



СИСТЕМЫ МОНИТОРИНГА
АВТОТРАНСПОРТА

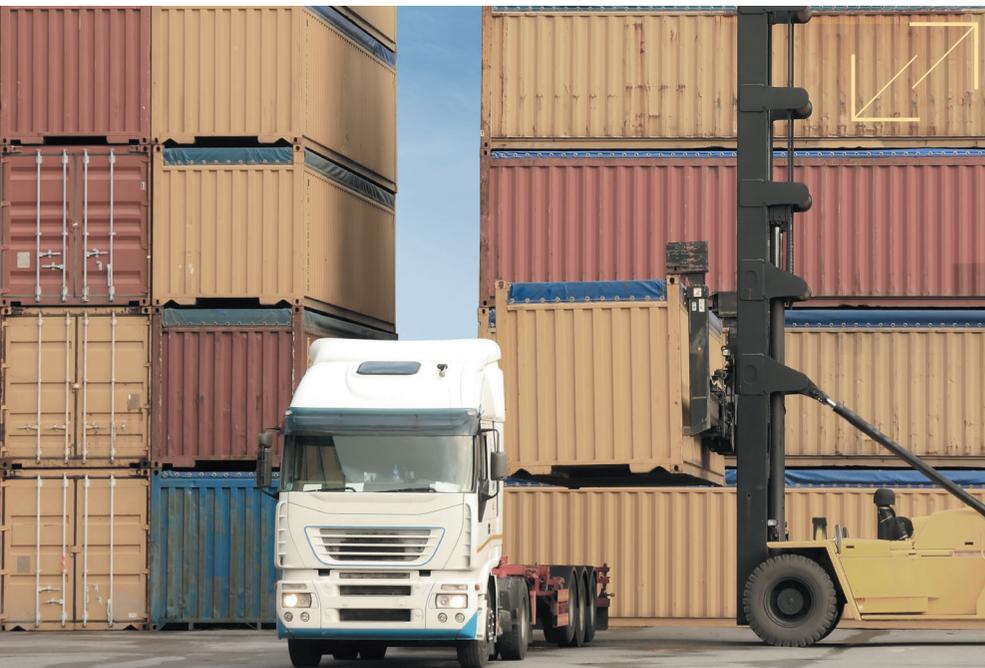


i0N Base
Navigation
User Terminal



iON Pro Navigation User Terminal

The iON Base navigation user terminal is a high-tech versatile device designed for installation in a vehicle or speciality machinery to monitor the proper use of a vehicle or fuel, to track the object location, the sensor and device states connected to the terminal. In addition, iON Base can be used to monitor various operating conditions of fixed-site facilities (vending equipment, boiler plants, diesel-generator units, oil storages, etc.).





iON Base Basic Functions:

- Real-time positioning of a target object, determining its speed and moving direction
- Data collection from various connected sensors
- Data transmission to the server (on request or schedule)
- Program notification of an operator on "alarm events" (power cut-off, internal antennas failure, case tampering, speed violations, etc.), notification via SMS and email
- Data storage in the non-volatile memory

iON Base Key Features:

- Internal non-volatile memory of large capacity (128 MB – 2.5 million records)
- Power-saving modes
- Support for a wide range of interfaces
- Support for remote updating of the terminal firmware
- SIM chip support
- Protection against tampering with the terminal (antenna connectors, cables, SIM card slots are protected by the cover fitted with the mechanical and electronic seals)
- Support for unloading data from the black box to a USB flash drive
- AES encryption use for transmitting data to the server and unloading to a USB flash drive



Operating Principle

The navigation terminal receives data on its position, current time, speed and driving direction from the GPS and GLONASS satellites. If no access to the satellites is provided, the object is positioned via the nearest GSM stations.

The data received from the satellites and readings of the connected sensors are transmitted to the dedicated server over the GSM network (in the GPRS mode). Data is transmitted over the Internet. The intuitive web interface allows the user to track the vehicle location and operating conditions via a PC, laptop, mobile phone or tablet computer from anywhere in the world.





