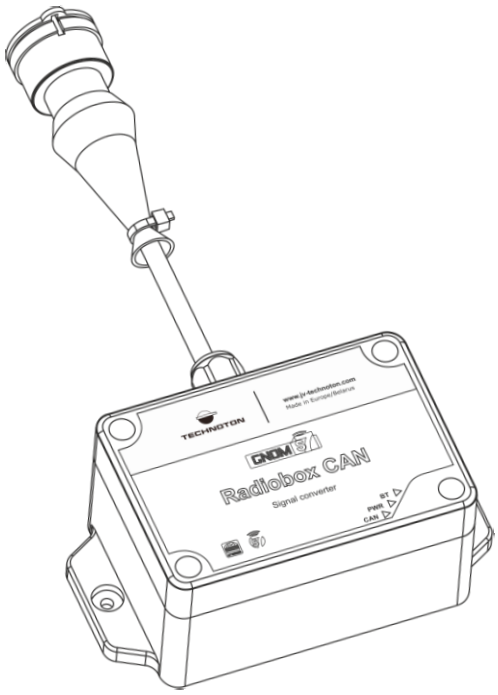
SIGNAL CONVERTER



GNOM S7 Radiobox CAN

OPERATION MANUAL

Version 1.0

TECHNOTON

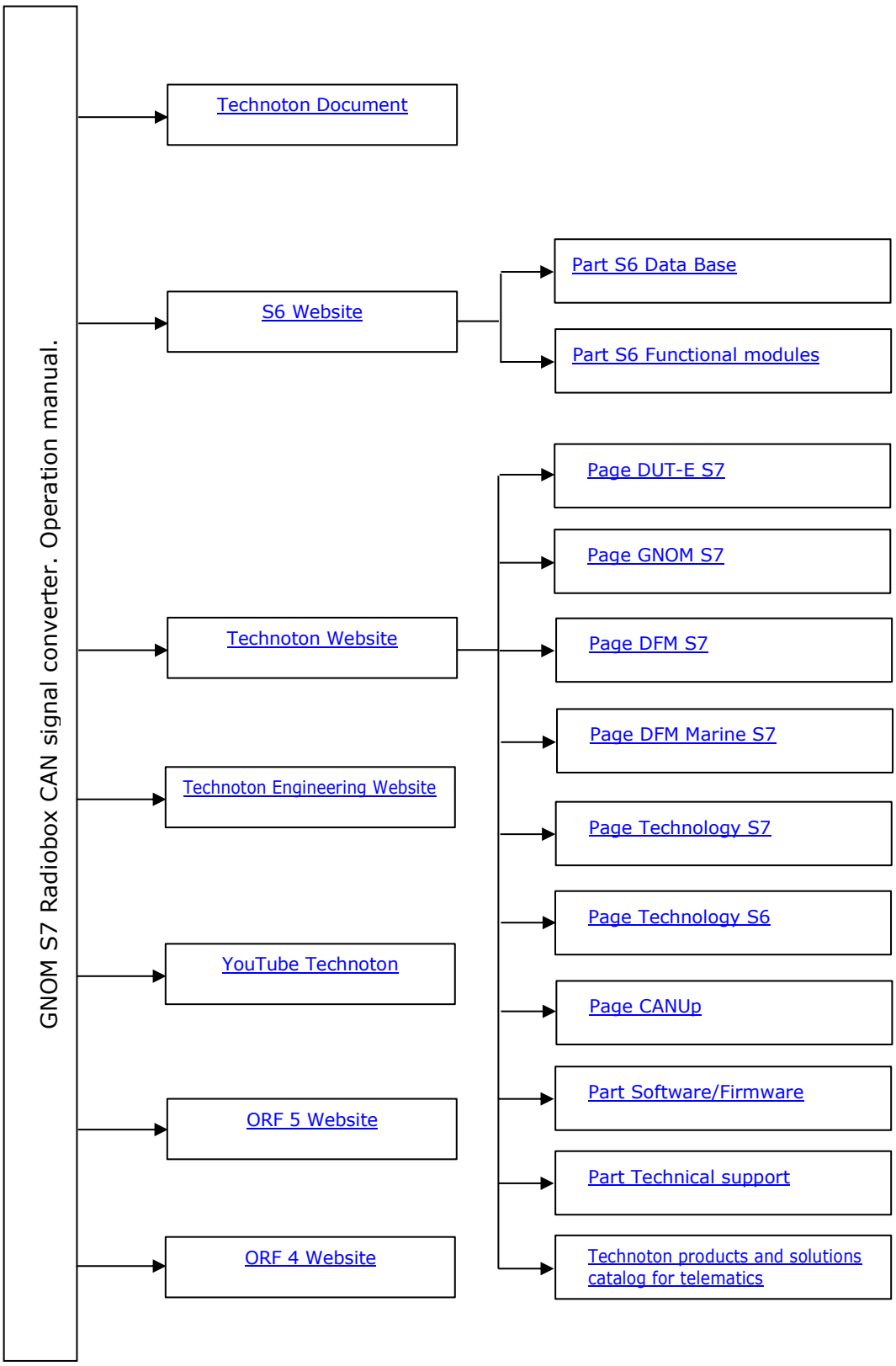
ADVANCED MACHINERY TELEMATICS

Contents

Revision history

Version	Date	Editor	Description of changes
1.0	02.2022	OD	Basic version

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.

GNOM S7 Radiobox CAN signal converter is designed using IoT Burger 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.

GNOM S7 Radiobox CAN signal converter is designed using S7 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.

GNOM S7 Radiobox CAN signal converter transfers data by means of S6 Technology.

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).

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. Sharp increase in axle load is "Load" Event. This Event may have one or more characteristics. So, the "Load" Event has the following characteristics: date/time, "axle load at the beginning of loading", "axle load at the end of loading", "cargo weight" etc. 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 characteristics of Parameter. Counter is represented by a number, which can only grow in time. Examples of Counters: fuel consumption, engine operation time, total distance and other.

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.

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 rules contained in this Operation Manual are related to **GNOM S7 Radiobox CAN signal converter** (hereinafter GNOM S7 Radiobox CAN), model code **60**, manufactured by JV Technoton, Minsk, Republic of Belarus.
Model code of GNOM S7 Radiobox CAN is defined by the 3^{d} and 4th digits of its serial number which is printed on the glassy cover inside the converter casing or on the package label (see figure 1):

Figure 1 — Identification of GNOM S7 Radiobox CAN model code

The manual contains information on design, operation principle, specifications and instructions on connection, configuration and use of GNOM S7 Radiobox CAN.

Radiobox CAN — is a tool to integrate indications of GNOM DP S7 / GNOM DDE S7 new generation wireless axle load sensors into the Telematics system.

Particular features of GNOM S7 Radiobox CAN signal converter:

- Reception of signals by means of S7 Technology through **Bluetooth Low Energy** channel from sensors (up to 10 pcs. at one time) and their conversion into SPN.
- Compatibility with Telematics terminals and displays which use CAN (SAE j1939) bus protocol.
- Internal processing data "onboard" the Vehicle by means of IoT Burger Technology (filtration and normalization of Parameters, detecting Events, maintenance of Counters) simplifies the Server operation and economizes traffic.
- Compliance with Units, Database and cabling system S6 Technology.
- Wireless configuration directly via Bluetooth using the Android-based smartphone/tablet without using the additional service adapter.
- Digital self-diagnostics function for monitoring the quality of the Unit operation.
- Hermetic casing (IP 68) prevents damaging the electronics module of the converter due to penetration of water and dirt inside.
- Simple mounting, the mounting kit provided.
- High-quality technical support and documentation.
- Conformity with European and national standards and directives.

GNOM S7 Radiobox CAN **signal converter is mounted on a** Vehicle **together** GNOM DP S7 **/** GNOM DDE S7 **wireless axle load sensors**.

Configuration of GNOM S7 Radiobox CAN for work with sensors using of S7 Technology is performed with the help of a smartphone/tablet based on Android 5.X and higher operating system (further on — Android device) through **Service GNOM S7 Radiobox**, mobile application whose functionality enables to:

- Display the list of all accessible GNOM S7 Radiobox CAN converters operating in the service mode*, with specifying for each Unit:
  - ID data (serial number, MAC-address of BLE-module);
  - received signal strength indicator (RSSI).
- Display the list of all accessible GNOM DP S7/GNOM DDE S7 sensors, with specifying for each of them:
  - ID data (serial number, MAC-address of BLE-module);
  - received signal strength indicator (RSSI);
  - time of the latest message reception.
- Display the converter electronic passport, its active malfunctions, Counters of restarts and of operation time.
- Authorize joint operation with the converter of up to 10 pcs. of sensors (S7 Units).
- For each authorized S7 Unit, record limits of loading modes and the table of the measuring system calibration into the memory of a mobile device.
- Display indications of axle load, ambient temperature, as well as recorded "Overload" and "Power ON/OFF" Events**.
- Adjust signals of time for the converter Functional modules.
- Configure CAN j1939/S6 output interface for the converter connection to external devices.
- Perform operations with the converter profile.
- Update the inbuilt converter software (firmware).

The user may free download the Service GNOM S7 Radiobox application from Google Play (search request "Technoton").

ATTENTION: It is strongly recommended to follow strictly the instructions of the present Manual when using GNOM S7 Radiobox CAN.

The Manufacturer guarantees GNOM S7 Radiobox CAN 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 GNOM S7 Radiobox CAN specifications that do not lead to a deterioration of the consumer qualities without prior customer notice.

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* Displaying GNOM S7 Radiobox CAN converter in the list of visible devices is impossible without its switching over into the service mode using the magnetic key (see 2.5.1).

** Readings of sensors and Events at the moment of switching the converter into the service mode. Data are not updated, until the converter service mode is switched off.

1 General information and technical specifications

1.1 Purpose of use, application area, operation principle

Radiobox CAN is designed for:

Reception of signals by means of S7 Technology from GNOM DP S7 / GNOM DDE S7 wireless axle load sensors (up to 10 pcs.) and their conversion into data (SPN) of CAN j1939/S6 Telematics interface.

Figure 2 — Purpose of GNOM S7 Radiobox CAN signal converter

Area of application:

Axle load monitoring, as part of transport Telematics systems based on the Terminal with CAN (SAE j1939) interface (see figure 3).

Operation principle:

GNOM S7 Radiobox CAN signal converter is mounted on a Vehicle and is connected to CAN j1939/S6 Telematics interface.

GNOM S7 Radiobox CAN has an inbuilt BLE-module which receives signals in the continuous mode from all GNOM DP S7 / GNOM DDE S7 onboard axle load sensors located within the range of 50 m from it, by means of S7 Technology.

The converter automatically processes readings of sensors selected by the user (up to 10 pcs.) and converts them into PGN, in accordance with j1939/S6 protocol. The converted data on current axle load, possible overload, ambient temperature and the sensors performance may be displayed using S6 Technology on the Telematics terminal and/or on the data display in the Vehicle driver cabin.

For comprehensive monitoring Parameters of a complicated Vehicle by means of S6 Technology, besides GNOM S7 Radiobox CAN converter, you may also connect a vehicle CAN-bus using FMSCrocodile contactless gateway and up to 16 pcs. of DFM CAN / DFM Marine CAN fuel flow meters together with DUT-E CAN / DUT-E 2Bio fuel level sensors (up to 16 pcs.).
The monitoring Terminal sends Reports to ORF 4 / ORF 5 Telematics service or directly to the user by SMS/E-mail.

