH controller and set up the controller to interact with the tachograph.

SETTINGS THE AUTOGRAPH CONTROLLER

To tune the AutoGRAPH controller to receive .ddd-files from a tachograph you need to select a type of the connected tachograph on the "Tachograph" tab (Fig.84, i.1):

0 – Default – to disable connection of tachograph to the controller;

1 – ШТРИХ-TaxoRUS CAN – to enable connection of the "SHTRIH-TaxoRUS" tachograph to the controller via CAN bus. If the controller is equipped with two CAN buses, tachograph must be connected to CAN1.

2 – ШТРИХ-TaxoRUS RS485(2) – to enable connection of the "SHTRIH-TaxoRUS" tachograph to the controller via RS-485 bus. This feature is available only for the AutoGRAPH controllers equipped with second RS-485 (RS-485-2) bus as the tachograph must be connected to RS-485-2 bus.

3 – VDO RS232 – to enable connection of the tachograph Continental VDO DTCO 3283 to the controller via RS-232 bus. This setting is duplicated on the "RS-232" bus.

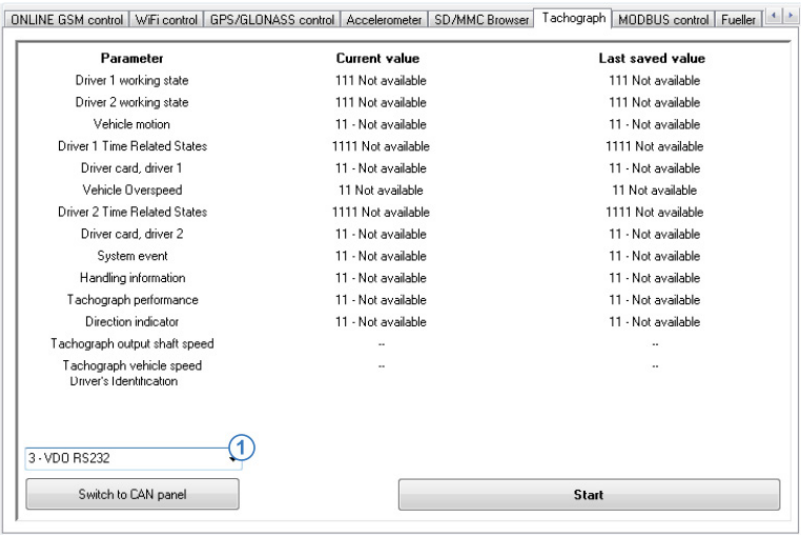


Fig.84. "Tachograph" tab.

To ensure that all settings are specified properly do a test of tachograph. To do it, press the "Start" button on the "Tachograph" tab. If all connections are made correctly, the program will read the captured data from the AutoGRAPH device and display it.

For more detailed information on how to configure the AutoGRAPH controller completely for proper operation with supported tachographs contact the manufacturer – TechnoKom Ltd.

MODBUS CONTROL

On the "MODBUS control" tab, the user can test the operation of MODBUS sensors connected to the device.

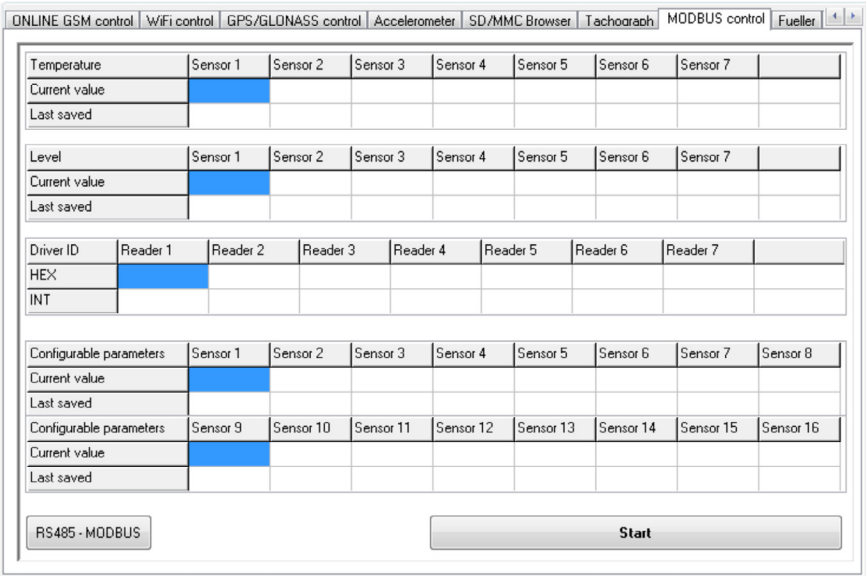


Fig.85. "MODBUS control" tab.

