



superlight GSM'SL

AutoGRAPH

VEHICLE TRACKING SYSTEM

2015 VERSION
2.2
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USER MANUAL



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Communication protocol between AutoGRAPH-GSM/SL on-board vehicle tracking controllers and communication data server is considered to be confidential information and intellectual property of TechnoKom.

The communication protocol between AutoGRAPH-GSM/SL on-board vehicle tracking controllers and a communication data server shall be transferred by TechnoKom to integrators and software manufacturers only upon signing the Confidentiality Undertaking.

Unauthorized distribution of protocol being used for communication between AutoGRAPH-GSM/SL on-board vehicle tracking controllers and communication data server is strictly prohibited.

Introduction

This User Manual applies to the AutoGRAPH-GSM/SL on-board vehicle tracking controller of rev. 7.1 (hereafter - tracker, device) produced by TechnoKom Ltd*. It contains installation and connection procedures of this device, as well as its function and control. This Manual constitutes the Operating Rules to be observed to ensure successful operation of the controller and its compliance with TU 6811-002-12606363-2013 and warranty provisions.

The Manual is intended for specialists who are aware of maintenance and installation principles typical for motor vehicles and are proficient in using the electronic and electrical equipment of various vehicles.

To ensure the best performance of AutoGRAPH-GSM/SL controllers, they should be installed and set up only by qualified specialists.

For proper operation of AutoGRAPH-GSM/SL controllers, a user should be aware of operating principles of the vehicle tracking system as a whole, as well as understand functions of its individual components. Therefore, it is highly recommended to study the fundamentals of operation of GPS navigation, GSM communication, peculiarities of short message service (SMS), GPRS and the Internet before starting.

* AutoGRAPH-GSM/SL controllers of rev. 7.1 are produced from serial № 2008250.



All information on functions, functional capabilities and other specifications related to AutoGRAPH-GSM/SL on-board vehicle tracking controllers, as well as all information contained in this User Manual is based on current data (at time of writing) and is deemed to be valid as of the date of publication.

TechnoKom reserves the right to modify the information or specifications without prior notice or commitment.



Some functions of AutoGRAPH-GSM/SL controllers depend on capacities and configuration of the existing mobile network operator (MNO).

Furthermore, some functions may be disabled by the operator, or their operating range may be limited due to the settings of the network. To check availability of a certain function, contact your mobile network operator.

Version history

This table provides a summary of the document revision

| Version | Description | Date |
|---------|---|---------|
| 1.0 | Initial release | 04/2013 |
| 1.1 | Added description of the device operation with two SIM cards and instruction of the second SIM installation | 06/2013 |
| 2.0 | New release intended for the AutoGRAPH-GSM/SL rev 7.1 | 02/2014 |
| 2.1 | Re-design of the document using brand identity | 08/2014 |
| 2.2 | Updated technical specification | 02/2015 |

Safe Operation and Exposure to Electromagnetic Fields

This section contains important information for effective and safe operation. Please read the information below before using the AutoGRAPH-GSM/SL on-board vehicle tracking controller.

Performance Characteristics

AutoGRAPH-GSM/SL on-board vehicle tracking controllers operate using a GSM/GPRS module and function as a low power receiver and transmitter. When the device is ON, it receives and transmits electromagnetic energy in the radiofrequency range. Operating band of the device ranges from 900 MHz to 1,990 MHz; the device uses digital modulation techniques.

When the device is in operation, a call service system controls the strength of sent-out RF signal.

Russian National Standards (GosStandart)

AutoGRAPH-GSM/SL on-board vehicle tracking controllers are designed on the basis of TU 6811-002-12606363-2013 and comply with the following standards:

- GOST R MEK 60950-2009. Information Technology Equipment. Safety.
- GOST R 51318.22-2006. Electromagnetic Compatibility of Technical Equipment. Information Technology Equipment. Man-Made Radio Disturbance. Limits and Methods of Measurement.
- GOST R 51318.24-99. Electromagnetic Compatibility of Technical Equipment. Immunity of Information Technology Equipment. Requirements and Test Methods.
- GOST R Certificate of Conformity: GOST R № ROSS RU.MN11.H07574.
- TR CU Certificate of Conformity: TS RU D-RU.AI30.B.00059.

Exposure to Electromagnetic Fields

The design of the AutoGRAPH-GSM/SL on-board vehicle-tracking controller complies with the following national and international standards, which specify the safe levels of exposure to radiofrequency electromagnetic fields:

- Ministry of Information Technologies and Communications of the Russian Federation. Regulations for application of user equipment (user radio stations) within GSM-900/1800 mobile telecommunication networks, approved under Order of Ministry of Information Technologies and Communications of the Russian Federation No. 114 dated September 20, 2005 (registered with Ministry of Justice of the Russian Federation on Sep. 28, 2005 under No. 7045).
- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR part 2 sub-part J.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95.
- Institute of Electrical and Electronic Engineers (IEEE) C95 1-1999 Edition.
- National Council on Radiation Protection and Measurements (NCRP) of the United States, Report 86, 1986.
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- National Radiological Protection Board of the United Kingdom 1995.
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999.
- Australian Communications Authority Radiocommunications (Electromagnetic Ra-

diation - Human Exposure) Standard 1999 (applicable to wireless phones only).

In order to ensure the best communication quality and compliance with the safety standards stipulated by the abovementioned documents, the equipment operating rules must be followed.

Antennas

Use only original supplied antennas. Antennas that have been modified may damage the device or cause violations of statutory rules and regulations.

DO NOT touch the GSM antenna of the device while it is in operation. This can impair communication quality and give rise to an undesired increase in radiated power.

DO NOT touch the GPS antenna of the device while it is in operation. This can impair the quality of reception and result in inaccurate positioning.

DO NOT use a device with a defective antenna. If there are any defects in antenna or antenna cable, replace the antenna or consult your local dealer as soon as possible.

Electromagnetic Interference and Compatibility

Almost any electronic device is subjected to electromagnetic interference unless it is adequately shielded, has proper construction or is compatible with devices operating in another frequency band.

Prohibition on Use of Mobile Communication Devices

If you come across a signage or a notice, which prohibits the use of mobile communication devices, turn off your tracker. This is required to avoid electromagnetic interference with equipment sensitive to electromagnetic fields often used in hospitals, health care institutions or petrol stations.

Medical Devices

Cardiac Pacemakers

Medical Device Manufacturers Association advises to use mobile communication devices at distances greater than 15 cm from cardiac pacemaker so as to prevent the failure of the latter. These recommendations conform to the studies carried out by independent medical laboratories and Research Centre for Wireless Technologies.

Hearing Devices

Sometimes, use of mobile communication devices may cause troubles for wearers of certain hearing devices. In this case, consult the manufacturer of your hearing device to select another model.

Other Medical Devices

For other personal medical devices, contact your physician or device manufacturer to find out whether your device is adequately shielded from electromagnetic interference generated by mobile communication devices.

General Information on Safe Use

Explosion Hazard Zones

SWITCH OFF the device when entering the explosion hazard zone. Explosion hazard zones include: fuel stations, box girder decks on sea vessels, facilities or plants for handling and storage of fuels or chemicals, areas with chemicals or solid particles such as grains, dust or metal powder in atmosphere; and any other locations where it is usually required to shut off a vehicle's engine. Explosion hazard areas are often (yet not always) expressly marked.

Blasting Areas

In order to avoid interference with blasting operations, SWITCH OFF the device in blasting areas or in any locations marked with "Two-way radio-communication is prohibited" signage. Observe the signage instructions and rules.

Basic Information

The AutoGRAPH-GSM/SL on-board vehicle tracking controller is a portable electronic recorder which tracks all movements of a vehicle by recording the time and the route in the form of geographic coordinates received from the satellites of global navigation system GPS (NAVSTAR) or GLONASS.

In addition to coordinates, the device records a number of other parameters: speed, direction of movement, event counters, etc., as well as the states of digital inputs of the controller, external sensors and data buses.

Collected data is transferred by a GSM 900/1800 mobile network operator by means of General Packet Radio Service (GPRS) to the dedicated server where they become available via the Internet for further analysis and processing by the AutoGRAPH Dispatch Software. The tracker may be used for any type of vehicles.



Data transfer is possible only when GSM 900/1800 mobile network operator, which supports General Packet Radio Service (GPRS), is available.

Technical Specification

| Description | Value |
|---|----------------------------------|
| Receiver type | uBlox MAX-M8Q |
| Supported GNSS | GPS + GLONASS / GALILEO / Beidou |
| Channels | 72 |
| Autonomous A-GPS | Yes |
| Differential GPS (D-GPS) | Yes |
| Communication | GSM (GPRS / SMS) |
| SIM holders | 2 |
| Type of antennas (GPS/GLONASS, GSM) | External |
| Connection to PC | USB 2.0 |
| Internal FLASH memory, records | > 270,000 |
| Digital inputs, total number | 2 |
| High-impedance digital inputs, total number | 1 |

| Description | Value |
|---|--------------|
| Digital outputs, total number | 1 |
| Built-in accelerometer | Yes |
| RS-485 Bus (TIA / EIA-485-A) | 1 |
| CAN Bus (SAE J1939 / FMS) | 1 |
| Operating voltage, V | 10...50 |
| Maximum supply voltage, V | 60 |
| Power consumption at 12 VDC: – when writing data, mA – when transferring data, mA | 50 200 |
| Time to first position fix (typ.), s | 26* |
| Position accuracy*: – Position (typ.), m – Velocity (typ.), m/s | 2.0 0.02 |
| Operating temperature, °C | -40...+85 |
| Dimensions, mm | 65 x 50 x 20 |
| Weight, kg | 0,05 |
| Average life time, years | 10 |

* With nominal GNSS signal levels -130dBm.

