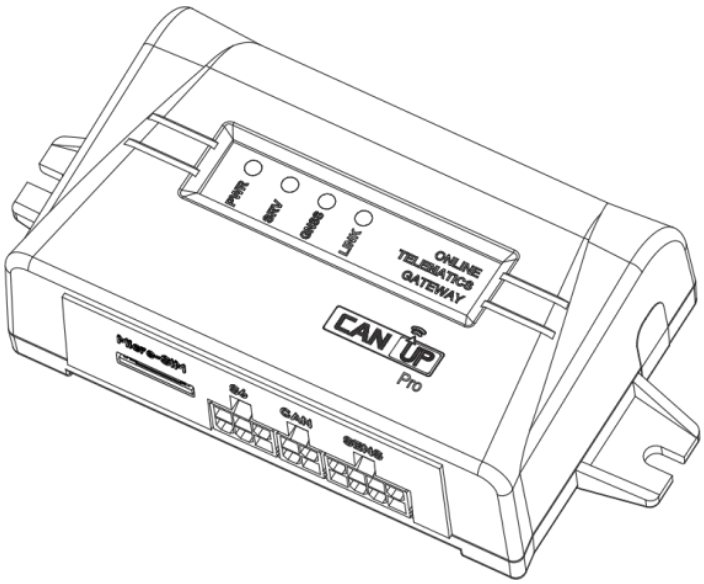
TELEMATICS GATEWAYS



CANUp 27
Standard /Pro 3G/Pro LTE/Pro Wi-Fi

OPERATION MANUAL

Version 4.0

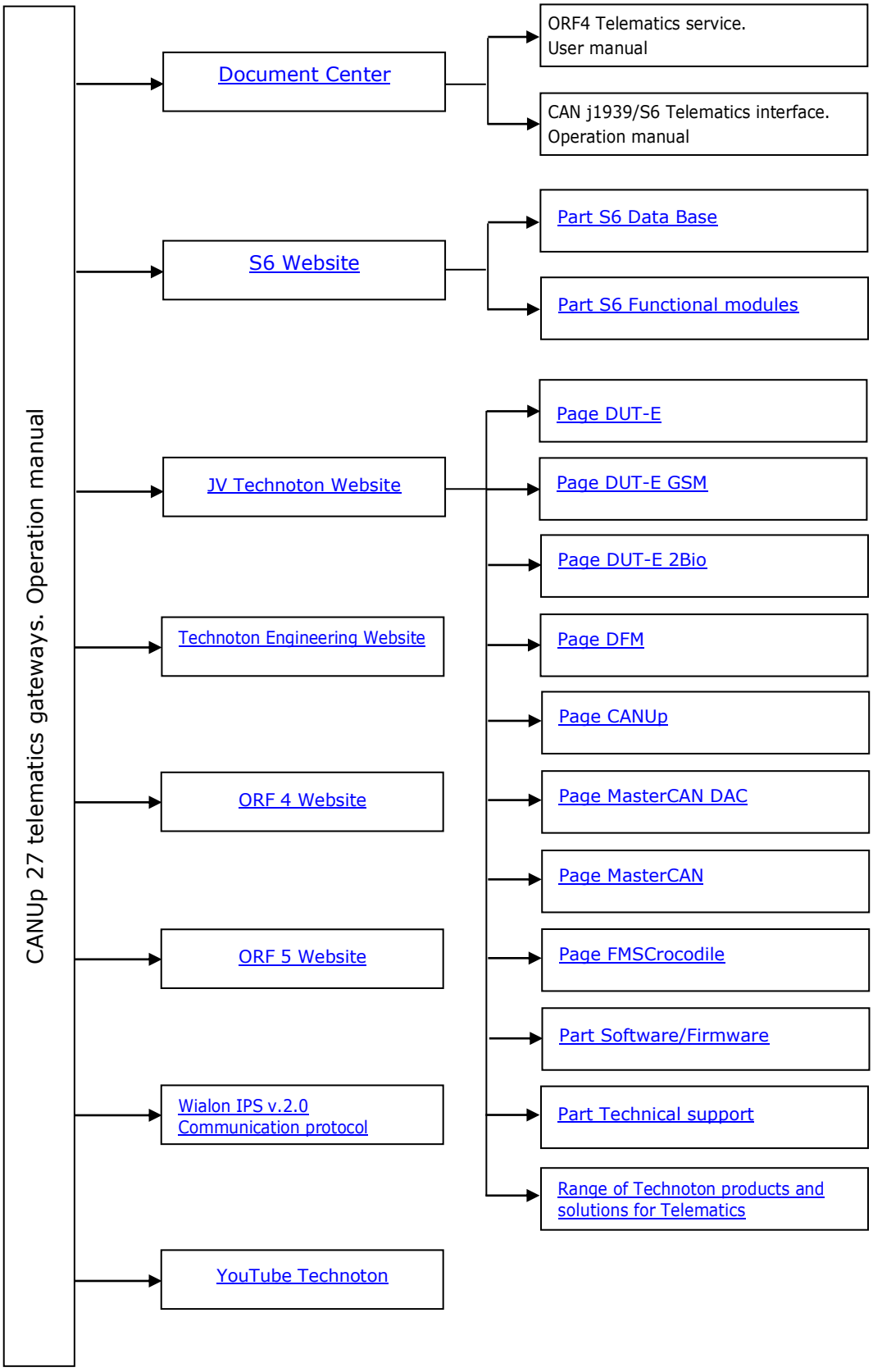
TECHNOTON
ADVANCED MACHINERY TELEMATICS

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.

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, GSM 2G/3G/LTE 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 3G / Pro LTE / Pro Wi-Fi of Telematics gateways, we are in the process of preparation for introducing S7 Technology.

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.

ORF 4 / ORF 5— is the by JV Technoton developed 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.

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 — report generated in ORF 4 / ORF 5 on Vehicle or group of Vehicles operation for chosen time period (usually a day, week or month). Can be composed of numbers, tables, charts, mapped route of vehicle, diagrams.

Onboard equipment (OE) — Telematics system elements, directly installed in Vehicle.

Onboard reports (the Reports) — information about vehicle which is returned to a user of Telematics system in accordance with inputted criteria. The Reports are generated by a terminal unit both periodically (Periodic reports) and on Event occurrence (Event report).

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 (USA), GLONASS (Russia), Galileo (EU), BeiDou (China).

Route — coordinates, speed and direction of vehicle movement. It matches with the route of the vehicle on the road. The map is displayed in the form of lines. Vehicle direction is displayed in the form of arrows.

Operational data— information about location and operation of the vehicle, transmitted by CANUp 27 to the Server in real time, it includes coordinates, speed, direction of movement and fuel volume in the tank. Operational data is updated by ORF 4 / ORF 5 upon receipt of more recent information.

Online monitoring (Operational monitoring) — remote monitoring of location and vehicle operation in real time, the accumulation of information and preparation of Analytical reports by requests of ORF 4 / ORF 5 user.

Parameter — time-varying or space characteristic of the Vehicle (SPN value). For example, speed, fuel volume in the tank, hourly fuel consumption, coordinates. Parameter is usually displayed in the form of graph, or averaged data.

Server (AVL Server) — hardware-software complex of Telematics service ORF 4, used for processing and storage of Operational data, formation and transmission of Analytical reports through Internet by request of ORF 4 / ORF 5 users.

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.

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.

Telematics terminal (Tracking device, Telematics unit) is a unit of Telematics system used for reading the signals of Vehicle standard and additional sensors, getting location data and transmitting the data to the Server.

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

Telematics system — complex solution for vehicle monitoring in real time and trip analysis. The main monitored characteristics of the vehicle: Route, Fuel consumption, Working time, technical integrity, Safety. In includes On-board report, Communication channels, Telematics service ORF 4 / ORF 5.

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.

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

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), model code: **01** (for CANUp 27 Standard), **04** (for CANUp 27 Pro 3G), **06** (for CANUp 27 Pro Wi-Fi), **07** (for CANUp 27 Pro LTE), **09** (for CANUp 27 Pro LTE A), **10** (for CANUp 27 Pro LTE G) developed and manufactured by JV Technoton, Minsk, Belarus.
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.

Figure 1 — Identifying CANUp 27 model code

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

CAN UP **— multifunctional tool within** Telematics systems **combining features of a** data converter**,** digital-to-analog converter **and the online GPS/GLONASS** Terminal**.**

CANUp 27 key features:

- Compliance with Units, Database and cabling system S6 Technology.
- IoT Burger Technology provides the "onboard" internal data processing without using any additional devices, simplifies the Server operation and economizes traffic.
- Supporting 10000+ standartized Parameters of equipment operation:
  - 3000+ Parameters of a standard vehicle CAN-bus;
  - 7000+ Parameters of CAN j1939/S6 Telematics interface and ISOBUS bus of farming equipment.
- Detection of quick Events — sharp change of set Parameters during 0.1...10 s time interval.
- Flexible system of generation up to 20 Onboard reports — adaptation for any type of mobile and fixed equipment.
- Simultaneous data reception using S7 Technology from up to 10 pcs. of wireless Units* by means of BLE-channel.
- Transmission of Reports to the Server using Wi-Fi, without using the services of a mobile communication operator**.
- Simple and safe connection to CAN bus or ISOBUS through CANCrocodile contactless reader.
- 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 Vehicle engine parameters for diagnostics and prevention of malfunctions.
- High-precision algorithm of tracking the Vehicle route, support of inbuilt geofences*.

* Implemented only in models CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.
** Only for model CANUp 27 Pro Wi-Fi.

- Sending Reports on Events directly to users without using Telematics server – by E-mail or SMS*.
- Unique self-diagnostics function allows real-time monitoring of performance of the device and connected Units.
- Option of remote configuration, firmware update and monitoring the gateway operation using SMS commands or directly from remote PC by means of service software.
- Independent operation using the inbuilt accumulator in case power supply from the Vehicle onboard circuit is unavailable.
- High quality technical support and documentation.
- Conformity with European and national automotive standards.

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.

CANUp 27 is represented by the following models:

1) CANUp 27 Standard — provides standard functionality allowing to:

- perform data processing (SPN) of CAN j1939/S6 Telematics interface;
- convert analog signals from vehicle 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 GSM 2G cellular communication technology.

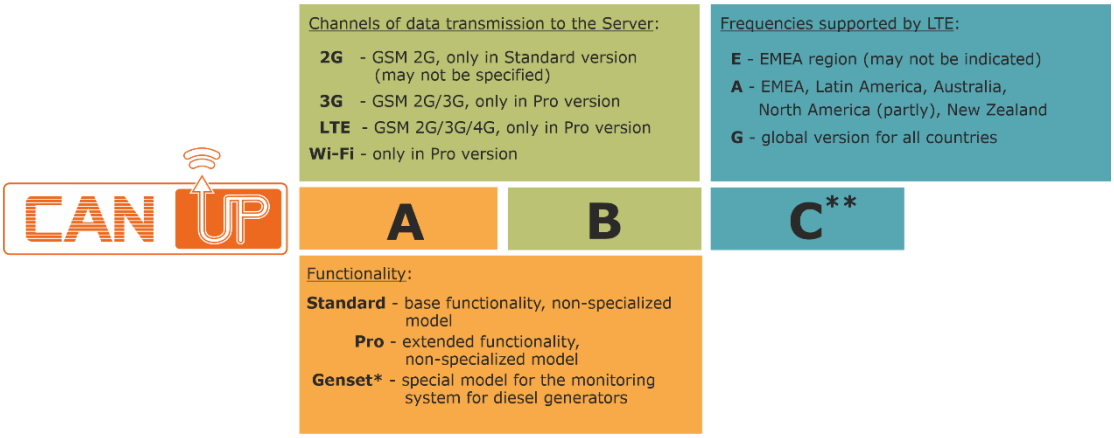
2) CANUp 27 Pro 3G / Pro LTE/ Pro Wi-Fi — has advanced functionality allowing to:

- carry out analysis of data from a standard vehicle CAN-bus or from ISOBUS farming equipment bus automatically singling out Telematics SPN from them;
- perform data processing (SPN) of CAN j1939/S6 Telematics interface;
- receive data from wireless sensors via BLE channel;
- to convert analog signals from vehicle 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 GSM 2G/3G (CANUp 27 Pro 3G only) or GSM 2G/3G/4G (CANUp 27 Pro LTE only) cellular communication technology;
- generate and transmit Onboard reports using Wi-Fi wireless Local Area Network technology (CANUp 27 Pro Wi-Fi only).

The functionality potential of each model of CANUp 27 is ensured by well-concerted operation of the respective Functional modules; their full list is provided in table C.1.

***** Only for models CANUp 27 Standard / Pro 3G / Pro LTE.

See figure 2 for identification codes for CANUp 27 ordering.



* In preparation for manufacturing.
** **C** indication is applied only for models CANUp 27 Pro LTE.

Figure 2 — CANUp 27 order identification codes

Examples of CANUp 27 ordering identification codes:

"CANUp 27 Standard telematics gateway"
(standard functionality, 2G channel of data transmission).

"CANUp 27 Pro 3G telematics gateway"
(extended functionality, 3G channel of data transmission).

"CANUp 27 Pro LTE telematics gateway"
(extended functionality, 4G channel of data transfer, supported frequencies — EMEA region).

"CANUp 27 Pro Wi-Fi telematics gateway"
(extended functionality, Wi-Fi channel of data transmission).

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;
- 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 10000 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*;
- monitoring the vehicle engine, in accordance with parameters received from the standard CAN-bus*;
- internal tracking by the gateway of passing preset Geofences by the Vehicle*;
- 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*;
- sending KML files with tracks of the Vehicle movement by E-mail**.

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")*;
- option of disabling Reports sending by E-mail at the time which is inconvenient for the user ("Don't Disturb" mode)**.

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.

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*;
- storage of recent malfunctions of the connected equipment in the non-volatile memory*.

6) Onboard clock:

- records the time of Event occurrence, even without GPS signal;
- allows gateway to operate without signals from GPS/GLONASS 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) Wireless data reception* through BLE-channel from wireless Units (DUT-E S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM S7 axles load sensors, ADM31 temperature and humidity sensors).

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* Implemented only in models CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.

** Only for model CANUp 27 Pro 3G / LTE.

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.
- Data reception from standard CAN (SAE j1939) or ISOBUS buses, their analysis and conversion into Telematics SPN*.
- Wireless reception of messages (PGN) from Units using S7 Technology*.
- 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**.

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* Valid only for CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.

** Except CANUp 27 Pro Wi-Fi.

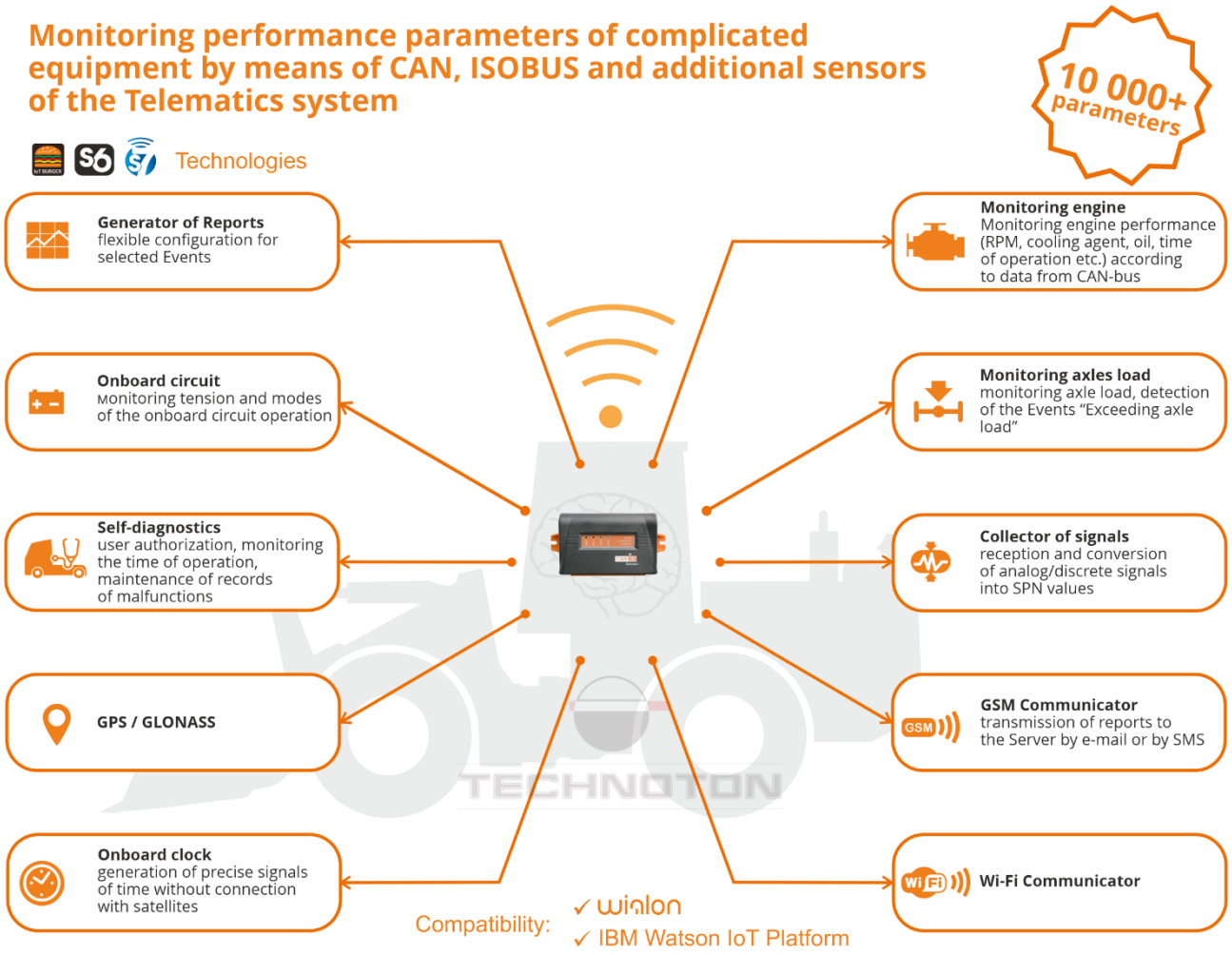
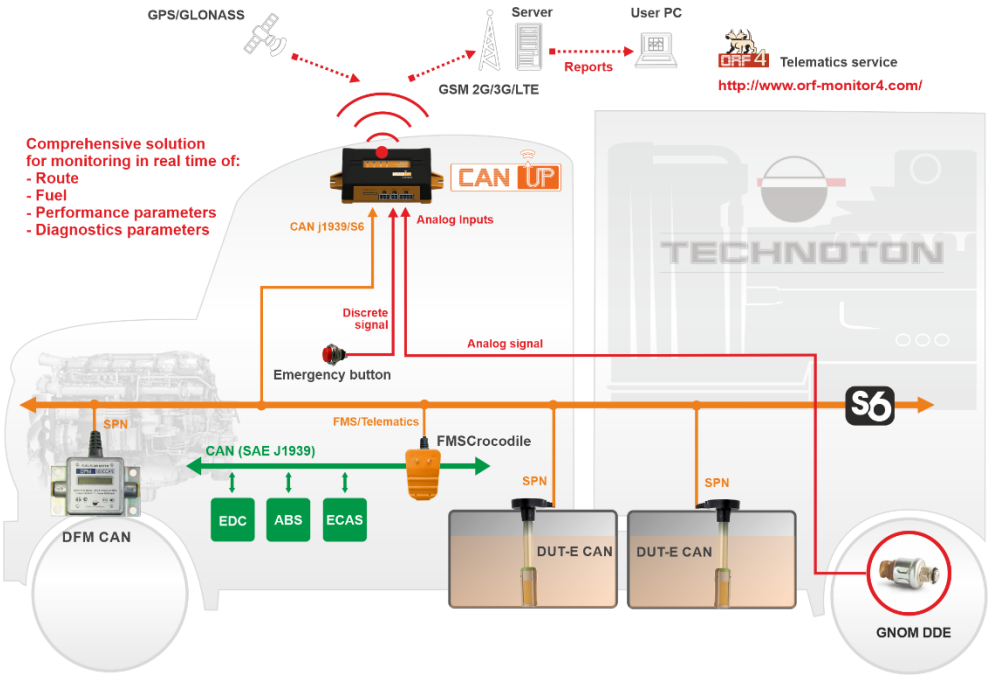
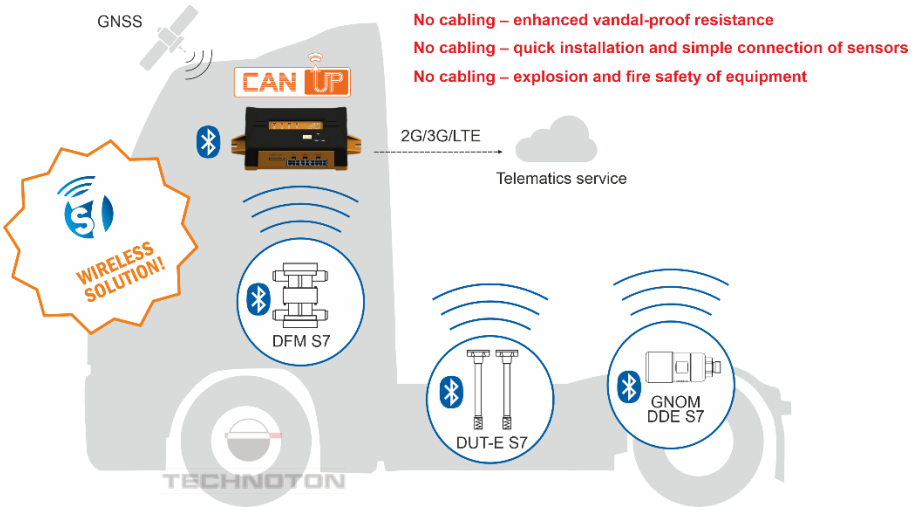


Figure 3 — CANUp 27 purposes of use

Areas of application:
1) CANUp 27 may be used in any types of Vehicles as part of the Telematics system for monitoring fuel, performance and diagnostics parameters, current location, direction and speed of movement.
CANUp 27 is mounted on a Vehicle and receives data (SPN) from Units by means of S6 Technology, converts the output data from the Vehicle onboard analog sensors into digital data of S6 Database (see figure 4 a).
CANUp 27 with extended functionality (models CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi) may also receive Telematics and diagnostics data from standard CAN or ISOBUS buses filtering all unnecessary data.
The availability of the inbuilt BLE-module enables CANUp 27 Pro 3G / Pro LTE/ Pro Wi-Fi to receive simultaneously data by means of S7 Technology from up to 10 pcs. of wireless Units — (DUT-E S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM S7 axles load sensors, ADM31 temperature and humidity sensors) (see figure 4 b).



a) operation of CANUp 27 Standard based on S6 Technology

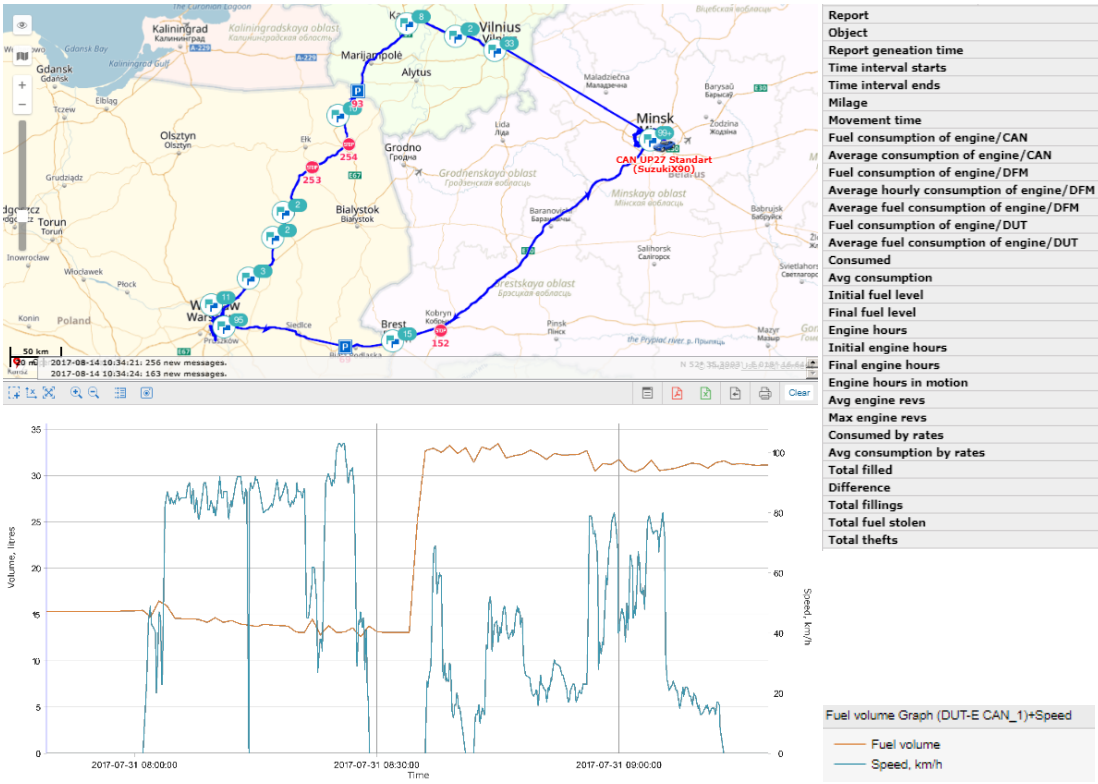


b) operation of CANUp 27 Pro based on S7 Technology

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

Using GNSS signals, CANUp 27 determines current vehicle location, movement speed and direction. In accordance with user settings, CANUp 27 generates and sends Onboard reports, which contain most important operational parameters of Vehicle (e.g. instant and trip fuel consumption, total fuel consumption, RPMs, fuel level, engine operation time, engine temperature, oil pressure and level and other parameters) to telematics Server. Server software processes and analyzes the received data to generate Analytical reports for a selected period (see figure 5).

RECOMMENDATION: ORF 4 / ORF 5 Vehicle monitoring web-server provides the best accuracy of reports on movement and fuel consumption.



Report	12.1 Fuel report
Object	CAN UP27 Standart (SuzukiX90)
Report geneation time	11.08.2017 13:41:44
Time interval starts	31.07.2017 00:00:00
Time interval ends	06.08.2017 23:59:59
Milage	442 km
Movement time	9:58:49
Fuel consumption of engine/CAN	39.11 lt
Average consumption of engine/CAN	8.76 lt/100 km
Fuel consumption of engine/DFM	0 lt
Average hourly consumption of engine/DFM	0 lt/h
Average fuel consumption of engine/DFM	0 lt/100 km
Fuel consumption of engine/DUT	30.85 lt
Average fuel consumption of engine/DUT	6.91 lt/100 km
Consumed	70 lt
Avg consumption	15.67 lt/100 km
Initial fuel level	17.85 lt
Final fuel level	24.80 lt
Engine hours	10:17:18
Initial engine hours	230:29:25
Final engine hours	240:46:43
Engine hours in motion	8:53:48
Avg engine revs	1818
Max engine revs	5308
Consumed by rates	0 lt
Avg consumption by rates	0 lt/100 km
Total filled	37.80 lt
Difference	37.80 lt
Total fillings	2
Total fuel stolen	0 lt
Total thefts	0

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

2) CANUp 27 may be applied for monitoring performance parameters of complex fixed installations including the mode of operation without using the Server.

The availability of CAN j1939/S6 interface allows CANUp 27 to receive data using S6 Technology from DUT-E CAN / DUT-E 2 Bio fuel level sensors (up to 16 pcs.) and from DFM CAN / DFM Marine CAN fuel flow meters (up to 16 pcs.). This is a convenient solution for fuel monitoring at stationary facilities (diesel generators sets, boiling/burning equipment), which does not require Server and paying for services. CANUp 27 automatically sends Reports on Events to user directly by E-mail* (up to 3 E-mail addresses) or as SMS messages* (up to 3 phone numbers) (see figure 6).

* Except CANUp 27 Pro Wi-Fi.

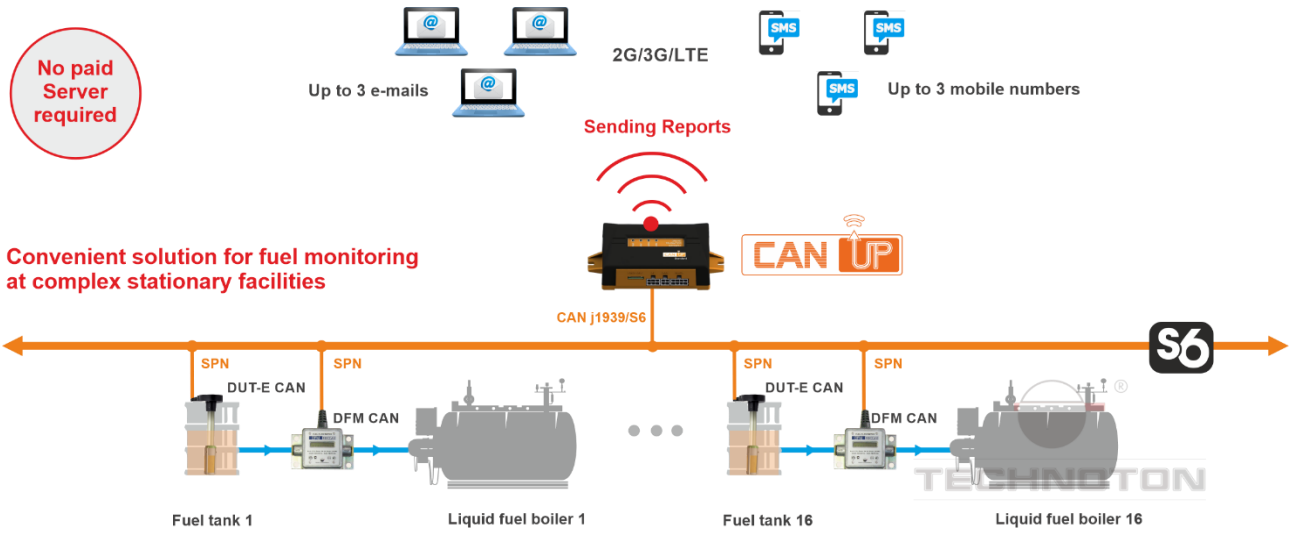


Figure 6 – Example of CANUp 27 Standard operation based on S6 Technology on a compex fixed installation

3) CANUp 27 Pro together with DUT-E S7 sensors may be employed for wireless monitoring of fuel volume in fixed tanks.

