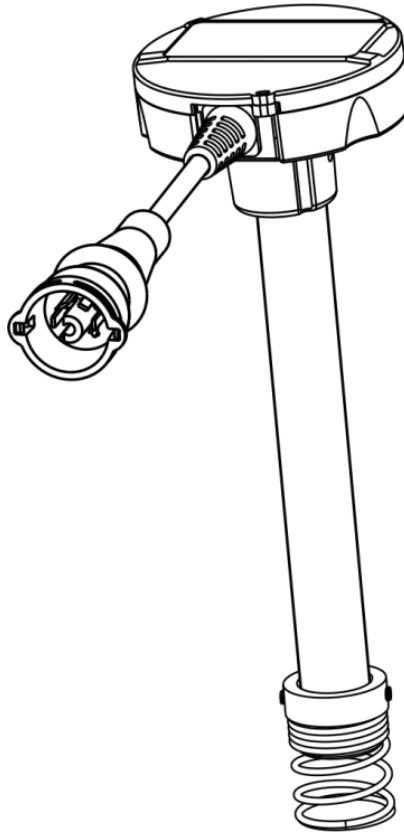


## FUEL LEVEL SENSOR



## DUT-E CAN

## OPERATION MANUAL

Version 12.0



**TECHNOTON**  
ADVANCED MACHINERY TELEMATICS

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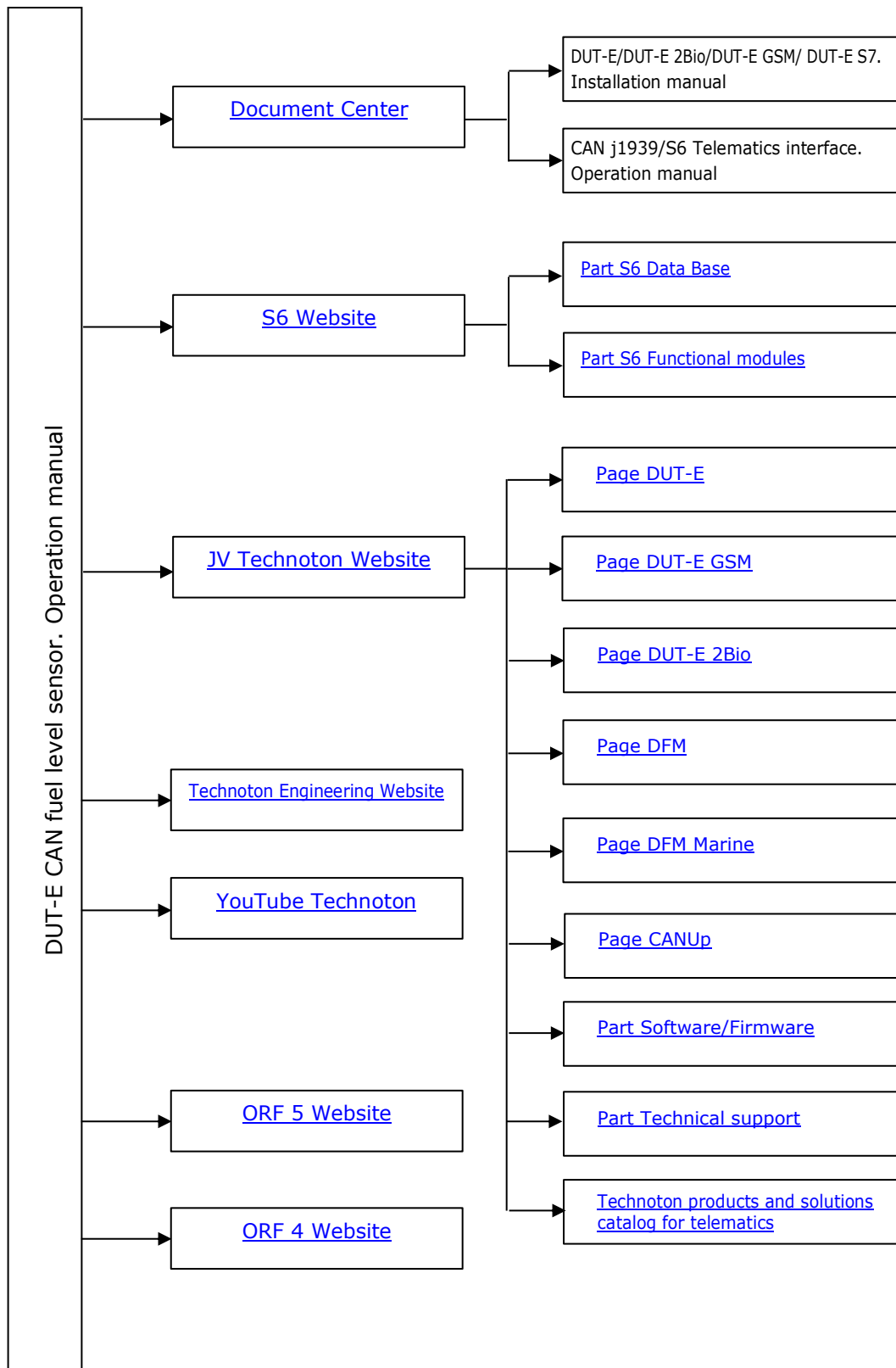
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## Revision history

Version	Date	Editor	Description of changes
1.0	01.2007		Basic version.
7.0	04.2016	OD	<ul style="list-style-type: none"> <li>• New design of measurement head of DUT-E.</li> <li>• Changes in delivery set of DUT-E, MK DUT-E.</li> <li>• Addition and updates to description of installation of DUT-E.</li> <li>• Changes in description of Service software.</li> <li>• New packaging of DUT-E.</li> <li>• Methodology of thermal correction coefficient calculation added.</li> <li>• International certificates ISO 9001:2008 (DaKKs) and Customs Union added.</li> </ul>
8.0	01.2017	OD	<ul style="list-style-type: none"> <li>• Instructions on S6 SK operation while configuring DUT-E CAN added.</li> <li>• Schemes of connection of DUT-E CAN to PC via S6 SK added (including scheme of sensors for configuration within S6 interface).</li> <li>• Terminology updated.</li> <li>• Operation instructions for software Service DUT-E updated.</li> <li>• New accessories for DUT-E added.</li> </ul>
9.0	03.2018	OD	<ul style="list-style-type: none"> <li>• Terminology of the document is updated (DUT-E design using <a href="#">S6 Technology</a> and <a href="#">IoT Burger Technology</a>).</li> <li>• Table of SPN of functional modules for DUT-E sensors is added.</li> <li>• A description the sensor setup using Service S6 DUT-E software is provided.</li> <li>• A procedure for DUT-E wireless connection to the Android device via Bluetooth using S6 BT Adapter is added as well as the sensor setup using the Android device with the Service S6 DUT-E (Android) service mobile application.</li> <li>• The structure of the document external links is provided.</li> </ul>
10.0	01.2019	OD	<ul style="list-style-type: none"> <li>• DUT-E model codes <b>26</b>, <b>30</b> and <b>31</b> are deleted.</li> <li>• New modification of DUT-E CAN with model code <b>54</b> is added.</li> <li>• Message list of output CAN j1939/S6 interface is updated.</li> <li>• E28 E-mark certificate information is added.</li> </ul>
11.0	05.2021	OD	<ul style="list-style-type: none"> <li>• The list of the sensors output messages via CAN j1939/S6 interface is updated.</li> <li>• The range of network addresses for DUT-E CAN in case of its operation using S6 Technology is extended; option to unite up to 16 pcs. of sensors into a single network.</li> </ul>
12.0	05.2023	OD	<ul style="list-style-type: none"> <li>• The certificates are updated.</li> <li>• Additional information on the product is provided.</li> <li>• Recommendations regarding creation of the calibration table for a tank of greater volume than 6553 l are added.</li> <li>• Method of calculating the thermal correction coefficient is improved etc.</li> <li>• Settings for Functional modules configuration with the help of Service S6 DUT-E (Android) service mobile application (version 3.00.05) and Service S6 DUT-E service software (version 6.05) are updated.</li> <li>• Examples of diagrams for the sensors connection to Terminals are added; diagrams of the sensors connection to the PC and Android device using service adapters are updated etc.</li> </ul>

## 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 standardized IoT parameters.



Particular features of IoT Burger:

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

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

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

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

[DUT-E CAN](#) fuel level sensor is designed using 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](#).