Scope of Supply

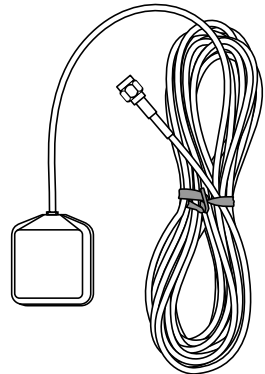
| No. | Description | Qty |
|-----|--------------------------------------|-----|
| 1 | AutoGRAPH-GSM/SL on-board controller | 1 |
| 2 | Interface cable | 1 |
| 3 | GPS/GLONASS antenna | 1 |
| 4 | GSM antenna | 1 |
| 5 | Fuse with a holder | 1 |
| 6 | Warranty certificate | 1 |



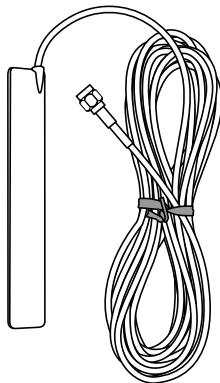
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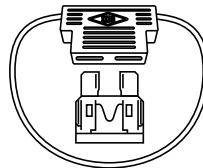
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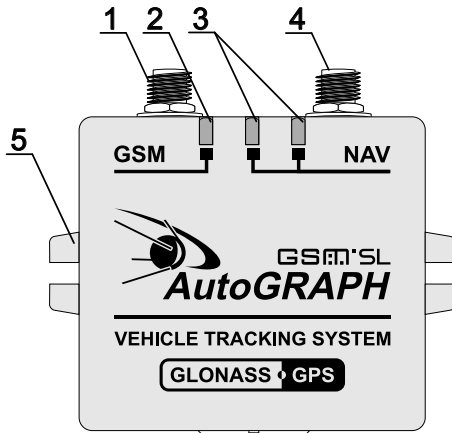


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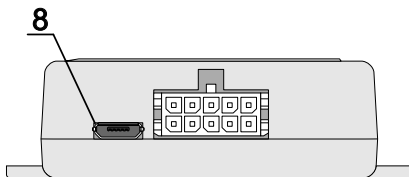
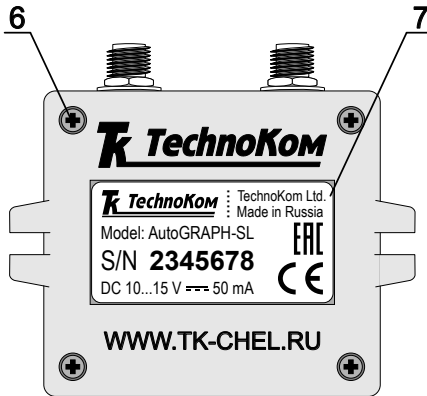


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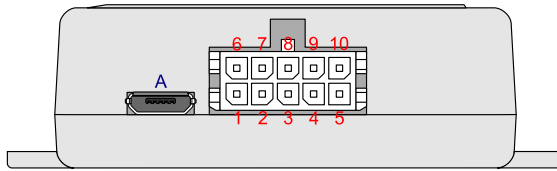
Components of AutoGRAPH-GSM/SL Controller



1. GSM antenna connector.
2. GSM LED.
3. GPS/GLONASS LEDs.
4. GPS/GLONASS antenna connector.
5. Mounting bracket.



Interface Connectors



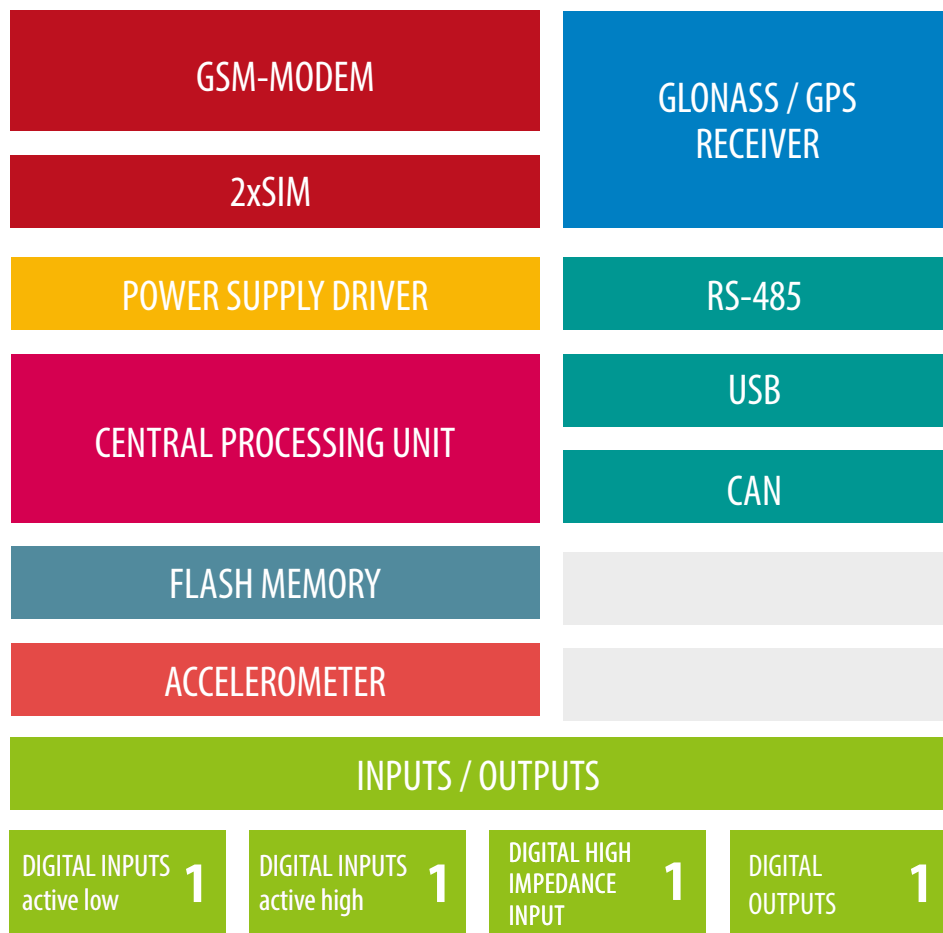
Primary interface connector

| № | Colour of a wire in a cable | Assignment |
|----|-----------------------------|------------------------------------|
| 1 | Red (long) | + Vin |
| 2 | Black | -Vin |
| 3 | Yellow | Digital input 1 (active low) |
| 4 | Brown with a white stripe | RS-485 (B) |
| 5 | Green with a white stripe | CAN (H) |
| 6 | Pink | High-impedance input (active high) |
| 7 | Gray | Open collector output 1 |
| 8 | White | Digital input 2 (active high) |
| 9 | Orange with a white stripe | RS-485 (A) |
| 10 | Yellow with a white stripe | CAN (L) |

Additional connectors

| ID | Assignment |
|----|--|
| A | Micro USB connector (programming / data reading / GPS mouse) |

Structure Diagram of AutoGRAPH-GSM/SL



GSM-modem

The GSM modem is intended to provide a connection between the controller and the GSM mobile network. The GSM signal is received and transmitted via an external GSM antenna. The controller is equipped with a SIM card to be identified by the GSM network and to be able to access the services provided by the mobile network operator. The GSM modem performs several functions:

- Enables the device to access the GSM network and to be identified by the network using the SIM card.

- Enables data exchange (including transfer of track points) between the AutoGRAPH-GSM/SL controller and the server via TCP/IP through the Internet by means of General Packet Radio Service (GPRS).

- Enables exchange of information using control SMS messages and USSD requests (for example, for subscriber's personal account monitoring).

GPS / GLONASS Module

The GPS module is designed using a 72-channel highly sensitive receiver. It receives coded signals by means of external active GPS/GLONASS antenna from the satellites of the Global Positioning System (NAVSTAR) and GLONASS, and uses its internal computer to determine the geographical coordinates of the receiver position, the exact time, speed and direction of movement. Received data is transferred via NMEA protocol from the GPS module output to the central processing unit for further processing.

Since the Fastrax IT530M module supports a hybrid navigation system, which combines two navigation systems, such as GPS and GLONASS, it is able to identify all visible satellites of both navigation systems automatically. As a result, the information being received is highly accurate and available even in the case of very poor visibility of satellites.

CPU

The central processing unit is the core of the AutoGRAPH-GSM/SL controller, which unites all of the system components together and ensures their interaction in accordance with the program stored in the device. The processing unit is a high-speed single-chip microcomputer able to perform computations of at a speed and accuracy level that is sufficient to meet various navigation and

service challenges. The custom firmware, developed by TechnoKom specialists, enables the CPU to receive data from the different modules of the system, to perform logical and mathematical processing of the data and to control the modules as appropriate. It should be noted that the functional capability of the controller firmware is being constantly enhanced and extended so as to provide users with new and improved features and options.

Non-Volatile FLASH Memory Module

The Non-Volatile FLASH memory module serves as a black box storage device to store the collected data. The FLASH memory module is designed to store up to 270,000 records for up to 10 years – even when the device is powered off. The FLASH memory module in the AutoGRAPH-GSM/SL is built on the basis of the ring buffer principle. This means that new records will be written over the oldest records first, ensuring that the most recent data is always available.

Power Supply Driver

The power supply driver with protection circuits generates all of the necessary supply voltages for controller components. The primary power supply input ensures operation at vehicle system voltage of 10-30 V, which makes it possible to use the controller on the majority of vehicles without employing any additional voltage regulation.

Furthermore, the power supply driver protects the controller against polarity reversal, voltage overload, interference, etc. A resettable fuse is installed in the supply circuit of the printed circuit board in order to provide extra protection.



Long-term exposure of the controller to the maximum values of the supply circuit may cause irreparable damage to the protection circuits due to overheating or disruption. This may lead to failure of the device.

DO NOT exceed the maximum values stated.

Operating voltage range and maximum supply voltage values are specified in Technical Specifications section.

Inputs / Outputs

The I/O block is intended for monitoring and measuring the parameters of external equipment and devices, as well as for controlling of various actuators and warning devices.

The I/O block is divided into two sections:

Digital inputs.

These inputs have two states: “1” and “0”, and are able to show a change of input state, count pulses and measure frequency. The tracker has one active low and one active high digital inputs.

Logic of the discrete inputs operation is shown in the table below:

| Physical state of the input | Logic state | |
|------------------------------------|------------------|-------------------|
| | Active low input | Active high input |
| High (connected to supply voltage) | 1 | 1 |
| Open-Circuit | 1 | 0 |
| Low (connected to ground) | 0 | 0 |



Note that logic states of the two inputs differ in open-circuit state (see the table above). This must be taken into account when making connections.