Reliability, Efficiency and Smooth Operation in Any Conditions

Any type of business is focused on obtaining the greatest results. To achieve this goal you need to solve two main problems:

- Efficient workflow planning and management
- Reduction of possible losses

iON Base is designed to solve these problems. Vehicle route and travel time tracking provides high efficiency by detecting unauthorized use and downtimes. Monitoring of fuel consumption minimizes possible frauds of dishonest employees.



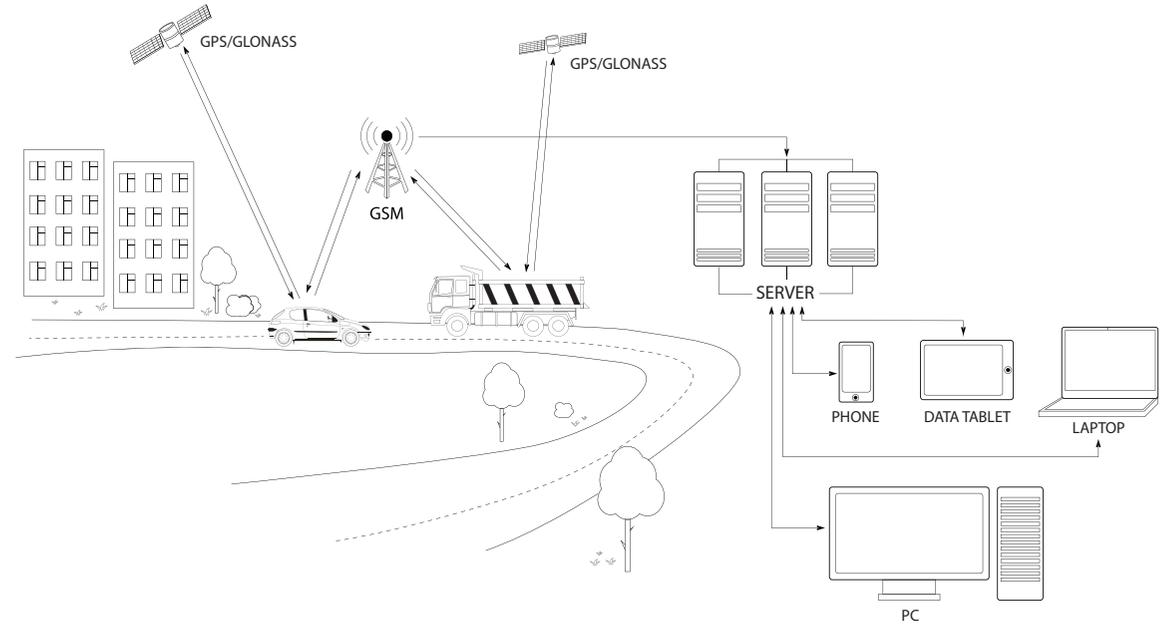
Moreover, when developing the device, we devoted special attention to its quality and reliability. The team of the iON Base developers aimed at creating cost-effective and efficient equipment providing a maximum set of features. iON Base stands out for its fault tolerance. To prevent the device from frauds and tampering, the connectors of interfaces, antennas and SIM cards are concealed by the housing fitted with the built-in sensor, which triggers and signals to the server in case of an unauthorized opening. This terminal's feature prevents from data alterations and reduces to a minimum the vehicle abuse, and so allows saving time and material supplies.



Reduction of Business Costs and Workflow Optimization Using iON Base

iON Base enables you to connect up to 6 digital liquid level sensors and up to 4 analog or frequency liquid level sensors. The information received from the sensors allows you to prevent unauthorized fuel draining and control the amount of fuel filling and consumption. In addition, the terminal allows you to expand the number of connected sensors using the input expander.

Data on traveled distance, tracking of vehicle movements both in a real-time and for specified time range enables you to prevent non-purpose use of machines, fraud trips, and unauthorized idling.