**ORF 4 / ORF 5**— is the by Technoton telematic services designed for receiving and processing Onboard reports via Internet, displaying Operational Data overlapped 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, GLONASS, Galileo, BeiDou.

**Model code** — digits designating the product modification. For DUT-E CAN sensor, its model code (**54**) is identified by the 1<sup>st</sup> and the 2<sup>nd</sup> digits of its serial number placed on its measuring probe and on its packing label.

**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 / ORF 5, used for processing and storage of Operational data, formation and transmission of Analytical reports through Internet by request of users.

**Event** — a relatively rare and sudden change in SPN. For example, the sharp increase of volume in the tank is the Event "Fuelling". An Event may have one or more characteristics. Thus, the Event "Fuelling" has the following characteristics: "volume of fuel at the beginning of the fueling", "volume of fuel at the end of the fueling", "volume of the fueling" and so on. As soon as an Event is detected, the Terminal registers the time of the Event which is subsequently specified in the Report of the Event. The Event is always linked to the time and the location where it was detected.

**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** (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. It includes On-board report, Communication channels, Telematics service ORF 4 / ORF 5.

**Vehicle** is an object controlled by the Vehicle Tracking System. This is generally a truck, a bus or a tractor, sometimes a locomotive, a ship, a utility vehicle. From the point of view of Vehicle Tracking System, static equipment such as diesel generators, heating boilers, burners, and so on are considered vehicles.

**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](#).

## Introduction

Recommendations and rules set out in this Operation Manual apply to **DUT-E CAN fuel level sensor** (further on — [DUT-E CAN](#)), Model code **54**, manufactured by [Technoton](#) company.

The DUT-E CAN [Model code](#) is identified by the first two digits of its serial number printed at its measuring probe or on its packing label:



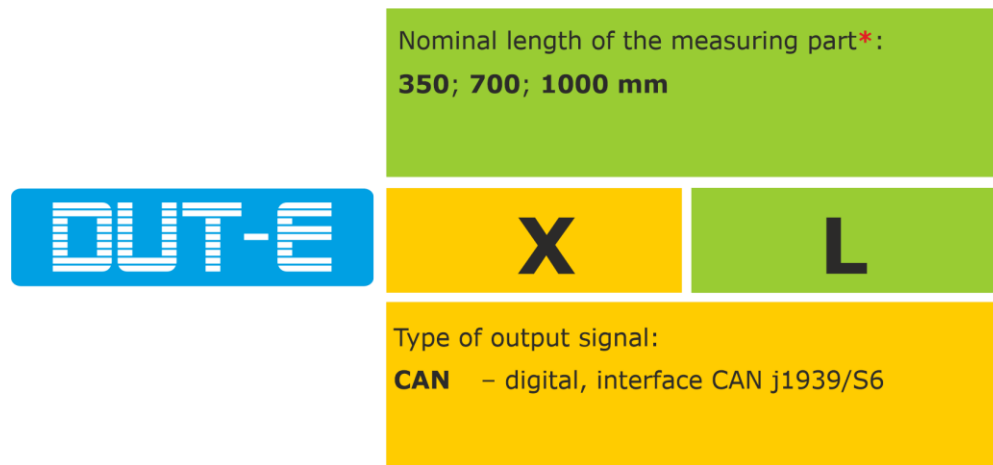
The manual contains information on design, operation principle, specifications and instructions on installation, use and maintenance of DUT-E CAN. Besides, this document defines the procedure for wire-connected and wireless connection configuration of sensors.

**DUT-E CAN** — additional intellectual sensor within [Telematics systems](#) which is used for accurate Diesel fuel level measurement, as well as measurement of fuel level of other non-conductive liquids in tanks of any vehicles / fixed tanks.

DUT-E CAN key features:

- it is designed based on [IoT Burger](#) Technology — the internal data processing (filtering and normalization of [Parameters](#), [Counters](#) recording, the tank calibration table is recorded into the sensor memory) simplifies the [Server](#) and [Telematics terminal](#) operation;
- conformity with [S6 Technology](#) — compatibility with [Units](#), [Database](#) and S6 cable system;
- uniting up to 16 fuel level sensors by means of S6 Technology, with an option of summation of readings of up to 8 sensors;
- measuring probe length extension up to 6 m with additional sections;
- thermal correction with adjustable coefficient allows automatic correction of measurements, depending on the fuel temperature;
- automatic compensation of ambient temperatures effect on the electronic sensor modules;
- function of digital self-diagnostics for sensor quality control;
- wireless configuration by means of Android devices via Bluetooth using [S6 BT Adapter](#) (purchased separately);
- ergonomic bayonet mount allows to save installation time;
- bottom spring for better mounting rigidity;
- screen filter (purchased separately) for secure protection from water and mud;
- full set of mounting accessories included;
- built-in voltage stabilizer – output signal does not depend on vehicle power supply voltage;
- reverse polarity and short circuit protection of any output to vehicle electrical system and chassis;
- sealing possibility to avoid unauthorized intrusion and tampering;
- compliance with national and European standards;
- great experience of operation, high quality of [technical support](#) and [documentation](#).

See figure 1 for identification codes for [DUT-E CAN](#) ordering:




\* Any length up to 1400 mm can be manufactured upon special order  
(in case the order is less than 200 pcs. per one quarter, the price is 20% higher).

*Figure 1 – DUT-E CAN order identification codes*

Example of DUT-E CAN ordering identification codes:

Fuel level sensor DUT-E CAN L=1000 mm  
(CAN j1939/S6 interface, measuring probe length 1000 mm).

For DUT-E CAN configuration using cable connection to the PC you should use [S6 SK](#) service adapter (to be purchased separately) and the Service S6 DUT-E service software (the software current version can be downloaded at <https://www.jv-technoton.com/>, section [Software/Firmware](#)).

For wireless configuration of DUT-E CAN using an Android device you should use [S6 BT Adapter](#) service adapter (to be purchased separately) and the Service S6 DUT-E (Android) service software (the software current version can be downloaded at ).



**ATTENTION:** It is strongly recommended to follow strictly the instructions of the present Manual when using, mounting or maintaining DUT-E CAN.

[The Manufacturer](#) guarantees DUT-E 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 DUT-E CAN specifications that do not lead to a deterioration of the consumer qualities without prior customer notice.

# 1 General information and technical specifications

## 1.1 Purpose of use and application area

**DUT-E CAN** is designed for high-accuracy measurement of liquid fuel level and volume in tanks of automotive, railroad vehicles, watercrafts and stationary objects (see figure 2).