The availability of the inbuilt BLE module allows CANUp 27 Pro to receive data from up to 10 pcs. DUT-E S7* wireless fuel level sensors using S7 Technology. This is a convenient solution for monitoring the volume of any light oil products, including dangerously explosive products without using services of a mobile communication operator (see figure 7).

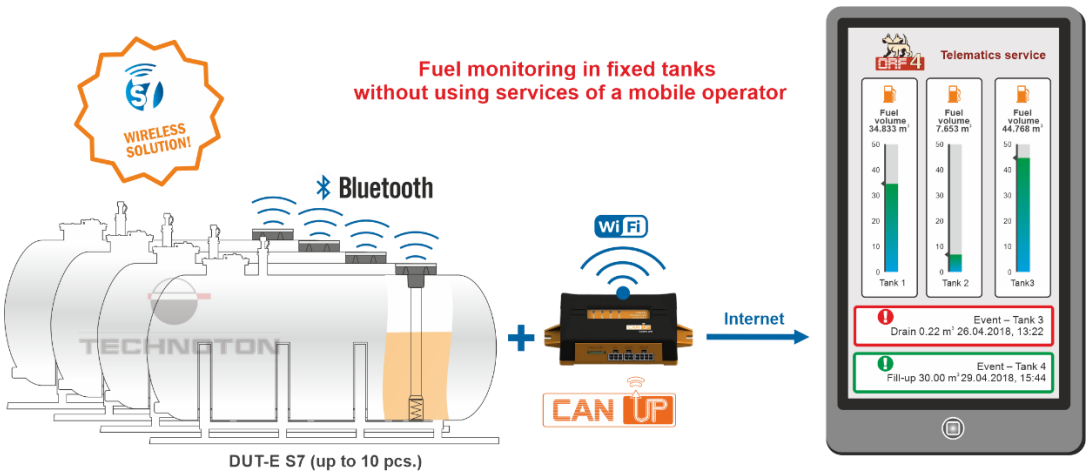


Figure 7 — Example of CANUp 27 Pro operation on a fixed installation using S7 Technology

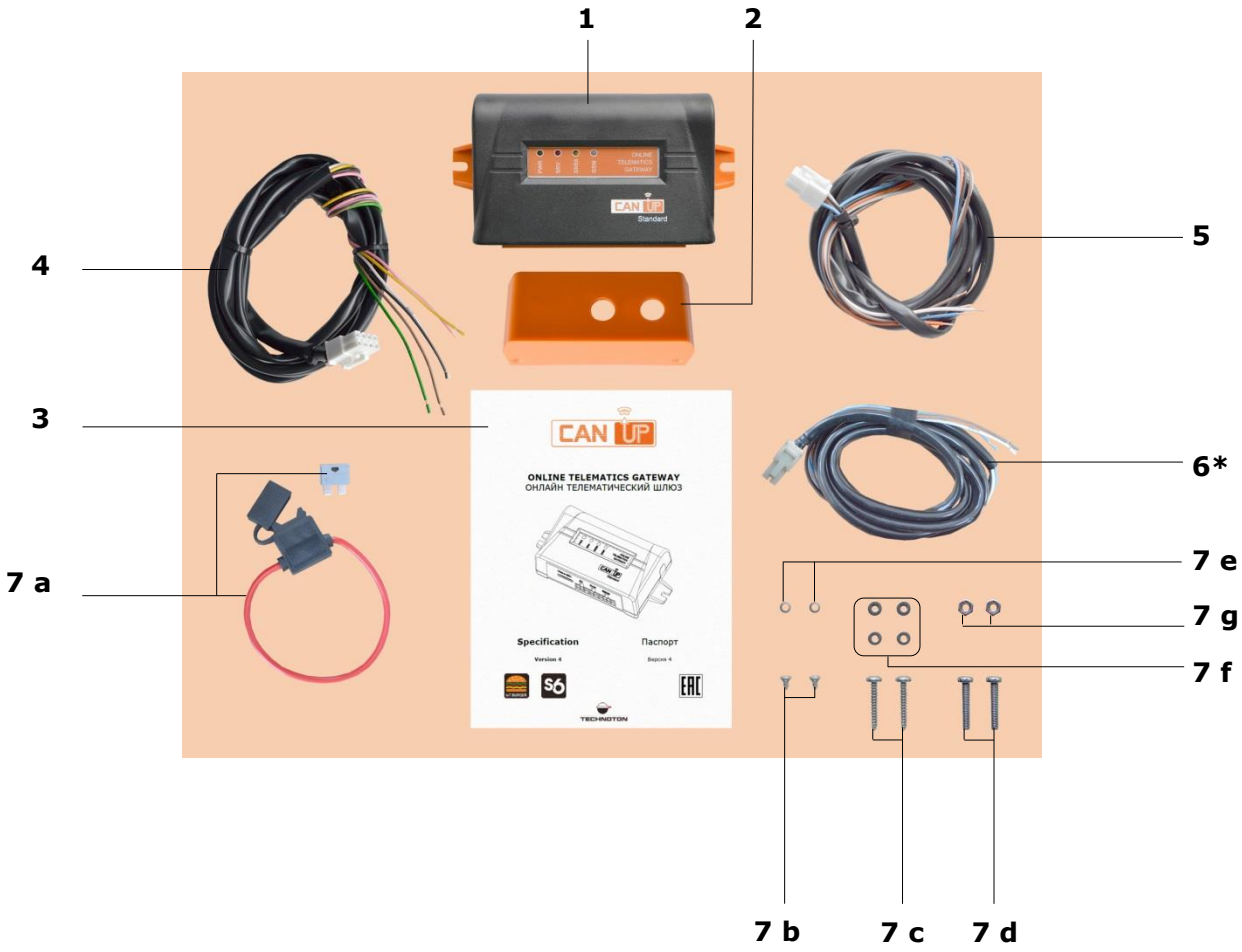
Table 1 — Telematics equipment that may be connected to CANUp 27 Pro at one time

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 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 (2 pcs.)	1	
MasterCAN Display 35 CAN j1939/S6 Display	2	
MasterCAN CC data converter	2	
MasterCAN V-Gate data converter	2	
MasterCAN DAC15 j1939 i/o module	2	
MasterCAN DAC2113 j1939 i/o module	2	
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

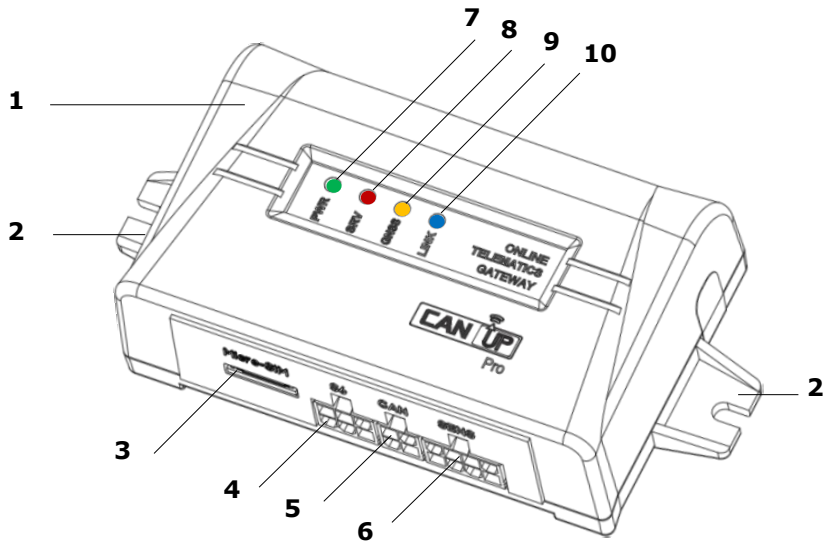


1	CANUp 27 online telematics gateway	– 1 pc.;
2	Sealing bar	– 1 pc.;
3	Passport with a list of factory settings	– 1 pc.;
4	CANUp 27 cable	– 1 pc.;
5	S6 cable	– 1 pc.;
6*	CAN 4 pin cable	– 1 pc.;
7	Mounting kit (1 pc) including:	
a)	fuse with holder (2 A)	- 1 pc.;
b)	self-tapping screw 3x6	- 2 pcs.;
c)	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.

1.3 CANUp 27 design



1 – casing of the electronics module inside which GNSS receiver, BLE-module, SIM card holder*, GSM-modem* and accumulator are located;
2 – installation holders;
3 – **Micro-SIM** slot for Micro-SIM card installation*;
4 – **S6** connector — CAN j1939/S6 interface for connection of Units using S6 Technology and for external power supply**;
5 – **CAN** connector — CAN 2.0B interface for connection to a standard CAN-bus or to ISOBUS bus***;
6 – **SENS** connector — analog input for connecting signals voltage/frequency/pulse/discrete;
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 (in CANUp 27 Standard / Pro G3 / Pro LTE), to monitor the status of Wi-Fi modem and Internet connection (in CANUp 27 Pro Wi-Fi).

Figure 9 — CANUp 27 design

* In model CANUp 27 Pro Wi-Fi these components are missing; there is an inbuilt Wi-Fi modem instead.
** CANUp 27 is powered through S6 cabling system.
*** In model CANUp 27 Standard **CAN** connector is a spare one.

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 3G**	**CANUp 27 Pro LTE**	**CANUp 27 Pro Wi-Fi**
Data transmission channels	2G	2G/3G	2G/3G/4G	Wi-Fi (IEEE 802.11 b/g/n)
Supported GSM frequency bands, MHz	see table 3			-
Wireless interface	-	S7		
Configurable digital interface	CAN j1939/S6			
Non-configurable digital interface	-	CAN 2.0B		
Physical signal inputs	Analog / Frequency / Discrete			
Communication protocols	Wialon IPS v.2.0	Wialon IPS v.2.0 / MQTT IBM Watson IoT		
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), not less than	40 000			
Temperature range, °C	-40…+60			
Level of sealing protection from dust and moisture	IP40			
Electromagnetic compatibility	see annex E			
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).				

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 3G	2G	GSM 900/1800 MHz	Europe, Asia, Africa
	3G	B1/B8	
CANUp 27 Pro LTE	2G	GSM 900/1800 MHz	Europe, Middle East, Africa
	3G	B1/B8	
	4G	B1/B3/B7/B8/B20/B28A	
CANUp 27 Pro LTE A	2G	GSM 850/900/1800/1900 MHz	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	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	
* We recommend to consult in advance your mobile communication operator regarding working GSM frequency bands it uses.			

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 fuel level sensor (up to 10 pcs.) - DFM S7 fuel flow meters (up to 10 pcs.) - DFM Marine S7 fuel flow meters (up to 10 pcs.) - GNOM DDE S7 pressure sensors (up to 4 pcs.) - DUT-E 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 3G/CANUp 27 Pro Wi-Fi is provided in 2.4.9. The structure and composition of data of output messages from wireless Units is provided in annex G.

** 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:

- Wialon IPS v.2.0 (Onboard reports format is specified in annex A);
- MQTT IBM Watson IoT* (see annex F).

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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* Only for models CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.

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: 100; 125; 250; 500; 1000 kbit/s (250 kbit/s by default).

To identify CANUp 27 and other 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
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
Wireless interface	Marker S7 Radiobox CAN	1	131

***** For CANUp 27 Pro 3G / Pro LTE/ Pro Wi-Fi, 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 CANUp 27 Pro digtal CAN interface (cannot be configured) comply with those of CAN 2.0B interface. The data transmission protocol corresponds to SAE j1939 group of standards.
CANUp 27 receives data via CAN 2.0B interface automatically, 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 Analog signals specifications

Choosing the required type of analog input signals and configuration of physical inputs of CANUp 27 is performed using Service CANUp service 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 (see C.13).	

1.4.7 Overall dimensions

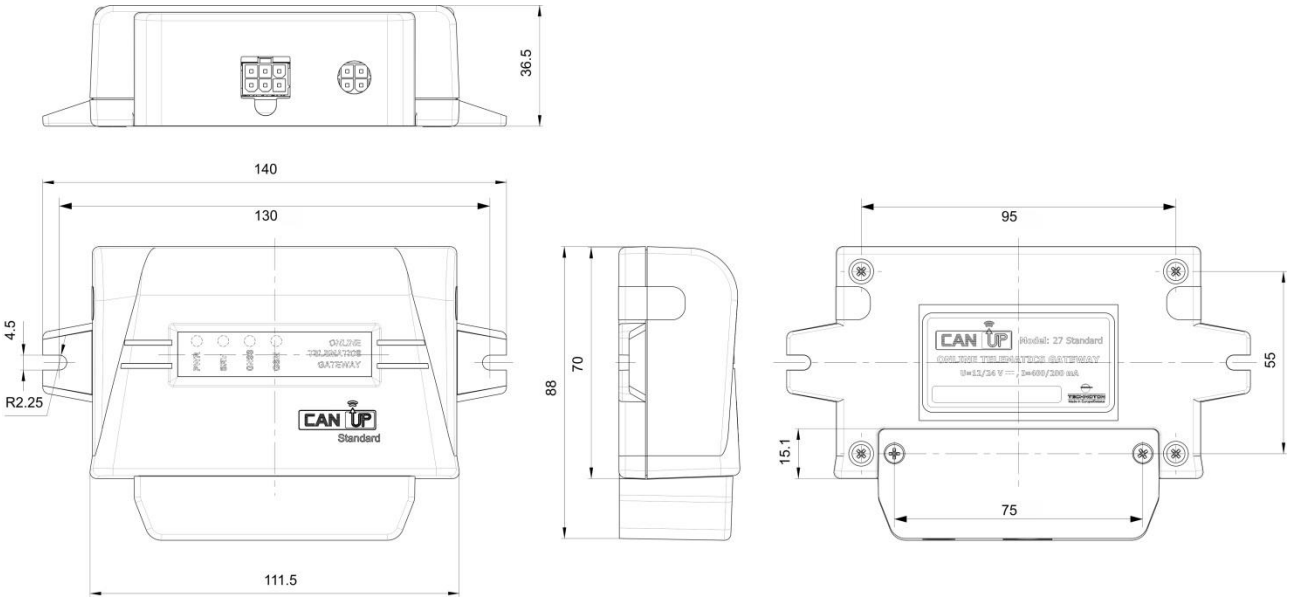


Figure 10 — CANUp 27 overall dimensions

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 Vehicle, 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 DUT-E S7 wireless sensors during CANUp 27 Pro G3/CANUp 27 Pro Wi-Fi 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 Pro 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 and CANUp 27 Pro G3.

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.

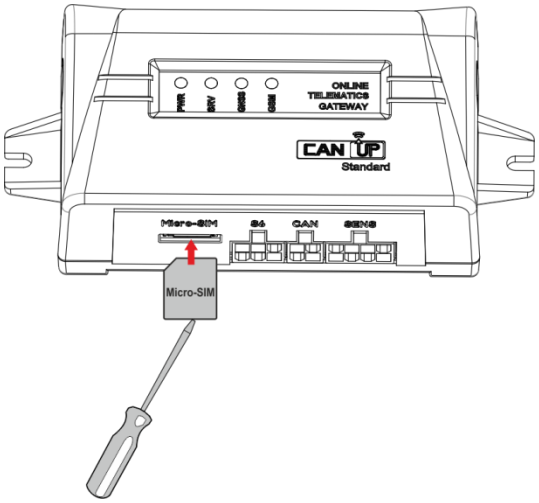


Figure 11 — Place of SIM card installation to CANUp 27 Standard / Pro 3G/ Pro LTE

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 interface (ISO 14230).
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 CAN j1939/S6 Operation manual.
See annex C for CANUp 27 settings, displayed and/or made by Service CANUp software.
Service CANUp software allows to conduct remote configuration using service software (see 2.4.8), 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:

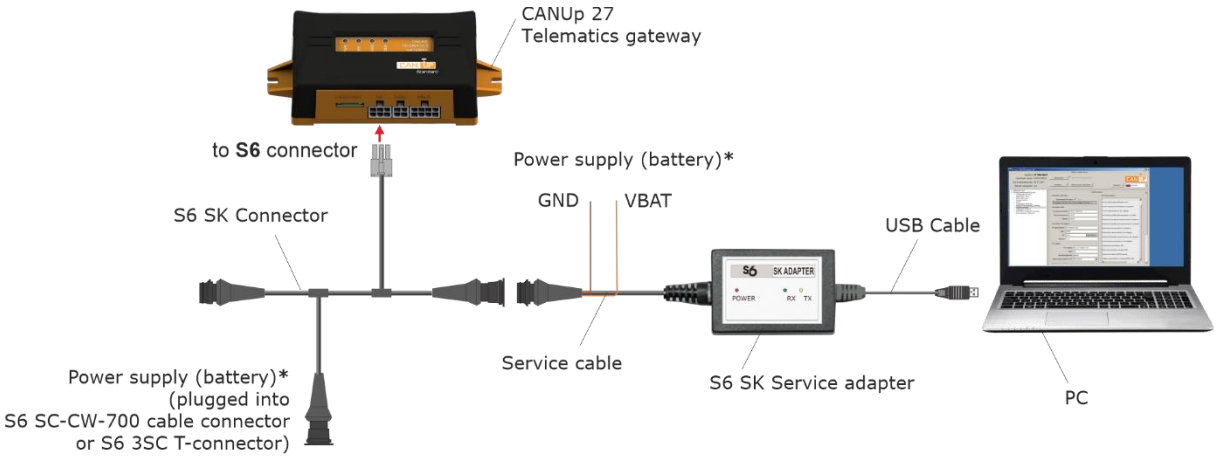
1) Connect the adapter to CANUp 27.
Plug of service cable of adapter is connected to S6 SK connector to **S6** socket. Power supply of CANUp 27 and service adapter can be either done through using free plug of S6 SK connector or using wires of service adapter (see figure 12 a).
During the configuration 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.

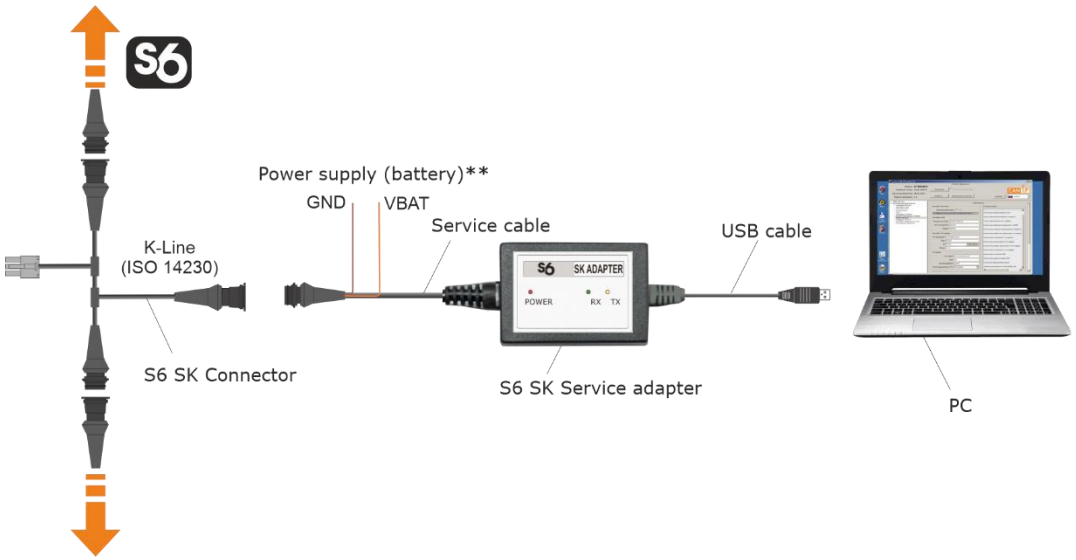
3) Connect power supply and ground wires to vehicle electrical system or battery.

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



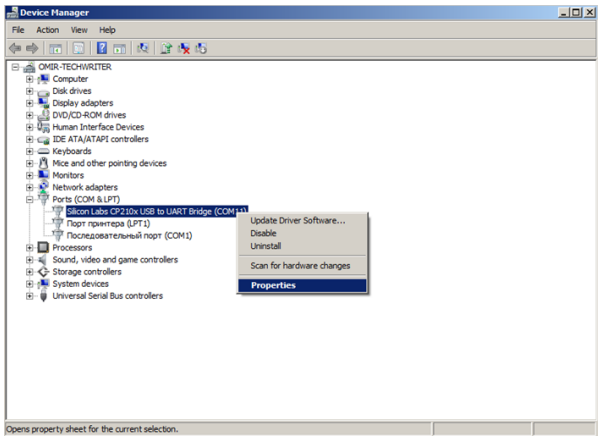
b) connecting CANUp 27 using S6 SK via S6 Technology

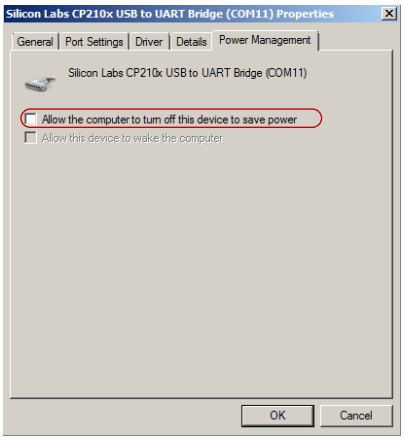
Figure 12 — Schemes of CANUp 27 connection to PC

* 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)

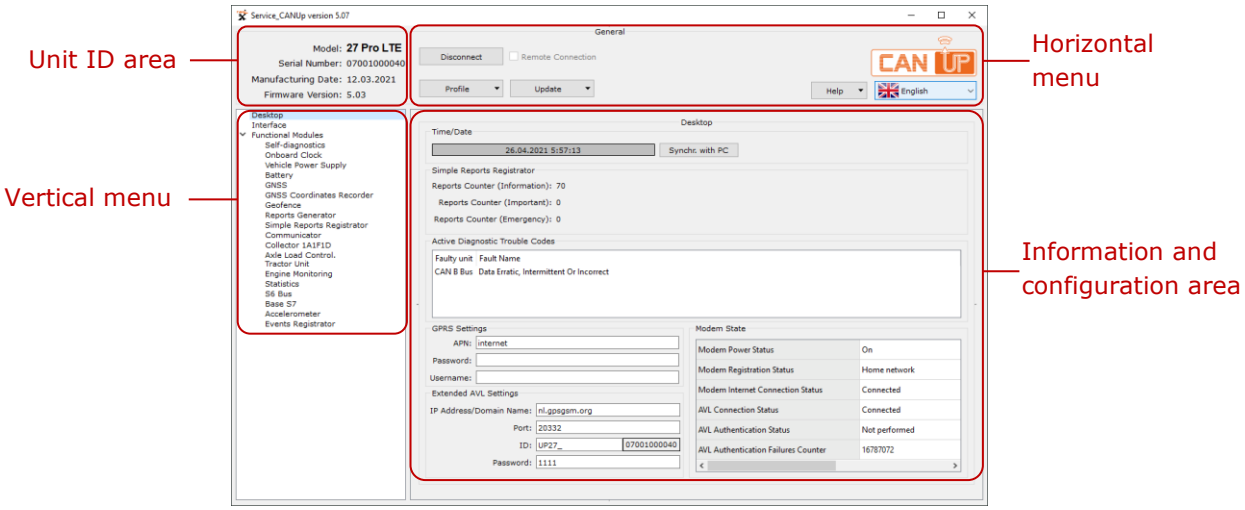


Figure 14 — Interface of Service CANUp

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 Unit;
- profile options (loading profile, saving profile and printing profile);
- updating firmware;
- S6 Database update in Service CANUp software;
- remote connection to Unit;
- selection of interface language;
- help and Information about the manufacturer.

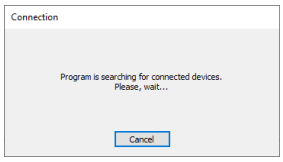
Vertical menu is used for selection of Function modules of CANUp 27. Its current parameters and configuration are displayed in **Configuration and Information area**. Function modules of Service CANUp software are based on PGN and SPN messages from **S6 Database** (see annex C).

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.

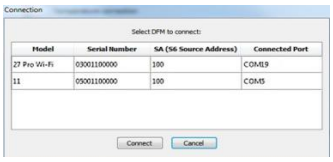
Information and Configuration area displays names (PGN) and parameters (SPN) of the messages. Each SPN holds the following: data range, discretion, measuring units.

2.4.3 Authorization

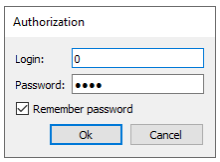
To enable connection between CANUp 27 and PC, click the button Connect in **Horizontal menu**. Service CANUp softwa e will search for the connected Units (see figure 15 a).
When connecting the service adapter by means of S6 Technology to the network comprising several Units, select the Unit which will be used during your work with the software from the list in the window **Connection** of Unit and press Connect button (see figure 15 b).
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 c).



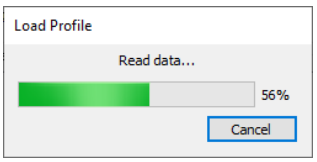
a) search for the connected Unit to PC



b) selecting one of several Units connected to S6 bus



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@technoton.by 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.

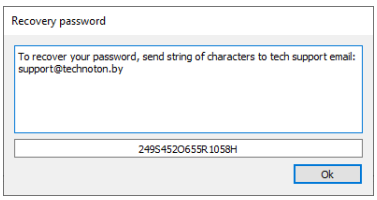
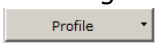


Figure 16 — Generating password recovery code

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.

2.4.4 CANUp 27 Profile

CANUp 27 **Profile** is set of PGN (passport data, counters and settings of Function modules).

It is possible to manage the profiles in both the CANUp 27 connected and autonomous mode. The button 

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.

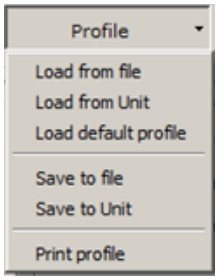
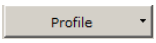


Figure 17 — View of Profile menu

Menu 

is divided into the following sections:

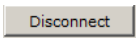
1) Load profile. The following options of profile loading are available in Service CANUp software:

- 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_27Pro3G_BLE_default.prf**, **CANUp_27ProLTE_default.prf** and **CANUp_27ProWiFi_BLE_default.prf** files, 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_3G_*.prf**, **CANUp_27_Pro_LTE_*.prf** and **CANUp_27_Pro_Wi-Fi_*.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 

button was pressed or Service CANUp software is being closed there will appear a notification on profile settings saving. Pressing 

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 CANUp 27 by means of S6 Technology, you need to configure CAN j1939/S6 interface parameters in **Interface** submenu of Service CANUp software (see figure 18):

1) From the dropdown list **CAN Protocol Type** (SPN 521530) select the data transmission protocol **SAE 1939+S6**.

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.

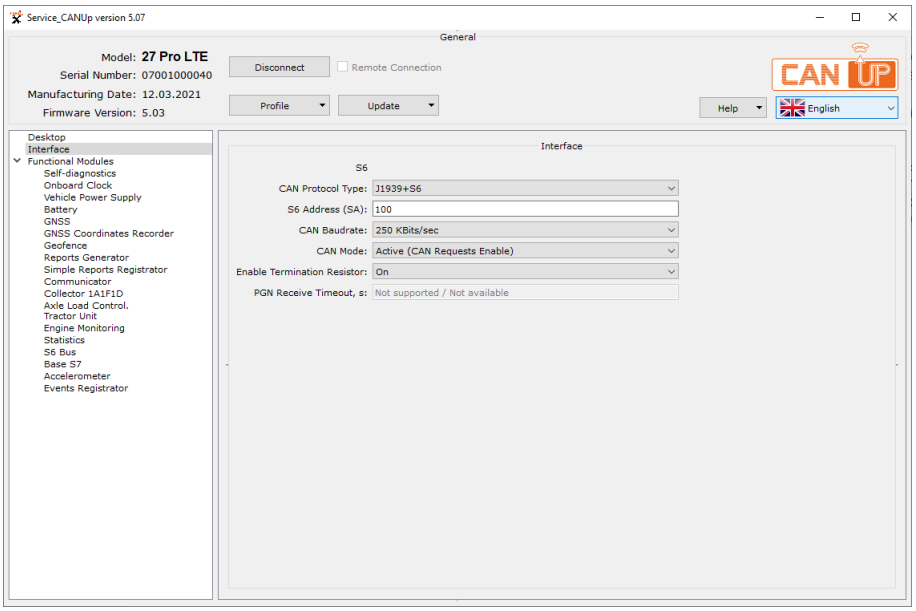


Figure 18 — Configuration of connection parameters for CANUp 27 connection via CAN j1939/S6 interface

2.4.6 Connection to ORF 4 Telematics service

Configuration of **any model of** CANUp 27 connection to ORF 4 Telematics interface 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 3G / Pro LTE (see C.11, table C.11);
- submenu WiFi Communicator FM for CANUp 27 Pro Wi-Fi (see C.12, table C.12).