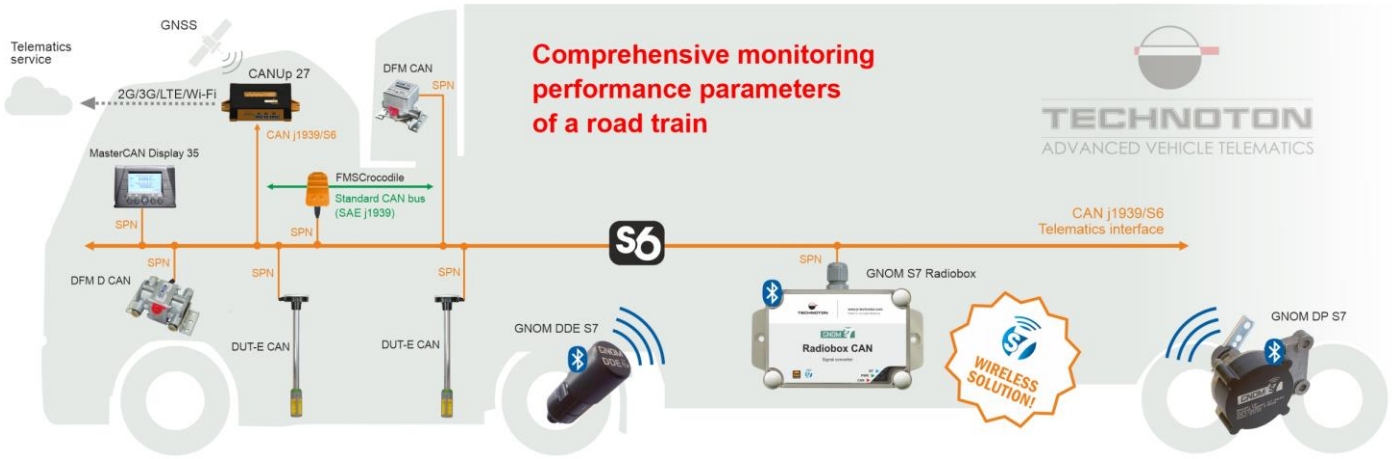
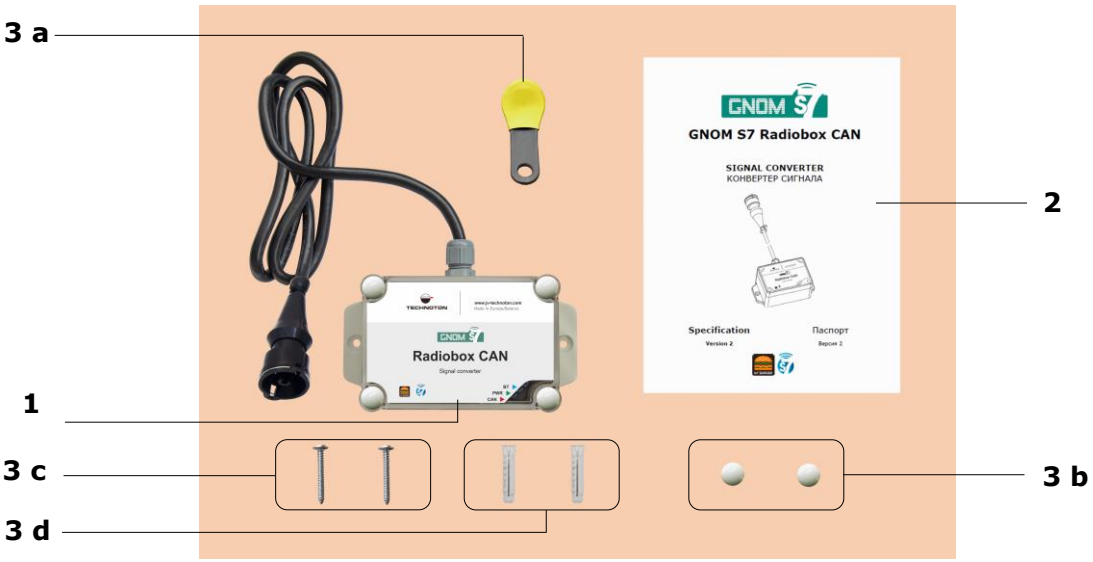


Figure 3 — Example of using GNOM S7 Radiobox CAN signal converter as part of the Telematics system based on the Terminal with CAN-input for monitoring axle load of a complicated Vehicle

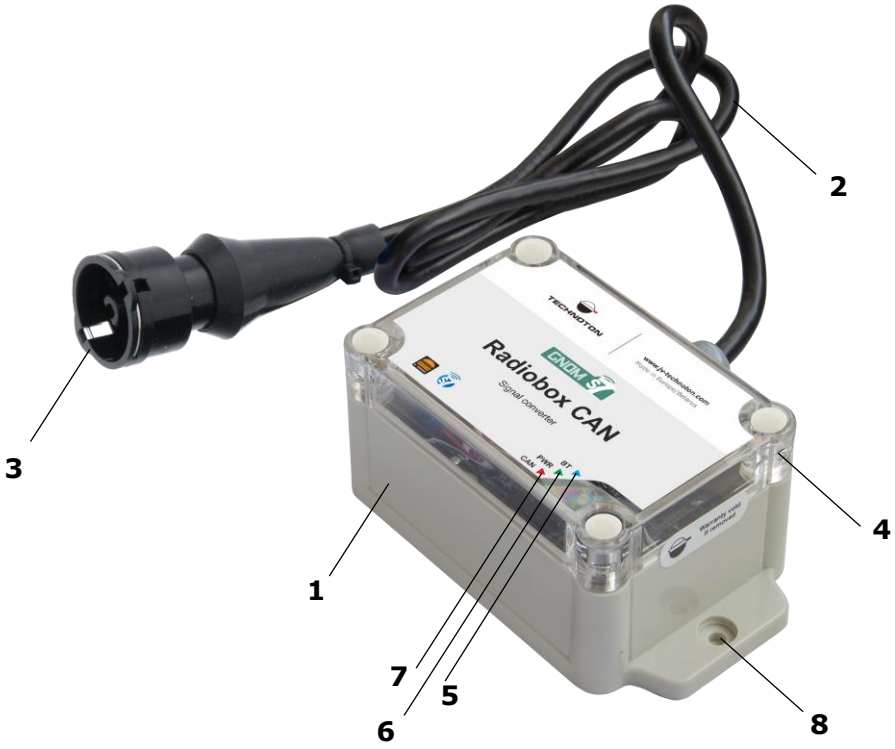
1.2 Exterior view and delivery set



1	GNOM S7 Radiobox CAN signal converter	– 1 pc.;
2	Passport	– 1 pc.;
3	Mounting accessories:	
	a) magnetic key	– 1 pc.;
	b) plug	– 2 pcs.;
	c) self-tapping screw 4x29	– 2 pcs.;
	d) dowel	– 2 pcs.

Figure 4 — The delivery sets of GNOM S7 Radiobox CAN signal converter

1.3 Design



1 – casing inside which are located: the BLE-module designed for data reception from wireless sensors by means of S7 Technology, the electronic module for data conversion;
2 – interface cable;
3 – **S6** connector for connection to the Vehicle onboard circuit power supply and to external devices via CAN j1939/S6 interface (see 2.3);
4 – glassy protective casing cover;
5 – blue **BT** LED indicator for visual monitoring Bluetooth-module operation in the operating mode (during reception of messages from wireless Units by means of S7 Technology) and in the service mode (during the converter configuration using an Android device);
6 – green **PWR** LED indicator for visual monitoring the converter power supply;
7 – red **CAN** LED indicator for visual monitoring data transfer to CAN j1939/S6 output interface by the converter;
8 – mounting holes (2 pcs.).

Figure 5 — Design of GNOM S7 Radiobox CAN signal converter

1.4 Technical specifications

1.4.1 Main specifications

Table 1 — Main specifications of GNOM S7 Radiobox CAN signal converters

Parameter, measuring unit	Value
Input/Service wireless interface	Bluetooth 4.2
Output interface	CAN j1939/S6
Transmission unit power (Tx Power), dBm	+4
Receiver sensitivity (Rx Power), dBm	-88
Maximum distance to the sensor/Android device, m	20 (in case there are metal partitions in the mounting location) 50 (when mounted within line-of-sight range)
Voltage range of external power supply, V	9…45
Maximal current consumption at supply voltage 12/24 V, mA, not more than	80/60
Temperature range, °C	-40…+85
Level of sealing protection from dust and moisture	IP68
Certificates of BLE module	FCC/CE-RED/IC/TELEC/KCC/SRRC/NCC BQB RoHS, REACH
Weight, kg, not more than	0.21
Overall dimensions, mm, not more than	see figure 6

1.4.2 Specifications of CAN j1939/S6 output interface

CAN j1939/S6 output interface (see 1.3) of GNOM S7 Radiobox CAN converter is used for transfer of converted data to the Telematics terminal and/or to CAN-display. The interface specifications correspond to S6 Technology.

The application level of the data transfer protocol is based on SAE j1939 standard and corresponds to S6 Database (see details at http://s6.jv-technoton.com/; you need to get registered to work with BD S6. Data can be transferred automatically or upon request. The list of the converter output messages is provided in table 2.

Baudrate can be selected from the following range of fixed values: 100; 125; 250; 500; 1000 kbit/s (by default — 250 kbit/s). The converter can also automatically adjust to any Baudrate in the bus from accessible values listed above.

For the converter identification by CAN j1939/S6 output interface, it has a fixed unique network address — 148.

Wireless configuration of the converter connection using CAN j1939/S6 interface (see 2.5.6) and for work with GNOM DP S7 / GNOM DDE S7 sensors using S7 Technology is performed by means of Bluetooth 4.2 with the help of Service GNOM S7 Radiobox mobile application. The current version of the application may be installed free of charge from Google Play (search request "Technoton").

Table 2 — Data composition in output messages of GNOM S7 Radiobox CAN signal converter

Field number	Length	Parameter	Description	Rules of output
Unit Work Counters PGN 62994 (0xF612)				On request
1	4 bytes	SPN 521116	Unit Hours Of Operation	
9	4 bytes	SPN 521118	Unit Reset Counter	
Unit Passport PGN 62995 (0xF613)				On request
1	16 bytes	SPN 521123	Line	
17	16 bytes	SPN 521344	Brand	
33	16 bytes	SPN 521345	Model	
49	16 bytes	SPN 521120	Serial Number	
65	8 bytes	SPN 521121	Firmware Version	
73	4 bytes	SPN 521125	Manufacturing Date	
77	1 byte	SPN 521188	S6 Address (SA)	
Bootloader Information PGN 63009 (0xF621)				On request
1	8 bytes	SPN 521122	Bootloader Version	
Important Events List PGN 63055 (0xF64F)				On request
1	4 bytes	SPN 521166	Event SPN	
5	1728 bytes	SPN 521357	Data	
Information Events List PGN 63056 (0xF650)				On request
1	4 bytes	SPN 521166	Event SPN	
5	1728 bytes	SPN 521357	Data	
Allowed Units S7 List PGN 63270 (0xF726)				On request
1	1 byte	SPN 521355	Array Elements Count	
2	6 bytes	SPN 521490	MAC Address	
8	1 byte	SPN 521188	S6 Address (SA)	
9	6 bytes	SPN 521490	MAC Address	
15	1 byte	SPN 521188	S6 Address (SA)	
16	6 bytes	SPN 521490	MAC Address	

Field number	Length	Parameter	Description	Rules of output
22	1 byte	SPN 521188	S6 Address (SA)	
23	6 bytes	SPN 521490	MAC Address	
29	1 byte	SPN 521188	S6 Address (SA)	
30	6 bytes	SPN 521490	MAC Address	
36	1 byte	SPN 521188	S6 Address (SA)	
37	6 bytes	SPN 521490	MAC Address	
43	1 byte	SPN 521188	S6 Address (SA)	
44	6 bytes	SPN 521490	MAC Address	
57	1 byte	SPN 521188	S6 Address (SA)	
58	6 bytes	SPN 521490	MAC Address	
64	1 byte	SPN 521188	S6 Address (SA)	
65	6 bytes	SPN 521490	MAC Address	
71	1 byte	SPN 521188	S6 Address (SA)	
Available Bluetooth Device List PGN 63279 (0xF72F)				On request
1	1 byte	SPN 521355	Array Elements Count	
2	6 bytes	SPN 521490	MAC Address	
8	1 byte	SPN 521178	Received Signal Strength Indicator (RSSI)	
9	2 bytes	SPN 521084	Timeout	
GNOM S7 Sensor Status PGN 63540 (0xF834)				1000 ms
1	1 byte	SPN 521737	Sensor ID	
2	2 bytes	SPN 521738	Weight	
4	1 byte	SPN 521457	Temperature	
5.1	2 bytes	SPN 521739	Load Status	
6	1 byte	SPN 521740	GNOM S7 Error Mask	
GNOM S7 Load Status Boundaries PGN 63541 (0xF835)				On request
1	1 byte	SPN 521355	Array Elements Count	
2	2 bytes	SPN 521738/37.1	Weight. Above Normal	
4	2 bytes	SPN 521738/37.2	Weight. Overload	
GNOM S7 Calibration Table PGN 63542 (0xF836)				On request
1	1 byte	SPN 521737	Sensor ID	
2	1 byte	SPN 521355	Array Elements Count	
3	2 bytes	SPN 521741	GNOM S7. Raw Data	
5	2 bytes	SPN 521738	Weight	
Active Diagnostic Trouble Codes PGN 65226 (0xFECA)				1000 ms
3	3 bytes	SPN 521044	Fault Identifier (SID+FMI)	
Time/Date PGN 65254 (0xFEE6)				On request
1	1 byte	SPN 959	Seconds	
2	1 byte	SPN 960	Minutes	
3	1 byte	SPN 961	Hours	
4	1 byte	SPN 963	Month	
5	1 byte	SPN 962	Day	
6	1 byte	SPN 964	Year	
7	1 byte	SPN 1601	Local minute offset	
8	1 byte	SPN 1602	Local hour offset	

PGN 63540 is transferred only in case the sensor is available within the converter range of visibility.