- **Temperature sensors.** The AutoGRAPH device can simultaneously operate with up to 8 temperature sensors via MODBUS. The user can set up sensors, on the "RS485-MODBUS" tab.
- **Level sensors.** The AutoGRAPH device can simultaneously operate with up to 8 level sensors. The user can set up sensors, on the "RS485-MODBUS" tab.
- **Card reader.** The AutoGRAPH device can simultaneously operate with up to 8 Card Reader-Smart or Card Reader-RFID devices. The user can set up addresses of the card readers on the "RS485-MODBUS" tab.
- **Configurable parameters.** On the "RS485-MODBUS" tab, the user can configure additional parameters from MODBUS.

After the configuration the user can test the device MODBUS on the "MODBUS" control tab. When testing the program displays readings received from MODBUS.

PASSENGER AND TRAFFIC CONTROL

On the "Passenger traffic control" tab the user can test the operation of IRMA sensors connected to the AutoGRAPH device.

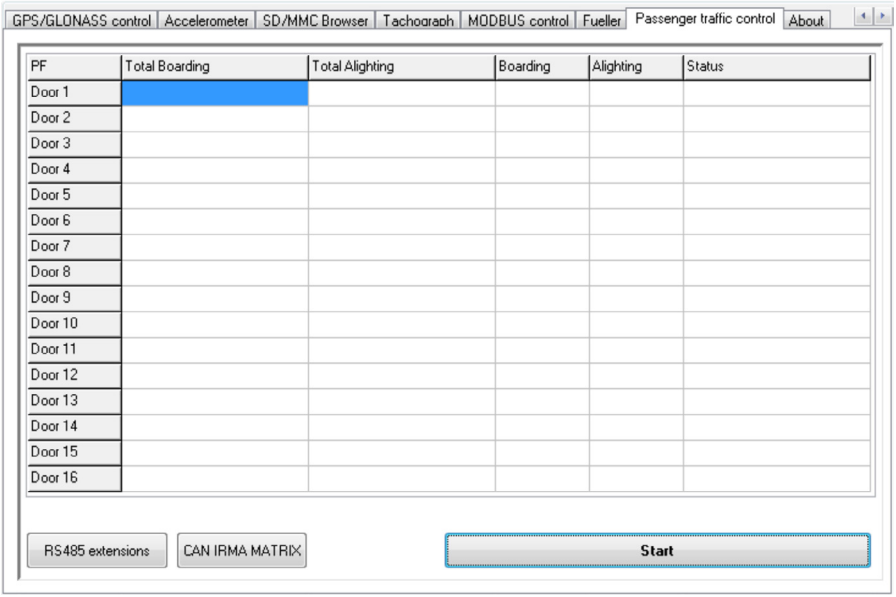


Fig.86. "Passenger traffic control" tab.

Before the test, go to the "RS485 extensions" and "CAN IRMA MATRIX" tab and set up parameters of passenger counting sensors.
To start the test, press the "Start" button. While the test, the program displays received data.

CAN CONTROL

On the "CAN Control" tab you can check CAN bus of AutoGRAPH controller.

To make a test of the controller's CAN bus:

- connect AutoGRAPH controller to the AG.GSMConf program;
- set up CAN bus of this controller.
- set a period of data recording from vehicle CAN bus;
- save the settings in AutoGRAPh controller;
- connect AutoGRAPH controller to vehicle CAN bus following the instruction given in the User Manual for that controller;
- press the "Start" button on the "CAN Control" tab to begin scanning of vehicle CAN bus (Fig.87). During the scanning AutoGRAPH controller will receive data from vehicle CAN bus and display it in the AG.GSMConf program.