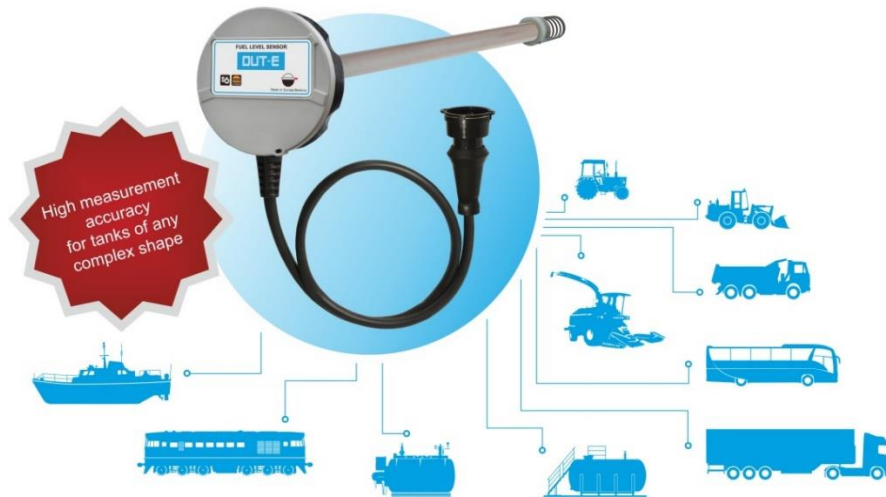


Figure 2 –DUT-E CAN purpose of application

### Application areas:

[DUT-E CAN](#) can be used within [Telematics system](#) (even without using web [Server](#)) for fuel monitoring (see figure 3):

- 1) In tanks of any mobile [Vehicles](#);
- 2) At various stationary objects – diesel-generator sets (gensets), boiling and heating equipment, stationary fuel tanks and storages etc.

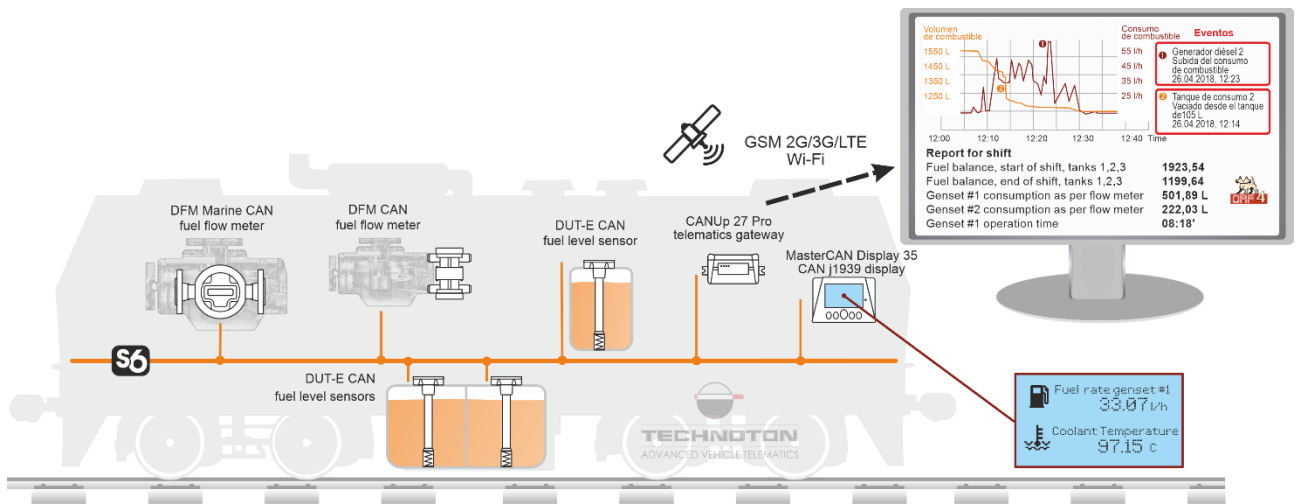
DUT-E CAN measures fuel level in the tank and generates an output signal to forward it to a vehicle [Tracking device](#). Tracking device records and processes the sensor data for further transmission to the telematics server. Server software processes and analyzes the received data to generate [Analytical reports](#) for a selected period of time. [ORF 4 Telematics service](#) allows convenient analysis of fuel volume inside tank of Vehicle (see figure 4).

CAN j1939/S6 interface allows to connect up to 16 units\* of DUT-E CAN simultaneously into a single wired network based on [S6 Technology](#). Along with DUT-E CAN, other equipment can be connected into the same network: [DFM CAN](#) and/or [DFM Marine CAN](#) fuel flow meters (up to 16 pcs.) / [DFM Industrial](#) (up to 8 pcs.) flow meters, [MasterCAN Display 35](#) – display for CAN j1939/S6 bus, and other standard and/or additional onboard equipment. For data gathering just one CAN-port of [CANUp 27](#) telematics gateway or some GPS-tracking device is needed.

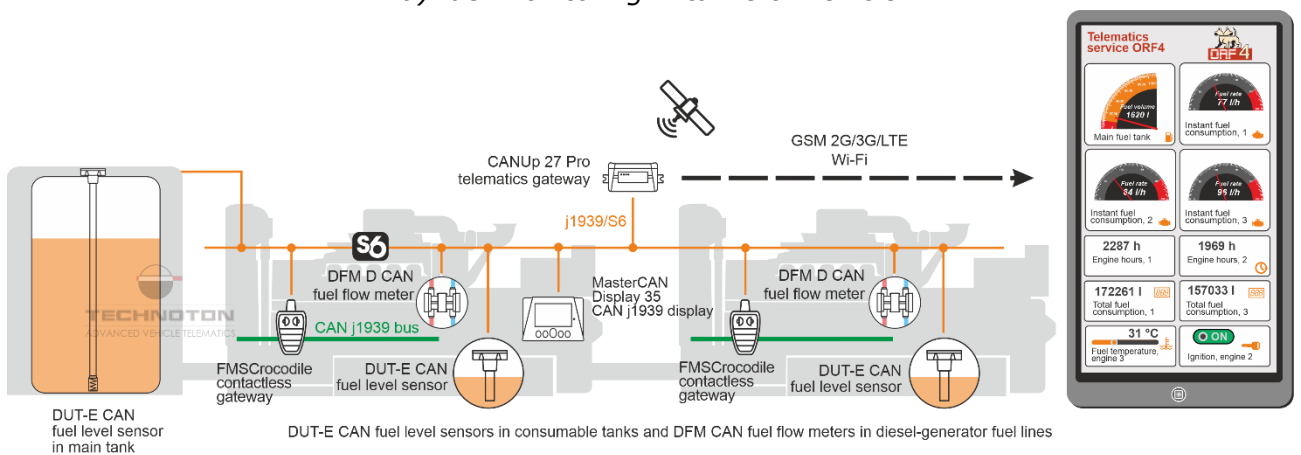
CANUp 27 can send Reports to user directly (without web Server) through e-mail (up to 3 e-mail addresses) or via SMS (up to 3 phone numbers).

S6 Technology is used both for basic tracking systems (e.g. for totalizing fuel volume data in two and more fuel tanks), and for monitoring of advanced (complex) mobile and stationary objects, where tens of operational [Parameters](#) should be followed.

\* For DUT-E CAN with the version of firmware not lower than 10.2, in case of using Service S6 DUT-E software, version from 5.12 and higher or Service S6 DUT-E (Android) application, version from 3.00.05 and higher.