Dual SIM Card Support

For the companies involved in long-distance transportation, the problem of reducing the network traffic is especially urgent. This concerns both interurban and international transportation. iON Base provides the solution to this problem.

The device supports two SIM cards delivering flexible operation in a roaming area and smooth communication.



Surge Protection

The onboard power system in the trucks of Russian origin is characterized by voltage surges when switching on or off inductive loads (starter, electric drives, fan, air conditioning equipment). The iON Base terminal is equipped with a protective diode against voltage surges, protection system against high-voltage noises and reverse voltage supply.

iON Pro features a wide range of input voltage: 9-50 V, maximum allowable voltage is 55 V.

The power circuit, used in the terminal, has been subjected to a comprehensive testing and is successfully applied in cars and trucks.



Operation in Harsh Environments

The iON Base terminal complies with the high requirements for reliable and smooth operation in harsh environments. Thus, the device supports operation even in areas with extremely low or high ambient temperatures.

The iON Base housing is designed with account for protection against dust and moisture (IP54).

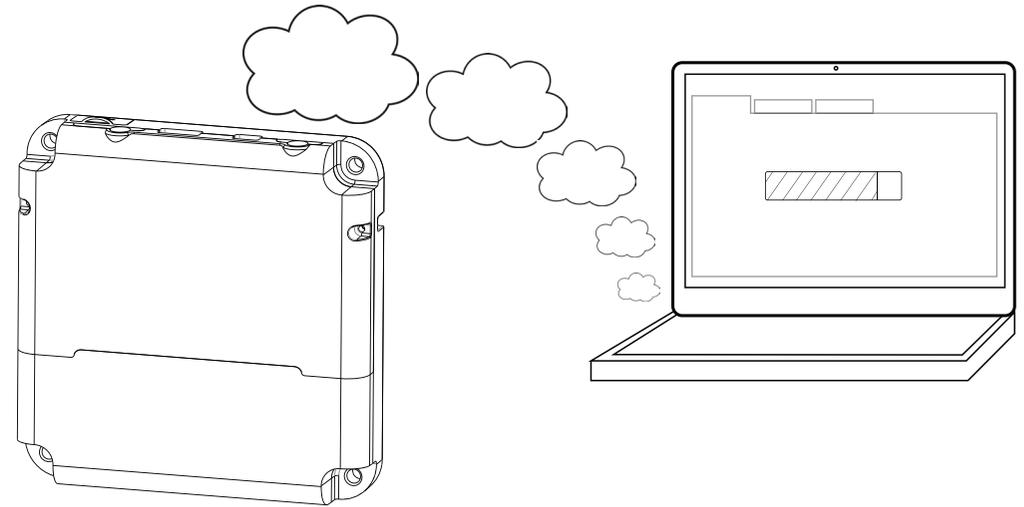
Operating temperature range is -40°C to $+60^{\circ}\text{C}$.





Firmware Updating

The iON Base navigation user terminal allows for remote firmware updating. The firmware updating can be also implemented automatically by the configured parameter, on a user's command through the web interface, when connecting to a PC as well as using an Android-based tablet computer (via a mini-USB connector).



Built-in Accelerometer

iON Base is equipped with a built-in three-axis accelerometer which enables detection of the vehicle movements, g-loads, harsh accelerating and braking. Harsh breaking and accelerating can cause freight displacement in a container and damage the vehicle structural components.

The built-in accelerometer allows you to control proper use of a vehicle, and consequently to extend service life as well as to provide a prompt signal about alarm situations to the dispatcher.