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 3G / Pro LTE

- 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: For obtaining APN settings, contact service center of SIM-card provider.

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 settings for CANUp 27 connection with AVL Server.

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 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 Service administrator by e-mail support@technoton.by.

4) In configuration of GNSS FM according to the settings of GNSS (see C.6, table C.6), 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.

2.4.7 Connection to IBM Watson IoT Platform

Configuration of connection to IBM Watson IoT Platform Server for models **CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi** 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 2.4.6) using CANUp Service software:

- submenu Communicator FM for CANUp 27 Pro 3G / Pro LTE (see C.11, table C.11);
- submenu WiFi Communicator FM for CANUp 27 Pro Wi-Fi (see C.12, table C.12).

To connect a Unit to IBM Watson IoT Platform Serve, you are to perform the following operations:

1) perform preliminary operations:

- create an account and get registered at Bluemix Service;
- create an organization at IBM Watson IoT Platform Server;
- create a Device type for CANUp 27 Pro, in case it was not created before;
- register the specific CANUp 27 Pro as a new device at IBM Watson IoT Platform Server; for this you should enter its Device Information:
  - Unique Device ID on the basis of its factory serial number and Device type;
  - Device ID Token (you can accept the token generated automatically). The Token must not contain repeating sequences of characters, words from the vocabulary, user names and other predefined sequences.

  We recommend to save the Token; in case it is lost, you will need to go through the Unit registration procedure again!
- Copy the following data from the Device Information page of IBM Watson IoT Platform which will be needed for further CANUp 27 Pro configuration:
  - Organization ID (org_id);
  - Device Type (UP27);
  - Device ID.

2) Using Service CANUp software, configure data transmission to the Server by CANUp 27 Pro using **Protocol MQTT IBM Watson IoT** (see annex F).

To connect CANUp 27 Pro to the Server, the following data are needed:
- URL: org_id.messaging.internetofthings.ibmcloud.com,
  in which org_id — Organization ID of IBM Watson IoT Platform;
- port: 1883;
- Device ID: d:org_id:device_type:device_id;
- User Name: use-token-auth;
- Password: Authentication Token;
- Event Format: iot-2/evt/event_id/fmt/format_string, where event_id is generated automatically by CANUp as line:
  sa_spn_qgr_qval, sa – address, spn – spn, qgr and qval – are specificators.

3) Configure the sending of Reports (submenu FM Reports Generator) by CANUp 27 Pro.

4) Watching indications of CANUp 27 Pro authentication parameters at IBM Watson IoT Platform Server make sure the authentication is completed successfully and the connection of CANUp 27 to IBM Watson IoT Platform Server is established.

ATTENTION: If connection problems occur, contact Service administrator by e-mail support@technoton.by.

5) In configuration of GNSS FM according to the settings of GNSS (see C.6, table C.6), 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 Remote connection to CANUp 27

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) (for connect to CANUp 27 Standard / Pro 3G / Pro LTE);
- local network IP address (provided by the local network administrator) (for connect to CANUp 27 Pro Wi-Fi).

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

1) To connect to a remote **CANUp 27 Standard / Pro 3G / Pro LTE** by means of GSM connection, perform the following operations:

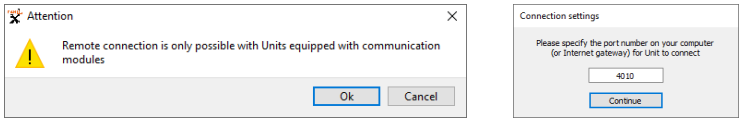
- In **Horizontal menu** of Service CANUp software tick **Remote Connection** field and press Connect button (see figure 14).
- After the window with a warning of Units with which remote connection can be established is displayed, **Connection settings** window will appear (see figure 19 a) in which you enter the selected number of your PC network port for connection to CANUp 27.
- In the window **Remote Connection** (see figure 19 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 to a remote **CANUp 27 Standard / Pro 3G / Pro LTE / Pro Wi-Fi** by means of GPRS-command **CSRV** through TCP channel, perform the following operations:

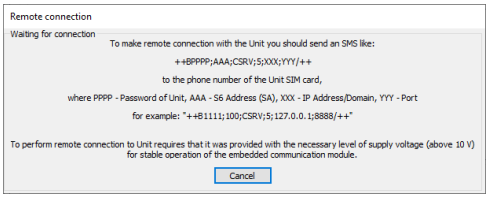
- Connect CANUp 27 to ORF 4 Telematics service according to 2.4.6.
- In ORF 4 open **Additional menu** for the respective object. In **Commands** tab (**Unit Properties** window) specify settings of GPRS-command **CSRV** for remote connection to CANUp 27 via TCP channel using Service CANUp software (see figure 19 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 Connect 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 19 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 19 b), open **Additional menu** in ORF 4 for the respective object and from the window **Execute a Command** enter GPRS-command **CSRV** (see figure 19 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 19 d).

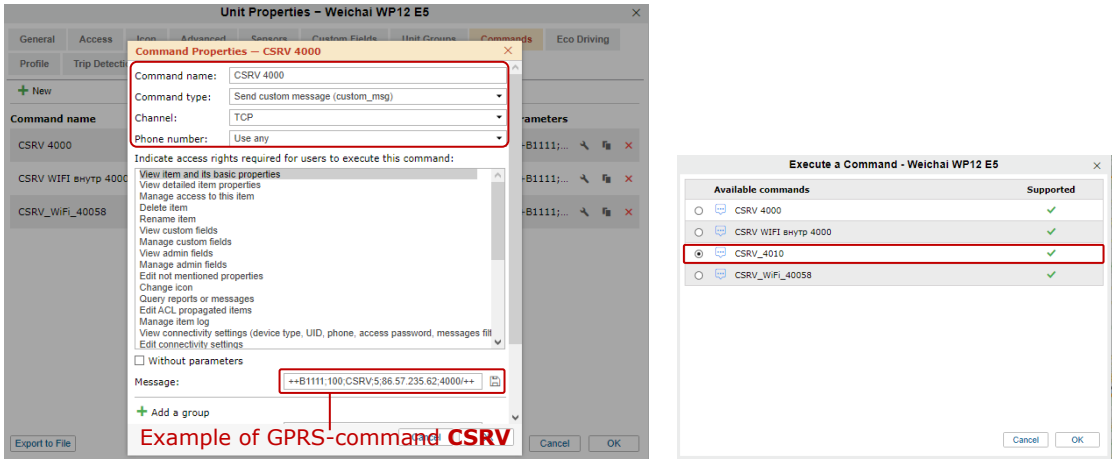
The maximum waiting time for remote connection to a Unit after sending SMS or GPRS-command **CSRV** is 5 min. If no connection is established during that time, the message of the waiting period end is displayed. In this case, you are to try again to establish the remote connection with CANUp 27.



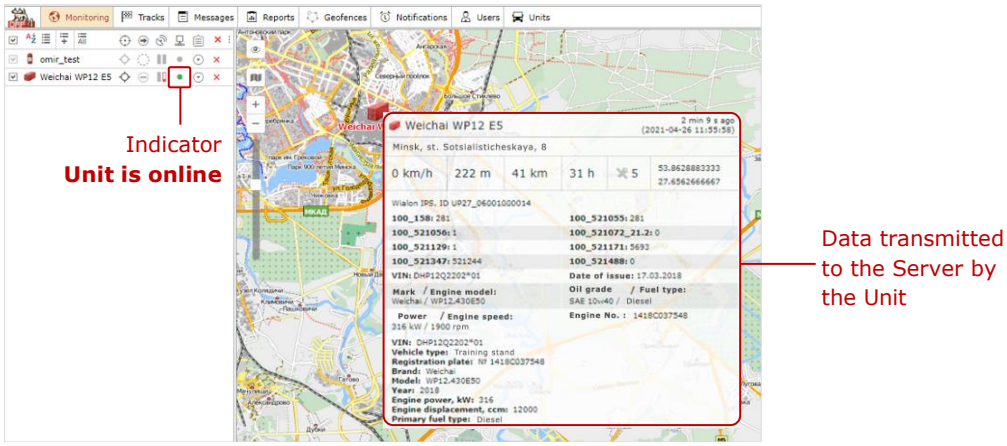
a) configuration of the PC network port



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 19 — Establishment of a remote connection with CANUp 27

2.4.9 Connection of wireless Units

Service CANUp software enables to configure the connection of the following wireless Units to **CANUp 27 Pro Pro 3G / Pro LTE / Pro Wi-Fi** by means of S7 Technology:

- DUT-E S7 fuel level sensors;
- DFM S7 / DFM Marine S7 fuel flow meters;
- GNOM DDE S7 pressure sensors;
- DUT-E 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 C.18) 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**, **0108** — DUT-E 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 20 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 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 20 b).

If the required Units are missing in the list of accessible devices, you can add them manually by pressing Add by MAC address button, having specified the appropriate MAC-addresses in the window **Add Unit** (see figure 20 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.

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**).

---

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

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 — **16 pcs.**
- GNOM DDE S7/GNOM DP S7 — **4 pcs.**

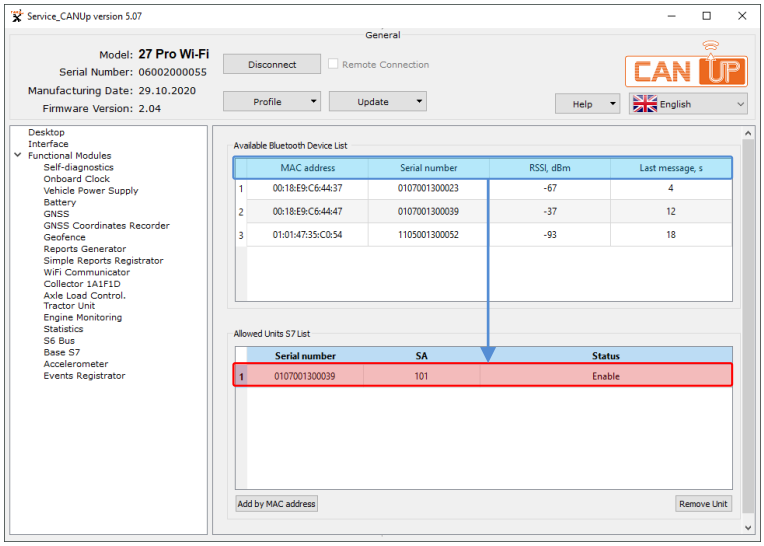
3) The network address of each Unit must be unique!

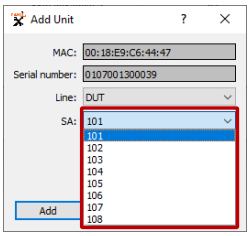
The same network addresses for cable-connected and wireless Units of one type simultaneously connected to the Gateway are not allowed!

3) In the submenu of Reports Generator FM (see 2.6 and C.9) 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 G.

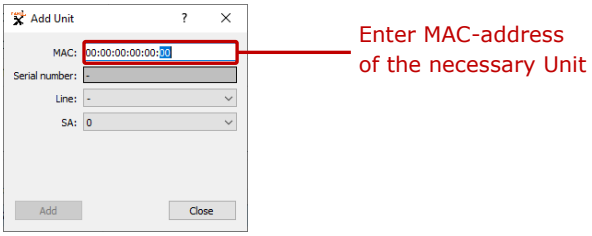
For each SPN added to the Report, select the designation **S7** from the dropdown list **Bus Marker**; in the field **S6 Address (SA)** specify the network address of the wireless source Unit of SPN.





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 20 — 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 7).

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.

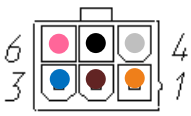
2) Prior to electrical connection of the sensor pay special attention to checking Vehicle chassis ground. Resistance between any point of vehicle chassis and "-" terminal of the battery or between terminals of the chassis ground switch should not exceed 1 Ohm.

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	Orange	K-Line	Digital, ISO 14230 Standard
	6	KL15	Pink	Signal of terminal 15 of ignition lock	Analog, voltage 0…36 V

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 21).
Note — For safe connection of CANUp 27 Standard to ISOBUS bus via CAN j1939/S6 interface, we recommend to employ CANCrocodile contactless reader.

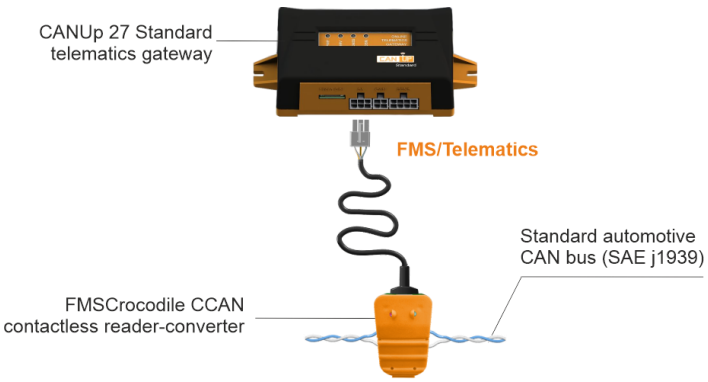
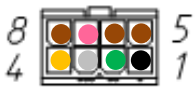
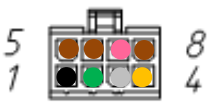


Figure 21 — Safe integration of Automotive CANbus into Telematics system using FMSCrocodile CCAN

3) Connection to the analog input of CANUp 27 is performed with **CANUp 27 cable** from the delivery set (see 1.2), in accordance with the 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
SENS connector of CANUp 27:  **SENS connector of CANUp 27 cable:** 	1	KLIN	Black	K-Line *	Digital, ISO 14230 Standard
	2	LLIN	Green	L-Line *	
	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	GND	Brown	Ground "-"	—
	7	DIN	Pink	Discrete signal input	Discrete, U_{PS}…3 (level 0) ** 3…0 (level 1)
	8	GND	Brown	Ground "-"	—

* Reserve for CANUp 27 Standard model.
** U_{PS} — voltage of power supply source.

Quick splice connectors (ordered separately) are recommended for connection signal wires to CANUp 27 (see figure 22).

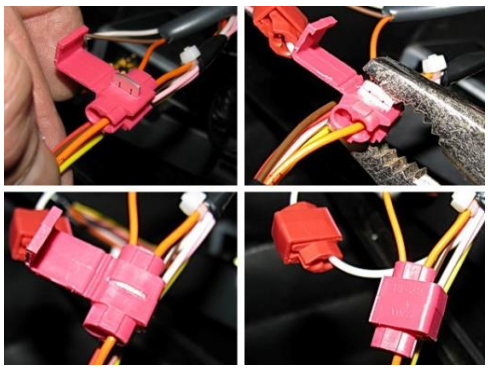
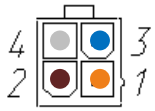
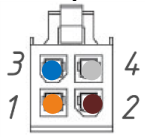


Figure 22 — Using connectors to connect wires of signal cable

4) CANUp 27 Pro is connected to a standard Vehicle CAN-bus or ISOBUS 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 at one time is provided in table 1.

2.6 Creating and customizing Reports

For work with Onboard reports of CANUp 27, the submenu Reports Generator FM which enables to create and configure **the maximum number of 20** various Reports is used.

To create a new Onboard Report, press button New Report... . In the displayed window **Select triggering Event for create Report** select from the dropdown list **Event** SPN of the Event of which the Report will be generated (see figure 23).

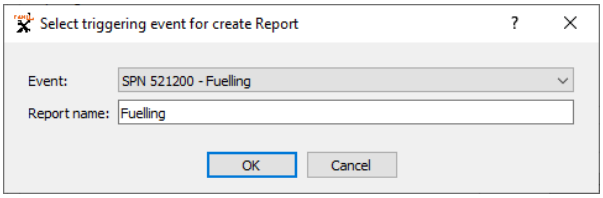


Figure 23 — Selecting Event for Onboard report generation

For quick creation of the Onboard Report based on the earlier created Report, select the necessary Report and press button Copy Report. Enter the new Report name in the field **Report Name**.

For loading Onboard Reports from the earlier saved Unit profile, select the necessary file **(*.prf)** from the PC hard disc and press button Load Reports... . In the displayed window **Load Reports** checkmark the necessary Reports names and press Load button. If you highlight any line of any Report, a prompt message with data (SPN) contained in it is displayed. In the upper portion of the window **Load Reports** there is a prompt of how many Reports you may choose to the maximum possible number (see figure 24).

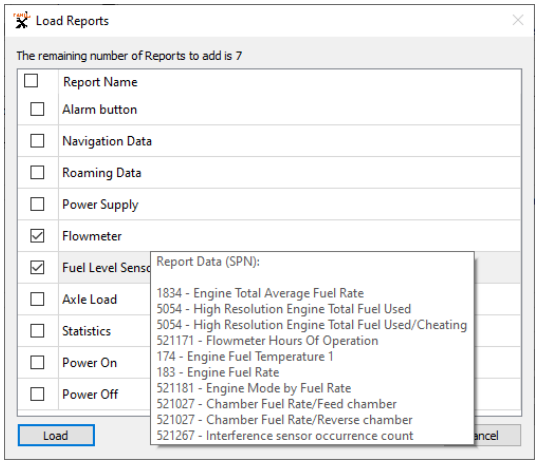


Figure 24 — Downloading Reports from the Unit profile

Created CANUp 27 Reports are displayed as tabs in **Reports Generator** area. Each tab has identical settings for the generating and sending Report to the Server. To delete a Report, use button, placed on each tab (see figure 25).

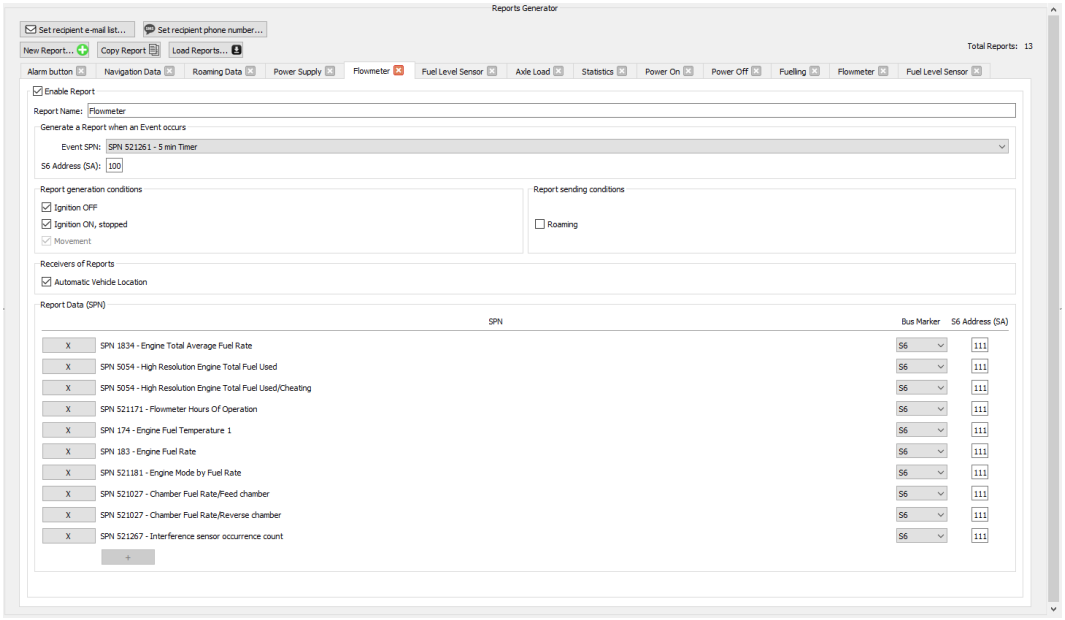


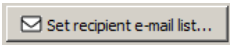
Figure 25 — Example of a tab with the Flowmeter Onboard Report settings

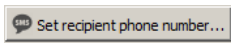
For each Report, the following settings are provided:

- **Enable Report** (SPN 521151) field is used to enable or disable generation of selected Report;
- **Report Name** (SPN 521250) field, where you should enter name of the Report to identify it. Use letters of Latin alphabet only (to exclude conversion of encodings during sending Reports by e-mail or via SMS) when entering the name of Report.
- in **Generate a Report when an Event occurs** area, there is:
  - **Event SPN** (SPN 521166) drop-down list corresponding to S6 Database. From this list, you can select the Event, which generates the Report when occurs;
  - field **S6 Address (SA)** to enter the network address of the SPN source Unit in CAN j1939/S6 bus (see 1.4.4) or in a standard CAN-bus.

Note — If the Event is generated not by the gateway but some other Unit whose network address is different from the address entered, ⚠ warning sign is displayed near the field **S6 Address (SA)**. When the precise network address of the source Unit is unknown, we recommend to use address 255. In this case, any Unit of the network can be the source of the chosen Event.

- In the area **Report generation conditions** you may specify conditions for the Report generation in the appropriate fields, depending on the status of ignition/connecting to Vehicle power supply or on whether the Vehicle is moving or not:
  - ignition is OFF (SPN 521151/12.0) (for CANUp 27 Pro) / switched OFF from Vehicle power supply (SPN 521151/12.3) (for CANUp 27 Standard);
  - ignition is ON, the Vehicle is not moving (SPN 521151/12.1) (for CANUp 27 Pro) / Vehicle power supply is ON, stopped (SPN 521151/12.4) (for CANUp 27 Standard);
  - Vehicle is moving (this setting is permanently ON).
- In the area **Report sending conditions** (SPN 521151/11.1), in the field **Roaming** you may enable or disable sending the Report in the Roaming mode;

- in the area **Receivers of Reports** you may specify versions of the Report which is to be sent, in the appropriate fields:
  - in the field **Automatic Vehicle Location** (SPN 521154/25.0) you may enable or disable sending the Report by GPRS;
  - **E-mail** - for sending Report by e-mail to selected addresses from pre-formed list of e-mail addresses of recipients. To create an address list, use 

button. A list can contain no more than three e-mail addresses of recipients. Each address must contain no more than 64 characters.
  - **SMS** - for sending Report as an SMS message to mobile phone numbers from the generated list of recipient numbers. To create a list of numbers, use 

button. The list can contain no more than three phone numbers of recipients, recorded in international format (maximum 13 digits).

Notes

1 In case any changes are made in lists of e-mail addresses or telephone numbers of Reports receivers, settings of Reports in which these receivers are specified will change automatically.
2 In order to improve the stability of the gateway operation, there is no feature of sending data by means of SMS messages and to e-mail addresses for SPN Events that are often generated (more often than once in 30 min) in all CANUp 27 models.
3 You may enable the feature of sending SPN in the form of source data (i.e. decimal value which is not converted) in the field **Raw Data** for the Report which is transmitted by means of SMS messages and to E-mail addresses.
4 In model CANUp 27 Pro 3G / Pro LTE you may enable the transmission of a KML file for the Reports "Statistics" and "Timer/Alarm", with a track of the Vehicle movement, in the field **Attach Track**.
5 In model CANUp 27 Pro Wi-Fi there is no feature of sending Reports by means of SMS messages and to E-mail addresses.

RECOMMENDATION: do not choose to send by e-mail and/or via SMS the Reports, which are generated more than once per hour.

- In **Report Data (SPN)** area, you can select data from **Select SPN/PGN** (see figure 26 a) window, which will be used for Report generation. To add SPN use 

button, to remove SPN use 

button, placed near the corresponding SPN. You can select up to 10 SPNs for one Report.

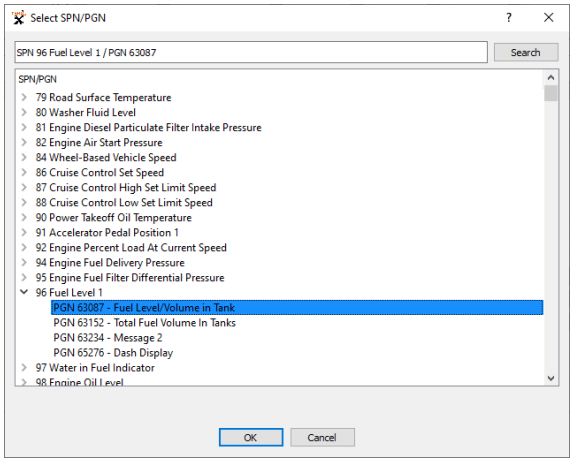
  You may select SPN from the following sources:

  - **DB S6** — selection of SPN from S6 Database. For this purpose, there is an option of searching SPN by its number or name which is entered into the search bar of **Select SPN/PGN** window. Highlight PGN which contains the needed SPN and confirm your choice by pressing 

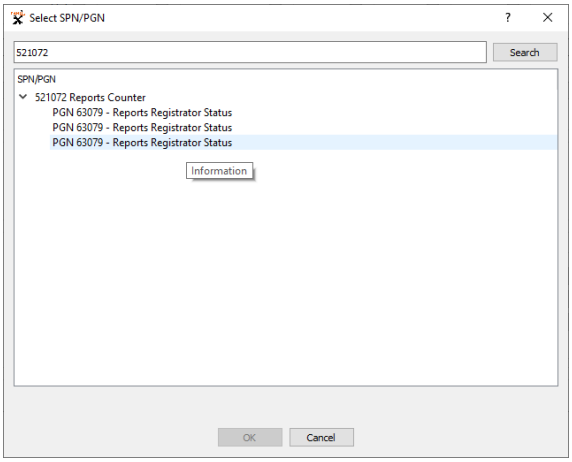
button. For SPN with the same numbers within one PGN, whenever you place the cursor on them, the prompt message containing the specificator is displayed (see figure 26 b).
  The following data are assigned automatically for the selected SPN: from the dropdown list **Bus Marker** – the message "Not used", while in the field **S6 Address (SA)** – the gateway network address (100).
  If the selected SPN is read from Units connected to CANUp 27 by means of S6 Technology, or by means of S7 Technology, or from the standard vehicle CAN-bus, you need to select manually: from the dropdown list **Bus Marker** the corresponding indication (**S6**/**S7**/**CAN**), while in the field **S6 Address (SA)** you need to specify the network address of the SPN source Unit SPN 521188).

- **S6 bus** — selection of SPN from Units connected to CANUp 27 via CAN j1939/S6 interface by means of S6 Technology.
Assigned automatically to the selected SPN: **S6** value from the dropdown list **Bus Marker**, while the network address of SPN source Unit (SPN 521188) — in the field **S6 Address (SA).**

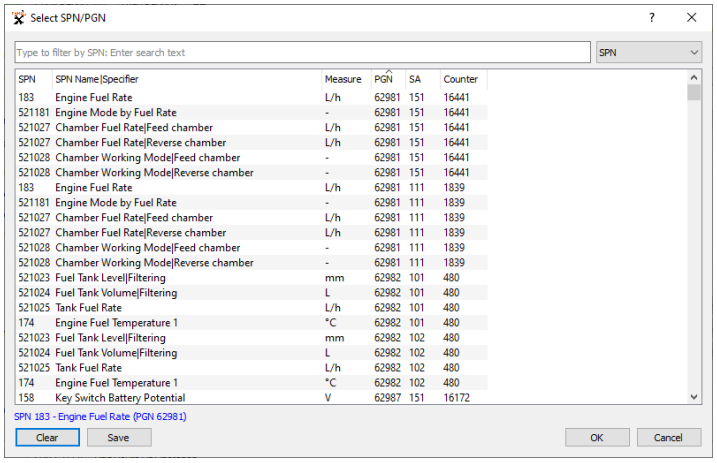
- **CAN bus** — selection of SPN from a standard Vehicle CAN-bus or ISOBUS. This selection is available only for CANUp 27 Pro in case of connection to the onboard CAN-bus or ISOBUS and in case **input data** for CAN interface **are available**.
For SPN selection, there is an option to filter it from the list of current PGN by SPN number, or by SPN/Specificator name, or by PGN name or by the network address SA of the source Unit (see figure 26 c).
Assigned automatically to the selected SPN: **CAN** value from the dropdown list **Bus Marker**, while the network address of SPN source Unit (SPN 521188) — in the field **S6 Address (SA).**



a) a list of SPNs in S6 Database



b) an example of displaying qualifier of SPNs with the same names



c) SPN selection from current CAN bus data

Figure 26 — Select SPN/PGN window for adding to Report

WARNING: For CANUp 27 Standard it is allowed to select only SPN with digital value no longer than 4 bytes that may be added to the Report. In case any SPN beyond these limitations is selected, the appropriate warning is displayed (see figure 27).

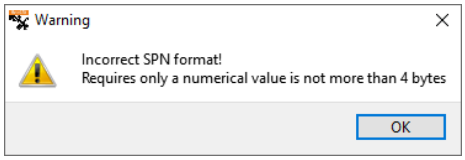


Figure 27 — Warning on choosing SPN of inappropriate format

2.7 Function test

To verify functioning it is required:

1) To register the Vehicle or stationary object with CANUp 27 installed in Telematics service ORF 4 (see the document Telematics service ORF 4. User manual).

2) Make sure that data is transmitted to the Server correctly (see figure 28).