1.4.3 Compatibility with external devices

GNOM S7 Radiobox CAN signal converter can be used together with Telematics terminals, displays or other external devices whose input interface meets specifications of its CAN j1939/S6 output interface (see 1.4.2).

Technoton on a regular basis conducts compatibility and mutual accuracy tests of the equipment manufactured; these tests are conducted with different models of Telematics terminals.

The table containing the up-to-date list of Declarations of compatibility of Telematics terminals from different manufacturers with equipment manufactured by Technoton is provided at https://jv-technoton.com/.

Recommendations on wireless connection of equipment to Telematics terminals can be obtained upon request at Technoton technical support service by e-mail: support@technoton.by.

1.4.4 Overall dimensions

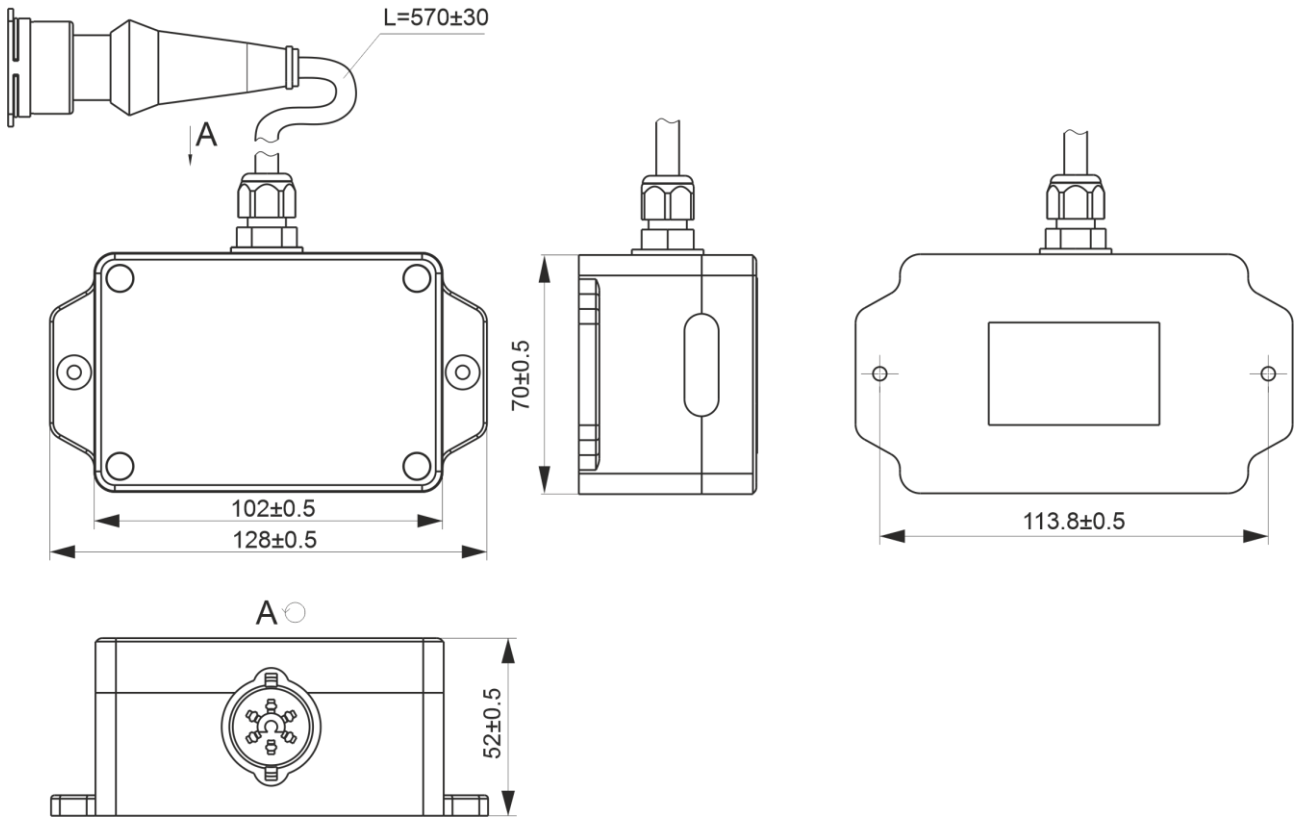


Figure 6 — Dimensions of GNOM S7 Radiobox CAN signal converter

2 Installation

To ensure proper operation of GNOM S7 Radiobox CAN converter, it should be mounted, electrically connected and configured by specialist, who finished official technical training and was certified for that.

ATTENTION:
1) When mounting GNOM S7 Radiobox CAN signal converter, strictly follow safety rules of car repair works as well as local safety rules of the customer' company.
2) Before connection it is recommended to carefully study through the electrical circuit diagram and the Operation manual for the machinery unit where converter is mounted.

2.1 Exterior inspection prior to starting works

It is required to conduct GNOM S7 Radiobox CAN converter 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 Mounting

IMPORTANT: GNOM S7 Radiobox CAN signal converter should not be mounted:
1) Near heating and cooling devices (e.g. the climate control system), power electrical circuits.
2) Less than 10 cm from rotating parts and surfaces.
3) Close to radio telephones, video signal transmitting devices and other wireless devices operating within 2.4 or 5.0 GHz ranges.
4) In closed metal cases or boxes preventing the spreading of the radio signal.

For mounting GNOM S7 Radiobox CAN, choose any suitable location with respect to the above-mentioned limitations. E.g. on the Vehicle frame, close to the driver's cabin (see figure 7).

For mounting GNOM S7 Radiobox CAN, use mounting elements from the delivery set.

IMPORTANT: The converter mounting location must be within the range of **no more than 20 m** (in case there are metal partitions) or **no more than 50 m** (within the range of direct visibility) from wireless axle load sensors whose readings need to be converted.

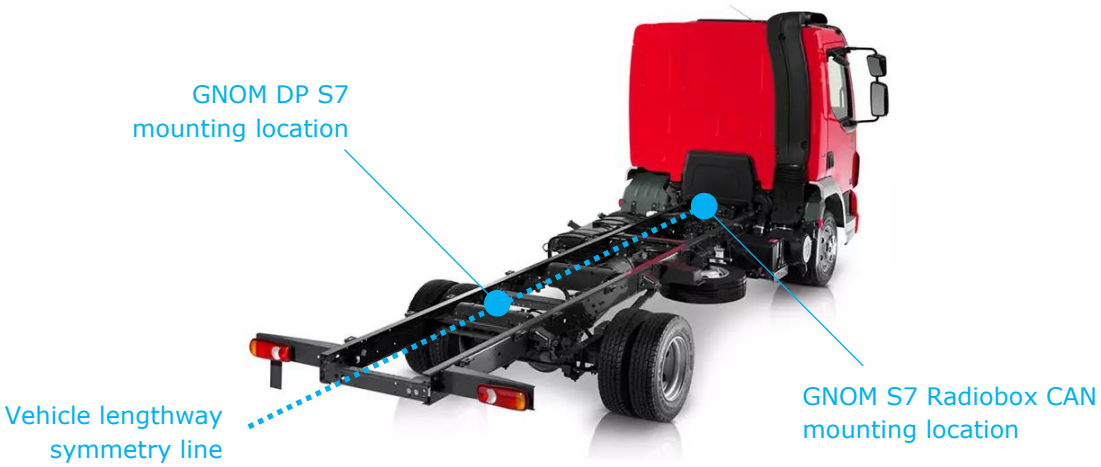


Figure 7 — Example of choosing a location for mounting GNOM S7 Radiobox CAN converter for reception of a signal from GNOM DP S7 wireless sensor

2.3 Electrical connection

The power supply of the GNOM S7 Radiobox CAN converter should be connected to the external power source (e.g. to the onboard circuit). When the converter operates within the network of Units by means of S6 Technology, power is supplied through S6 cable system.

IMPORTANT:

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

2) Before starting electrical connection of the converter special attention must be paid to the quality of the chassis ground. Resistance between any point of the chassis and the negative clamp of the power supply (battery) must not exceed **1 Ohm**.

3) It is recommended to use **fuse** when connecting converter to power supply. Nominal fuse current is **2 A**.

4) For the converter electrical connection to the tracking device and to the external power supply, we recommend to purchase S6 SC-CW-700 signal cable (see annex C). We recommend to connect wires of the signal cable using **connectors** (to be purchased separately).

5) When connecting converter to onboard power source it is necessary to connect feed "+" and chassis "-" wires to the same sockets where appropriate wires of tracker are connected.

Power supply and external devices (e.g. Units by means of S6 Technology) are connected through the connector of the converter interface cable (see 1.3), in accordance with the designation of the connector contacts, color and marking of wires, in accordance with table 3.

Table 3 — Connector pinout and designation of the interface cable wires of GNOM S7 Radiobox CAN signal converter

Connector Pinout	Connector Contact Number	Signal designation	Wire Color		Signal	
					Designation	Type
	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	

GNOM S7 Radiobox CAN converter starts operating (scanning the air for radio signals and detect GNOM DP S7 / GNOM DDE S7 wireless axle load sensors) from the moment the onboard power supply is on.

2.4 Connection schemes examples

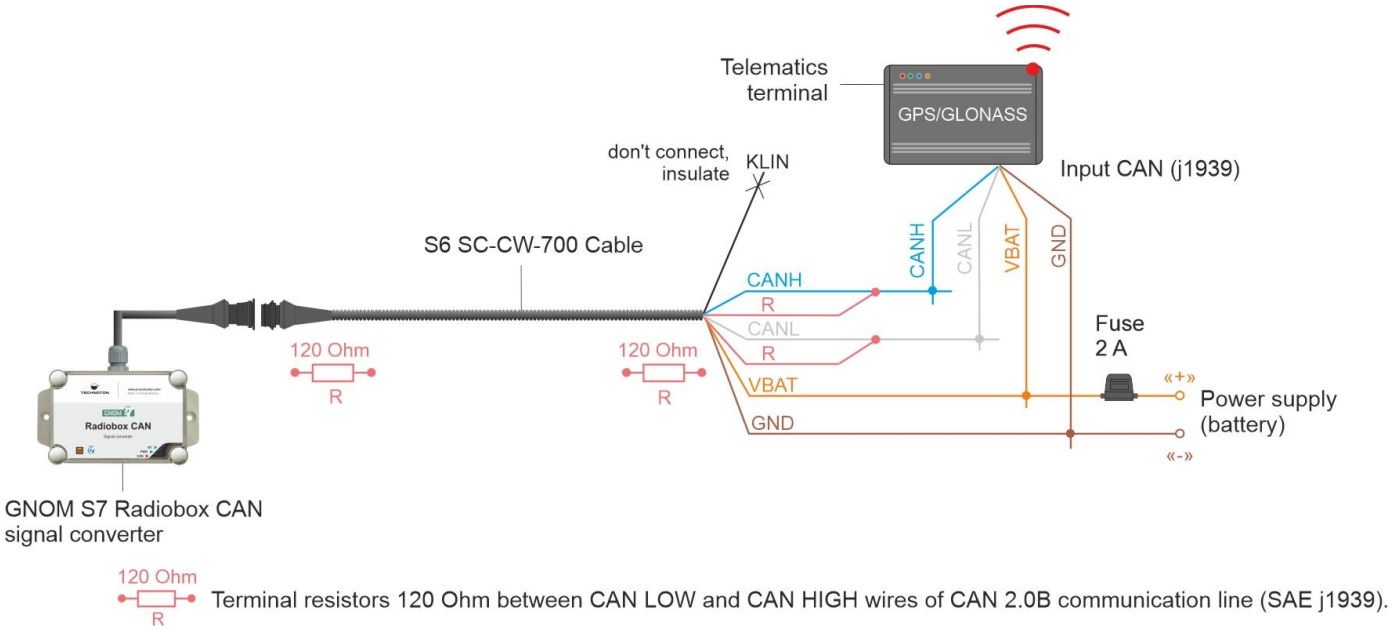


Figure 8 — Example of [GNOM S7 Radiobox CAN] signal converter connection to the Terminal with CAN-input which is incompatible with S6 cable system