Connectivity

Unlike similar equipment, iON Base supports a wide range of interfaces:

- RS-485
- RS-232*
- CAN (J1939/FMS)
- 1-Wire
- USB

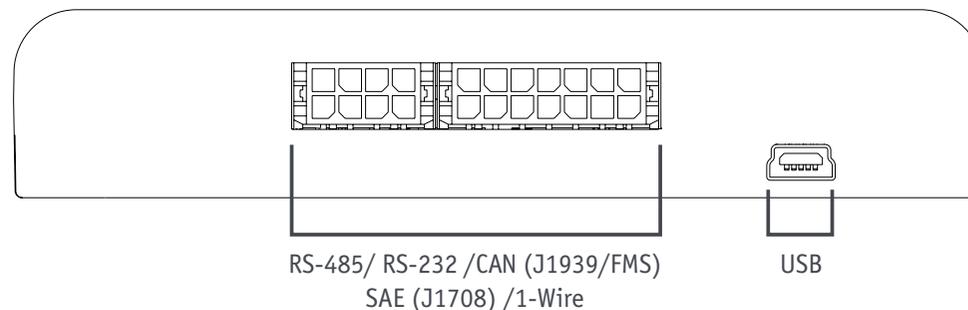
* *Optional (via the interface expander)*

iON Base is equipped with two RS-485 interfaces that enable connection of liquid level sensors, a liquid level indicator LLD and other additional equipment. The RS-485 interface provides flexible configuration of the port basic parameters enhancing the possibilities for connection of devices.

When connecting via CAN bus, the device can receive data on the vehicle operation directly from the onboard computer. The CAN interface supports the J1939/FMS protocol that specifies a common standard for trucks. To provide iON Base compatibility with non-standard protocols, the multipurpose CAN-LOG controller can be deployed, connected via RS-485 interface. The controller allows you to get information from a large fleet of trucks, motor cars or agricultural machinery.

iON Base is equipped with two 1-Wire interfaces enabling the terminal to interact simultaneously, for example, with an identification system and with the temperature sensors. This feature distinguishes iON Base from terminals of other manufacturers.

The driver identification system is equipped with a feedback option - it indicates the reading process of a driver's key. Namely, in order to let the driver know if the system has identified a key-card, it is sufficient to connect a LED and a reader unit, or only a unit with an integrated LED to the terminal.



The maximum number of temperature sensors that can be connected to the terminal amounts to 15. It is the largest number of sensors supported by similar models. This feature considerably widens the range of tasks to be solved by iON Base. For example, this can include monitoring of refrigerators, boiler plants, etc.

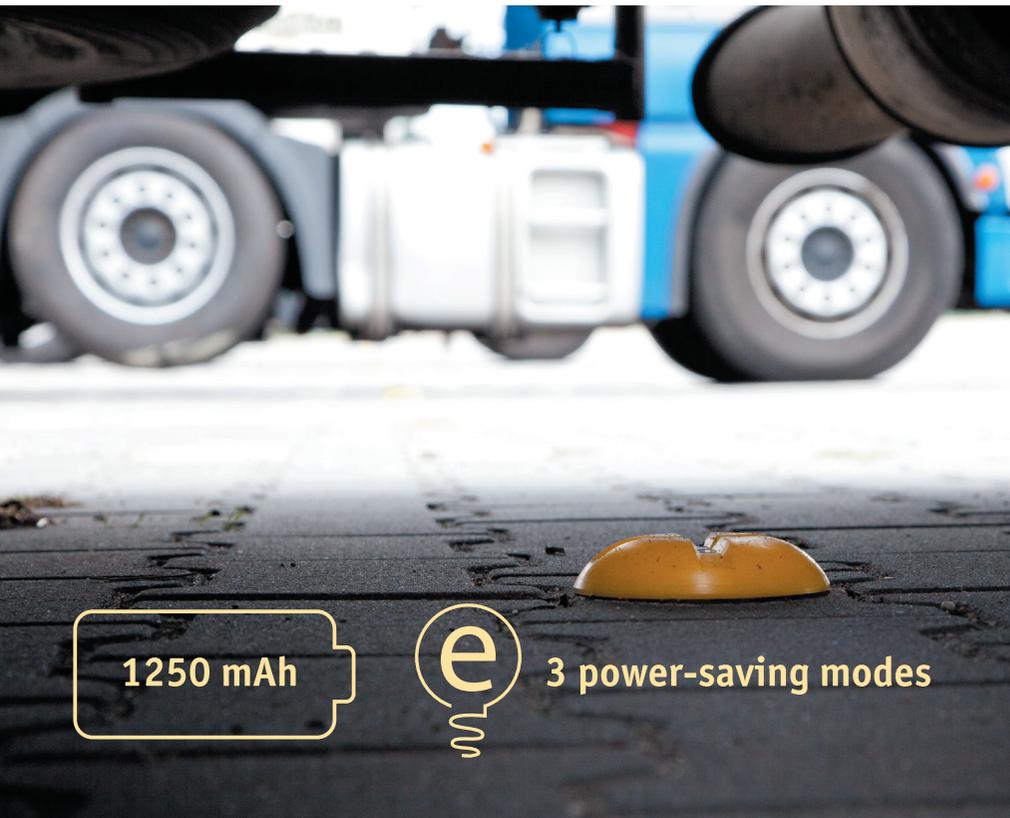
Mini-USB allows you to configure and test the terminal, read out the "black box" data, connect a web camera, display data on a computer screen without any optional adapters.