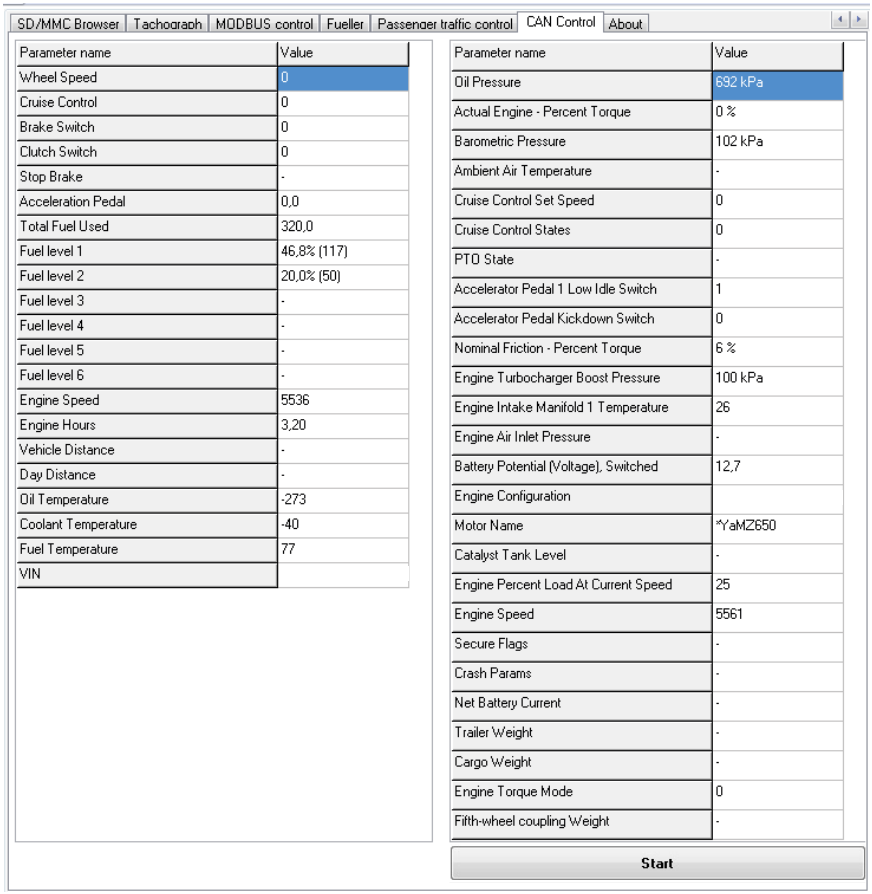


Fig.87. "CAN Control" tab.

Record settings in the device

When you finished with all settings press Setup button to save your settings.
When saving settings red and green LEDs of the device will flash. When settings are saved you will see a corresponding message.
AG.GSMConf software enables a user to create two key files with passwords and settings: [file_name].atg and [file_name]-srv.atg.
[file_name]-srv.atg file has to be submitted to the server administrator to include the file to the list of devices being serviced by the server. If the device has already been serviced by the server and its password hasn't been changed, there is no need to change the server key file. When the password of the device is changed, the key file residing on server must be changed, otherwise the server won't accept any data from this file.
[file_name].atg file should be saved in \dbf folder which is located in the AutoGRAPH dispatch software installation directory on all dispatcher PCs which will be used to monitor the devices with numbers as indicated in [file_name].atg file.

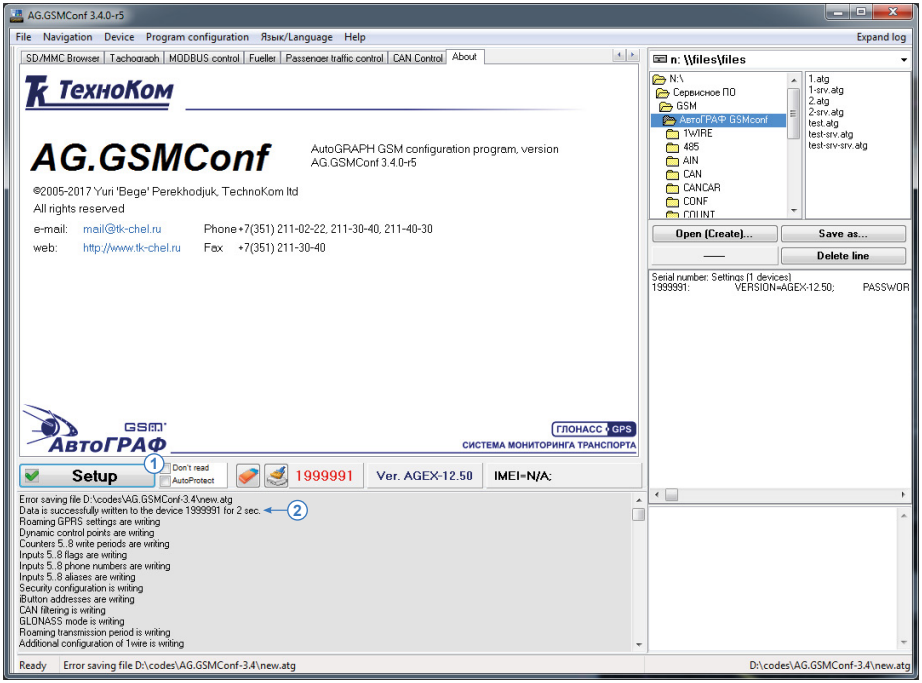


Fig.88. Applying the settings.

The "Setup" button saves the settings into the connected device. When settings are successfully applied to the device you will see icon and a message on successfully saved settings in a status window (Fig.88, item 2).