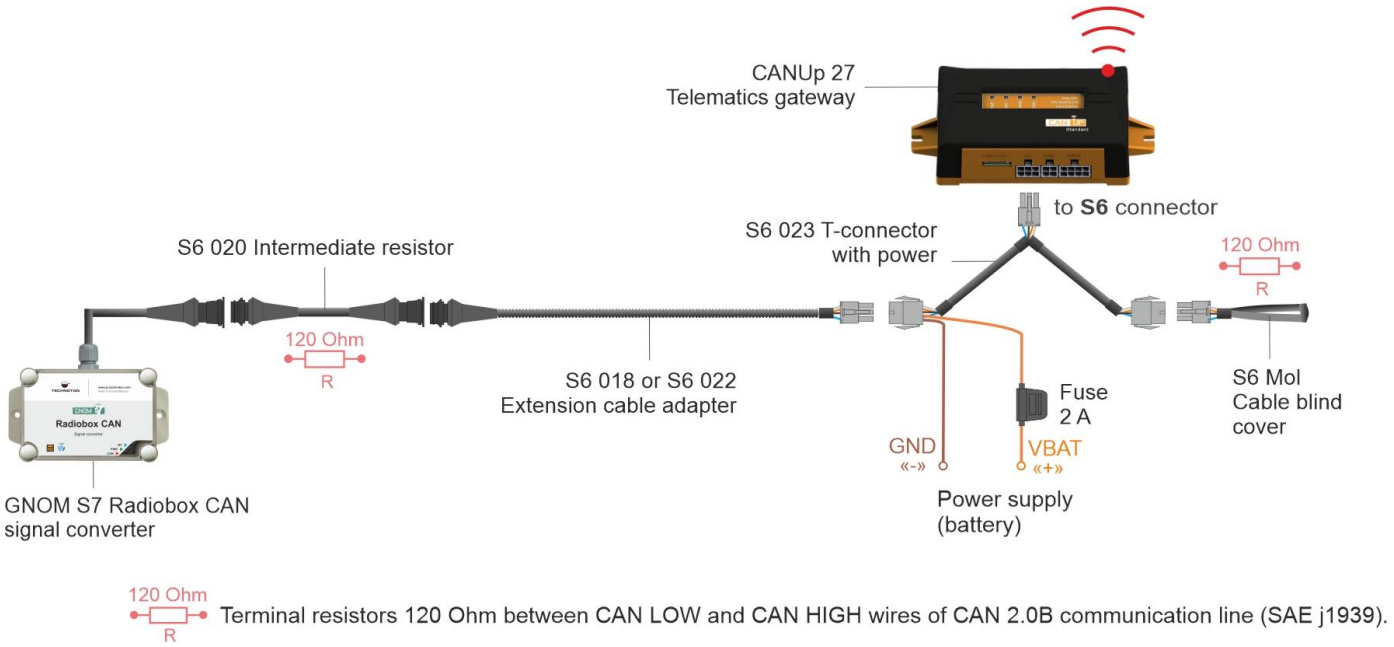
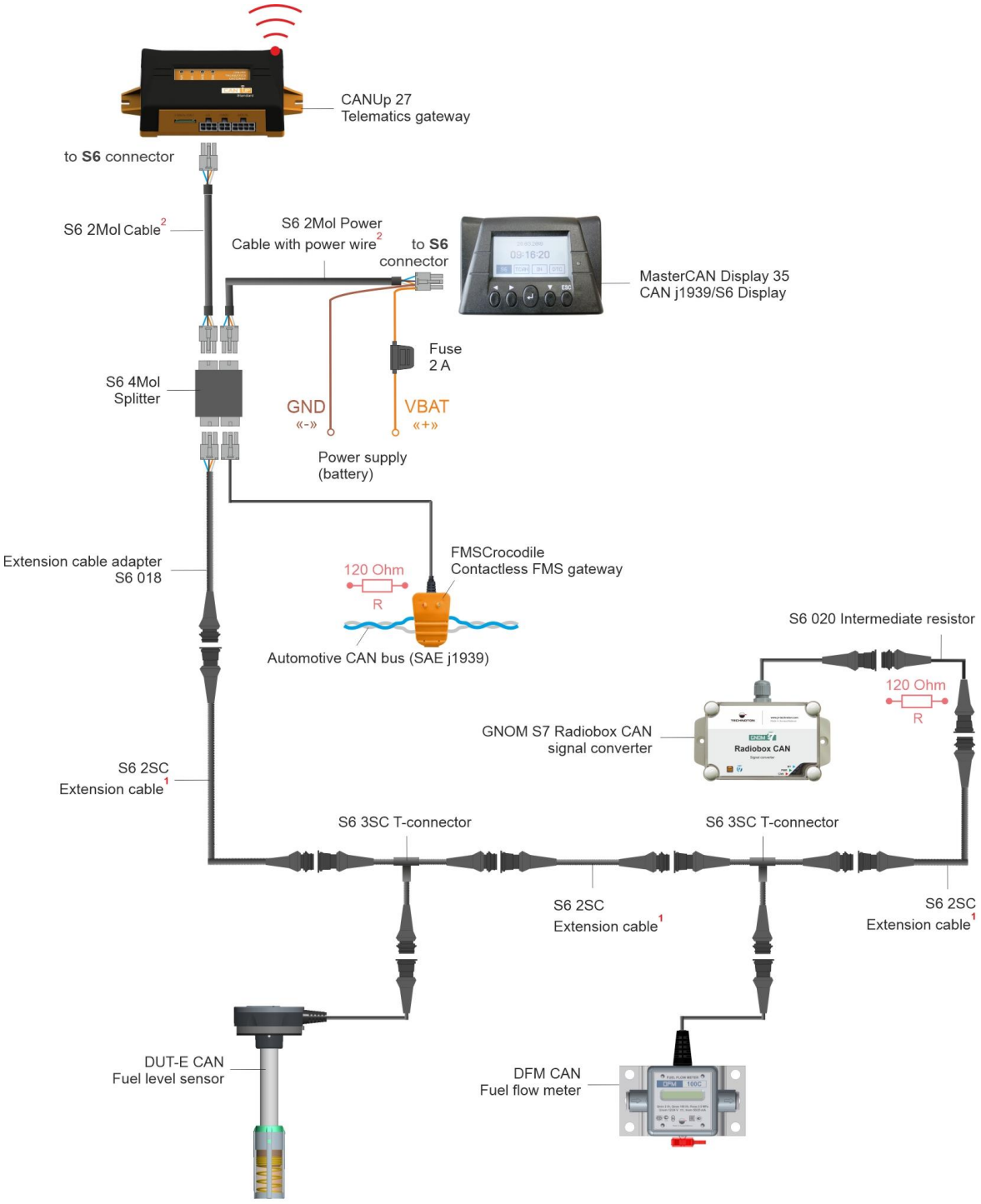


Figure 9 — Example of GNOM S7 Radiobox CAN signal converter connection to the Terminal with CAN-input which is compatible with S6 cable system



[1] Length is selected depending on mounting conditions. Standard lengths: 1, 3, 7 and 12 m.

[2] Length is selected depending on mounting conditions. Standard lengths: 0.2 and 1 m.

120 Ohm R Terminal resistors 120 Ohm between CAN LOW and CAN HIGH wires of CAN 2.0B communication line (SAE j1939).

Figure 10 — Example of GNOM S7 Radiobox CAN signal converter connection to the network of Units of CAN j1939/S6 Telematics interface during comprehensive monitoring performance parameters of a complicated Vehicle

Note — A description of S6 cable system components which need to be ordered is provided in CAN j1939/S6 Telematics interface operation manual.

2.5 Converter configuration for operation with wireless axle load sensors

2.5.1 Basic provisions

For wireless configuration of GNOM S7 Radiobox CAN converter using S7 Technology, first, install the Service GNOM S7 Radiobox mobile application based on Android 5.X and higher platform on your smartphone/tablet (Android) from Google Play (search request "Technoton").

ATTENTION:

1) During your work with Service GNOM S7 Radiobox application, to eliminate any communication disruption in the communication line between the signal converter, wireless sensors and the Android device, you need to make sure that there are no sources of electromagnetic interference close to the workplace (radiotelephones, video signal transmitting devices and other wireless devices operating within 2.4 or 5.0 GHz ranges, powerful transformers and switching equipment, welding equipment, high-voltage lines etc).

2) The maximum allowed distance between the signal converter to be configured, wireless sensors and the Android device depends on the quality of the Bluetooth module of the Android device. To ensure the uninterrupted data transfer, we do not recommend that this distance should exceed **20 m** (see figure 11).

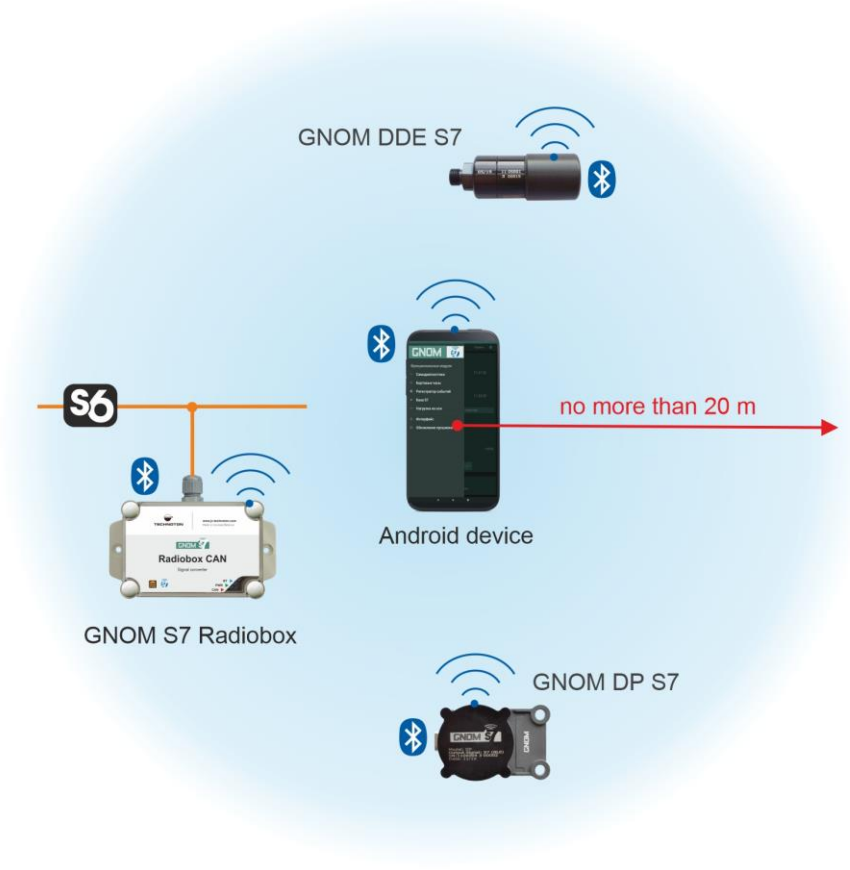


Figure 11 — Distance between Units during the configuration of GNOM S7 Radiobox CAN using the Android device

It should be noted that signal transmission from GNOM DP S7 / GNOM DDE S7 to the converter is possible **only after the sensor activation**. A wireless sensor is active and ready for work with the application from the moment the "Operating"/ "Manufacturing" mode is enabled in its BLE-module.

You can study detailed description of modes of operation of wireless axle load sensors, depending on their BLE-module status, in GNOM S7 operation manual.

IMPORTANT:

1) The configuration of GNOM S7 Radiobox CAN using Service GNOM S7 Radiobox mobile application is possible only after the converter is switched into the **service mode**. To perform this, you need to apply the magnetic key for 5 s (see the delivery set) to the place on the converter casing which is indicated in figure 12.

2) The list of sensors that are accessible for connection to the converter is created **only before the converter is switched over into the service mode**; during work with the application data on accessible Units are not updated. Therefore, we recommend to activate the service mode not earlier than **20…30 s** after power is supplied to the converter, so that its BLE-module could have time to detect accessible sensors.

3) Blinking blue **BT** LED indicator (see 1.3) once a second is a sign that the converter is operating in the service mode.

4) The service mode is switched off automatically **30 s** after the mobile application is closed.

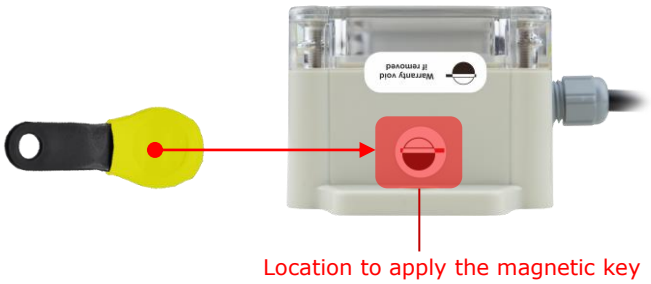


Figure 12— Activation of the service mode of GNOM S7 Radiobox CAN signal converter

After the service mode is activated, GNOM S7 Radiobox CAN signal converter is ready for work with Service GNOM S7 Radiobox application.