iON Base features six multipurpose inputs, with two ones serving as outputs. This feature enables the terminal to be used for solution of many tasks. Multipurpose inputs and inputs/outputs provide connection of any devices with an analog, discrete, or pulse input (fuel flow and fuel level, pressure, temperature, and ignition sensors, attachment sensors, tachometer, etc.). Moreover, all the inputs support the pull-up on/off option providing flexible configuration of the terminal.

The iON Base navigation user terminal finds an application for many sectors, such as freight and passenger transportation, agriculture, housing and public utilities, etc.

Unique Features of the iON Base Navigation User Terminal

The features of the iON Base navigation terminal compare favorably with similar products, currently introduced in the market. The team of developers has implemented the innovative solutions at affordable prices to the end user.



Built-in Li-Pol Battery and Several Power-Saving Modes

Unlike similar models, iON Base is equipped with a built-in lithium polymer battery (Li-Pol) of 1250 mAh capacity. It enables smooth continuous operation of the terminal if no external power is supplied.

The onboard equipment consumes the battery energy of the vehicle even with the engine powered off. Therefore, after long idling there might be some problems with the engine start. To solve this problem, the iON Base terminal is provided with the power-saving modes of flexible configuration. Switching between the modes is recorded by the server and displayed in the dispatcher application. Power-saving modes allow for significant GPRS traffic saving.

1. Low Power Mode. GPS and GSM operate at regular intervals. By default, the terminal is powered from the vehicle power system. The settings can be configured for the device power supply from the built-in battery. When the battery master switch is disabled, the terminal switches to modes 2 or 3 and operates from the built-in battery.

2. Sleep Mode. The terminal can respond to SMS commands. Power is provided from the built-in battery (if the master switch is off) or from the onboard power system. The device wakes up at ignition start or start of motion.

3. Deep Sleep Mode. The vehicle battery provides the lowest power consumption. Power is provided from the built-in battery (if the master switch is off) or from the onboard power system. The device wakes up at ignition start or start of motion (power consumption is 3.4 mA at 24V power voltage and 6.1 mA at 12V power voltage).

Besides, power-saving modes allow for significant SIM card traffic economy.



Large Capacity of the Built-in Memory

The device's operation is based on a "black box" principle - all data, including time of events, is recorded to the internal non-volatile memory and transmitted to the server. Thus, even with poor signal or no network available, all the data received by the terminal is stored.

Frequently, the companies, involved in long-distance transportation, face the challenge of data loss due to communication cuts-off, a SIM card zero balance, outages of data collection servers, etc. As a rule, navigation terminals cannot store a large amount of data, but iON Base enables you to handle this task.

If no communication with the server available, all data is recorded into the built-in memory. Generally, navigation terminals can hold no more than 8 MB (250 thousand records). The capacity of the iON Base built-in non-volatile memory amounts to 128 MB. It is sufficient for storing 2.5 million records!

The data can be transmitted to the server when communication is restored, when connecting the device to a PC or via USB flash drive.