Remote configuration of AutoGRAPH device

AutoGRAPH on-board controller starting from the firmware of the version 5.0 and higher (since serial number 32500) support remote configuration via a data server and using SMS commands. The procedure of the remote configuration via data server is built-in the AG.GSMConf program.

Remote configuration of AutoGRAPH on-board devices using the AG.GSMConf requires the AutoGRAPH server software of the version 5.4 and higher.

To send new settings to the controller remotely, select Device menu – Configuration via server in the AG.GSMConf program. This will open the menu "Device configuration via server" intended to request settings from AutoGRAPH device and send new configuration to this device.

CONNECTION TO DATA SERVER

To be able to send settings via AutoGRAPH server to AutoGRAPH device , connect to the server and obtain a security token.

CONNECTION OPTIONS

Go to the "Device configuration via server" menu and enter following parameter in the "Server configuration" section ():

Serial number – 7-digit unique serial number of the AutoGRAPH controller being configured remotely.

Server address – an IP address or a domain name of AutoGRAPH server which the AutoGRAPH device transmits data and which is used to send settings to the that device.

Server port – a dispatcher port number of AutoGRAPH server. This port differs from that which AutoGRAPH device transmits data.

ACCESS TO SERVER

Access to AutoGRAPH server can be provided in two ways: by a login and a password of a user registered on the server and using Windows authentication.

Log-in as a user of AutoGRAPH server

This type of authorisation is used if a user have been registered already on AutoGRAPH server used for remote configuration of AutoGRAPH devices.

To connect to the server using an account of AutoGRAPH server user, enter a login in the "User name" field and a password in the "User password" field **(Fig.88)**.

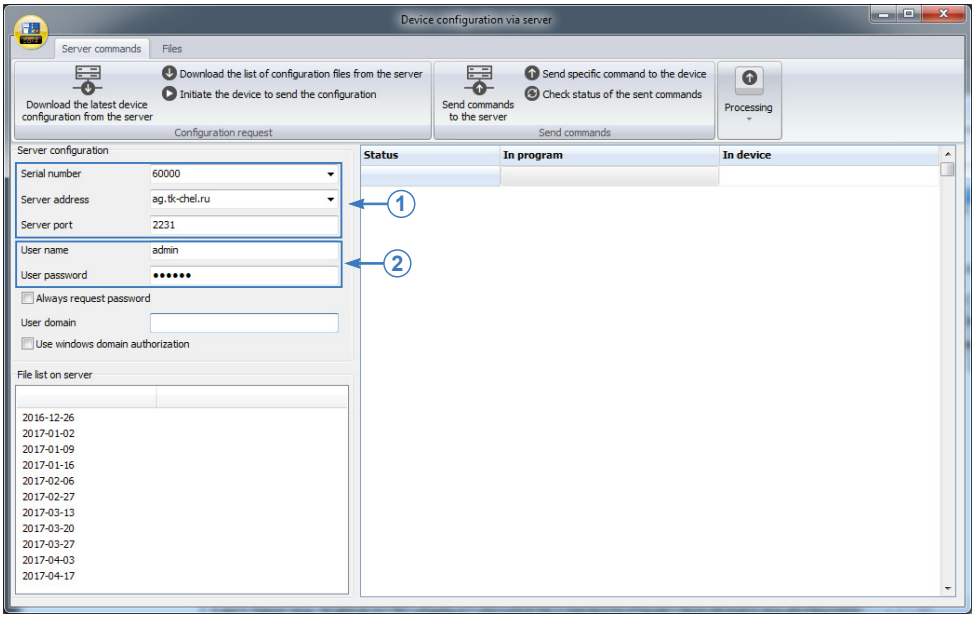


Fig.89. Connection to server.

Log-in as Windows user

AutoGRAPH server software supports Windows authentication starting from the version 5.4 and higher. This makes possible using of a Windows user account which is a member of a domain network to access to the server.

You can connect to the server as a current Windows user of the current domain or as other user of domain network which validity is controlled in Windows AD.

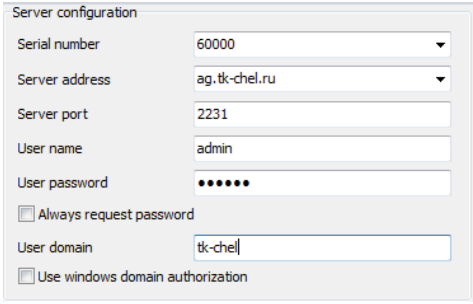


Fig.90. Windows authentication as any user.