The settings of the GNOM S7 Radiobox CAN Functional modules displayed and/or edited using the Service GNOM S7 Radiobox mobile application can be found in annex A.

2.5.2 Establishment of connection with the converter

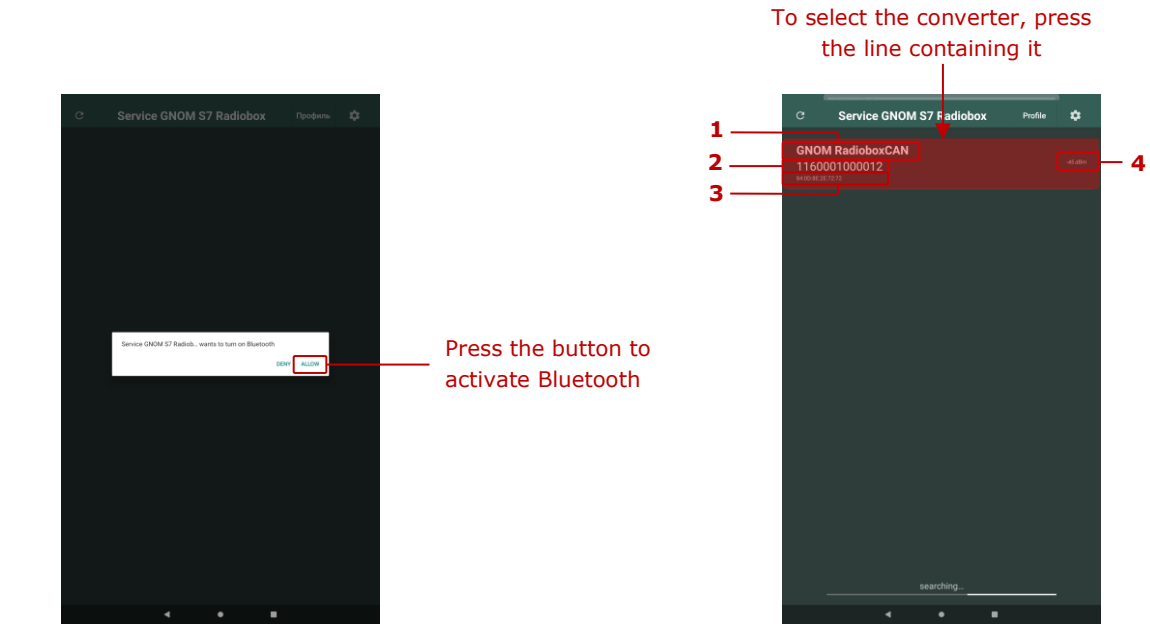
Start Service GNOM S7 Radiobox mobile application from the main menu of the Android device using the shortcut created in the process of the application installation. The application will offer to activate Bluetooth (in case it was off) (see figure 13 a).

After Bluetooth activation, the application will search and detect converters.

Each Unit detected is automatically entered into the list of accessible devices by the application, with displaying the following data (see figure 13 b):

- model **(1)**;
- serial number **(2)**;
- MAC-address of the BLE-module **(3)**;
- received signal strength indicator (RSSI) **(4)**.

To configure GNOM S7 Radiobox CAN press the line with the serial number of the required Unit in the list of accessible devices.



a) offer to allow the Bluetooth connection *b) Unit selection from the list of accessible devices*

Figure 13 — Establishing connection between the converter and the Android device using Service GNOM S7 Radiobox application

2.5.3 Interface of Service GNOM S7 Radiobox application

Service GNOM S7 Radiobox application interface consists of **Information and Configuration area** and **Tools panel** (see figure 14).

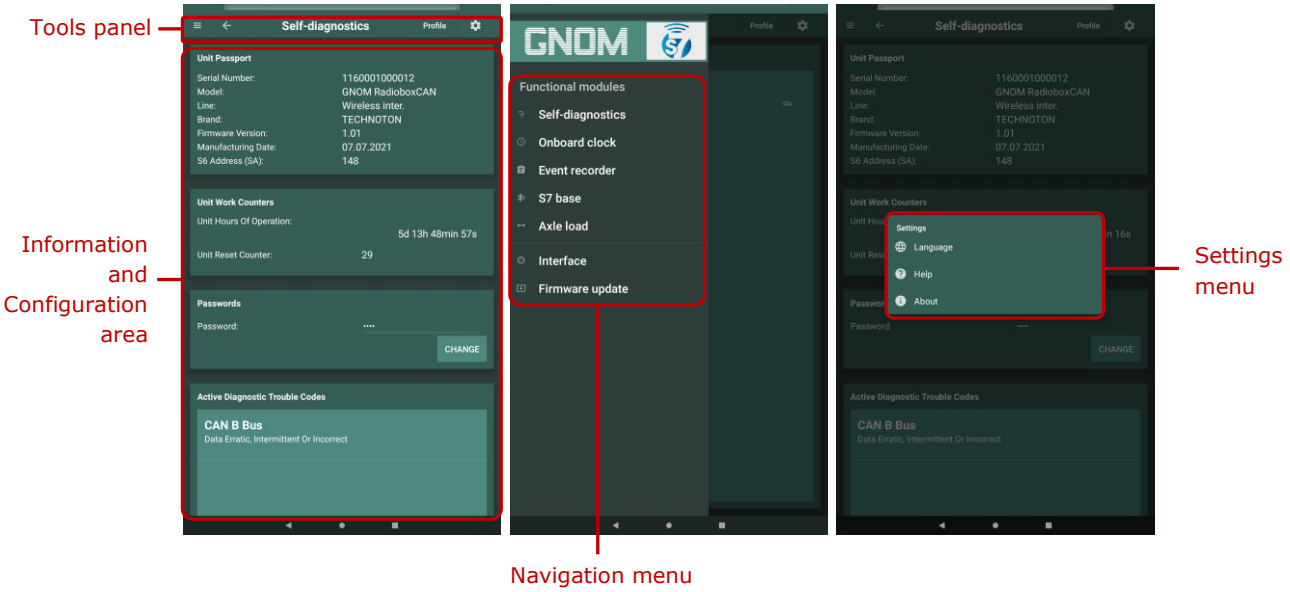
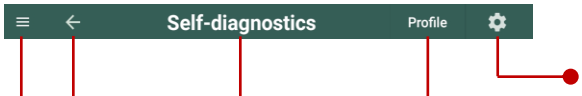


Figure 14 — Interface of Service GNOM S7 Radiobox mobile application

In the **Information and Configuration** area current settings of the GNOM S7 Radiobox CAN converter Functional modules (FM) are displayed.

In the **Tools panel** area, there are the following elements for use during work with Service GNOM S7 Radiobox application:



- icon to open the **Settings menu** (selection of the interface language, opening Help and Application information);
- button to select operations with the converter profile;
- name of the selected FM of the converter;
- icon of disconnection from the Unit;
- shortcut to open the **Navigation Menu** (selecting FM of a Unit, monitoring the electronic passport, Counters, diagnostics of malfunctions, selection of sensors for converting signals, monitoring indications of axle load and recorded Events, adjustment of signals of time and configuration of connection, according to the output interface, firmware update etc.).

When working with converter, Service GNOM S7 Radiobox mobile app operates with data (PGN and SPN) from S6 databases.

2.5.4 Authorization

To establish connection for a session of wireless communication by means of S7 Technology between GNOM S7 Radiobox CAN converter and the Android device, press the line with the required Unit in the list of accessible devices (see figure 13 b). The mobile application will automatically connect the device with the selected converter.

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).

After the successful authorization, the Profile of the selected converter will be loaded.

Figure 15 — Establishing a connection for a session of wireless communication between GNOM S7 Radiobox CAN converter and the Android device

2.5.5 Operations with the converter profile

GNOM S7 Radiobox CAN signal converter **Profile** is set of PGN (passport data and settings of Function modules of converter).

Profile menu serves to perform operations with the converter profile; it is opened by pressing Profile button on the **Tools panel** (see figure 16).

The **Profile** menu contains the following options for operations with the converter profile:

- Load from file — is used to load the profile saved in the memory of the Android device before. In the window where the file is to be loaded you need to find and select the Profile file (***.prf**);
- Save to file — is used to save the changed settings of the profile in the Android device memory;
- Load from Unit — is used to load the profile from the converter connected to the Android device;
- Save to Unit — is used to save the changed settings of the profile in the memory of the connected converter.
- Load default profile — is used for loading a profile with standard settings.

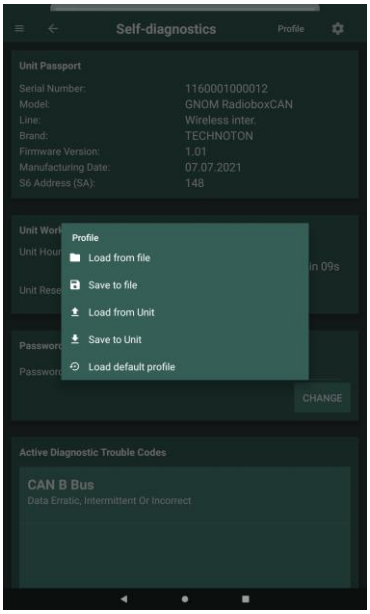


Figure 16 — View of Profile menu Service GNOM S7 Radiobox mobile application

2.5.6 Configuration of connection using CAN j1939/S6 output interface

In order to connect GNOM S7 Radiobox CAN converter to external devices, you have to configure parameters of CAN j1939/S6 output interface in Interface submenu (**Navigation menu**, see 2.5.3) (see figure 17):

1) In **CAN Protocol Type** field (SPN 521530) (this setting is a fixed one) **J1939+S6** data transfer protocol is specified.

2) 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**) or **Auto**, i.e. the converter will automatically adjust to any accessible Baudrate from values of the above range.

3) CAN Mode (this setting is a fixed one) — **Active (CAN Requests Enable)** data transfer mode is set. The converter generates active requests to Units connected via S6 Technology. Active requests are necessary to receive PGN, which, by default, are missing in bus, but may be transferred to the converter only upon request.

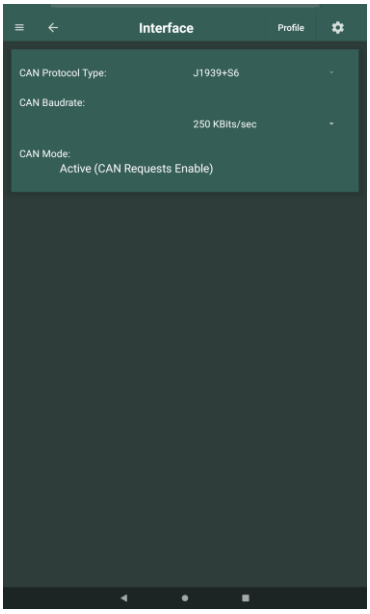


Figure 17 — GNOM S7 Radiobox CAN converter connection parameters configuration via CAN j1939/S6 interface

2.5.7 Linking wireless sensors to the converter

Service GNOM S7 Radiobox mobile application allows to link **up to 10 pcs.** GNOM DP S7 / GNOM DDE S7 wireless axle load sensors to GNOM S7 Radiobox CAN converter by means of S7 Technology (see figure 18).

To establish communication between GNOM S7 Radiobox CAN and wireless sensors, in order to receive and convert their signals, you need to perform the following operations:

1) In S7 base submenu (see A.4), from **Available Bluetooth Device List** area select the required Unit, in accordance with its serial number. The list is generated automatically and contains up to 15 wireless sensors detected by the BLE-module of the converter.

IMPORTANT: The list of accessible sensors is generated only **before the converter service mode is activated**; during work with the application data on accessible sensors are not updated. Therefore, we recommend to activate the service mode (see 2.5.1) not right after the converter is switched on, but after a **20...30 s** pause.

For each sensor, the following data are displayed from **Available Bluetooth Device List** area (see figure 18 a):

- serial number **(1)**;
- MAC-address of the BLE-module **(2)**;
- time of receiving last message **(3)**;
- received signal strength indicator (RSSI) **(4)**;

ATTENTION: You can identify the model of the selected wireless sensor according to the first four digits of its serial number:
- **1105** — GNOM DDE S7 pressure sensor.
- **1106** — GNOM DP S7 position sensor.