Furthermore, the controller is equipped with one digital high-impedance active high input with logic levels independent of the supply voltage of the device connected to this input.

Operation modes of the digital inputs are fully configurable and include:

- **Normal input.** In this mode, the digital inputs are monitored. When the input state changes, the time and location data is stored into the device memory. Normal 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.
- **Storage counter.** 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.
- **Periodic counter.** This mode is intended for counting of pulses within one minute. Periodic counter mode is used for receive 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 connecting 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.** This mode is intended for sensors with frequency outputs. The device is capable of measuring frequencies of 0 – 1,500 Hz. Frequency mode is used, for example, for fuel level sensors with frequency outputs, engine and shaft speed sensors, proximity sensors etc.

Digital output

Digital output is intended to control various external actuators, as well as to activate warning devices. The controller has one programmable open collector digital output. Controlling of the discrete output (monitoring of its state) may be performed by means of control SMS messages or commands transmitted by the server via GPRS. Using control commands, the customer can either switch the output state, which will be held up till the next control command, or send a pulse of a certain duration (from 1 to 10 seconds) to switch the output on for the pulse duration.

Furthermore, the discrete output may serve to indicate cases of exceeding speed limits, acceleration, entry to and exit from control points, enabling of security functions etc.



For detailed information on control commands see the “Control and configuration commands for AutoGRAPH-GSM” document.

Accelerometer

The AutoGRAPH-GSM/SL is equipped with 3-axis digital accelerometer with wide range of full scales from $\pm 2g$ to $\pm 16g$ intended to detect motion, determine the tracker’s orientation, measure vibration level, etc. The tracker can be set up to send a notification to a preset telephone number or data to a preset server, when detecting the acceleration exceeding a preset threshold.

USB Port

The USB port embedded into controller is intended to:

- configure and check the performance of the controller by means of the configuration program – GSMConf;
- read data from the device so as to deliver them to the AutoGRAPH Dispatch Software;
- update processor microcode (firmware) of the device;
- use the controller in the “GPS mouse” mode.

When using the device as a GPS mouse, the tracker, which is connected to the USB port of a PC, laptop or PDA with a data cable via virtual serial port (COM port), transmits the location data in RMC format through the NMEA protocol once per second. This enables the users to locate the object equipped with an AutoGRAPH-GSM-SL using software such as OziExplorer, Google Earth Plus/Pro, 2GIS for PC 3.0, Garmin, Navitel and many others. For details please refer to “Using the GPS mouse” document.



For detailed information on GPS mouse mode see “AutoGRAPH-GSM controller: GPS mouse mode” document.

CAN Bus (SAE J1939/FMS)

The CAN bus is an industrial network standard primarily designed for interconnection of various actuators and sensors in a single network. It is used in the automotive industry as a management and control line. The CAN interface of the controller may be connected to the CAN bus of a vehicle and is intended for use with SAE J1939 / FMS standard protocol. This standard is widely used in vehicles of well-known truck manufacturers, such as SCANIA, MAN, VOLVO, DAF, IVEKO, RENAULT, MERCEDES (DaimlerChrysler), KAMAZ and MAZ trucks of latest models etc. Use of the two-wire CAN bus enables quick connection and allows access to a great number of parameters directly from the sensors of vehicles.

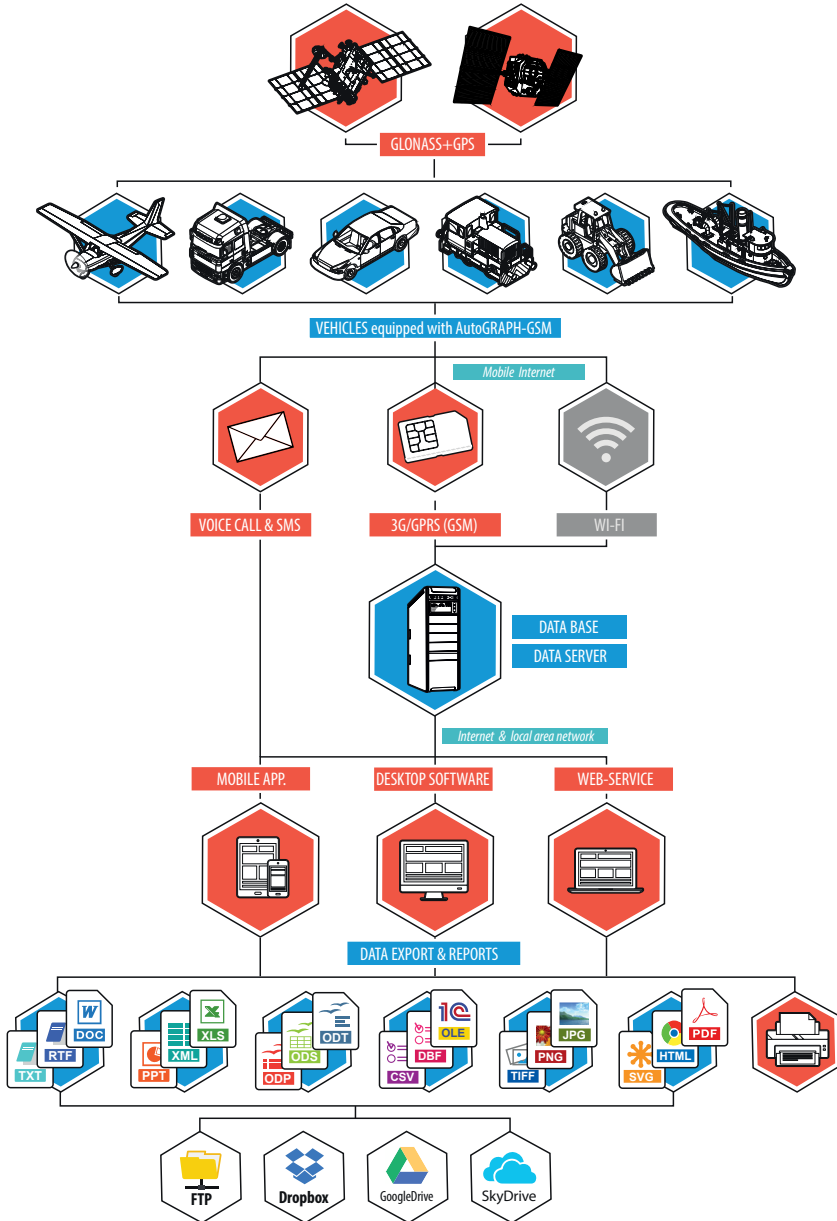
Using the CAN bus, the following information would become available: vehicle speed, cruise control status, accelerator pedal position, brakes and clutch switch statuses, fuel consumption, fuel level in tanks (up to 6 sensors), engine speed, service distance, engine hours, engine coolant temperature, oil and fuel temperatures, total vehicle distance and vehicle distance per day and axle weight. Furthermore, it enables monitoring of some custom parameters not covered by SAE J1939 / FMS standard.

RS-485 (TIA / EIA-485-A)

RS-485 (TIA / EIA-485-A) is a data transfer standard for data transmission via a two-wire serial channel. This bus serves to simultaneously connect up to 32 different devices and sensors compatible with the controller's software (firmware) by two wires. The bus enables users to connect up to 8 fuel level LLS sensors, as well as Escort-TD, Strela-D485, DUT-E-485, DT7.3-06, UZI-1.x and other sensors, and some extra expansion modules to extend the controller's functions, e.g. display for indication and messaging with a vehicle driver, passenger traffic metering unit, expansion modules for discrete and analog inputs, barometrical altimeter, RS-232/RS-485 converters, etc.

The RS-485 port of the AutoGRAPH-GSM/SL controller supports MODBUS protocol that enables the users to connect the controller to the thermal sensors, which transmit data via this protocol.

Brief Description of Vehicle Tracking System Operation



AutoGRAPH-GSM/SL controllers installed on vehicles constantly receive coded signals from Global Positioning System (NAVSTAR) and GLONASS satellites. These signals are used to determine exact coordinates of the vehicle location.

The coordinates are written to the non-volatile memory of the AutoGRAPH-GSM/SL controller, either on a regular basis or adaptively. Furthermore, the storage memory records and stores the statuses of various sensors connected to the tracker or data buses, and other parameters required by the software.

Either on a regular basis or upon occurrence of a preset event, the collected data is transferred to the dedicated AutoGRAPH server over the Internet using General Packet Radio Service (GPRS) supported by a GSM mobile network operator.

The server is a computer running Microsoft Windows Server or Linux/FreeBSD with an Internet connection, permanent IP-address and reliable data storage device. The server is responsible for receiving data from AutoGRAPH-GSM/SL controllers, storing the data and transmission upon request to the dispatcher stations. Key files are used to provide data access security on the server.

Dispatcher workstations are personal computers or laptops with the AutoGRAPH dispatch software installed (and with the key files required for particular vehicles) that has either Internet access or server connection via LAN. An Internet connection and computer with the Dispatch Software will enable users to obtain data from anywhere in the world. Easy deployment of the Dispatch Software without the need to install third-party database support enables users to immediately create new dispatcher workstations with any PC running MS Windows 2000/XP/Vista/7/8. The number of workstations is unlimited. The Dispatch Software is completely free of charge and the latest version may be downloaded from the

official website of TechnoKom: <http://www.tk-chel.ru>.

Mobile users can easily track vehicle movement in real-time using WEB based AutoGRAPH.WEB Dispatch Software run on any mobile device connected to the Internet.

Upon the user's request or on a regular basis the dispatcher workstation connects to the server to update data on vehicles. Depending on the AutoGRAPH server software version, access to the data is offered by means of the key files stored in the dispatcher workstation or using personal login and password. The received data is stored in a local folder on the dispatcher workstation that enables processing of the data without being connected to the server. Furthermore, to reduce the web traffic, the dispatching network may be organized in such a way as to send any missing data through the Internet to only one workstation, while all other users may use these downloaded data via LAN by retrieving them from the local data folder of the workstation. The users may use this data to track the vehicles on a map, browse through various parameters, events and readings of various sensors. In addition, it is possible to generate various types of reports and charts both for each particular vehicle and in groups.