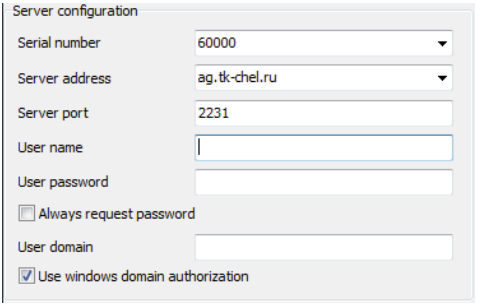


Fig.91. Windows authentication as current user.

1. To log in as any Windows user of any domain network (Fig.90):

- enter a user login in the "User name" fields;
- enter a password of this user in Windows system;
- enter a name of the domain network of the user. You can use both short and full domain names, e.g. t3 and t3.th-chel.ru.

2. To log in as a current Windows user (Fig.91):

- ensure that the PC connecting to server is in the domain network;
- enable the option "Use windows domain authorization" in the "Device configuration via server" menu.

When connecting to the server for the first time after running the AG.GSMConf program, a new security token is generated on the server for the user establishing the connection. If the option "Always request password" is enabled, the user password will be requested every time after the program restart as well as a new token will be created. If the option is disabled, the previously generated token will be valid within its lifetime even after the program restart. Independent from the option the password is requested again if the token lifetime expires.

DEVICE SETTINGS

The AG.GSMConf supports request of the device settings via server. The received settings are saved on the server which make possible to store the device configuration history. Automatic transmission of current configuration is disabled in AutoGRAPH devices.
All device settings available on the server can be downloaded from the server and displayed on the "Device configuration via server" menu.
To force the AutoGRAPH device, which number is entered in the "Serial number" field, to send its configuration to the server, press the "Initiate the device to send the configuration" on the "Configuration request" panel **(Fig.92)**. After processing the command a new file of the .log format containing the device settings will be created. The file name has following format *Serial number – File data*.

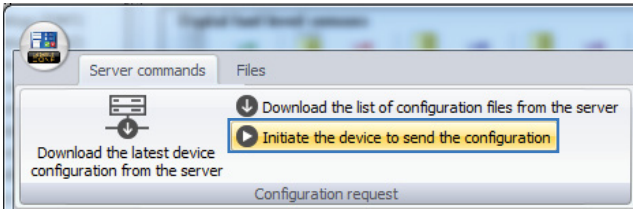


Fig.92. Initiate transmission of the configuration by device.

To request a list of configuration files of the device stored on the server, press "Download the list of configuration files from the server" **(Fig.93, i.1)**. The downloaded files will be displayed on the "File list at server" panel **(Fig.93, i.2)**.
To load settings from one the configuration files on the server in the AG.GSMConf program, double click this file. All settings from the selected file will appear on the "In device" column.

To download the last settings from the device in the AG.GSMConf program, press "Download the latest device configuration from the server" **(Fig.94, i.1)**. The received settings will appear on the "In device" column **(Fig.94, i.2)**.

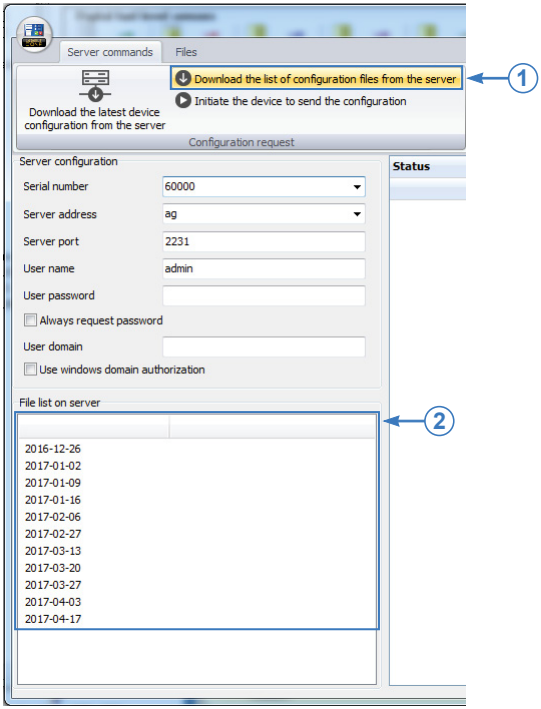


Fig.93. Request a list of configuration files of the device from server.