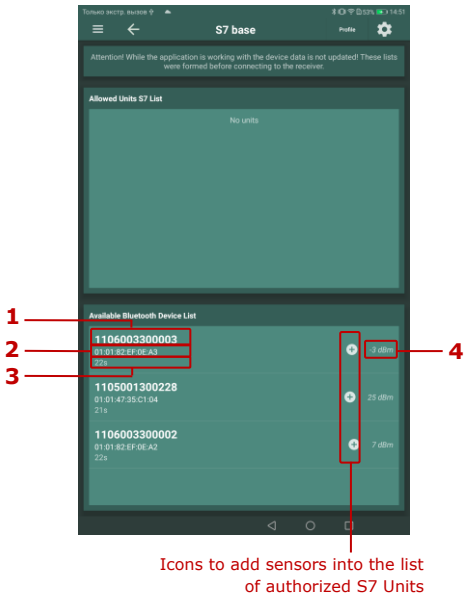
2) Add the selected sensor into the area **Allowed Units S7 List**, by pressing the appropriate button .

The application automatically assigns a network address (SA) to each GNOM DP S7 / GNOM DDE S7 sensor from vacant addresses within the range **0...250** for its identification during operation using S7 Technology (for the first five added sensors — from range **82...85**).

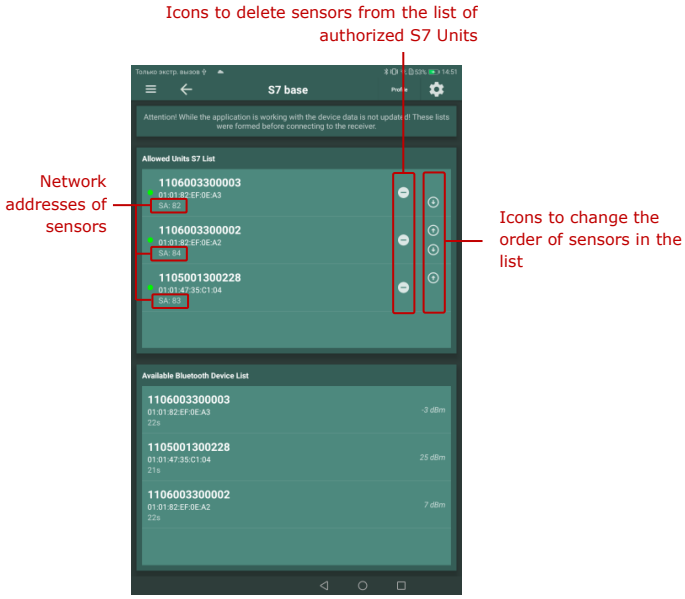
If necessary, you can manually change the automatically assigned value of the network address for any other vacant address from range **0...250**. To do this, you are to press the line of the appropriate sensor in the area **Allowed Units S7 List** and enter the number you want in **Enter new address** dialog box.

/ icons serve to arrange the list of sensors, according to their positions, using which you may move a particular sensor one line up or down.

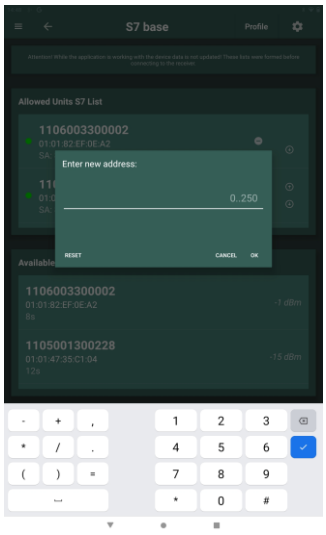
If you need to delete a sensor from the list, press the appropriate icon (see figure 18 b).



a) addition of Units for linking to the converter, when using S7 Technology



b) arranging the list of selected sensors



c) dialog box to change a sensor network address

Figure 18 — Linking wireless Units to the converter for joint operation using S7 Technology

2.5.8 Configuration of measuring system

IMPORTANT: For correct conversion of signals from GNOM DP S7 / GNOM DDE S7 axle load sensors by GNOM S7 Radiobox CAN converter, you must **by all means configure the measuring system!**

The measuring system is configured in Axle load submenu (see A.5) in which you need to record into the converter memory for each of the sensors from **Allowed Units S7 List** area (see figure 19):

1) Calibration table which determines the dependence of air pressure in the air suspension circuit (for GNOM DDE S7) or of the pivot lever angular deviation (for GNOM DP S7) on various values of axle load (cargo weight). In accordance with the table, the converter will further on calculate the current value of axle load (cargo weight).

2) Load status boundaries, according to which the converter will record exceeding of the Vehicle maximum load and "Overload" Event.

Depending on the aims of monitoring, the following types of calibration are carried out:

"Monitoring the load on the Vehicle axles" — each monitored axle of the Vehicle is weighed separately (irrespective of the number of sensors installed) and dependence of indications of each sensor on different values of axle load is determined.
Special scales for weighing each axle of a vehicle are used to determine values of axle load in points of the calibration table.
"Monitoring the Vehicle weight" — dependence of sensor readings on various values of the Vehicle weight is defined. In order to define the Vehicle weight in points of the calibration table, special scales for vehicles are used; the entire Vehicle climbs on the platform for weighing.
To enhance the accuracy of the cargo weight measurement, we recommend to mount two sensors on one Vehicle: for the road train — on the rear axle (bogie) of the tractor truck and on the axle (bogie) of the semi-trailer. For a standard truck — on the front and on the far rear axles. The process of calibration is identical for each of the monitored axles.

IMPORTANT: During the calibration you must:

- Load the Vehicle, bearing in mind general health and safety regulations, as well as rules for loading/unloading, locating, and fixing cargo on the platform that are established at a particular road transport company.
- Discrete cargo must be located "front-back" along the Vehicle platform spreading it as evenly as possible all along the platform. During weighing the cargo, the most accurate data of the cargo weight can be obtained with bulk or liquid cargo.

You can conduct the calibration using one of the following methods:

Loading of given weights (pieces of known weight)

Load weight is calculated according to formula

Load weight = Total weight of loaded pieces (1)

Weighing with axle weighing scales

- the most loaded axle of loaded vehicle with unknown weight;

With such calibration the system won't be able to process load weight.

- the whole vehicle loaded with unknown weight;

Load weight is calculated according to formula

Load weight = Weight of fully loaded vehicle – Weight of empty vehicle (2)

To create the calibration table and to enter limits for its loading, press the line of the respective sensor in the area **Allowed Units S7 List**.

Calibration points are entered respectively into the table of correspondence of pressure indications in the Vehicle air suspension circuit (**Pressure, kPa** column for GNOM DDE S7) or of the pivot lever angular deviation (**Pitch, deg** column for GNOM DP S7) to the Vehicle axle load (**Weight, kg** column).

In case you need to delete the line, highlight it and press DELETE button.

DELETE ALL button serves to clear all entered lines of the calibration table.

As soon as you finish calibration, you may save the calibration table by pressing SAVE button in the form of (***.ttr** / ***.ttr7**) file in the memory of a mobile device.

Using LOAD button, you may load the earlier created file of the calibration table from the memory of a mobile device.

ATTENTION:

1) Points of the calibration table are selected within the range from minimal axle load (unloaded Vehicle) to maximum possible load (maximally loaded Vehicle).

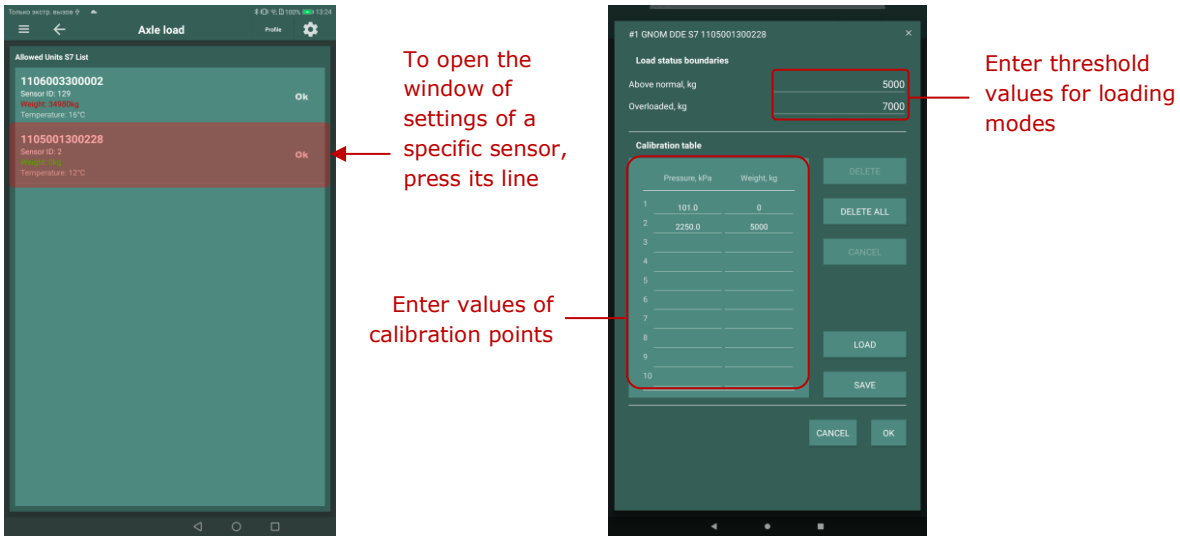
2) The number of calibration points is in proportion to axle load measurement accuracy. The recommended number of calibration points — **2...6 pcs.** You can enter **up to 30 points** at a maximum into the converter memory. The calibration table should contain at least two points: "completely unloaded Vehicle" and "maximally loaded Vehicle".

3) The maximum possible axle load value in the calibration point is **655 metric tons**.

In **Above normal, kg** field, enter the load threshold value according to which the converter would detect exceeding of the maximum load of a specific Vehicle. In **Overloaded, kg** field, enter the load threshold value according to which the converter would record "Overload" Event.

After you enter settings of all sensors from **Allowed Units S7 List** area, save the modified converter profile in the memory of the mobile device (see 2.5.5). The measuring system configuration is completed.

In case of the converter replacement, you are to transfer the profile with the respective settings of the measuring system into its memory.



*a) list of sensors linked to the converter in the submenu of **Axle load FM***

b) window of settings for a specific sensor

Figure 19 — Example of the measuring system configuration using Service GNOM S7 Radiobox application

2.6 Function test

If the GNOM S7 Radiobox CAN signal converter configuration and connection have been performed correctly, the device operation starts from the moment the power is on. When the power supply is off, the converter operation stops.

During the converter operation you should see the lights of LED indicators located under the glassy cover of its casing (see table 4).

Table 4 – Designation of signals of the GNOM S7 Radiobox CAN converter LED indicators

LED Indicator			Signal description
Marking	**Status**	**Light color**	
BT		Blue	Converter switching into service mode (blinking frequency — once in 1 s).
			Data exchange with the Android device during work with Service GNOM S7 Radiobox mobile application (blinking frequency — 10 times in 1 s).
			Reception of messages from wireless GNOM DP S7 / GNOM DDE S7 axle load sensors (blinking 0.1 s long at the moment messages from flow meters are received).
PWR		Green	Power supply is ON.
	No signal		Power supply is OFF (or voltage is less than minimum required).
CAN		Red	Transfer of converted data via CAN j1939/S6 interface is in progress.
			Error or disconnection of CAN j1939/S6 interface.
	No signal		No data transfer via CAN j1939/S6 interface.

As soon as the converter leaves the service mode, it must transfer data into CAN j1939/S6 output interface (see table 2).
During operation in Service GNOM S7 Radiobox mobile application, indications of axle load and ambient temperature for each of the sensors linked to the converter are displayed in the submenu of **Axle load FM***.

In case the maximum Vehicle load is exceeded, axle load indications are displayed in yellow in the mobile application, while in case of overload, they are displayed in red.

In the submenu of Event recorder important Events "Overload" and information Events "Power on"/Power off" are displayed in case of their occurrence* (see figure 20).

For each recorded "Overload" Event, the following data are displayed:

- date and time of recording;
- sensor identifier (ID);
- axle load value.

For each recorded "Power on"/Power off" Event, date and time of recording are displayed.

If needed, the list of information Events can be cleared using CLEAR button. However, you cannot clear the list of important Events.