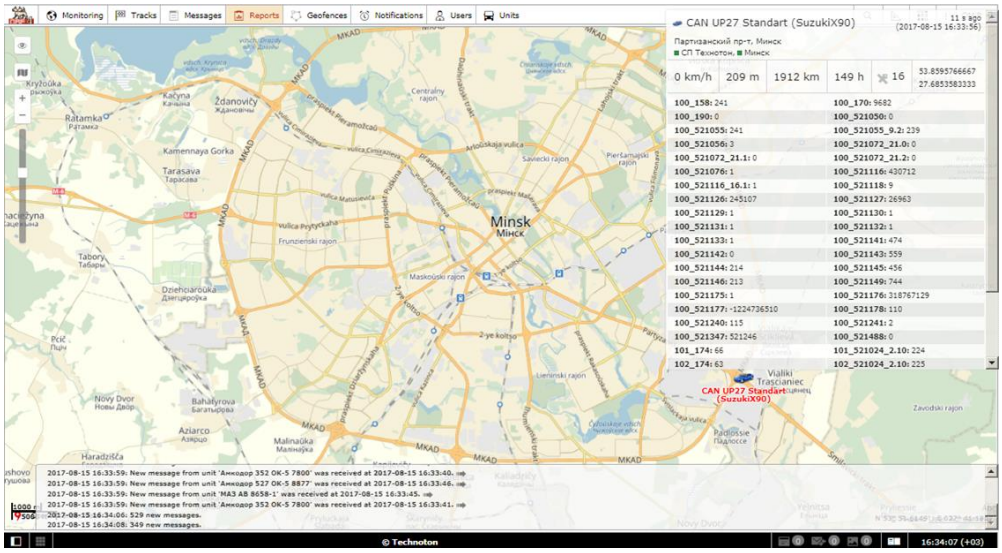


Figure 28 — Example of how the vehicle (with CANUp 27 installed) is displayed in ORF 4 monitoring service

During CANUp 27 operation, signals of LED indicators, located on the top cover of CANUp 27 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		External power supply is off. Battery is discharged.
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.
			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 switched off or defective.
LINK***		Blue	Initialization of Wi-Fi modem.
			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 3G / Pro LTE.
*** For CANUp 27 Pro Wi-Fi.

3 Packaging

CANUp 27 delivery sets come in cardboard boxes of the following shape (figure 29)

Figure 29 — CANUp 27 packaging

Label sticker with information on the product name, certificates, serial number, firmware version, manufacture date, weight as well as Quality Control seal and QR code is stuck on two sides of the CANUp 27 box (see figure 30).

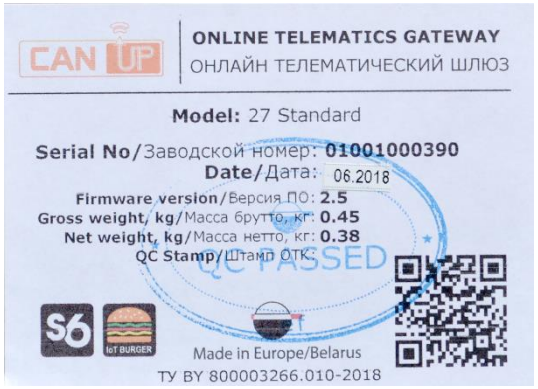


Figure 30 — CANUp 27 packaging label

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 sensors 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

Manufacturer

Tel/Fax: +375 17 240-39-73

https://www.jv-technoton.com/

http://s6.jv-technoton.com/

E-mail: marketing@technoton.by

Technical support

E-mail: support@technoton.by

Annex A

List and contents of CANUp 27 On-board reports

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 3G / Pro LTE / Pro Wi-Fi	

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 3G / Pro LTE / Pro Wi-Fi 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 3G / Pro LTE / Pro Wi-Fi multiple specificators are supported (up to three pcs.). ** Only for CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.
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 3G / Pro LTE / Pro Wi-Fi 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;RTSM;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	ftp.technoton.by
<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

SPN of CANUp 27 Functional modules

C.1 List of CANUp 27 Functional modules

Reception and processing of the Vehicle performance parameters, parameters of its location, maintenance of Counters, recording of Events, configuration and self-diagnostics of the gateway are ensured by well-concerted operation of Functional modules (FM) of CANUp 27 (see table C.1).
The format of parameters (SPN) of FM CANUp 27 corresponds to S6 Database (DB).

Table C.1 — List of CANUp 27 Functional Modules

#	Designation of Functional module	Models of telematics gateway CANUp 27		
		Standard	Pro 3G / Pro LTE	Pro Wi-Fi
1	Self-diagnostics FM	+	+	+
2	Onboard Clock FM	+	+	+
3	Vehicle Power Supply FM	+	+	+
4	Battery FM	+	+	+
5	GNSS FM	+	+	+
6	GNSS Coordinates Recorder FM	-	+	+
7	Geofence FM	-	+	+
8	Reports Generator FM	+	+	+
9	Simple Reports Registrator FM	+	+	+
10	Communicator FM	+	+	-
11	WiFi Communicator FM	-	-	+
12	Collector 1A1F1D FM	+	+	+
13	Axle Load Control. Tractor Unit FM	+	+	+
14	Engine Monitoring FM	-	+	+
15	Statistics FM	-	+	+
16	S6 Bus FM	-	+	+
17	Base S7 FM	-	+	+
18	Accelerometer FM	-	+	+
19	Events Registrator FM	+	+	+

C.2 Self-diagnostics FM

Self-diagnostics FM — designed for user authorization, identification of CANUp 27 passport data, operation time recording and also active malfunctions.

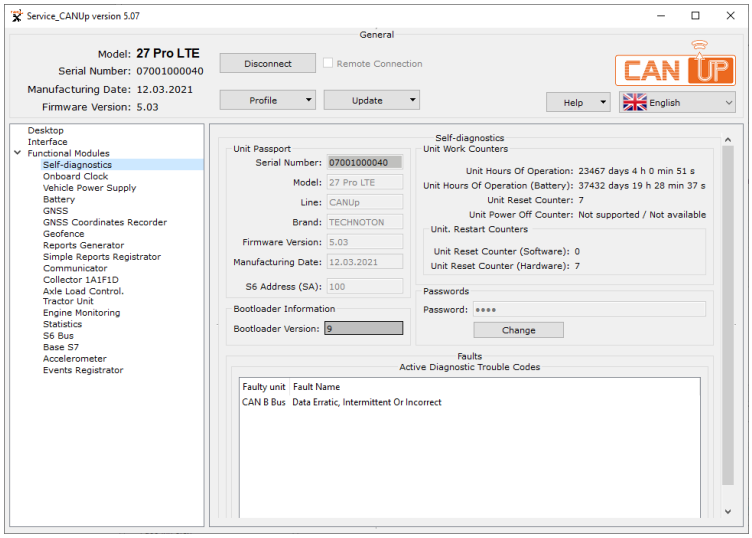


Figure C.1 — Example of settings of the Self-diagnostics FM in Service CANUp software

Table C.2 — Self-diagnostics FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Unit. Passport PGN 62995				
521120	Serial Number	On the fact	No	Serial number is a set of numbers that is used for identification of specific CANUp 27. Serial number CANUp 27 has the following format: AABBB C DDDDD, where: AA – code of CANUp model; BBB – digits that reflect changes product changes; C – Manufacturer code; DDDDD – sequential number. Setting is not available for editing.
521345	Model	On the fact	No	Model – this is version of the CANUp 27 inside of CANUp product line. Each model has its own functional and constructive features: - CANUp 27 Standard – model with standard functionality; - CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi – models with extended functionality. Setting is not available for editing.
521123	Line	CANUp	No	Name of the product line. The line represents a group of similar products – online telematics gateways produced under general trademark CANUp. Setting is not available for editing.
521344	Mark	TECHNOTON	No	Name of CANUp 27 Manufacturer. Setting is not available for editing.
521121	Firmware Version	On the fact	No	Version of built in Software CANUp 27. Setting is not available for editing.
521125	Date Of Production	On the fact	No	Date (day, month, year) of CANUp 27 production. Setting is not available for editing.
521188	Address at S6 (SA) Bus	100	No	Network address CANUp 27 which is connected via S6 Technology. Network address value can be 100 only.

SPN	Name	Factory value	Unit of measure	Clarification
Unit. Counters PGN 62994				
521116	Unit Hours Of Operation	On the fact	s	Counter of summarized working time of CANUp 27 since its production moment*.
521116/16.1	Unit Hours Of Operation/ 16.1 Battery	On the fact	s	Counter of summarized working time of CANUp 27 using the inbuilt accumulator battery (in case there is no power supply from the external source) since its production moment*.
521118	Number Of Unit Restarts	On the fact	No	Counter of sensor's processor restarts at a time when the power is On or there is an impact of conducted interferences of the vehicle's on-board network*. Restarts accounting is carried out since production date of the CANUp 27.
Unit. Restart Counters** PGN 63280				
521118/30.0	Unit Reset Counter/ 30.0 Software	On the fact	pcs.	Counter of the number of CANUp 27 processor restartds, in accordance with preset factory setting; by default – one restart in 24 hours*. The counting of restarts begins from the moment of CANUp 27 delivery from the factory.
521118/30.1	Unit Reset Counter/ 30.1 Hardware	On the fact	pcs.	Counter of the number ofCANUp 27 processor restarts in case of power supply failure (onboard circuit outage and complete battery discharge) or in case of the Unit inbuilt software failure*. The counting of restarts is conducted from the moment of CANUp 27 delivery from the factory.
Unit. Passwords PGN 63017				
521593/3.3	Password/ 3.3 Installer	1111	No	Password is entered for user authorization while establishing connection session between CANUp 27 and service Software for configuring the Unit. Password is a specific combination of four digits. By default, used: Login – 0, password – 1111. User can change password of the CANUp 27. After entering and confirming the new password is recorded into internal memory of the CANUp 27.
Active DTC PGN 65226				
521044	Malfunction Code (SID)	On the fact	No	List of current CANUp 27 malfunctions are displayed at the settings field (in case of its presence — up to 10). For each active malfunction is indicated following: - faulty nod; - malfunction name. This setting allows to monitor CANUp 27 working performance. In case of lack of active malfunctions, the following message is displayed "No malfunctions".
Bootloader Information PGN 63009				
521122	Bootloader Version	On the fact	No	Displays the current version of the loader used for correct starting the inbuilt Unit software (firmware), as well as for the Unit firmware update.

* The User cannot reset this Counter himself. Only the Manufacturer or the Regional Service Center are authorized to do it.
** Only for CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.

C.3 Onboard clock FM

Onboard clock FM — designed for generation of signals of time and its transmission to other functional modules of CANUp 27, as well as for flexible adjustment of time for transmission of periodic Reports (sending Reports at specified moments of time)*.

* This setting is valid only for CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi.

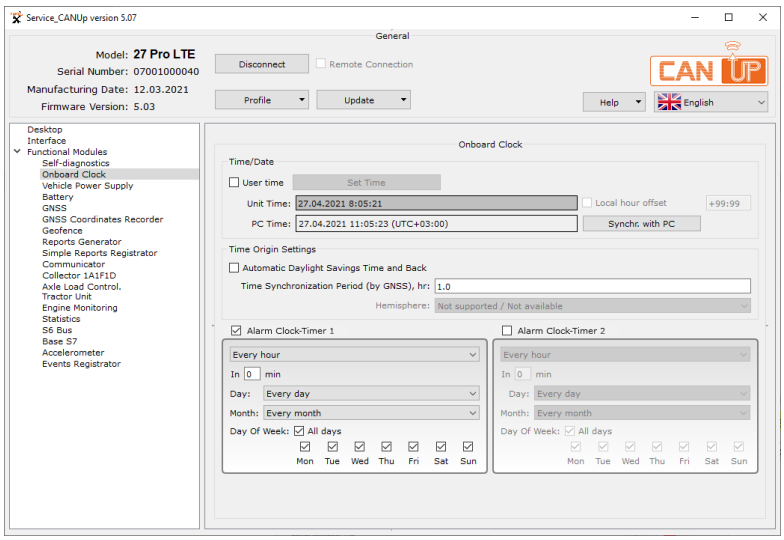


Figure C.2 — Example of settings of the Onboard clock FM in Service CANUp software

Table C.3 — Onboard clock FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
				Time/Date PGN 65254	
959	Seconds	On the fact	s	0…62.5	Present time — seconds*.
960	Minutes	On the fact	Min	0…250	Present time — minutes*.
961	Hours	On the fact	h	0…250	Present time — hours*.
963	Month	On the fact	month	0…250	Present date — month*.
962	Day	On the fact	d	0…62.5	Present date — day*.
964	Year	On the fact	year	1985…2235	Present date — year*.
1601	Time Displacement In Minutes	0	min	0…59	Time displacement (in minutes) in relation to Coordinated Universal Time that matches with local time (Time zone). It is activated and available for editing when configuring present time manually and when synchronizing time with PC.
1602	Time Displacement In Hours	+3	h	-24…+24	Time displacement (in hours) in relation to Coordinated Universal Time that matches with local time (Time zone). It is activated and available for editing when configuring present time manually and when synchronizing time with PC.
				Time Counter Settings PGN 63011	
521350	Automatic Time Switching (winter/ summer)	Off	No	On/Off	Enabling/disabling of automatic present time switching to winter/summer.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521353	Period Of Time Synchronization With GNSS	1.0	h	0…210554000	Time interval value (in hours), after which there is an automatic present time adjustment performed according to GNSS signals. This setting is available for editing by user. Automatic time adjustment with GNSS signals is not carried out when the value is 0 h.
Alarm clock-timer 1 PGN 63250 Alarm clock-timer 2 PGN 63251**					
521461	Alarm Clock-Timer Enable	On	No	On/Off	Field for switching ON/OFF the "Timer/Alarm" mode. In this field you can adjust transmission of a periodic Report at specific time for CANUp 27 Pro.
959	Seconds	0	s	0…59	Field for entering seconds during setting specific time for the Report transmission with periodicity "Once in 24 hours".
960	Minutes	0	min	0…59	Field for entering minutes during setting specific time for the Report transmission with periodicity "Once in 24 hours"/ "Every hour".
961	Hours	0	h	0…23	Field for entering hours during setting specific time for the Report transmission with periodicity "Once in 24 hours".
962	Day	Every day	d	1…31/ 255 (Every day)	Field for selection a specific day for the periodic Report transmission.
963	Month	Every month	month	1…12/ 255 (Every month)	Current date — month*.
521411	Day Of Week	On	No	On/Off	Fields for switching ON/OFF the tansmission of a periodic Report on a specific day of the week. They contain a bit mask with indication of the respective day of the week: 0 - Off. 2^0- Monday. 2^1- Tuesday. 2^2- Wednesday. 2^3- Thursday. 2^4- Friday. 2^5- Saturday. 2^6- Sunday. 127 – all days of the week.

* Used during Events registration. Present time is available for user for editing manually or synchronizing of date/time with computer clock. By default, time is set in UTC format (Coordinated Universal Time standard) and displayed according to local displacement.
** Only for CANUp 27 Pro

C.4 Vehicle Power Supply FM

Vehicle Power Supply FM — is designed for monitoring of onboard power network voltage, current mode of power network, operation time of Vehicle in different power network modes, quantity of engine starts*, exceeding permissible time of continuous operation of starter*.

* In the process of preparation for introduction.

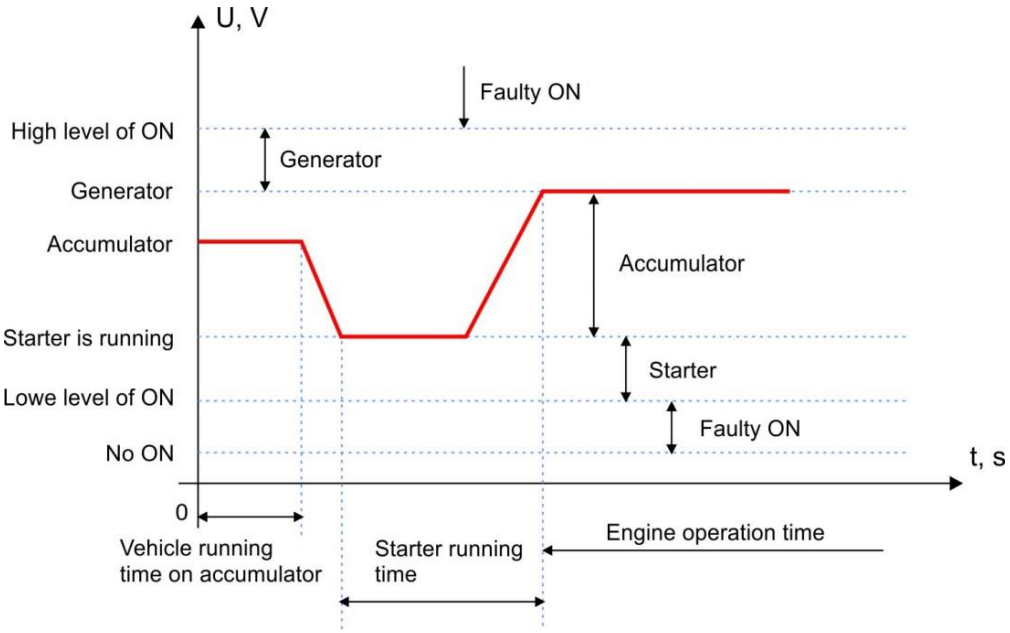


Figure C.3 — Operation modes on onboard network (ON) voltage level

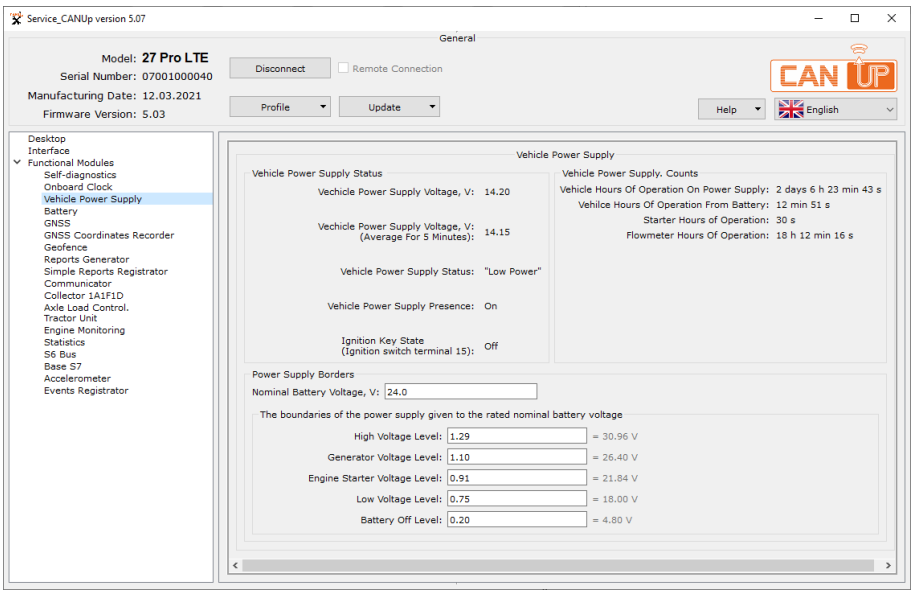


Figure C.4 — Example of settings of the Vehicle Power Supply FM in Service CANUp software

Table C.4 — Vehicle power supply FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Vehicle Power Supply Status PGN 63089					
521055	Vehicle Power Supply Voltage	On the fact	V	0…3212.75	Shows current value of ON voltage.
521055/2.9	Vehicle Power Supply Voltage/ 2.9 Average For 5 Minutes	On the fact	V	0…3212.75	Shows average value of ON voltage within previous 5 minutes.
521056	Vehicle Power Supply Status	On the fact	No	Off/ Lowe level/ Accumulator/ Starter/ Generator/ High level	Shows current mode of ON in accordance with user-defined borders of ON voltage levels of Vehicle (see figures C.3, C.4).
521076	Vehicle Power Supply Presence	On the fact	No	On/Off	Displays the current state of the board (On/Off) in accordance with the user-set voltage level of the TC system trip (see figures C.3, C.4).
521049/16.2	Ignition Key State/ 16.2 Ignition switch terminal 15	On the fact	No	On/Off	Displays the current position of the Vehicle ignition key (On/Off). The voltage supply to terminal 15 of the Vehicle ignition key indicates that the ignition key is in the ON position.
Power Supply Borders PGN 63067					
521075	Nominal Battery Voltage	24	V	0…60	Field for entering a nominal value of accumulator voltage of Vehicle (U_{nom}=12V/24V).
521063	High Voltage Level	1.29	-	0…1.99	Field for entering value of high voltage level of onboard network (1.29•U_{nom}) (see figures C.3, C.4). Entered value of voltage is used as a threshold for recording "Faulty ON" Event.
521064	Generator Voltage Level	1.16	-	0…1.99	Field for entering value of voltage level of generator, i.e. when engine of Vehicle is running (1.16•U_{nom}) (see figures C.3, C.4).
521065	Engine Starter Voltage Level	0.91	-	0…1.99	Field for entering value of voltage level starter is running, i.i when Vehicle's engine is starting (0.91•U_{nom}) (see figures C.3, C.4).
521067	Low Voltage Level	0.75	-	0…1.99	Field for entering value of low voltage level of ON (0.75•U_{nom}). Entered value of voltage is used as a threshold for recording "Faulty ON" Event (see figures C.3, C.4).
521068	Battery Off Level	0.20	-	0…1.99	Field for entering value of voltage level when ON switches off (0.20•U_{nom}) (see figures C.3, C.4).
Vehicle Power Supply. Counts PGN 62976					
521173	Vehicle Hours Of Operation On Power Supply	On the fact	s	0…4211080000	Counter of total operating time of Vehicle from onboard network since CANUp 27 installation to the Vehicle. User cannot reset the value of this counter*.
521172	Vehicle Hours Of Operation From Battery	On the fact	s	0…4211080000	Counter of total operating time of Vehicle from accumulator since CANUp 27 installation to the Vehicle. User cannot reset the value of this counter*.
521170	Starter Hours Of Operation	On the fact	s	0…4211080000	Counter of total operating time of starter since CANUp 27 installation to the Vehicle. User cannot reset the value of this counter*.
521171	Starter Hours Of Operation	On the fact	s	0…4211080000	Counter of total operating time of Vehicle's engine since CANUp 27 installation to the Vehicle. User cannot reset the value of this counter*.
* Counter can be reset by the Manufacturer or RSC.					

C.5 Battery FM

Battery FM — designed for power supply status check, built-in battery condition and total CANUp 27 operation time from the battery.

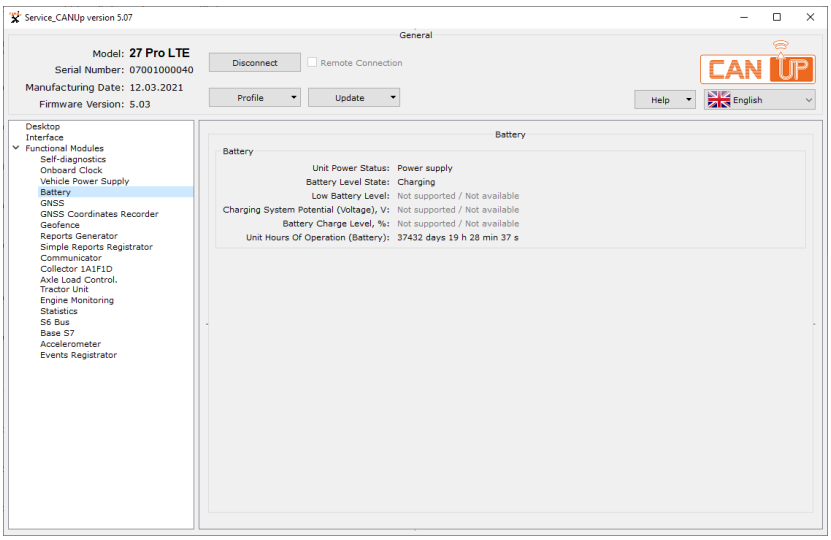


Figure C.5 — Example of settings of the Battery FM in Service CANUp software

Table C.5 — Battery FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Battery PGN 63086				
521129	Unit Power Status	On the fact	No	Current power-supply status of CANUp 27: - powered from embedded power source; - powered from on-board electrical system; - power is off; - power-supply status is not available/not supported by this device. Since during work with the service software and with cable connection to a Unit data exchange between the PC and CANUp 27 takes place only when power is supplied from the external power source, the power supply status during CANUp 27 configuration is always identified as "Power supply from the onboard circuit".
521050	Battery Level State	On the fact	No	Current charge status of inbuilt battery of CANUp27: - fully charged; - charging; - cannot define battery status; - battery is not available.
167	Charging System Potential (Voltage)	On the fact	V	Current voltage of embedded battery of CANUp 27. This parameter can be measured only in case of CANUp 27 power supply from the inbuilt accumulator. In case the external power supply is used, the status "Not supported/"No access" is always displayed for this setting.
521061	Battery Charge Level	On the fact	%	Current charge of embedded battery of CANUp 27. When working with service software, this setting will always be displayed as "not available/not supported by this device".
521116/16.1	Unit Hours Of Operation/ 16.1 Battery	On the fact	s	Counter of total operation time of CANUp 27 from embedded battery since installation to Vehicle. The Counter cannot be reset by user. Counter can be reset by the Manufacturer or RSC.

C.6 GNSS FM

GNSS FM — receives and process signals from GNSS, calculates parameters received from navigation receiver (coordinates of location, speed and direction of the movement of the Vehicle).

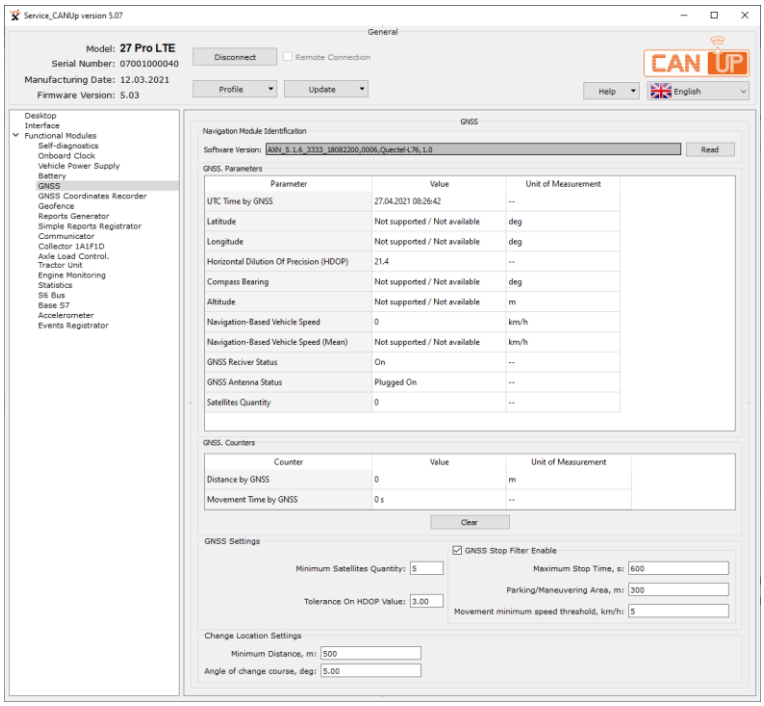


Figure C.6 — Example of settings of the GNSS FM in Service CANUp software

Table C.6 — GNSS FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Navigation Module Identification PGN 63244					
521282	Software Version	On the fact	No	No	The firmware version of the inbuilt GNSS-module of CANUp 27 is displayed.
GNSS. Parameters PGN 62998					
521155	Time According To GNSS	On the fact	s	0…4211080000*	This setting displays present time in UTC format, defined according to GNSS data.
584	Latitude	On the fact	Degree	-210…211.101*	This setting displays geographical coordinates of latitude of present location of the vehicle, defined according to GNSS data.
585	Longitude	On the fact	Degree	-210…211.101*	This setting displays geographical coordinates of longitude of present location of the vehicle, defined according to GNSS data.
521090	Geometric Dilution Of Precision (HDOP)	On the fact	No	0…642.55*	This setting displays present value of HDOP – coefficient that characterizes accuracy of the current location defining of the object in the horizontal plane. HDOP value can vary in range from 1 (maximum accuracy) to 50 (minimum accuracy).
165	Compass Azimuth	On the fact	Degree	0…501.99*	This setting displays present movement direction of the vehicle, defined according to GNSS data.
580	Height	On the fact	m	2500…5531.88*	This setting displays height of present vehicle location above the sea level, defined according to GNSS data.