Support for unloading data to a USB drive considerably expands the range of tasks that can be solved by iON Base. Firstly, it offers considerable traffic economy. Secondly, it enables easy operation, which is especially important when using vehicles in hard-to-reach areas with poor signal or no cellular coverage. When unloading data, the protection system with the built-in key is activated.





Unique Mechanism of Data Transmission to the Server

Unlike similar models, data from the iON Base terminal to the server is transmitted via two self-sufficient packets. The first packet is a real time priority packet. You can configure the frequency of packet sending via the configuration manager, as well as data containing the packet (position data, current time, speed and driving direction as well as various events and parameters - fuel draining, filling, location of loading and unloading, speed violations, etc.). The second one contains data from the non-volatile memory, i.e. stored data which is not yet transmitted to the server.

It allows the dispatcher to receive real time relevant information on the vehicle movements and operation.

For example, if no connection to the device is established for several days (due to operation in an area of poor signal, no cellular coverage, technical problems with the server, etc.), first of all, the dispatcher receives the object's current position as soon as the device comes into contact, and all other data is received as the data is unloaded from the non-volatile memory. Models produced by other manufacturers usually transmit data via a single packet, from old packets to new ones. It results in the situation that the dispatcher sees irrelevant information for a long time - the vehicle observed on the screen is displayed with old data. Moreover, the data transmission mechanism features flexible configuration - the device can be configured for unloading data by size and schedule.

Such data transmission algorithm is easy to use for operation of a dispatcher centre and cost-effective due to traffic saving in a roaming area. The real time priority packet can be disabled from the server or using the configuration manager.

System against Tampering with the Device

In the process of the iON Base development much attention was devoted to the protection of the device against tampering. The user's part is securely protected by the housing - all the connectors to connect wires, antennas, SIM card are concealed under the cover. After completing the configuration and connection procedures, the device is closed by the cover and sealed. The LED indicators turn off in 20 minutes after closing the cover. In this way a driver is not able to assess the device operating conditions (if required, this option can be disabled by a system administrator).

The components of the integrated protection for the iON Base terminal are the following:

- **Mechanical protection.** The installation package is supplied with the self-destroying seals from the manufacturer. In addition, the space for additional seal is provided.
- **Electronic protection.** The device is equipped with the electronic seal placed under the housing, which registers removal of the cover (for access to SIM cards, wires and antennas). When the case is opened, the terminal sends a signal to the server. The event of opening is displayed in the dispatcher program as a message.
- **Warranty.** The device is supplied with the second electronic seal. The end user shall have no coverage or benefits under the warranty if the product has been subject to unauthorized tampering with the main watertight part of the tracking terminal.



Passenger, Employee and Freight Transportation Safety

The safety of passengers, employees and freight is of utmost importance. The vehicle's interior can be equipped with an alarm button and voice communication with the dispatcher. In case of intruder's assault, road accidents and other abnormal situations, the driver can promptly send necessary information to the dispatcher station.

Voice communication can be implemented in one of the two options:

- Vehicle handsfree kit (a speaker + a microphone)
- Half-duplex communication kit (a speaker + a microphone with push-to-talk key)

Both modes feature a sound and a LED call indicators as well as a call answer button. In addition, the device is provided with the option of automatic response to a dispatcher call. When the connected smoke detector triggers, the device sends a signal to the server about the smoke formation in the vehicle interior.

The event alarm system in the dispatcher program provides flexible configuration. In addition, SMS notification to the specified numbers is supported.





Benefits of Applying iON Base in a Workflow

- Identifying cases of unauthorized fuel draining and filling
- Identifying cases of unauthorized vehicle use, downtimes and idling
- Monitoring the weak points in driving behavior, resulting in a more economically efficient vehicle maintenance and reduced fuel costs
- Counting the total number of attachment operating cycles, motometer and fuel waste
- Monitoring sensors connected to the terminal - temperature, pressure, smoke, etc.
- Improved passenger, employee and freight safety
- Boosting company's profit
- Workflow optimization
- Reduced costs