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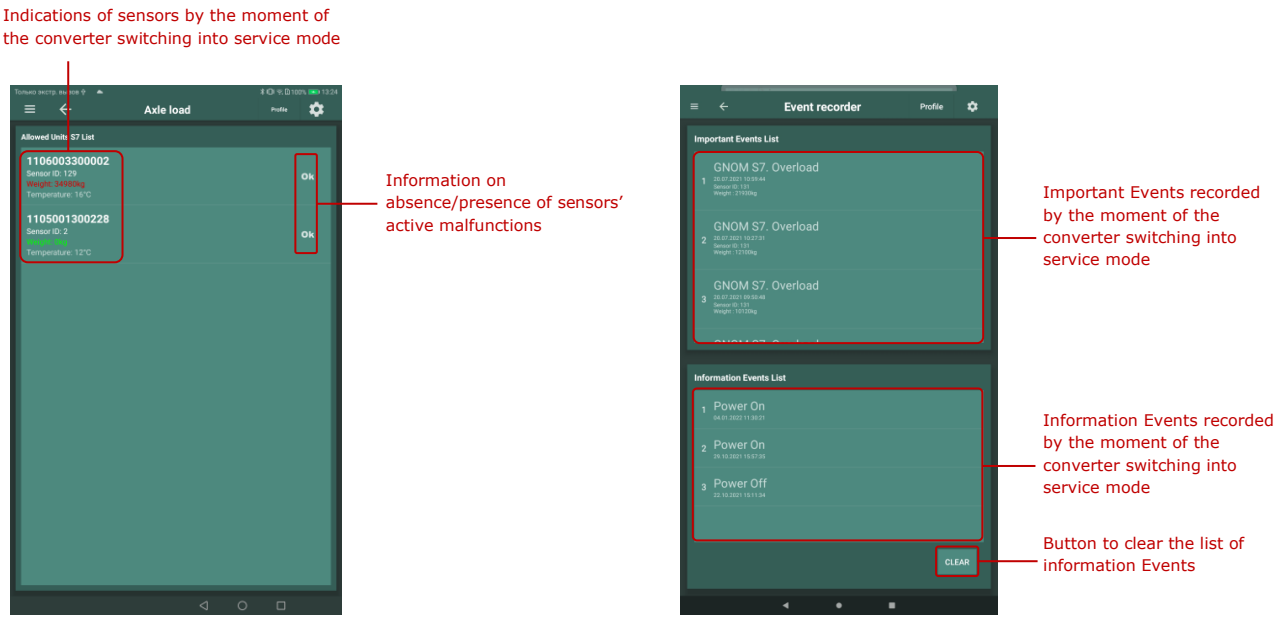
* Indications of sensors and Events displayed in the mobile application are not updated, till the converter leaves the service mode.



*a) indications of sensors linked to the converter in the submenu of **Axle load FM***

*b) lists of recorded Events in the submenu of **Events Registrator FM***

Figure 20 — Example of displaying data using Service GNOM S7 Radiobox application

3 Packaging

GNOM S7 Radiobox CAN signal converters delivery sets come in cardboard boxes of the following shape (figure 21).

Figure 21 — Packaging GNOM S7 Radiobox CAN signal converter

Labels containing information on the product name, its serial number, date of manufacturing, version of the inbuilt software, weight, Technologies, QC department stamp and QR code are fixed on the converters' packages (see figure 22).

Figure 22 — GNOM S7 Radiobox CAN signal converter packaging label

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

4 Storage

GNOM S7 Radiobox CAN signal converter is recommended to be stored in dry closed places.

Converter storage is allowed only in original packaging at temperature range from -50 to +40° C and relative humidity up to 98 % at +25° C.

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

Converter shelf life must not exceed 24 months.

5 Transportation

Transportation of GNOM S7 Radiobox CAN signal converter is recommended in closed transport that provides protection from mechanical damage and precipitation.

When transporting by air, converter 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 converter should be sealed.

6 Utilization/re-cycling

GNOM S7 Radiobox CAN signal converter does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

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

Contacts

Manufacturer

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

marketing@technoton.by

Technical support

E-mail: support@technoton.by

Annex A
SPN of GNOM S7 Radiobox CAN signal converter Functional modules

Reception and processing of signals from GNOM DP S7 / GNOM DDE S7 wireless axle load sensors, their conversion into CAN j1939/S6 Telematics interface, configuration and self-diagnostics are ensured by coordinated operation of Functional modules (FM) of GNOM S7 Radiobox CAN signal converter (see **Navigation menu** of Service GNOM S7 Radiobox mobile application in 2.5.3).
The format of parameters (SPN) of FM GNOM S7 Radiobox CAN signal converter corresponds to S6 Database (S6 DB).

A.1 Self-diagnostics FM

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

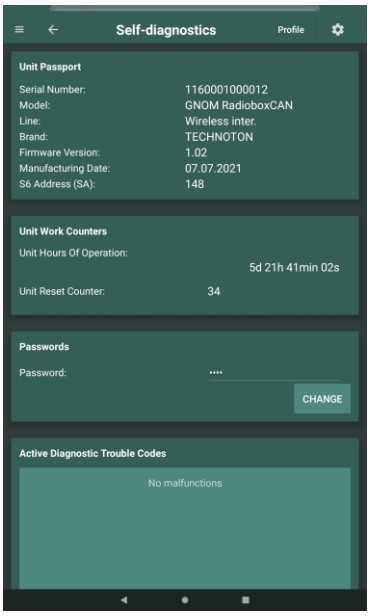


Figure A.1 — Example of the window of settings of Self-diagnostics FM in Service GNOM S7 Radiobox app

Table A.1 — Self-diagnostics FM. Displayed and/or editable SPN with the help of Service GNOM S7 Radiobox app

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 Unit. Converter serial number has the following format: NN ZZAAA B XXXXX, where: NN – code of GNOM S7 line of wireless sensors; ZZ - code of converter model in product line; AAA - digits that reflect changes product changes; B - Manufacturer code; XXXXX – sequential number. SPN is not available for editing.

SPN	Name	Factory value	Unit of measure	Clarification
521345	Model	On the fact	No	Model – this is version of the converter inside of product line GNOM S7. Each model has its own functional and constructive features. Particularity of GNOM S7 Radiobox CAN — conversion of signals from GNOM DP S7 / GNOM DDE S7 wireless axle load sensors received by means of S7 Technology into CAN j1939/S6 output interface. SPN is not available for editing.
521123	Line	GNOM S7	No	Name of the product line of wireless sensors. The line represents a group of similar products – produced under general trademark GNOM S7. SPN is not available for editing.
521344	Mark	TECHNOTON	No	Name of converter Manufacturer. SPN is not available for editing.
521121	Firmware Version	On the fact	No	Version of built in Software converter. SPN is not available for editing.
521125	Date Of Production	On the fact	No	Date (day, month, year) of converter production. SPN is not available for editing.
521188	Address at S6 (SA) Bus	148	No	Fixed network address of GNOM S7 Radiobox CAN for its identification in CAN j1939/S6 output interface. The value of the network address is assigned automatically and is not accessible for editing.
Unit work Counters PGN 62994				
521116	Unit hours of operation	On the fact	s	Counter of summarized working time of the GNOM S7 Radiobox CAN since its production moment. The user can not reset the value of this counter. It can be reset by the Manufacturer or RSC only.
521118	Unit reset counter	On the fact	pc.	Counter of GNOM S7 Radiobox CAN'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 GNOM S7 Radiobox CAN. The user can not reset the value of this counter. It can be reset by the Manufacturer or RSC only.
Passwords PGN 63017				
521593/3.3	Password/ 3.3 Installer	1111	No	Password is entered for user authorization while establishing connection session between fuel flow meter and service Software for configuring the converter. Password is a specific combination of four digits. By default used: Login – 0, password – 1111. User can change password of the converter. After entering and confirming the new password is recorded into internal memory of the converter.
Active diagnostic trouble codes PGN 65226				
521044	Fault identifier (SID+FMI)	On the fact	No	List of current converter 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 converter working performance. In case of lack of active malfunctions the following message is displayed "No malfunctions".

A.2 Onboard clock FM

Onboard clock (Onboard clock FM) — designed for generation of signals of time and its transmission to other functional modules of GNOM S7 Radiobox CAN signal converter.

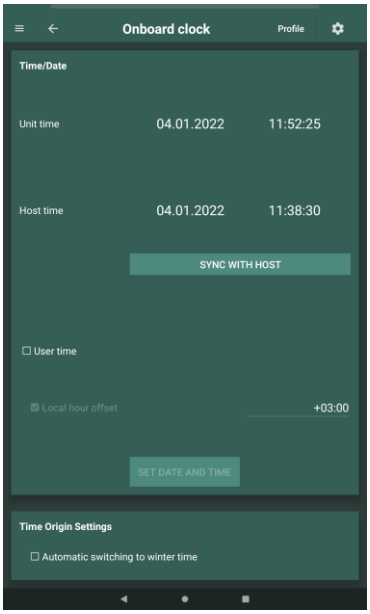


Figure A.2 — Example of the window of settings of Onboard clock FM in Service GNOM S7 Radiobox app

Table A.2 — Onboard clock FM. Displayed and/or editable SPN with the help of Service GNOM S7 Radiobox app

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 enabled and is accessible for editing, when current time is set manually and during synchronization with time indication on the mobile device.
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 enabled and is accessible for editing, when current time is set manually and during synchronization with time indication on the mobile device.
Time origin settings PGN 63011					
521350	Automatic daylight savings time and back	Off	No	On/Off	Daylight saving time automatic adjustment ON/OFF.
* It is used during recording of Events. Current time is accessible for the user for editing manually or by means of date/time synchronization with the clock in the mobile device. By default, time is set in UTC format (Coordinated Universal Time standard) and displayed according to local displacement.					

A.3 Events Registrator FM

Event recorder (Events Registrator FM) — designed for registration of 15 important and 15 informative latest GNOM S7 Radiobox CAN signal converter Events.

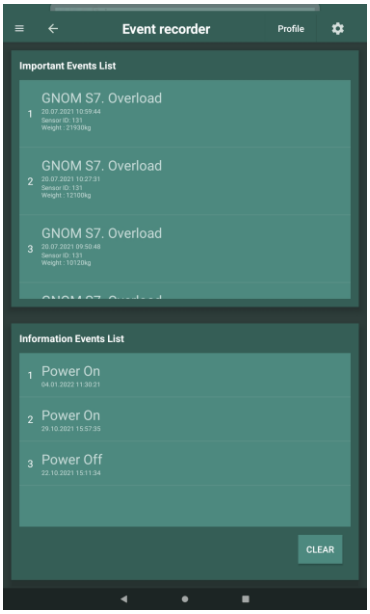


Figure A.3 — Example of the window of settings of Events Registrator FM in Service GNOM S7 Radiobox app

Table A.3 — Events Registrator FM. Displayed and/or editable SPN with the help of Service GNOM S7 Radiobox app

SPN	Name	Factory value	Unit of measure	Clarification
Important Events List PGN 63055				
521166	Event SPN	No	No	List of important Events is displayed (up to 15 pcs.)*. "Overload" Event is considered as important. For each recorded "Overload" Event, the following data are displayed: - date and time of recording; - sensor identifier (ID); - axle load value. A user cannot clear the list of important Events.
Information Events List PGN 63056				
521166	Event SPN	No	No	List of information Events is displayed (up to 15 pcs.)*. The following Events are considered information Events: - "Power On"; - "Power Off". For recorded information Events, date and time of their recording are displayed. A user can clear the list of information Events.

* 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.

A.4 Base S7 FM

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

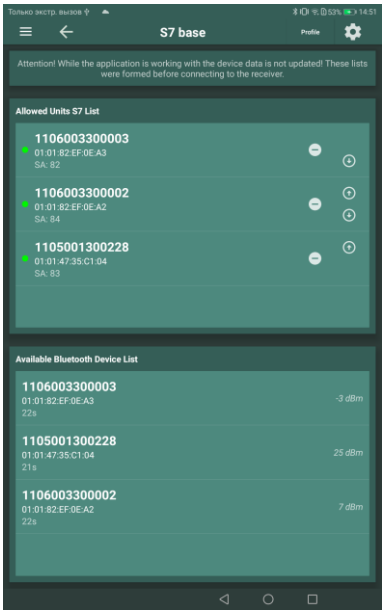


Figure A.4 — Example of the window of settings of Base S7 FM in Service GNOM S7 Radiobox app

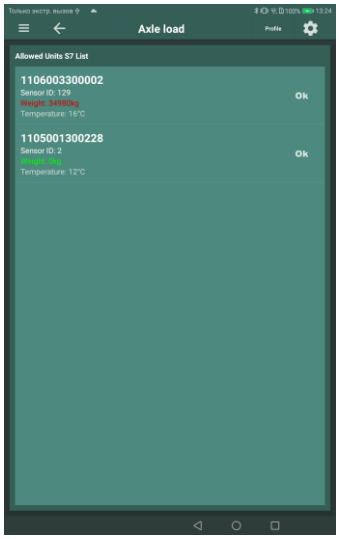
Table A.4 — Base S7 FM. Displayed and/or editable SPN with the help of Service GNOM S7 Radiobox app

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 (GNOM DP S7 / GNOM DDE S7) axle load sensors) that are currently accessible for the BLE-module of GNOM S7 Radiobox CAN converter. The maximum number of elements in the list — 15. The list is not accessible for editing.
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.