SPN	Name	Factory value	Unit of measure	Range	Clarification
517	Vehicle Speed According To GNSS	On the fact	km/h	0…250.996*	This setting displays present vehicle speed, defined according to GNSS data.
521134	GNSS Receiver Status	On the fact	No	On/Error	This setting displays status of serviceability of built-in navigation receiver CANUp 27.
521135	GNSS Antenna Status	On the fact	No	Connected	This setting displays connection** status of built-in navigation antenna CANUp 27.
521128	Number Of Satellites	On the fact	pcs.	0…250*	This setting displays present number of visible navigation satellites.
GNSS. Counters PGN 62996					
521126	Distance By GNSS	On the fact	m	0…4211080000	Shows value of total travel distance of Vehicle since Unit installation to the Vehicle. This Counter can be reset by the user.
521127	Movement Time By GNSS	On the fact	s	0…4211080000	Shows value of total travel time of Vehicle since Unit installation to the Vehicle. User cannot reset the value of this Counter.
GNSS Settings PGN 63058					
521098	Minimum Satellites Quantity	5	pcs.	0…255	Field for entering of minimum number of visible navigation satellites, above which coordinates and movement vehicle's speed are considered to be reliable.
521097	Tolerance On HDOP Value	3.00	No	0…642.55	Field for entering of allowable maximum value of HDOP, bellow which coordinates and movement vehicle's speed are considered to be reliable.
521101	GNSS Stop Filter Enable	On	No	On/Off	Field to switch ON/OFF the feature of automatic identification of the Vehicle parking mode according to parameters entered.
521102	Maximum Stop Time	600	s	0…64255	Field for entering the threshold time value which, in case it is exceeded, identifies the parking mode, if the Vehicle is immobile and the coordinates of the Vehicle location do not change.
521103	Parking/ Maneuvering Area	20	m	-2500…5531.88	Field for entering the threshold value of the distance which, in case it is exceeded, if the Vehicle is immobile, results in changing the coordinates of the Vehicle location.
521266	Movement Minimum Speed Threshold, km/h	5	km/h	0…63	Field for entering the threshold value of speed below which the Vehicle is considered immobile.
Change Location Settings PGN 63105					
521078	Minimum Distance	500	m	0…4294970000	Field for entering minimum distance between points on the straight section of Vehicle's movement for sending the Report.
521079	Angle Of Change Course	5.00	Degree	0…360	Field for entering Vehicle's course change angle, which if exceeded triggers Report sending.

* When poor quality reception of navigation data or mismatch of GNSS coordinates reliability and vehicle movement speed, the following message displays "Not supported/ not available".
** Status "Connected" is always displayed for GNSS antenna.

C.7 GNSS Coordinates Recorder FM

GNSS Coordinates Recorder FM — is designed to register the coordinates of the moving Vehicle location points, to create a track of the Vehicle movement by the points and send the track in the Reports "Statistics" and "Timer/Alarm" by E-mail in KML-file format.

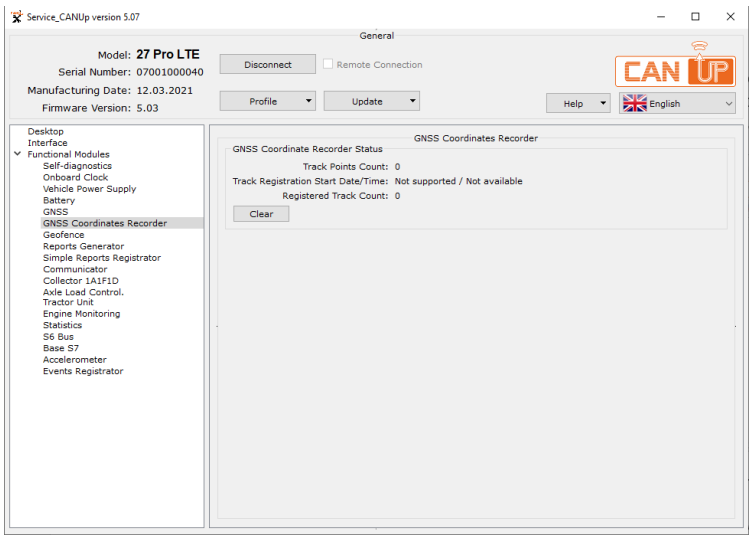


Figure C.7 — Example of settings of the GNSS Coordinates Recorder FM in Service CANUp software

Table C.7 — GNSS Coordinates Recorder FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
GNSS Coordinate Recorder Status PGN 63078				
521081	Track Points Count	On the fact	pcs.	For an active track, the current Counter indication of points with the latest coordinates of the Vehicle movement which are stored in the Counter memory is displayed. The maximum number of points in one track is 6000. The user may reset this Counter himself.
521082	Track Registration Start Date/Time	On the fact	No	For an active track, date and time of saving the first point with the coordinates of the Vehicle movement in the Unit memory is displayed. The date is stored in the local time format of the Unit.
521083	Registered Track Count	On the fact	pcs.	The current indication by the Counter of the Vehicle movement tracks which are stored in the Unit memory is displayed. When the all memory is filled, a new track overwrites the oldest one. The maximum number of saved tracks 14. The user may reset this Counter himself.

C.8 Geofence FM

Geofence FM — is designed to create and configure Geofences in order to monitor the time of their passing by the Vehicle. Each Geofence is a virtual area on the map of terrain with a boundary to form a circle of a specified radius.

In order to load the local map during the configuration of Geofence FM, you need to ensure steady PC Internet connection!

List of maps that can be loaded during the configuration of Geofences

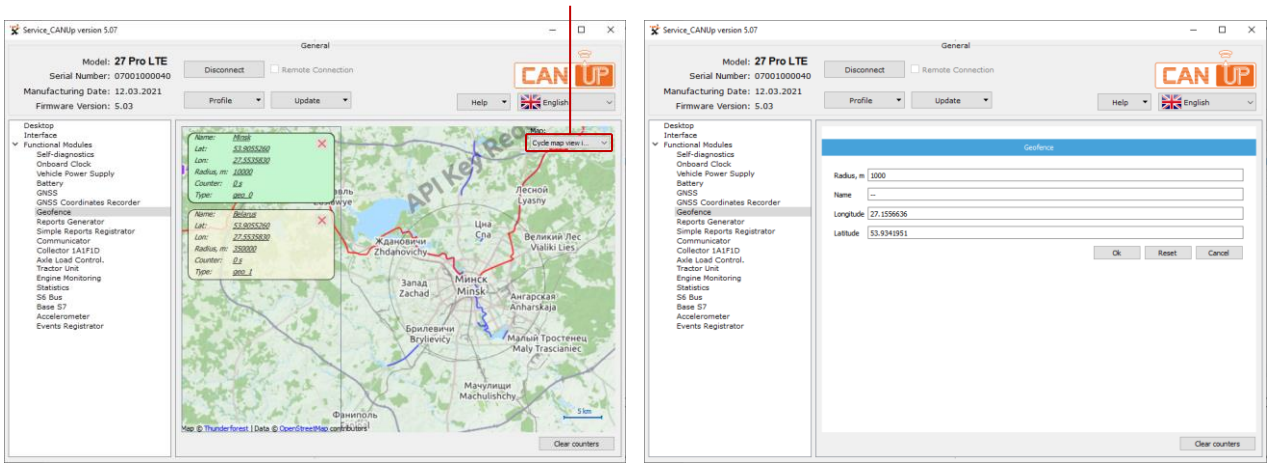


Figure C.8 — Example of settings of the Geofence FM in Service CANUp software

Table C.8 — Geofence FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Geofence. Settings PGN 63262					
521412	Geofence Quantity	No	pcs.	1…10	The current number of Geofences stored in the Unit memory. In case the user needs, he may delete each of the Geofences individually (in the window of its properties) or all Geofences at once (you need to click the right mouse button on the shortcut menu on the map).
521413/ 29.0…29.9	Geofence Name/ 29.0 Geofence 1… 29.9 Geofence 10	No	No	No	Field to enter the name of the Geofence which is being created or edited 1…10. Only digits, Roman letters and characters "-" , "_" , "." are allowed to enter. 12 characters at a maximum.
584/ 29.0…29.9	Latitude/ 29.0 Geofence 1… 29.9 Geofence 10	No	deg	-210…211.101	Field in which the geographic coordinate of latitude for the center of zone 1…10 is specified. The center of the Geofence 1…10 is selected by clicking the right mouse button on the required point of the map. The value of latitude entered automatically may be edited manually by the user.
585/ 29.0…29.9	Longitude/ 29.0 Geofence 1… 29.9 Geofence 10	No	deg	-210…211.101	Field in which the geographic coordinate of longitude for the center of Geofence 1…10 is specified. The center of Geofence 1…10 is selected by clicking the right mouse button on the required point of the map. The value of latitude entered automatically may be edited manually by the user.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521414/ 29.0…29.9	Radius/ 29.0 Geofence 1… 29.9 Geofence 10	No	m	0…4211080000	Field to enter the value of distance from the center to the boundary of Geofence 1…10 which is being created or edited.
Geofence. Counters PGN 63264					
521416	Location In Geofence Status Mask	No	No	0…65535	Bit mask showing the number of the Geofence in which the Vehicle is located at the moment: 2^0- Geofence 1; 2^1- Geofence 2; 2^2- Geofence 3; 2^3- Geofence 4; 2^4- Geofence 5; 2^5- Geofence 6; 2^6- Geofence 7; 2^7- Geofence 8; 2^8- Geofence 9; 2^9- Geofence 10.
521412	Geofence Quantity	No	pcs.	1…10	The current number of Geofences stored in the Unit memory. In case the user needs, he may delete each of the Geofences individually (in the window of its properties) or all Geofences at once (you need to click the right mouse button on the shortcut menu on the map).
521417 29.0…29.9	Time In Geofence/ 29.0 Geofence 1… 29.9 Geofence 10	No	s	0…4211080000	Indication of the Counter of total time during which the Vehicle was within Geofence 1…10. The Counter is displayed in the Properties window of each Geofence 1…10.

C.9 Reports Generator FM

Reports Generator FM — designed for Onboard Reports formation in accordance with defined configurations and sending through Communicator FM (for CANUp 27 Standard / Pro 3G / Pro LTE) or WiFi Communicator FM (for CANUp 27 Pro Wi-Fi).

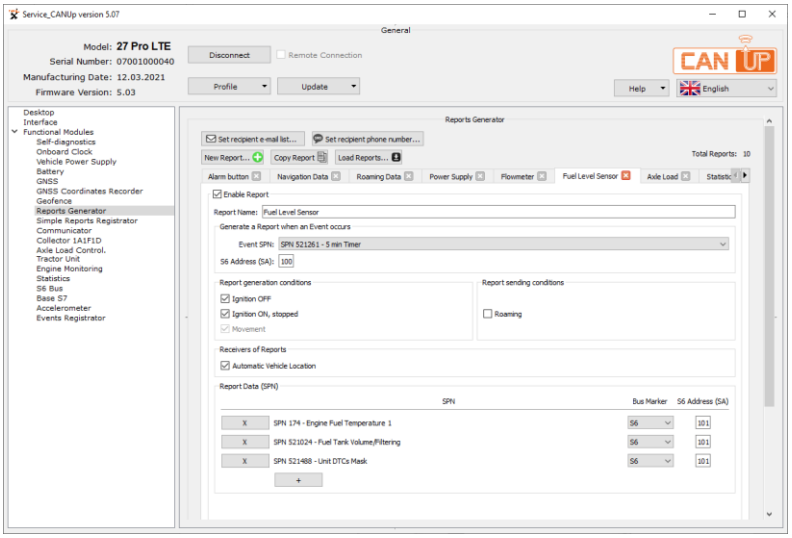


Figure C.9 — Example of settings of the Reports Generator FM in Service CANUp software

Table C.9 — Reports Generator FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
E-Mail List* PGN 63122					
521355	Array Elements Count	No	pcs.	0…3	Number of e-mail addresses in the list of recipients for sending Report by e-mail.
521242	E-Mail Address	No	No	No	Address of Report recipient. The address should not contain more than 64 characters.
Phone Numbers List* PGN 63124					
521355	Array Elements Count	No	pcs.	0…3	Number of phone numbers in the list of recipients for sending Report to mobile phone numbers.
521020	Phone Number	No	No	No	Report recipient's phone number. Number should be specified in international format (13 digits maximum).
Report 1 Generate Attributes PGN 63125 Report 2 Generate Attributes PGN 63126 Report 3 Generate Attributes PGN 63127 Report 4 Generate Attributes PGN 63128 Report 5 Generate Attributes PGN 63129 Report 6 Generate Attributes PGN 63130 Report 7 Generate Attributes PGN 63131 Report 8 Generate Attributes PGN 63132 Report 9 Generate Attributes PGN 63133 Report 10 Generate Attributes PGN 63134				Report 11 Generate Attributes PGN 63135 Report 12 Generate Attributes PGN 63136 Report 13 Generate Attributes PGN 63137 Report 14 Generate Attributes PGN 63138 Report 15 Generate Attributes PGN 63139 Report 16 Generate Attributes PGN 63140 Report 17 Generate Attributes PGN 63141 Report 18 Generate Attributes PGN 63142 Report 19 Generate Attributes PGN 63143 Report 20 Generate Attributes PGN 63144	
521250	Report Name	No	No	No	Field for entering Report's name for identifying. To enter the name, use only Latin characters.
521347	SPN Value	No	No	0…4294970000	Dropdown list to select the Event in case of which the Report is to be generated.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521151	Enable Report	On	No	On/Off	Field to enable or disable the Report generation.
521151/12.3	Enable Report/ 12.3 Switched OFF from vehicle power supply	On	No	On/Off	Field to enable or disable the Report generation (on condition the Unit is not connected to the Vehicle onboard circuit (power is supplied from the inbuilt accumulator).
521151/12.4	Enable Report/ 12.4 Vehicle power supply is ON, stopped	On	No	On/Off	Field to enable or disable the Report generation on condition the Unit is connected to the Vehicle onboard circuit but the Vehicle is not moving.
521151/11.1	Enable Report/ 11.1 Roaming	Off	No	On/Off	Field to enable or disable sending the Report in the roaming mode.
521154/25.0	Send Report/ 25.0 AVL	On	No	On/Off	Field to enable or disable sending the Report to the Server.
521154/25.1	Send Report/ 25.1 E-mail	Off	No	On/Off	Field to enable or disable sending the Report by E-mail.
521151/25.2	E-mail Id/ 25.2 E-mail 1	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the first E-mail recipient.
521151/25.3	E-mail Id/ 25.3 E-mail 2	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the second E-mail recipient.
521151/25.4	E-mail Id/ 25.4 E-mail 3	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the third E-mail recipient.
521154/25.5	Send Report/ 25.5 SMS	Off	No	On/Off	Field to enable or disable sending the Report in the form of SMS message.
521252/25.6	SMS Id/ 25.6 SMS 1	Disabled	No	No	Dropdown list to enable or disable the number of the first recipient of the Report in the form of SMS.
521252/25.7	SMS Id/ 25.7 SMS 2	Disabled	No	No	Dropdown list to enable or disable the number of the second recipient of the Report in the form of SMS message.
521252/25.8	SMS Id/ 25.8 SMS 3	Disabled	No	No	Dropdown list to enable or disable the number of the third recipient of the Report in the form of SMS message.
521253	SPN Quantity in Report	No	pcs.	0...10	Number of SPN that can be added during the generation of the Report content.
521347	SPN Value	No	On the fact	0...4294970000	SPN that have digital value and no longer than 4 bytes are allowed to add to the Report.
521367	Specifier. Group	No	On the fact	0...255	Specifying value of SPN which is added to the Report content.
521368	Specifier. Value	No	On the fact	0...255	Additional specifying value of SPN which is added to the Report content.
521150	PGN	No	On the fact	0...65535	PGN which includes SPN which is added to the Report content.
521254	Bus Marker	Not used	No	No	Specification of bus from which the Unit reads SPN which is added to the Report content: - S6 — reading SPN using S6 Technology; - Not used — reading SPN not required.
521188	S6 Address (SA)	100	No	0...255	Network address in CAN-bus of the device which is source of SPN added to the Report content.
Extended Report Generate Attributes PGN 63275					
521151	Enable Report	On	No	On/Off	Field to enable or disable the generation of the selected Report.
521166	Event SPN	No	No	0...4294970000	Dropdown list to select the Event in case of which the Report is to be generated.
521250	Report name	No	No	No	Field to enter the Report name for its identification. We recommend to enter only Roman letters.
521151/12.0	Enable Report/ 12.0 Ignition OFF	On	No	On/Off	Field to enable or disable the generation of the selected Report on condition the Vehicle ignition is OFF.
521151/12.1	Enable Report / 12.1 Ignition ON, stopped	On	No	On/Off	Field to enable or disable the generation of the selected Report on condition the Vehicle ignition is ON, but the Vehicle is not moving.
521151/11.1	Enable Report/ 11.1 Roaming	Off	No	On/Off	Field to enable or disable sending the Report on condition the Vehicle is in the roaming mode.
521154/25.0	Send Report/ 25.0 AVL	On	No	On/Off	Field to enable or disable sending the Report to the Server.
521154/25.1*	Send Report/ 25.1 E-mail	Off	No	On/Off	Field to enable or disable sending the Report by E-mail.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521251*	E-mail ID	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the first Report recipient by E-mail.
521251*	E-mail ID	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the second Report recipient by E-mail.
521251*	E-mail ID	Disabled	No	No	Dropdown list to enable or disable the E-mail address of the third Report recipient by E-mail.
521456*	Attach Track	Disabled	No	No	Enable or disable transmission of a KML-file with a track of the Vehicle movement in Reports "Statistics" and "Timer/Alarm" sent to E-mail addresses.
521154/25.5*	Send Report/ 25.5 SMS	Off	No	On/Off	Field to enable or disable sending the Report in the form of SMS message.
521252*	SMS ID	Disabled	No	No	Dropdown list to enable or disable the number of the first recipient of the Report in the form of SMS.
521252*	SMS ID	Disabled	No	No	Dropdown list to enable or disable the number of the second recipient of the Report in the form of SMS.
521252*	SMS ID	Disabled	No	No	Dropdown list to enable or disable the number of the third recipient of the Report in the form of SMS.
521253	SPN Quantity in Report	No	pcs.	0…10	Number of SPN that can be added during the generation of the Report content.
521347	SPN Value	No	On the fact	0…4294970000	Value of SPN which is added to the Report content.
521367	Specifier. Group	No	On the fact	0…255	Specifying value of SPN which is added to the Report content.
521368	Specifier. Value	No	On the fact	0…255	Additional specifying value of SPN which is added to the Report content.
521150	PGN	No	No	0…65535	PGN which includes SPN which is added to the Report content.
521254	Bus Marker	Not used	No	No	Source from which the CANUp 27 reads SPN of the Event which is added to the Report content: - S6 — source specified by the user when SPN of the Event is read from Units via CAN j1939/S6 interface using S6 Technology; - S7 — source specified by the user when SPN of the Event is read from wireless Units using S7 Technology; - CAN — source assigned automatically, when SPN of the Event is read from a standard Vehicle CAN-bus or ISOBUS using CAN interface; - Not used — source assigned automatically, when SPN of the Event is selected from S6 Database.
521188	S6 Address (SA)	100	No	0…255	Device network address (in the source which is specified in the "Bus marker") which is the source of SPN added to the Report content.
Report Format PGN 63214					
521277	Delivery Method	Disabled	No	No	Enable/Disable transmission of the Report by SMS messages or to E-mail addresses*.
521278	SPN Value View Format	Disabled	No	No	Enable/Disable sending SPN by SMS messages and to E-mail addresses in the form of processed data (converted values taking into account SPN specifications)*.
SPN only for CANUp 27 Standard.					
SPN only for CANUp 27 Pro.					
* Except model CANUp 27 Pro Wi-Fi.					

C.10 Simple Reports Registrator FM

Simple Reports Registrator FM — registers Reports according to sections, corresponding to importance of Reports and the priority of its processing.

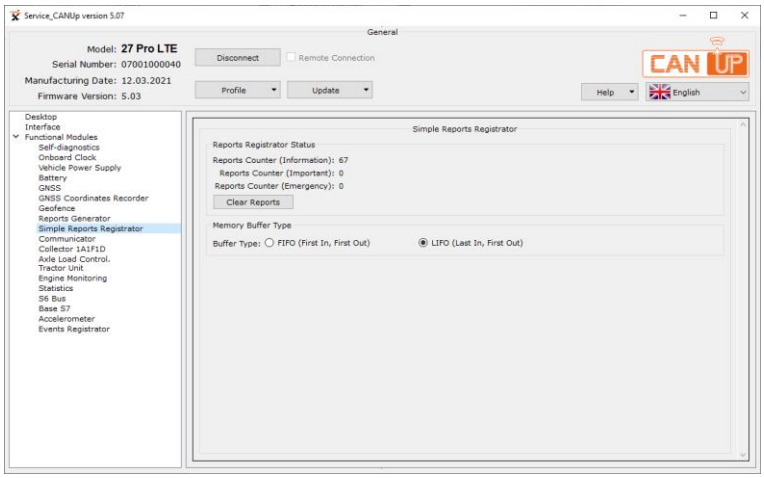


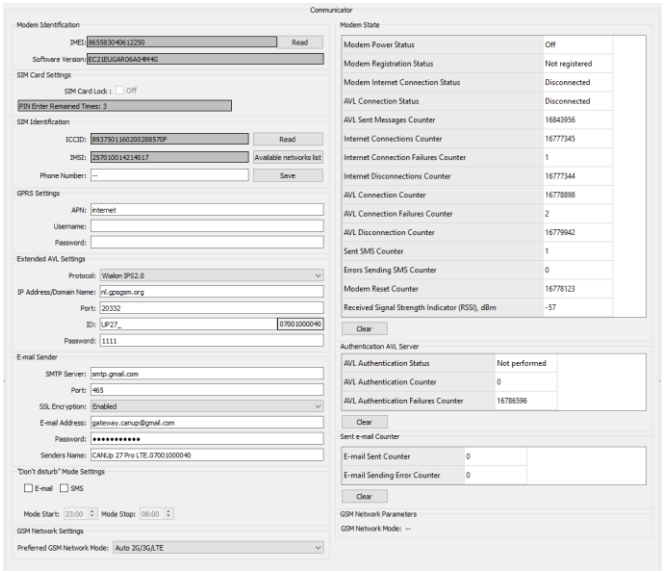
Figure C.10 — Example of settings of the Simple Reports Registrator FM in Service CANUp software

Table C.10 — Reports Registrator FM.
SPNs, displayed and/or editable in Service CANUp software

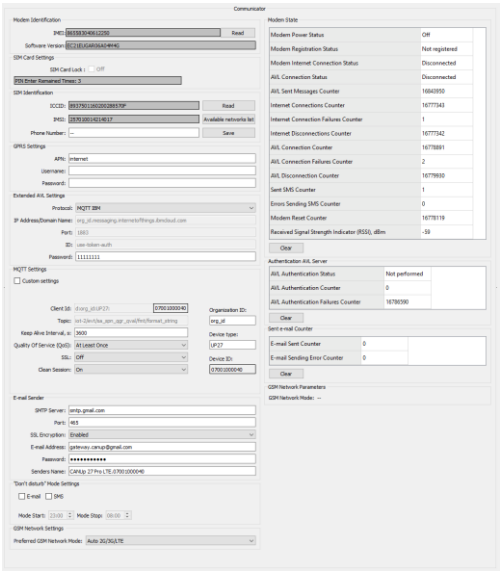
SPN	Name	Factory value	Unit of measure	Clarification
Reports Registrator Status PGN 63079				
521072/21.0	Reports Counter/21.0 Emergency	On the fact	No	Displays current number of registered Reports on emergency Events (for example - "Alarm").
521072/21.1	Reports Counter/21.1 Important	On the fact	No	Displays current number of registered Reports on important Events (for example - "Drain", "Refueling").
521072/21.2	Reports Counter/21.2 Information	On the fact	No	Displays current number of registered Reports on informational Events (for example - "Ignition On/Off", "Satellites detected/lost", "GPRS is available/not available").
Memory Buffer Type PGN 63102				
521489	Buffer Type	LIFO	No	Fields for selecting priority type for sending Reports, accumulated in internal memory while Vehicle was outside of network operator's coverage, to the Server: - FIFO (First In, First Out) – sending accumulated Reports in chronological sequence (i.e. starting from oldest Reports). - LIFO (Last In, First out) – sending accumulated Reports in opposite chronology (i.e. staring from newest Reports).

C.11 Communicator FM

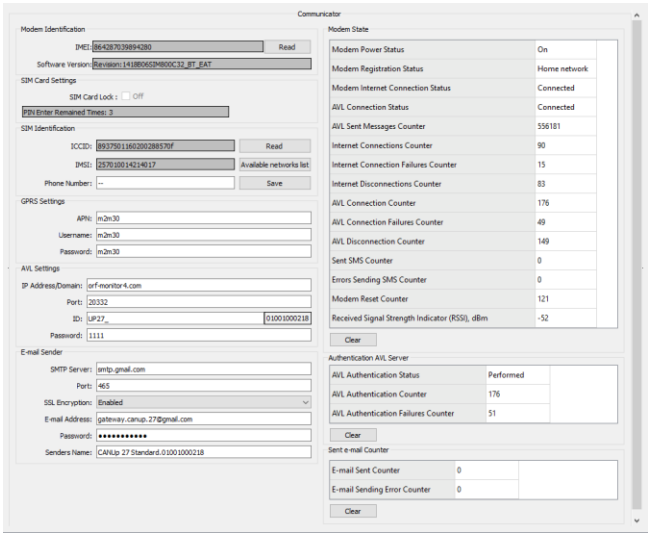
Communicator FM — designed for transmitting of generated onboard reports CANUp 27 Standard / Pro 3G / Pro LTE to the Server/e-mail/SMS, configuration settings of parameters responsible for connection to Internet, AVL Server, FTP Server.



a) for CANUp 27 Pro 3G / Pro LTE (Wialon IPS 2.0 protocol)



b) for CANUp 27 Pro 3G / Pro LTE (MQTT IBM protocol)



c) for CANUp 27 Standard

Figure C.11 — Example of settings of the Communicator FM in Service CANUp software

Table C.11 — Communicator FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Modem Identification PGN 63237				
521281	IMEI	On the fact	No	The International Mobile Equipment Identity is displayed in the cellular communication operator network for the Unit inbuilt modem. The International Mobile Equipment Identity is a unique number consisting of 15 digits in the decimal form in which the last digit is a check-sum digit according to Luhn algorithm, in accordance with ISO/IEC 7812. The data are not available for editing.
521282	Software Version	On the fact	No	The firmware version for the inbuilt GSM modem is displayed. The data are not available for editing.
SIM-card settings PGN 63059				
521625	PIN-code	On the fact	No	PIN-code is a specific sequence of four digits for each SIM-card. Field for entering of PIN-code is displayed while using SIM-card that is password protected.
521628	Remaining Number Of Attempts For PIN-code Entering	On the fact	No	Counter of remaining number of attempts for PIN-code entering of protected SIM-card while not correct PIN-code is entered. The user cannot reset this Counter.
521627	SIM-Card Locking	On the fact	No	SIM-card is locked automatically while PIN-code is entered incorrectly. To unlock the SIM-card enter its present correct PIN-code and turn locking off.
SIM Identification PGN 63238				
521283	ICCID	On the fact	No	The unique serial number of SIM Card (Integrated Circuit Card Identifier) is displayed. The serial number is printed on the SIM card and contains 19 digits; their values are specified, in accordance with ITU-T E.118 Standard. The data are not available for editing.
521284	IMSI	On the fact	No	The International Mobile Subscriber Identity associated with an individual user of GSM mobile communication. The data are not available for editing.
521020	Phone Number	On the fact	No	Field to enter the telephone number corresponding to the SIM card which is used. The number is entered in the international format. This setting is optional.
GPRS Settings PGN 63020				
521619	Access Point GPRS	internet	No	It is necessary to enter access point address of GSM provider (APN) for connecting Unit to the Internet. Access point address can be obtained from GSM service provider which SIM-card is installed into the Unit.
521620/13.0	User Name/13.0 Access Point GPRS	No	No	It is necessary to enter access point user name for Unit authorization while connecting to the Internet. User name can be obtained from GSM service provider which SIM-card is installed into the Unit.
521621/13.0	Password/13.0 Access Point GPRS	No	No	It is necessary to enter access point user password for Unit authorization while connecting to the Internet. User password can be obtained from GSM service provider which SIM-card is installed into the Unit.
AVL Settings PGN 63068				
521622/13.2	IP Address/ Domain/ 13.2 Automatic Vehicle Location	On the fact	No	It is necessary to enter IP- or URL- address of AVL Server that CANUp 27 Standard is establishing connection with for transmitting Onboard reports.
521623/13.2	Port/13.2 Automatic Vehicle Location	On the fact	No	It is necessary to enter opened port number of AVL Server that will be used for communicating with CANUp 27 Standard.

