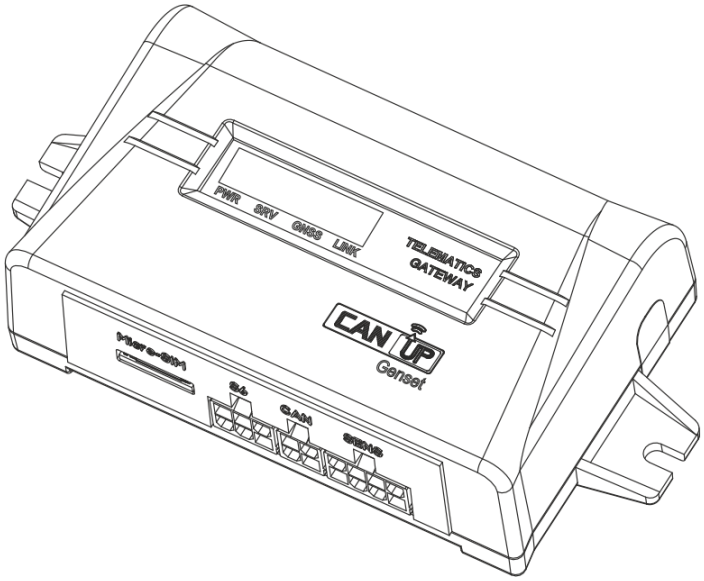
TELEMATICS GATEWAYS

Only for model codes 11, 12,14, 15, 16,17,18,19,20



CANUp 27 Standard / Pro / Genset

OPERATION MANUAL

Version 7.1

TECHNOTON
ADVANCED MACHINERY TELEMATICS

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Contents

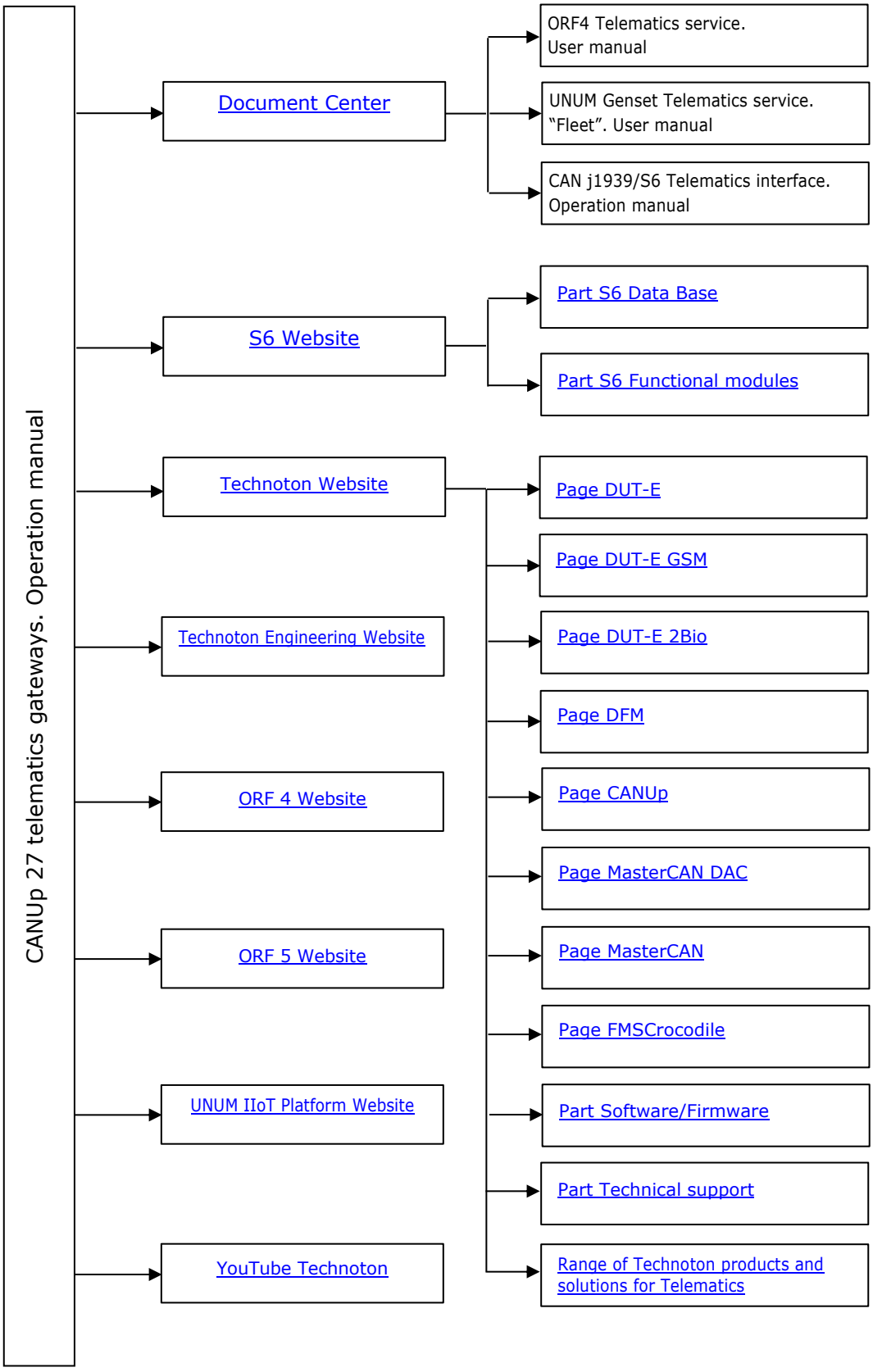
Revision history

Version	Date	Editor	Description of changes
1.0	08.2017	OD	Basic version.
2.0	12.2018	OD	• New models of online Telematics gateway with extended functionality are introduced: - CANUp 27 Pro 3G; - CANUp 27 Pro Wi-Fi. • Information on CANUp 27 models codes is added. • Changes in the contents of CANUp 27 delivery set are reflected. • List of Reports transmitted by CANUp 27 to the Server as well as their contents are updated. • Descriptions of SPN of Functional Modules are added for models CANUp 27 Pro and updated for CANUp 27 Standard. • Detailed information regarding CANUp 27 electromagnetic compatibility is added. • Description of MQTT IBM Watson IoT protocol is included. • The document terminology is updated (CAN j1939/S6 Telematics interface).
3.0	07.2019	OD	• Information on the feasibility of CANUp 27 Pro 3G and CANUp 27 Pro Wi-Fi operation using S7 Technology is added. • The procedure for connecting wireless Units to CANUp 27 Pro by means of S7 Technology is defined. • A description of Base S7 FM contained in CANUp 27 Pro 3G and CANUp 27 Pro Wi-Fi models is added. • Information on the composition of data received by the Gateway in messages sent by wireless Units is included. • Gateway technical specifications and settings of its Functional modules are updated.
4.0	04.2021	OD	• Information on new models of gateways is added (CANUp 27 Pro LTE; CANUp 27 Pro LTE A; CANUp 27 Pro LTE G). • List of GSM frequency bands supported by the gateways during the data transfer using 2G / 3G / 4G technologies is provided. • New functional features are added: - work with data of ISOBUS farming equipment bus; - using the frequency input for counting input pulses (“Counting” type of the physical input); - singling out and displaying values of signals from physical inputs during a Unit configuration; - new FM “Axle Load Control. Tractor Unit”; - option of a Unit remote configuration via TCP channel using the GPRS-command CSRV and by means of connection to “hidden” access points for CANUp 27 Pro Wi-Fi; - work with extended ranges of Units’ network addresses; - support of new cable-connected and wireless Units, option to add a wireless Unit by its MAC-address; - S6 Database update via Internet for the service software etc. • Data content of output messages for the new wireless Units is added: DFM Marine S7 fuel flow meter, GNOM DP S7 position sensor and ADM31 temperature and humidity sensor. • Minimum requirements for the PC for work with Service CANUp service software are set out.

Version	Date	Editor	Description of changes
5.0	10.2022	OD	• The gateway model codes are updated. • The Functional modules assemblies are introduced. The gateways models are based on the assemblies. • CANUp 27 designation is updated; examples of models specification for ordering them are updated. • CANUp 27 Pro 3G model is deleted. • FM Control of additional equipment (for CANUp 27 Pro LTE) including the description of the Telematics gateway in the Vehicle engine remote immobilization system is added. • The gateway specifications and settings of its Functional modules by means of Service CANUp software are updated: - "Reset" button for Unit reset by means of software is added in FM Self-diagnostics; - support for UNUM IIOT protocol settings is added, - support for MQTT IBM Watson IoT protocol is deleted, - in FM S7 Base, an option to add a Unit into the list of authorized Units by double clicking is added etc. • The description of MQTT IBM Watson IoT protocol is deleted. • The description of MQTT UNUM IIOT Platform (v 1.8) is included. • Information on the composition of data received by the gateway in messages from wireless Units is updated. • New Units for work with CANUp 27 using S6 Technology etc.
6.0	05.2023	OD	• Special modification of the Telematics gateway for Diesel generators — CANUp 27 Genset is introduced. • The application "SPN of CANUp 27 Functional modules" is deleted and is issued as a new separate document "Catalogue of Functional Modules of CANUp 27 Telematics Gateways" . • Sections "Creation and configuration of Reports" and "Special settings of CANUp 27 Genset" are deleted and presented in the document "Catalogue of Functional modules of CANUp 27 Telematics Gateways". • List of GSM frequency ranges supported by the gateways is updated. • List of Parameters which are transferred in preset Reports of CANUp 27 Genset is added. • Information on composition of data received in messages of wireless Units is updated. • Recommendations regarding electrical connection of different models of the gateway are added. • New certificates are added: - Declaration of Compliance with requirements of technical regulation "Telecommunications systems. Safety". - E-mark — Uniform provisions concerning the official approval of vehicles with regard to electromagnetic compatibility, in accordance with Regulation No 10 of the United Nations and others.

Version	Date	Editor	Description of changes
7.0	02.2025	OD	• Model codes of the gateways are updated. • Basic information on the product is updated. • Technical specifications are updated. • Functionality features are added: - option of remote connection with the gateway and flow meters/level sensors connected to it by a command from UNUM IIOT Platform server by using service software; - scanner of specified Modbus RTU registers, with displaying initial values of registers and converted SPN; - option of remote control of the Diesel generator controller via RS-485 by a command to record Modbus RTU register; - analytics of fuellings/fuel discharges and changes of fuel dielectric permittivity by indications of connected level sensors; - logging of remote control commands; - registration of Events of disappearance/appearance of Units operating together with the gateway in a single network using S6 Technology. • Information on the composition of data received in messages from DUT-E S7 / DUT-E 2Bio S7 wireless fuel level sensors is updated. • The description of UNUM communication protocol is updated. • The list of equipment that can be connected to CANUp 27 Pro S7 at one time is updated etc.
7.1	03.2026	OD	• The description of the UNUM communication protocol has been removed and issued as a separate document.

Structure of external links



Terms and Definitions

IoT Burger is the Technology of creating smart sensors and complex telematics IIoT devices operating in real time with built-in analytic features (further on – IoT Burger). The basis of IoT Burger is the software/hardware core, a set of ready-to-use universal Functional Modules, the database of standartized IoT parameters.

Particular features of IoT Burger:

- inbuilt analytic features for maximum treatment of signals within the device itself;
- a possibility to design devices with extremely low power consumption;
- doesn't require programming in the majority of applications, flexible setup;
- using inexpensive industrially manufactured equipment parts;
- measurement and treatment of "quick" processes which is impossible to implement using cloud technologies;
- an option of ready Reports delivery to the user avoiding server platforms;
- the inbuilt system of data authenticity assurance (self-diagnostics, authorization, impact control).

The technology provides for the availability of several measurement channels in any device including pre-set analytical treatment (filtration, linearization, thermal compensation) and the controlled error of measurement.

Devices created using IoT Burger may be united to form a wire-connected or wireless connection network. Data may be transmitted to the telematics server, to popular IoT platforms, by SMS, E-mail, to social networks.

At present, 2G/3G/LTE/NB-IoT/Wi-Fi/BLE data transmission standards are used in devices with IoT Burger. The reports transmitted contain data on instant and average values of Parameters, Counters, Events. The flexible system of Reports setup enables the user to select the optimal ratio of the data completeness and the volume of traffic.

All models of CANUp 27 telematics gateways are designed based on IoT Burger Technology.

S6 is the Technology of combining smart sensors and other IoT devices within one wire network for monitoring of complex stationary and mobile objects: vehicles, locomotives, smart homes, technological equipment etc. The Technology is based and expands SAE j1939 automotive standards.

Information on cabling system, service adapter and S6 software refer to CAN j1939/S6 Operation manual.

All models of CANUp 27 telematics gateways are designed based on S6 Technology.

S7 — Technology designed for wireless collection of data from unattended sensors in systems of industrial and automobile Telematics. S7 Technology is recommended for use in facilities where wiring is impossible or hard to install.

S7 Technology implements Bluetooth 4.X Low Energy (BLE) as a communication channel.

S7 Technology provides ultra-low power consumption and a long period of independent operation for smart sensors and other IoT devices.

On the application level, S7 Technology is fully compatible with S6 Technology which uses cabling.

Advantages of S7 Technology:

- Simple design of data transmission protocol;
- Low power consumption, a potential for fully independent operation of sensors for several years;
- Option of data collection by several data recipients at one time.

For models CANUp 27 Pro of Telematics gateways, we are in the process of preparation for introducing S7 Technology.

CAN (Controller Area Network) — serial digital bus-type communication interface which conforms with ISO 11898-1:2003 International Standard.
Various high-level protocols can be used in CAN-bus for data transfer: j1939, CANopen, DeviceNet, CAN Kingdom etc. CAN-bus serves to unite different executive electronic devices and sensors into a single network in the automobile industry or in systems of industrial automation.

ISOBUS – is a communication protocol used in farming machinery which complies with ISO 11783 standard and is based on SAE j1939.

ISOBUS bus contains Parameters of farming machinery operation and besides "classical" Parameters (total fuel consumption, engine rpm, cooling agent temperature), it also includes Parameters of attached equipment (plough, sowing machine, mowing machine, cultivator, winnowing machine, spraying machine etc.).

Over 7000 Parameters (SPN) of farming machinery operation complying with ISOBUS protocol are included into S6 Database.

MODBUS RTU – is the industrial communication protocol based on serial data transfer (RS-485/RS-232 interface). It is used for reliable data exchange based on Master/Slave type of relation between electronic devices in automation and monitoring systems.

j1708 — serial digital bus-type communication interface. j1708 bus is used for data transfer and data exchange between the engine controller and other electronic devices in some Vehicles. The level of data presentation meets SAE j1587 Standard.

UNUM IIoT Platform — platform of the industrial Internet of Things which serves for creation and subsequent management of Telematics services of Complicated machines in different industries (power industry, road, water and railway transport, farming, mining industry etc.). It uses special hardware/software set — Database of stanartized Parameters, design and data transfer technologies, IIoT Onboard equipment, cloud software, service hardware/software.

ORF 4 / ORF 5— is the by Technoton telematic services designed for receiving and processing Onboard reports via Internet, displaying Operational Dataoverlapped on area maps, information storage in database and Analytical reports generation upon user's request.

UNUM Genset — specialized Telematics service designed by Technoton which is aimed at real-time monitoring and Post-analysis of Diesel generators performance.

PGN (Parameter Group Number) — is a combined group of S6 parameters, which has common name and number. Functional modules (FM) of the Unit can have input/output PGNs and setup PGNs.

SPN (Suspect Parameter Number) — informational unit of S6. Each SPN has determined name, number, extension, data type and numerical value. The following types of SPN exist: Parameters, Counters, Events. SPN can have a qualifier which allows qualification of parameter's value (e.g. – Onboard power supply limit/Minimum).

Analytical report — telematics service Report on the monitored Object or group of Objects operation for the selected period of time (normally day, week, month). Can be composed of numbers, tables, charts, mapped route of vehicle, diagrams.

Complicated machine — a vehicle or a fixed object that have one or several engines, fuel tanks and a great number of standard and additional sensors. The particularity of complicated machines' Telematics is determined by a broad set of onboard equipment with different interfaces and by the need to integrate standard data buses and analog devices into a single monitoring system.

Counter — cumulative numerical characteristic of Parameter. Counter is displayed by a single number and over time its value is increasing. Examples of counters: fuel consumption, trip, engine hours counter etc.

Dashboards — software tools of UNUM Genset Telematics service designed for Operational monitoring of Paramaters, Counters, Events and malfunctions of an Asset/Group. Data on Dashboards are visualized with the help of different widgets — scales, graphs, digital pointers, lists, tables, the map. The data composition and set of widgets on a Dashboard are determined by a selected Dashboard template from the list of Tasks for the Asset.

Dashboard template — set of widgets configured for specific SPN / VSPN and linked to a specific Task selected for Operational monitoring of the Asset performance.

Diesel generator (DG) — independent power source. It can be fixed or mobile. It consists of one or several internal combustion engines producing mechanical power and one or several generators (alternators) converting mechanical power into electric power.

Edge Computing — is a computing method allowing data procession in the device itsef (data collection location). During Edge Computing access to data is provided via Internet.

Edge Computing ensures maximum data processing rate and communication capacity, no delays and instant response to received data.

Event — relatively rare and sudden change in SPN. For example, applying the magnetic field to the fuel flow meter in order to falsify indications of the hourly fuel consumption is the "Interference" Event. An Event can have one or several characteristics. Thus, the "Interference" Event has the following characteristics: date/time and duration of the interference. When the Event occurs, a terminal unit registers the time of occurrence, which is later mentioned in a report on the event. Thus, the Event is always attached to exact time and place of occurrence.

Function module (FM) unit-embedded component of hardware and software combination, executing a group of special functions. Uses input/output PGNs and settings PGNs.

GNSS (Global Navigation Satellite System) — system for area positioning of an object through satellite signal processing. GNSS is composed of space, ground and user segments. Currently, there are several GNSSs: GPS, GLONASS, Galileo, BeiDou.

Model code — digits reflecting the product modification. For CANUp 27 Telematic gateways, the model code is identified by the 1st and 2nd digits of its serial number placed on the nameplate in the bottom portion of its casing or on its packing label.

Monitored object (Asset, Object) — mobile or fixed Object monitored by means of the Telematics system.

Onboard equipment (OE) — elements of the Telematics service located directly onboard the monitored Object.

Onboard reports (the Reports) — information on the Object which a Telematics system user receives in accordance with his specified requirements. The Reports are generated by a terminal unit both periodically (Periodic reports) and on Event occurrence (Event report).

Operational data — information on the monitored Object location and its operation parameters transferred by CANUp 27 to the Telematics server in real time. It includes data on the coordinates, speed and direction of movement, fuel volume in the tank etc. Operational data are updated as new data updates are received.

Online monitoring (Operational monitoring) — remote control of the Object location and its performance parameters in real time, accumulation of data and generation of Analytic reports upon request of a Telematics service user.

Parameter — monitored object characteristic changing with time or space. For example, speed, fuel volume in the tank, hourly fuel consumption, coordinates. Parameter is usually displayed in the form of graph, or averaged data.

Post-analysis — analysis of the monitored Object operation which is conducted based on Analytic reports for the period of time selected by the user. The data received are used in the owner company business activities (accounting, management accounting, maintenance etc.).

Route — data array containing the coordinates, speed and direction of the monitored Object movement. It corresponds to the vehicle route on the terrain. It is displayed by lines on the Map. The movement direction is displayed with arrows.

Server (AVL Server) — hardware /software set of the Telematics service aimed at Operational data processing and storage, generating Analytic reports and their transfer via Internet upon users' requests.

Tasks — chargeable UNUM Genset services of Operational monitoring and Post-analysis of the Asset operation provided to an Asset by subscription. Examples of Tasks: monitoring of fuel/electric generator/engine, malfunctions and operation errors, self-diagnostics of the Telematics system, remote control.

Telematics terminal (Tracking device, Telematics unit) — Monitoring system component performing the following functions: reading signals from standard and additional sensors mounted on the monitored Object, determining the location and transfer of data to the Telematics system server.

In case of using CANUp 27 gateway within the Telematics system, the Terminal is not required.

Telematics system — comprehensive solution for tracking monitored Objects in real time and for Post-analysis of their operation. In includes On-board equipment, Communication channels, the Telematics server.
E.g. the main monitored operation specifications for a Vehicle are: Route, fuel consumption, working time, technical integrity, safety.

For Diesel generators the main specifications are: location, frequency, current, voltage, generator power, fuel consumption, working time, technical integrity of units etc.

Vehicle an object controlled within Telematics system. Usually Vehicle means a truck, tractor or bus, sometimes a locomotive or river boat. From Telematics system point of view, stationary objects are also considered to be vehicles: diesel gensets, stationary tanks, boilers/burners.

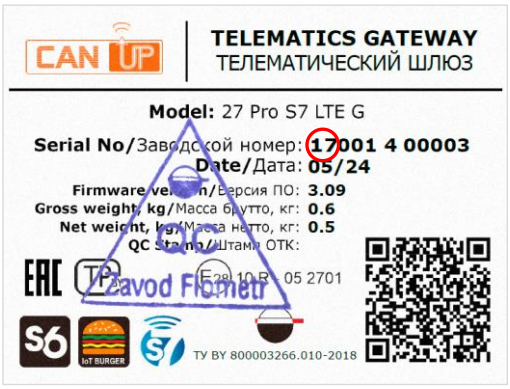
Unit is an element of vehicle on-board equipment compatible with S6 bus, which uses S6 Technology or S7 Technology.

Introduction

Recommendations and guidelines contained in this Operation Manual are related to **CANUp 27 telematics gateways** (hereinafter CANUp 27), developed and manufactured by Technoton company, Model codes:

- **11** — CANUp 27 Genset 2G;
- **12** — CANUp 27 Standard 2G;
- **14** — CANUp 27 Pro S7 Wi-Fi;
- **15** — CANUp 27 Pro S7 LTE E;
- **16** — CANUp 27 Pro S7 LTE A;
- **17** — CANUp 27 Pro S7 LTE G;
- **18** — CANUp 27 Genset LTE E;
- **19** — CANUp 27 Genset LTE A;
- **20** — CANUp 27 Genset LTE G.

The code of CANUp 27 model is identified by the first two digits of its factory serial number located below on the label, in the bottom portion of the unit casing or on the label of packing.



This document contains information on the design, principle of operation, specifications, recommendations for connection, configuration and operation of CANUp 27.

CAN UP **— is the innovation Telematics gateway for monitoring operation of Complicated machines of different industries (water and railway transport, quarry, mining, oil and gas equipment, farming equipment, fuel trucks, Diesel power units, boiler equipment, corporate gas-filling stations etc.).**

CANUp 27 — is the multi-functional tool combining the functionality of a data converter, a digital-to-analog converter (i/o module) and an onboard online Terminal.

CANUp 27 is the obligatory component for building Telematics systems based on UNUM IIoT Platform and for uniting Onboard equipment into a single network (see figure 1).

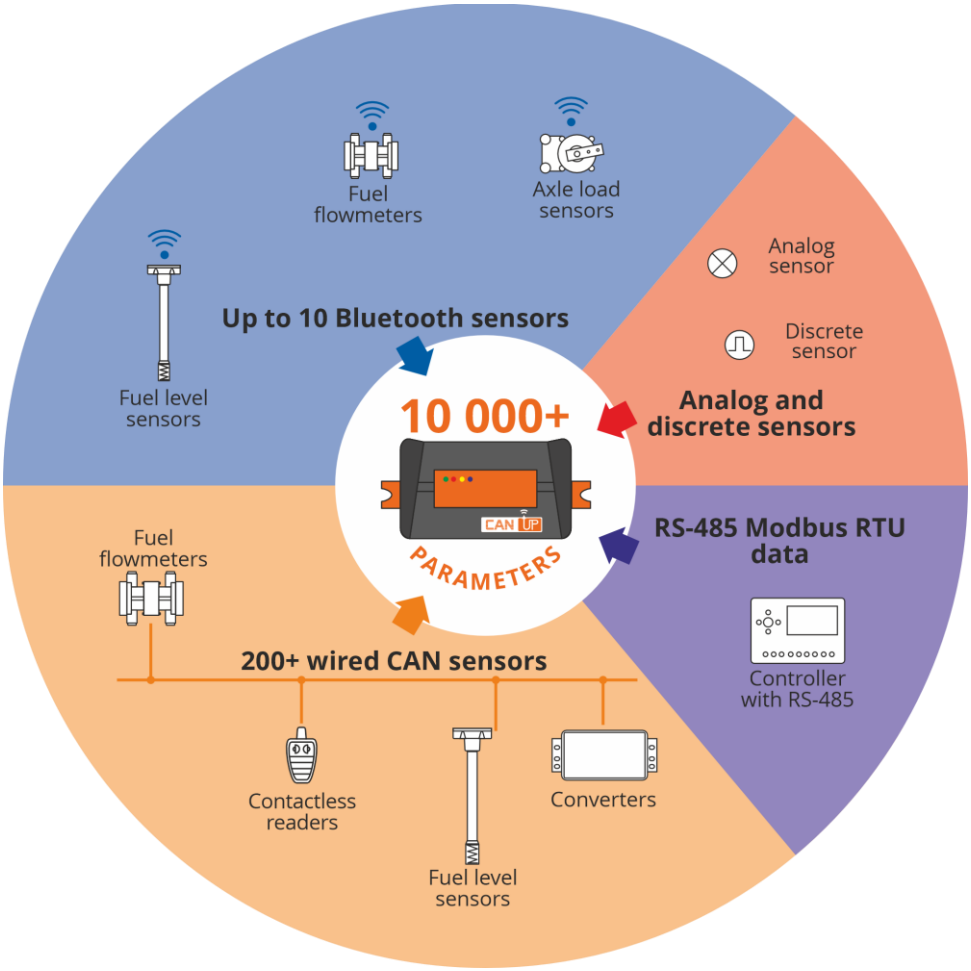


Figure 1 — Creating a developed network of onboard units using CANUp 27

CANUp 27 key features:

- Automatic scanning and sorting out 10000+ standartized Parameters of equipment operation:
  - 3000+ Parameters of a standard vehicle CAN-bus;
  - 7000+ Parameters of CAN j1939/S6 Telematics interface, ISOBUS and Modbus RTU.
- Unified format of data presentation enhances their accuracy, credibility and facilitates their subsequent processing.
- Simultaneous connection of 200+ Technoton sensors via CAN j1939/S6 interface.
- Inbuilt analytics using IoT Burger Technology, with maximum "onboard" data treatment by means of Edge Computing method, (calibration, filtration, linearization, normalization of Parameters, detection of Events, maintenance of Counters) simplifies the Server operation and economizes traffic.
- Compliance with S6 Technology — easy connection and guaranteed 100% compatibility with Units, the Database, and the S6 cabling system.
- High discreteness of Parameters changing (from 0.1 s) allows to record quick Events and enhances detailing of Reports at the monitoring Server.
- Simultaneous data reception using S7 Technology from up to 10 pcs. of wireless Units by means of BLE-channel[1].

- Event-based model for Onboard reports generation (depending on a model — up to 32 pcs., each containing up to 10 Parameters / Counters), flexible adaptation to any type of mobile / fixed machines, ability to send reports on a timer with an interval from 10 seconds to 24 hours.
- Transmission of Reports to the Server using Wi-Fi, without using the services of a mobile communication operator[2].
- Reading data from Modbus RTU registers of external devices by means of RS-485 interface, their conversion into SPN and integration into the Telematics system[3].
- Scanner of preset Modbus RTU registers (up to 50 pcs.), with displaying initial values of registers and converted output SPN, with an option to load settings of slots and registers from a file[3].
- Remote control over an external device via RS-485 interface following the command of Modbus RTU register recording[3].
- Remote connection with a gateway or with connected fuel level sensors and flow meters by a controlling command from UNUM IIOT Platform Server using the respective service software[3].
- Logging of remote control commands sent from UNUM IIOT Platform Server[3].
- Automatic processing of "long" PGN (longer than 8 bytes) and obtaining from them ready information for the Telematics system.
- Converting output analog signals of automotive sensors to digital data (SPN) and their integration into Telematics system.
- Real-time monitoring of the engine parameters for diagnostics and prevention of malfunctions.
- High-precision algorithm of tracking the Route, support of inbuilt geofences[4].
- Automatic identification of Events and sending notifications of their occurence directly to users without using services of the Server — by e-mail to selected e-mail addresses or in the form of SMS messages to selected telephone numbers[5].
- Detecting fuellings/fuel discharges and changes of the fuel dielectric permittivity by readings of up to 8 pcs. of cable-connected/wireless level sensors connected at one time[6].
- Unique self-diagnostics function allows real-time monitoring of performance of the device, and each of the connected Units.
- Recording of Events of Units disappearance/appearance in the network of CAN j1939/S6 Telematics interface.
- Option of remote configuration, firmware update and monitoring the gateway operation using SMS commands or directly from remote PC by means of service software.
- Simple and safe connection to CAN bus or ISOBUS through CANCrocodile contactless reader.
- Independent operation using the inbuilt accumulator in case power supply from the onboard circuit is unavailable.
- High quality technical support and documentation.
- Conformity with European and national automotive standards.