a) fuel monitoring in tanks of Vehicle



b) fuel monitoring in tanks of stationary objects

Figure 3 – Examples of DUT-E CAN application

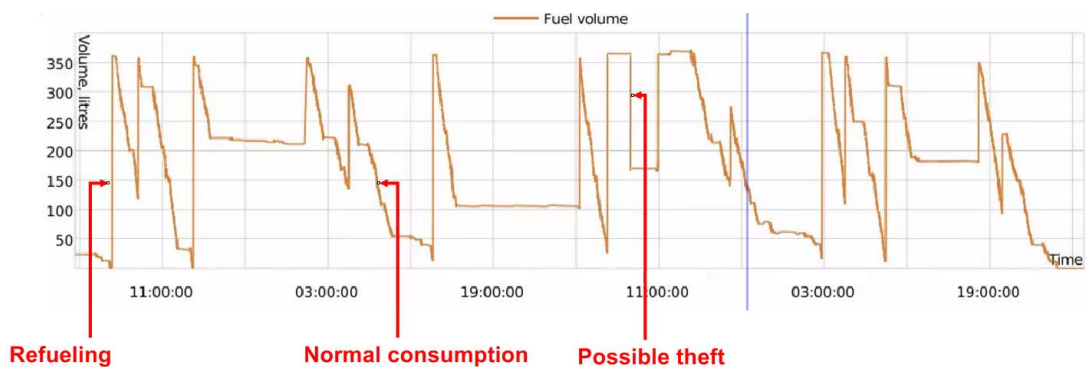
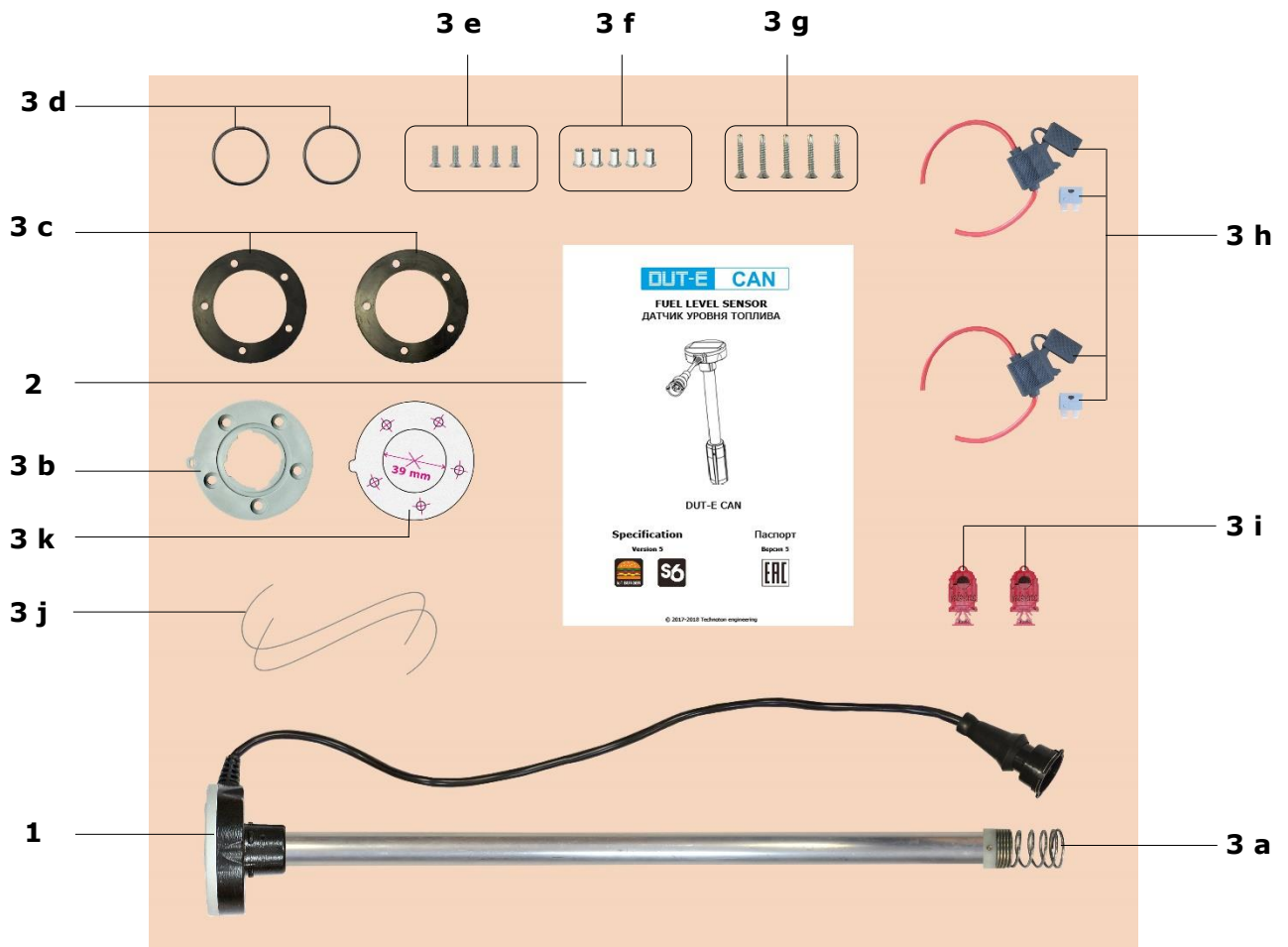


Figure 4 – Example of Analytical report generated in ORF 4 software, based on the DUT-E CAN data

[DUT-E CAN](#) connected to [Tracking device](#) by [S6 Technology](#) makes possible to control in real time:

- current values of the level and volume of fuel in each tank;
- total volume of fuel in the number of tanks from 1 to 8 and separately in each tank;
- determine exact refueling amount;
- reveal fuel theft facts;
- fuel temperature;
- sensor specification data (passport);
- presence of water in fuel;
- sensor malfunctions.

## 1.2 Exterior view and delivery set



- |           |   |             |
|-----------|---|-------------|
| <b>1</b>  | - <a href="#">DUT-E CAN</a> fuel level sensor | - 1 pc.;    |
| <b>2</b>  | - Specification with factory settings sheet   | - 1 pc.;    |
| <b>3</b>  | - Mounting kit (1 pc.) including:             |             |
| <b>a)</b> | bottom stop                                   | - 1 pc.;    |
| <b>b)</b> | plastic mounting plate                        | - 1 pc.;    |
| <b>c)</b> | rubber gasket                                 | - 2 pcs.*;  |
| <b>d)</b> | sealing rubber ring                           | - 2 pcs.*;  |
| <b>e)</b> | bolt  | - 5 pcs.;   |
| <b>f)</b> | threaded rivet                                | - 5 pcs.;   |
| <b>g)</b> | self-tapping screw                            | - 5 pcs.;   |
| <b>h)</b> | fuse with holder (2 A)                        | - 2 pcs.;   |
| <b>i)</b> | plastic seal                                  | - 2 pcs.**; |
| <b>j)</b> | sealing cord                                  | - 2 pcs.;   |
| <b>k)</b> | hole placement template                       | - 1 pc.     |

Figure 5 — DUT-E CAN delivery set

\* 1 pc. – used for DUT-E CAN installation and 1 pc. is a spare part.  
Could be complemented with 4 mm thick gasket.

\*\* Exterior of seal can be different.

## 1.3 Unit structure and operation principle

[DUT-E CAN](#) fuel level sensor (see figure 6) consists of a measuring probe (**1**), measuring "head" (**2**) containing an electronic module inside, the interface cable (**3**) with connector for electrical connection (**4**) of the Vehicle onboard circuit and to the [Terminal](#).

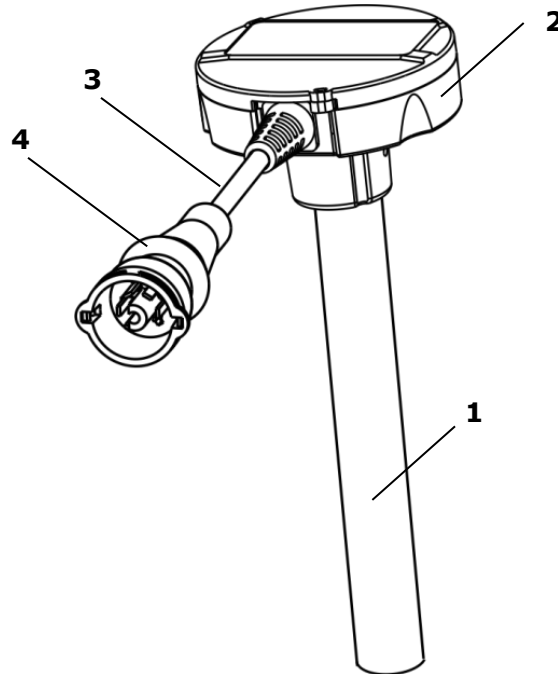


Figure 6 — Structure of DUT-E

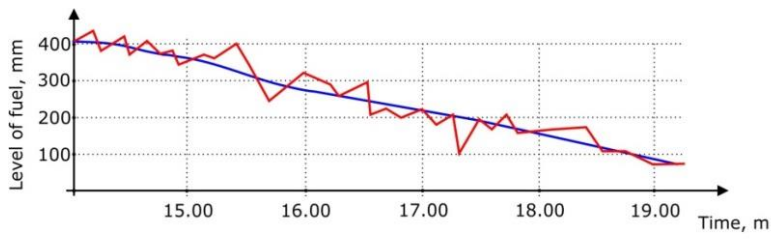
DUT-E operation principle is based on condenser capacitance measurement, where measuring probe pipes are used as capacitor plates. Electric capacitance changes depending on measuring probe immersion depth in the fuel which is dielectric liquid. The sensor analyzes current value of electric capacitance and then generates an appropriate output signal.