To interact with various external applications and handlers (including 1C), the AutoGRAPH Software incorporates OLE server application (COM server) which enables data exchange between the AutoGRAPH Software and the programs written in the majority of existing programming languages which support OLE-enabled data exchange, as well as programs and systems based on their own embedded programming language (1C Enterprise, MS Office, various databases, etc.). Furthermore, there is an option to upload all tracking data and reports in the form of MS Excel, DBF and CSV files, as well as to use an external customizable reporting module which allows users not only to generate a large number of reports with fully customized layout, data and

charts to be presented, but also to save them in many different formats to enable further processing, sending or presentation: PDF, Open Office ODS, Open Office ODT, MS Excel (OLE), MS Excel (XML), XML, RTF, HTML, TEXT, CSV, BMP, JPEG, TIFF, GIF.

Among other things, dispatcher workstations can change a range of the AutoGRAPH-GSM/SL parameters by sending control SMS commands via a data server or using a

mobile phone, that enables them to perform polling and flexible configuration of the system without taking the controllers out of the vehicles.

Control SMS commands and preset events enables sending of vehicle location coordinates and various notification messages to an ordinary cell phone of GSM standard by means of SMS messages.



It should be noted that this brief description covers just one of the simple operation schemes of the vehicle tracking system based on AutoGRAPH-GSM/SL hardware and software. The device has a range of customizations available to tailor the product to the users' needs.



There are various third-party software solutions that can be interfaced with the AutoGRAPH-GSM/SL, which may support some specific functionality.



To obtain detailed information on the implementation of particular features for customization of the monitoring system in accordance with your needs, please contact your regional authorized representative of TechnoKom and the manufacturer's technical support service.

Connection of AutoGRAPH-GSM controller

This section covers connection procedures of the AutoGRAPH-GSM/SL controller:

- Installation of a SIM Card
- Connection of a GPS/GLONASS antenna
- Connection of a GSM antenna
- Power supply connection
- Digital input connections
- Output connection
- RS-485 bus (TIA / EIA-485-A) connection
- CAN bus (SAE J1939 / FMS) connection

To make the device ready for the simplest operation scheme it would be sufficient just to install a SIM card, GPS/GLONASS and GSM antennas, and to connect a device to a power supply source.

However, the hardware and software of the AutoGRAPH-GSM/SL controller includes an extensive range of features and capabilities, which allow for easy configuration, customization and adaptation of the system to the needs of the user.

Application of digital inputs and data buses enables permanent monitoring of various parameters (for example, fuel consumption and fuel level), as well as to monitor operating conditions and performance of external equipment and devices and to promptly respond to various events (for example, to the pushing of an alarm button). The output of the controller enables the device to control various actuators and warning devices. All of these features allow the creation of diverse variants of the system able to perform monitoring of a great number of parameters and to respond to various events.

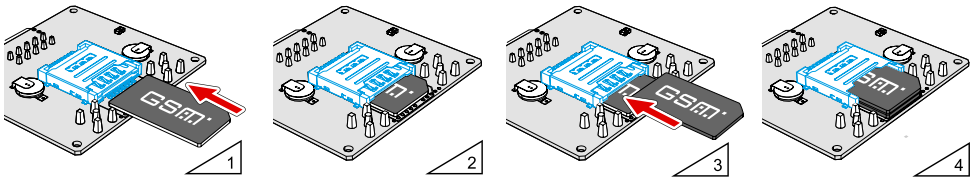
The following sections focus on basic connection diagrams of various interfaces, inputs and outputs of the AutoGRAPH-GSM/SL controller.

Installation of SIM-cards

In order to connect the AutoGRAPH-GSM/SL controller to the GSM mobile network, it is necessary to install one or two SIM cards.

To insert SIM-cards:

- Unscrew the four fastening screws and remove the back cover of the tracker.
- The AutoGRAPH-GSM/SL supports two SIM cards.
- Insert a SIM card in the lower retaining slot of the SIM card holder with the card's contacts facing the PCB (see fig.1). Be sure that the card's keying matches the key on the PCB (see fig.2).
- If necessary, insert a second SIM card in the upper retaining slot of the SIM card holder with the card's contacts facing the PCB (see fig.3). Be sure that the card's keying matches the key on the PCB (see fig.4).
- When the SIM cards are connected place the back cover back and tighten the four fastening screws.



The SIM card installed in the lower retaining slot of the SIM card holder is the primary card. When switched on, the AutoGRAPH-GSM/SL controller will operate with this SIM card. The SIM card installed in the upper retaining slot of the SIM card holder is the backup card. The tracker will switch to the backup SIM card when the primary one is unavailable (disabled, damaged or not inserted).



Always ground yourself before handling the PCB i.e. by wearing an ESD wrist strap or touching a metal computer chassis.



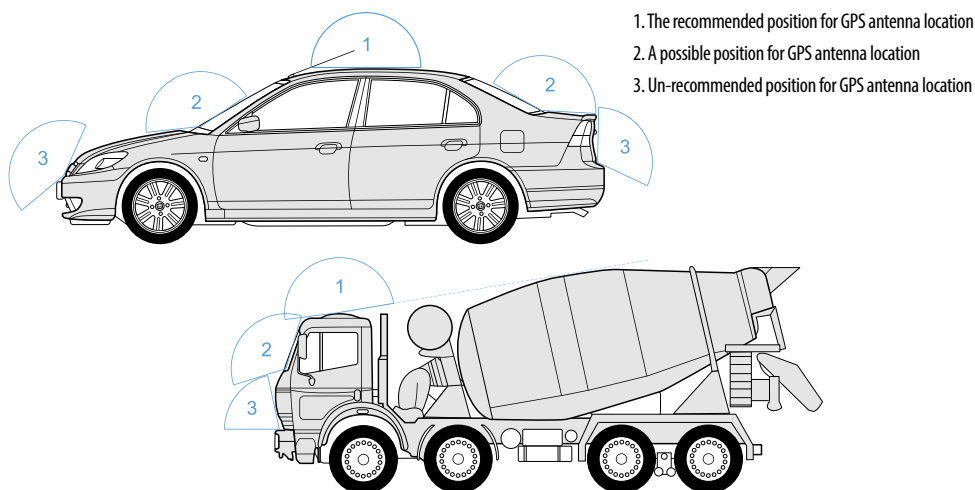
Do a test of a new SIM card in a cell phone before you install it into the controller. This ensures that GPRS / SMS / USSD services are enabled and operate properly, the PIN code matches the code preset in the controller (in order to prevent locking), and a personal account associated with the SIM card has the sufficient balance for successful operation of the services.

Installation of a GPS/GLONASS Antenna

The controller is supplied with magnetic mounted waterproof, active GPS/GLONASS antenna. The GPS/GLONASS antenna is connected to the connector in the upper-right part of the AutoGRAPH-GSM/SL controller.

The position of the GPS/GLONASS antenna is critical to goof performance of the GPS receiver, therefore, it is highly recommended to plan the antenna's position on a vehicle before installation.

The antenna should be located in an open area, which shall ensure free GPS signal transmission; its active surface should face the sky and be parallel to the celestial sphere. Possible variants are illustrated in the figure below:



When locating the antenna make allowance for the length of its cable. When laying the cable, avoid sharp edges. Cable bend radius should be at least 10 cable diameters (about 3...5 cm).

Do not fix antenna before you make settings and configure your system, it is highly recommended to determine its final position and install only when you are absolutely sure that the system is configured and operates properly.



Do not splice or cut the antenna cable.

Installation of a GSM Antenna

The AutoGRAPH-GSM/SL controller is supplied with a flat GSM antenna. The antenna has an adhesive coating for it to be stuck to the window.

The GSM antenna is connected to the connector in the upper-left part of the AutoGRAPH-GSM controller.

The position of the GPS/GLONASS antenna is critical to good performance of the GSM and GPRS communication; therefore it is highly recommended to plan the antenna's position on a vehicle before installation.

The antenna should be located in an open area, which shall ensure free GSM signal transmission.

Wipe the window surface with the cloth supplied with the antenna before you attach the GSM antenna. If antenna is supplied without a cloth, clean the window surface with any cloth damped with alcohol-based liquid before sticking the antenna.



When locating the antenna make allowance for the length of its cable. When laying the cable, avoid sharp edges. Cable bend radius should be at least 10 cable diameters (about 3-5 cm).



Do not fix antenna before you make settings and configure your system, it is highly recommended to determine its final position and install only when you are absolutely sure that the system is configured and operates properly.



Do not splice or cut the antenna cable.



In order to avoid cross-talk effects place the GSM and GPS antennas at least 50 cm away from each other.

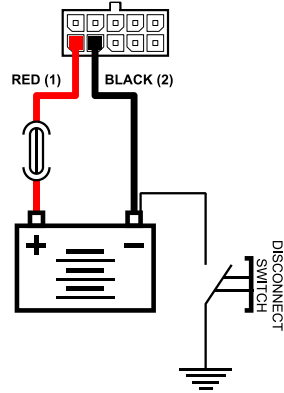
Power Supply Connection

The AutoGRAPH-GSM/SL controller is connected to the power supply source through the interface cable supplied with the device. The device is supplied with a fuse intended to provide a short circuit protection of power supply. The fuse holder is installed on a wire ring, which should be cut before operation.

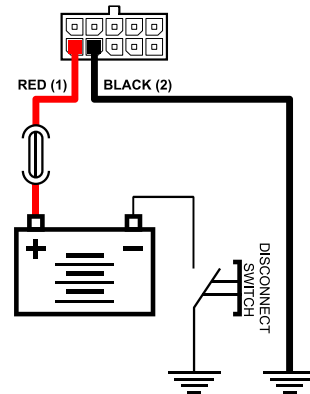
When making connections, pay special attention to the safety rules stipulated by the regulations for motor vehicle repair procedures. All connections should be properly isolated and securely connected. If the wire is too short, it can be spliced with a wire of at least 0.5 mm² cross section (20 AWG or thicker).

The power supply input of the controller is rated for the vehicle system operating voltage of 10-30 V DC.

Power can be fed to the controller either before or after the vehicle's battery disconnect switch.