[1] For models with S7 wireless interface.
[2] For models with data transfer support by means of Wi-Fi.
[3] For CANUp 27 Genset.
[4] For CANUp 27 Pro.
[5] Except models with data transfer support by means of Wi-Fi.
[6] For CANUp 27 Pro LTE.

Functional features of CANUp 27 models are ensured by well-concerted operation of the appropriate assemblies (sets) of Functional modules (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

CANUp 27 models may be presented by the following assemblies of Functional modules:

1) CANUp 27 Standard — non-specialized assembly with basic functionality which enables to:

- process data (SPN) from Units of CAN j1939/S6 Telematics interface;
- convert analog signals from external sensors into digital data of SPN (protocol j1939/S6);
- generate and transmit Onboard reports to the Server/by E-mail/by SMS using GSM 2G cellular communication technology.

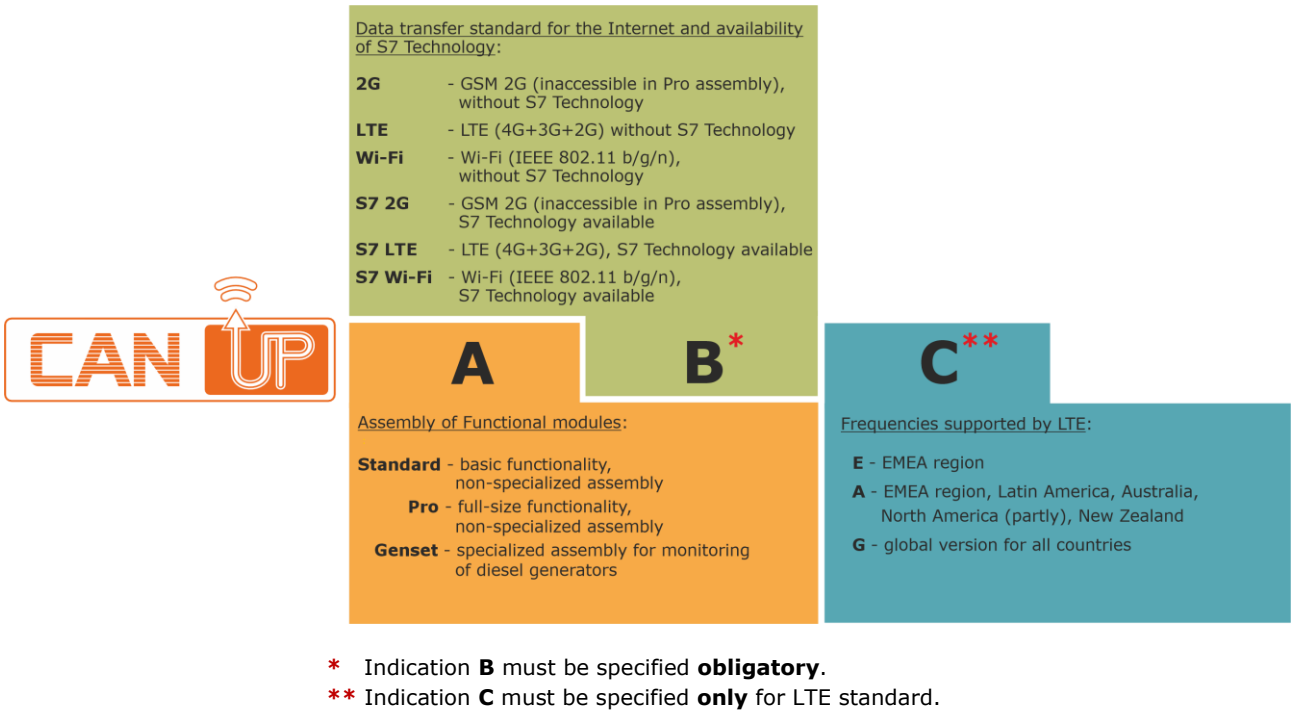
2) CANUp 27 Pro — non-specialized assembly with full-size functionality which enables to:

- process data (SPN) from Units of CAN j1939/S6 Telematics interface;
- scan and analyze data of a standard vehicle CAN-bus or ISOBUS bus of farming equipment automatically singling out Telematics SPN in them;
- receive data from wireless sensors via BLE channel (via S7 Technology);
- to convert analog signals from external sensors into digital data (SPN) of CAN j1939/S6 Telematics interface;
- generate and transmit Onboard reports to the Server/by E-mail/by SMS using LTE (GSM 2G/3G/4G) cellular communication technology;
- generate and transmit Onboard reports using Wi-Fi wireless Local Area Network technology (IEEE 802.11 b/g/n).

3) CANUp 27 Genset — specialized assembly for monitoring performance parameters of Diesel generators with functionality which enables to:

- process data (SPN) from Units of CAN j1939/S6 Telematics interface;
- scan and analyze data of a standard CAN-bus of a generator automatically singling out Telematics SPN;
- read out data from external devices using RS-485 interface (Modbus RTU protocol) and convert them into SPN (CAN j1939/S6 protocol);
- convert analog signals from external sensors into digital data of SPN (CAN j1939/S6 protocol);
- automatically generate Events in case the selected SPN change, in accordance with set criteria;
- exercise remote control over the Diesel generator controller via RS-485 interface (Modbus RTU protocol) following the command of Modbus register recording which is sent from AVL Server or by means of SMS message;
- generate and transfer Onboard reports to the Server/E-mail/SMS using GSM cellular communication technology.

See figure 2 for identification codes for CANUp 27 ordering.



* Indication **B** must be specified **obligatory**.
** Indication **C** must be specified **only** for LTE standard.

Figure 2 — CANUp 27 order identification codes

Examples of CANUp 27 ordering identification codes:

"CANUp 27 Genset 2G telematics gateway"
(special assembly for Diesel generators, 2G standard of data transfer).

"CANUp 27 Standard 2G telematics gateway"
(basic functionality, non-specialized assembly, 2G standard of data transfer).

"CANUp 27 Pro S7 Wi-Fi telematics gateway"
(full-size functionality, non-specialized assembly, with S7 Technology, Wi-Fi standard of data transfer).

"CANUp 27 Pro S7 LTE E telematics gateway"
(full-size functionality, non-specialized assembly, with S7 Technology, LTE standard of data transfer, EMEA region).

"CANUp 27 Pro S7 LTE A telematics gateway"
(full-size functionality, non-specialized assembly, with S7 Technology, LTE standard of data transfer, EMEA region, Latin America, Australia, North America, New Zealand).

"CANUp 27 Pro S7 LTE G telematics gateway"
(full-size functionality, non-specialized assembly, with S7 Technology, LTE standard of data transfer, global version for all countries).

"CANUp 27 Genset LTE E telematics gateway"
(special assembly for Diesel generators, LTE standard of data transfer, EMEA region).

"CANUp 27 Genset LTE A telematics gateway"
(special assembly for Diesel generators, LTE standard of data transfer,
EMEA region, Latin America, Australia, North America, New Zealand).

"CANUp 27 Genset LTE G telematics gateway"
(special assembly for Diesel generators, LTE standard of data transfer,
global version for all countries).

For CANUp 27 configuration S6 SK service adapter (purchased separately) and Service CANUp software (can be downloaded from https://www.jv-technoton.com/, Software/Firmware) should be used.

ATTENTION: It is strongly recommended to follow strictly the instructions of the present Manual when using, mounting or maintaining CANUp 27.

The Manufacturer guarantees CANUp 27 compliance with the requirements of technical regulations subject to the conditions of storage, transportation and operation set out in this Manual.

ATTENTION: Manufacturer reserves the right to modify CANUp 27 specifications that do not lead to a deterioration of the consumer qualities without prior customer notice.

Functional features of CANUp 27:

1) Recording of Events — rapid changes of Parameters, significant for monitored object, for example:

- refueling / fuel syphoning;
- speeding, RPM, route deviation, leaving Geofence, duration of continuous driving;
- turning on/off auxiliary equipment of object;
- Units disappearance/appearance in the network of CAN j1939/S6 interface[6];
- loading/unloading, exceeding allowed axle load, coupling/uncoupling a trailer.

2) Report generator – receiving prepared information, which does not require further processing on the Server:

- changes of operational parameters of the object are continuously registered in nonvolatile memory;
- data composition can be flexibly adjusted by user - a choice of more than 10800 Parameters;
- possibility of adaptive Report generation - upon Event recognition, when parameters of movement are changing (passing route section, movement direction angle change etc.);
- recoding minimal changes of rapidly changing Parameters (engine speed, power network voltage, speed);
- generation of Reports including the counting of the Reports increments for certain time intervals[1];
- monitoring the vehicle engine, in accordance with parameters received from the standard CAN-bus[6];
- internal tracking by the gateway of passing preset Geofences by the Vehicle[1];
- setting modes of parking and movement, as well as monitoring the start and end of the Vehicle movement, taking into account indications of the inbuilt accelerometer[1];
- sending KML files with tracks of the Vehicle movement by E-mail[2].

3) Report registration – accumulating reports and preparing them to transfer to the Server.

- each Report is registered in internal memory of Unit according to formation time;
- sequence of sending Reports to the Server is determined: emergency (alarm button, road accident) - first, important and informational - second;
- storage of Reports in case of inability to transfer (no network) and sending them as soon as possible (back in network coverage area);
- flexible configuration of periodic Reports transmission precisely at the time specified ("Timer/Alarm mode")[6];
- option of disabling Reports sending by E-mail at the time which is inconvenient for the user ("Don't Disturb" mode)[6].

4) Onboard electrical network monitoring – remote diagnostics of onboard network health, detection and prevention of malfunctions.

- monitoring current voltage;
- notifying on network malfunction;
- registering Vehicle operation time from onboard network, from generator, from battery;
- monitoring the exceeding of maximum allowed time for the starter uninterrupted operation[6].

5) Self-diagnostics of internal and external circuits of Unit saves time when localizing malfunctions of onboard equipment.

- current (active) gateway malfunctions are displayed;
- stores latest malfunctions of gateway and connected Units in nonvolatile memory;
- current (active) malfunctions of equipment connected via CAN j1939/S6 interface are displayed[6];
- storage of recent malfunctions of the connected equipment in the non-volatile memory[6].

6) Onboard clock:
- records the time of Events occurrence, even in case of no signal from GNSS;
- allows gateway to operate without signals from GNSS satellites.

7) Position monitoring:
- determining current position (coordinates), speed and direction of movement;
- preparing data for Report generation (determining distance between points of the route, recording movement direction angle change).

8) Collection of analog signals:
- processing signals from analog sensors: filtering out noise, linearizing signals, compiling calibration tables for physical inputs (i.e. transforming values to understandable units of measurement, e.g. V/Hz to mm/L/ton);
- singling out and displaying values of signals from physical inputs during the gateway configuration;
- counting input pulses for the frequency input;
- digitizing analog signals in the corresponding CAN messages.

9) Statistics Reports of changes of set Parameters; they are generated automatically for the period of the selected initial Event till the selected final Event[1].

10) Wireless data reception[4] through BLE-channel from wireless Units (DUT-E S7 / DUT-E 2Bio S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM S7 axles load sensors, ADM31 temperature and humidity sensors).

11) Remote control by means of CAN j1939/S6 interface[2] with additional equipment connected using a command message sent by GPRS-command or SMS.

12) Reading registers of Modbus RTU protocol by means of RS-485 interface[5] from external electronic units and conversion of the read data into SPN (j1939/S6 protocol).

13) Generation of Events[5], in case the set Parameters (SPN) change according to conditions specified.

14) Remote control via RS-485 interface (Modbus RTU protocol)[5] by means of the external electronic module (Diesel generator controller) with commands sent by the Server to record one or two Modbus RTU registers or by means of SMS sent from any of three entrusted telephone numbers.

15) Automatic detection of fuellings/fuel discharges and changes of the fuel dielectric permittivity by readings of up to 8 pcs. of DUT-E / DUT-E 2 Bio level sensors connected at one time[2].

16) Remote connection by a controlling command from UNUM IIOT Platform **Server with the gateway and connected Units** (DUT-E CAN / DUT-E 2 Bio CAN fuel level sensors, DFM CAN / DFM Marine CAN / DFM Industrial CAN flow meters) using respective service software[5].

17) Automatic scanner of preset Modbus RTU registers (up to 50 pcs.), with displaying initial values of registers and converted output SPN, with an option to load settings of slots of registers from the profile file[5].

18) Logging of remote control commands sent from UNUM IIOT Platform Server[6].

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[1] For CANUp 27 Pro.
[2] For CANUp 27 Pro LTE.
[3] For models with data transfer support by means of Wi-Fi.
[4] For models with S7 wireless interface.
[5] For CANUp 27 Genset.
[6] For CANUp 27 Pro / Genset.

1 General information and technical specifications of CANUp 27

1.1 Purpose of use and application area, operation principle

is designed for (see figure 3):

- Reception and processing of data from Units using S6 Technology.
- Reception of data from CAN (SAE j1939) standard bus, their analysis and conversion into Telematics SPN[1];
- Wireless reception of messages (PGN) from Units using S7 Technology[2].
- Conversion of analog signals from standard sensors into digital data (SPN).
- Receiving signal form navigation satellites.
- Generating and sending Onboard reports to Server of telematics services.
- Sending Reports on Events to users directly by e-mail or SMS[3].
- Reading registers of Modbus RTU protocol by means of RS-485 interface from external electronic units and conversion of the read data into SPN[4];
- Remote control over the external device by means of RS-485 interface (Modbus RTU protocol) following the special command via TCP/IP or SMS[4];
- Automatic generation of Events[5] in case SPN change according to conditions specified[4].

[1] Only for CANUp 27 Pro / Genset.
[2] Valid for models with S7 wireless interface.
[3] Except models with data transfer support by means of Wi-Fi.
[4] Only for CANUp 27 Genset.

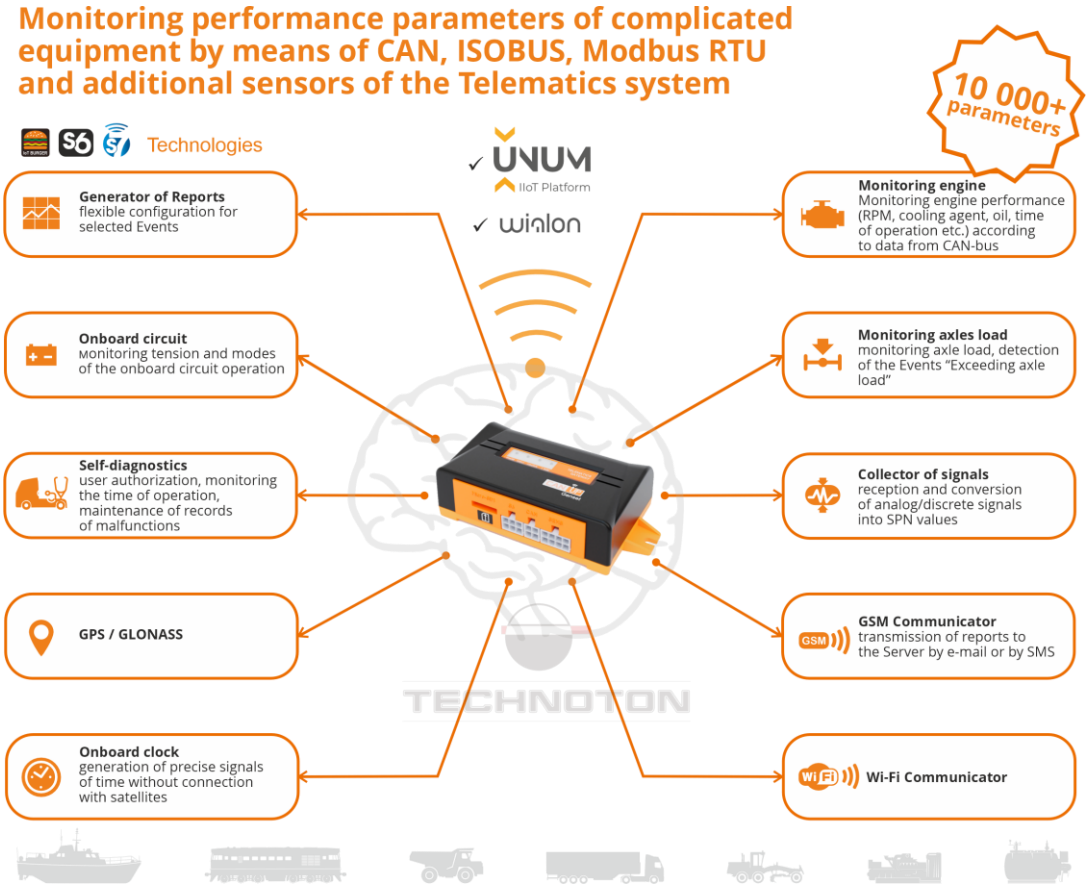


Figure 3 — CANUp 27 purposes of use

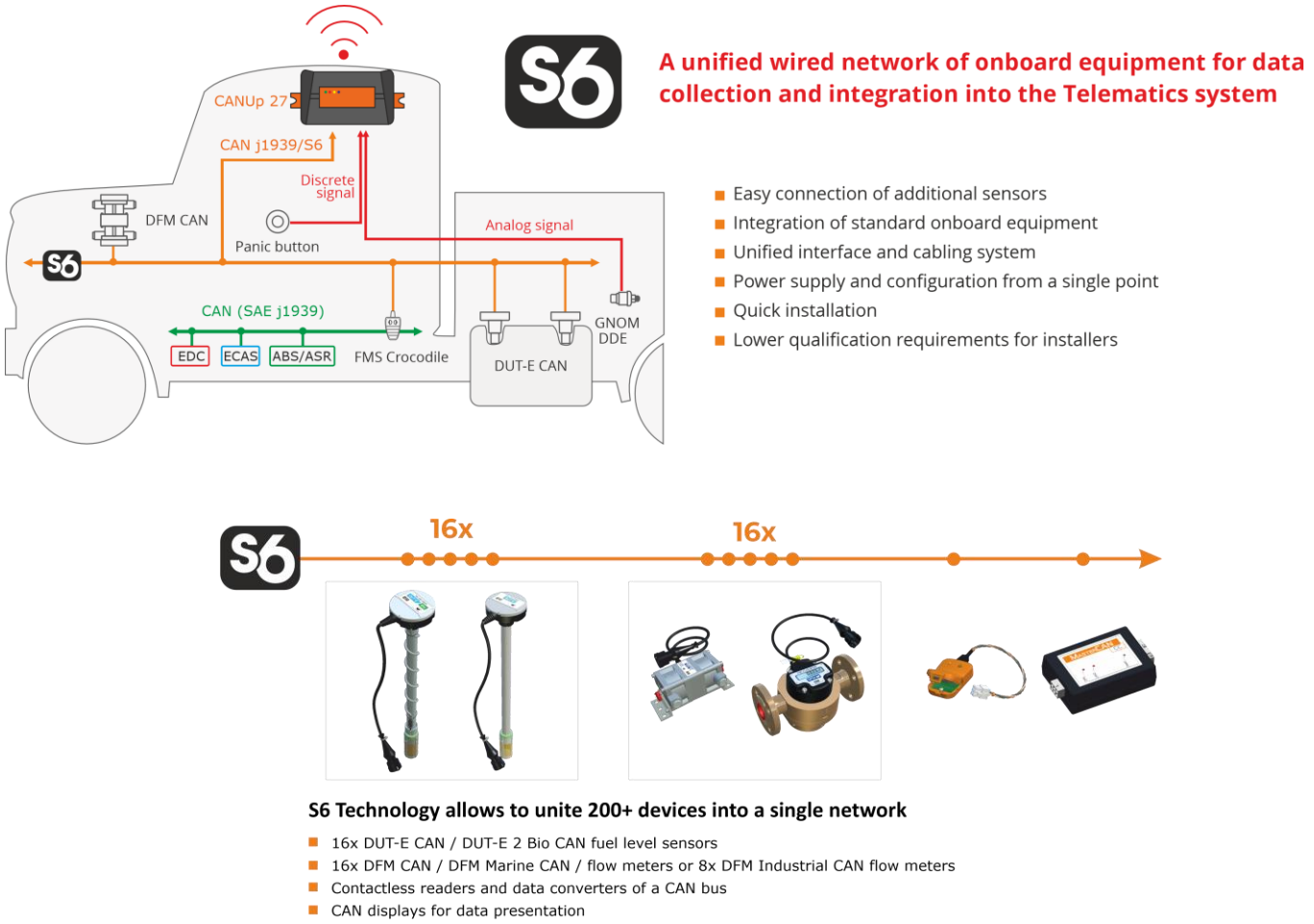
Areas of application and the principle of operation of the Telematics gateways, depending on the type of the assembly set:

1) Standard assembly sets — CANUp 27 Standard / Pro are employed as components of Telematics systems for monitoring 10 000+ performance indicators of any Complicated machines, in accordance with the specific equipment type and data sources (standard and additional sensors, CAN-buses, ISOBUS etc.).

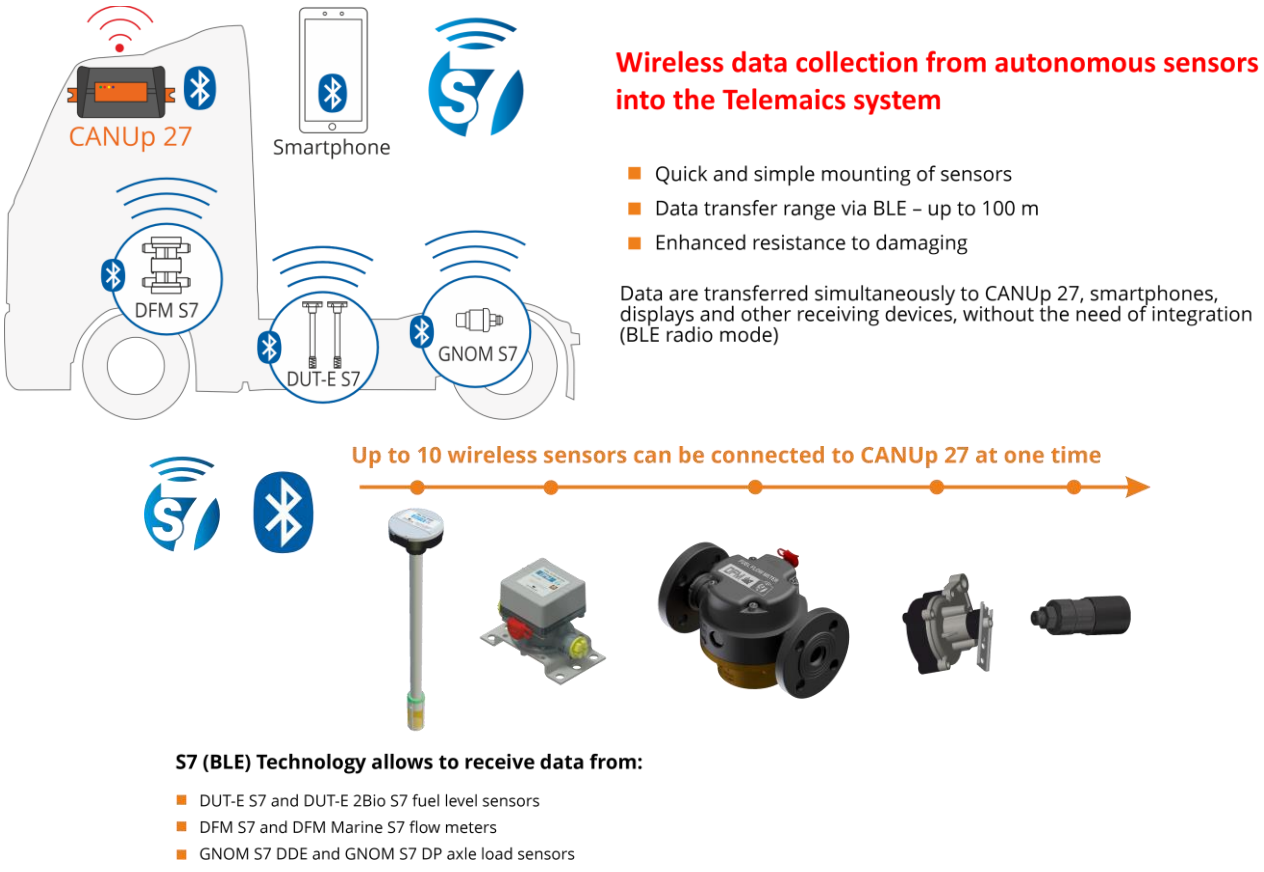
CANUp 27 mounted on a Monitored asset receives data (SPN) from Units by means of S6 Technology and converts output signals from onboard analog sensors into digital data of S6 Database (see figure 4 a).

The gateway with enhanced functionality (CANUp 27 Pro model) can also automatically scan standard CAN–buses or ISOBUS, receive Telematics or diagnostics data, filter all unnecessary data.

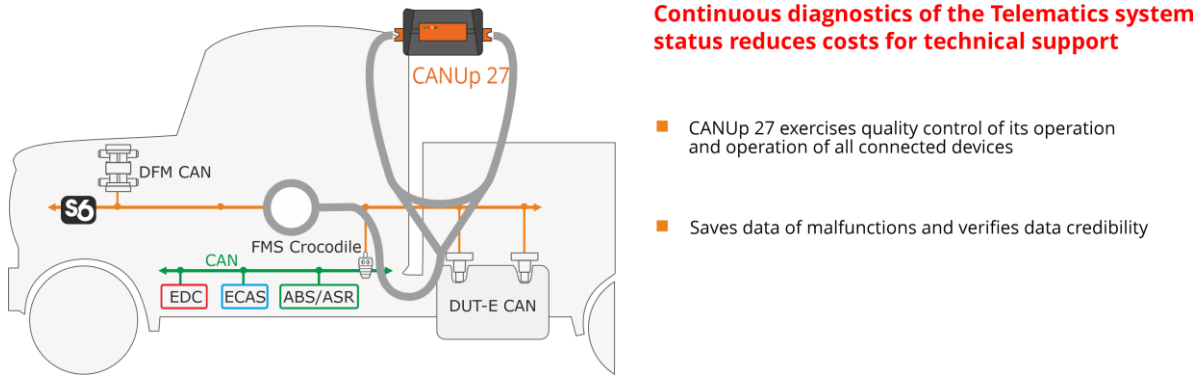
The availability of the inbuilt BLE-module allows CANUp 27 Pro S7 LTE / Pro S7 Wi-Fi to receive at one time data by means of S7 Technology from up to 10 pcs. wireless Units — DUT-E S7 / DUT-E 2Bio S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM S7 axle load sensors, ADM31 temperature and humidity sensors (see figure 4 b).



a) operation using S6 Technology



b) operation using S7 Technology



c) self-diagnostics and diagnostics of connected Onboard equipment

Figure 4 — Examples of CANUp 27 employment on a Vehicle as part of the Telematics system

According to signals from GNSS, CANUp 27 defines the location, speed, and direction of a mobile Asset movement. In accordance with user settings, the gateway generates Onboard reports (up to 32 pcs.) for their transfer to the Telematics Server. Each Report contains up to 10 pcs. of the Asset performance indicators selected by the user from S6 Database of standardized Parameters.

CANUp 27 generates, stores and sends Reports both according to the timer settings, and in case an Event occurs; this eliminates the risk of important data loss. An abrupt change of an Asset performance indicator value is considered by the gateway as an Event (e.g. fuel discharge, tension spike, pressure fall etc.). Changes of Parameters are identified with high discreteness (0.1…10 s); this enhances the detailization of data accumulated at the Server.
Based on the gateway Onboard reports, the Telematics system software enables users to conduct Operational monitoring and Post-analysis of the Assets performance (see figures 5 and 7).

Notifications of users of Events (including directly by E-mail/SMS skipping the Server) allow to respond promptly to changes in the equipment operation, using methods of its preventive maintenance, to prevent any possible failures.

RECOMMENDATIONS

1) To monitor the route of movement and fuel consumption of the Vehicle (when using CANUp 27 Genset CANUp 27 Standard / Pro), you may use ORF 4 / ORF 5 Telematics service (see the document "ORF 4 Telematics service. User manual").

2) To monitor 300+ performance indicators of Diesel generator units using the PC browser or the mobile application (when using CANUp 27 Genset), **we highly recommend** to use the latest specialized UNUM Genset Telematics service (see the document "UNUM Genset Telematics service. "Fleet". User manual").