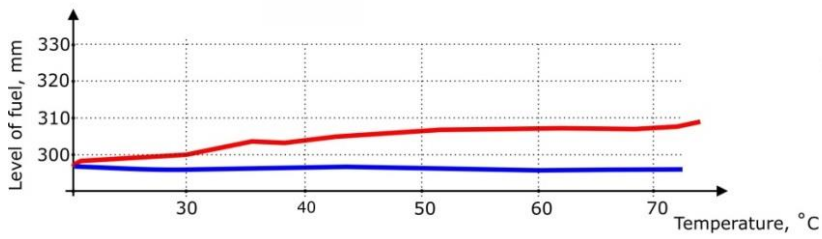
**WARNING:** Capacitive principle ensures highest accuracy of liquid measurement when the liquid has **constant dielectric permeability coefficient**. Otherwise, additional inaccuracy of measurement may appear.

DUT-E fuel level sensors can calculate current fuel amount independently in accordance with calibration table recorded in the sensor internal memory with service adapter (see [2.7](#) and the [DUT-E fuel level sensor installation](#) video).

For increasing accuracy of measurement, DUT-E CAN has an option of automatic correction of signal — filtering by time, thermal correction (see [2.8](#)) and thermal compensation (see figure 7).



Signal filtration



Thermal correction and thermal compensation

- DUT-E readings
- Fuel level readings without correction

Figure 7 — The feature of automatic correction of the DUT-E CAN output signal is ON

## 1.4 Technical specifications

[DUT-E CAN](#) is powered by on-board power supply of the [Vehicle](#) where it is installed.

DUT-E CAN can be used in the conditions of temperate and cold climate.

For resistance to mechanical impact DUT-E CAN is shake and shockproof.


### 1.4.1 Main specifications

Table 1 – DUT-E CAN main specifications

Parameter, measuring unit	Value
Working fluid	Diesel fuel**
Fuel level sensor operating principle	Capacitive
Output signal	<a href="#">CAN j1939/S6</a> Digital interface
Service interface	K-Line (ISO 14230)
Relative measuring error (to the length of the measuring part), %, not more than	±1.0
Sensor sensitivity to fuel level changes, mm	0.1
Power supply voltage range, V	10...45
Current consumption at supply voltage 12/24 V, mA, not more than	150/75
Time for operation readiness after the power is ON, s, not more	10
<a href="#">Maximum cutting</a> of the measuring probe*	Up to any length required
<a href="#">Maximum length</a> extension of the measuring probe, mm, not more*	6000
Temperature range, °C	-40...+85
Ingress protection rating	IP55/IP57
Electromagnetic compatibility	see <a href="#">annex D</a>
Weight, kg, not more than	0.6 (at L=1000 mm) 0.5 (at L=700 mm) 0.4 (at L=350 mm)
Overall dimensions, mm, not more than	see <a href="#">figure 8</a>
<p>* After cutting/length extension of the measuring probe the sensor calibration is obligatory.</p> <p>** The sensor is allowed to operate using other types of fuel (e.g. gasoline). However, it should be taken into consideration that while using the sensor in the explosive environment, the sensor must be electrically connected through the external power and spark protection unit (purchased separately), to meet the requirements regarding the spark-proof electric circuit. The spark-proof circuit must meet the following parameters:</p> <ul style="list-style-type: none"> <li>- maximum input voltage — 10 V;</li> <li>- maximum input current — 200 mA;</li> <li>- maximum internal capacity — 15.0 µF;</li> <li>- maximum inherent inductance — 1.188 mHn.</li> </ul>	

## 1.4.2 Specifications of CAN j1939/S6 digital interface

Specifications of CAN j1939/S6 [DUT-E CAN](#) digital interface correspond to [S6 Technology](#). The data transfer protocol is based on SAE j1939 standard and meets its requirements. A list of the data transfer protocol messages is provided in table 2.

The DUT-E CAN configuration is carried out using K-Line interface (ISO 14230) via Service S6 DUT-E service software (current version can be downloaded at <https://www.jv-technoton.com/>, section [Software/Firmware](#)) or Service S6 DUT-E (Android) service software (current version can be downloaded at  [Google Play](#)) (see [2.9](#)).

Data transfer is conducted automatically and upon request. Baudrate can be selected from the range of fixed values: 100; 125; 250; 500; 1000 kbit/s (default baud rate 250 kbit/s).

S6 Technology enables to connect up to 16 pcs. fuel level sensors with CAN j1939/S6 interface at one time to form a single network S6 (DUT-E CAN / [DUT-E 2Bio CAN](#) / [DUT-E GSM](#)). For each connected sensor a unique network address (SA) must be specified from the ranges: basic – 101...108 (by default – 101) and additional – 91...98\*.

S6 Technology enables to sum up readings of up to 8 pcs. DUT-E CAN sensors (see [2.10](#)). For each connected sensor you are to specify a unique network address from the range 101...108.



**IMPORTANT: The obligatory condition** for correct transfer of DUT-E CAN data via CAN j1939/S6 interface is the availability of two **120 Ohms** terminal resistors at both ends of CAN 2.0B (SAE j1939) communication line between CAN LOW and CAN HIGH wires.

\* You may specify addresses from range 91...98 only for DUT-E CAN, version of firmware not lower than 10.2, when using Service S6 DUT-E (Android) software, version from 3.00.05 and higher.

Table 2 – Data composition of DUT-E CAN output message

Field number	Length	Parameter	Description	Rules of output
Output data <a href="#">Self-diagnostics FM</a> (version 10)				
Unit Work Counters <a href="#">PGN 62994</a> (0xF612)				On request
1	4 bytes	<a href="#">SPN 521116</a>	Unit Hours Of Operation	
9	4 bytes	<a href="#">SPN 521118</a>	Unit Reset Counter	
Unit DTCs <a href="#">PGN 63169</a> (0xF6C1)				On request
1	4 bytes	<a href="#">SPN 521488</a>	Unit DTCs Mask (see <a href="#">table 3</a> )	
Unit. Restart Counters <a href="#">PGN 63280</a> (0xF730)				On request
1	4 bytes	<a href="#">SPN 521118</a> /30.0	Unit Reset Counter. Software	
5	4 bytes	<a href="#">SPN 521118</a> /30.1	Unit Reset Counter. Hardware	
Active Diagnostic Trouble Codes <a href="#">PGN 65226</a> (0xFECA)				1000 ms
3	3 bytes	<a href="#">SPN 521044</a>	Fault Identifier (SID+FMI)	
6.1	7 bits	<a href="#">SPN 1216</a>	Occurrence Count	
6.8	1 bit	<a href="#">SPN 1706</a>	SPN Conversion Method	