Power connection before disconnect switch



Power connection after disconnect switch



If power is connected before the vehicle battery disconnect switch, the controller shall always be ON, therefore, it is highly recommended to use adaptive position recording for this case so as to minimize an amount of data to be transferred, as well as to reduce GPRS and web traffic.



The fuse should be placed as close as possible to the point where the AutoGRAPH-GSM/SL is connected to the vehicle power system.

Connection of Digital Input 1 (active low)

The AutoGRAPH-GSM/SL controller has one active low digital input (pin 3 on the interface connector).

This input has two states:

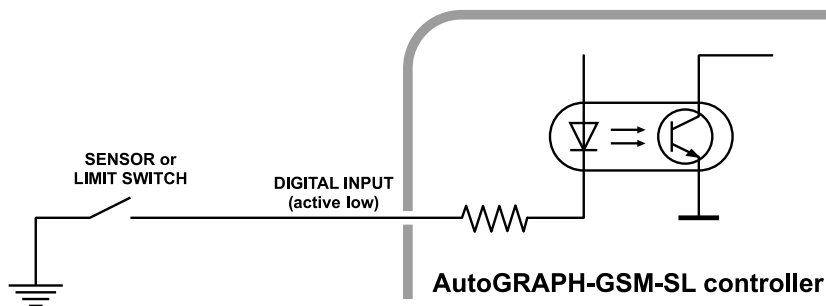
logical “1”, when the input is connected to the supply voltage or open-circuit.

logical “0”, when the input connected to the ground.

The input is able to show change of the input state, count pulses and measure frequency and is intended for connection to various dry contact sensors.

Ensure that the sensors are in good order and able to maintain reliable operation. The manufacturer shall not bear any responsibility for correct state recording of these sensors (chatter, loss of contact and etc.).

Internal Connection Diagram for Active Low Digital Input



It should be noted that all voltage levels of active low digital inputs under 5 V shall be considered to be logical ‘0’, while all voltage levels above 6 V shall be considered to be logical ‘1’. If the input is disconnected it shall denote logical ‘1’.



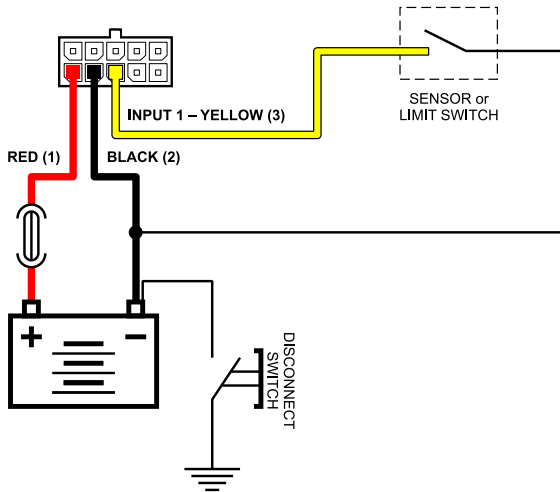
The active low digital input can be used to connect an emergency oil pressure relief sensor to control the engine performance. In this case, the AutoGRAPH dispatch software shall enable metering of engine hours and application of various filters related to the engine’s operating time. For example, “Skip the coordinates” filter when the engine is shut down reduces traffic and filters coordinate drift at stops when the engine is not running.

External Connection Diagram for Active Low Digital Input

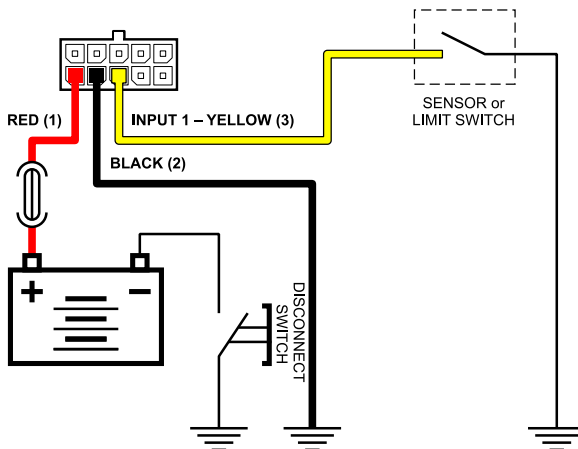
The external connection diagram for the active low digital input can vary depending on the position of the vehicle battery disconnect switch in the circuit (see Power Supply Connection diagrams).

This is due to the fact that when the sensors are connected to the vehicle body (after vehicle battery disconnect switch option), and the disconnect switch opens, the tracker will not be able to record sensor states on the digital input 1 correctly.

Connection Diagram for Active Low Digital Input “Before Disconnect Switch” Option:



Connection Diagram for Active Low Digital Input “After Disconnect Switch” Option:



Connection Diagram for Active Low Digital Input Inductive Load Circuit:

Sometimes, it is necessary to integrate the controller's digital input into a circuit with an inductive load, such as a relay winding, solenoid valve or any other device that has an inductance coil.

When an inductive load is being disconnected, stored current must be dissipated, this causes a self-induced electromotive force of inversed polarity (back EMF) that may damage the controller.

To prevent this, use one of the following protection options if an inductive load is being applied to the controller:

1. Protective diode (fig. 1) – to be installed in parallel to the inductive load. In this case, forward current of the protective diode (I_{fw}) should be at least $1.5 \cdot I_{\text{holding, coil}}$. If the coil holding current is unknown or uncertain, use the option with safety relay protection.

2. Safety relay (fig. 2) – to be installed in parallel to the inductive load. In this case, the safety relay contacts are used for closing the controller's input on ground.

Figure 1.

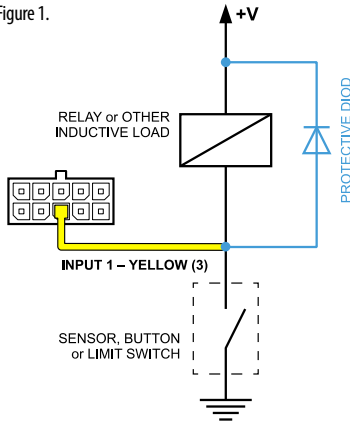
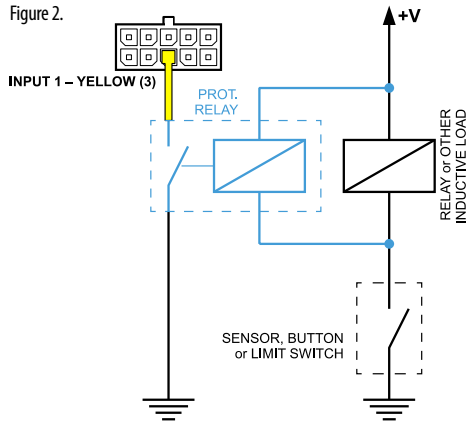


Figure 2.



You may use following protective diodes: KD212, KD116-1 or similar.



Use may use safety relays designed for switching of direct current circuits with voltage rating compatible with the vehicle system voltage. For example, relays of 901.3747 type manufactured by AVAR, AQ, (www.ellink.ru/co/avar) for a vehicle system voltage of 24 V.

Connection of Digital Input 2 (active high)

AutoGRAPH-GSM/SL controller has one active high digital input (pin 8 on the interface connector).

This input has two states:

logical "1", when the input is powered by supply voltage;

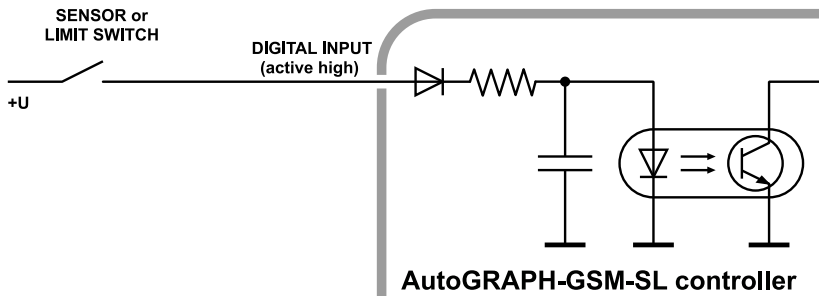
logical "0", when the input is connected to the ground or open-circuit.

The input is able to show change of the input state, count pulses and measure frequency and is intended for connection to various dry contact sensors. Ensure that the sensors are in good order and able to maintain reliable operation. The manufacturer shall not bear any responsibility for correct state recording of these sensors (chatter, loss of contact and etc.).

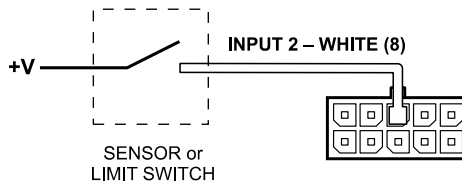


It should be noted that all voltage levels of digital inputs on "+" under 5 V will be considered to be logical zero ('ground'), while all voltage levels above 6 V shall be considered to be logical "1" ('+'). If the input is open-circuit it shall denote logical "0".

Internal Connection Diagram for Active Low Digital Input



External Connection Diagram for High Active Digital Input



Connection Diagram for Active High Digital Input Inductive Load Circuit

Sometimes, it is necessary to integrate the controller’s digital input into a circuit with an inductive load such as a relay winding, solenoid valve or any other device, which has inductance coil.

When an inductive load is being disconnected, stored current must be dissipated, this causes a self-induced electromotive force of inversed polarity (back EMF) that may damage the controller.

To prevent such breakdown, use one of the following protection options, if an inductive load is being applied to the tracker:

1. Protective diode (fig. 1) – to be installed in parallel to the inductive load. In this case, forward current of the protective diode (I_{fw}) should be at least $1.5 \cdot I$ holding, coil. If the coil holding current is unknown or uncertain, use the option with safety relay protection.

2. Safety relay (fig. 2) – to be installed in parallel to inductive load. In this case, the safety relay contacts are used for closing the controller’s input on supply voltage.

Figure 1.