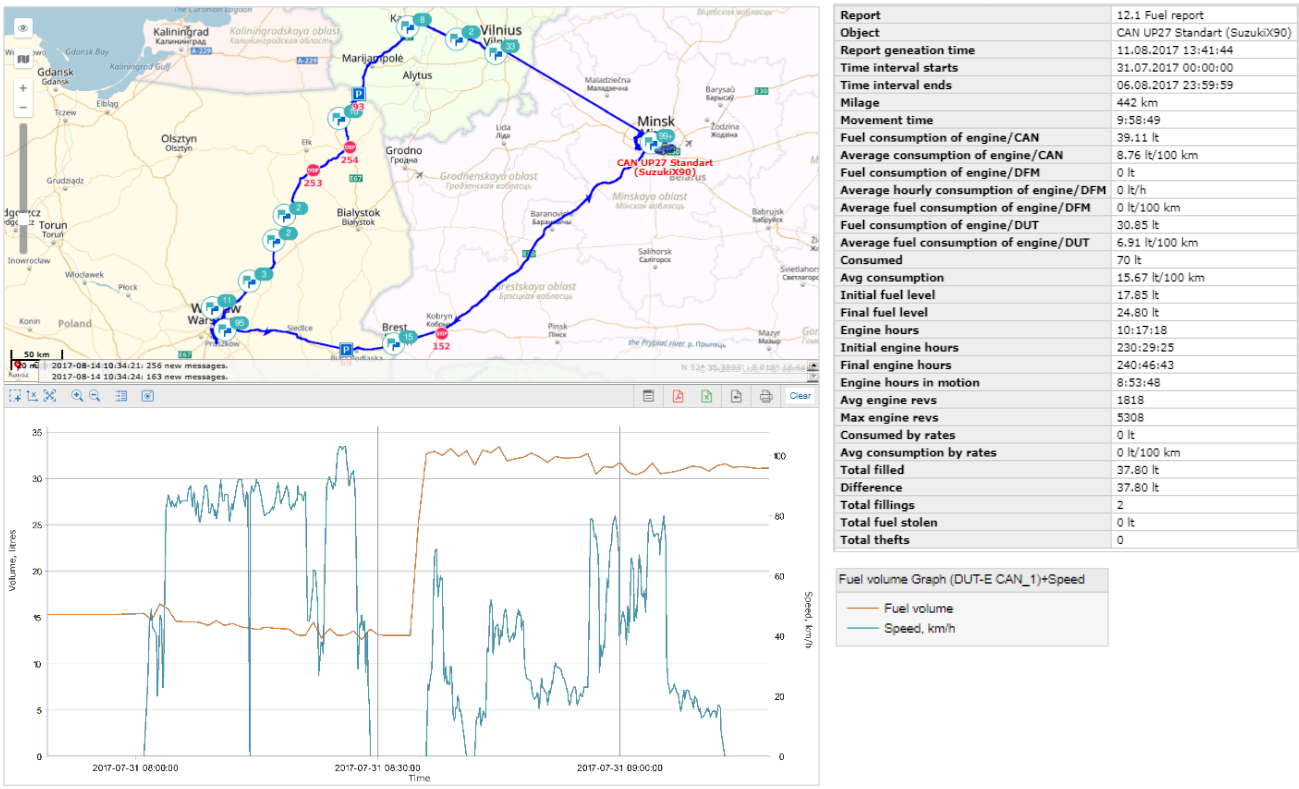


Figure 5 — Example of Analytical report, generated in ORF 4 software, based on the CANUp 27 Standard Reports

2) The specialized assembly sets — CANUp 27 Genset are employed for monitoring Diesel generator units operation.

The availability of CAN j1939/S6 interface allows CANUp 27 Genset to receive data from DFM CAN / DFM Marine CAN fuel flow meters (up to 16 pcs.) and DUT-E CAN / DUT-E 2 Bio fuel level sensors (up to 16 pcs.) by means of S6 Technology.

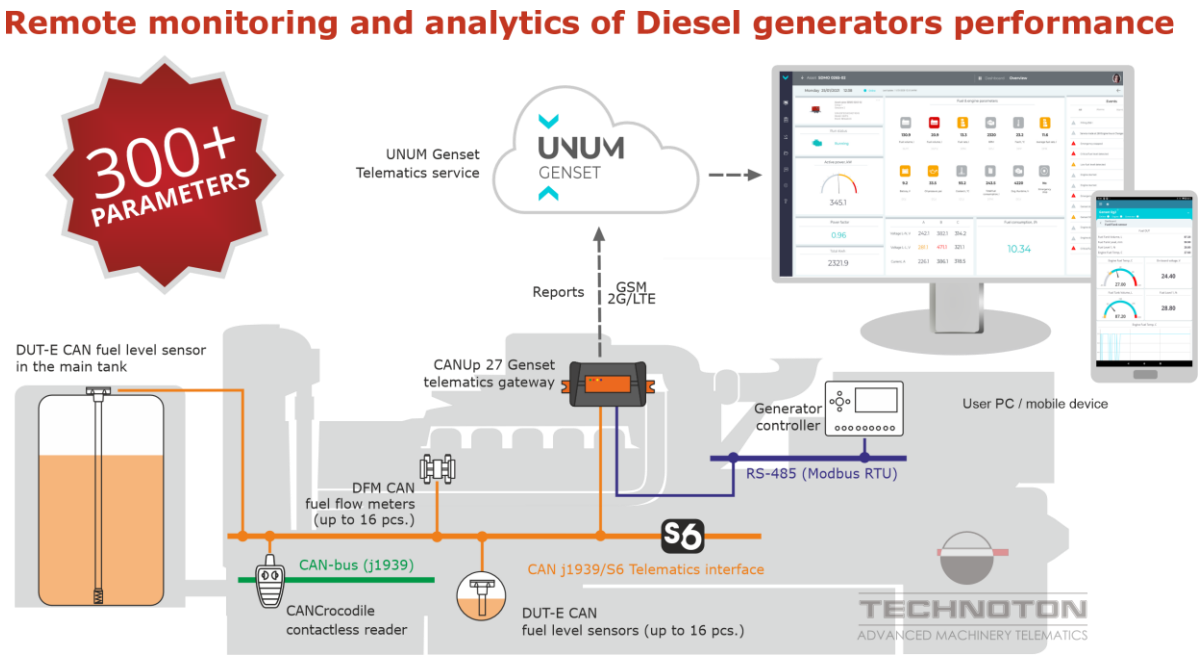
The gateway receives data from a standard CAN-bus of a Diesel generator through CANCrocodile contactless reader connected to CAN (SAE j1939) interface filtering automatically required SPN (see figure 6 a).

If needed, automatic sending of notifications of Events in the Diesel generator unit directly to the user (skipping the Server) is available by E-mail (up to 3 E-mail addresses) or in the form of SMS messages (up to 3 telephone numbers).

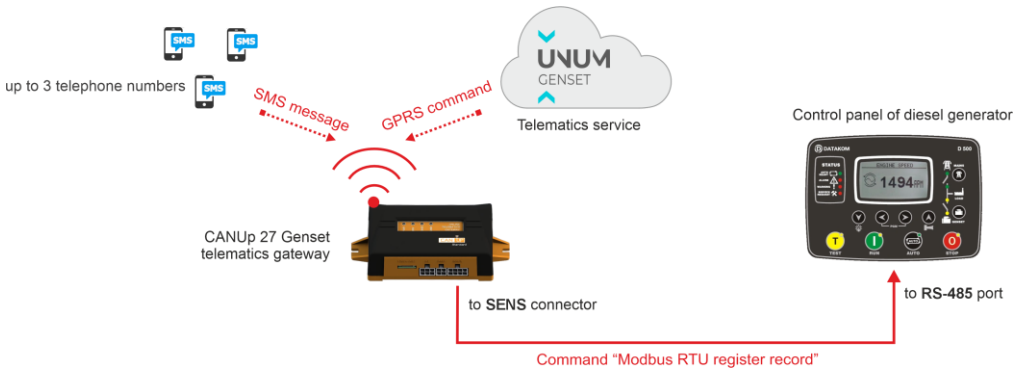
CANUp 27 Genset can read out data from up to 50 pcs. Modbus RTU registers of the Diesel generator controller via RS-485 interface and convert them into SPN of S6 Database, in order to

generate Reports. The gateway also has the automatic scanner of set Modbus RTU registers, with displaying initial values of registers and values of converted output SPN in the service software.

CANUp 27 Genset allows remote control of the Diesel generator unit (conduct the configuration, switching on/off, reset in case of errors etc.) (see figure 6 b). For this purpose, you need to connect the gateway to the Diesel generator controller via RS-485 interface and send an SMS command to record the appropriate Modbus RTU register from any of the 3 entrusted mobile numbers. This command imitates functions of pressing buttons on the Diesel generator control panel (e.g. "Engine Start" / "Engine Stop"). You may also send a controlling command for recording a Modbus RTU register from the Telematics service by means of a GPRS message via TCP/IP channel. The formats of SMS and GPRS messages of this command are identical (see detailed information on the procedure for remote control of Diesel generator units controllers in CANUp and DATACOM/COMAP configuration instructions).

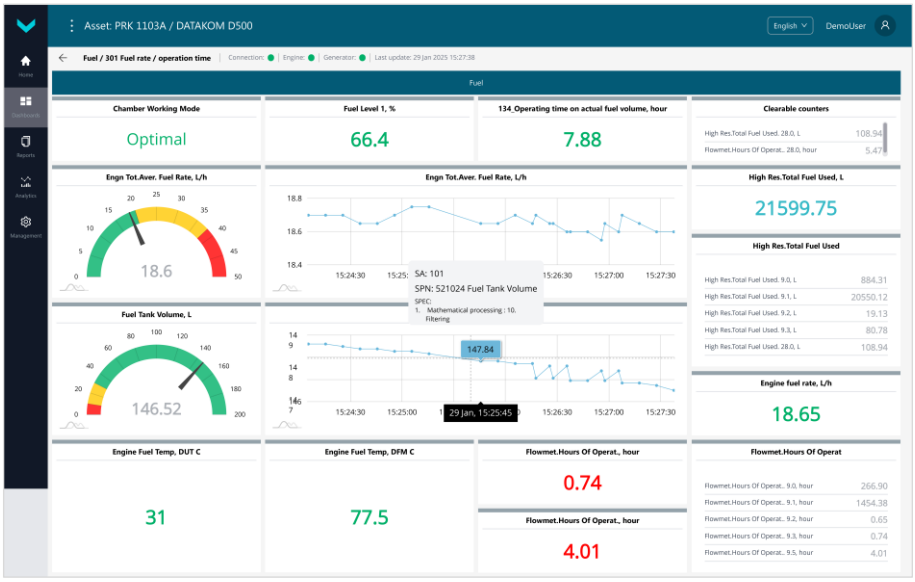


a) monitoring Diesel generator unit operation

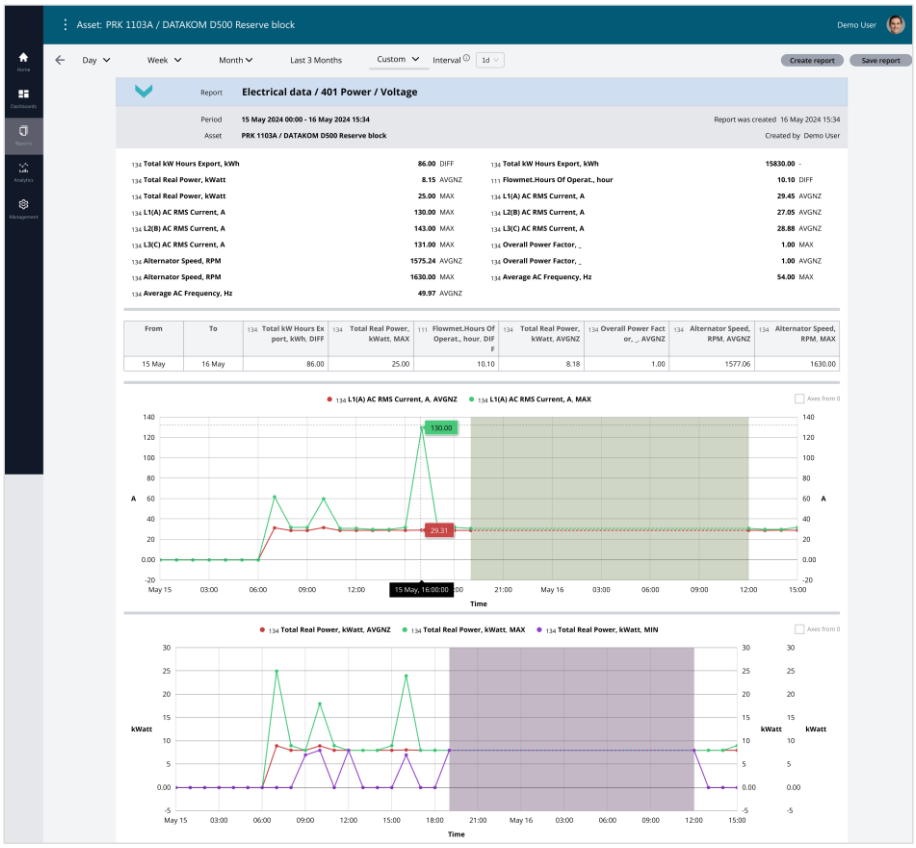


b) remote control over the Diesel generator unit controller

Figure 6 — Examples of CANUp 27 Genset areas of application



a) Dashboard displaying real-time data of fuel consumption, time and mode of the Diesel generator unit engine operation



b) Analytical report containing data of the Diesel generator unit electric Parameters for the period of one day

Figure 7 — Examples of displaying Diesel generator unit indicators in UNUM Genset Telematics service based on data from CANUp 27 Genset

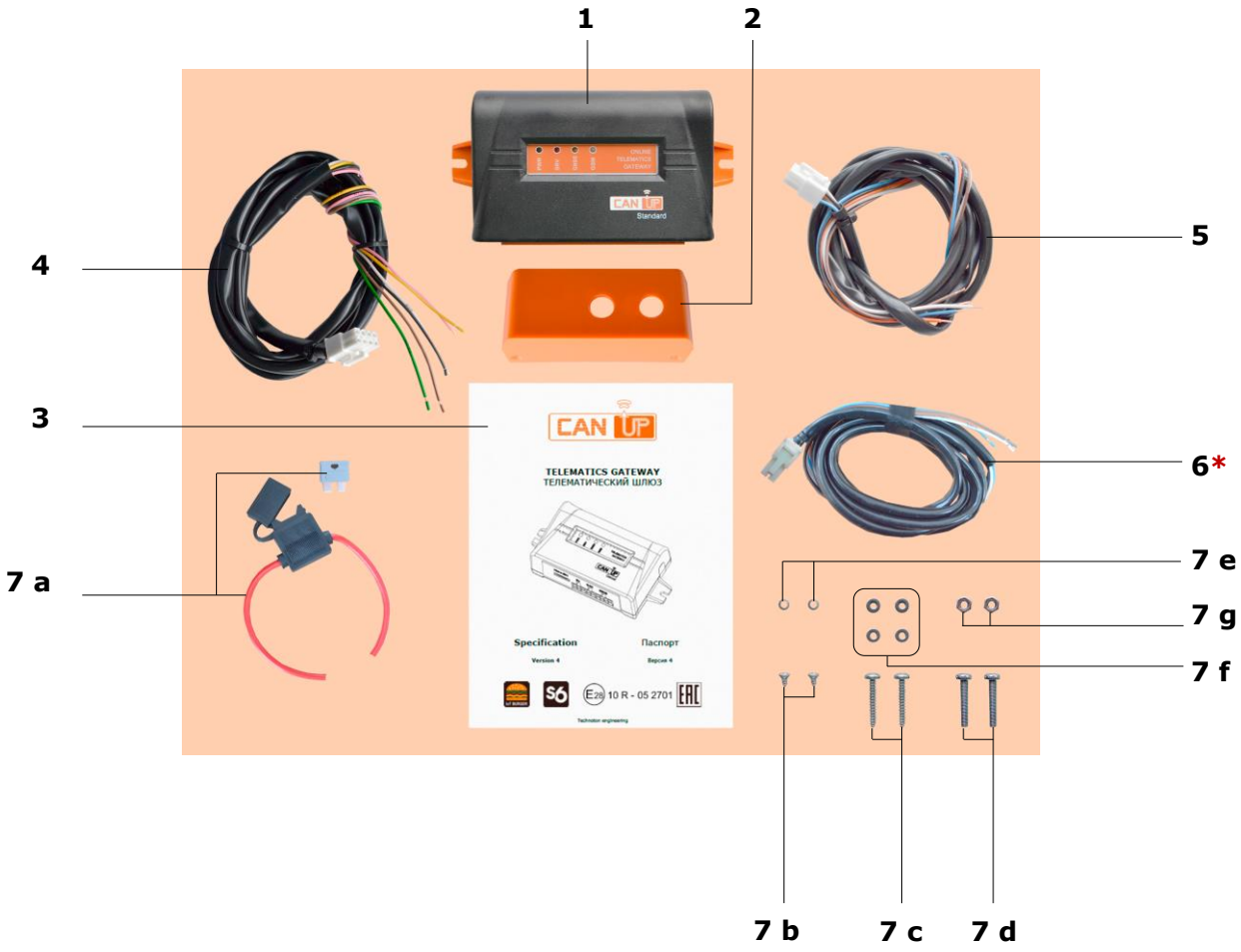
Table 1 — Telematics equipment that may be connected to CANUp 27 Pro S7 at one time

Designation of equipment	Number of pcs.	Note
DFM CAN / DFM Marine CAN / DFM Industrial CAN* fuel/liquid flow meters	16	Connection by means of S6 Technology (to **S6** connector) in any combination of flow meters models.
DFM S7 / DFM Marine S7 fuel flow meters		Wireless connection by means of S7 Technology. The total number of wire-connected (only with CAN j1939/S6 interface) and wireless fuel flow meters – no more than 16 pcs.
DUT-E CAN / DUT-E 2Bio / DUT-E GSM fuel level sensors	16	Connection by means of S6 Technology (to **S6** connector) in any combination of fuel level sensors models.
DUT-E S7 / DUT-E 2Bio S7 fuel level sensor		Wireless connection by means of S7 Technology. The total number of wire-connected (only with CAN j1939/S6 interface) and wireless fuel level sensors – no more than 16 pcs.
GNOM DP CAN axle load sensor	4	Connection by means of S6 Technology (to **S6** connector) in any combination of models of axles load sensors.
GNOM DDE S7 / DUT-E DP S7 axle load sensors		Wireless connection by means of S7 Technology. Total number of connected axles load sensors — cable connected (only with CAN j1939/S6 interface) and wireless sensors — no more than 4 pcs.
Marker S7 Radiobox CAN wireless interface together with Marker S7 active asset tags	1	
MasterCAN Display 35 CAN j1939/S6 Display	2	
MasterCAN CC data converter	2	
MasterCAN V-Gate data converter	2	
MasterCAN CAN2RS data converter	1	
MasterCAN RS2CAN data converter	1	
MasterCAN P2CAN data converter	1	
MasterCAN DAC15 j1939 i/o module	2	
MasterCAN DAC2113 j1939 i/o module	2	
S7 Radiobox CAN signal converter in combination with DUT-E S7 (type 0113) / DUT-E 2Bio S7 wireless fuel level sensors and (or) DFM S7 / DFM Marine S7 fuel flow meters (up to 10 pcs.)	1	
GNOM S7 Radiobox CAN signal converter in combination with GNOM DDE S7 / DUT-E DP S7 wireless axle load sensors (up to 10 pcs.)	1	
FMSCrocodile CCAN contactless reader-converter	1	
CANCrocodile / CANCrocoLITE contactless reader	1	Connection to **CAN** connector, operation in the sniffer mode.
GNOM DDE / GNOM DP axle load sensor	1	Connection to **SENS** connector. It is allowed to connect at one time: - 1 sensor with frequency output; - 1 sensor with analog output.
DUT-E AF fuel level sensor	1	
ADM31 temperature and humidity sensor	4	Wireless connection by means of S7 Technology.
Emergency button	1	Connection to **SENS** connector.

The maximum possible number of wireless Units for simultaneous connection by means of S7 Technology is 10 pcs., in any combination of their types.

* Up to 8 pcs. of DFM Industrial CAN flow meters may be connected into a single network at one time.

1.2 Exterior view and delivery set

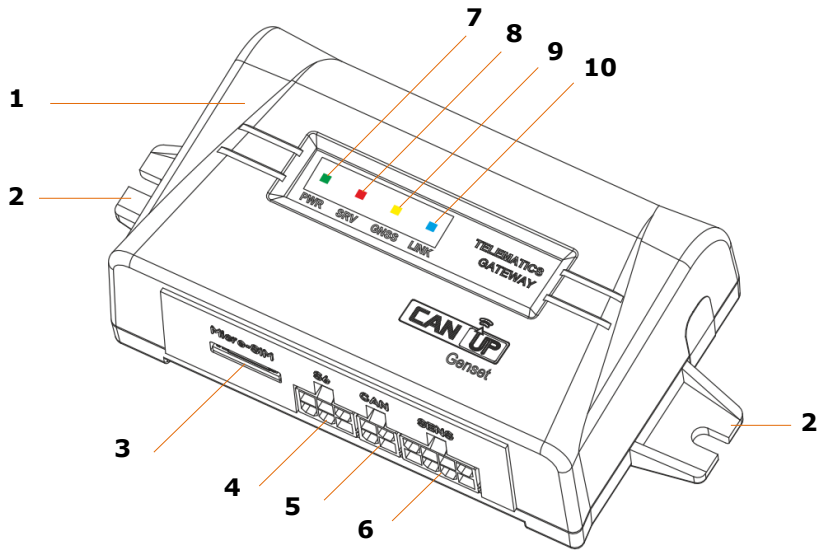


1	CANUp 27 online telematics gateway	– 1 pc.;
2	Sealing bar	– 1 pc.;
3	Passport with a list of factory settings	– 1 pc.;
4	CANUp 27 cable	– 1 pc.;
5	S6 cable	– 1 pc.;
6*	CAN 4 pin cable	– 1 pc.;
7	Mounting kit (1 pc) including:	
a)	fuse with holder (2 A)	- 1 pc.;
b)	self-tapping screw 3x6	- 2 pcs.;
c)	self-tapping screw 4.2x25	- 2 pcs.;
d)	screw M4x25	- 2 pcs.;
e)	lock washer 4.65	- 2 pcs.;
f)	washer 4	- 4 pcs.;
g)	nut M4	- 2 pcs.

Figure 8 — CANUp 27 delivery set

* Supplied only for CANUp 27 Pro / Genset.

1.3 CANUp 27 design



1 – gateway casing; inside it there are: the electronic module, GNSS receiver, BLE module[1], SIM card holder[2], GSM modem[2] and the accumulator;
2 – installation holders;
3 – **Micro-SIM** slot for Micro-SIM card installation[2];
4 – **S6** connector — CAN j1939/S6 interface for connection of Units using S6 Technology and for external power supply[3];
5 – **CAN** connector — CAN 2.0B interface for connection to a standard CAN-bus or to ISOBUS bus[4];
6 – **SENS** connector— RS-485 interface (Modbus RTU)[5] and analog input for connection of analog/frequency/pulse/discrete signals;
7 – green LED-indicator **PWR** for power supply status;
8 – red LED-indicator **SRV** for Vehicle ignition status check and data sending to PC check (when setting up with service software);
9 – yellow LED-indicator **GNSS** for GPS receiver status check;
10 – blue LED indicator **LINK** to monitor the status of GSM modem and GPRS connection (for models with data transfer support according to 2G / LTE standard), to monitor the status of Wi-Fi modem and Internet connection (for models with data transfer support via Wi-Fi).

Figure 9 — CANUp 27 design

[1] For models with S7 wireless interface.
[2] For models with data transfer support by means of Wi-Fi, these elements are missing; their electronic module contains the inbuilt Wi-Fi modem.
[3] Power is supplied to CANUp 27 through S6 cable system.
[4] In model CANUp 27 Standard **CAN** connector is a spare one.
[5] Only CANUp 27 Genset has RS-485 interface in **SENS** connector.

1.4 Technical specifications

1.4.1 Main specifications

Table 2 — CANUp 27 main specifications

Parameter, measuring unit	Value			
	CANUp 27 Standard	**CANUp 27 Pro LTE**	**CANUp 27 Pro Wi-Fi**	**CANUp 27 Genset**
Data transmission channels	2G	2G/3G/4G	Wi-Fi (IEEE 802.11 b/g/n)	2G/3G/4G**
Supported GSM frequency bands, MHz	see table 3		-	see table 3
Wireless interface	-	S7		-
Configurable digital interface	CAN j1939/S6			
Non-configurable digital interface	-	CAN 2.0B (SAE j1939)		
Serial interface	-			RS-485
Physical signal inputs	Analog / Frequency / Discrete			
Service interface	K-Line (ISO 14230)			
Communication protocols	Wialon IPS v.2.0	Wialon IPS v.2.0 / UNUM		
Voltage range of external power supply, V	9…45			
Capacity of inbuilt Li-Ion accumulator, mA/h	700			
Inbuilt battery ensures autonomous functioning without external power supply, h, not less than	4…6*			
Maximal current consumption at supply voltage 12/24 V, mA, not more than	500/250			
Average current consumption at supply voltage 12/24V, mA, not more than	380/190			
Time of readiness to receive GNSS signals, after the power supply is on, s, no more than	10			
Reports number that can be stored in buffer memory (factory settings of reports), pcs.	up to 40 000			
Temperature range, °C	-40…+60			
Level of sealing protection from dust and moisture	IP40			
Electromagnetic compatibility	see annex D			
Weight, kg, not more than	0.2			
Overall dimensions, mm, not more than	see figure 10			

* Depending on the ambient temperature and settings of periodicity (rules) for sending Onboard reports to the Server of telematics services (AVL Server).
** Depending on Model code (see Introduction).

Table 3 — GSM frequency bands supported by CANUp 27 gateways

Model	Data transmission channel	Frequency bands (Bands)	Region of application*
CANUp 27 Standard	2G	GSM 850/900/1800/1900 MHz	Europe, Asia, USA, Canada, Latin America, Africa
CANUp 27 Pro LTE E	2G	GSM 900/1800 MHz	Europe, Middle East, Africa (EMEA region)
	3G	B1/B8	
	4G	B1/B3/B7/B8/B20/B28A	
CANUp 27 Pro LTE A / Genset LTE A	2G	GSM 850/900/1800/1900 MHz	EMEA region and Latin America, Australia, New Zealand
	3G	B1/B2/B4/B5/B8	
	4G	B1/B2/B3/B4/B5/B7/B8/B28/B40	
CANUp 27 Pro LTE G / Genset LTE G	2G	GSM 850/900/1800/1900 MHz	Worldwide
	3G	B1/B2/B4/B5/B6/B8/B19	
	4G	B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/ B19/B20/B25/B26/B28/B38/B39/B40/B41	
CANUp 27 Genset 2G	2G	GSM 850/900/1800/1900 MHz	Europe, Asia, USA, Canada, Latin America, Africa
CANUp 27 Genset LTE E	2G	GSM 900/1800 MHz	Europe, Middle East, Africa (EMEA region)
	3G	B1/B8	
	4G	B1/B3/B7/B8/B20/B28A	

* Designations of regions. As for working ranges of GSM frequencies, we recommend to consult in advance your mobile communication operator in whose network the gateway will be employed.

1.4.2 Specifications of S7 wireless interface

Table 4 — Specifications of S7 wireless interface

Parameter, measuring unit	Value
Communication channel	Bluetooth 4.2
Transmission unit power (Tx Power), dBm	+4
Receiver sensitivity (Rx Power), dBm	-88
Maximum areal reach, m	20 (when mounted on a Vehicle and inside a building) 50 (when mounted within line-of-sight range)
Wireless Units* that can be connected	- DUT-E S7 / DUT-E 2Bio S7 fuel level sensor (up to 10 pcs.); - DFM S7 / DFM Marine S7 fuel flow meters (up to 10 pcs.); - GNOM DDE S7 pressure sensors (up to 4 pcs.); - GNOM DP S7 position sensors (up to 4 pcs.); - ADM31 temperature and humidity sensors (up to 4 pcs.).
Maximum number of wireless Units available for connection at one time, pcs.	10**
Data transmission interval, s	5
Certificates of BLE module electromagnetic compatibility	FCC/CE-RED/SRRC/TELEC BQB RoHS/REACH

* The procedure for wireless Units connection to CANUp 27 Pro LTE / Pro Wi-Fi is provided in 2.4.11. The structure and composition of data of output messages from wireless Units is provided in annex F.