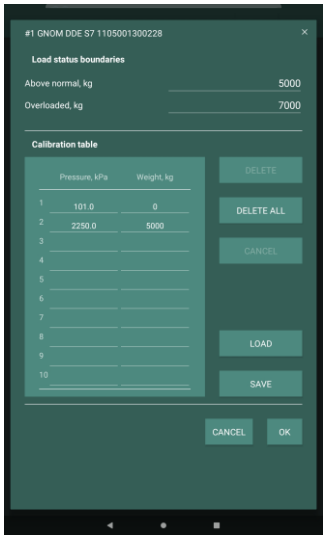
SPN	Name	Factory value	Unit of measure	Clarification
Allowed Units S7 List PGN 63270				
521355	Array Elements Count	On the fact	pcs.	Number of MAC addresses of wireless Units (GNOM DP S7 / GNOM DDE S7) axle load sensors) that are currently accessible for the BLE-module of GNOM S7 Radiobox CAN converter. The maximum number of elements in the list — 10. The list is not accessible for editing.
521188	S6 Address (SA)	No	No	Network address of wireless sensor selected by the user for linking to GNOM S7 Radiobox CAN converter by means of S7 Technology and which is used for the Unit (wireless sensor) identification in CAN j1939/S6 output interface. Value of the network address is assigned to Unit automatically from the number of vacant addresses within the following ranges: 0…250 (for the first five added Units— from 82…85 range). Network addresses of Units can be changed by user. Network address of each Unit must be unique.
521490	MAC Address	On the fact	No	MAC address of wireless sensor selected by user for linking to the converter by means of S7 Technology which is displayed in the list of authorized Units. Based on MAC address, the service mobile application generates serial number for a specific Unit and also determines its accessibility for work using S7 Technology. These data are not accessible for editing.

A.5 Axles Load Monitoring. GNOM S7 FM

Axle load (Axles Load Monitoring. GNOM S7 FM) — is designed for configuration of the measuring system and for reception of axle load data, ambient temperature and to determine the Vehicle loading modes.



a) displayed data



b) measuring system calibration

Figure A.5 — Example of the window of settings of Axle Load FM in Service GNOM S7 Radiobox app

Table A.5 — Axle Load FM. Displayed and/or editable SPN with the help of Service GNOM S7 Radiobox app

SPN	Name	Factory value	Unit of measure	Clarification
GNOM S7 Load Status Boundaries PGN 63541				
521355	Array Elements Count	On the fact	pcs.	Number of GNOM DP S7 / GNOM DDE S7 axle load sensors which the user has linked to GNOM S7 Radiobox CAN converter for joint work using S7 Technology (see 2.5.7). Maximum number of elements in the list — 10 pcs.
521738/37.1	Weight/ 37.1 Above Normal	On the fact	kg	Field to enter axle load threshold value for a corresponding sensor according to which the converter will determine exceeding Vehicle maximum load.
521738/37.2	Weight / 37.2 Overload	On the fact	kg	Field to enter axle load threshold value for a corresponding sensor according to which the converter will determine exceeding “Overload” Event.
GNOM S7 Calibration Table PGN 63542				
521737	Sensor ID	On the fact	No	Number (ID) is displayed which is used to identify indications of a respective GNOM S7 wireless sensor. ID values are assigned to sensors automatically, in accordance with the order in which the user adds them into the list of authorized Units (see 2.5.7). Higher bit of ID byte has the value corresponding to sensor model: 0 – for GNOM DDE S7 (ID assumes values 1…10), 1 – for GNOM DP S7 (i.e. ID assumes values 129-139). You can add 10 sensors at a maximum.

SPN	Name	Factory value	Unit of measure	Clarification
521355	Array Elements Count	On the fact	pcs.	Number of points of calibration table created in the process of measuring system calibration for a specific sensor. The recommended number of calibration points – 2...6 pcs. within the range from minimal axle load (unloaded Vehicle) to maximum load (fully loaded Vehicle). You can enter maximally 30 points into the converter memory. As a minimum, the table should contain two points: "completely unloaded Vehicle" and "fully loaded Vehicle".
521741	GNOM S7. Raw Data	On the fact	kPa (for GNOM DDE S7) deg (for GNOM DP S7)	Fields to enter pressure values in the Vehicle air pressure suspension circuit (for GNOM DDE S7) or lever angular deviation (for GNOM DP S7) which correspond to points of the calibration table.
521738	Weight	On the fact	kg	Fields to enter axle load values corresponding to points of the calibration table.
GNOM S7 Sensor Status PGN 63540				
521737	Sensor ID	On the fact	No	Number (ID) used to identify indications of a respective GNOM S7 wireless sensor is displayed. ID values are assigned to sensors automatically, in accordance with the order in which the user adds them into the list of authorized Units (see 2.5.7). Higher bit of ID byte has the value corresponding to sensor model: 0 – for GNOM DDE S7 (ID assumes values 1…10), 1 – for GNOM DP S7 (i.e. ID assumes values 129-139). You can add 10 sensors at a maximum.
521738	Weight	On the fact	kg	Axle load indications for the appropriate sensor are displayed. Data are not updated, till the converter leaves the service mode. In case Vehicle maximum load is surpassed, indications are displayed in yellow; in case of overload, they are displayed in red.
521457	Temperature	On the fact	°C	Ambient temperature readings for a respective sensor are displayed. Data are not updated, till the converter leaves the service mode.
521739	Load Status	On the fact	No	In case Vehicle maximum load is surpassed, axle load indications of a respective sensor at the moment the converter is switched into the service mode are displayed in yellow; in case of overload, they are displayed in red.
521740	GNOM S7 Error Mask	On the fact	No	Data on presence/absence of active malfunctions of a specific sensor at the moment the converter is switched into the service mode are displayed. Numeric values of malfunctions mask (DTCs Mask) of GNOM S7 sensors: 1 – Low battery charge (<10 %). 2 - Accelerometer. System does not respond or is not configured. 4 – Pressure sensor. System does not respond or is not configured. 8 – Temperature sensor. System does not respond or is not configured. 16 – Position sensor. No data or incorrect data. 128 – The device is operating in the manufacturing mode. (this indication is not a sign of sensor malfunction, but it indicates that its BLE-module operates in the "Manufacturing" mode).

Detailed parameters description (SPN), structure and content of messages (PGN) of FM GNOM S7 Radiobox CAN signal converter are placed at the following web site https://s6.jv-technoton.com/ (to access S6 DB registration is required).

Annex B
GNOM S7 Radiobox CAN firmware upgrade

WARNING: GNOM S7 Radiobox CAN firmware update should be carried out **only** for implementing improvements, recommended by the Manufacturer.

To upgrade data converter firmware the following actions should be made:

1) Copy the firmware file **(*.blf3)** to the Android device, to the installation folder of Service GNOM S7 Radiobox mobile application, start the application and switch the converter into the service mode using the magnetic key (see 2.5.1).

IMPORTANT: When re-uploading firmware, power supply voltage of converter should not drop out of 9…45 V range.

2) After the authorization (see 2.5.4), select Firmware update submenu in the navigation menu (see figure B.1).

3) Select the firmware file in the Android device and by pressing LOAD, button, start the process of its loading into the converter memory.
After the application has checked the firmware file for its integrity and compatibility, the window showing the process of loading the firmware file into the converter memory will appear. In case of any errors, the application will issue the appropriate warning. The process of loading the updated firmware may take a few minutes.
If you need to cancel the firmware update procedure, press ABORT button.

WARNING: To avoid converter failure, before the end of the firmware upgrade process **is forbidden:**
- close SService GNOM S7 Radiobox mobile application;
- power down the Android device;
- power down the converter.

4) After the successful completion of the firmware update procedure, the appropriate message will appear and the application will automatically disconnect the Android device from the converter. The converter will be ready for operation again.

5) Switch the converter into the service mode using the magnetic key (see 2.5.1) and go through the authorization (see 2.5.4). In Self-diagnostics submenu the new firmware version will be displayed.

If the converter 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 converter operability.
If the repeated attempt fails, we recommend to consult Technoton Technical Support Service by e-mail support@technoton.by.

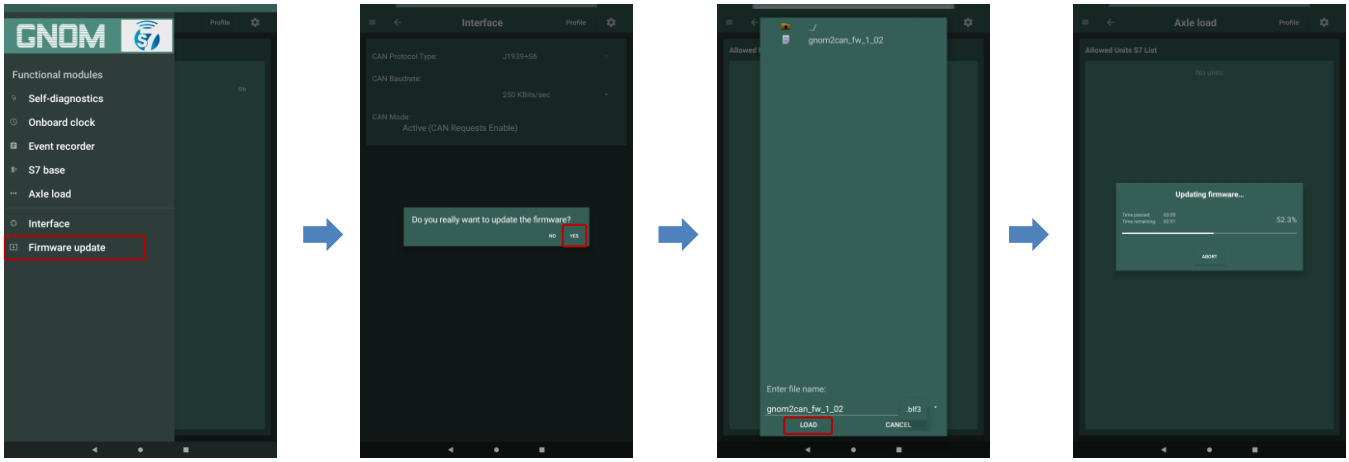
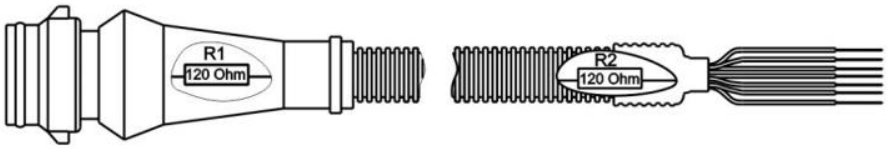


Figure B.1 — The process of loading the firmware file into the converter memory

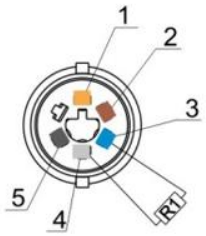
Annex C
Signal cable

View	Component name	Description
	S6 SC-CW-700 signal cable	Dedicated to connect Units with S6 SC connector and CAN j1939/S6 interface to tracking devices and external power supply. Length - 7 m. It has 2 pcs. of inbuilt terminal resistors (120 Ohms). It is not included into GNOM S7 Radiobox CAN delivery set.

Design



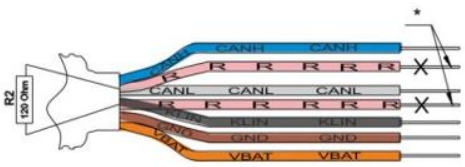
Cable length 700±5 cm.



Pin	Wire color	Circuit
1	orange	VBAT
2	brown	GND
3	blue	CANH
4	white	CANL
5	black	KLIN
6	-	-

Connecting

without built-in terminal resistor R2 | with built-in terminal resistor R2



* Do not connect R2 resistor wires (pink, identification mark R), insulate.

** Connect electrically one of the R2 resistor wires (pink, identification mark R) with CANH wire, and the other - with CANL wire.

Annex D
Videography

Useful Technoton videos are on the YouTube channel which is regularly updated:

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