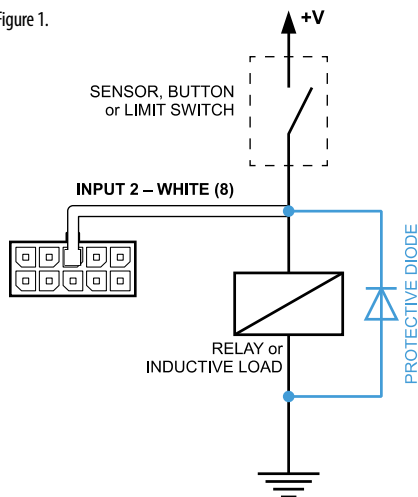
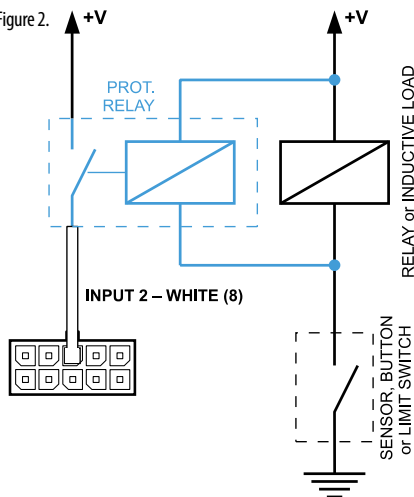


Figure 2.



You may use following protective diodes: KD212, KD116-1 or similar.



Use may use safety relays designed for switching of direct current circuits with voltage rating compatible with the vehicle system voltage. For example, relays of 901.3747 type manufactured by AVAR, AO, (www.ellink.ru/co/avar) for a vehicle system voltage of 24 V.

Connection of High-impedance Digital Input

The AutoGRAPH-GSM/SL controller has one high-impedance input (pin 5 on the interface connector).

It is a high-impedance active high digital input intended to connect a device with a voltage output to the tracker.

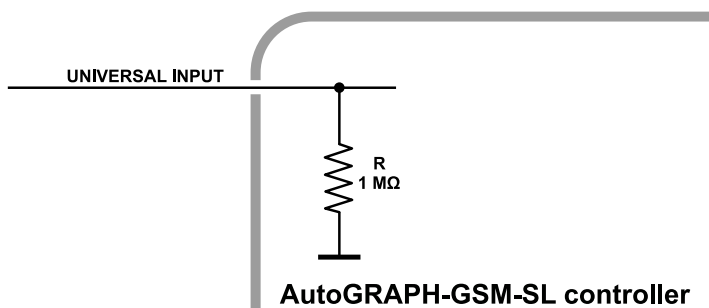
The high-impedance input has two states:

logical "1" – when input voltage is greater than 7 V;

logical "0" – when input voltage is lower than 3 V.

If the high-impedance input is open-circuit it shall denote logical "0".

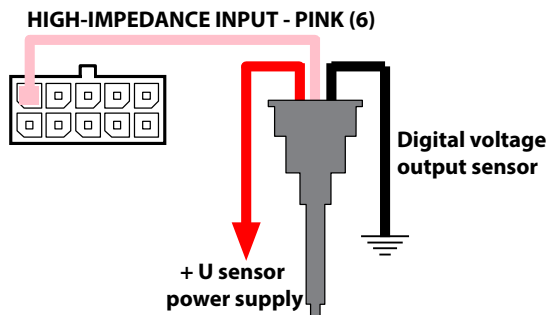
Internal Diagram of High-impedance Input:



The input resistance of the high-impedance input is 1 mega-ohm (1MΩ).

The cut-off frequency of the input low-pass filter is 5,000 Hz.

Internal Diagram of High-impedance Input:



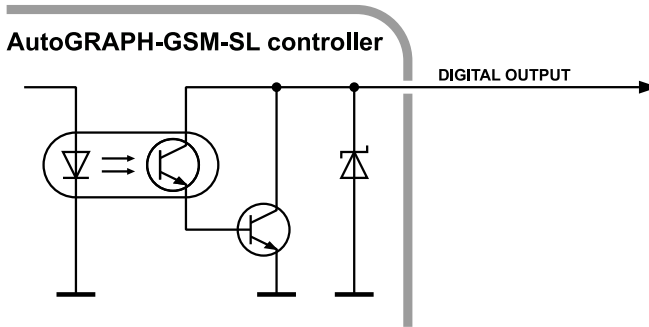
Connection of Output

The AutoGRAPH-GSM/SL controller has one open collector digital output. The output of the controller is intended to control various external actuators, as well as to activate warning devices.

Minimum recommended load current is 10 mA.

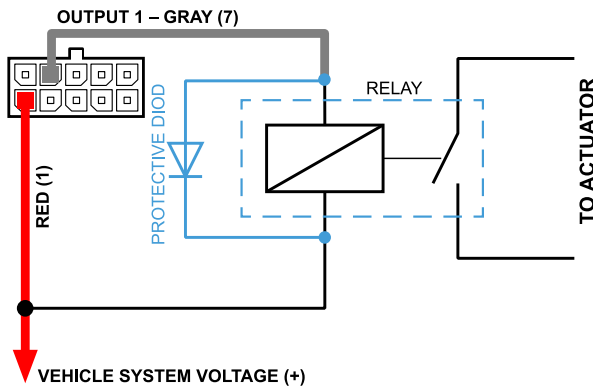
Maximum load current should not exceed 500 mA.

Internal Diagram of the Controller Output:



Output Connection Diagram:

The following is an example of a relay connected to the controller output. To avoid damage of the controller output due to back EMF, induced from disconnecting an inductive load, connect a protective diode in parallel to the relay. To select a correct diode make sure that direct current of this protective diode is at least 1.5 times greater than the relay holding current.

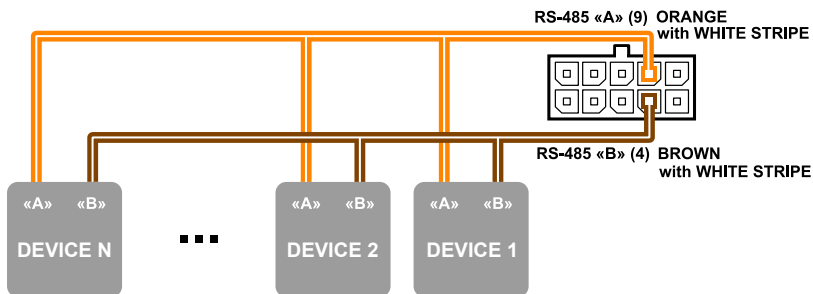


RS-485 Bus (TIA / EIA-485-A)

The AutoGRAPH-GSM/SL controller is equipped with an RS-485 (TIA/EIA-485-A) interface. This is one of the most commonly used industrial standards of communication. A network based on an RS-485 interface consists of transceivers connected with twisted pair wires. All devices are connected to one twisted pair in the same manner: non-inverting outputs (A) to one wire and inverting outputs (B) to another wire.

The AutoGRAPH-GSM/SL controller allows up to 16 devices to be connected simultaneously to one RS-485 bus. There are many sensors of all kinds, interfaces and expansion modules that are compatible with the tracker's firmware. Among such devices are: fuel level sensors (up to 8 sensors simultaneously), passenger traffic metering system, input expander, display for messaging with a vehicle driver, the AutoGRAPH-CR card reader, temperature sensors which support MODBUS protocol, etc.

General Block Diagram of Connection of External Devices to RS-485 Bus:



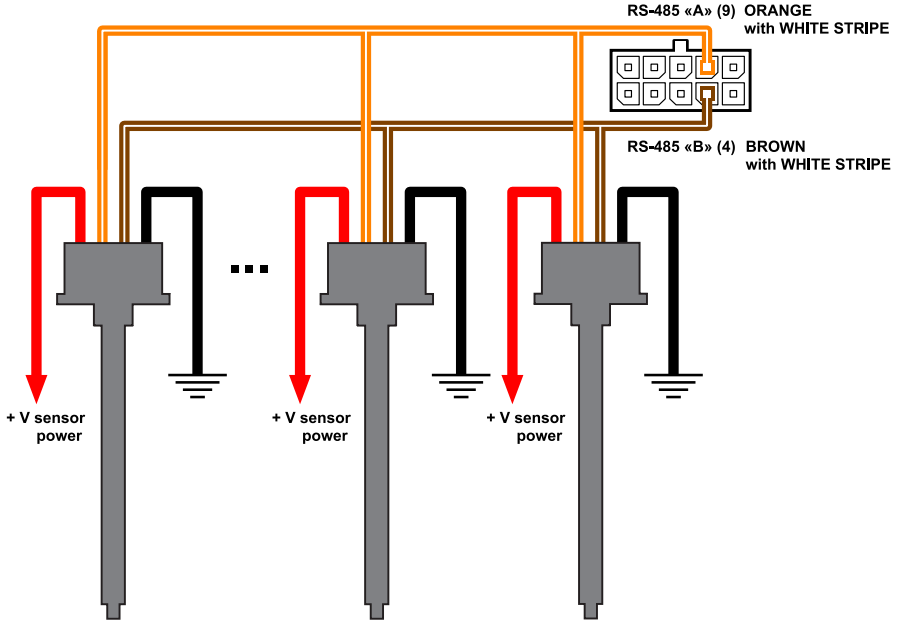
All connections should be made when the controller and all external devices to be connected to the RS-485 bus are disconnected from power supply.



Be careful not to mix up connections to "A" and "B" lines. If the lines are swapped, device may not operate correctly.

Connection of Fuel Level Sensors to RS-485 Bus

Currently, the AutoGRAPH-GSM/SL controller supports connection of any fuel level sensors with an RS-485 interface which use LLS protocol.



For more information on connection and configuration of the tracker for further operation with fuel level sensors through the RS-485 bus see "AutoGRAPH: RS-485 Bus (TIA / EIA-485-A)" document.

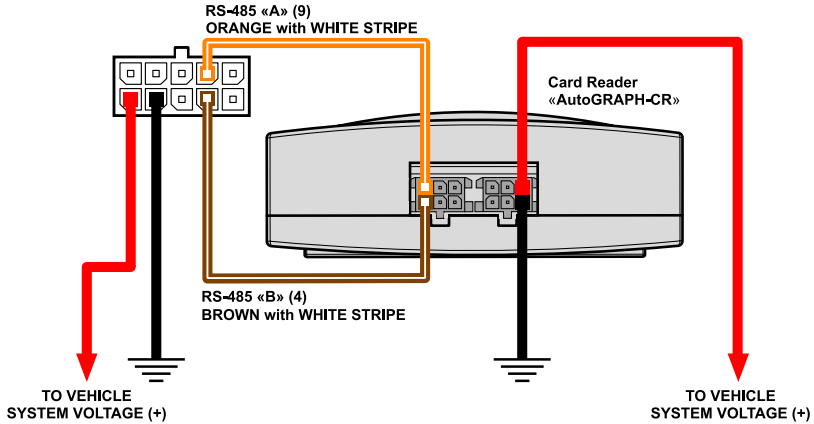


Before making any connections study the manuals for fuel level sensors supplied by the sensor manufacturers. Pay attention to the supply voltage range of the sensors and peculiarities of their configuration. Some sensors require external supply voltage stabilization. If you have any doubts on making connections or configuration, consult the representative of the sensor manufacturer or your regional TechnoKom dealer.