** In any combination of types of wireless Units.

1.4.3 Data transfer protocol to Server

CANUp 27 sends Onboard reports to the telematics Server (AVL server) in form of data packets using communication protocols:

- UNUM* (for the data composition in Onboard reports, see annex E);
- Wialon IPS v.2.0 (Onboard reports format is specified in annex A).

The selection of the required protocol and user configuration of its parameters for transmission of data to the Server is performed using Service CANUp service software (the current version may be downloaded at https://www.jv-technoton.com/, section Software/Firmware).

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* Applicable only to CANUp 27 Pro / Genset models.
Provided to users upon request through Technoton technical support by support@jv-technoton.com.

1.4.4 CAN j1939/S6 configurable digital interface characteristics

CAN j1939/S6 configurable digital interface of CANUp 27 characteristics comply with S6 Technology. Data transfer protocol is based on SAE j1939 standard and meets its requirements.

Configuration of CANUp 27 connection options via CAN j1939/S6 interface is performed via K-Line interface (ISO 14230) (see 2.4.5) using Services CANUp software (can be downloaded from https://www.jv-technoton.com/, Software/Firmware).

CANUp 27 is compatible with any PGN of S6 Database. Any SPN* can be selected to generate Reports.

CANUp 27 may receive data via CAN j1939/S6 interface in the automatic mode or upon request. Operation in the sniffer mode is also possible. Baudrate can be selected from the following range of fixed values: 100; 125; 250; 500; 1000 kbit/s (250 kbit/s by default).

For the CANUp 27 identification by CAN j1939/S6 output interface, it has a fixed unique network address — 100. To identify Units using S6 Technology, you must specify the unique network addresses (SA) using the service software according to table 5.

Table 5 — Authorized network addresses for S6 Units connected to form a network using S6 Technology

Units S6		Maximum quantity at single Object	Authorized Network Addresses (SA)
Type	**Model**		
Telematics gateway	CANUp 27	1	100
CAN j1939/S6 Display	MasterCAN Display 35	2	109, 110
Fuel flow meters	DFM CAN/DFM D CAN	16	0…240 (recommended ranges 111…118, 151…158)
	DFM Marine CAN		
Flow meters	DFM Industrial CAN	8	111…118
Fuel level sensors	DUT-E CAN	16	91…98, 101…108
	DUT-E GSM		
	DUT-E 2Bio CAN		
Data converters	MasterCAN CC	2	122, 142
	MasterCAN C232/485	2	124, 144
	MasterCAN V-Gate	2	125, 145
	MasterCAN CAN2RS	1	135
	MasterCAN RS2CAN	1	134
	MasterCAN P2CAN	1	140
Contactless reader-converter	FMSCrocodile CCAN	1	122
j1939 i/o modules	MasterCAN DAC15	2	126, 146
	MasterCAN DAC2113		127, 147
Position sensor	GNOM DP CAN	1	218, 82…85
Wireless interface	Marker S7 Radiobox CAN	1	131
Signal converter	S7 Radiobox CAN	1	142
Signal converter	GNOM S7 Radiobox CAN	1	148

* For CANUp 27 Pro / Genset, length of a text SPN will be automatically limited to 24 bytes. For CANUp 27 Standard SPN must have only digital values and be no longer than 4 bytes.

1.4.5 CAN non-configurable digital interface characteristics

Specifications of the digital non-configurable CAN interface in CANUp 27 Pro / Genset Telematics gateways correspond to the specification of CAN 2.0B interface. The data transmission protocol corresponds to SAE j1939 group of standards.

The Telematics gateway using CAN 2.0B interface has the feature of automatic adjustment to any Baudrate used in the bus from the range of accessible values: 100; 125; 250; 500; 1000 kbit/s. Data are received in the sniffer mode.

The composition of PGN depends on the data contained in the connected standard CAN-bus or in ISOBUS and may differ significantly depending on the manufacturer, model and the year of the equipment manufacturing.

1.4.6 Specifications of RS-485 serial interface

The configurable RS-485 interface is the input interface of CANUp 27 Genset Telematics gateway. Its specifications meet the standard of RS-485 serial interface.

CANUp 27 Genset conducts data exchange using the serial interface in the demand/response mode, in accordance with Modbus RTU protocol.

Connection parameters of CANUp 27 Genset are configured by means of RS-485 interface with the help of Service CANUp service software (versions from 7.X) via K-Line interface (ISO 14230) (see 2.4.6). The current version may be downloaded at https://www.jv-technoton.com/, section Software/Firmware.

Using the service software, you can maximally generate up to 50 slots for data reading and convertion via serial interface. Each slot is a set of reading settings for one or two specified Modbus RTU registers.

During its operation within the network of devices with RS-485 interface, CANUp 27 Genset is always the Master device. The gateway can read data from Slave devices operating in the same network with it, from any selected register of Modbus RTU protocol.

For CANUp 27 Genset and Slave devices operating in the same network with it, unique network addresses from 0…255 range must be specified.

Baudrate can be selected from the following range of fixed values: 2400; 4800; 9600; 19200; 38400; 57600; 115200 bit/s.

1.4.7 Analog signals specifications

Choosing the required type of analog input signals and configuration of physical inputs of CANUp 27 is performed using Service CANUp software (current version can be downloaded from the website https://www.jv-technoton.com/, section Software/Firmware).

Table 6 — Specifications of signals of CANUp 27 analog inputs

Signal type, measurement units	Value
Voltage, V	0…30
Frequency**, kHz	0.001…10
Discrete, V	U_{PS}…3 (level 0)* 3…0 (level 1)

* U_{PS} — voltage of power supply source.

** Using Service CANUp software you can specify the "Counting" physical input type for counting input pulses (**Collector 1A1F1D FM** submenu, see the Catalogue of Functional modules of CANUp 27 telematics gateways).

1.4.8 Overall dimensions

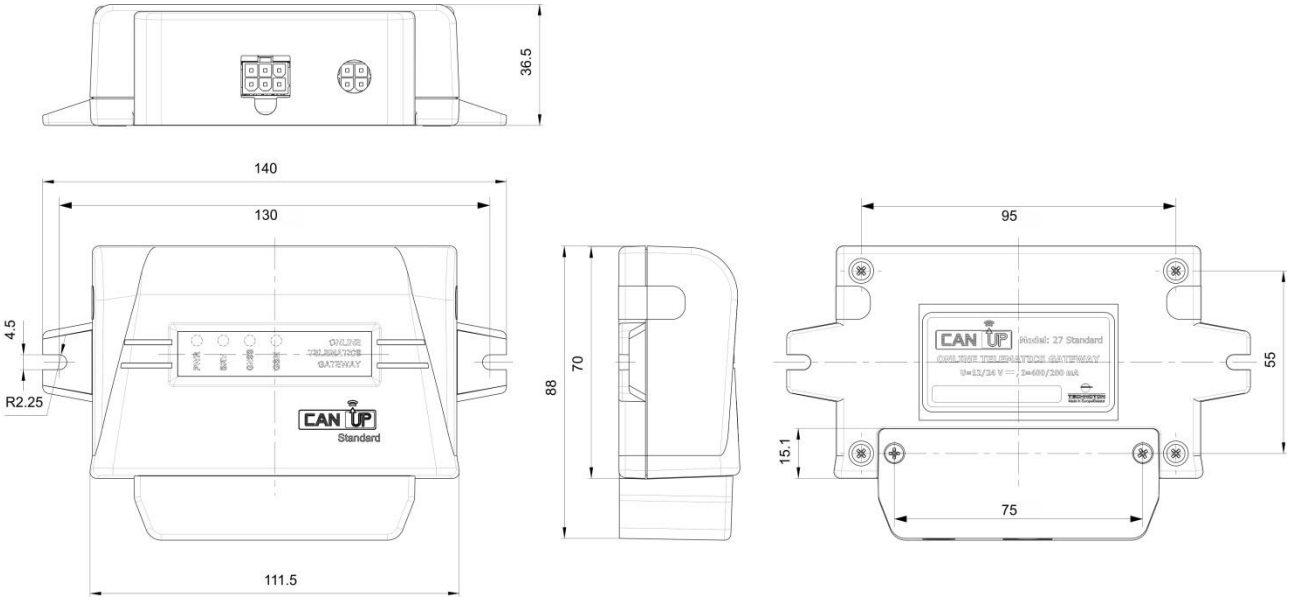


Figure 10 — CANUp 27 overall dimensions

2 CANUp 27 installation

ATTENTION:
1) When mounting CANUp 27, strictly follow safety rules of car repair works as well as local safety rules of the customer' company.
2) Before the start, it is recommended to carefully study through the electrical circuit diagram and Operation manual for the Object, where CANUp 27 is mounted.

For CANUp 27 correct operation its mounting and configuration should be carried out by certified specialists who have passed corporate technical training.

2.1 Exterior inspection prior to starting works

It is required to conduct CANUp 27 exterior inspection for the presence of the possible defects of body or connectors arisen during transportation, storage or careless use.

Contact the supplier if any defects are detected.

2.2 Operational restrictions

IMPORTANT:

1) In the process of CANUp 27 installation it should be taken into account that GLONASS/GPS antenna is mounted within its casing. Therefore, to ensure unobstructed reception of signals from GNSS, it is necessary to provide a **maximum view of the sky** at place of CANUp 27 mounting.

2) To eliminate failures in the communication line between the gateway and wireless Units during CANUp 27 operation based on S7 Technology, you need to make sure there are no sources of electromagnetic interference (radiotelephones, video signals transmission units and other wireless devices operating within 2.4 GHz or 5.0 GHz ranges, powerful transformers and switching equipment, welding equipment, high-voltage transmission lines etc.).

3) To ensure uninterrupted data transmission using S7 Technology, we do not recommend that the distance between CANUp 27 and wireless Units should exceed **20 m**.

CANUp 27 installation should be done in a dry location protected from aggressive impact of the environment. CANUp 27 should not be mounted near heating and cooling devices (e.g. the climate control system). Also, it is not recommended to mount CANUp 27 close to the vehicle electrical circuits.

A suitable location to mount CANUp 27 is inside driver's cabin.

To avoid the driver's distraction during driving, we do not recommend that the LED indicators of the mounted Gateway should be located within the sight of the driver!

2.3 SIM card installation

The installation of SIM card is foreseen only for models CANUp 27 Standard / Pro LTE / Genset.

ATTENTION:
1) SIM card (Micro-SIM) is not a part of delivery set and should be purchased from a local GSM operator. It is recommended to use SIM card with GPRS/SMS function only and disable PIN protection of the SIM card
2) SIM card should be installed by qualified personnel. Before installation it is recommended to disconnect external power of CANUp 27.

Insert SIM card (contacts facing down) into the **Micro-SIM** slot of CANUp 27 and using your fingernail or with a small screwdriver gently push it into the SIM holder until it clicks (see figure 11).

Note — To remove the SIM card, press it with your fingernail or with a small screwdriver until you hear a click. Before removing the SIM card, it is recommended to disconnect external power of CANUp 27.

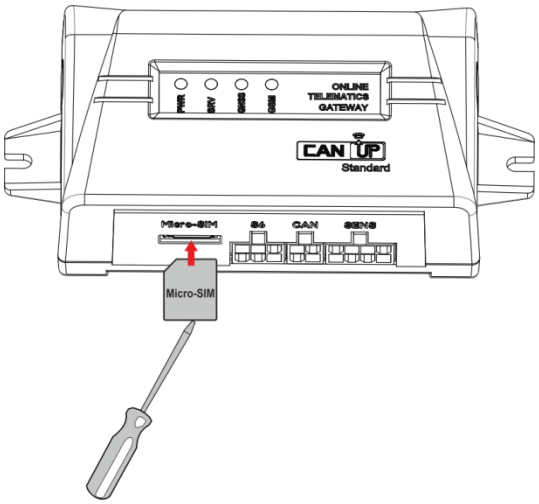


Figure 11 — Place of SIM card installation to CANUp 27 Standard / Pro LTE / Genset

2.4 Configuration of CANUp 27

ATTENTION: To avoid any communication faults between PC and CANUp 27 make sure there are no sources of electromagnetic interference close to the workplace (running electric motors, welding equipment, high-power transformers, power lines, etc.).

CANUp 27 is configured via K-Line (ISO 14230) service interface.

For configuration of CANUp 27 it is required to connect to PC with S6 SK service adapter.
To run S6 SK is required to install Driver USB and special software Service CANUp.

Note — Installation file of software has the view as: Service_CANUp_X_X_Setup.exe. X_X corresponds to the version of software.

ATTENTION: For work with Service CANUp software, you need a separate PC (desktop or laptop) on which **only** Technoton service software that meets the following minimal requirements is installed:
- Windows 7/10 operating system of X32/X64 bit depth;
- CPU — Intel Core i3, dual-core, 2.0 GHz;
- RAM — 4 Gb;
- availability of USB 2.0 port;
- display resolution 1366x768.

Description of S6 SK and requirements for PC can be found in Operation manual of CAN j1939/S6 Telematics interface.

CANUp 27 settings displayed and/or edited using the software are provided in the document Catalogue of Functional modules of CANUp 27 Telematics gateways.

Service CANUp software allows to conduct remote configuration using service software (see 2.4.9 and 2.4.10), as well as to conduct CANUp 27 firmware update by means of SMS commands without cable connection to the PC (see annex B).

2.4.1 Connecting CANUp 27 to PC

ATTENTION: Prior to connecting CANUp 27 to a PC, it is necessary to turn off electrical circuits of the Vehicle*. To do this, use the battery switch or remove the battery terminals.

Before starting work with S6 SK it is necessary to conduct exterior inspection of adapter and cables for the presence of the possible defects arisen during transportation, storage or careless use.

Avoid the following when connecting S6 SK to CANUp 27, mounted into the tank of the Vehicle:

- ingress of fuel and lubricants and moisture to the contact pins of adapter slots or connectors of service cables;
- potential damage of the adapter and cables by the rotating and heating elements of the engine.

* When configuring CANUp 27 installed on Vehicle. When configuring sensors connected connected via S6 Technology, power supply of onboard network (battery) can be turned on.

CANUp 27 connection to PC per the connection schemes (see figure 12) in the following order:

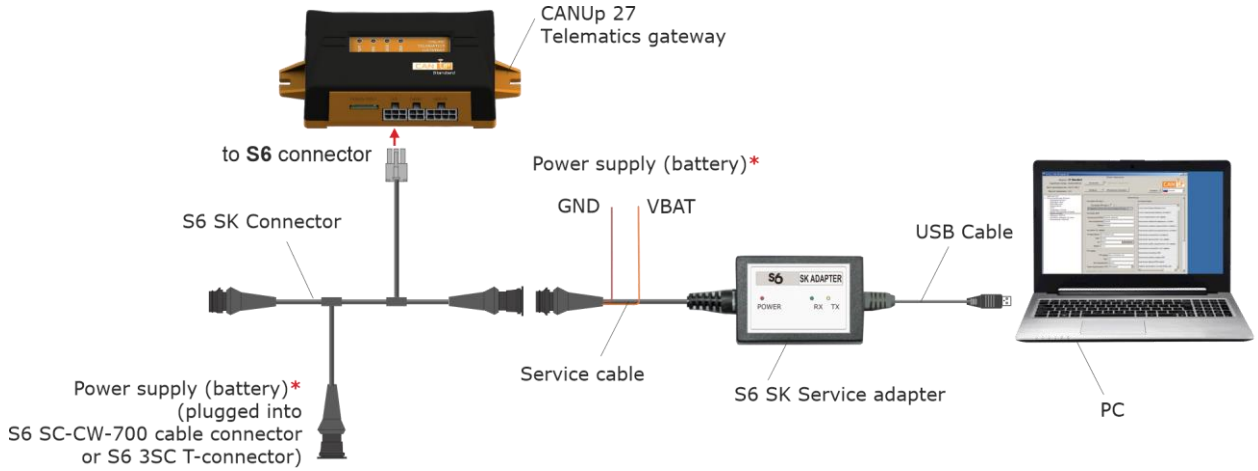
1) Connect the adapter to CANUp 27.
Plug of service cable of adapter is connected to S6 SK connector to **S6** socket. Power supply of CANUp 27 and service adapter can be either done through using free plug of S6 SK connector or using wires of service adapter (see figure 12 a).
During the configuration of CANUp 27 operating within the network of Units by means of S6 Technology the connector of the adapter service cable may be connected into the break of S6 cable system instead of any S6 3SC T-connector. In this case, power is supplied to CANUp 27 and the adapter through S6 cable system (see figure 12 b).

2) Connect the adapter with USB cable to a free USB-port of your PC.
Note — Adapter can also be connected to USB-port of your PC after turning vehicle's electrical system ON and starting the software.

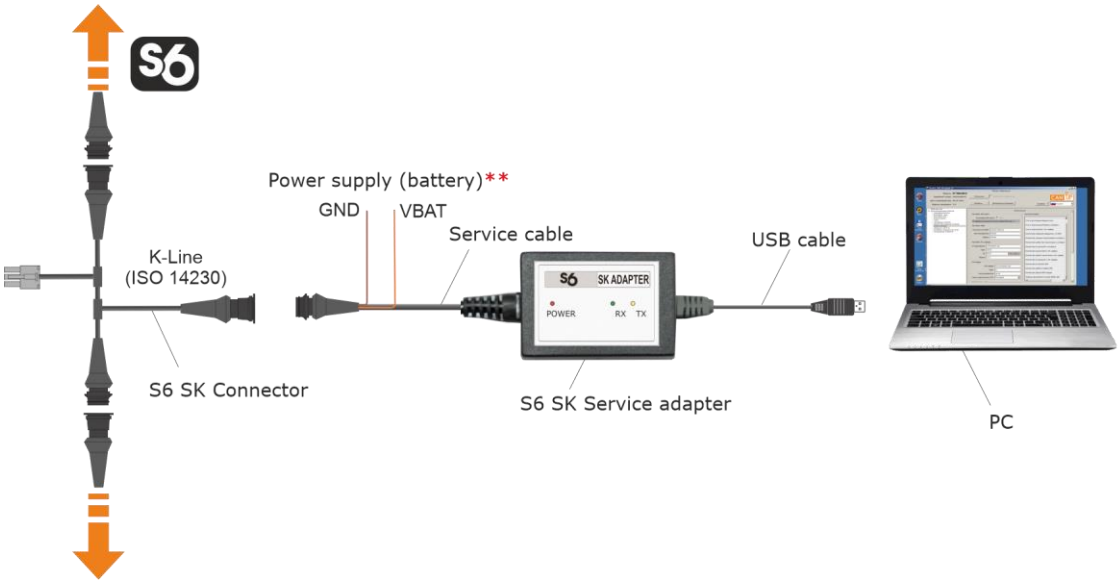
3) Connect power supply and ground wires to vehicle electrical system or battery.

4) Power on the vehicle (battery).

LED-indicator of red color (marked POWER) placed on the front panel of the adapter will light up after the adapter is connected to PC. If the indicator does not light up, check that USB cable is properly connected to PC.



a) connecting CANUp 27 using S6 SK



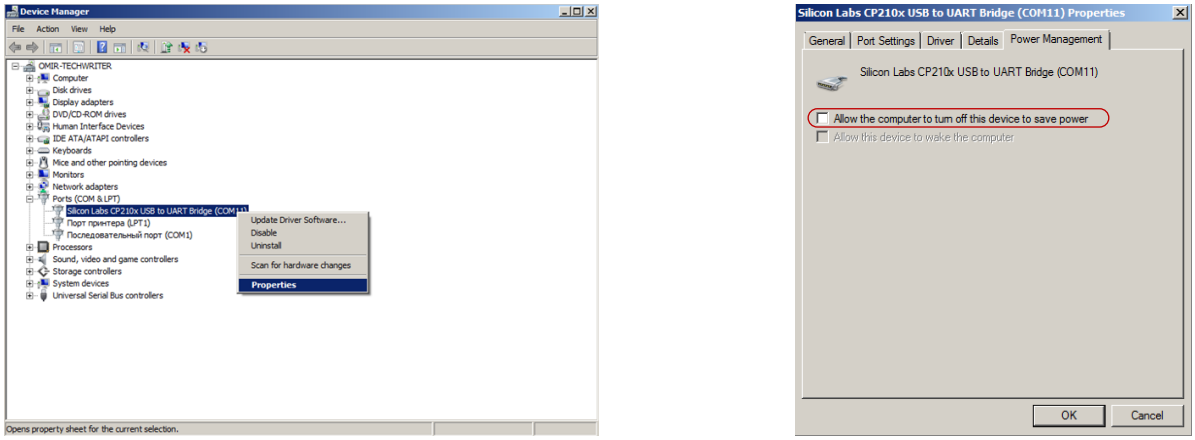
b) connecting CANUp 27 using S6 SK via S6 Technology

Figure 12 — Schemes of CANUp 27 connection to PC

* For connecting power supply (battery) you can choose any of marked places.
** No need to connect. Power supply (battery) is carried out though S6 cabling system.

Windows automatically detects adapter connected to PC's USB port as USB device and enables virtual COM port driver for it. The virtual COM port will be displayed in the list of ports of Windows Device manager (see figure 13).

ATENTION: It is recommended to untick power save check box for Service CANUp in the virtual COM-port properties for energy safety purpose (see figure 13 b).



a) selecting port properties *b) disabling power save option*

Figure 13 — Virtual COM-port configuration in Device manager

S6 SK is ready to use since the power is on. See table 7 for signal description of LED indicators located on the adapter.

Table 7 – Adapter LED signals description

LED Indicator			Signal description
Marking	**Status**	**Light color**	
POWER		Red	Power supply is on
	No signal		Power supply is off (or voltage is less than minimum required)
RX		Green	CANUp 27 data is being received
	No signal		No data from CANUp 27
TX		Yellow	Data is being transmitted to CANUp 27
	No signal		No data to CANUp 27

2.4.2 Interface of Service CANUp software

Service CANUp software is launched with  desktop shortcut created during installation. Software interface consists of **Horizontal menu**, **Vertical menu, Unit ID area** and **Information and Configuration area** (see figure 14)

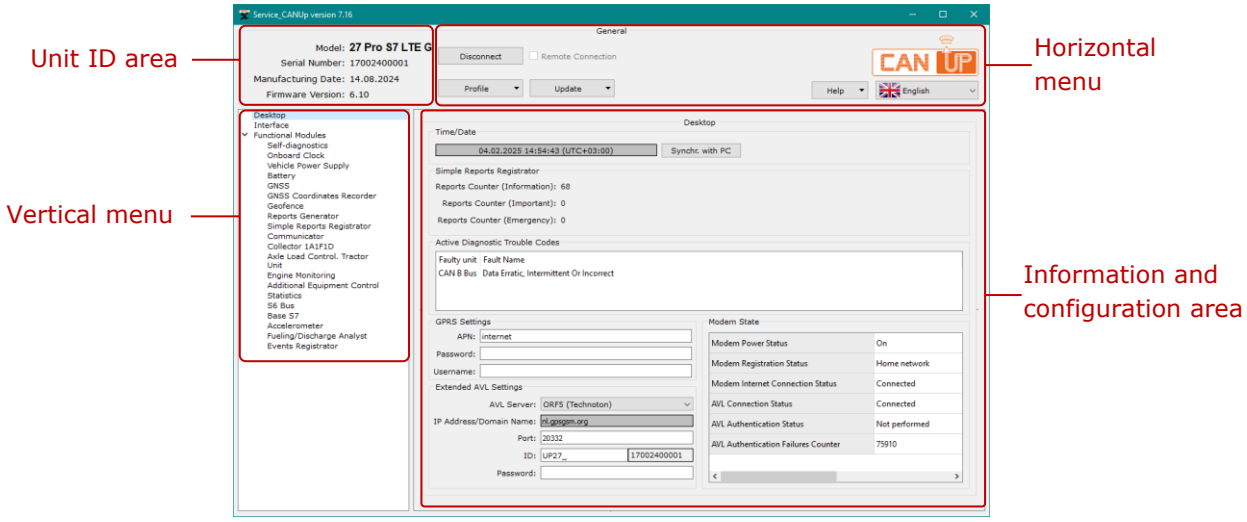


Figure 14 — Interface of Service CANUp

ATTENTION: At lower screen resolutions (less than 1024x768) Service CANUp window is automatically set to full screen. In this case scroll bars are used to display unseen areas.

Unit ID area provides information about the model, serial number, manufacturing date and firmware version of the connected CANUp 27.

Horizontal menu provides the following:

- connection/disconnection of CANUp 27;
- establishing a remote connection;
- profile options (loading profile, saving profile and printing profile);
- updating firmware;
- S6 Database update in Service CANUp software;
- selection of interface language;
- help and information about the Manufacturer.

Vertical menu is used for selection of Function modules of CANUp 27. Its current parameters and configuration are displayed in **Configuration and Information area**. Function modules of Service CANUp software are based on PGN and SPN messages from **S6 Database** (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

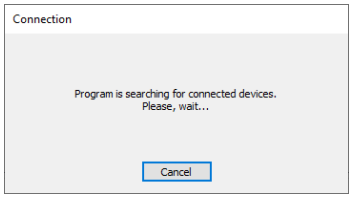
To update S6 database in Service CANUp software via Internet, use DB S6 button in the dropdown menu Update. The detailed description of S6 Database can be found in the web-page http://s6.jv-technoton.com/ part S6 Data base.

Information and Configuration area displays names (PGN) and parameters (SPN) of the messages. For each SPN, a prompt containing its specifications is displayed: data range, discreteness, unit of measurement etc. Automatic control of correctness of entered data is provided in the fields for settings editing. Appropriate prompts appear, whenever you place the cursor into the field containing the value to be edited.

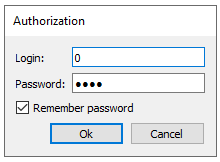
2.4.3 Authorization

To enable connection between CANUp 27 and PC, click the button Connect in **Horizontal menu**. Service CANUp softwa e will search for the connected Units (see figure 15 a).

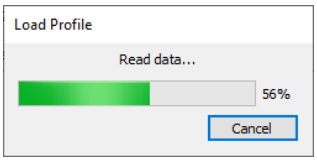
Enter Login and Password of the Unit into the appropriate fields of **Autorization** window. The default **Login** is **0**. The default **Password** is **1111**. To save a new Password (to avoid entering the password again during connection next time), tick **Remember Password** (see figure 15 b).



a) search for the connected Unit to PC



c) user authorization



d) Unit's profile loading

Figure 15 — Enable connection between the CANUp 27 and PC

To recover the password (in case it is lost) you need to place the cursor into the **Login** or the **Password** field of the window **Authorization** and press **Ctrl+F10** key combination.

Service Service CANUp software will display a code to recover the current password of the Unit (see figure 16). This message is being sent to Technoton technical department by e-mail support@jv-technoton.com together with password recovery request.

Requirements for CANUp 27 password request:

- scan copy of the request signed and selaed by the official representative of the company the Unit been purchased by should be attached;
- request should contain serial number and manufacturer date of the Unit;
- email should contain full name and contact e-mail of a person who should receive the recovered password.

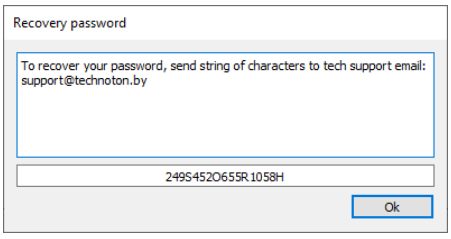


Figure 16 — Generating password recovery code

In case of incorrect Login and Password or incorrect connection to PC the warning error message will appear.

If Authorization is made successfully, then **Desktop** will appear automatically when you run the software (see figure 14). **Desktop** contains configuration and current parameters of Function modules of the connected CANUp 27 (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

2.4.4 Operations with profile

CANUp 27 **profile** is set of PGN (passport data, Counters and settings of Function modules, see the Catalogue of Functional modules of CANUp 27 telematics gateways).

It is possible to manage the profiles in both the CANUp 27 connected and autonomous mode. The button Profile with drop down menu is used to choose the options (see figure 17). Profile can be stored as a file to PC hard drive or loaded into the memory of the Unit. It can be printed as well.

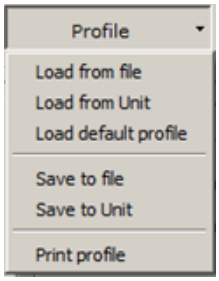


Figure 17 — View of Profile menu

Menu Profile is divided into the following sections:

1) Load profile. The following options of profile loading are available in Service CANUp software:

- Load profile from file — for loading of previously saved profile from the hard drive or removable disk. It is required to find and choose profile file in the appeared Open window (**CANUp_*.prf**).
- Load profile from Unit — is used for loading profile from the connected CANUp 27.
- Load default profile — is used for loading profile with default factory settings. With this profile, it is possible to study utility operation without real CANUp 27 connection. By default, profiles for the respective models of gateways are recorded in the files **CANUp_27Standard_default.prf**, **CANUp_27ProLTE_default.prf**, **CANUp_27ProWiFi_BLE_default.prf**, **CANUp_27Genset2G_default.prf** and **CANUp_27GensetLTE_default.prf**, in the folder of installation file Service_CANUp.exe.