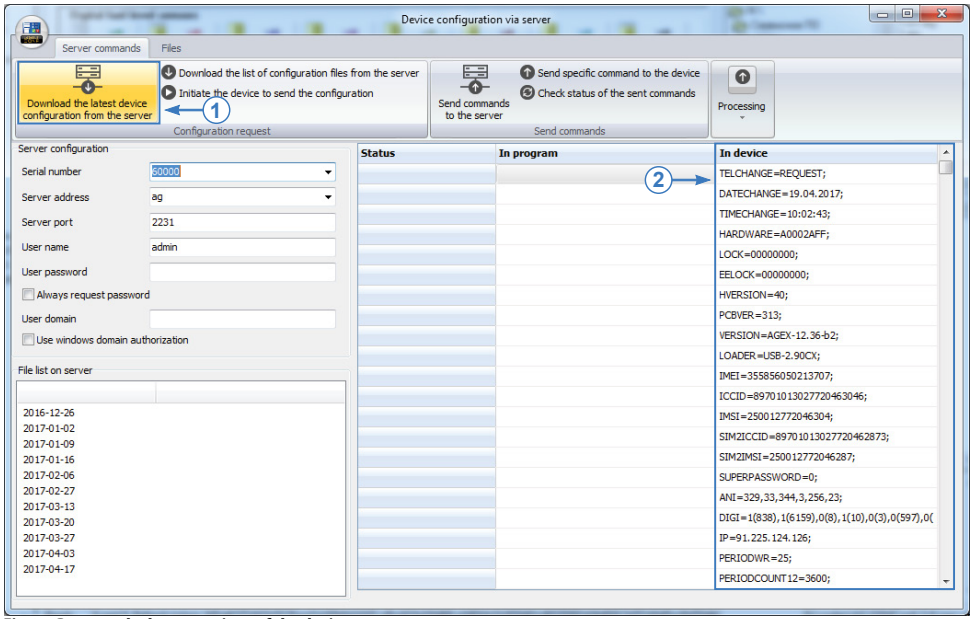


Fig.94. Request the latest settings of the device.

REMOTE CONFIGURATION

Using the AG.GSMConf program you can send only one command or a list of them simultaneously to AutoGRAPH device.

CHANGE ONE SETTING OF THE DEVICE

To set only one settings of AutoGRAPH device do not changing other settings, press "Send specific command to the device" on the "Send commands" panel **(Fig.95, i.1)**. Then enter a command with the required settings in the "Send command to device" menu **(Fig.95, i.2)**, e. g. *DRIVING=10,700:10,700:15,700:5,700:5,700:20,100:0,0;* – the command intended to set up the mode of driving quality control. As the command is entered press "Send command".

The required command can be copied on one of the program tabs if it is generated automatically or prepared manually in accordance with the required format.

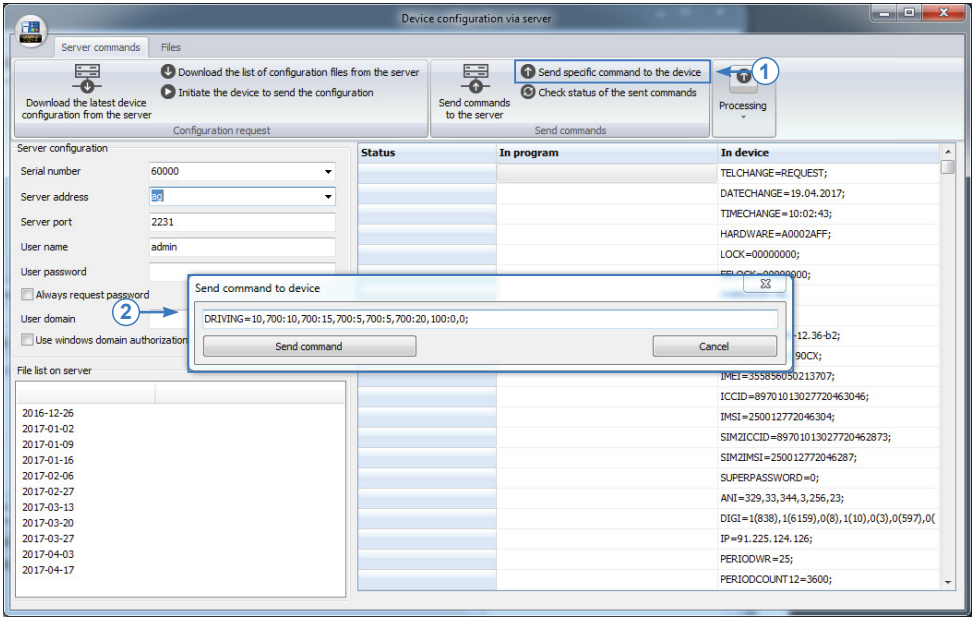


Fig.95. Request a list of configuration files of the device from server.

To close the menu after sending the command press the "Cancel" button.

To request the state of the command processing press "Check status of the sent commands". The state is displayed at the bottom of the menu **(Fig.96)**. A highlight colour of a string depends on the command state. Highlighted yellow is state of waiting for a response from the device. Highlighted green is a state of successful processing of the command by the device. After the processing actual settings of the device are displayed on the right column. Red colour is an error of the command processing: wrong format of the command, no reply from the device and etc.