Field number	Length	Parameter	Description	Rules of output
Previously Active Diagnostic Trouble Codes <a href="#">PGN 65227</a> (0xFECE)				On request
3	3 bytes	<a href="#">SPN 521044</a>	Fault Identifier (SID+FMI)	
6.1	7 bits	<a href="#">SPN 1216</a>	Occurrence Count	
6.8	1 bit	<a href="#">SPN 1706</a>	SPN Conversion Method	
Unit Passport <a href="#">PGN 62995</a> (0xF613)				On request
1	16 bytes	<a href="#">SPN 521123</a>	Line	
17	16 bytes	<a href="#">SPN 521344</a>	Brand	
33	16 bytes	<a href="#">SPN 521345</a>	Model	
49	16 bytes	<a href="#">SPN 521120</a>	Serial Number	
65	8 bytes	<a href="#">SPN 521121</a>	Firmware Version	
73	4 bytes	<a href="#">SPN 521125</a>	Manufacturing Date	
77	1 byte	<a href="#">SPN 521188</a>	S6 Address (SA)	
Output data <a href="#">Level Sensor Lite FM</a> (version 2)				
Filtered Fuel Level/Volume in Tank <a href="#">PGN 62982</a> (0xF606)				1000 ms
1	2 bytes	<a href="#">SPN 521023</a> /2.10	Fuel Tank Level. Filtering	
3	2 bytes	<a href="#">SPN 521024</a> /2.10	Fuel Tank Volume. Filtering	
5	2 bytes	<a href="#">SPN 521025</a>	Tank Fuel Rate	
7	1 byte	<a href="#">SPN 174</a>	Engine Fuel Temperature 1	
Fuel Level/Volume in Tank <a href="#">PGN 63087</a> (0xF66F)				1000 ms
1	2 bytes	<a href="#">SPN 521023</a>	Fuel Tank Level	
3	2 bytes	<a href="#">SPN 521024</a>	Fuel Tank Volume	
5	1 byte	<a href="#">SPN 96</a>	Fuel Level 1	
Tank Fuel Level <a href="#">PGN 63148</a> (0xF6AC)				1000 ms
1	4 bytes	<a href="#">SPN 521032</a>	Fuel Volume. High Resolutions	
5	2 bytes	<a href="#">SPN 521033</a>	Tank Volume	
Pulse-width Modulation Duty Cycle <a href="#">PGN 63489</a> (0xF801)				On request
1	4 bytes	<a href="#">SPN 521440</a>	Frequency (Duty Cycle)	
9	2 bytes	<a href="#">SPN 521442</a>	Fuel Temperature (High Precision)	
11	2 bytes	<a href="#">SPN 521023</a>	Fuel Tank Level	
Dash Display <a href="#">PGN 65276</a> (0xFEFC)				1000 ms
2	1 byte	<a href="#">SPN 96</a>	Fuel Level 1	
7	1 byte	<a href="#">SPN 38</a>	Fuel Level 2	
Output data <a href="#">Fuel Level Control FM</a> (version 1)				
Total Fuel Volume In Tanks <a href="#">PGN 63152</a> (0xF6B0)				1000 ms
1	2 bytes	<a href="#">SPN 521024</a> /2.11	Fuel Tank Volume. Summary Value	
3	1 byte	<a href="#">SPN 96</a> /2.11	Fuel Level 1. Summary Value	
4	2 bytes	<a href="#">SPN 521033</a>	Tank Volume	

Table 3 — Malfunction codes of DUT-E CAN sensor

Numerical designation of malfunction code		Description of malfunction code	Service
SID	FMI		
1231	2	CAN-bus. Data Erratic, Intermittent Or Incorrect	Check reliability of electrical connection and connection of terminal resistors.
523000	4	Fuel Level Sensor. Measuring Generator Fault. Measuring Tube Shorting	Wash the measuring probe tubes in the fuel. Clean the tank from mud.
523000	13	Fuel Level Sensor. Calibration Error	Check correctness of the entered value of actual length of the measuring probe and/or recalibrate the sensor.
523000	14...21	Fuel Level Sensor. No response from Slave sensor with the respective network address (SA) from 101...108 range during the summation of readings	Check reliability of electrical connection of the respective sensor and its serviceability.

### 1.4.3 Sensor and tracking devices compatibility

[DUT-E CAN](#) may be used together with [Telematics terminals](#) or any other tracking devices whose inputs are compatible with parameters of DUT-E CAN output signals, in accordance with [1.4.2](#).

[Technoton](#) regularly conducts compatibility and mutual accuracy tests of all manufactured products with Terminals of different models.

A [table](#) containing the current list of Compatibility Declarations for Telematics terminals produced by different manufacturers with DUT-E CAN sensors and other products of Technoton is provided at the company site <https://www.jv-technoton.com/>.

Recommendations on the equipment connection and configuration can be obtained at the Technoton [Technical support](#) service.

### 1.4.4 Overall dimensions

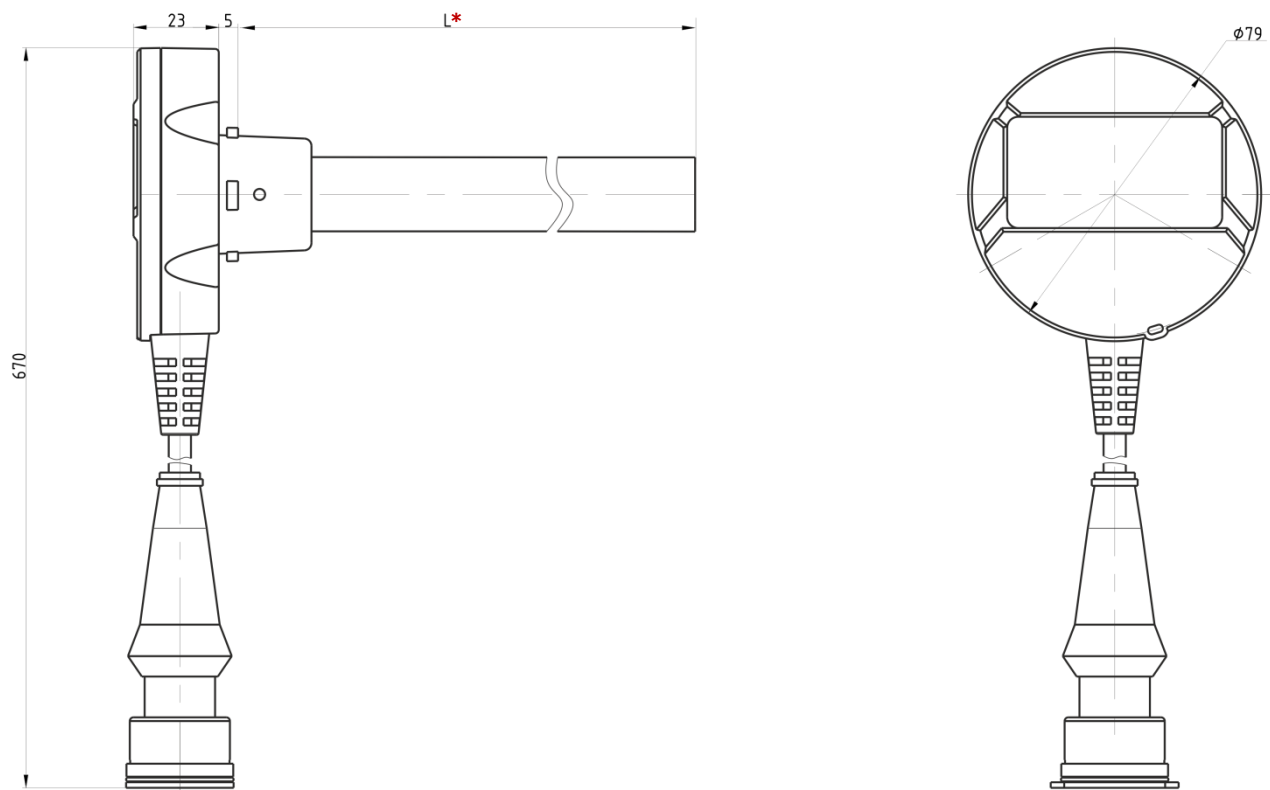


Figure 8 — [DUT-E CAN](#) overall dimensions

\* Nominal measuring probe length (350 / 700 / 1000 mm).