ATTENTION: In autonomous mode only default profile or previously saved profile is available for loading.

2) Saving profile. Service CANUp software has following profile saving options:

- Save to file — for saving profile to the hard drive or removable disk. This option is available only for profile loaded from file or Unit.
  Select the location and give the name to file. Depending on the model, the final Profile file name will be as follows:
  CANUp_27_Standard_*.prf, **CANUp_27_Pro_LTE_*.prf**, **CANUp_27_Pro_Wi-Fi_*.prf**, **CANUp_27_Genset_2G_*.prf**, **CANUp_27_Genset_LTE_*.prf**.
  Instead * entering username is recommended. Prefix **CANUp_** and format **.prf** will be inserted automatically.

- Save to unit — is used for saving modified settings into profile of the connected Unit. It is available only during the time when there an active connection between PC and CANUp 27.

If the modified settings were not saved into Unit and Disconnect button was pressed or Service CANUp software is being closed there will appear a notification on profile settings saving. Pressing Yes will save all the unsaved parameters and settings CANUp 27.

3) Print Profile. Profile file can be saved on a PC disk in **.pdf** format for later printing or viewing on the display. File name automatically generates CANUp 27 serial number and date when file was created.

RECOMMENDATION: It is recommended to attach the hardcopy of the profile to CANUp 27 specification to log the history of the settings and configurations.

2.4.5 Configuration of connection via CAN j1939/S6 interface

To connect **any** CANUp 27 **model** by means of S6 Technology, select **Interface** heading in the **Vertical menu** of Service CANUp software (see figure 18) and enable the following settings of CAN j1939/S6 interface:

1) From the dropdown list **CAN Protocol Type** (SPN 521530) choose **SAE 1939+S6** data transfer protocol. **Not supported** setting is used in case CAN j1939/S6 interface of the gateway is not connected to the external device.

2) To identify CANUp 27 within the network comprising several Units connected with S6 Technology, enter the unique network address **100** in the field **S6 Address(SA)** (SPN 521188).

3) From the dropdown list **CAN Baudrate** (SPN 521531) select the required Baudrate from the following range of fixed values: **100**; **125**; **250**; **500**; **1000 kbit/s** (by default — **250 kbit/s**).

4) From the dropdown list **CAN Mode** select the required mode of data reception in CAN j1939/S6 interface:

- **Active (CAN Requests Enable)** — CANUp 27 sends active request to standard CAN bus or to Units, which are connected using S6 Technology. PGN which, by default, are missing in the bus, but are provided upon request.
  Note — in contrast to Units connected using S6 Technology, sending active request to standard CAN bus may cause malfunction of Vehicle electronic units.
- **Passive (CAN Requests Disable)** — CANUp 27 does not send active requests to standard CAN bus or to Units, connected using S6 Technology. In this mode, CANUp 27 is identified by its network address by other Units and receives data from them in automatic mode.
- **Silent (Sniffer)** — CANUp 27 is not identified by other Units. Data are received in sniffer mode.

5) Through **Enable Termination Resistor** drop-down list (SPN 521533), turn on or off (by default - **Off**) built-in terminating resistor (120 Ohm) between the CAN LOW and CAN HIGH pins of **S6** socket of CANUp 27. Activation of the terminal resistor is the necessary condition for correct data transfer via CAN 2.0B (SAE j1939) communication line.

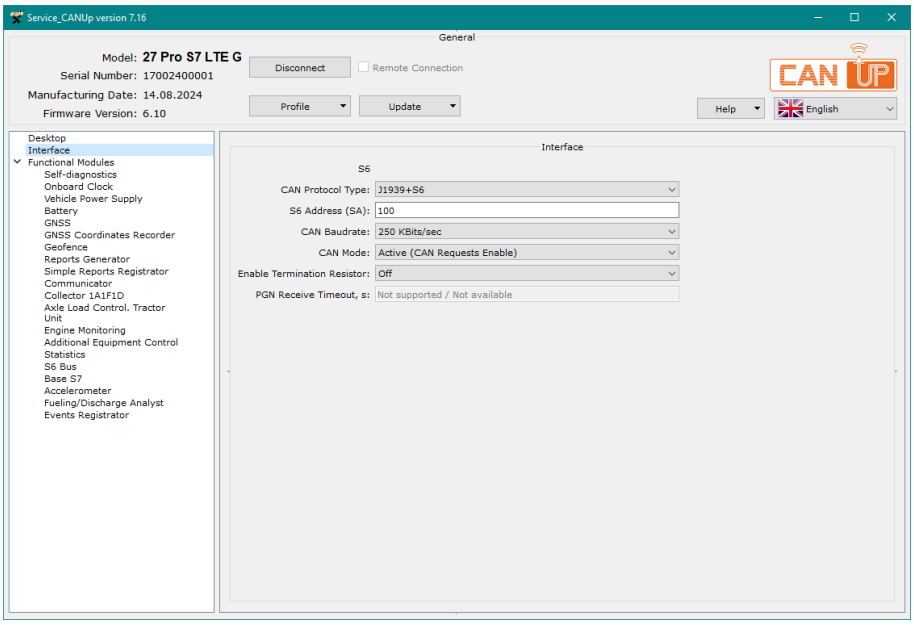


Figure 18 — Window for configuration of CANUp 27 connection parameters via CAN j1939/S6 interface

2.4.6 Confuiguration of connection by means of RS-485 serial interface

In order to connect CANUp 27 Genset to the respective external device by means of RS-485 serial interface, select **Serial interface** heading in the **Vertical menu** of Service CANUp software (see figure 19) and also select the following settings:

1) From the dropdown list **Serial** (SPN 521437) select **RS 485** interface. **Not supported** setting is used, in case RS-485 interface of the gateway is not connected to the external device.

2) In the field **Output Protocol Type** (SPN 521315) **MODBUS** data transfer protocol is specified.

3) In the field **Device Address** (SPN 521318) select the gateway unique network address within serial interface from **0...255** range (by default — **2**).

4) From the dropdown list **RS232/485 Baud Rate** (SPN 521326) choose data transfer speed for serial interface from the following range of fixed values: **2400**; **4800**; **9600**; **19200**; **38400**; **57600**; **115200 bit/s** (by default — **19200 bit/s**).

5) In th area **COM Port Settings** specify data exchange parameters for the converter serial interface:

- In the field **Data bits** (SPN 521285) specify the number of data bits that can be transmitted between the start bit and stop bit (by default — **8 bits**).
- From the dropdown list **Stop bits** (SPN 521286) select the number of stop bits that are needed for correct identification of the byte end from the following range of values: **1**; **0.5**; **2**; **1.5** (by default — **1 bit**).
- From the dropdown list **Parity** (SPN 521287) select the mode of even parity control from the following range of values: **No**; **Even**; **Odd** (by default — **No**).
- From the dropdown list **Flow control*** (SPN 521288) select the data flow monitoring mode from the following range of values: **No**; **Hardware**; **Software** (by default — **No**).

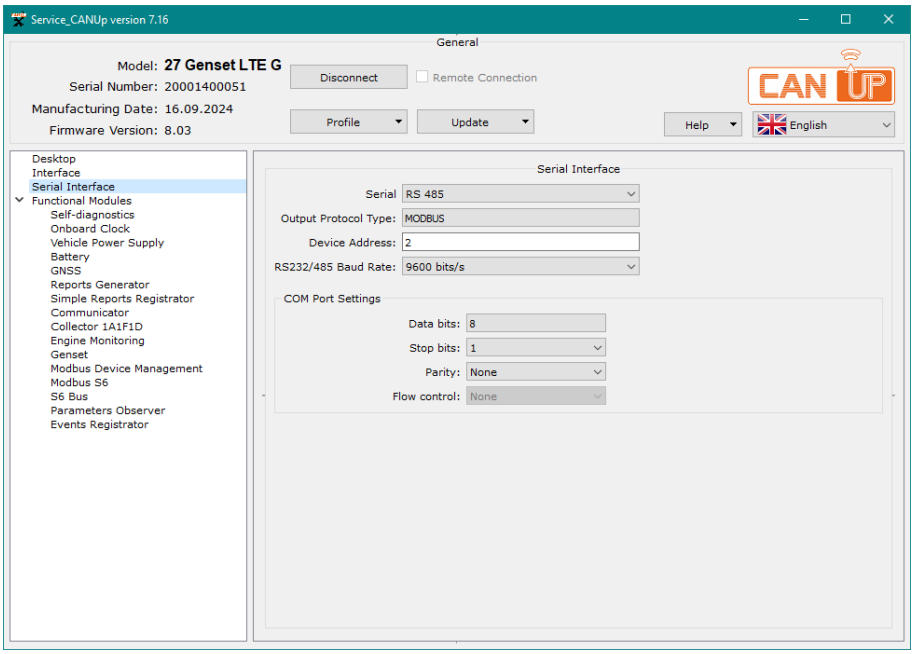


Figure 19 — Window of the CANUp 27 Genset connection parameters configuration via serial interface

* For the software version 7.X this setting is not supported.

2.4.7 Connection to ORF 4/ORF 4 Telematics service

RECOMMENDATION: You can find detailed information on CANUp 27 Standard/ Pro/Genset **gateways connection** to ORF 4 / ORF 5 Telematics service in CANUp 27 and ORF. Quick Start Guide. It is available for downloading at the Technoton document center.

Configuration of **any model of** CANUp 27 connection to ORF 4 / ORF 5 Telematics service is performed only after establishing a communication session between the Unit and PC (see 2.4.3) using Service CANUp software:

- submenu **Communicator FM** for CANUp 27 Standard / Pro LTE / Genset;
- submenu **WiFi Communicator FM** for CANUp 27 Pro Wi-Fi
  (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

To connect a Unit to ORF 4 Telematics interface, you are to perform the following operations:

1) Connect the Unit to the Internet:

for CANUp 27 Standard / Pro LTE / Genset

- in case of using SIM card with PIN code protection, first, you have to unlock it (enter PIN code and remove the checkmark in the appropriate field);
- enter Internet connection settings of the Unit GPRS modem (APN of mobile communication operator);
- taking note of GPRS modem indications parameters make sure the modem is connected to Internet.

ATTENTION: You can obtain APN settings from the mobile communication operator whose SIM card is inserted into CANUp 27.

for CANUp 27 Pro Wi-Fi

- from the list of Wi-Fi routers available for connection you need to select the router which will be used as the authorized Internet access point for Internet connection;
  Note — If necessary, you may configure a user access point not included into the list of Wi-Fi routers accessible for connection.
- connect to the selected router;
- taking note of the Wi-Fi module indications of status parameters make sure the modem of the Unit is connected to Internet.

2) Enter the settings to connect CANUp 27 to the AVL Server. First, obtain access rights from the representative of the company providing the telematics service.

IMPORTANT: Data inserted into the fields of prefix (ID) should match with data inserted into the fields "Unique ID", they are entered during registration in the ORF 4 / ORF 5 Telematics service (see ORF 4 Telematics service. User manual).

3) Check CANUp 27 authentication settings on the Server to be sure that the Unit authentication is made successfully and there is connection with the Server.

ATTENTION: If connection problems occur, contact Technoton technical support service by e-mail support@jv-technoton.com.

4) In configuration of **GNSS FM** submenu according to the settings of GNSS (see the Catalogue of Functional modules of CANUp 27 telematics gateways), check that built-in navigation receiver of CANUp 27 is working properly and receives data from satellite navigation.

ATTENTION: For good reception of navigation data it is necessary to **maximize the view of the sky** at the place where the CANUp 27 is being tested.

2.4.8 Connection to UNUM IIOT Platform Server

RECOMMENDATION: You can find detailed information on CANUp 27 Pro/Genset **gateways connection** to UNUM IIOT Platform server in CANUp 27 and UNUM. Quick Start Guide. It is available for downloading at the Technoton document center.

Configuration of connection to UNUM IIOT Platform Server for models **CANUp 27 Pro LTE / Pro Wi-Fi / Genset** is conducted after establishing a communication session between the Unit and the PC (see 2.4.3) and after the Unit connection to the Internet (see 2.4.7) using CANUp Service software:

- submenu **Communicator FM** for CANUp 27 Pro LTE / Genset;
- submenu **WiFi Communicator FM** for CANUp 27 Pro Wi-Fi
  (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

To connect a Unit to UNUM IIOT Platform, you need to perform the following operations:

1) Perform preliminary operations at UNUM IIOT Platform Server (see the document UNUM Genset Telematics service. "Fleet". User manual):

- receive access rights to the server from the Telematics services provider company;
- create an Asset;
- register a specific CANUp 27 as a new device at the Server and generate Identification data of its profile for the device authentification:
  - unique device identifier — UNIM ID;
  - Login;
  - Password;
  - Topic.
- subscribe to receiving data from the Telematics system;
- copy the generated CANUp 27 ID data from the appropriate fields for their transfer into the settings of the service software.
  During transfer of ID data into the software settings, be sure to avoid accidental pasting spaces or other unnecessary characters!

WARNING: CANUp 27 ID data are generated automatically during registration at the Server and are contained in the Unit profile which cannot be saved in a separate file and subsequently recovered. In case the Unit profile is lost or damaged, you have to repeat the procedure of its registration at the Server.

2) Using Service CANUp software, configure CANUp 27 for data transfer to the Server according to UNUM protocol (provided to users upon request through Technoton technical support by support@jv-technoton.com).

To connect CANUp 27 to the Server, you are to enable the following settings:
- AVL Server: Other
- IP Address/Domain Name: server1.unum-genset.com;
- Port: 1883;
- Protocol: UNUM;
- ID: Login*;
- Password*;
- Client ID: UNUM ID*;
- Topic*.

* Copy the value from ID data of CANUp 27 profile that are generated at the server and insert it into the appropriate software field.

3) Configure sending Reports in the submenu of **Reports Generator FM** (see the Catalogue of Functional modules of CANUp 27 telematics gateways).

4) Watching indications of CANUp 27 authentication parameters at UNUM IIOT Platform Server make sure the authentication is completed successfully and the connection of CANUp 27 to Server is established.

ATTENTION: If connection problems occur, contact Technoton technical support service by e-mail support@jv-technoton.com.

5) In configuration of **GNSS FM** submenu according to the settings of GNSS (see the Catalogue of Functional modules of CANUp 27 telematics gateways), check that built-in navigation receiver of CANUp 27 is working properly and receives data from satellite navigation.

ATTENTION: For good reception of navigation data it is necessary to **maximize the view of the sky** at the place where the CANUp 27 is being tested.

2.4.9 Remote connection with CANUp 27 by means of GSM connection and by means of GPRS command from ORF 4

Service CANUp software enables to establish a remote connection **to any models of CANUp 27** by means of Internet without using cable connection to the PC.

IMPORTANT:
1) PC which will be used for remote connection to CANUp 27 should have:
- open network port for external connections;
- static IP address on the Internet (provided by your Internet Service Provider).

2) To ensure stable operation of in-built communication module of CANUp 27 during remote configuration, it is necessary to provide:
- supply voltage within its limits — range 9…45 V;
- stable Internet connection to the remote Unit.

1) To connect to a remote **CANUp 27 Standard / Pro LTE / Genset by means of GSM connection**, perform the following operations:

- In **Horizontal menu** of Service CANUp software tick **Remote Connection** field and press 

button (see figure 14).
- After the window with a warning of Units with which remote connection can be established is displayed, **Connection settings** window will appear (see figure 20 a) in which you enter the selected number of your PC network port for connection to CANUp 27.
- In the window **Remote Connection** (see figure 20 b) the format of **a special SMS-message** is provided; you are to send it to the mobile number of CANUp 27 SIM card. The special SMS initiates the Internet connection for remote connection of CANUp 27 to the PC.

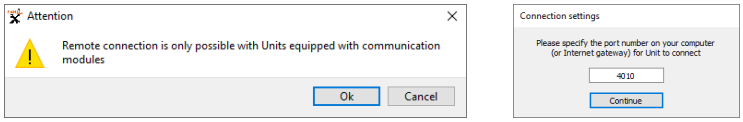
2) To connect by means of GPRS command CSRV from ORF 4 Server via TCP channel to a remote **CANUp 27 Standard / Pro LTE / Pro Wi-Fi / Genset**, perform the following operations:

- Connect CANUp 27 to ORF 4 Telematics service according to 2.4.7.
- In ORF 4 open **Additional menu** for the respective object. In **Commands** tab (**Unit Properties** window) specify settings of GPRS-command **CSRV** for remote connection to CANUp 27 via TCP channel using Service CANUp software (see figure 20 c). The structure of fields of GPRS-command **CSRV** is similar to that of the same name SMS-command provided in annex B.
- In **Horizontal menu** of Service CANUp software tick **Remote Connection** field and press 

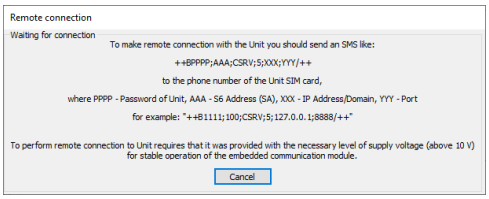
button (see figure 14).
- After the window containing a warning of Units with which remote connection can be established, **Connection settings** window will appear (see figure 20 a) in which you are to enter the selected number of the PC port for connection to CANUp 27.
- After **Remote Connection** window of Service CANUp software is displayed (see figure 20 b), open **Additional menu** in ORF 4 for the respective object and from the window **Execute a Command** enter GPRS-command **CSRV** (see figure 20 c). This command initiates the Internet connection for remote connection of CANUp 27 to the PC.

IMPORTANT: Before you send the command, you must make sure that CANUp 27 is connected to ORF 4 Telematics service (the green indicator **Object connected** is on) and is transmitting data to the Server (see figure 20 d).

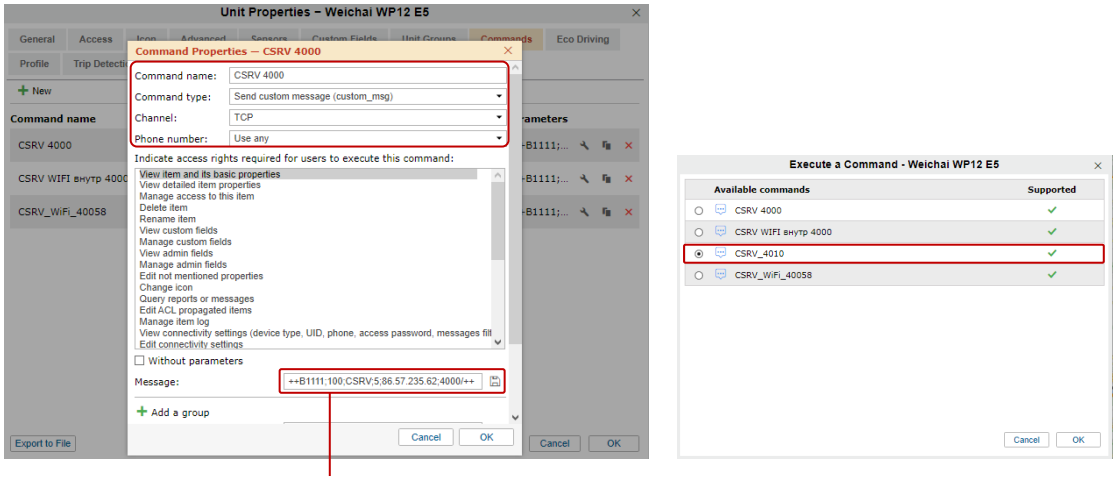
The maximum waiting time for remote connection to a Unit after sending SMS or GPRS-command **CSRV** is **30 min**. If no connection is established during that time, the message of the waiting period end is displayed. In this case, you are to try again to establish the remote connection with CANUp 27.



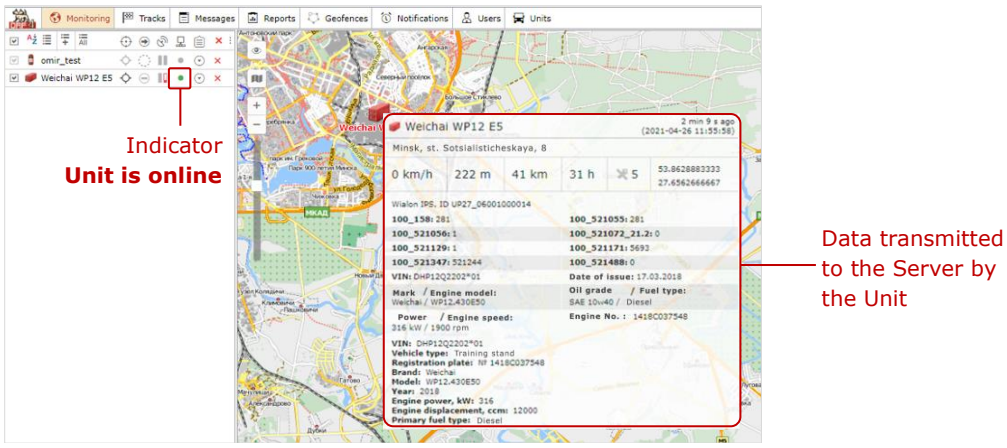
a) configuration of the PC network port



b) window with a special SMS for remote connection to a Unit



c) example of ORF 4 windows for configuration of properties and execution of GPRS-command CSRV for remote connection to a Unit



c) example of checking a Unit connection to ORF 4 Telematics service before sending GPRS-command CSRV

Figure 20 — Establishment of a remote connection with CANUp 27

2.4.10 Remote connection with CANUp 27 and connected Units by a control command from UNUM IIOT Platform Server

Service CANUp software (versions from 7.16 and higher) allows remote connection via the Internet to **CANUp 27 Pro LTE / Pro Wi-Fi / Genset gateways** by means of a control command from UNUM IIoT Platform Server for configuration/viewing data/diagnostics/firmware update without using cable connection to the PC.

In case you need, you can also establish remote connection through the gateway with Units connected to it by a control command from UNUM IIOT Platform Server for configuration/viewing data/diagnostics with the help of the appropriate service software: ServiceS6 DUT-E / ServiceS6 DFM / ServiceS6 DFM Marine / ServiceS6 DFM Industrial. Remote firmware update of Units connected to the gateway is not foreseen.

IMPORTANT:
1) PC which will be used for remote connection to CANUp 27 should have:
- open network port for external connections;
- static IP address on the Internet (provided by your Internet Service Provider).

2) To ensure stable operation of in-built communication module of CANUp 27 during remote configuration, it is necessary to provide:
- supply voltage within its limits — range 9…45 V;
- stable Internet connection to the remote Unit.

To connect by means of a control command from the Server of UNUM IIOT Platform to a remote Unit, perform the following operations:

1) Connect CANUp 27 to UNUM Genset Telematics server, according to 2.4.8.

2) In the window of Dashboards templates management (**Management** tab) of UNUM Genset service enter and create a Template with **Command** widget (see details in the document UNUM Genset Telematics service. "Fleet". User manual).
The **Command** widget has a button to send a preset Server command, to enable remote access to a Unit. While configuring the widget, you need to fill all obligatory fields marked with* (see figure 21):

- **Select command*** — choose the command for remote connection (**206.Remote connection**) from the dropdown list;
- **Command name*** — enter the name of the button to execute the remote connection command;
- **DA***— enter the network address of remote connection command destination (for CANUp 27 — **100**);
- **IP Address/Domain*** — specify the IP address of the PC from which the remote connection will be executed;
- **Port*** — specify the PC open network port from which the remote connection will be executed.
- **Bus Address*** — specify the network address via CAN j1939/S6 interface for the Unit which is to be remotely connected (for CANUp 27 — **100**).

IMPORTANT: For remote connection with the required Unit via CANUp 27, when configuring the widget, first, you need **to know the specific** Unit **network address.** Further on, you need to enter this address into the obligatory **Bus Address*** field of the Dashboard template widget for remote access to the respective Unit. You can check for authorized network addresses of Units in table 5.

3) Assign a name to the created Dashboard template and link it to the needed Asset.

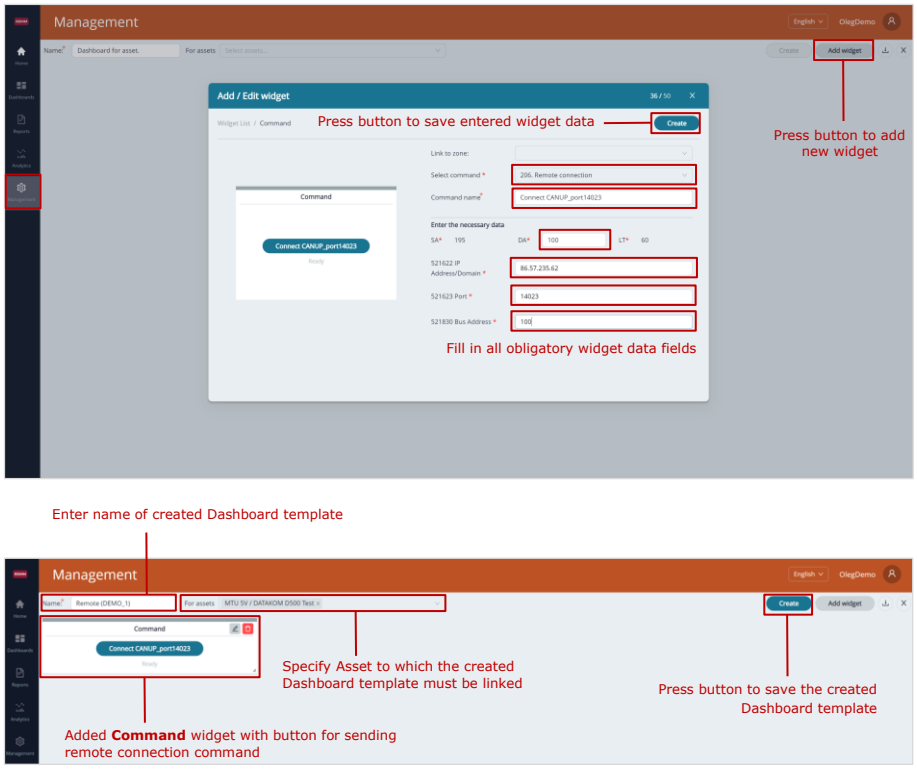


Figure 21 — Creation of a Dashboard template with a widget of a remote connection command

4) In the **Horizontal menu** of Service CANUp service software (in case of remote connection with CANUp 27) or of service software of the respective Unit (in case of remote connection with Units via CANUp 27) tick **Remote connection** field and press Connect button (see figure 22 a).

5) After the window which displays Units with which remote connection can be established appears, it is followed by the **Connection settings** window in which you are to enter the selected PC network port from which the remote connection will be executed.

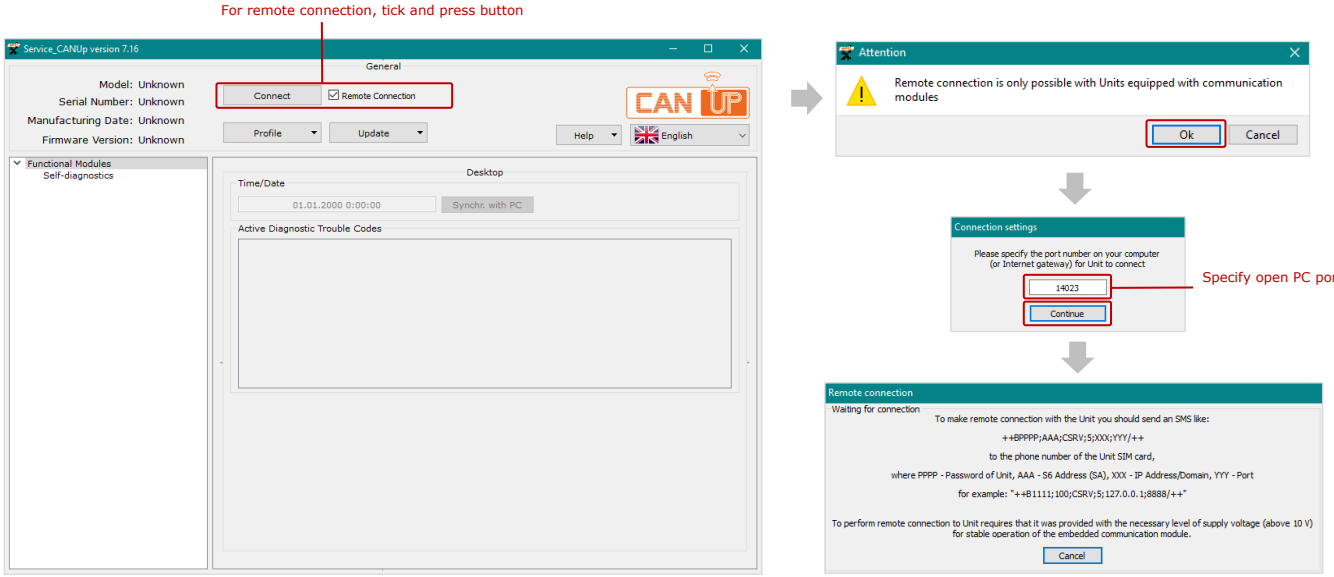
6) After **Remote connection** window appears in the service software, open the appropriate Dashboard of remote connection in UNUM Genset service. By pressing the **Command** widget button, enable the remote connection command (see figure 22 b). This command initiates the Internet connection for CANUp 27 gateway remote connection to the PC or for the needed Unit connected to the gateway (e.g. DFM CAN).