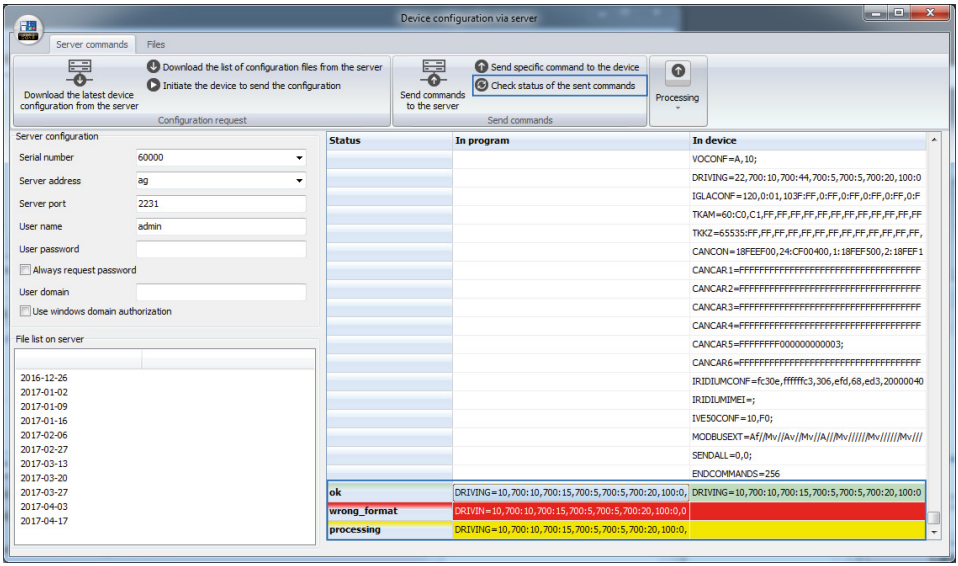


Fig.96. Status of the processing a command.

CHANGE A LIST OF SETTINGS

A list of commands for remote configuration of the device is created at the basis of the settings selected in the AG.GSMConf program.

To create and send the list of command:

- go to the "Device configuration via server" menu;
- if necessary, initiate transmission of the settings to server by AutoGRAPH device;
- request current settings from the device pressing the button "Download the latest device configuration from the server";
- press the button "Recognize commands from the server and fill in the program fields" to fill the program fields with actual settings requested from the device **(Fig.97, i.1)**. Wait until the program has recognized all settings;
- set new settings in the AG.GSMConf program instead of read settings;
- press the button "Fill the command queue from the program fields" **(Fig.97, i.2)** to create the commands for remote change of required parameters according to the new settings selected in the AG.GSMConf program. As a result the program will create the commands to set all settings of the device and display them in the "In program" column of the table **(Fig.97, i.3)**;
- the list can be edited before sending. Double left click a string of the table to edit it. Delete a command when editing to remove it completely from the list;
- press the button "Remove duplicates from the command queue" **(Fig.97, i.4)** to delete the commands which contain the same settings as installed in the device. The compare operation is performed between the queue for transmission and the command previously requested from the device. If a setting to be sent and a setting in the device are similar, the command is removed from the queue.
- press the "Send the commands to the server" button **(Fig.97, i.5)**.
- check a state of the commands processing.

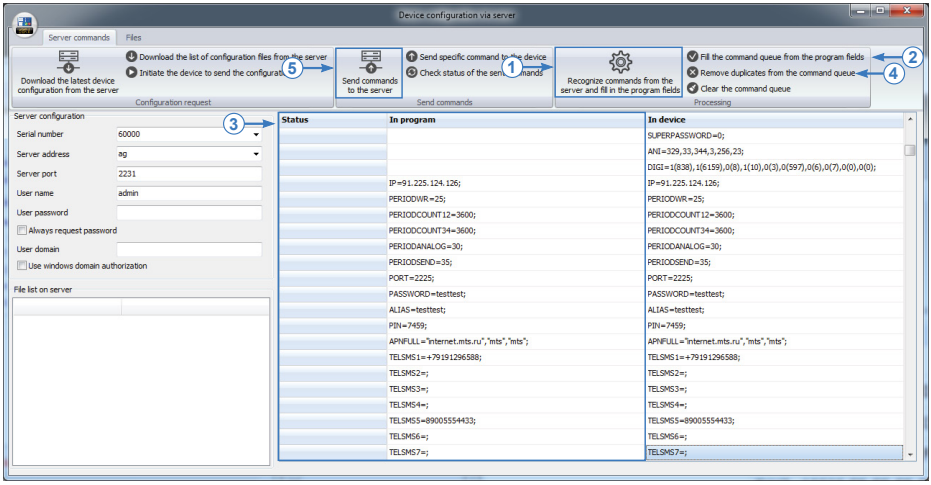


Fig.97. Sending a list of commands.