Connection of Fuel Level Sensors to RS-485 Bus

The AutoGRAPH-CR is designed for reading RFID and SIM cards.

The ID (identification number) of inserted card is transmitted to the AutoGRAPH-GSM/SL controller via the RS-485 bus. Up to 250 IDs can be stored in the flash memory of the Card reader. Each card can configure the output of the card reader when connected.

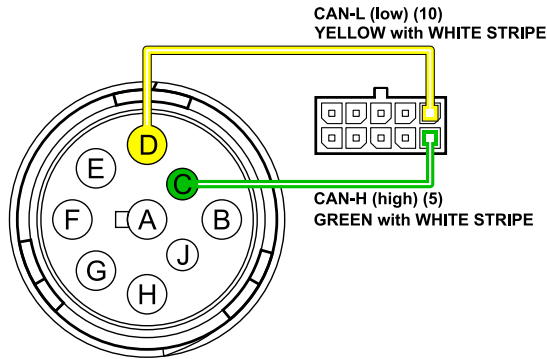


For more information on connection and configuration of controller for operation with information display through the RS-485 bus see "AutoGRAPH-CR User Manual".

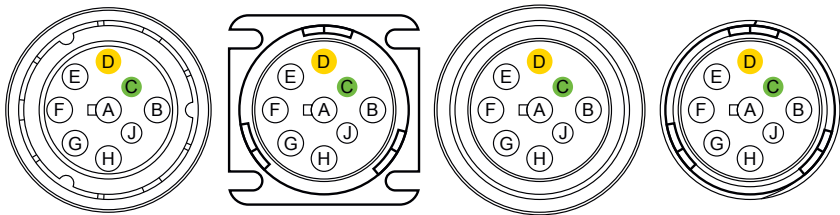
CAN BUS (SAE J1939 / FMS)

The AutoGRAPH-GSM/SL is equipped with CAN bus (SAE J1939 / FMS) provided to connect to CAN bus of a vehicle and read data. By default, the tracker supports SAE J1939 / FMS protocol of CAN, but advanced users can specify any CAN protocol in the tracker and read data using it. The protocol can be configured using the GSMConf program or control commands via an SMS and a data server.

Connection to CAN Bus (SAE J1939 / FMS)



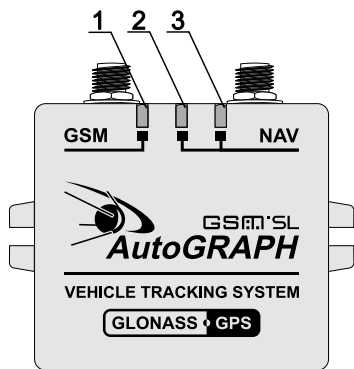
Typical Vehicle Connectors of SAE J1939-13 Standard



| Pin | Assignment (SAE J1939-13) |
|-----|--|
| A | Battery (-) |
| B | (+) Unswitched - with Unconditioned 10 A fuse |
| C | SAE J1939 CAN-H (high) |
| D | SAE J1939 CAN-L (low) |
| E | CAN-SHIELD (for SAE J1939-11) or No Connection (for ISO 11783-2) |
| F | SAE J1708 (+) |
| G | SAE J1708 (-) |
| H | Proprietary OEM Use or Implement Bus CAN-H |
| J | Proprietary OEM Use or Implement Bus CAN-L |

Indication of Operation

There are three LEDs on front side of the tracker intended to indicate operation of the tracker.



1. GSM LED (orange).

The LED indicates operation of GSM modem.

2. Bi-colour GPS/GLONASS LED (red and green).

The LED indicates the GPS / GLONASS receiver mode. If “GLONASS only” mode is set up, the LED will flash red. If “GPS (NAVSTAR) only” mode or mixed (GLONASS / NAVSTAR) mode is set up, the LED will flash red and green simultaneously.

3. A single-colour GPS/GLONASS LED (green).

The LED indicates a state of positioning.

Before switching the AutoGRAPH-GSM/SL on, connect GPS/GLONASS and GSM antennas to the controller.

- Power the controller up.
- Wait until the tracker starts up: the GSM LED flashes once every 3 seconds; the bi-colour GPS/GLONASS LED flashes once a second; green GPS / GLONASS LED lights constantly.
- Starting time takes approximately 23 seconds. If the tracker does not start for a long time, verify compliance with the operating conditions.

Indication of the GPS/GLONASS Receiver Operation

- **When powering up from the vehicle system voltage** both of GPS / GLONASS LEDs light up and go out after one second.
- **Upon normal operation**, the bi-colour LED flashes once a second. The single-colour LED is constantly green after positioning of the vehicle and goes out upon loss of signal from satellites.

Indication of GSM Module Operation

- **Searching for a network** – the GSM LED flashes once a second.
- **Normal connection to GSM network** – the GSM LED flashes once every three seconds.
- **The GSM module is not powered** – the GSM LED is OFF.

Error Indication

Both of GPS / GLONASS LEDs can be used for indication of the tracker's errors. When an error is detected the bi-colour GPS / GLONASS LED lights up in red, the single-colour GPS / GLONASS LED flashes green several times, after that the bi-colour LED goes out. Number of the flashing of the single-colour LED determines an error code.

| Number of flashing | Description of an error |
|--------------------|---|
| 1 | GSM modem turning on failure. Ensure, that SIM card is not damaged and correct PIN is entered |
| 2 | Flash memory failure |
| 3 | GSM modem power supply circuit is damaged |
| 4 | Firmware of the controller is damaged |
| 5 | Flash memory failure. Memory is protected |
| 6 | Flash memory failure. Memory is protected |
| 7 | SIM PUK is required. |
| 8 | SIM is not inserted. |

Operation with a PC

- **Memory cleaning** – the bi-colour GPS / GLONASS LED lights red constantly.
- **Data reading** – the single-colour GPS / GLONASS LED lights constantly.
- **Writing the settings** – the single-colour GPS / GLONASS LED flashes.



When the bi-colour GPS/GLONASS LED flashes green and red simultaneously, the customer will see a mix of the both colours.

Installing the Drivers

This section covers the procedure of installing the drivers of the AutoGRAPH-GSM/SL controller for Microsoft Windows 7 OS.



The AutoGRAPH-GSM/SL controller drivers required for Windows Server 2003, Vista, 7, 8, Server 2003, Server 2008 (x86 and x64) are free of charge and can be downloaded from the official website of TechnoKom: <http://www.tk-chel.ru>

To install the tracker drivers onto Microsoft Windows 7 OS:

1. Connect the tracker to your PC using the interface cable. The system will automatically search for new equipment (Fig.1). For proper operation, it is sufficient to install drivers for AutoGRAPH device. The AutoGRAPH CDC drivers are required for the tracker operation in the GPS-mouse mode.
2. If the Internet connection is available, Windows 7 will automatically connect to the Windows Update website and install suitable driver for the tracker. If the Internet connection is not available, continue with the procedure outlined below.
3. Download the archived drivers folder from the official website of TechnoKom - AGUSBDriver.zip and extract files to a temporary directory on a hard drive.
4. Launch the driver update wizard and select “Browse my computer for driver software” to search for drivers manually (Fig.2).

Figure 1.

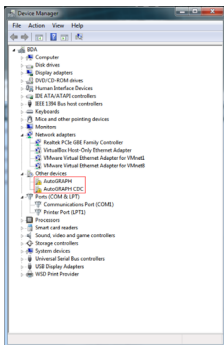
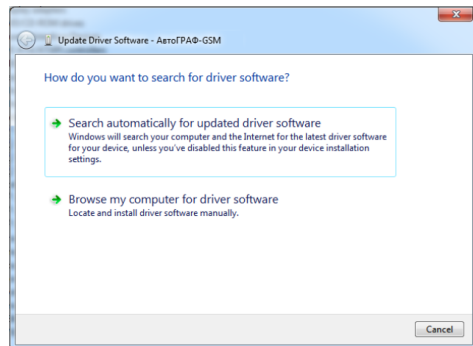


Figure 2.



5. Browse to the location where the drivers are saved (Fig.3).
6. Install the driver. When the driver is installed the system will automatically identify connected device (Fig.4).
7. If necessary, install drivers for the AutoGRAPH CDC device following the outlined instruction.
8. Drivers for the AutoGRAPH-GSM/SL are successfully installed. The device is ready to operate with troubleshooting utilities, dispatch software and other applications (Fig.5).

Figure 3.

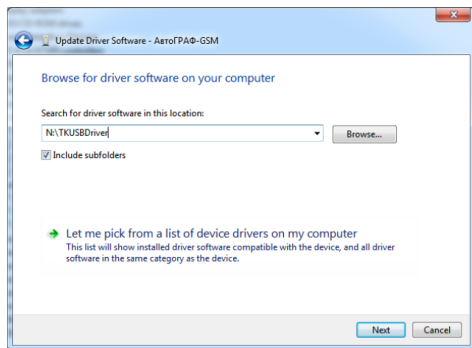


Figure 4.