Completed successfully message under **Command** widget button notifies of successful connection initiation, while Not completed message indicates unsuccessful initiation.

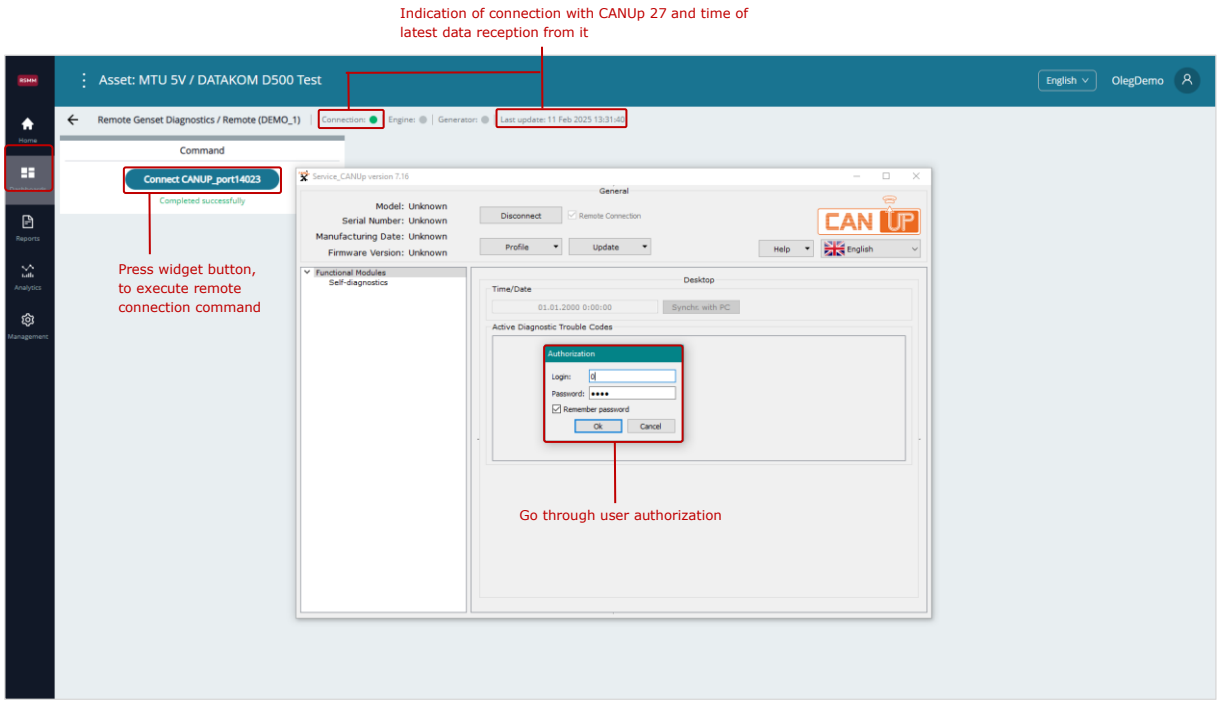
IMPORTANT: Before you send the command, you need to make sure that the Asset to which CANUp 27 is linked is connected to UNUM Genset Telematics server (the corresponding Connection: green indicator is on) and data transfer to the Server is in progress.

The maximum waiting time for connection to the remote CANUp 27 or Unit after the command from UNUM Genset Server is sent is **30 s**. If no connection is established during that time, you are to repeat the attempt, to get connected.

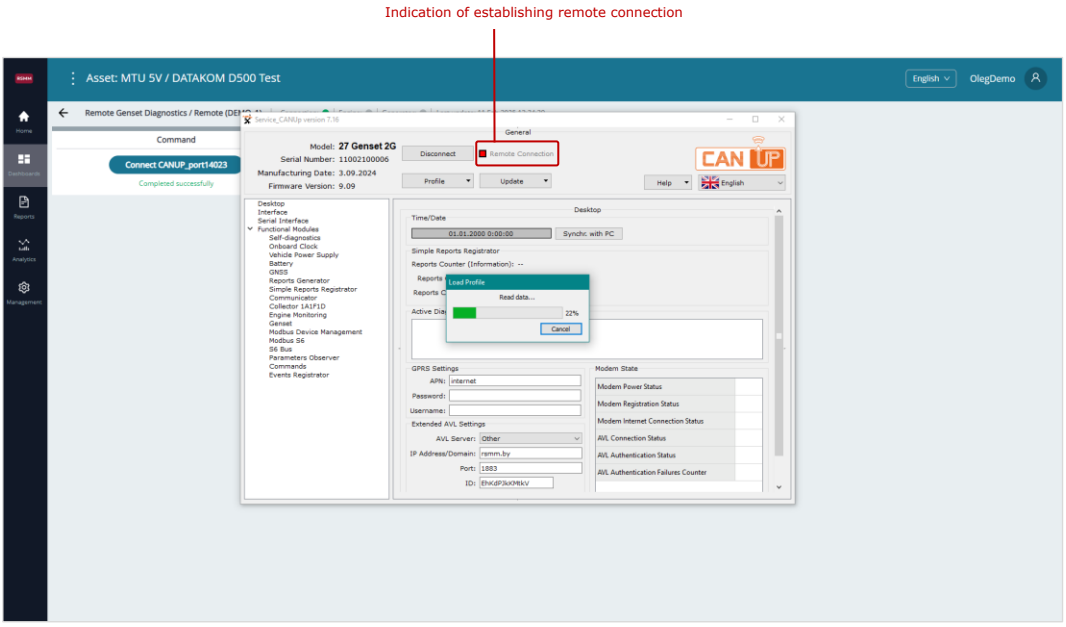
7) After the remote connection to the Unit is established, go through authorization (similar to 2.4.3). As soon as loading of the Unit profile is completed, the **Remote connection** field will change its color to red (see figure 22 c); settings and current values of Functional modules parameters of the remote Unit will be displayed in the service software (see examples in figures 22 d…f).



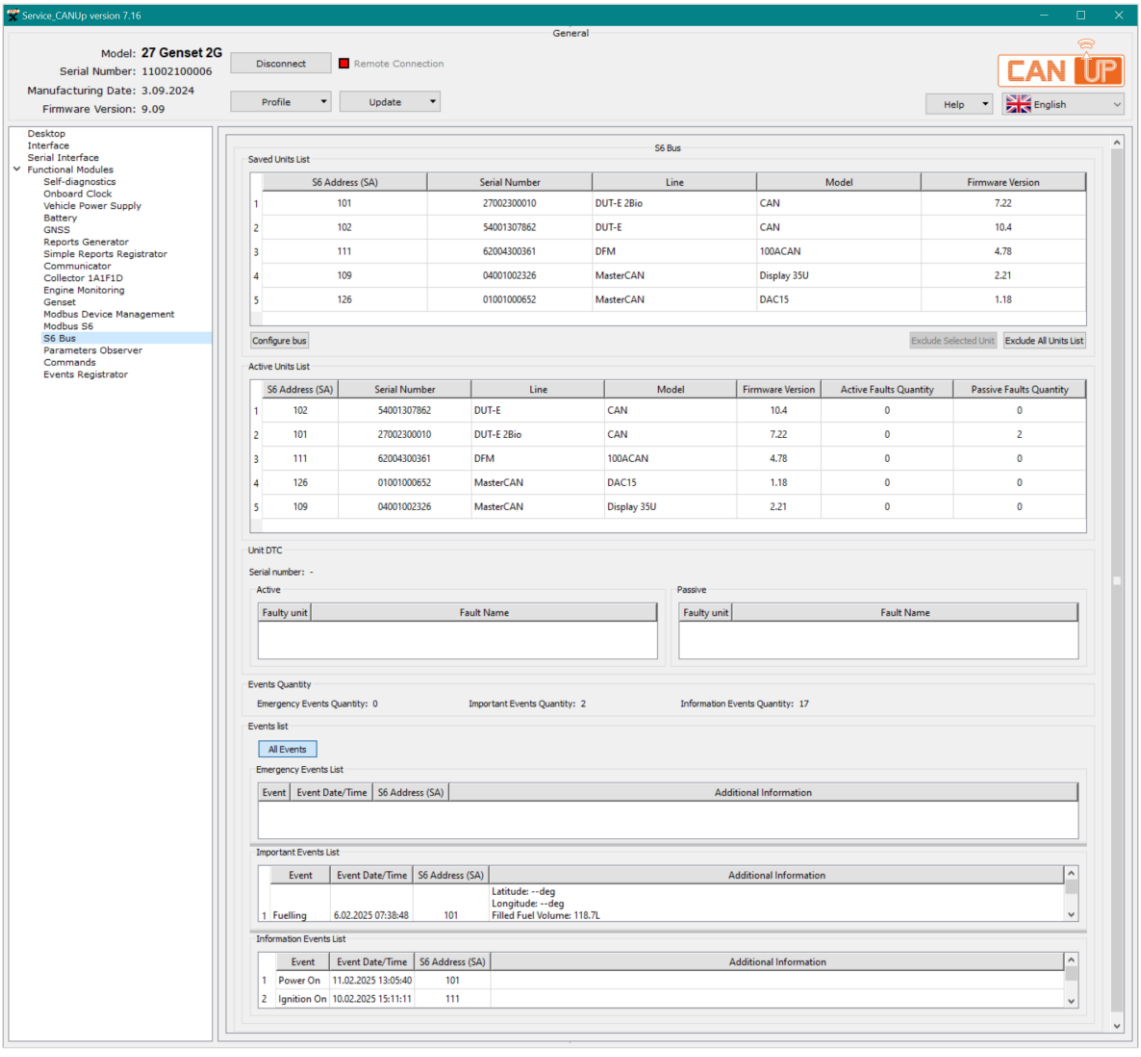
a) example of enabling remote connection and configuration of the PC network port in the service software



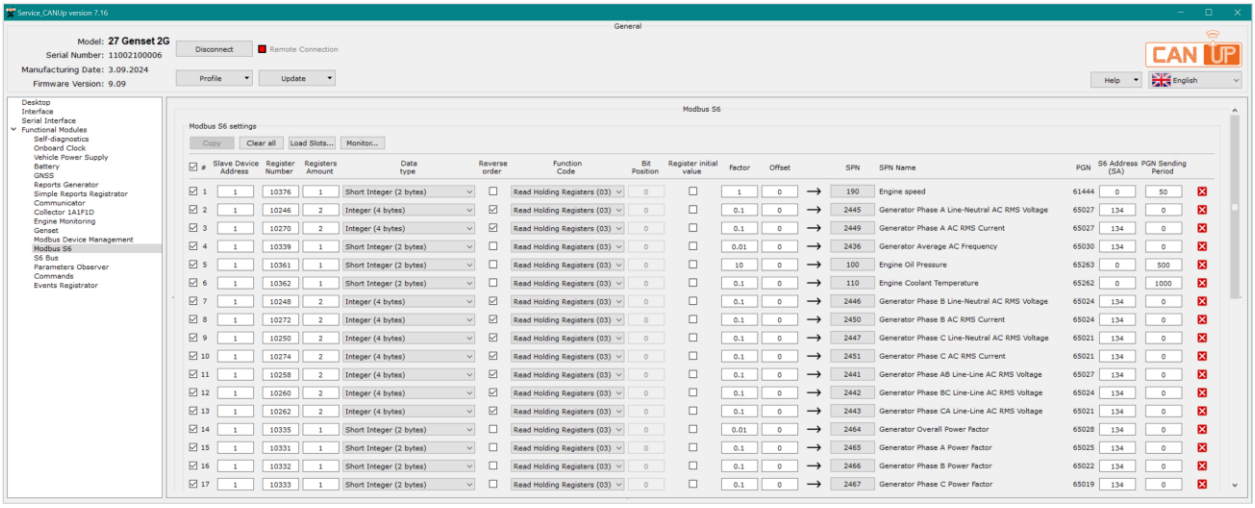
b) example of establishing a communication session between the PC and remote Unit

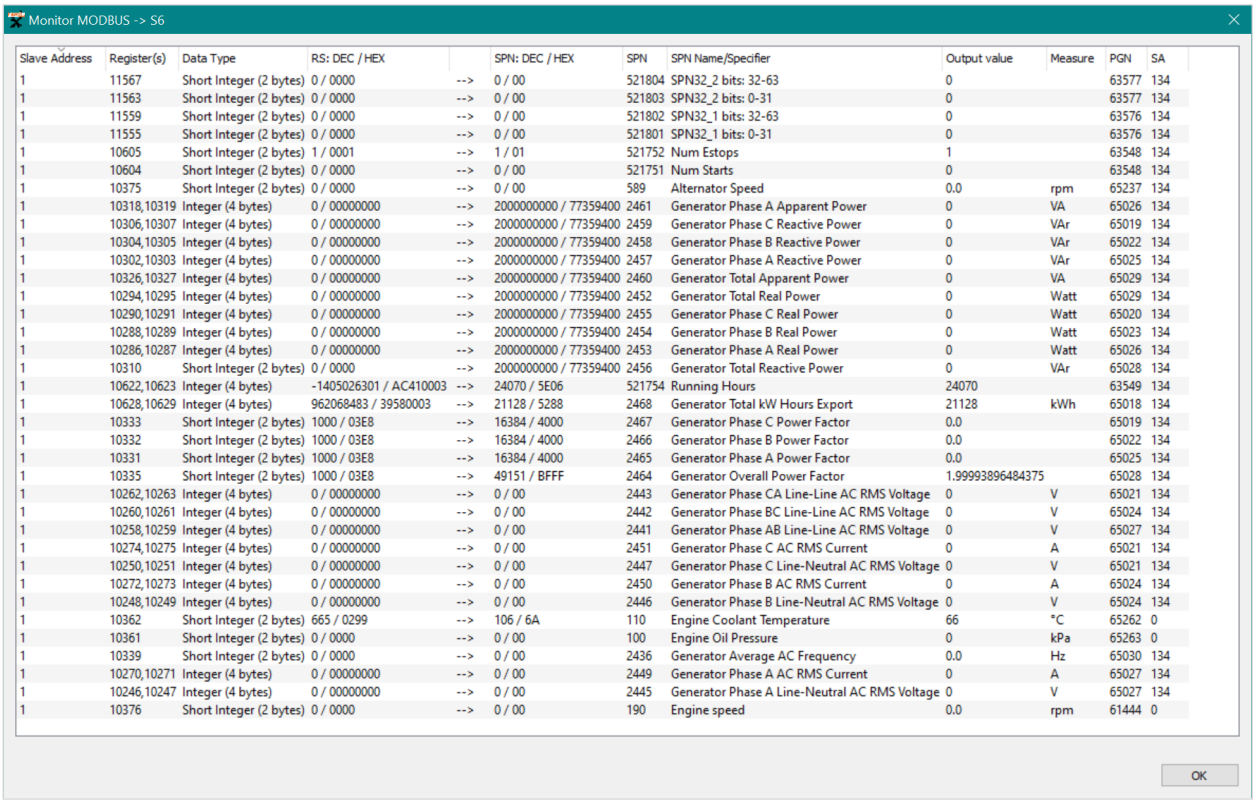


c) example of loading a remote Unit profile



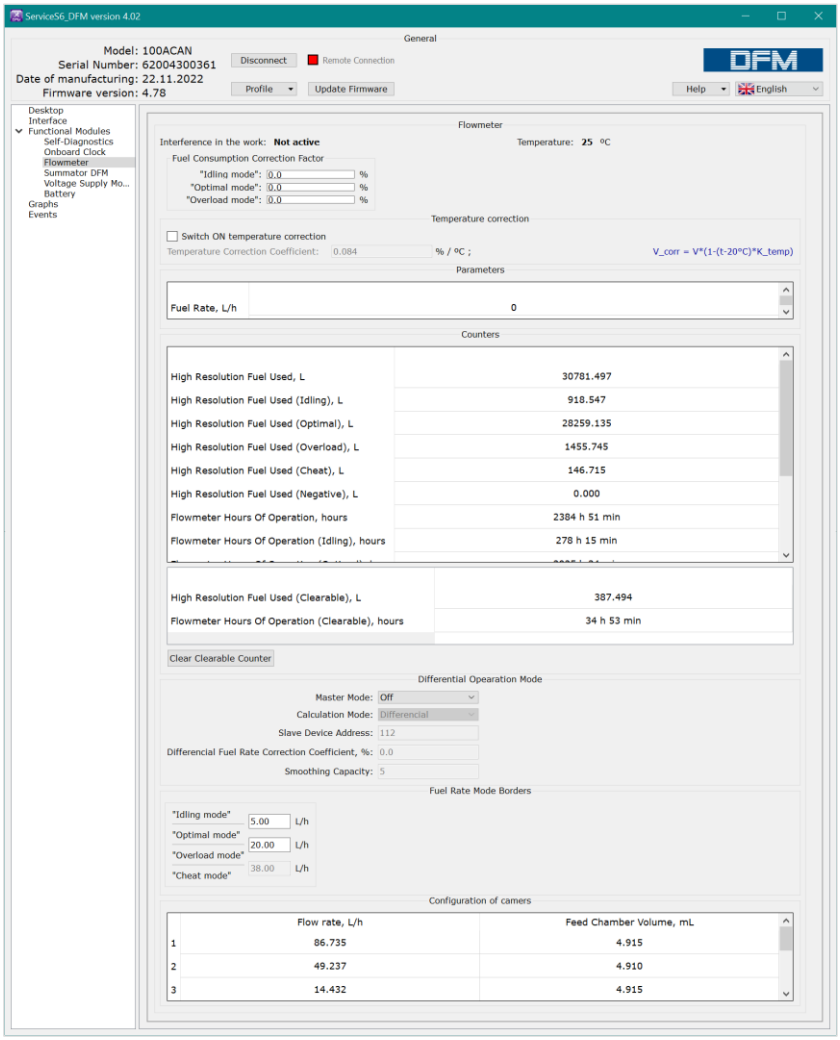
d) example of the window for diagnostics of performance of Units connected to a remote CANUp 27 using [S6 Technology]

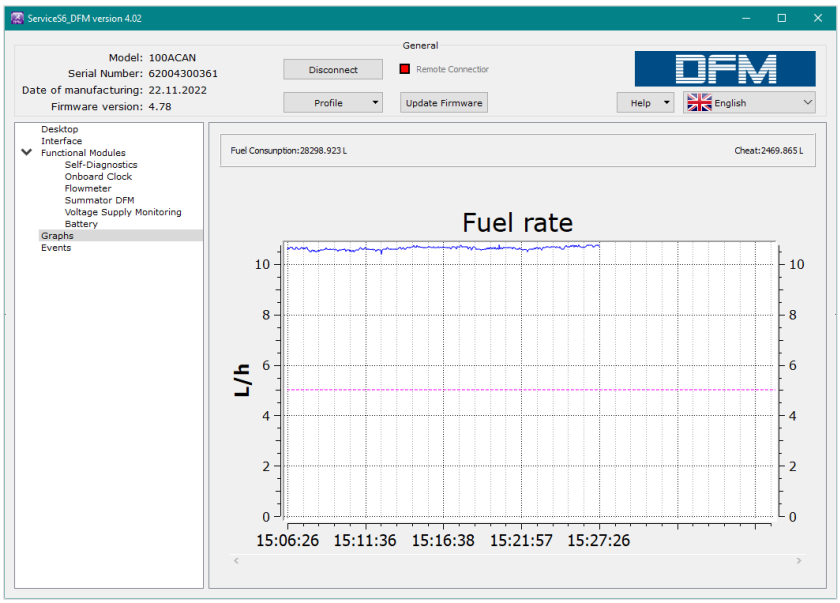




Slave Address	Register(s)	Data Type	RS: DEC / HEX		SPN: DEC / HEX	SPN	SPN Name/Specifier	Output value	Measure	PGN	SA
1	11567	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	521804	SPN32_2 bits: 32-63	0		63577	134
1	11563	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	521803	SPN32_2 bits: 0-31	0		63577	134
1	11559	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	521802	SPN32_1 bits: 32-63	0		63576	134
1	11555	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	521801	SPN32_1 bits: 0-31	0		63576	134
1	10605	Short Integer (2 bytes)	1 / 0001	-->	1 / 01	521752	Num Estops	1		63548	134
1	10604	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	521751	Num Starts	0		63548	134
1	10375	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	589	Alternator Speed	0.0	rpm	65237	134
1	10318,10319	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2461	Generator Phase A Apparent Power	0	VA	65026	134
1	10306,10307	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2459	Generator Phase C Reactive Power	0	VAr	65019	134
1	10304,10305	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2458	Generator Phase B Reactive Power	0	VAr	65022	134
1	10302,10303	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2457	Generator Phase A Reactive Power	0	VAr	65025	134
1	10326,10327	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2460	Generator Total Apparent Power	0	VA	65029	134
1	10294,10295	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2452	Generator Total Real Power	0	Watt	65029	134
1	10290,10291	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2455	Generator Phase C Real Power	0	Watt	65020	134
1	10288,10289	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2454	Generator Phase B Real Power	0	Watt	65023	134
1	10286,10287	Integer (4 bytes)	0 / 00000000	-->	2000000000 / 77359400	2453	Generator Phase A Real Power	0	Watt	65026	134
1	10310	Short Integer (2 bytes)	0 / 0000	-->	2000000000 / 77359400	2456	Generator Total Reactive Power	0	VAr	65028	134
1	10622,10623	Integer (4 bytes)	-1405026301 / AC410003	-->	24070 / 5E06	521754	Running Hours	24070		63549	134
1	10628,10629	Integer (4 bytes)	962068483 / 39580003	-->	21128 / 5288	2468	Generator Total kW Hours Export	21128	kWh	65018	134
1	10333	Short Integer (2 bytes)	1000 / 03E8	-->	16384 / 4000	2467	Generator Phase C Power Factor	0.0		65019	134
1	10332	Short Integer (2 bytes)	1000 / 03E8	-->	16384 / 4000	2466	Generator Phase B Power Factor	0.0		65022	134
1	10331	Short Integer (2 bytes)	1000 / 03E8	-->	16384 / 4000	2465	Generator Phase A Power Factor	0.0		65025	134
1	10335	Short Integer (2 bytes)	1000 / 03E8	-->	49151 / BFFF	2464	Generator Overall Power Factor	1.99993896484375		65028	134
1	10262,10263	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2443	Generator Phase CA Line-Line AC RMS Voltage	0	V	65021	134
1	10260,10261	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2442	Generator Phase BC Line-Line AC RMS Voltage	0	V	65024	134
1	10258,10259	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2441	Generator Phase AB Line-Line AC RMS Voltage	0	V	65027	134
1	10274,10275	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2451	Generator Phase C AC RMS Current	0	A	65021	134
1	10250,10251	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2447	Generator Phase C Line-Neutral AC RMS Voltage	0	V	65021	134
1	10272,10273	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2450	Generator Phase B AC RMS Current	0	A	65024	134
1	10248,10249	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2446	Generator Phase B Line-Neutral AC RMS Voltage	0	V	65024	134
1	10362	Short Integer (2 bytes)	665 / 0299	-->	106 / 6A	110	Engine Coolant Temperature	66	°C	65262	0
1	10361	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	100	Engine Oil Pressure	0	kPa	65263	0
1	10339	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	2436	Generator Average AC Frequency	0.0	Hz	65030	134
1	10270,10271	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2449	Generator Phase A AC RMS Current	0	A	65027	134
1	10246,10247	Integer (4 bytes)	0 / 00000000	-->	0 / 00	2445	Generator Phase A Line-Neutral AC RMS Voltage	0	V	65027	134
1	10376	Short Integer (2 bytes)	0 / 0000	-->	0 / 00	190	Engine speed	0.0	rpm	61444	0

e) example of a scanner of Modbus RTU registers on the Diesel generator control panel which is connected to remote CANUp 27





f) examples of windows with indications of fuel consumption of a remote DFM CAN flow meter

Figure 22 — Establishing remote connection with CANUp 27 and Units connected to it by a command from UNUM Genset

2.4.11 Connection of wireless Units

Service CANUp software enables to configure the connection of the following wireless Units to **CANUp 27 Pro LTE / Pro Wi-Fi** by means of S7 Technology:

- DUT-E S7 / DUT-E 2Bio S7 fuel level sensors;
- DFM S7 / DFM Marine S7 fuel flow meters;
- GNOM DDE S7 pressure sensors;
- GNOM DP S7 position sensors;
- ADM31 temperature and humidity sensors.

To establish connection between the gateway and the wireless Unit and to receive data from it, you are to perform the following operations:

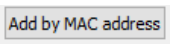
1) Select the required Unit in **Base S7 FM** submenu (see the Catalogue of Functional modules of CANUp 27 telematics gateways) from the table **Available Bluetooth Device List**, in accordance with its serial number*. This table is a list of the Units MAC addresses (up to 15 addresses), currently visible (accessible) for the BLE-module of CANUp 27 Pro.

ATTENTION: You can identify the line of the selected wireless Unit manufactured by Technoton according to the first four digits of its serial number:
- **0107**, **0113** — DUT-E S7 fuel level sensors;
- **0112** — DUT-E 2Bio S7 fuel level sensors;
- **0270**, **0271**, **0272**, **0273**, **0235**, **0236**, **0237** — DFM S7 fuel flow meters;
- **0470**, **0471**, **0472** — DFM Marine S7 fuel flow meters;
- **1105** — GNOM DDE S7 pressure sensor;
- **1106** — GNOM DP S7 position sensor.

2) By drag-and-drop, copy the selected Unit into the table **Allowed Units S7 List** (see figure 23 a). Each Unit is automatically assigned its network address (SA) from the number of vacant addresses for its identification during work using S7 Technology. Possible designations of network addresses of S7 Units may be assigned from the following ranges:

- for DUT-E S7 / DUT-E 2Bio S7 fuel level sensors — **91…98, 101…108**;
- for DFM S7 / DFM Marine S7 fuel flow meters — **111…118, 151…158**;
- for GNOM DDE S7 pressure sensors and GNOM DP S7 position sensors — **82…85**;
- for ADM31 temperature and humidity sensors — **136…139**.

In case you need to replace the network address, click twice the line of the respective Unit. You may select a vacant network address in the window **Add Unit** that appears, choosing it from the dropdown list **SA** (see figure 23 b).

If the required Units are missing in the list of accessible devices, you can add them manually by pressing 

button, having specified the appropriate MAC-addresses in the window **Add Unit** (see figure 23 c).

IMPORTANT: For joint operation with the gateway, the data structure of MAC-addresses of wireless Units from other manufacturers must correspond to S6 Database.

* In case of connection of ADM31 temperature and humidity sensors, the necessary sensor is selected in accordance with its MAC-address.

The possibility to operate using S7 Technology is determined for each Unit added to the **Allowed Units S7 List**, in accordance with its accessibility status (**Enable/Disable**).