## 2 Sensor installation

For [DUT-E CAN](#) correct operation its mounting and configuration should be carried out by certified specialists who have passed [corporate technical training](#).



**ATTENTION:** During sensor mounting you are to follow general health and safety rules for repairing vehicles and tractors, as well as health and safety rules established at a particular company.

In this chapter, general recommendations regarding mounting DUT-E CAN sensor are provided. Detailed instructions regarding the sensor installation are provided in the [DUT-E/DUT-E 2Bio/DUT-E GSM/DUT-E S7 installation manual](#).

The following tools and accessories are recommended to have for DUT-E CAN mounting:

- Small tools: (box wrench kits, drive sockets, screwdrivers, pliers, jab saw or angle grinder with a cutoff disk, rivet spinner).
- Drill (screw driving machine) with a set of drill bits for metal.
- Hollow drill set, d=38 mm.
- Verified measuring reservoir for fuel (10...20 l volume).
- If the tank volume is greater than 200 l, the fuel filling station with a counter or [DUT-E ATS automatic calibration station](#) are desirable.
- Calibration pipe with one end sealed, its length being no less than the height of the tank to be equipped.
- Silicone sealing compound.
- Rags.
- Diesel fuel; full tank for each Vehicle.
- Spare tank for fuel of volume equal to that of the given fuel tank;
- In case of configuration using the cable system — [S6 SK](#) service adapter and PC with the installed [Service S6 DUT-E](#) service software.  
In case of wireless configuration — [S6 BT Adapter](#) service adapter and the Android device with the installed Service S6 DUT-E (Android) service mobile application;



**RECOMMENDATION:** Tank calibration using DUT-E ATS automatic calibration station eliminates the impact of human factor on the calibration accuracy and reduces the calibration error down to  $\pm 0.5$  % of the tank volume, it also reduces by 2...3 times labor costs and time for the tank calibration (see [DUT-E ATS operation manual](#)).

### 2.1 Exterior inspection prior to works start

It is necessary to conduct DUT-E CAN exterior inspection for the presence of the possible defects arisen during transportation, storage or careless use.

Contact the product supplier if there any defects.

## 2.2 General recommendations for sensor installation

### 2.2.1 Standard fuel sensor replacement

DUT-E CAN can be mounted either into the flange of factory mounted float sensor\* or into a specially drilled hole of the fuel tank.



**ATTENTION:** If the standard fuel sensor is not located in the geometrical center of the tank, it is not recommended to replace it with [DUT-E CAN](#). DUT-E CAN installation far from the geometrical center of the tank will lead to significant fluctuations in fuel level readings.

Dismount the standard sensor and clean the mounting area before DUT-E CAN mounting.

M5x16 bolts can be used for installation; they are included into the [delivery set](#). Bolt or screw heads must be completely sunk in the mounting plate (see figure 9).



*Figure 9 — Mounting plate screwed to the tank*

Preorder correspondent mounting plate to replace the standard sensor with **SAE 5 bolt** bores layout.



**RECOMMENDATION:** For a further easier sealing of sensor pass the sealing cord through the sealing hole of the plate **prior** to fastening the plate to the tank!

---

\* Study carefully the layout of the mounting bores for a factory mounted fuel sensor and compare it with the drawing of bores for a mounting plate.

## 2.2.2 Installation into a special hole

### **IMPORTANT:**



- 1) Before drilling a bore in a fuel tank, the tank must be emptied, dismantled (if necessary) and dried or filled with water.
- 2) Before drilling, make sure that there are no bulkheads that interfere [DUT-E CAN](#) installation.
- 3) Eliminate contact of DUT-E CAN measuring probe with the bar of the standard float fuel sensor.

Sequence of operations during mounting DUT-E CAN:

- 1) Determine installation location. **Geometrical center of the fuel tank** is recommended (see figure 10). This will reduce measurement errors caused by fuel level deviation during driving.

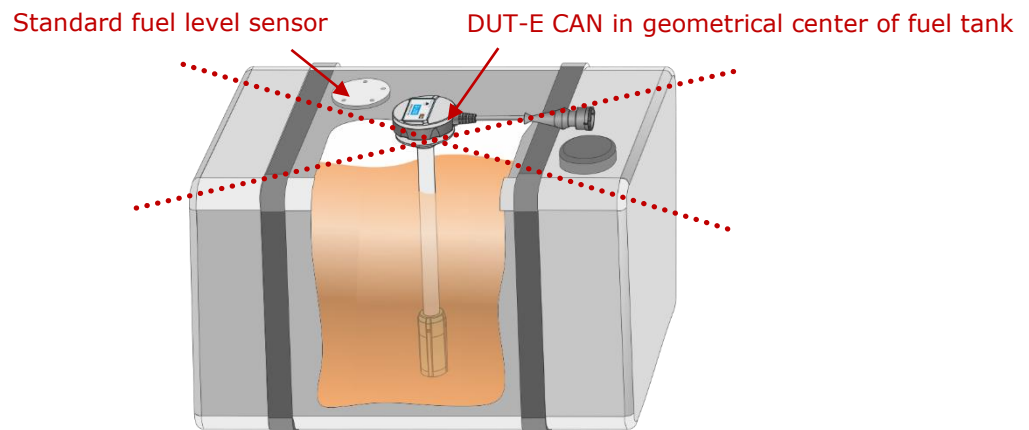


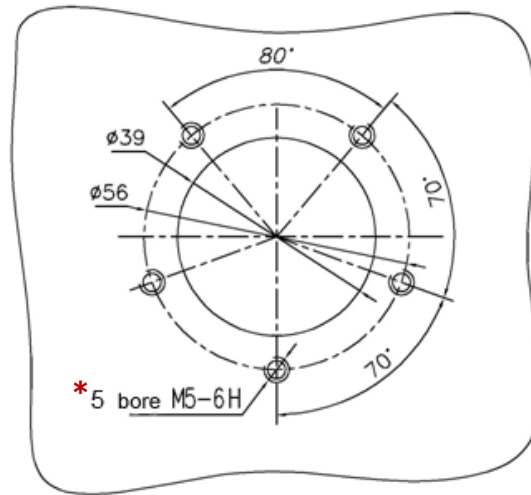
Figure 10 — Recommended location for a DUT-E CAN installation

- 2) Stick hole placement template from DUT-E CAN [delivery set](#) to the top of the tank and drill holes accordingly (see figure 11).

We recommend to drill a hole for the sensor mounting plate with a hollow drill set **38 mm** in diameter.



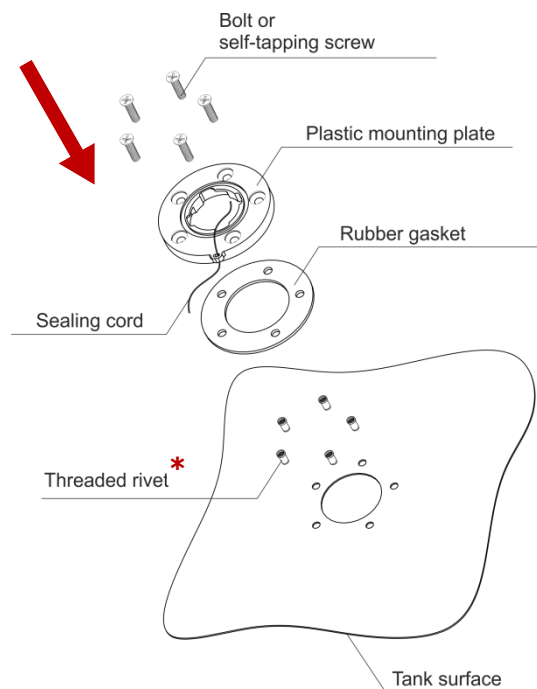
**BE CAREFUL:** The mounting plate can be installed only in one position on the bores prepared! Before marking and drilling, examine the place where you plan to fix the mounting plate because sealing holes should be accessible.