LOADING REMOTE CONFIGURATION COMMANDS FROM ATC FILE

The commands for remote configuration of AutoGRAPH device can be loaded in AG.GSMConf program from the file of .atc format. This type of the file is created by the AG.GSMConf program when recording settings in AutoGRAPH device via USB or saving them in an external file.

To load the commands in the transmitting queue from such file, go to the "Files" tab then press the "Load commands from .atc file" button and select a file to load **(Fig.98)**. The commands from the selected file will be added in the transmitting queue and displayed on the "In device" column on the "Server commands" tab.

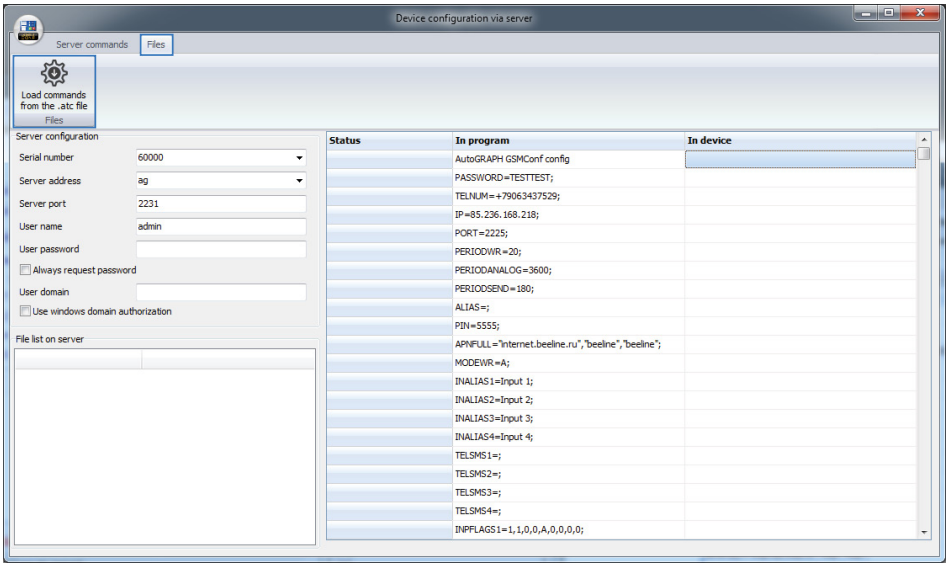


Fig.98. Loading the configuration from an ATC file.

Reading data from the device

The AG.GSMConf program support reading of data files from AutoGRAPH on-board devices. Data recorded by AutoGRAPH device is stored in binary files of the .sbin format and can be used for the diagnostics of the device.
To read data from the device, connect it to the AG.GSMConf program and select Menu “Device” – Read .sbin data file.

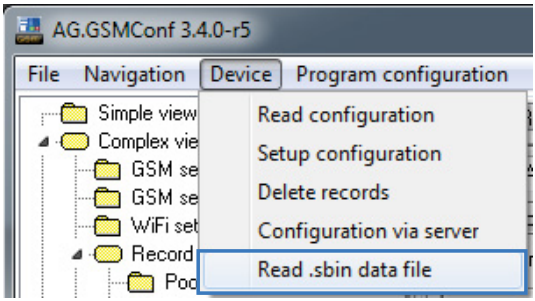


Fig.99. Loading the configuration from an ATC file.

After that the program will start the reading of data from the connected device and after finishing will open the folder with the read files. The files are stored in the \Data folder of the AG.GSMConf program in separate folders according to device serial number.

Appendix 1

This section covers description of CAN records given on the "CAN tuning – conditions" tab.

Label	Description
	Ignition is ON
	Vehicle theft alarm system is activated
	Vehicle is closed by key fob
	Key in ignition switch
	Dynamic ignition is ON
	Front passenger door open
	Back passengers door open
	Driver door open
	Passengers door open
	Boot lid
	Bonnet
	Hand brake (available only when ignition is ON)
	Foot brake (available only when ignition is ON)
	Engine is ON (available only when ignition is ON)
	Webasto

Label	Description
	STOP
	Engine oil pressure
	Engine cooling system
	Brake system
	Vehicle charging system
	Air bag (SRS)
	Check engine
	Bulb monitoring
	Low tire pressure warning
	Brake pads wear
	Master warning light
	ABS warning
	Low fuel level
	ESP

Label	Description
	Glow plug
	FAP
	EPC
	Park lights on

Label	Description
	Low beam on
	High beam on
	Passenger seat belt
	Driver seat belt

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