WARNINGS:

1) The maximum number of any wireless Units simultaneously connected to CANUp 27 Pro by means of S7 Technology — **10 pcs.**

2) The maximum number of cable-connected and wireless Units of one type simultaneously connected to CANUp 27 Pro by means of S6 Technology and S7 Technology:

- DFM CAN/DFM Marine CAN/DFM Industrial CAN/DFM S7/DFM Marine S7 — **16 pcs.**
- DUT-E CAN/DUT-E 2Bio CAN/DUT-E GSM/DUT-E S7/DUT-E 2Bio S7 — **16 pcs.**
- GNOM DDE S7/GNOM DP S7 — **4 pcs.**

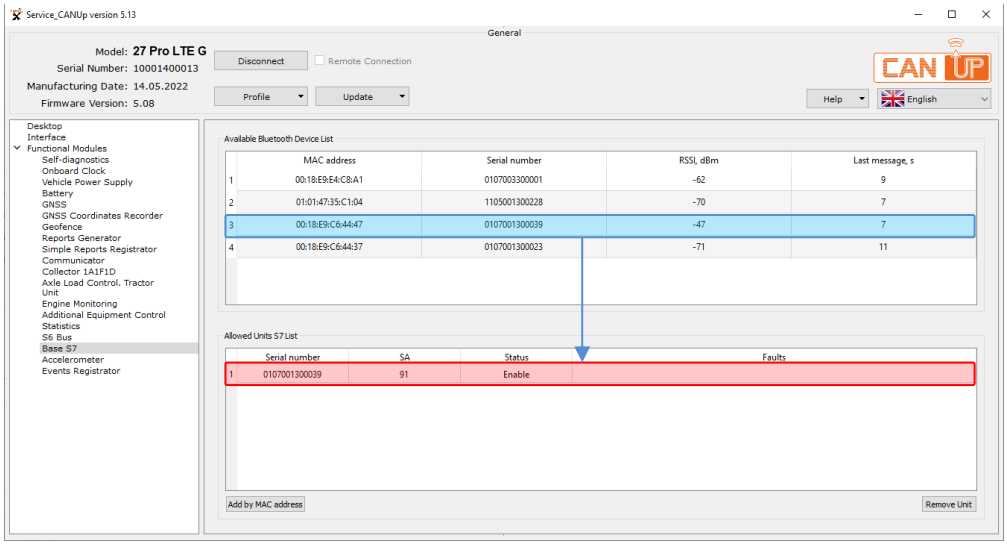
3) The network address of each Unit must be unique!

The same network addresses for cable-connected and wireless Units of one type simultaneously connected to the Gateway are not allowed!

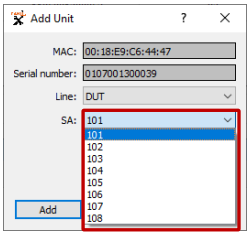
3) In the submenu of **Reports Generator FM** (see the Catalogue of Functional modules of CANUp 27 telematics gateways) select the data source **DB S6** and add data (SPN) from the output message (PGN) of the respective wireless Unit to the Report which is being generated.

The data content of output messages of wireless Units is provided in annex F.

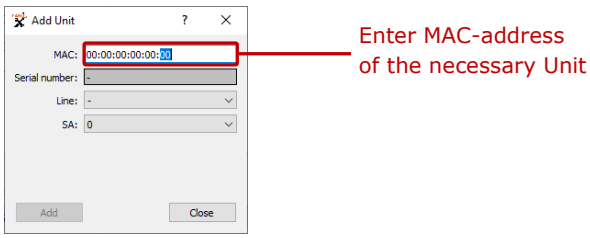
For each SPN added to the Report, select the designation **S7** from the dropdown list **Bus Marker**; in the field **S6 Address (SA)** specify the network address of the wireless source Unit of SPN.



a) adding a Unit for connection by means of S7 Technology



b) editing the network address of the Unit which is being connected



c) addition of a Unit according to the specified MAC-address

Figure 23 — Configuration of S7 Database FM for work with wireless Units using S7 Technology

2.5 Electrical connection

1) CANUp 27 is powered from external power source (e.g. electrical onboard network of Vehicle) through S6 cabling system in accordance with pin assignment of **S6** connector (see table 8).

In case there is no external power supply, CANUp 27 can operate using the inbuilt accumulator battery during 4…6 h (depending on the ambient temperature and the settings of periodicity of sending Onboard reports to the Server of Telematics services).

IMPORTANT:

1) Before mounting and connecting CANUp 27 switch off power supply of the Vehicle electrical circuits. To do this switch off the battery switch or release the terminals of the wires connected to the battery.

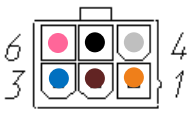
2) Prior to electrical connection of the sensor pay special attention to checking Vehicle chassis ground. Resistance between any point of vehicle chassis and "-" terminal of the battery or between terminals of the chassis ground switch should not exceed 1 Ohm.

3) When connecting CANUp 27 to onboard electrical network of Vehicle, use **fuse** (2 A) from delivery set in accordance to scheme of connection.

4) It is **strongly recommended** to lay CANUp 27 signal cable together with the standard vehicle wiring with the mandatory tie-wrap fixing of every 50 cm, at positive ambient temperature.

2) Connection of CANUp 27 by means of CAN j1939/S6 digital interface (see 1.4.4) is carried out with **S6 cable** from the delivery set, in accordance with designation of contacts of **S6** connectors (see table 8).

*Table 8 — Designation of contacts of **S6** connectors*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
S6 connector of CANUp 27  **S6 connector of S6 cable:** 	1	VBAT	Orange	Power "+"	Analog, voltage (9…45) V
	2	GND	Brown	Ground "-"	—
	3	CANH	Blue	CAN HIGH	Digital, CAN 2.0B, SAE j1939 Standard
	4	CANL	White	CAN LOW	
	5	KLIN	Black	K-Line	Digital, ISO 14230 Standard
	6*	KL15	Pink	Signal of terminal 15 of ignition lock	Analog, voltage (9…45) V
* For model CANUp 27 Standard, contact 6 is a spare one.					

For secure connection of CANUp 27 Standard model using CAN j1939/S6 digital interface to the Vehicle CAN-bus, we recommend to use FMSCrocodile CCAN contactless reader/converter (see figure 24).

Note — For safe connection of CANUp 27 Standard to ISOBUS bus via CAN j1939/S6 interface, we recommend to employ CANCrocodile contactless reader.

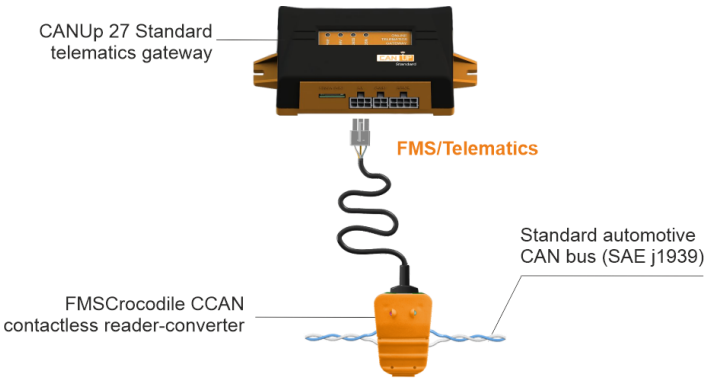


Figure 24 — Safe integration of Automotive CANbus into Telematics system using FMSCrocodile CCAN

Quick splice connectors (ordered separately) are recommended for connection signal wires to CANUp 27 (see figure 25).

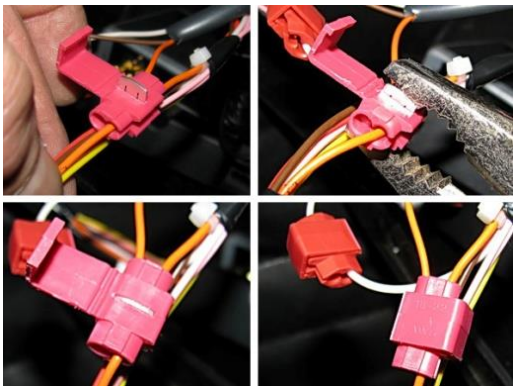
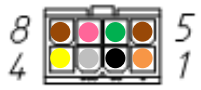
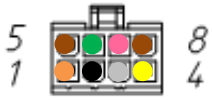
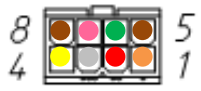
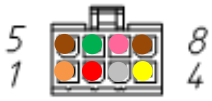


Figure 25 — Using connectors to connect wires of signal cable

3) Connection of any models of CANUp 27 using analog inputs (see 1.4.7) and connection of CANUp 27 Genset using RS-485 serial interface (see 1.4.6) is made using **CANUp 27 cable** from the delivery set (see 1.2), in accordance with designation of contacts of **SENS** connectors, according to table 9.

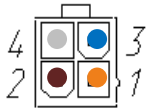
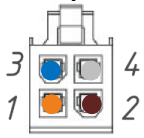
*Table 9 — Designation of contacts of **SENS** connectors*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
CANUp 27 Standard (Model code 01) / CANUp 27 Standard 2G (Model code 12) / CANUp 27 Pro					
SENS connector of CANUp 27 Standard / Pro:  **SENS connector of CANUp 27 cable:** 	1	VBAT	Orange	Power "+"	Analog, voltage (9…45) V
	2	KLIN	Black	Reserve	
	3	AIN	White	Analog signal input	Analog, voltage (0…30) V
	4	FIN	Yellow	Frequency signal input	Frequency (0.001…10) kHz
	5	GND	Brown	Ground "-"	—
	6	LLIN	Green	Reserve	
	7	DIN	Pink	Discrete signal input	Discrete, U_{PS}…3 (level 0)* 3…0 (level 1)
	8	GND	Brown	Ground "-"	—
CANUp 27 Genset					
SENS connector of CANUp 27 Genset:  **SENS connector of CANUp 27 cable:** 	1	VBAT	Orange	Power "+"	Analog, voltage (9…45) V
	2	RS485.B	Red	Data reception/ transmission	Digital, RS-485 Standard
	3	AIN	White	Analog signal input	Analog, voltage (0…30) V
	4	FIN	Yellow	Frequency signal input	Frequency (0.001…10) kHz
	5	GND	Brown	Ground "-"	—
	6	RS485.A	Green	Data reception/ transmission	Digital, RS-485 Standard
	7	DIN	Pink	Discrete signal input	Discrete, U_{PS}…3 (level 0)* 3…0 (level 1)
	8	GND	Brown	Ground "-"	—
* U_{PS} — voltage of power supply source.					

4) Connection of CANUp 27 Pro / CANUp 27 Genset by means of CAN interface (see 1.4.5) is carried out with **CAN 4 pin cable** from the delivery set (see 1.2), in accordance with the designation of contacts of **CAN** connectors, according to table 10.

For model CANUp 27 Standard, **CAN** connector is a spare one.

*Table 10 — Designation of contacts of **CAN** connectors*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
CAN connector of CANUp 27:  **CAN connector of CAN 4 pin cable:** 	1	VE	Orange	Power "+"	Analog, voltage (9…45) V
	2	GND	Brown	Ground "-"	—
	3	CANH	Blue	CAN HIGH	Digital, CAN 2.0B, SAE j1939 Standard
	4	CANL	White	CAN LOW	

Examples of CANUp 27 connection diagrams using S6 Technolgy including a list of S6 Cable System components that need to be ordered are provided in the Operation Manual for CAN j1939/S6 Telematics Interface.

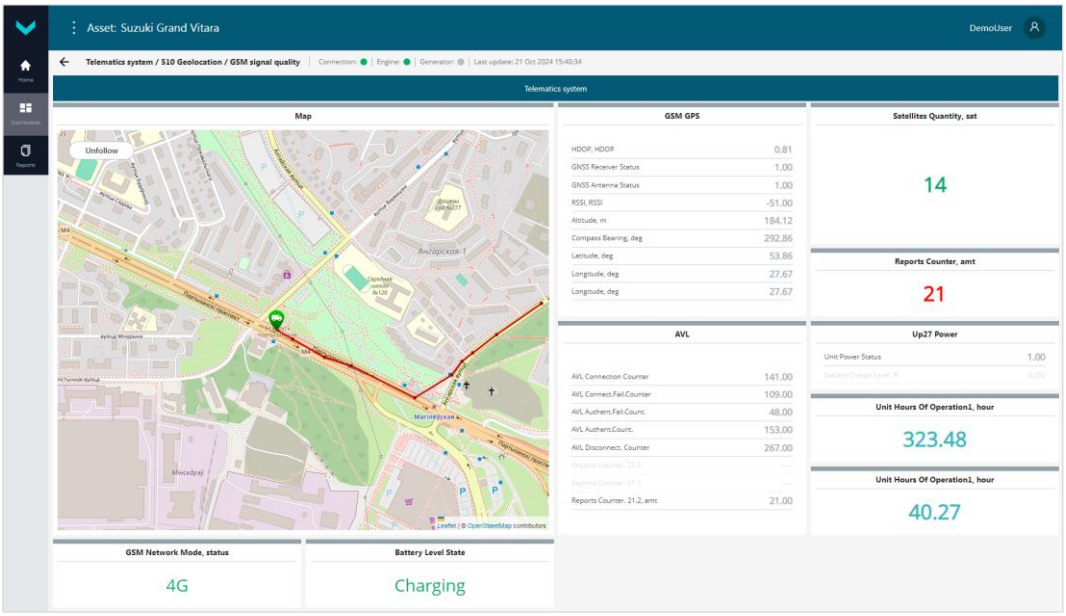
A list of Units and other Telematics equipment that may be connected to CANUp 27 Pro at one time is provided in table 1.

2.6 Function test

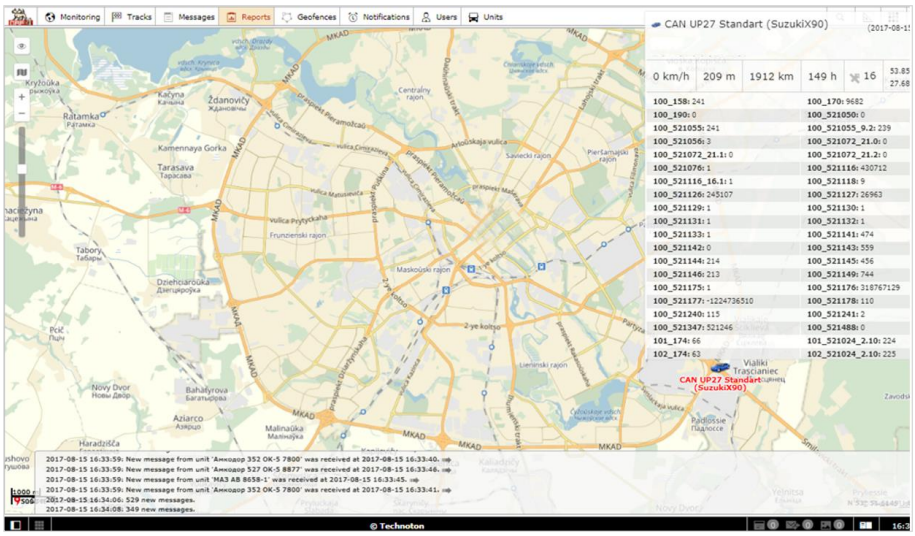
To verify functioning it is required:

1) Register the mobile/fixed Asset equipped with CANUp 27 gateway at UNUM Genset Telematics service (see the document "UNUM Genset Telematics service. "Fleet". User manual") or in ORF 4 / ORF 5 (see the document ORF 4 Telematics service. User manual).

2) Make sure that data is transmitted to the Server correctly (see figure 26).



a) at the Dashboard of UNUM Genset service



b) at real-time window of ORF 4 service

Figure 26 — Examples of displaying in real time data and a tag of a moving mobile Asset equipped with CANUp 27

3) During CANUp 27 operation, signals of LED indicators, located on the top cover of Unit body, should be visible (see table 11).

Table 11 – CANUp 27 LED signals description

LED Indicator			Signal description*
Marking	**Status**	**Light color**	
PWR		Green	External power supply is on. Battery is charged.
			External power supply is on. Battery is charging.
			External power supply is off. Powered from battery.
	No signal		External power supply is off. Battery is discharged.
SRV		Red	Data transfer from PC is in progress (when working with Service CANUp software).
			Ignition is turned on (engine is running). Regular operation mode.
	No signal		Vehicle ignition is on, engine is not started. No connection to PC (during work with Service CANUp software).
GNSS		Yellow	Satellite receiver is on. Satellites are not detected or data is not reliable.
			Satellite receiver is on. Satellites are detected and data is reliable.
	No signal		Satellite receiver is not working.
LINK**		Blue	GSM modem initialization, search for network.
			Modem is registered in GSM network, no GPRS connection.
			GPRS connection established, no authorized to access Server.
			GPRS connection established, no authorized to access Server. Report sending in progress.
	No signal		GPRS modem is out of order.
LINK***		Blue	Wi-Fi modem initialization.
			Wi-Fi modem is connected to the access point (router).
			Connection with the Server is established, but no authentication on the Server.
			There is authentication on the Server. Reports transmission is in progress.
	No signal		Wi-Fi modem is off or out of order.

* For flashing light signals, interval between flashes is 2 seconds.
** For CANUp 27 Standard / Pro LTE / Genset.
*** For CANUp 27 Pro Wi-Fi.

3 Packaging

Delivery sets of CANUp 27 are shipped in carton boxes; their view is presented in figure 27.

Figure 27 — CANUp 27 packaging

Labels containing information on the product name, its serial number, date of manufacturing, version of the inbuilt software, weight, Technologies, certificates, QC department stamp and QR code are fixed on the CANUp 27 packages (see figure 28).

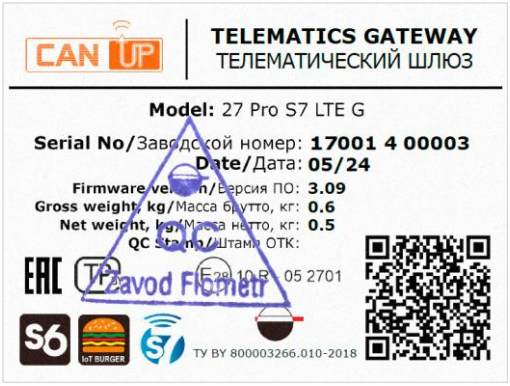


Figure 28 — CANUp 27 packaging label

Note — Label design and contents can be modified by the Manufacturer.

4 Storage

CANUp 27 is recommended to be stored in dry enclosed areas.

CANUp 27 storage is allowed only in original packaging at temperature range from +10 to +30 °C and relative humidity from 45 to 75 % at 25 °C.

Do not store CANUp 27 in the same room with substances that cause metal corrosion and / or contain aggressive impurities.

CANUp 27 shelf life must not exceed 24 months.

5 Transportation

Transportation of CANUp 27 is recommended in closed transport that provides protection for CANUp 27 from mechanical damage and precipitation.

When transporting by air, CANUp 27 must be stored in heated pressurized compartments.

Air environment in transportation compartments should not contain acid, alkaline and other aggressive impurities.

Shipping containers with packed CANUp 27 should be sealed.

6 Utilization/re-cycling

CANUp 27 does not contain precious metals in amount that should be recorded.

The inbuilt lithium-ion accumulator battery of CANUp 27 contains harmful substances and components that are hazardous to human health and environment.

CANUp 27 must not be disposed of together with general domestic waste.
The Buyer is responsible for the disposal of CANUp 27 by means of its delivery to the hazardous waste collecting center; this will ensure safety for human health and environment.

Technoton bears no responsibility for any non-compliance with the above disposal and recycling requirements for CANUp 27.

Contacts

Distribution, technical support and service

TECHNOTON

Technoton's quality management system is certified for compliance with ISO 9001:2015

sales@jv-technoton.com

support@jv-technoton.com

Annex A
List and content of Onboard reports according to Wialon IPS v.2.0 protocol

CANUp 27 uses TCP connection for sending data. Reports from CANUp 27 to AVL Server are sent using Wialon IPS v.2.0 protocol.

Table A.1 — List of CANUp 27 Reports

Description	Packet Type in accordance with Wialon IPS 2.0 protocol
Report on authentication on AVL Server	L
Report with data *	D
Composite Report **	B
* For CANUp 27 Standard. ** For CANUp 27 Pro LTE / Pro Wi-Fi / Genset	

A.1 Authentication Report on AVL Server

The view of the Authentication Report at AVL Server is presented below:

#L#protocol_version;id;password;crc16\r\n

Table A.2 — Authentication Report on AVL Server

Field Designation	Data Transmitted
protocol_version	Version of Wialon protocol. The field must contain value 2.0
id	Unique ID of CANUp 27 which consists of a prefix (SPN 521080) and the Unit serial number (SPN 521120)
password	Unit Password
crc16	Checksum
;	Separator character

Example:
#L#2.0;UP27_02001100000;1111;A96E
where
UP27_02001100000 - Unit ID consisting of prefix "UP27_" and serial number "02001100000";
1111 - Unit password;
A96E - checksum calculated using crc16 algorithm.

A.2 Report containing data

A Report containing data has the following view:

#D#date;time;lat1;lat2;lon1;lon2;speed;course;height;sats;hdop;inputs;outputs;adc;ibutton;params;crc16\r\n

The Report in the form as above is transmitted only by CANUp 27 Standard.

In CANUp 27 Pro LTE / Pro Wi-Fi / Genset the Report containing data is partially transmitted in the form of Composite Report (see table A.1).

Table A.3 — Report containing data

Field name	Transmitted data
date	SPN 962, SPN 963, SPN 964 Date in format DDMMYY, in UTC, if nothing, NA is transmitted.
time	SPN 959, SPN 960, SPN 961 Time in format HHMMSS, in UTC, if nothing, NA is transmitted.
lat1, lat2	SPN 584 Latitude (5544.6025;N), if nothing, NA is transmitted; NA.
lon1, lon2	SPN 585 Longitude (03739.6834;E), if nothing, NA is transmitted.
speed	SPN 517 Speed, integer, km/h, if nothing, NA is transmitted.
course	SPN 165 Course, integer, degrees, if nothing, NA is transmitted.
height	SPN 580 Height, integer, in meters, if nothing, NA is transmitted.
sats	SPN 521128 The number of satellites, integer, if nothing, NA is transmitted.
hdop	SPN 521090 Reduced precision, fractional number, if nothing, NA is transmitted.
inputs	Not used – NA.
outputs	Not used – NA.
adc	Not used – NA.
ibutton	Not used – NA.
params	The field contains the transmitted data, in accordance with S6 Database. The data are presented as a pattern: NAME:TYPE:VALUE, where NAME – SA, SPN and specificator* separated by character "_"; TYPE – data type: 1 – integer value or 3** – ASCII-line; VALUE – SPN value. Notes * Specificator is designated as X.Y, where X is the group number, Y is value within the group; For CANUp 27 Pro LTE / Pro Wi-Fi / Genset multiple specificators are supported (up to three pcs.). **Only for CANUp 27 Pro LTE / Pro Wi-Fi / Genset.
crc16	Checksum
;	Separator

Example:

#D#280818;144432;1040.1034;N;12259.0108;E;0.000;37.594;35.500;16;0.680;NA;NA;NA;NA;101_521347:1:521246,101_174:1:71,101_521023_2.10:1:0,101_521024_2.10:1:0,101_521488:1:0;DAAE

where

280818	– date: 28.08.2018;
144432	– time: 14:44:32;
1040.1034;N	– latitude: 10.668390° N;
12259.0108;E	– longitude: 122.983513 ° E;
0.000	– Vehicle speed: 0,0 km/h;
37.594	– Vehicle course of movement: 37,594°;
35.500	– altitude above the sea level: 35.5 m;
16	– number of visible satellites;
0.680	– horizontal dilution of precision (HDOP).

Report parameters are below:

101_521347:1:521246	– SA=101, SPN=521347, value =521246;
101_174:1:71	– SA=101, SPN=174, value =71;
101_521023_2.10:1:0	– SA=101, SPN=521023, specificator =2.10 value =0;
101_521024_2.10:1:0	– SA=101, SPN=521024, specificator =2.10 value =0;
101_521488:1:0	– SA=101, SPN=521488, value =0;

Last field: DAAE – checksum calculated based on crc16 algorithm.

A.3 Composite Report

Composite Report is supported only in CANUp 27 Pro LTE / Pro Wi-Fi / Genset and the common form of it is:

#B#msg|crc16\r\n

in which **msg** are several bodies of general Reports with data (see A.2) (without specifying the type) separated by character **|**.

Example:

#B#291118;082246;NA;NA;NA;NA;0.000;NA;NA;0;NA;NA;NA;NA;NA;100_521347:1:521261,100_521126:1:1641108,100_521127:1:258761,100_521072_21.2:1:1,100_521072_21.1:1:0,100_521072_21.0:1:0|291118;082245;NA;NA;NA;NA;0.000;NA;NA;0;NA;NA;NA;NA;NA;100_521347:1:521246,100_521129:1:1,100_521050:1:1|A614

where

Report 1:

291118;082246;NA;NA;NA;NA;0.000;NA;NA;0;NA;NA;NA;NA;NA;100_521347:1:521261,100_521126:1:1641108,100_521127:1:258761,100_521072_21.2:1:1,100_521072_21.1:1:0,100_521072_21.0:1:0

291118	– date: 29.11.2018;
082246	– time: 08:22:46;
NA, NA	– latitude not specified;
NA, NA	– longitude not specified;
0.000	– Vehicle speed: 0,0 km/h;
NA	– Vehicle course of movement not specified;
NA	– altitude above the sea level not specified;
NA	– number of visible satellites not specified;
NA	– horizontal dilution of precision (HDOP) not specified.

Report 1 parameters are below:

100_521347:1:521261	– SA=100, SPN=521347, value =521261;
100_521126:1:1641108	– SA=100, SPN=521126, value =1641108;
100_521127:1:258761	– SA=100, SPN=521127, value =258761;
100_521072_21.2:1:1	– SA=100, SPN=521072, specificator =21.1, value =1;
100_521072_21.1:1:0	– SA=100, SPN=521072, specificator =21.0, value =0;
100_521072_21.0:1:0	– SA=100, SPN=521072, specificator =21.0, value =0;

Report 2:
291118;082245;NA;NA;NA;NA;0.000;NA;NA;0;NA;NA;NA;NA;NA;100_521347:1:521246,100_521129:1:1,100_521050:1:1

291118 – date: 29.11.2018;
082245 – time: 08:22:45;
NA, NA – latitude not specified;
NA, NA – longitude not specified;
0.000 – Vehicle speed: 0,0 km/h;
NA – Vehicle course of movement not specified;
NA – altitude above the sea level not specified;
NA – number of visible satellites not specified;
NA – horizontal dilution of precision (HDOP) not specified.

Report 2 parameters are below:
100_521347:1:521246 – SA=100, SPN=521347, value =521246;
100_521129:1:1 – SA=100, SPN=521129, value =1;
100_521050:1:1 – SA=100, SPN=521050, value =1;

Last field: A614 – checksum calculated based on crc16 algorithm.

Annex B
SMS commands for CANUp 27 remote configuration

Format of SMS-commands: **++PVX;Y;Z;V;DDD…DDDD/++**

Table B.1 — Fields SMS-commands

Field SMS-commands	Purpose	Notes
++	Beginning of the command	—
PV	Version of SMS format structure	One symbol (meaning of symbol — B)
X	Password of CANUp 27	Numbers, not less than 4
Y	SA CANUp 27 identification (network address on the S6 bus)	Numbers, not less than 4
Z	Command	Symbols (0,1,2…Z), not less than 4
V	Time to execute the command	Minutes, not less than 4
DDD…DDDD	Field of the command	Text or number, max 50 symbols
/++	End of the command	—

Notes
1 All symbols — Latin.
2 All numbers — decimal of symbol format.
3 Separator — semicolon **(;)**.
4 Command for set up (entry) of field configuration begins from letter **S**.
5 Command for reading field of configuration begins from letter **R**.

Table B.2 — List of SMS-commands

Command	Purpose	Field of the command (DDD...DDDD)	Notes
LDFW	Load firmware.	see table B.3	—
RDID	Get serial number and firmware version.	—	Returns serial number of CANUp 27 and its firmware version. Example command: ++B1111;100;RDID;5;/++
RAPN	Get configurations of connection to mobile operator.	—	Example command: ++B1111;100;RAPN;5;/++ Example of CANUp 27 response: CANUp 27 S/N:123456789 APN=internet Login=123 Pass=123
SAPN	Save configurations of connection to mobile operator.	APN access point, login, password	Example command: ++B1111;100;SAPN;5;internet;123;123/++ Command value consists of the name of the access point (APN) of mobile operator, login and password for connection
RAVL	Get AVL server configurations.	—	Example of CANUp 27 response: CANUp 27 S/N:123456789 IP=orf-monitor4.com Port=1234 IP_prefix=CANUp 27 Password=1234
SAVL	Save AVL server configurations.	IP address/domain, port, user ID, password	Example command: ++B1111;100;SAVL;5; orf-monitor4.com;20332;;/++ Parameters in command field ma be missing, in this case the current settings are used. Port - no more than 5 digits, ID - no more than 13 symbols, Password - no more than 16 symbols

Command	Purpose	Field of the command (DDD…DDDD)	Notes
RLOC	Return serial number and coordinates of CANUp 27: latitude and longitude, hyperlink to googlemaps.	—	The command returns serial number and coordinates of CANUp 27: latitude and longitude, hyperlink to googlemaps Example of CANUp 27 response: CANUp 27 S/N:123456789 Lat:53.860008 Lon:27.686987 Link on map: http://maps.google.com/ ?q=53.860008,27.686987
RSTM	Restart modem.	—	Example command: ++B1111;100;RSTM;5;/++
CSRV	Remote connection and control of the CANUp 27 via service software.	IP address, port of PC, where service software is running, and Internet connection is established	Example command: ++B1111;100;CSRV;5; 127.0.0.1;1234/++

*Table B.3 — Fields of SMS-command **LDFW***

Required fields		**Examples**
<file_name>	File name and letter case should be the same as on the server	dut_e_fw_1_0.blf3
<ftp_pass>	Password for access to ftp-server	1234
Optional fields		**Examples**
<ftp_addr>	Ftp-server address	ns1.orf-monitor.com
<ftp_port>	Port for connection to ftp-server	21
<ftp_connection_mode>	Connection mode 0 – active; 1 – passive	1
<ftp_login>	Login for access to ftp-server	anonymous
Notes 1 For firmware files, create a folder named “firmware” in the root directory of the server. 2 If you need to specify any of the optional fields, all the preceding fields must also be specified. Missing fields are automatically filled with the corresponding settings saved in the CANUp 27. Example command: ++B1111;100;LDFW;5;file.blf3;PSW/++ (file.blf3 – Firmware file, PSW – password for access to ftp-server).		