SPN	Name	Factory value	Unit of measure	Clarification
521080/13.2	ID/13.2 Automatic Vehicle Location	UP27_XXXXXXXXXX (XXXXXXXXXX — CANUp 27 Standard serial number, automatically generated)	No	It is necessary to enter prefix for CANUp 27 Standard identification at AVL Server. Fields of entered prefix have to match with the settings of "Unique ID" field while registering vehicle at ORF4 Telematics Server (see User manual).
521621/13.2	Password/13.2 Automatic Vehicle Location	On the fact	No	It is necessary to enter password for CANUp 27 Standard authentication at the AVL server.
Extended AVL Settings PGN 63232				
521595/13.2	IP Address/ Domain/ 13.2 Automatic Vehicle Location	nl.gpsgsm.org	No	You need to enter IP- or URL-address of AVL Server with which CANUp 27 Pro 3G / Pro LTE is establishing communication to transmit Onboard reports: - orf-monitor4.com (for protocol Wialon IPS2.0); - org_id.messaging.internetofthings.ibmcloud.com (for protocol MQTT IBM).
521623/13.2	Port/13.2 Automatic Vehicle Location	On the fact	No	You need to enter the number of the open port of AVL Server which will be used for communication with CANUp 27 Pro 3G / Pro LTE.
521080/13.2	ID/13.2 Automatic Vehicle Location	UP27_XXXXXXXXXX (XXXXXXXXXX — CANUp 27 Pro 3G/ Pro LTE serial number, automatically generated)	No	You need to enter a prefix CANUp 27 Pro 3G / Pro LTE identification at AVL Server. The fields of the prefix entered must match the fields of ID setting during the Vehicle registration at ORF 4 Telematics Service or at IBM Watson IoT platform: - UP27_ XXXXXXXXXX (for protocol Wialon IPS2.0); - use-token-auth XXXXXXXXXX (for protocol MQTT IBM). (XXXXXXXXXX — serial number of CANUp 27 Pro 3G / Pro LTE, is entered automatically)
521594/13.2	Password/13.2 Automatic Vehicle Location	On the fact	No	You need to enter for CANUp 27 Pro 3G / Pro LTE authentication at AVL Server.
521399/13.2	Protocol/13.2 Automatic Vehicle Location	Wialon IPS2.0	No	From the dropdown list you need to select the required communication protocol for transmission of Onboard reports by CANUp 27 Pro 3G / Pro LTE to AVL Server: - Wialon IPS2.0 (Onboard reports format see in annex A); - MQTT IBM (see annex F).
MQTT Settings PGN 63258				
521039	Client Id	d:org_id:UP27:XXXXXXXXXX (XXXXXXXXXX — CANUp 27 Pro 3G / Pro LTE serial number, automatically generated)	No	Field to enter Client ID used in Connect Message (see annex F) to establish connection between CANUp 27 Pro 3G / Pro LTE and IBM Watson IoT Server. The field is accessible for editing after the user settings are enabled. There is an option for individual editing in the respective fields of lines that are contained in the Client ID: - org_id — ID of organization assigned during the registration at IBM Watson IoT platform; - device_type — type of device specified during the registration at IBM Watson IoT platform.
521040	Topic	iot-2/evt/sa_spn_qgr_qval/fmt/format_string	No	Field to enter variable name of Publish Message (see annex F) used for transmission of Onboard Reports by CANUp 27 Pro 3G / Pro LTE to the Server of IBM Watson IoT platform. The field is accessible for editing after the user settings are enabled.
521041	Keep Alive Interval	3600	s	Field to enter the maximum interval of time in seconds during which the connection between CANUp 27 Pro 3G / Pro LTE and IBM Watson IoT Server platform will be active without any traffic.
521042	Quality Of Service (QoS)	At Least Once	No	From the dropdown list select one of quality levels of Onboard reports: - No more than once — on this level, CANUp 27 Pro 3G / Pro LTE sends a Report to the Server only once, not expecting the delivery confirmation; - At least, once — this level ensures that the Report from CANUp 27 Pro 3G / Pro LTE will be delivered to the Server of IBM Watson IoT platform; however, there is a possibility of sending Reports duplicates.

SPN	Name	Factory value	Unit of measure	Clarification
521087	Clean Session	On	No	From the dropdown list select one version of completing the session during the user disconnection from the Server of IBM Watson IoT platform: - OFF — The Server saves the session and all user settings. All Reports of CANUp 27 Pro 3G / Pro LTE accumulated during the OFF period will be automatically transmitted to the user during his next connection; - ON — During the next connection the user he will have to conduct another configuration in order to receive CANUp 27 Pro 3G / Pro LTE Reports from the Server.
E-Mail Sender PGN 63145				
521618	SMTP Server	smtp.gmail.com	No	Field to enter the address of SMTP Server. It is allowed to use no more than 32 characters (Roman letters, dots). SMTP Server is the network protocol of e-mail transmission (Simple Mail Transfer Protocol) in TCP/IP networks. The main functions of SMTP Server: - checkup of correctness of settings and authorization for Unit to send a Report; - sending a Report to the specified address by the Unit. If the delivery is impossible, the Server transmits to the sender a sending error message.
521623/13.3	Port/ 13.3 SMTP Server	465	No	Field to enter SMTP-port number to retransmit Reports from the Unit. It is allowed to use no more than 5 digits. Port 465 is used to send letters encoded in accordance with SSL protocol. This connection is better protected than the usual TCP/IP.
521617/13.3	SSL Encryption/ 13.3 SMTP Server	Enabled	No	From the dropdown list you may enable or disable encoding Reports according to the level of SSL (Secure Sockets Layer). SSL encoding is the cryptographic protocol used for enhanced security data transmission by E-mail.
521242	E-mail Address	On the fact	No	Field to enter the address of mailbox from which the Unit will send Reports to E-mail addresses of users. It is allowed to use no more than 64 characters (Roman letters, digits, dots).
521621	Password	On the fact	No	Field to enter password to the Unit E-mail mailbox. It is allowed to use no more than 16 characters (only Roman letters, digits and special characters).
521616	Senders Name	On the fact	No	Field to enter the name of the Unit from which Reports are to be sent by E-mail. The maximum length of address – 48 characters. It is allowed to use only Roman letters, digits, dots, as well as the following characters: dash, dot, underlining and space. By default: CANUp 27 Pro 3G.XXXXXXXXXX / CANUp 27 Pro LTE.XXXXXXXXXX / CANUp 27 Standard.XXXXXXXXXX, Where XXXXXXXXXX — serial Unit number. The data are entered automatically, but accessible for editing.
"Don't disturb" Mode Settings** PGN 63267				
521420/25.1	Don't Disturb Mode Active/25.1 E-mail	Off	No	Field to enable or disable sending Reports by E-mail by the Unit during the specified time interval.
521420/25.5	Don't Disturb Mode Active/25.5 SMS	Off	No	Field to enable or disable sending Reports as SMS messages by the Unit during the specified time interval.
960/24.2	Minutes/ 24.2 Mode Start	00	min	Field to enter minutes for the start of the time interval during which sending Reports by E-mail and/or as SMS messages by the Unit is disabled. The field is accessible for editing only if sending Reports by E-mail and/or as SMS messages is enabled.

SPN	Name	Factory value	Unit of measure	Clarification
961/24.2	Hours/ 24.2 Mode Start	23	h	Field to enter hours for the start of the time interval during which sending Reports by E-mail and/or as SMS messages is disabled. The field is accessible for editing only if sending Reports by E-mail and/or as SMS messages is enabled.
960/24.3	Minutes/ 24.3 Mode Stop	00	min	Field to enter minutes for the end of the time interval during which sending Reports by E-mail and/or as SMS messages by the Unit is disabled. The field is accessible for editing only if sending Reports by E-mail and/or as SMS messages is enabled.
961/24.3	Hours/ 24.3 Mode Stop	8	h	Field to enter hours for the end of the time interval during which sending Reports by E-mail and/or as SMS messages by the Unit is disabled. The field is accessible for editing only if sending Reports by E-mail and/or as SMS messages is enabled.
GSM Network Settings** PGN 63179				
521335	Preferred GSM Network Mode	Auto 2G/3G/LTE	No	From the dropdown list you may select the cellular communication standard for the Unit inbult GSM modem: - Auto 2G/3G/LTE — automatic switching between GSM 2G / GSM 3G / GSM 4G networks; - Only 2G — operation only in GSM 2G networks; - Only 3G — operation only in GSM 3G networks; - Only LTE (NB-IoT) — operation only in GSM 4G networks. In the majority of cases, we recommend to use "Auto 2G/3G/LTE" during the Unit operation in home network. However, in some cases enabling "Only 2G" or "Only 3G" modes may improve the operation of the Unit inbuilt modem. E.g. if the Vehicle is outside the 3G network signal coverage area, enabling "Only 2G" mode will save the battery charge in case of using the inbuilt accumulator. Besides, enabling "Only 3G" mode, when the signal is feeble, will provide more stable and higher speed Internet connection of modem.
GSM Network Parameters** PGN 63178				
521334	GSM Network Mode	On the fact	No	The setting displays the cellular communication standard which is currently used by the Unit inbult GSM modem: 2G / 3G / 4G.
Modem Status PGN 63007				
521130	GPRS Modem Power Status	On the fact	No	This setting displays present GPRS modem power status (On/Off).
521131	Modem Registration Status In The Network	On the fact	No	This setting displays present GPRS modem registration status in GSM network (No network/Home network/Roaming).
521132	Modem Connection Status To The Internet	On the fact	No	This setting displays present GPRS modem connection status to the Internet (Connected/Disabled).
521133	Connection Status Of AVL To The Server	On the fact	No	This setting displays present status of GPRS modem connection to AVL server (Connected/Disabled).
521140	Number Of Messages Transmitted Via GPRS	On the fact	pcs.	Counter of Onboard Reports transmitted by modem to AVL server address via GPRS channel*.
521141	Number Of Successful Internet Connections	On the fact	pcs.	Counter of successful GPRS modem connections to the Internet*.
521142	Number Of Internet Connection errors	On the fact	pcs.	Counter of GPRS modem connection errors to the Internet*.
521143	Number Of Internet disconnections	On the fact	pcs.	Counter of GPRS modem disconnections from the Internet*.
521144	Number Of Connections To AVL Server	On the fact	pcs.	Counter of GPRS modem connections to AVL Server*.

SPN	Name	Factory value	Unit of measure	Clarification
521145	Number Of Connection Errors To AVL Server	On the fact	pcs.	Counter of GPRS modem connection errors to AVL Server*.
521146	Number Of Disconnections From AVL Server	On the fact	pcs.	Counter of GPRS modem disconnections from AVL Server*.
521147	Number Of Sent SMS	On the fact	pcs.	Counter of sent SMS commands for remote configuration of CANUp 27*.
521148	Number Of SMS Sent Errors	On the fact	pcs.	Counter of sent SMS command errors for remote configuration of CANUp 27*.
521149	Number Of GPRS Modem Resets	On the fact	pcs.	Counter of automatic GPRS modem resets while GPRS modem has operation errors*.
521178	Received Signal Strength Indication (RSSI)	On the fact	dBm	This setting displays present level of signal strength (on a logarithmic scale) received by GPRS modem receiver. Produced range: from -52 to -115 dBm.
Authentication At AVL Server PGN 63099				
521175	Authentication Status On AVL Server	On the fact	No	This setting displays present authentication status (originality check) of CANUp 27 at AVL Server (Completed/Not completed).
521176	Number Of Successful Authentications At AVL Server	On the fact	pcs.	Counter of successful authentications of CANUp 27 at AVL Server*.
521177	Number Of Authentication Errors At AVL Server	On the fact	pcs.	Counter of authentication errors of CANUp 27 at AVL Server*.
Sent E-Mail Counter PGN 63147				
521240	E-Mail Sent Counter	On the fact	pcs.	Counter of number of Reports sent by e-mail*.
521241	E-Mail Sending Error Counter	On the fact	pcs.	Counter of number of failed Report by e-mail sending attempts*.

* User can reset values of all Counters PGN 63007, PGN 63099 and (or) PGN 63147 if it is necessary.
** Settings are relevant only for CANUp 27 Pro 3G / Pro LTE.

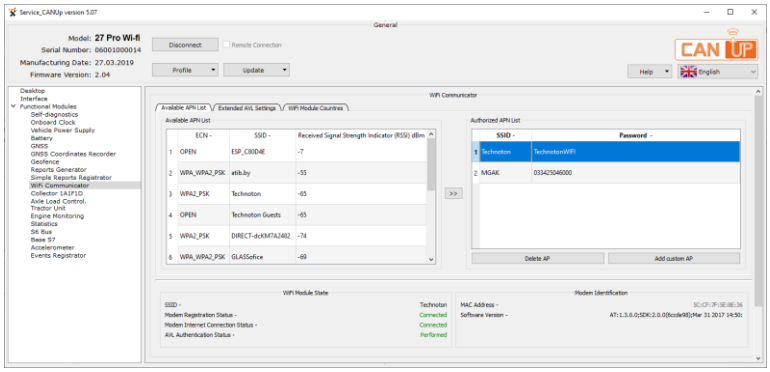
Obligatory settings for CANUp 27 Standard/CANUp 27 Pro 3G / Pro LTE, required for connecting to Internet and sending Reports to Server.

Obligatory settings only for CANUp 27 Standard.

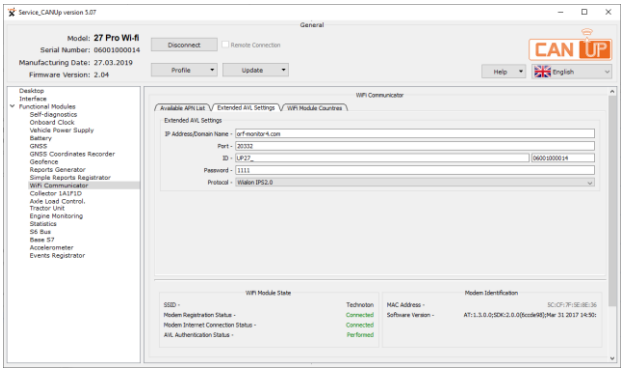
Obligatory settings only for CANUp 27 Pro 3G / Pro LTE.

C.12 WiFi Communicator FM

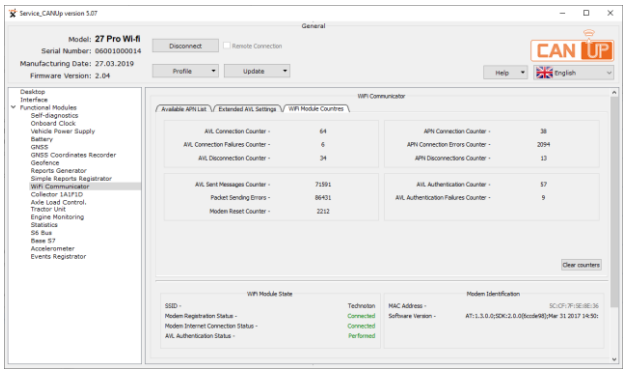
WiFi Communicator FM — is designed for transmission of generated Onboard reports of CANUp 27 Pro Wi-Fi via Internet using the Wi-Fi access point to the Server, for configuration of parameters of connection to AVL Server, for diagnostics of the inbuilt Wi-Fi module.



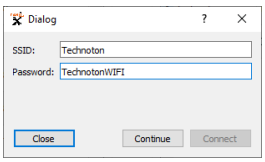
a) list of available access points



b) extended AVL Server settings



c) Counters of WiFi module



d) connection of Wi-Fi access point

Figure C.12 — Example of settings of the WiFi Communicator FM in Service CANUp software

Table C.12 — WiFi Communicator FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Authentication At AVL Server PGN 63099				
521175	Authentication Status On AVL Server	On the fact	No	This setting displays the current status of authentication (authenticity check) of CANUp 27 Pro Wi-Fi at AVL Server (Completed/Not completed).
521176	Number Of Successful Authentications At AVL Server	On the fact	pcs.	Counter of number of successful CANUp 27 Pro Wi-Fi authentications at AVL Server*.
521177	Number of Authentication Errors At AVL Server	On the fact	pcs.	Counter of authentication errors of CANUp 27 Pro Wi-Fi at AVL Server*.

SPN	Name	Factory value	Unit of measure	Clarification
WiFi Module State PGN 63281				
521106	SSID	On the fact	No	Field to enter the ID of access point (SSID) used for wireless connection of CANUp 27 Pro Wi-Fi to Internet. Maximum length: 32 characters. It is allowed to use only Roman letters, digits as well as characters: dash, dot, underlining and space.
521131	Modem Registration Status	On the fact	No	This setting displays the current status of registration of the inbuilt Wi-Fi modem of CANUp 27 Pro Wi-Fi at the authorized access point (Enabled/Disabled).
521132	Modem Internet Connection Status	On the fact	No	This setting displays the current status of the Internet connection of CANUp 27 Pro Wi-Fi modem (Enabled/Disabled).
521105	ECN	On the fact	No	This setting displays the type of confidential information protection (WEP/WPA/WPA2/PSK) which is used in the authorized access point.
521178	Received signal strength indication (RSSI)	On the fact	dBm	This setting displays the current level of signal power (in the logarithmic scale) received by CANUp 27 Pro Wi-Fi modem from the Wi-Fi access point. The range displayed: from -52 to -115 dBm.
WiFi Module Counters* PGN 63282				
521107	APN Connection Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt modem connections to the authorized access point.
521108	APN Connection Errors Counter	On the fact	pcs.	Counter of errors of CANUp 27 Pro Wi-Fi inbuilt modem connections to the authorized access point.
521109	APN Disconnections Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt modem disconnections from the authorized access point.
521144	AVL Connection Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt modem connections to AVL Server.
521145	AVL Connection Failures Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt modem connection errors while connecting to AVL Server.
521146	AVL Disconnection Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt modem disconnections from AVL Server.
521140	AVL Sent Messages Counter	On the fact	pcs.	Counter of Onboard reports transmitted by CANUp 27 Pro Wi-Fi via Internet AVL Server.
521110	Packet Sending Errors	On the fact	pcs.	Counter of Onboard reports transmission errors by CANUp 27 Pro Wi-Fi at AVL Server.
521149	Modem Reset Counter	On the fact	pcs.	Counter of CANUp 27 Pro Wi-Fi inbuilt Wi-Fi modem restarts in cases of its operation failures.
Available APN List PGN 63283				
521355	Array Elements Count	On the fact	pcs.	List of available access points (routers) for Internet connection identified by the inbuilt Wi-Fi modem of CANUp 27 Pro Wi-Fi he area. This list may contain any number of routers in the coverage area of the inbuilt Wi-Fi modem of CANUp 27 Pro Wi-Fi.
521105	ECN	On the fact	No	This setting displays the type of data confidentiality protection (WEP/WPA/WPA2/PSK) used in a specific access point.
521106	SSID	On the fact	No	Identifiers (SSID) of access points (routers) that can be identified in the local area by the inbuilt Wi-Fi modem of CANUp 27 Pro Wi-Fi.
521178	Received Signal Strength Indicator (RSSI)	On the fact	dBm	This setting displays the current level of signal power (in the logarithmic scale) received by CANUp 27 Pro Wi-Fi modem from the access point. The range displayed: from -52 to -115 dBm.

SPN	Name	Factory value	Unit of measure	Clarification
Extended AVL Settings PGN 63232				
521595/13.2	IP Address/ Domain/ 13.2 Automatic Vehicle Location	On the fact	No	You need to enter IP- or URL-address of AVL Server with which CANUp 27 Pro Wi-Fi is establishing communication to transmit Onboard reports.
521623/13.2	Port/13.2 Automatic Vehicle Location	On the fact	No	You need to enter the number of the open port of AVL Server which will be used for communication with CANUp 27 Pro Wi-Fi.
521080/13.2	ID/13.2 Automatic Vehicle Location	UP27_ XXXXXXXXXX (XXXXXXXXXX — CANUp 27 Pro Wi-Fi, serial number, automatically generated)	No	You need to enter a prefix CANUp 27 Pro Wi-Fi identification at AVL Server. The fields of the prefix entered must match the fields of ID setting during the Vehicle registration at ORF 4 Telematics Service or at IBM Watson IoT platform: - UP27_XXXXXXXXXX (for protocol Wialon IPS2.0); - use-token-auth XXXXXXXXXX (for protocol MQTT IBM). (XXXXXXXXXX — serial number of CANUp 27 Pro Wi-Fi, entered automatically)
521594/13.2	Password/13.2 Automatic Vehicle Location	On the fact	No	You need to enter password for CANUp 27 Pro Wi-Fi authentication at AVL Server.
521399/13.2	Protocol/13.2 Automatic Vehicle Location	Wialon IPS2.0	No	From the dropdown list you need to select the required communication protocol for transmission of Onboard reports by CANUp 27 Pro Wi-Fi to AVL Server: - Wialon IPS2.0 (Onboard reports format see in annex A); - MQTT IBM (see annex F).
MQTT settings PGN 63258				
521039	Client Id	d:org_id:UP27:XXXXXXXXXX (XXXXXXXXXX — CANUp 27 Pro Wi-Fi, serial number, automatically generated)	No	Field to enter Client ID used in Connect Message (see Annex F) to establish connection between CANUp 27 Pro Wi-Fi and IBM Watson IoT Server. The field is accessible for editing after the user settings are enabled. There is an option of individual editing in the respective fields of lines that are contained in the Client ID: - org_id — ID of organization assigned during the registration at IBM Watson IoT platform; - device_type — type of device specified during the registration at IBM Watson IoT platform.
521040	Topic	iot-2/evt/sa_spn_qgr_qval/fmt/format_string	No	Field to enter variable name of Publish Message (see Annex F) used for transmission of Onboard reports by CANUp 27 Pro Wi-Fi to the Server of IBM Watson IoT platform. The field is accessible for editing after the user settings are enabled.
521041	Keep Alive Interval	3600	s	Field to enter the maximum interval of time in seconds during which the connection between CANUp 27 Pro Wi-Fi and IBM Watson IoT Server platform will be active without any traffic.
521042	Quality Of Service (QoS)	At Least Once	No	From the dropdown list select one of quality levels of Onboard reports: - No more than once — on this level, CANUp 27 Pro Wi-Fi sends a Report to the Server only once, not expecting the delivery confirmation; - At least once — this level ensures that the Report from CANUp 27 Pro Wi-Fi will be delivered to the Server of IBM Watson IoT platform; however, there is a possibility of sending Reports duplicates.
521087	Clean Session	On	No	From the dropdown list select one version of completing the session during the user disconnection from the Server of IBM Watson IoT platform: - OFF — the Server saves the session and all user settings. All Reports of CANUp 27 Pro Wi-Fi accumulated during the OFF period will be automatically transmitted to the user during his next connection; - ON — during the next connection the user he will have to conduct another configuration in order to receive CANUp 27 Pro Wi-Fi Reports from the Server.

SPN	Name	Factory value	Unit of measure	Clarification
Authorized APN List PGN 63284				
521355	Array Elements Count	On the fact	pcs.	List of Authorized Access Points (routers) for Internet connection of CANUp 27 Pro Wi-Fi. To create this list, the user may select a router from the List of Available Access Points or add a user access point (see figure C.12 d). To connect CANUp 27 Pro Wi-Fi to the access point, the user must enter its password in the respective field. In case he needs, the user may delete any router from the List of Authorized Access Points. The maximum number of routers in the List of Authorized Access Points is 10. CANUp 27 Pro Wi-Fi may be connected to only one authorized access point.
521106	SSID	On the fact	No	Identifiers (SSID) of routers in the List of Authorized Access Points.

***** User can reset values of all Counters PGN 63282 if it is necessary.

— Obligatory settings for CANUp 27 Pro Wi-Fi, required for connecting to Internet and sending Reports to Server.

C.13 Collector 1A1F1D FM

Collector 1A1F1D FM — used for receiving and transformation of analog/frequency/pulse/ discrete signal to digital values of SPN parameters.

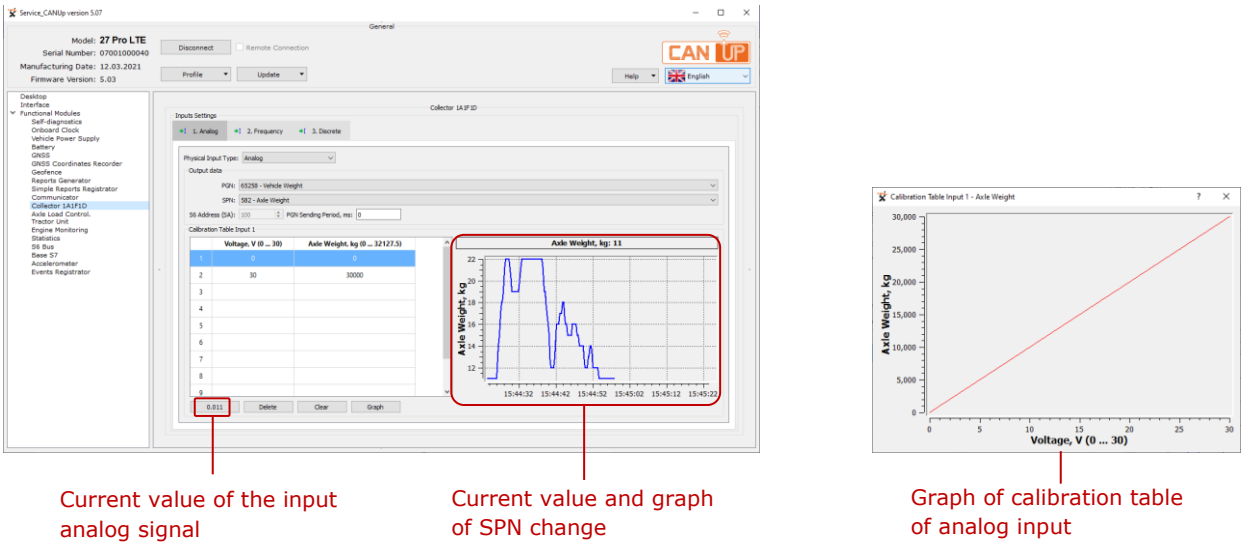


Figure C.13 — Example of settings of the Collector 1A1F1D FM in Service CANUp software

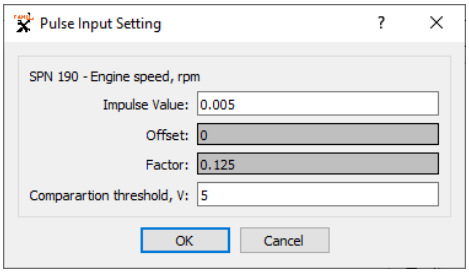


Figure C.14 — Example of window of configuration of pulse input

Table C.13 — Collector 1A1F1D FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Inputs Settings (PGN 63100)					
521363	Inputs Quantity	3	No	No	Number of physical inputs of CANUp 27.
521364	Input Number	0	No	No	Select I1 group of contacts of analog physical input of CANUp27.
521150	PGN	65258 Vehicle weight	No	0…65535	Enter output PGN, which will contain SPN parameter converted from analog signal. PGN can be selected through Service software from the list, containing most important Vehicle parameters, or from the extended S6 DB list.
1214	SPN	582 Axle weight	No	0…524287	Select SPN, which should be resulted from converting analog signal.
521188	S6 Address (SA)	100	No	0…255	Enter unique network address (SA) of CANUp 27 connected via S6 Technology. SA cannot be edited if PGN is sent "on request".

SPN	Name	Factory value	Unit of measure	Range	Clarification
521362	PGN Sending Period	0	ms	0…4294970000	Enter time interval (in ms) of sending generated PGN via S6 Technology. For "on request" sending, enter 0 ms.
521364	Input Number	1	No	No	Contact group 12 of frequency/counting physical input of CANUp 27 is selected.
521150	PGN	PGN 61444 Electronic Engine Controller 1	No	0…65535	Output PGN containing SPN parameter converted from frequency or pulse signal is specified. PGN can be selected through Service software from the list, containing most important Vehicle parameters, or from the extended S6 DB list.
1214	SPN	SPN 190 Engine speed	No	0…524287	SPN which is to be received as a result of frequency/pulse signal conversion is selected.
521188	S6 Address (SA)	100	No	0…255	Enter unique network address (SA) of CANUp 27 connected via S6 Technology. SA cannot be edited if PGN is sent "on request".
521362	PGN Sending Period	50	ms	0…4294970000	Enter time interval (in ms) of sending generated PGN via S6 Technology. For "on request" sending, enter 0 ms.
521364	Input Number	2	No	No	Contact group 13 of discrete physical input of CANUp 27 is selected.
521150	PGN	PGN 64960 Passenger Counter	No	0…65535	Output PGN containing SPN parameter converted from discrete signal is specified. PGN can be selected through Service software from the list, containing most important Vehicle parameters, or from the extended S6 DB list.
1214	SPN	SPN 3044 Silent Alarm Status	No	0…524287	SPN which is to be received as a result of discrete signal conversion is selected.
521188	S6 Address (SA)	100	No	0…255	Enter unique network address (SA) of CANUp 27 connected via S6 Technology. SA cannot be edited if PGN is sent "on request".
521362	PGN Sending Period	0	ms	0…4294970000	Enter time interval (in ms) of sending generated PGN via S6 Technology. For "on request" sending, enter 0 ms.
Calibration Table Input 1 (PGN 63101)					
521431	Physical Input/Output Type Mask	4	No	0…255	Bit mask containing a description of possible functions of input 1: 0 – Not supported; 4 – Analog (by default).
521365	Physical input type	4-Analog	V	0…30	Analog type of the signal physical input (value of the bit mask – 4) is selected from the dropdown list. The user can also deactivate the analog input support. In such a case, all settings of the input will become inaccessible for editing.
521355	Array Elements Count	2	pcs.	1…10	Number of points of the calibration table which is created during the configuration of the input. The maximum number of calibration points – 10.
521366	Signal input value	0; 30	V	0…4294970000	For points of the calibration table of input 1 values of analog input signal are specified*.
521347	SPN value	0; 30000	kg	0…4294970000	For points of the calibration table of input 1 values of converted SPN parameter are specified*.
Calibration Table Input 2 (PGN 63153)					
521431	Physical Input/Output Type Mask	48	No	0…255	Bit mask containing a description of possible functions of input 2: 0 – Not supported; 16 – Frequency (by default); 32 – Counting.
521365	Physical input type	16- Frequency	kHz (for frequency input) No (for counting input)	0.001…10 (for frequency input) No (for counting input)	Selected from the dropdown list: Frequency (bit mask value 16) or Counting (bit mask value 32) type of the signal physical type. The user can also deactivate the input supprt. In such a case, all input settings will become inaccessible for editing.
521355	Array Elements Count	2	pcs.	1…10	Number of points of the calibration table created during the frequency input configuration. The maximum number of calibration points – 10.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521366	Signal input value	On the fact	On the fact	0…4294970000	In case of selecting the counting physical type, the calibration table is inactive. For points of the calibration table of input 2, only values of frequency input signal are specified*.
521347	SPN value	On the fact	On the fact	0…4294970000	For points of the calibration table of input 2 values of converted SPN parameter are specified*.
Pulse Input Setting (PGN 63509)					
521274	Impulse Value	On the fact	On the fact	0…4294967295	Coefficient which defines the amount of physical value corresponding to one input pulse is specified. (see figure C.14). E.g. one pulse of DFM fuel flow meter corresponds to the volume of fuel which has passed through its measuring chamber. The flow meter pulse value is specified in its operation documentation.
521295	Offset	0	On the fact	0…4294970000	Offset attribute is introduced; it is necessary for automatic calculation of value of SPN received as a result of the pulse signal conversion.
521296	Factor	1	On the fact	0…4294970000	Factor attribute is introduced; it is necessary for automatic calculation of value of SPN received as a result of the pulse signal conversion.
521678	Comparartion threshold	On the fact	On the fact	0…3212.75	The minimum value of input signal amplitude is specified which, in case it is surpassed, is counted as a pulse.
Calibration Table Input 3 ((PGN 63154)					
521431	Physical Input/Output Type Mask	8	No	0…255	Bit mask containing a description of possible functions of input 3: 0 – Not supported; 8 – Discrete.
521365	Physical input type	8-Discrete	No	U_{PS}…3 (“0”) 3…0 (“1”) (U_{PS} — voltage of power supply source)	Discrete type of the signal physical input (value of the bit mask – 8) is selected from the dropdown list. The user can also deactivate the discrete input support. In such a case, all settings of the input will become inaccessible for editing.
521355	Array Elements Count	2	pcs.	1…10	Number of points of the calibration table created during the discrete input configuration. The maximum number of calibration points – 2.
521366	Signal input value	0; 3	V	0…4294970000	For points of the calibration table of input 3 values of the discrete input signal corresponding to two states of pressing the emergency button are specified*.
521347	SPN value	“1”; “0”	On the fact	0…4294970000	For points of the calibration table of input 3 two states of pressing the emergency button are specified which correspond to “0” and “1” values of the discrete input signal*.
Physical Inputs Signal Level (PGN 63298)					
521366	Signal Input Value	0	V Hz	0…4294970000	The current value of the input signal (analog/frequency/discrete) displayed on the button below the calibration table in the process of calibration of the respective physical input.