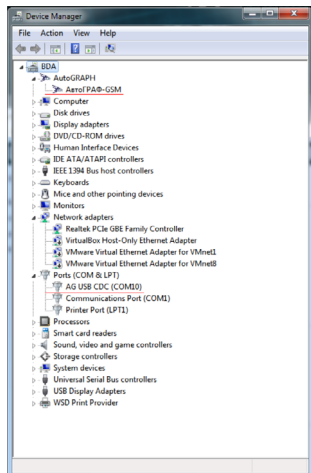
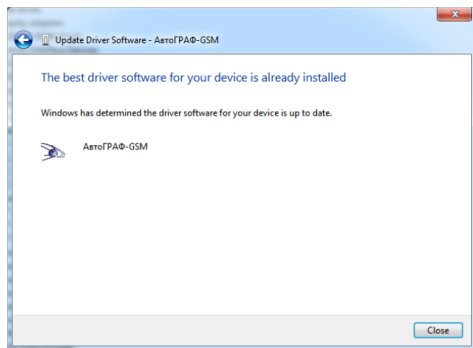


Figure 5.

Connection of Controller to PC

Some cases may require connection of the AutoGRAPH-GSM/SL controller to a personal computer (PC) or a laptop. A PC connection may be required for:

- configuration and checking of the performance of the controller by means of the configuration program – GSMConf;
- using the controller in the “GPS mouse” mode;
- reading the data from the tracker storage memory and writing the data directly to the AutoGRAPH Dispatch Software.

The tracker is connected to a PC by means of a standard USB A Male – to USB microB 5pin cable.

To connect the tracker to a PC:

- Disconnect the tracker from the vehicle power supply.
- Disconnect the antennas and remove the device from the vehicle.
- Connect the tracker to your PC using a USB cable.
- If the drivers are installed, the system automatically identifies the controller. If the drivers are not installed, install them following the steps specified in the “Installing the drivers” section.
- The tracker is ready for operation with the applications.



Instructions for programming the tracker, using the GSMConf configuration program, are given in the “GSMConf Program User Manual” document.



*Reading of data from the controller using the AutoGRAPH Dispatch Software is described in detail in the “AutoGRAPH Dispatch Software User Manual”.
Furthermore, the AutoGRAPH Dispatch Software has functionality to delete all data from the controller storage memory.*

Transportation and Storage of Controller

Transportation of trackers

In terms of mechanical damages during transportation, transportation conditions should comply with requirements stipulated by GOST 23216 for group “” (“Zh”):

Device may be transported by automobile transport with unlimited number of transshipments:

- along the roads with asphalt or concrete pavement (1st category roads) for distances over 1,000 km;
- along cobblestone (2nd and 3rd category roads) and unpaved roads for distances over 250 km at 40 km/h or for distances over 250 km at a greater speed permissible for a corresponding vehicle.

Device may be transported by different means of transport:

- by air, by rail and by water (except for the sea), by several different transport means and in combinations with automobile transport, referred to the transportation conditions of “Л” (“L”) and “С” (“S”) groups with the total number of transshipments not more than four, or referred to these transportation conditions;
- by water (except for the sea) in combinations with transportations referred to the transportation conditions of “С” (“S”) group with unlimited number of transshipments.
- transportations including sea transportation

Securing of cargo on transport means and transportation of equipment should be carried out in accordance with rules and regulations specific for a certain mean of transport.



In the case of transportation by water (except for the sea) and transportation, which includes sea transport, the goods should be placed in either waterproof packing, or dry sealed compartments or containers. In the case of transportation by air, the goods should be placed in sealed compartments.

Storage of trackers

In terms of environmental and climatic effects, storage conditions should comply with requirements stipulated by GOST 15150 for group 1 (“Л” (“L”)):

Heated and ventilated warehouses, air-conditioned storage facilities located in any macroclimatic areas with relative air humidity suitable for equipment versions designed for moderately cold climate (УХЛ4 (UKhL4)).

Appendix 1. Warranty Provisions (summary)

TechnoKom, OOO, hereby secures the consumer's rights granted by local laws within the Russian Federation and CIS countries, and no other rights.

TechnoKom warrants the AutoGRAPH-GSM/SL controller shall comply with TU 6811-002-12606363-2013 (Technical Requirements) provided that the customer adheres to the operating rules set forth in this User Manual.

Warranty period of the device shall be Thirty Six (36) months from the date when the controller is sold (delivered) to the consumer, but it shall not exceed Forty (40) months from the date of its manufacture.

If the warranty certificate or other document supporting the fact that the controller has been sold (delivered) to the customer lacks date of selling, name and official seal of a dealer, warranty period shall be deemed to start from the date of manufacture of the controller.

Customer shall have a right to repair the product in TechnoKom service centre, if any workmanship or structural defects are found in the device within the warranty period.

Customer has a right to aftersales service and maintenance within the warranty period.

Customer has any other legal rights stipulated by the legislation of the Russian Federation and CIS countries laws.

If the cause of breakdown cannot be identified at the moment of warranty claim application, it is required to carry out the technical expertise, which shall last for 30 days from the date when the customer files its warranty claim application.

Warranty does not cover any other problems that arise as a result of:

- Violation of transportation, storage and operation rules set forth in this User Manual.
- Unauthorized dismantling of the device if it has guarantee seals and labels.
- Unauthorized repairs or repairs carried out by the third parties within the warranty period.
- Unallowable change of parameters of the external electric power, misuse, abuse or improper operation of the product as indicated by traces of electrical and/or other damage.
- Unauthorized soldering or unauthorized attempts to connect any leads or other elements and connectors to a circuit board of the controller as indicated by the corresponding traces.
- Mechanical damage of body or circuit board of the controller, SIM card holder, antennas, connectors or broken wires.
- Corrosion of external or internal parts or ingress of moisture into the device as indicated by the corresponding traces.
- Misappropriation or malicious damage of external antenna and cable.
- Damage caused by penetration of foreign objects, contaminants, liquids, or insects into the device.
- Damages caused by high or low temperature or exposure to intensive microwave radiation.
- Damages caused by nature, fire, social factors, casual external factors and unexpected accidents.
- Damages caused by incompatibility of parameters or incorrect connection of add-on devices, buses, interfaces and sensors to the controller.
- Operation of the controller at the vehicle system voltage that goes beyond the range specified in technical specifications.

- Damages caused by attempts to configure the controller by means of a third party program.
- Improper functioning due to incompetent or incorrect configuration of the controller, using either the configuration program or SMS commands.
- Improper functioning due to the fact that a SIM card installed by the customer in the controller is not subscribed to the following services:

General Packet Radio Service (GPRS);
 Voice communication;
 reception/sending of SMS messages

or a mobile network operator disabled these services because of negative account balance of a SIM card or for any other reason.

- Improper functioning due to the faulty SIM cards installed in the controller or due to SIM card locking.



TechnoKom disclaims any liability for claims concerned with damage or loss of data which exceed the product cost, as well as for claims concerned with accidental, intentional or consequential damage caused by use or inability to use the product to the extent permissible by law.*



This warranty has no effect on legal consumer rights such as adequate quality protection, fitness for the purpose for which similar products are usually used upon normal conditions, and aftersales service, as well as on any other rights you may have in relation to the seller of the product which may arise from a deed of purchase and purchase-and-sale contract.



Any warranty provisions that conflict with legislation in force shall have no legal effect and shall be governed by the legislation.



If the customer fails to adhere to warranty provisions, the warranty shall be cancelled.

* Including but not limited to, damages for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings.

Appendix 2. Certificates of Conformity



ELEKTROTECHNICKÝ ZKUŠEBNÍ ÚSTAV



ELECTROTECHNICAL TESTING INSTITUTE - CZECH REPUBLIC
ELEKTROTECHNISCHE PRÜFANSTALT - TSCHIECHISCHE REPUBLIK
INSTITUT ELECTROTECHNIQUE DESSAIS - RÉPUBLIQUE TCHÉQUE
ЭЛЕКТРОТЕХНИЧЕСКИЙ ИСПЫТАТЕЛЬНЫЙ ИНСТИТУТ - ЧЕШСКАЯ РЕСПУБЛИКА

Pod Lisem 129, 171 02 Praha 8 - Troja

The Electrotechnical Testing Institute, the Notified Body 1014 grants the

CE CONFORMITY CERTIFICATE

with the following European Directives: 2004/108/EC including amendments

No.: 1140510

Name of product: AutoGRAPH-SL

Type: AutoGRAPH-SL

Rating: 10-30 V, 50 mA

Ordering firm: TechnoKom Ltd.
ul. Brat'jev Kaširinych 65, Čeljabinsk, Russian Federation

Manufacturer: TechnoKom Ltd.
ul. Brat'jev Kaširinych 65, Čeljabinsk, Russian Federation

Trade mark:

A sample of product was tested and found to be in conformity with following standards:
EN 50498:2011

as shown in the Test Report No.: 402280-01/01 of: 24.06.2014

The conformity of product with stated standards implies the conformity of product with principal elements of the above mentioned EU directives.

The validity of the Certificate is limited till: 30.6.2017

30.6.2014

Prague



Vladimir Filiač
Deputy Head of Certification Body



Stamp



402280-01

ELEKTROTECHNICKÝ ZKUŠEBNÍ ÚSTAV



ELECTROTECHNICAL TESTING INSTITUTE - CZECH REPUBLIC
 ELEKTROTECHNISCHE PRÜFANSTALT - TSchechISCHE REPUBLIK
 INSTITUT ELECTROTECHNIQUE DES SAIS - RÉPUBLIQUE TchéQUE
 ЭЛЕКТРОТЕХНИЧЕСКИЙ ИСПЫТАТЕЛЬНЫЙ ИНСТИТУТ - ЧЕШСКАЯ РЕСПУБЛИКА

Pod Lisem 129, 171 02 Praha 8 - Troja

CERTIFICATE

No.: 1140509

Product: AutoGRAPH-SL

Type: AutoGRAPH-SL

Rating: 10-30 V, 50 mA

Ordering firm: TechnoKom Ltd.
 ul. Braťjev Kaširinych 65, Čeljabinsk, Russian Federation

Manufacturer: TechnoKom Ltd.
 ul. Braťjev Kaširinych 65, Čeljabinsk, Russian Federation

Trade mark:

The test results are stated in the test-report No.: 402280-01/01 of: 24.06.2014

A sample of the product was found to be in conformity with:
 EN 50498:2011

The validity of the certificate is limited to: 30.6.2017

30.6.2014

Prague

Vladimír Filiáč
 Deputy Head of Certification Body



Stamp



402280-01



superlight GSM
AutoGRAPH
USER MANUAL
v. 2.2

TechnoKom Ltd.

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