Annex C
CANUp 27 firmware upgrade

WARNING: CANUp 27 firmware update should be carried out **only** for implementing improvements, recommended by the Manufacturer.

To upgrade CANUp 27 firmware the following actions should be made:

1) Connect CANUp 27 to PC using S6 SK service adapter (see 2.4.1).

WARNING: when re-uploading firmware, power supply voltage of CANUp 27 should not drop out of 10…45 V range.

2) After authorization (see 2.4.3) press Unit firmware button in the dropdown menu Update of Service CANUp software.
3) Choose firmware upgrade file **(*.blf3)** on PC disk or memory stick.
4) Press Open button, that will start firmware file downloading into CANUp 27 memory.
After firmware file integrity and compatibility check by Service CANUp Software window of firmware uploading into CANUp 27 memory will appear. In case of any errors the Software will send warning message.
To cancel firmware upgrade it is needed to press Stop button.

ATTENTION: Before the end of the update process and automatic Service CANUp software reset it is **forbidden**:
1) Power down the PC.
2) Power down the CANUp 27.
3) Disconnect CANUp 27 from the adapter and adapter from the PC.
4) Run any resource-intensive applications on the PC.

Service CANUp Software will display appropriate message and automatically will disconnect CANUp 27 from PC in case the update is successful. CANUp 27 is ready for further operation.
Service CANUp Software will display a new firmware version with the next connection session between PC and CANUp 27.

ATTENTION: To update the firmware of a remote Unit, you must send one of the following commands to it:
1) SMS-command **LDFW** (see annex B) (you may use it only for the models CANUp 27 Standard / Pro LTE).
2) GPRS-command **LDFW** (you may use it for any models of CANUp 27). The structure of fields of the GPRS-command **LDFW** is identical to the structure of the same name SMS-command provided in annex B. The procedure for sending the command **LDFW** is similar to that of sending the GPRS-command **CSRV** described in 2.4.9.
3) Control command of UNUM IIOT Platform Server for remote connection using Service CANUp software (versions from 7.16 and higher) (can be used for models CANUp 27 Pro / Genset). After remote connection, the firmware update is conducted in the same way as for cable connection.

If the CANUp 27 firmware update has been completed incorrectly and the current version of the inbuilt software has been damaged, the firmware update procedure has to be repeated. In this case, the inbuilt firmware loader is activated which enables to recover CANUp 27 operability. If the repeated attempt fails, we recommend to consult Technoton Technical Support Service by e-mail support@jv-technoton.com.

Annex D
Electromagnetic compatibility specifications

Table D.1 — Protection of power circuits of CANUp 27 against conductive, capacitive and inductive interference as described in ISO 7637-2:2002

Test pulse	Test level	U_S tested level, V for supply voltage	
		12 V	24 V
1	IV	-100	-600
2a	IV	+50	+50
2b	IV	+10	+20
3a	IV	-150	-200
3b	IV	+100	+200
4	IV	-7	-16
5	III	+65	+123

Table D.2 — Protection of signal circuits of CANUp 27 against conductive, capacitive and inductive interference as described in ISO 7637-3:2002

Test pulse	Test level	U_S tested level, V for supply voltage	
		12 V	24 V
Pulse "a" of short duration	IV	-60	-80
Pulse "b" of short duration	IV	+40	+80
Positive pulse of long duration (DCC)	IV	+30	+45
Negative pulse of long duration (DCC)	IV	-30	-45
Positive pulse of long duration (ICC)	IV	+6	+10
Negative pulse of long duration (ICC)	IV	-6	-10

Table D.3— CANUp 27 own radio interference field strength as per UNECE Regulation No.10 (Revision 4)

Tested bandwidth, MHz	Quasi-peak value of field strength of radio interference, dB µV/m		Average value of field strength of radio interference, dB µV/m	
	Horizontal polarization	Vertical polarization	Horizontal polarization	Vertical polarization
30…34	27	25	20	20
34…45	23	21	16	18
45…60	18	18	13	14
60…75	17	16	10	9
75…100	11	13	7	8
100…130	12	14	7	9
130…170	22	16	18	12
170…225	24	18	18	13
225…300	32	24	27	11
300…400	19	21	13	14
400…525	22	24	16	15
525…700	24	27	23	23
700…850	34	32	25	27
850…1000	35	33	27	26

Annex E
Data composition in the preset Reports of CANUp 27 Pro / Genset

Table E.1 — List of preset packets for CANUp 27 Pro / Genset

Packet name, ID	Composition (List of SPN)	Remark
CANUp 27 Pro*		
Alarm button ID=7	SPN 521226 – Event "Alarm Button Pressed"	Sent in case Emergency button connected to Unit discrete input is pressed. Disabled by default.
Navigation ID=10	"LA" – latitude, "LO" – longitude	Sent in case of Event "Change of Vehicle location".
Roaming data ID=1	SPN 521126 – Distance by GNSS, SPN 521127 – Movement Time by GNSS, SPN 521072/21.2 – Reports Counter /Information, SPN 521072/21.1 – Reports Counter /Important, SPN 521072/21.0 - Reports Counter /Emergency, SPN 521131 – Modem Registration Status, SPN 521488 – Unit DTCs mask	Periodic sending data when in roaming mode.
Fuel Level Sensor ID=1	SPN 521024/2.10 – Fuel Tank Volume / Filtering, SPN 174 – Engine Fuel Temperature 1, SPN 521488 – Unit DTCs mask	Used in case DUT-E fuel level sensor connection. Disabled by default.
Flowmeter ID=1	SPN 1834 – Engine Total Average Fuel Rate, SPN 5054 – High Resolution Engine Total Fuel Used, SPN 5054/9.3 - High Resolution Engine Total Fuel Used / Tampering, SPN 521171 – Flowmeter Hours of Operation, SPN 174 - Engine Fuel Temperature 1, SPN 183 – Engine Fuel Rate, l/h, SPN 521181 – Engine Mode by Fuel Rate, SPN 521027/18.0 - Chamber Fuel Rate. Feed chamber, l/h, SPN 521027/18.1 - Chamber Fuel Rate. Reverse chamber, l/h, SPN 521267 – Interference Sensor Occurrence Count	Used in case DFM fuel flow meter connection. Disabled by default.
CANUp 27 Genset*		
DTC ID=8	Any malfunction	SPN of Event: SPN 521786 - Fault
Navigation ID=10	"LA" – latitude, "LO" – longitude	SPN of Event: SPN 521247 - 1/2 h Timer
Events ID=7	Any Event	SPN of Event: SPN 521787 – All Events

Packet name, ID	Composition (List of SPN)	Remark
Fuel ID=1	SPN 5054 - High Resolution Engine Total Fuel Used, SPN 521171 - Flowmeter Hours Of Operation, SPN 183 - Engine Fuel Rate, SPN 521024/2.10 – Fuel Tank Volume (Filtering), SPN 174 - Engine Fuel Temperature 1, SPN 521027/18.0 - Chamber Fuel Rate (Feed chamber), SPN 521027/18.1 - Chamber Fuel Rate (Reverse chamber), SPN 521181 - Engine Mode by Fuel Rate, SPN 5054/9.3 - High Resolution Engine Total Fuel Used (Cheating), SPN 5054/9.4 - High Resolution Engine Total Fuel Used (Negative)	SPN of Event: SPN 521246 - 1 min Timer
Engine ID=1	SPN 100 - Engine Oil Pressure, SPN 110 - Engine Coolant Temperature, SPN 190 - Engine speed, SPN 183 - Engine Fuel Rate, SPN 250 - Engine Total Fuel Used, SPN 521190 - Engine Hours Of Operation, SPN 521749 - Engine Status	SPN of Event: SPN 521246 - 1 min Timer
Generator 1 ID=1	SPN 2452 - Generator Total Real Power, SPN 2460 - Generator Total Apparent Power, SPN 2468 - Generator Total kW Hours Export, SPN 2469 - Generator Total kW Hours Import, SPN 2444 - Generator Average Line-Neutral AC RMS Voltage, SPN 2448 - Generator Average AC RMS Current, SPN 2436 - Generator Average AC Frequency, SPN 589 - Alternator Speed, SPN 2464 - Generator Overall Power Factor, SPN 2456 - Generator Total Reactive Power	SPN of Event: SPN 521246 - 1 min Timer
Generator 2 ID=1	SPN 2437 - Generator Phase A AC Frequency, SPN 2438 - Generator Phase B AC Frequency, SPN 2439 - Generator Phase C AC Frequency, SPN 2441 - Generator Phase AB Line-Line AC RMS Voltage, SPN 2442 - Generator Phase BC Line-Line AC RMS Voltage, SPN 2443 - Generator Phase CA Line-Line AC RMS Voltage, SPN 2449 - Generator Phase A AC RMS Current, SPN 2450 - Generator Phase B AC RMS Current, SPN 2451 - Generator Phase C AC RMS Current, SPN 4078 - Generator Alternator Efficiency	SPN of Event: SPN 521246 - 1 min Timer
Generator 3 ID=1	SPN 2461 - Generator Phase A Apparent Power, SPN 2462 - Generator Phase B Apparent Power, SPN 2463 - Generator Phase C Apparent Power, SPN 2445 - Generator Phase A Line-Neutral AC RMS Voltage, SPN 2446 - Generator Phase B Line-Neutral AC RMS Voltage, SPN 2447 - Generator Phase C Line-Neutral AC RMS Voltage, SPN 521749 - Engine Status, SPN 521754 - Running Hours	SPN of Event: SPN 521246 - 1 min Timer

Packet name, ID	Composition (List of SPN)	Remark
Generator 4 ID=1	SPN 2482 - Utility Average AC RMS Current, SPN 2474 - Utility Average Line-Line AC RMS Voltage, SPN 2478 - Utility Average Line-Neutral AC RMS Voltage, SPN 2470 - Utility Average AC Frequency, SPN 521751 - Num Starts, SPN 521752 - Num Estops, SPN 521753 - Shutdowns	SPN of Event: SPN 521246 - 1 min Timer
Unit 1 ID=1	SPN 158 - Key Switch Battery Potential, SPN 521072/21.2 - Reports Counter (Information), SPN 521072/21.1 - Reports Counter (Important), SPN 521116 - Unit Hours Of Operation, SPN 521116/16.1 - Unit Hours Of Operation (Battery), SPN 521190/16.0 - Engine Hours Of Operation (Vehicle power supply), SPN 521149 - Modem Reset Counter, SPN 521488 – Unit DTCs Mask	SPN of Event: SPN 521247 - 1/2 h Timer
* The preset Reports of the gateways may differ from those listed.		

Annex F
Data composition in output messages of wireless Units

Wireless Units transmit data using S7 Technology without the establishment of connection with the receiving device and without acknowledgement of data reception. The data in the form of Advertising packets are transmitted automatically in the continuous mode with the periodicity of 5 s. The structure of a data packet of wireless Units is provided in figure F.1.

Service field (AD0) (permanent values)			**Data field (AD1)** (variable values)					
Data length (AD Length) (1 byte)	**Data type (AD Type)** (1 byte)	**Data (Data)** (1 byte)	**Data length (AD Length)** (1 byte)	**Data type (AD Type)** (1 byte)	**Company identifier (Company ID)** (2 bytes)	**Unit firmware version (Soft Ver)** (1 byte)	**PGN number (PGN)** (2 bytes)	**PGN data (PGN Data)** (0…21 bytes)
0x02	0x01	0x06	0xXX	0xFF	0x0972[1] 0xFFFF[2]	0xXX	0xXXXX	…

[1] DUT-E S7 (Model code 13), DUT-E 2Bio S7, DFM S7 (with the version of firmware from 5.0 and higher).
[2] For DUT-E S7 (Model code 07 with the version of firmware lower than 13.0).

Figure F.1 — Structure of data packet transmitted by wireless Units

The application level of the protocol of the wireless Units output messages conforms with S6 Database.

F.1 Output message of DUT-E S7/DUT-E 2Bio S7 fuel level sensors

Table F.1 — Data composition of DUT-E S7 / DUT-E 2Bio S7 output message

Field number	Length	Parameter	Name
1) Fuel Level Sensor. Raw Data PGN 63277 (0xF72D)			
1	4 bytes	SPN 521440	Frequency (Duty Cycle)
5	1 byte	SPN 521457	Temperature
6	4 bytes	SPN 521773	Third Electrode Frequency[3]
10	2 bytes	SPN 521774	Fuel Permittivity Relative[3]
12	4 bytes	SPN 521488	Unit DTCs Mask (see table F.2)
16	2 bytes	SPN 521023	Fuel Tank Level[2]
18	4 bytes	SPN 521728	Fuel Tank Volume[2]
2) MAC Address PGN 63558 (0xF846)[1]			
1	6 bytes	SPN 521490	MAC Address

[1] Valid for all wireless sensors except DUT-E S7 (Model code 07) with the version of firmware lower than 24.0.
[2] Valid only for sensors DUT-E S7 (Model code 13) and DUT-E 2Bio S7.
[3] Valid only for sensors DUT-E 2Bio S7.
For DUT-E 2Bio S7, ON/OFF status of the fuel type correction feature set in the sensor Profile affects the correctness of these indications.

IMPORTANT:
DUT-E S7 sensors (Model code 13) and DUT-E 2Bio S7 may independently generate and broadcast ready fuel level readings (SPN 521023) and fuel volume in the tank readings (SPN 521728). For their correctness, first, you need to record the profile into the sensor internal memory with the help of the Fuel Tanks Monitor application. The profile must contain:
- sensor measuring probe length;
- "Empty"/ "Full" calibration frequencies of the measuring generator for the minimum and maximum fuel levels;
- values of points of the tank calibration table.

If DUT-E 2Bio S7 is mounted in the tank in which different types of fuel are used from time to time, the fuel type correction feature must be enabled in its profile and values of "Empty"/"Full" calibration frequencies for the third electrode must be specified.

Table F.2 — Numerical values of malfunction mask (DTCs Mask) of DUT-E S7

Numerical value	Description of malfunction
1	Fuel temperature. No data or incorrect data
64	Current frequency of sensor's measuring generator is higher by more than 100 Hz, compared to the stored value obtained during the calibration of the sensor's "minimum"
512	Defective measuring generator. Possible locking of the measuring module pipes
1024	Low battery charge (<10 %)
2097152	Real time clock. Clocking is off
16777216	Device operates in "Manufacturing" mode*
8388608	Malfunction of 3d electrode measuring generator**
* This value is not a sign of the sensor malfunction; it only shows that its BLE-module operates in "Manufacturing" mode. ** Valid only for DUT-E 2Bio S7.	

SPN values of the sensor output message may be calculated according to the formula (F.1) using attributes from table F.3.

$$\textbf{Parameter value = SPN Content} \cdot \textbf{Factor (Resolution) + Offset} \quad \text{(F.1)}$$

Table F.3 — Attributes for calculation of current values of DUT-E S7 parameters

Parameter	Factor (Resolution)	Offset
SPN 521440	0.001	0 Hz
SPN 521457	1	-50 °C
SPN 521023*	0.1	0 mm
SPN 521728*	0.1	0 l
SPN 521773**	0.001	0 Hz
SPN 521774**	0.001	0

* Valid only DUT-E S7 (Model code 13) and DUT-E 2Bio S7.
** Valid only for DUT-E 2Bio S7.

The fuel level value (L_{act}) may be calculated according to the formula (F.2):

$$L_{act} = L_s \cdot F_1 \cdot (F_0/F_{act}-1)/(F_0-F_1), \text{ mm} \quad \text{(F.2)}$$

where L_s – length of the sensor measuring probe after cutting, mm;
F_0 – frequency of the dry sensor measuring generator, Hz;
F_1 – measuring generator frequency of the sensor fully plunged into the fuel, Hz;
F_{act} – current value of the sensor measuring generator frequency, Hz.

F.2 Output messages of DFM S7 fuel flow meter

Table F.4 — Data composition of DFM S7 output messages

Field number	Length	Parameter	Name
1) Flowmeter. Parameters 2 PGN 63287 (0xF737)			
1	2 bytes	SPN 183	Engine Fuel Rate, l/h
3.1	4 bits	SPN 521181	Engine Mode by Fuel Rate
4	2 bytes	SPN 521027/18.0	Chamber Fuel Rate. Feed chamber
6	2 bytes	SPN 521027/18.1	Chamber Fuel Rate. Reverse chamber
8.1	4 bits	SPN 521028/18.0	Chamber Working Mode. Feed chamber
8.5	4 bits	SPN 521028/18.1	Chamber Working Mode. Reverse chamber
9	1 byte	SPN 174	Engine Fuel Temperature 1
10	2 bytes	SPN 521463/9.5	Flowmeter Hours Of Operation. Interference
12	4 bytes	SPN 521488	Unit DTCs Mask* (see table F.6)
16	4 bytes	SPN 521493	Unit Events Mask* (see table F.7)
20	1 byte	SPN 521061	Battery Charge Level
2) Flowmeter. Total Fuel Used PGN 63288 (0xF738)			
1	4 bytes	SPN 5054	High Resolution Engine Total Fuel Used
5	4 bytes	SPN 5054/9.0	High Resolution Engine Total Fuel Used. Idle
9	4 bytes	SPN 5054/9.1	High Resolution Engine Total Fuel Used. Optimal
13	4 bytes	SPN 5054/9.2	High Resolution Engine Total Fuel Used. Overload
17	4 bytes	SPN 5054/9.3	High Resolution Engine Total Fuel Used. Cheating
3) Flowmeter. Hours Of Operation PGN 63289 (0xF739)			
1	4 bytes	SPN 521171	Flowmeter Hours Of Operation
5	4 bytes	SPN 521171/9.0	Flowmeter Hours Of Operation. Idle
9	4 bytes	SPN 521171/9.1	Flowmeter Hours Of Operation. Optimal
13	4 bytes	SPN 521171/9.2	Flowmeter Hours Of Operation. Overload
17	4 bytes	SPN 521171/9.3	Flowmeter Hours Of Operation. Cheating
4) Flowmeter. Chambers Counters PGN 63314 (0xF752)			
1	4 bytes	SPN 5054/18.0	High Resolution Engine Total Fuel Used. Feed chamber
5	4 bytes	SPN 5054/18.1	High Resolution Engine Total Fuel Used. Reverse chamber
9	4 bytes	SPN 5054/9.4	High Resolution Engine Total Fuel Used. Negative
13	4 bytes	SPN 5054/18.0/9.3	High Resolution Engine Total Fuel Used. Feed chamber. Cheating
17	4 bytes	SPN 5054/18.1/9.3	High Resolution Engine Total Fuel Used. Reverse chamber. Cheating
5) MAC Address PGN 63558 (0xF846)**			
1	6 bytes	SPN 521490	MAC Address

* All Events and malfunctions of the flow meter are recorded from the moment they appear till the moment they disappear, but during the time interval no less than 1 min.

** Only for flow meters with the version of firmware from 5.0 and higher.

SPN values of the flow meter output message may be calculated according to the formula (F.1) using attributes from table F.5.

Table F.5 — Attributes for calculation of current values of DFM S7 parameters

Parameter	Factor (Resolution)	Offset
SPN 183	0.05 l/h	0 l/h
SPN 521181	1	0
SPN 521027	0.05 l/h	0 l/h
SPN 521028	1	0
SPN 174	1 °C	-40 °C
SPN 521488	1	0
SPN 5054	0.001 l	0 l
SPN 521171	1 s	0 s
SPN 521463	1 s	0 s

Table F.6 — Numerical values of malfunction mask (DTCs Mask) DFM S7

Numerical value	Description of malfunction
1	Fuel temperature. Data missing or incorrect
32	Analog to digital converter launch error
265	Calibration missing
1024	Low battery charge (<10 %)
2097152	Real time clock. Clocking is off
16777216	Device operates in the manufacturing mode*
* This value is not a sign of any flow meter malfunction; it just indicates that its BLE module operates in “Manufacturing” mode.	

Table F.7 — Digital values of Events mask of DFM S7

Numerical value	Designation of Event
1	Flow meter tampering
2	Interference into flow meter operation

F.3 Output messages of DFM Marine S7 fuel flow meter

Table F.8 — Data composition of DFM Marine S7 output messages

Field number	Length	Parameter	Name
1) Flowmeter Marine. Parameters PGN 63517 (0xF81D)			
1	4 bytes	SPN 521313	Engine Fuel Rate
5	4 bytes	SPN 521313/2.1	Engine Fuel Rate. Mean
9.1	4 bits	SPN 521181	Engine Mode by Fuel Rate
10	1 byte	SPN 174	Engine Fuel Temperature 1
11	2 bytes	SPN 521463/9.5	Flowmeter Hours Of Operation. Interference
13	4 bytes	SPN 521488	Unit DTCs Mask* (see table F.10)
17	4 bytes	SPN 521493	Unit Events Mask* (see table F.11)
21	1 byte	SPN 521061	Battery Charge Level
2) Flowmeter Marine. Total Consumption PGN 63518 (0xF81E)			
1	4 bytes	SPN 521314	High Resolution Engine Total Fuel Used
5	4 bytes	SPN 521314/9.0	High Resolution Engine Total Fuel Used. Idle
9	4 bytes	SPN 521314/9.1	High Resolution Engine Total Fuel Used. Optimal
13	4 bytes	SPN 521314/9.2	High Resolution Engine Total Fuel Used. Overload
17	4 bytes	SPN 521314/9.3	High Resolution Engine Total Fuel Used. Cheating
3) Flowmeter. Hours of operation PGN 63289 (0xF739)			
1	4 bytes	SPN 521171	Flowmeter Hours Of Operation
5	4 bytes	SPN 521171/9.0	Flowmeter Hours Of Operation. Idle
9	4 bytes	SPN 521171/9.1	Flowmeter Hours Of Operation. Optimal
13	4 bytes	SPN 521171/9.2	Flowmeter Hours Of Operation. Overload
17	4 bytes	SPN 521171/9.3	Flowmeter Hours Of Operation. Cheating
4) MAC Address PGN 63558 (0xF846)			
1	6 bytes	SPN 521490	MAC Address
* All Events and malfunctions of the flow meter are recorded from the moment they appear till the moment they disappear, but during the time interval no less than 1 min.			

SPN values of the flow meter output message may be calculated according to the formula (F.1) using attributes from table F.9.

Table F.9 — Attributes for calculation of current values of DFM Marine S7 parameters

Parameter	Factor (Resolution)	Offset
SPN 521313	0.00001 m³/h	-21474.83647 m³/h
SPN 521181	1	0
SPN 521061	1 %	0 %
SPN 174	1 °C	-40 °C
SPN 521488	1	0
SPN 521314	0.00001 m³	0 m³
SPN 521171	1 s	0 s
SPN 521463	1 s	0 s

Table F.10 — Numerical values of malfunction mask (DTCs Mask) DFM Marine S7

Numerical value	Description of malfunction
1	Fuel temperature. Data missing or incorrect
32	Analog to digital converter launch error
265	Calibration missing
1024	Low battery charge (<10 %)
2097152	Real time clock. Clocking is off
16777216	Device operates in the manufacturing mode*
* This value is not a sign of any flow meter malfunction; it just indicates that its BLE module operates in "Manufacturing" mode.	

Table F.11 — Digital values of Events mask of DFM Marine S7

Numerical value	Designation of Event
1	Flow meter tampering
2	Interference into flow meter operation

F.4 Output message of GNOM DDE S7 pressure sensor

Table F.12 — Data composition of GNOM DDE S7 output message

Field number	Length	Parameter	Name
Axle Load Sensor PGN 63285 (0xF735)			
1	2 bytes	SPN 521511	Suspension air pressure, kPa
2	1 byte	SPN 521513	Suspension air temperature, °C
3	4 bytes	SPN 521488	Unit DTCs mask (see table F.13)
4	2 bytes	SPN 5347*	Lateral acceleration extended range, m/s^2
5	2 bytes	SPN 5348*	Longitudinal acceleration extended range, m/s^2
6	2 bytes	SPN 5349*	Vertical acceleration extended range, m/s^2
7	8 bytes	-	Reserve
* In the process of preparation for introduction.			

Table F.13 — Numerical values of malfunction mask (DTCs Mask) GNOM DDE S7

Numerical value	Description of malfunction
1024	Low battery charge (<10 %)
33554432	Accelerometer. The system does not respond or is not configured
67108864	Pressure sensor. The system does not respond or is not configured
268435456	Temperature sensor. The system does not respond or is not configured
16777216	Device operates in the manufacturing mode*
* This value is not a sign of any flow meter malfunction; it just indicates that its BLE module operates in “Manufacturing” mode.	

SPN values of the sensor output message may be calculated according to the formula (F.1) using attributes from table F.14.

Table F.14 — Attributes for calculation of current values of GNOM DDE S7 parameters

Parameter	Factor (Resolution)	Offset
SPN 521511	0.1	0 kPa
SPN 521513	1	-40 °C
SPN 5347	0.01	-320 m/s²
SPN 5348	0.01	-320 m/s²
SPN 5349	0.01	-320 m/s²

F.5 Output message of GNOM DP S7 position sensor

Table F.15 — Data composition of GNOM DP S7 output message

Field number	Length	Parameter	Name
Position Sensor PGN 63304 (0xF748)			
1	2 bytes	SPN 521469	Angle, deg
2	1 byte	SPN 521457	Temperature, °C
3	4 bytes	SPN 521488	Unit DTCs mask (see table F.16)
7	14 bytes	-	Reserve

Table F.16 — Numerical values of malfunction mask (DTCs Mask) GNOM DP S7

Numerical value	Description of malfunction
268435456	Temperature sensor. The system does not respond or is not configured
536870912	Position sensor. Data missing or incorrect
16777216	Device operates in the manufacturing mode*
* This value is not a sign of any flow meter malfunction; it just indicates that its BLE module operates in “Manufacturing” mode.	

SPN values of the sensor output message may be calculated according to the formula (F.1) using attributes from table F.17.

Table F.17 — Attributes for calculation of current values of GNOM DP S7 parameters

Parameter	Factor (Resolution)	Offset
SPN 521469	0.1	0 deg
SPN 521457	1	-50 °C

F.6 Output message from ADM31 temperature and humidity sensor

Table F.18 — Data composition of ADM31 output message

Field number	Length	Parameter	Name
Temperature / Humidity Sensor PGN 63521 (0xF821)			
1	1 byte	SPN 521492	Software Version
2	2 bytes	SPN 167	Charging System Potential (Voltage), V
4	1 byte	SPN 521703	Temperature / Humidity Sensor Status
5	1 byte	SPN 521457	Temperature, °C
6	1 byte	SPN 354	Relative Humidity, %
7	2 bytes	SPN 521702	Illumination, lx

SPN values of the sensor output message may be calculated according to the formula (F.1) using attributes from table F.19.

Table F.19 — Attributes for calculation of current values of ADM31 parameters

Parameter	Factor (Resolution)	Offset
SPN 521457	1	-50 °C
SPN 354	0.4	0 %
SPN 521702	1	0

Annex G
Videography

1) Video clip **CANUp Telematics gateway**

Check out the link: https://youtu.be/1PgmVpr1rDw

2) Video clip **Configuring CANUp for receiving data from sensors over S6 Technology**

Check out the link: https://youtu.be/ttymylf1mfo

3) Video clip **Wireless BLE sensors connection to CANUp**

Check out the link: https://youtu.be/9jg__89B8QY

4) Video clip **Configuring CANUp reports. Telematics gateway setup**

Check out the link: https://youtu.be/untuzXsOtkA

5) Other Technoton videos are on the YouTube channel which is regularly updated:

https://www.youtube.com/channel/UCq7EF3DHrgl7fOWB2ynsR-A