Settings of analog physical input.

Settings of frequency/counting physical input.

Settings of discrete physical input.

* By default, the table contains two points corresponding to the extreme values of the input signal range of fluctuations. You can specify the maximum of 10 calibration points (for discrete input – 2 points). After pressing “Graph” button, the graph of dependence of values of the converted parameter of SPN on input signal values is displayed, in accordance with the calibration table (see example in figure C.13).

C.14 Axle Load Control. Tractor Unit FM

Axle Load Control. Tractor Unit FM — designed for obtaining real-time data on current Vehicle load per axle, total trip and operation time in different modes of axle load, Events of loading/unloading/overloading Vehicle, as well as the trailer coupling/uncoupling.

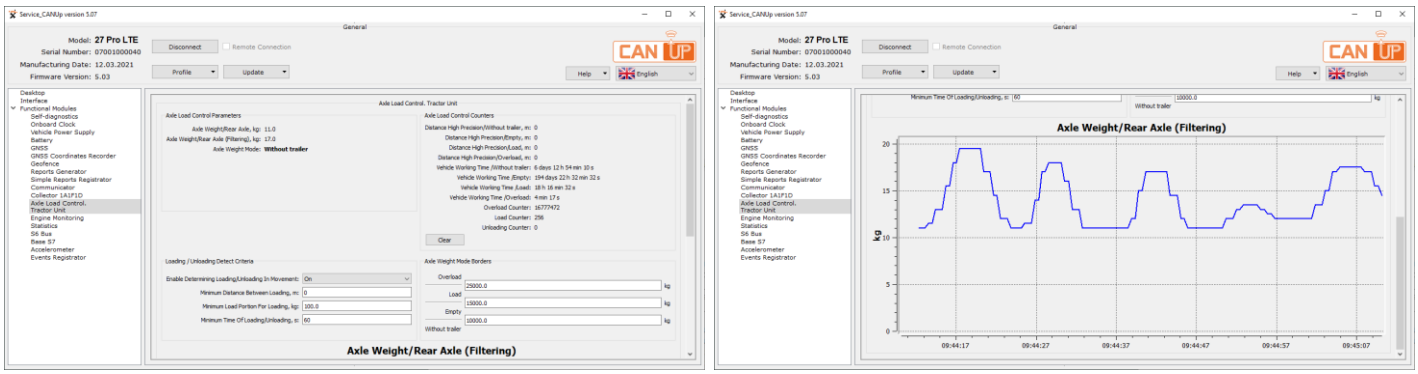


Figure C.15 — Example of settings of the Axle Load Control. Tractor Unit FM in Service CANUp software

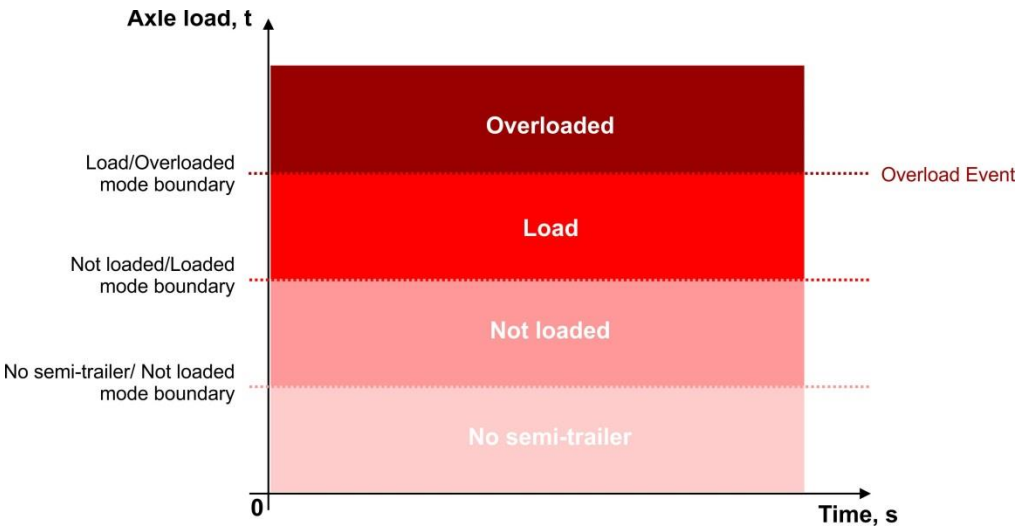


Figure C.16 — Axle load mode boundaries

Table C.14 — Axles Load Monitoring FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Axle Load Control Parameters PGN 62985					
582/19.2	Axle weight/ 19.2 Rear axle	On the fact	kg	0…32127.5	Displays current value of load on rear axle of Vehicle.
582/19.2/2.10	Axle weight/ 19.2 Rear axle / 2.10 Filtering	On the fact	kg	0…32127.5	Displays filtrated current value of load on rear axle of Vehicle, i.e. values filtrated during pre-set time interval.
521182	Axle weight Mode	On the fact	No	No	Vehicle operation mode according to current value of axle load (see figure C.16).

SPN	Name	Factory value	Unit of measure	Range	Clarification
Axle Load Control Counters PGN 62986					
521004/10.0	Distance high precision/ 10.0 Without trailer	On the fact	m	0…4211080000	Displays total distance, covered by Vehicle in operation mode corresponding to axle load without a semi-trailer. The counter can be reset by user.
521004/10.1	Distance high precision/ 10.1 Empty	On the fact	m	0…4211080000	Displays total distance, covered by Vehicle in operation mode corresponding to axle load with unloaded semi-trailer. The counter can be reset by user.
521004/10.2	Distance high precision / 10.2 Load	On the fact	m	0…4211080000	Displays total distance, covered by Vehicle in operation mode corresponding to axle load with loaded semi-trailer. The counter can be reset by user.
521004/10.3	Distance high precision/ 10.3 Overload	On the fact	m	0…4211080000	Displays total distance, covered by Vehicle in operation mode when maximum allowed load per axle was exceeded. The counter can be reset by user.
521057/10.0	Vehicle working time/ 10.0 Without trailer	On the fact	s	0…4211080000	Displays total time of Vehicle in operation mode corresponding to axle load without a semi-trailer. The counter can be reset by user.
521057/10.1	Vehicle working time/ 10.1 Empty	On the fact	s	0…4211080000	Displays total time of Vehicle in operation mode corresponding to axle load with unloaded semi-trailer. The counter can be reset by user.
521057/10.2	Vehicle working time/ 10.2 Load	On the fact	s	0…4211080000	Displays total time of Vehicle in operation mode corresponding to axle load with loaded semi-trailer. The counter can be reset by user.
521057/10.3	Vehicle working time/ 10.3 Overload	On the fact	s	0…4211080000	Displays total time of Vehicle in operation mode when maximum allowed load per axle was exceeded. The counter can be reset by user.
521036	Overload Counter	On the fact	pcs.	0…4211080000	Displays number of recorded facts of exceeding maximum allowed load per axle of Vehicle. The counter can be reset by user.
521037	Load Counter	On the fact	pcs.	0…4211080000	Displays number of recorded facts of loading cargo to semi-trailer. The counter can be reset by user.
521038	Unloading Counter	On the fact	pcs.	0…4211080000	Displays number of recorded facts of unloading cargo from semi-trailer. The counter can be reset by user.
Loading/Unloading Detect Criteria PGN 63151					
521258	Enable determining Loading/Unloading in movement	On	No	On/Off	Enabling or disabling to recognize Event of Loading/Unloading while Vehicle is moving.
521255	Minimum distance between loading	0	m	0…4211080000	Enter minimum trip distance (in meters) between Vehicle loadings. This option can be useful for logistics operations monitoring within smaller areas.
521256	Minimum load portion for loading	100	kg	0…32127.5	Enter minimum cargo weight, which is recognized by Telematics system as Vehicle Loading Event.
521257	Minimum time of Loading/Unloading	60	s	0…64255	Enter minimum time interval between Loading/Unloading (in seconds) Vehicle. This option can be useful for logistics operations optimization.
Axle weight Mode Borders PGN 63066					
521393/10.1	Axle weight Mode border / 10.1 Empty	10000	kg	0…32127.5	Enter axle load value, which will be a boundary between “No semi-trailer” and “not loaded” operation modes (see figure C.16).
521393/10.2	Axle weight Mode border / 10.2 Load	15000	kg	0…32127.5	Enter axle load value, which will be a boundary between “not loaded” and “loaded” operation modes (see figure C.16).
521393/10.3	Axle weight Mode border / 10.3 Overload	25000	kg	0…32127.5	Enter axle load value, which will be a boundary between “loaded” and “overloaded” operation modes. If boundary is exceeded, Telematics system will recognize “Overload” Event (see figure C.16).

C.15 Engine Monitoring FM

Engine Monitoring FM — is designed for real-time monitoring of current values of main Parameters and Counters of the Vehicle engine operation based on data received from the onboard CAN-bus, as well as for identification of Events according to preset limit values of Parameters.

For correct operation of FM Engine Monitoring, you need to connect the Unit to the Vehicle CAN-bus.

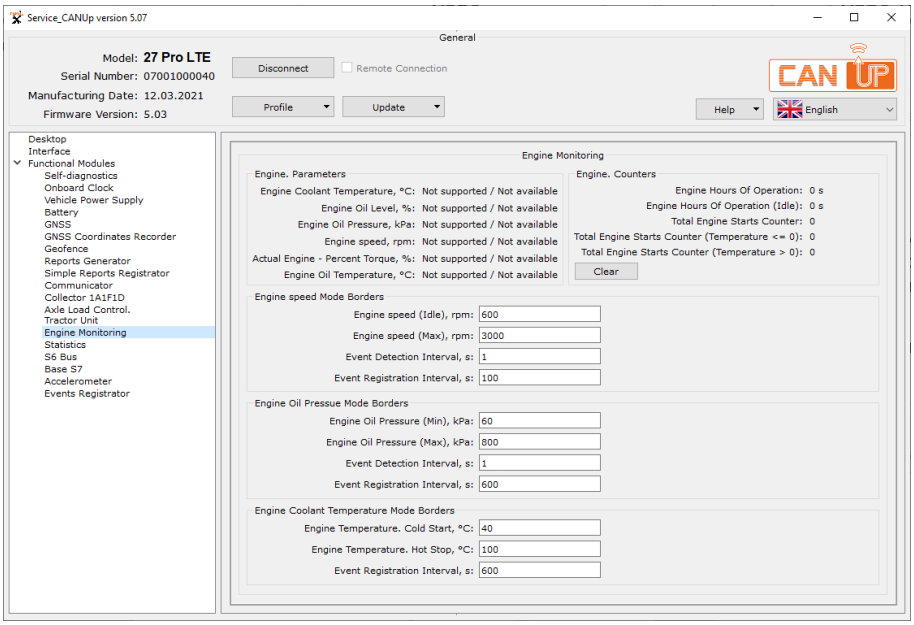
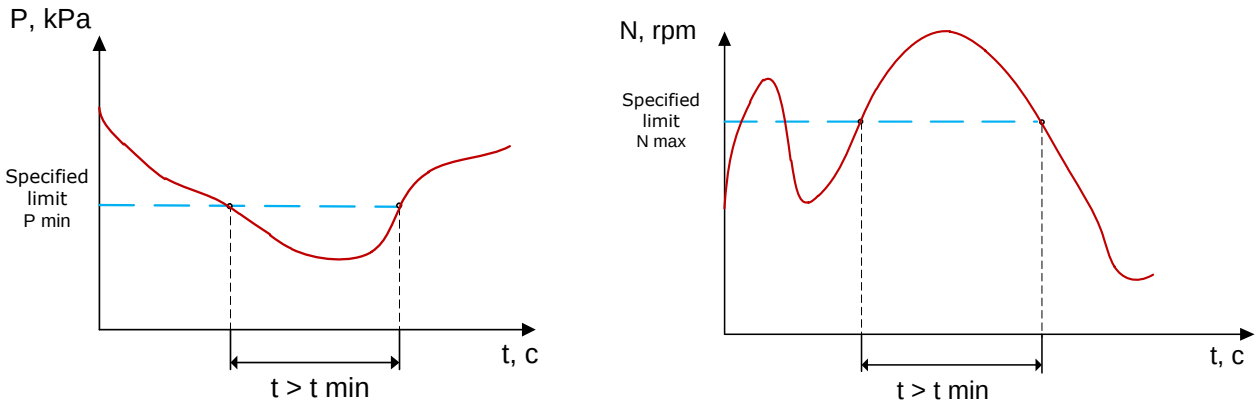


Figure C.17 — Example of settings of the Engine Monitoring FM in Service CANUp software



a) of low oil pressure in the engine *b) of exceeding engine rpm limit*

Figure C.18 — Examples of preset limits of Parameters to identify Events in FM Engine Monitoring

Table C.15 — Engine Monitoring FM.
SPNs, displayed and/or editable in Service CANUp software

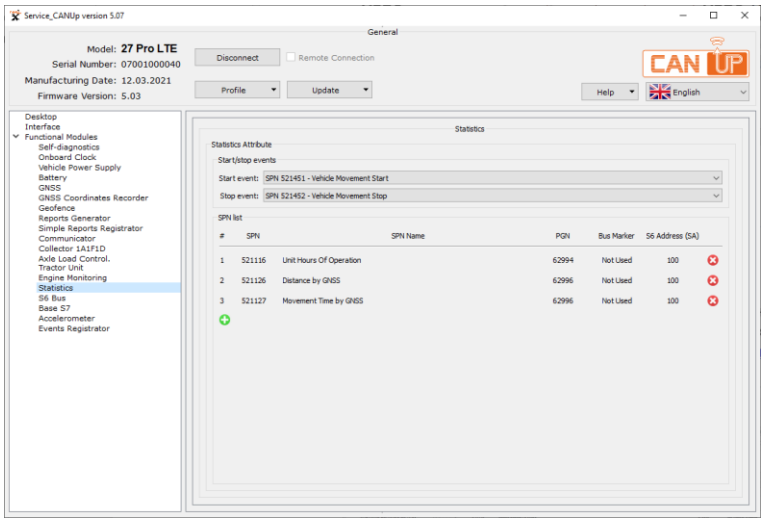
SPN	Name	Factory value	Unit of measure	Range	Clarification
Engine. Parameters PGN 62978					
110	Engine Coolant Temperature	No	°C	-40…210	Current value of the Vehicle engine cooling agent temperature is displayed. The cooling agent temperature is, in fact, the temperature of the engine itself. The diesel engine optimal range of working temperature is 70…90 °C. The engine temperature at maximum load should not exceed 97 °C. The process of formation of fuel/air mix and the quality of its combustion, i.e. correct engine running depend on the cooling agent temperature.
98	Engine Oil Level	No	%	0…100	Current value of oil level in the Vehicle engine is displayed. For correct engine operation the oil level must not change throughout the whole period "from replacement to replacement". The causes of oil level lowering are: malfunction of the oil pump, the wear of cylinders, overheating of piston rings, oil filter or oil retainers leakage etc. The causes of oil level raising are: cooling agent penetration into oil because of leakage in the cylinder assembly or because of fuel penetration into oil due to the wear of pistons, oil retainers, faulty injectors etc.
100	Engine Oil Pressure	No	kPa	0…1000	Current value of oil pressure in the Vehicle engine is displayed. Oil pressure must be permanent in the running engine. The causes of low oil pressure are: lowering of oil level in the engine, strong resistance of the oil filter, the oil pump malfunction etc. The causes of high oil pressure are: using oil of inappropriate viscosity, malfunctions of the retaining valve, pressure relief valve or discharge valve, malfunctions of the lubrication system components etc.
190	Engine Speed	No	Rpm	0…8031.88	Current value of the Vehicle engine crankshaft rpm is displayed. Monitoring the crankshaft rpm enables the driver to adjust the driving mode, to provide the optimal load for the engine; it reduces the risk of the engine overheating and increased wear of the engine parts. In the optimal mode, diesel engine rpm must be within 1800…2800 rpm range.
513	Actual Engine - Percent Torque	No	%	-125…125	Per cent of maximum Vehicle engine torque is displayed (instant value). This is a quality indicator characterizing the crankshaft rotative force, depending on the pressing force of the accelerator pedal and the current mode of the engine load. The best engine acceleration dynamics and the optimal engine thrust performance are reached at rpm, when the actual torque is maximal. The reduction of the actual torque indication may be a sign of the engine wear-out.

SPN	Name	Factory value	Unit of measure	Range	Clarification
175	Engine Oil Temperature	No	°C	-273…1734.97	Current value of oil temperature in the Vehicle engine is displayed. The optimal oil temperature at which the wear of engine parts is minimal: 90…105 °C, i.e. 10…15 °C higher than the cooling agent temperature. If the oil temperature is below 90°C, the efficiency of the engine operation is lower and the engine service life is less. Clearance spaces between the piston and the cylinder are bigger, compression is lower. Lubricant is mixed with fuel and that results in the appearing of soot and growing of fuel consumption. The metal of the cylinders is corroded by acids that appear; this results in the increased wear of the cylinders. If the oil is heated over 105 °C, its viscosity becomes less, it gets more fluid which leads to the engine parts friction. If the oil temperature is over 125 °C, it penetrates into work space of the cylinders and burns there. All this results in the increased engine wearing.
Engine. Counters PGN 62977					
521190	Engine Hours Of Operation	0 h 0 min 0 s	s	0…4211080000	Counter of total time of the Vehicle engine operation within the whole range of load, including the ”Idling” mode of engine operation. The Counter readings increment from the time of manufacturing and it cannot be reset by the user.
521190/9.0	Engine Hours Of Operatio/ 9.0 Idle	0 h 0 min 0 s	s	0…4211080000	Counter of total time of the Vehicle engine operation in the ”Idling” mode of engine operation. The Counter readings increment from the time of manufacturing and it cannot be reset by the user.
521001	Total Engine Starts Counter	No	pcs.	0…4211080000	Counter of total number of the Vehicle engine starts which increments in case of any rpm. The Counter readings increment from the time of manufacturing and it cannot be reset by the user.
521001/14.1	Total Engine Starts Counter/ 14.1 Temperature <= 0	No	pcs.	0…4211080000	Counter of total number of the Vehicle engine “cold” starts (when the engine temperature is no higher than 0 °C) which result in its increased wear. The Counter readings increment from the time of manufacturing and it cannot be reset by the user.
521001/14.0	Total Engine Starts Counter / 14.0 Temperature > 0	No	pcs.	0…4211080000	Counter of total number of the Vehicle engine “hot” starts (when the engine temperature is higher than 0 °C). You can evaluate the correctness of the engine service by indications of this Counter. The Counter readings increment from the time of manufacturing and it cannot be reset by the user.
Engine speed mode borders PGN 63060					
190/9.0	Engine speed/ 9.0 Idle	600	Rpm	0…8031.88	Setting the lower limit of the Vehicle engine rpm variations range (“Idling” mode of engine operation). This setting is designed to identify the Event “Exceeding Engine rpm”) which is identified in case of exceeding the specified upper limit of engine rpm within specified time (see figure C.18 b). This setting is accessible for editing by the user.
190/2.7	Engine speed/ 2.7 Max	3000	Rpm	0…8031.88	Setting the upper limit of the Vehicle engine rpm variations range. This setting is designed to identify the Event “Exceeding Engine rpm”) which is identified in case of exceeding the specified upper limit of engine rpm within specified time (see figure C.18 b). This setting is accessible for editing by the user.
521389	Event Detection Interval	1	s	0…64255	In this field, the time interval during which the Vehicle engine rpm exceed the specified upper limit of the rpm variations range is specified and a decision is taken to register the Event “Exceeding Engine rpm” (see figure C.18 b).
521390	Event Registration Interval	100	s	0…64255	In this field, the time interval during which only one Event «Exceeding Engine rpm” is registered (see figure C.18 b).

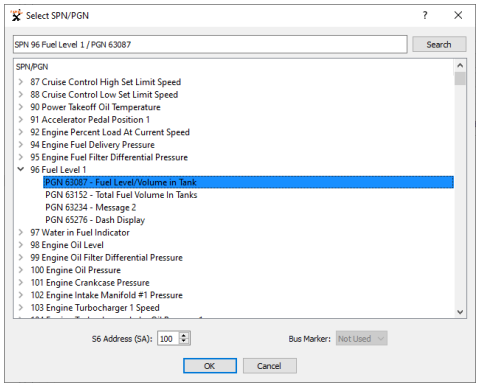
SPN	Name	Factory value	Unit of measure	Range	Clarification
Engine Oil Pressure Mode Borders PGN 63062					
190/9.0	Engine Oil Pressure/ 2.8 Min	60	kPa	0…8031.88	Setting the lower limit of the Vehicle engine oil pressure variations range (“Minimum” oil pressure). This setting is used to identify the Event “Low Oil Pressure” which is identified by the oil pressure falling below the specified minimal value (lower limit) of the range within specified time period (see figure C.18 a). This setting is accessible for editing by the user.
190/2.7	Engine Oil Pressure/ 2.7 Max	800	kPa	0…8031.88	Setting the upper limit of the Vehicle engine oil pressure variations range (“Maximum” oil pressure). This setting is used to identify the Event “High Oil Pressure” which is identified by the oil pressure exceeding the specified maximum value (upper limit) of the range within specified time period (see figure C.18 a). This setting is accessible for editing by the user.
521389	Event Detection Interval	1	s	0…64255	In this field, the time interval during which the Vehicle engine oil pressure is below the specified lower limit/above the specified upper limit of oil pressure variations range and a decision is taken to register the Event “Low Oil Pressure/High Oil Pressure” (see figure C.18 a).
521390	Event Registration Interval	600	s	0…64255	In this field, the time interval during which only one Event ”Low Oil Pressure/High Oil Pressure” is registered (see figure C.18 a).
Engine Coolant Temperature Mode Borders PGN 63063					
521402	Engine Temperature. Cold Start	40	°C	-40…210	Setting the lower limit of the Vehicle engine temperature variations range. This setting is used to identify the Event “Cold Start” which is identified by the Vehicle movement, crankshaft rpm and when the engine temperature is below the allowed value (specified lower limit). This setting is accessible for editing by the user.
521403	Engine Temperature. Hot Stop	100	°C	-40…210	Setting the upper limit of the Vehicle engine temperature variations range. This setting is used to identify the Event “Hot Stop” which is identified by the zero crankshaft rpm and when the engine temperature is above the allowed value (specified upper limit). This setting is accessible for editing by the user.
521390	Event Registration Interval	600	s	0…64255	In this field, the time interval during which only one Event “Hot Stop”/”Cold Start” is registered.

C.16 Statistics FM

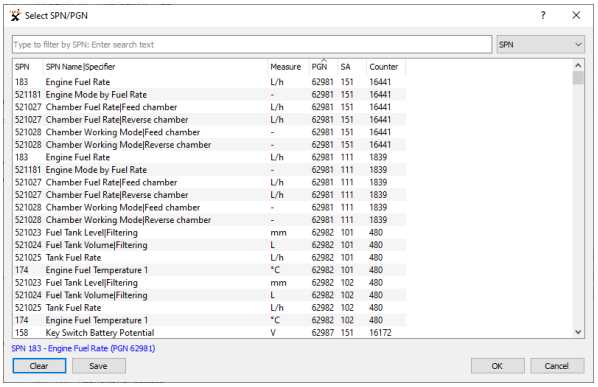
Statistics FM — is designed to generate base data of "Statistics" Report from the period of the selected initial Event to the final Event based on which increments of specified Counters are calculated.



a) window Statistics FM



b) a list of SPNs in S6 Database



c) SPN selection from current CAN bus data

Figure C.19 — Example of settings of the Statistics FM in Service CANUp software

Table C.16 — Statistics FM.SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Statistics Attribute PGN 63252					
521347	SPN Value	No	On the fact	0…4294970000	Value of parameter (SPN) which is added to the content of the statistics Report as the initial event of "Event". It is allowed to add to the Report SPN that have digital value and no longer than 4 bytes.
521347	SPN Value	No	On the fact	0…4294970000	Value of parameter (SPN) which is added to the content of the statistics Report as the final event of "Event". It is allowed to add to the Report SPN that have digital value and no longer than 4 bytes.

SPN	Name	Factory value	Unit of measure	Range	Clarification
521253	SPN quantity in Report	No	pcs.	0…10	Number of parameters (SPN) that can be added during the generation of content of a statistics Report.
521368	Specifier. Value	No	On the fact	0…255	Specifying value of parameter (SPN) which is added to the content of the statistics Report.
521150	PGN	No	On the fact	0…65535	Group of parameters (PGN) that includes SPN which is added to the Report content.
521188	S6 Address (SA)	100	No	0…255	Network address in CAN-bus of the device which is source of SPN added to the content of the statistics Report.
521254	Bus Marker	Not used	No	No	Source from which the CANUp 27 reads SPN of the Event which is added to the Report content: - S6 — source specified by the user when SPN of the Event is read from Units via CAN j1939/S6 interface using S6 Technology; - S7 — source designated by the user, when Events SPN is read from wireless Units by means of S7 Technology; - CAN — source assigned automatically, when SPN of the Event is read from a standard Vehicle bus using CAN interface; - Not used — source assigned automatically, when SPN of the Event is selected from S6 Database.

C.17 S6 Bus FM

S6 Bus FM — is designed for analysis and diagnostics of operation (monitoring of active and saved malfunctions, emergency important and information Events) of Units connected to form a network using S6 Technology.

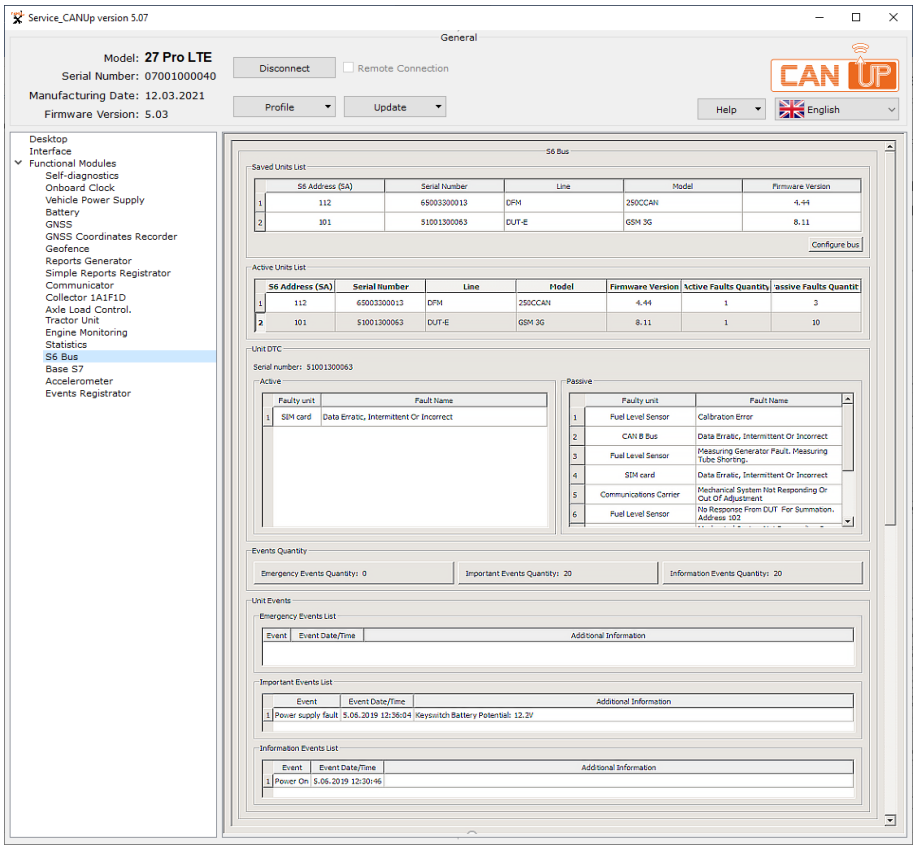


Figure C.20 — Example of settings of the S6 Bus FM in Service CANUp software

Table C.17 — S6 Bus FM.
SPNs, displayed and/or editable in Service CANUp software

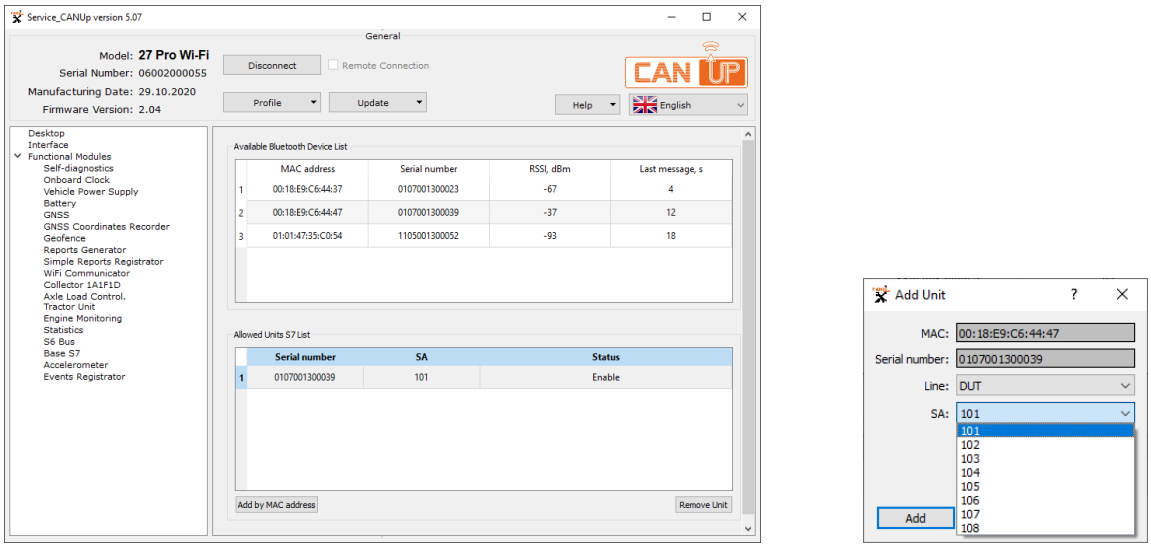
SPN	Name	Factory value	Unit of measure	Clarification
Saved Units List PGN 63257				
521355	Array Elements Count	No	pcs.	Number of Units contained in the List of Saved Units (max. 15). The List of Saved Units is created based on List of Active Units by pressing the button "Configure Bus". For Units of this list, CANUp 27 Pro 3G/CANUp 27 Pro Wi-Fi generates Events "Unit Connections to S6 Bus"/"Unit Disconnections from S6 Bus". Data are not available for editing.
521188	S6 Address (SA)	No	No	Network address of the Unit contained in the List of Saved Units (see table 5). The network address serves to identify Units during their operation using S6 Technology. Data are not available for editing.

SPN	Name	Factory value	Unit of measure	Clarification
521120	Serial Number	No	No	The Unit serial number is a set of digits designed for clear identification of a specific Unit. A serial number of Unit has the format: AABBB C DDDDD, in which: AA – code of model in the line of products; BBB – digits reflecting changes in the product; C – Manufacturer code; DDDDD – sequence number. Data are not available for editing.
521123	Line	No	No	Designation of the line of products to which the Unit from the List of Saved Units belongs. The line of products is a group of products of the same kind – online Telematics gateways manufactured with the common trademark (e.g. DUT-E, DFM, DFM Marine etc.). Data are not available for editing.
521345	Model	No	No	Model is the Unit design within its line of products. Each of the Units models has its functional and/or design particularities. Data are not available for editing.
521121	Firmware Version	No	No	Version of the Unit inbuilt software contained in the List of Saved Units. Data are not available for editing.
Active Units List PGN 63254				
521355	Array Elements Count	No	pcs.	Number of Units contained in the List of Active Units (max. 15). This list contains all Units which together with CANUp 27 Pro 3G/CANUp 27 Pro Wi-Fi are connected to form a network based on S6 Technology. For each Unit from the List of Active Units you may receive information on Active and Saved Malfunctions. The registered Events are also displayed for the selected Unit according to their types in the respective tables (“List of Emergency Events”, “List of Important Events” and “List of Information Events”). The total number of Events for all active Units is displayed in the “Number of Events” group of data for each Event type. Data are not available for editing.
521188	S6 Address (SA)	No	No	Network address of the Unit contained in the List of Active Units (see table 5). The network address serves to identify Units during their operation using S6 Technology. Data are not available for editing.
521120	Serial Number	No	No	The Unit serial number is a set of digits designed for clear identification of a specific Unit. A serial number of Unit has the format: AABBB C DDDDD, in which: AA – code of model in the line of products; BBB – digits reflecting changes in the product; C – Manufacturer code; DDDDD – sequence number. Data are not available for editing.
521123	Line	No	No	Designation of the line of products to which the Unit from the List of Active Units belongs. The line of products is a group of products of the same kind – online Telematics gateways manufactured with the common trademark (e.g. DUT-E, DFM, DFM Marine etc.). Data are not available for editing.
521345	Model	No	No	Model is the Unit design within its line of products. Each of the Units models has its functional and/or design particularities. Data are not available for editing.
521121	Firmware version	No	No	Version of the Unit inbuilt software contained in the List of Active Units. Data are not available for editing.
521045	Active Faults Quantity	No	No	Displays the number of active malfunctions of the Unit (if any, up to 15) contained in the List of Active Units. Data are not available for editing.
521046	Passive Faults Quantity	No	No	Displays the number of saved malfunctions of the Unit (if any, up to 15) contained in the List of Active Units. Data are not available for editing.

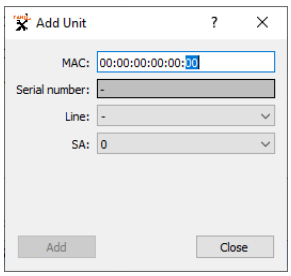
SPN	Name	Factory value	Unit of measure	Clarification
Unit S6 Active DTC List PGN 63255				
521355	Array Elements Count	No	pcs.	Number of current malfunctions of active Units (up to 15). Data are not available for editing.
521188	S6 Address (SA)	No	No	Network address of active Unit which is the source of the currently displayed malfunction. Data are not available for editing.
521104	Fault Code. SID	No	No	Displays the defective unit (e.g. "Fuel Level Sensor") for each current malfunction.
521048	FMI	No	No	Displays malfunction designation (e.g. "Calibration Error") for each current malfunction.
Unit S6 Saved DTC List PGN 63256				
521355	Array Elements Count	No	pcs.	Number of saved malfunctions of active Units (up to 15). Data are not available for editing.
521188	S6 Address (SA)	No	No	Network address of active Unit which is the source of the currently displayed malfunction. Data are not available for editing.
521104	Fault Code. SID	No	No	Displays the defective unit (e.g. "Fuel Level Sensor") for each saved malfunction.
521048	FMI	No	No	Displays malfunction designation (e.g. "Calibration Error") for each saved malfunction.
Units S6 Emergency Events List PGN 63273				
521355	Array Elements Count	No	pcs.	Displays the current number (up to 20) of emergency Events from active Units. Data are not available for editing.
521166	Event SPN	No	No	Displays the current number (up to 20) of emergency Events from active Units. Emergency Events are such as, for instance, "Activation of Emergency Button".*
Units S6 Important Events List PGN 63272				
521355	Array Elements Count	No	pcs.	Displays the current number (up to 20) of important Events from active Units. Data are not available for editing.
521166	Event SPN	No	No	Displays the list (up to 20) of important Events from active Units. Events such as, for instance, Events: "Onboard Circuit Failure", "Fuel Drain from the Tank", "Fuelling Tank" "Interference into Flow Meter Operation" are considered to be important Events.*
Units S6 Information Events List PGN 63274				
521355	Array Elements Count	No	pcs.	Displays the current number (up to 20) of information Events from active Units. Data are not available for editing.
521166	Event SPN	No	No	Displays the list (up to 20) of information Events from active Units. Events, such as, for instance: "Power Supply ON/OFF, "GNSS Signal Loss/Restore" are considered to be information Events.*
* For each Event the following data are specified: designation, date/time of occurrence, as well as additional information (if any). Events are displayed in chronological sequence, starting from the most recent. As soon as the maximum number of Events displayed is reached, new Events overwrite the earliest Events.				

C.18 Base S7 FM

Base S7 FM — is designed for reception of messages (PGN) from wireless Units by means of S7 Technology.



a) adding a wireless Unit from the list of accessible devices



b) adding a wireless Unit by the specified MAC-address

Figure C.21 — Example of settings of the FM S7 Base in Service CANUp software

Table C.18 — Base S7 FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Available Bluetooth Device List PGN 63279				
521355	Array Elements Count	On the fact	pcs.	Number of MAC-addresses of wireless Units (DUT-E S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM DDE S7 pressure sensors DUT-E DP S7 position sensors, ADM31 temperature and humidity sensors) which are accessible at a given moment for the BLE-module of CANUp 27 Pro. The maximum number of elements in the list — 15. The list is not accessible for editing.

SPN	Name	Factory value	Unit of measure	Clarification
521490	MAC Address	On the fact	No	The setting displays the unique identifier (MAC address) of BLE-module of the wireless Unit. Using MAC address, the software generates a serial number of a specific Unit and also identifies its accessibility status for operation based on S7 Technology. The data are not accessible for editing.
521178	Received Signal Strength Indicator (RSSI)	On the fact	dBm	The setting displays the current level of the signal power (by the logarithmic scale) received from the wireless Unit. The displayed range: from -125…0 dBm. The data are not accessible for editing.
521084	Timeout	On the fact	s	The setting displays the length of the time interval after reception of the latest message from the wireless Unit. The data are not accessible for editing.
Allowed Units S7 List PGN 63270				
521355	Array Elements Count	On the fact	pcs.	The number of MAC addresses of wireless Units (DUT-E S7 fuel level sensors, DFM S7 / DFM Marine S7 fuel flow meters, GNOM DDE S7 pressure sensors DUT-E DP S7 position sensors, ADM31 temperature and humidity sensors) selected by the user for connection to CANUp 27 Pro using S7 Technology. The maximum number of elements in the list — 10. The user has access to editing the list — adding/deleting Units.
521188	S6 Address (SA)	No	No	The network address of the wireless Unit selected by the user for connection to CANUp 27 Pro using S7 Technology. The network address is used for identiofication of Units during work using S7 Technology. The designation of the network address is automatically assigned to the Unit from the number of vacant addresses within the following ranges: Value of network address is automatically assigned to a Unit from the number of vacant addresses within the following ranges: - for DUT-E S7 fuel level sensors: 91…98, 101…108; - for DFM 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. The network addresses may be changed by the user. A network address for each Unit must be unique! The use of coinciding network addresses for cable-connected and wireless Units of the same type is not allowed!
521490	MAC Address	On the fact	No	The MAC address of the wireless Unit selected by the user for connection using S7 Technology by itself is not displayed in the list of authorized Units. However, the software generates the serial number for a specific Unit using its MAC address and also by its MAC address it identifies its accessibility status for work using S7 Technology. The data are not accessible for editing.

C.19 Accelerometer FM

Accelerometer FM — is designed to identify current values of the Vehicle linear accelerations in three rectangular axes of Cartesian coordinate system and to calculate root-meansquare values of these accelerations, to identify the Vehicle movement and its banking angles.

After CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi mounting on the Vehicle you need to calibrate the inbuilt accelerometer, i.e. to specify zero values of pitch angle and banking angle by pressing Set <0> **button!**

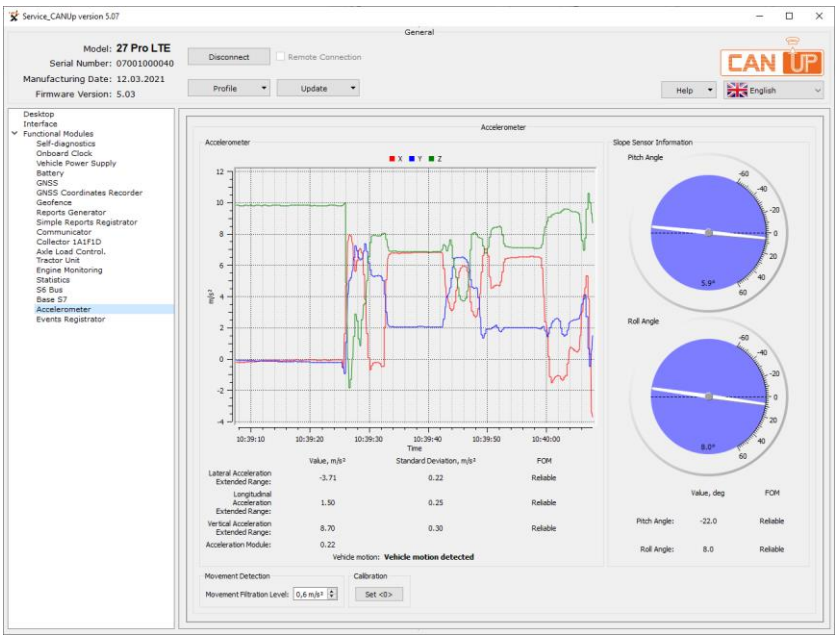


Figure C.22 — Example of settings of the Accelerometer FM in Service CANUp software

Table C.19 — Accelerometer FM.
SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Range	Clarification
				Accelerometer PGN 63155	
5347	Lateral Acceleration Extended Range	On the fact	m/s^2	-320…322.55	Current value of the Vehicle transverse linear acceleration is displayed (along Y axis of the Cartesian coordinate system) and the diagram of its changing with time.
5347/2.3	Lateral Acceleration Extended Range / 2.3 Standard Deviation	On the fact	m/s^2	-320…322.55	Value of the Vehicle mean-square deviation calculated based on the current data of the Vehicle transverse linear acceleration is displayed. You can estimate the reliability of the measured values of the Vehicle transverse linear acceleration by the value of mean-square deviation.
5350	Lateral Acceleration Extended Range Figure of Merit	On the fact	No	Reliable/ Unreliable	Estimate of reliability of the measured values of the Vehicle transverse linear acceleration is displayed. If the transverse linear acceleration is less than 5 m/s^2, the acceleration data are reliable, while in case the transverse linear acceleration is more than 5 m/s^2, the data are unreliable.
5348	Longitudinal Acceleration Extended Range	On the fact	m/s^2	-320…322.55	Current value of the Vehicle longitudinal axis linear acceleration is displayed (along X axis of the Cartesian coordinate system) and the diagram of its changing with time.

SPN	Name	Factory value	Unit of measure	Range	Clarification
5348/2.3	Longitudinal Acceleration Extended Range / 2.3 Standard Deviation	On the fact	m/s^2	-320…322.55	Value of the Vehicle mean-square deviation calculated based on the current data of the Vehicle longitudinal linear acceleration is displayed. You can estimate the reliability of the measured values the Vehicle longitudinal linear acceleration by the value of mean-square deviation.
5351	Longitudinal Acceleration Extended Range Figure of Merit	On the fact	No	Reliable/ Unreliable	Estimate of reliability of measured values of the Vehicle longitudinal linear acceleration is displayed. If the longitudinal linear acceleration is less than 5 m/s^2, the acceleration data are reliable, while in case of longitudinal linear acceleration more than 5 m/s^2, the acceleration data are unreliable.
5349	Vertical Acceleration Extended Range	On the fact	m/s^2	-320…322.55	Current mean value of the Vehicle vertical linear acceleration is displayed (along Z axis of the Cartesian coordinate system) and the diagram of its changing with time.
5349/2.3	Vertical Acceleration Extended Range / 2.3 Standard Deviation	On the fact	m/s^2	-320…322.55	Value of the Vehicle mean-square deviation calculated based on the current data of the Vehicle vertical linear acceleration is displayed. You can estimate the reliability of the measured values the Vehicle vertical linear acceleration by the value of mean-square deviation.
5352	Vertical Acceleration Extended Range Figure of Merit	On the fact	No	Reliable/ Unreliable	Estimate of reliability of measured values of the Vehicle vertical linear acceleration is displayed. If the vertical linear acceleration is less than 5 m/s^2, the acceleration data are reliable, while in case of vertical linear acceleration more than 5 m/s^2, the acceleration data are unreliable.
521384	Acceleration Module	On the fact	m/s^2	-320…322.55	Automatically calculated total value of the Vehicle linear acceleration in three axes of coordinates (X, Y, Z) is displayed; this value is equal to square root of the sum of squares of the Vehicle linear accelerations in each axis. If this value exceeds the specified level of the Movement Filtering (SPN 521341), the Unit automatically identifies the Vehicle current status in relation to the Vehicle movement.
1611	Vehicle motion	On the fact	No	Vehicle motion not detected/ Vehicle motion detected	Vehicle current status in relation to the Vehicle movement is displayed (the Vehicle is moving/not moving).
Movement PGN 63247					
521341	Movement filtration level	0.3	m/s^2	-12.5…12.5	Field in which the user may specify threshold value of acceleration with which the value of the sum of the Vehicle linear accelerations in the three coordinates axes (X, Y, Z) must be compared. According to the results of the comparison, the Unit automatically identifies the Vehicle current status in relation to movement.
Slope Sensor Information PGN 61459					
3318	Pitch Angle	On the fact	deg	-64…64.51	Displays the current value of the grade angle in relation to the transverse axis of coordinates (Y axis).
3319	Roll Angle	On the fact	deg	-64…64.51	Displays the current value of the grade angle in relation to the longitudinal axis of coordinates (X axis).
3323	Pitch Angle Figure Of Merit	On the fact	No	Reliable/ Unreliable	Estimate of reliability of measurement of the Vehicle banking angle. If the value of the pitch angle is less than 60°, its value is considered reliable.
3324	Roll Angle Figure Of Merit	On the fact	No	Reliable/ Unreliable	Estimate of reliability of measurement of the Vehicle banking angle. If the value of the banking angle is less than 60°, its value is considered reliable.

C.20 Events Registrator FM

Events Registrator FM — designed for registration of 15 emergency, 15 important and 15 informative latest Events.

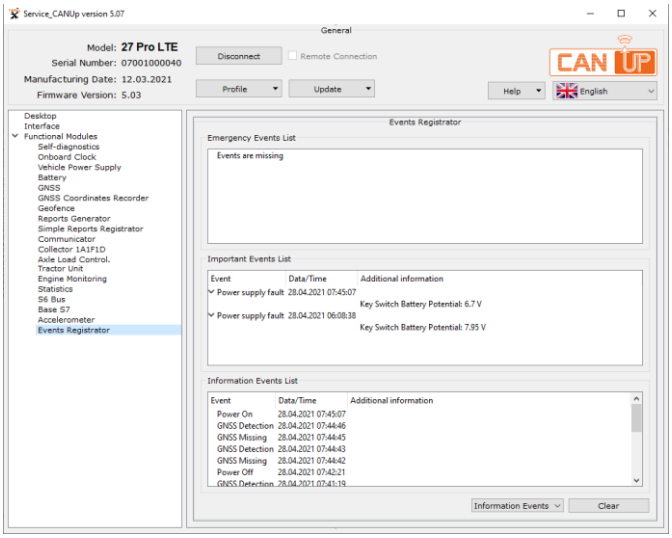


Figure C.23 — Example of settings of the Events Registrator FM in Service CANUp software

Table C.20 — Events Registrator FM. SPNs, displayed and/or editable in Service CANUp software

SPN	Name	Factory value	Unit of measure	Clarification
Emergency Events List PGN 63051				
521166	Event SPN	No	No	List of emergency Events is displayed (up to 15).** Activation of Emergency Button belongs to emergency Events.
Important Events List PGN 63055				
521166	Event SPN	No	No	List of important Events is displayed (up to 15).** The following Events are considered to be important: - Onboard circuit failure (with voltage value displayed); - Overload; - Hot stop/Cold start*; - Exceeding engine rpm*; - High/low oil pressure in the engine*; - Too high onboard circuit voltage.
Information Events List PGN 63056				
521166	Event SPN	No	No	List of information Events is displayed (up to 15).** The following Events are considered to be information Events: - Power supply ON/OFF; - Ignition ON/OFF*; - GNSS signals Loss/Restore; - Load/Unload; - Trailer coupled/trailer uncoupled; - Geofence Entry*; - Geofence Exit*; - Unit Loss/Restore in S6-bus*.
* Only for CANUp 27 Pro 3G / Pro LTE / Pro Wi-Fi. **For each Event the following data are specified: designation, date/time of occurrence, as well as additional information (if any). Events are displayed in chronological sequence, starting from the most recent. As soon as the maximum number of Events displayed is reached, new Events overwrite the earliest Events. The user cannot clear the list of important Events.				

Detailed parameters description (SPN), structure and content of messages (PGN) of FM CANUp 27 are placed at the following web site http://s6.jv-technoton.com/ (to access S6 DB registration is required).

Annex D
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 3G / 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 2.4.8.

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@technoton.by.

Annex E

Electromagnetic compatibility specifications

Table E.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 E.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 E.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 F
Description of MQTT IBM Watson IoT protocol

1) Designation

MQTT IBM Watson IoT protocol is used to transmit Onboard reports by Units (CANUp 27 Pro online Telematics gateway or by DUT-E GSM fuel level sensor), when they are used as components of the Internet of Things (IoT) Telematics system based on IBM Watson IoT Platform. Reports are generated in accordance with SPN of the Event specified by the user in the service software.

2) Particulars

- Asynchronous data transmission;
- Compact messages;
- Reliable delivery of messages in conditions of unstabe communication of the data transmission line;
- Support of several levels of Quality of Service (QoS);
- Simple integration of new devices.

3) General information

On the application level, the protocol is applied over TCP/IP protocol and by default uses port 1883 (8883 in case of connection via SSL). Messages are exchanged between the Unit (Publisher) and IBM Watson IoT platform (Broker).
The Unit sends data to Broker, in accordance with the topic specified in the message (Topic field). Users can receive data from a great number of Units (Publishers) through Broker, depending on their subscription to particular topics.

There are altogether 15 types of messages in MQTT IBM Watson IoT protocol. The main types of messages: Connect – to establish a connection with the Broker; Publish – to publish data in the topic at Broker, Subscribe – to subscribe to the topic at Broker; Unsubscribe – to cancel the topic subscription.

4) Format of MQTT messages

Generally, an MQTT message consists of the following components:

- fixed heading which is present in all messages (see figure F.1);
- variable heading which is present only in certain messages;
- fields of data (Payload) which are present only in certain messages.

	7	6	5	4	3	2	1	0
byte 1	message type				auxiliary flags			
byte 2	current message length (variable heading + data)							

Figure F.1 — Format of a fixed heading

5) Establishing a connection

Right after establishing a connection between IBM Watson IoT platform and the Server the Unit must send a packet of **Connect Message** to the Server. The format of fixed heading of **Connect Message** is shown in figure F.2.

Fixed Heading		
1 byte		1 byte
packet type	reserved	message length
0b0001	0b0000	0xXXXX

Figure F.2 — Format of Connect Message fixed heading

Variable heading of **Connect Message** consists of a sequence of 4 fields (see figure F.3):

- **Protocol Name** — UTF-8 line containing protocol name – "MQTT".
- **Protocol Level** — 8-bit unsigned number which is the number of revision of the protocol used by the Unit. The value of the Protocol Level field for the current protocol version is (0x04).
- **Connect Flags** — byte containing a number of parameters that identify the state of MQTT connection. This field also indicates the presence or absence of fields in data (see figure F.4).
- **Keep Alive** — is the maximum time interval (in seconds) between the end of one packet transmission and start of another packet transmission.)

Variable Heading				
2 bytes	4 bytes	1 byte	1 byte	2 bytes
Length	Protocol Name	Protocol Level	Connect Flags	Keep Alive
0x0004	0x4D515454	0x04	0xC2	0x0E10
	"M" "Q" "T" "T"			

Figure F.3 — Format of the variable heading of Connect Message

Connect Flags field							
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
User Name Flag	Password Flag	Will Retain	Will QoS		Will Flag	Clean Session	Reserved
1	1	0	0	0	0	1	0

Figure F.4 — Structure of Connect Flags field for the variable heading of Connect Message

For **Connect Message**, the **Payload** data field contains the following fields (see figure F.5): **Client ID**, **User Name** and **Password**. These fields are lines of characters in UTF-8 format in which:

- *org_id* — ID of organization which is assigned during the registration at IBM Watson IoT platform;
- *device_type and device_id* — type and ID of Units specified during their registration at IBM Watson IoT platform.

Payload data field	
Length	Client ID
0x0000-0x0017	d:*org_id*:*device_type*:*device_id*

Payload data field			
Length	User Name	Length	Password
0x000E	use-token-auth	0x0000 – 0xFFFF	11111111

Figure F.5 — Structure of Payload data field for Connect Message

6) Publishing messages

To transmit data to IBM Watson IoT platform, Units employ packets of **Publish Messages**. The format of a fixed and a variable heading of a **Publish Message** are provided in figures F.6 and F.7, respectively.

Fixed Heading					
1 byte					1 byte
Packet type	DUP flag	QoS level		Retain	Message length
0b0011	0	0	1	0	0x30

Figure F.6 — Format of a fixed heading of a Publish-message

Variable Heading		
Length	Topic name	Packet Identifier
0xXXXX	iot-2/evt/*sa_spn_spec1_spec2*/fmt/format_string	0x0001

Figure F.7 — Format of a variable heading of a Publish Message

Topic name is a line of characters in UTF-8 format where *sa_spn_spec1_spec2* is a variable field in which:

- **sa** – network address of the Unit connected to CAN j1939/S6 Telematics interface from which the Report is received;
- **spn** – SPN number (see S6 Database) by which the Report is generated. To generate a Report, only SPN with digital values and no longer than 4 bytes are allowed to be used;
- **spec1, spec2** – SPN specificators, i.e. additional fields specifying the value of SPN by which the Report is generated.

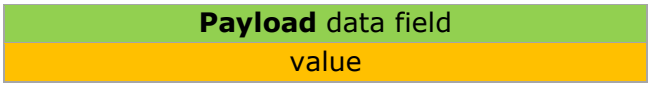


Figure F.8 — Structure of Payload data field for Connect Message

For **Publish Message Payload** data field contains **value —** the Parameter (SPN) value in the decimal form in UTF-8 format (see figure F.8) which can be calculated using the formula (F.1):

$$\textbf{Parameter value = value * factor + offset} \quad \text{(F.1)}$$

in which **factor** and **offset** are special coefficients used for SPN calculation.
Values of **factor** and **offset** coefficients as well as units of measurement of SPN are provided in S6 Database http://s6.jv-technoton.com/.

Annex G
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 G.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	0xFFFF	0xXX	0xXXXX	…

Figure G.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.

G.1 Output message of DUT-E S7 fuel level sensor

Table G.1 — Data composition of DUT-E S7 output message

Field number	Length	Parameter	Name
Fuel Level Sensor. RAW Data PGN 63277 (0xF72D)			
1	4 bytes	SPN 521440	Frequency, Hz
2	1 byte	SPN 521457	Temperature, °C
3	2 bytes	SPN 5347*	Lateral acceleration extended range, m/s^2
4	2 bytes	SPN 5348*	Longitudinal acceleration extended range, m/s^2
5	2 bytes	SPN 5349*	Vertical acceleration extended range, m/s^2
6	4 bytes	SPN 521488	Unit DTCs mask (see table G.2)
8	6 bytes	-	Reserve
* In the process of preparation for introduction.			

Table G.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

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

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

Table G.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 5347	0.01	-320 m/s²
SPN 5348	0.01	-320 m/s²
SPN 5349	0.01	-320 m/s²

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

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

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

G.2 Output messages of DFM S7 fuel flow meter

Table G.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, l/h
6	2 bytes	SPN 521027/18.1	Chamber Fuel Rate. Reverse chamber, l/h
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 G.6)
16	4 bytes	SPN 521493	Unit Events Mask* (see table G.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
* 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 (G.1) using attributes from table G.5.

Table G.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 521121	1	0
SPN 5054	0.001 l	0 l
SPN 521171	1 s	0 s
SPN 521463*	1 s	0 s
* In the process of preparation for introduction.		

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

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

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

Table G.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 G.10)
17	4 bytes	SPN 521493	Unit Events Mask* (see table G.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
* All Events and malfunctions of the Unit are recorded from the moment they take place till the moment they end, but with no less than 1 min. time interval.			

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

Table G.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 G.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 G.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

G.4 Output message of GNOM DDE S7 pressure sensor

Table G.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 G.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 G.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 (G.1) using attributes from table G.14.

Table G.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

G.5 Output message of GNOM DP S7 position sensor

Table G.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 G.16)
7	14 bytes	-	Reserve

Table G.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

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

Table G.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

G.6 Output message of ADM31 temperature and humidity sensor

Table G.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 (G.1) using attributes from table G.19.

Table G.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