\* While installing fastening plate with threaded rivets, make  $d=7\text{ mm}$  holes for rivets.

Figure 11 — Bores layout for sensor mounting plate fastening

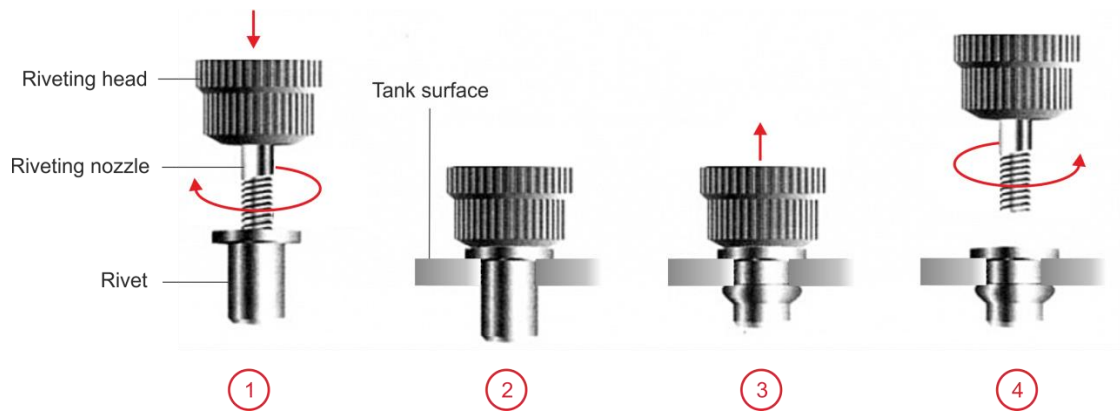
**3)** Put rubber gasket and fastening plate over prepared holes, fix them with screws and threaded rivets of with self-tapping screws from [MK DUT-E](#) mounting kit (see figure 12).



\* Recommend for installation of sensor in fuel tank with thin walls (**less than 2 mm**).

Figure 12 — Mounting plate fastening

When using threaded rivets, they should be mounted using riveter and according to figure 13.



a) threaded rivets procedure of installation



b) installed fastening plate view of from inside of tank

Figure 13 — Threaded rivets usage for sensor installation



**ATTENTION:** When fixing the mounting plate to the tank, make sure that the bolt or screw heads are not skewed and completely sunk in the plate in order to provide **electrical isolation** between the tank and [DUT-E CAN](#).

## 2.2.3 Probe cutting according to tank depth



**ATTENTION:** It is allowed to cut the measuring probe of [DUT-E CAN](#) to any length needed.

Sequence of operations during cutting the measuring probe of DUT-E CAN:

**1)** Measure the depth of the tank from mounting plate to the bottom.



**IMPORTANT:** It is **required to leave a 20...30 mm gap** between the edge of the measuring probe and the tank bottom to:

- provide at least **10 mm** operation area for bottom spring stopper (if the bottom spring is fixed in full loading position the bayonet mounting plate can get damaged);
- avoid the short circuit of the measuring probe tubes with conductive mud or water at the tank bottom.

**2)** Cut off DUT-E CAN probe so that the edge of the probe is in 25 mm above the bottom of the tank.



Figure 14 — DUT-E CAN measuring probe cutting and flushing the cut with fuel



**RECOMMENDATION:** Cut DUT-E CAN probe with a metal hacksaw. Carefully clean the edge and wash the tubes with clean fuel (see figure 14).

**3)** After cutting DUT-E CAN, the sensor calibration is obligatory (see [2.6](#)).

## 2.2.4 Length extension



**ATTENTION:** It is allowed to extend the length of [DUT-E CAN](#) up to **6000 mm**.

Length extension option significantly decreases expenses on storage and transportation. The sensor length is extended by means of attachment of [additional sections of DUT-E](#) to its measuring probe (see figure 15 and [DUT-E Length extension with KDC](#) video).

Model range of additional sections includes: **KDC 250**, **KDC 500** and **KDC 1000** (lengths of 250, 500 and 1000 mm respectively).

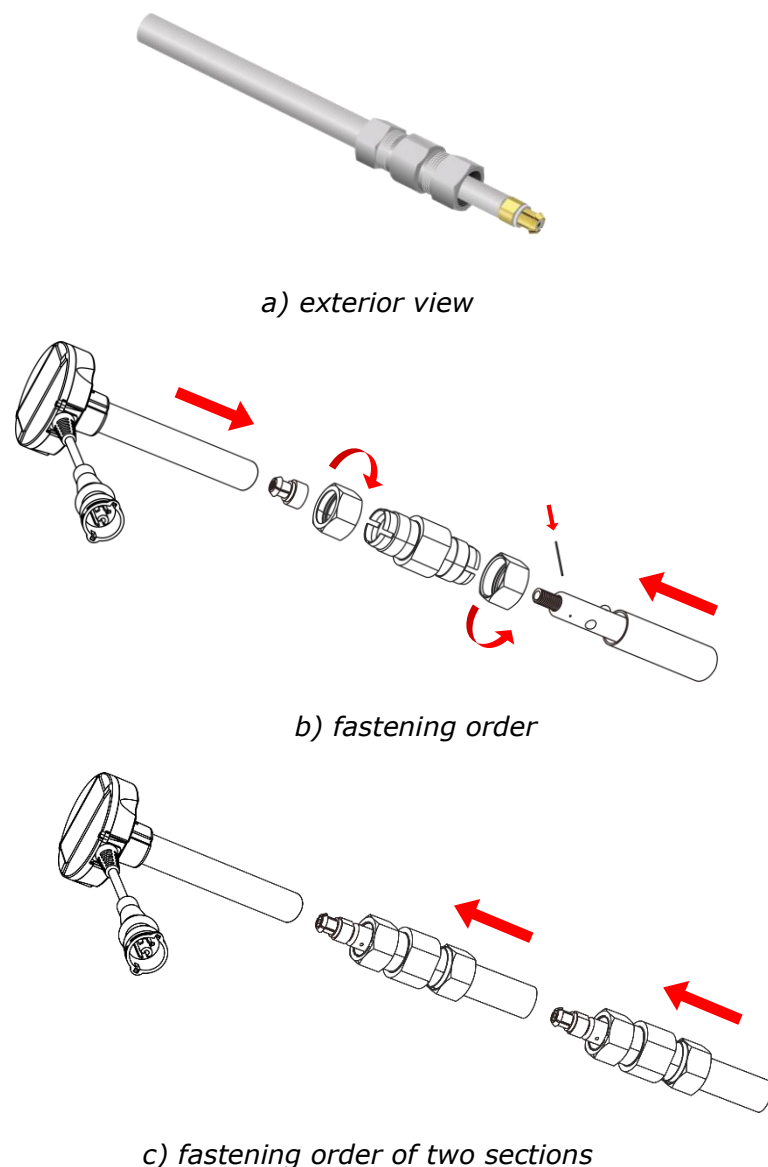


Figure 15 — Additional section DUT-E

In case you fix additional sections, the force moment of tightening the threaded connection of the internal tube must be **10 N/m**, and that of the external tube must be **40 N/m**.

Additional sections can be cut to necessary size. Follow instructions of clause [2.2.3](#) when cutting the sections.

After length extension of DUT-E CAN, the sensor calibration is obligatory (see [2.6](#)).

## 2.2.5 Mounting a screen filter and fixing the sensor

Before fixing [DUT-E CAN](#), put the **screen filter** (purchased separately) at the end of the sensor measuring probe (see figure 16 a); it serves to protect the measuring probe electrodes from water and dirt. Using the screen filter allows to increase considerably the sensor non-failure service life (see the video [Screen filter of a fuel level sensor](#)).

The screen filter is fixed in accordance with sequence of operations shown in figure 16 b. First, a fixing element is put on the measuring probe. Then, the bottom stop is mounted and fixed with two screws on the side. The screen filter is put over the bottom stop and fixed with locks of the fixing element.

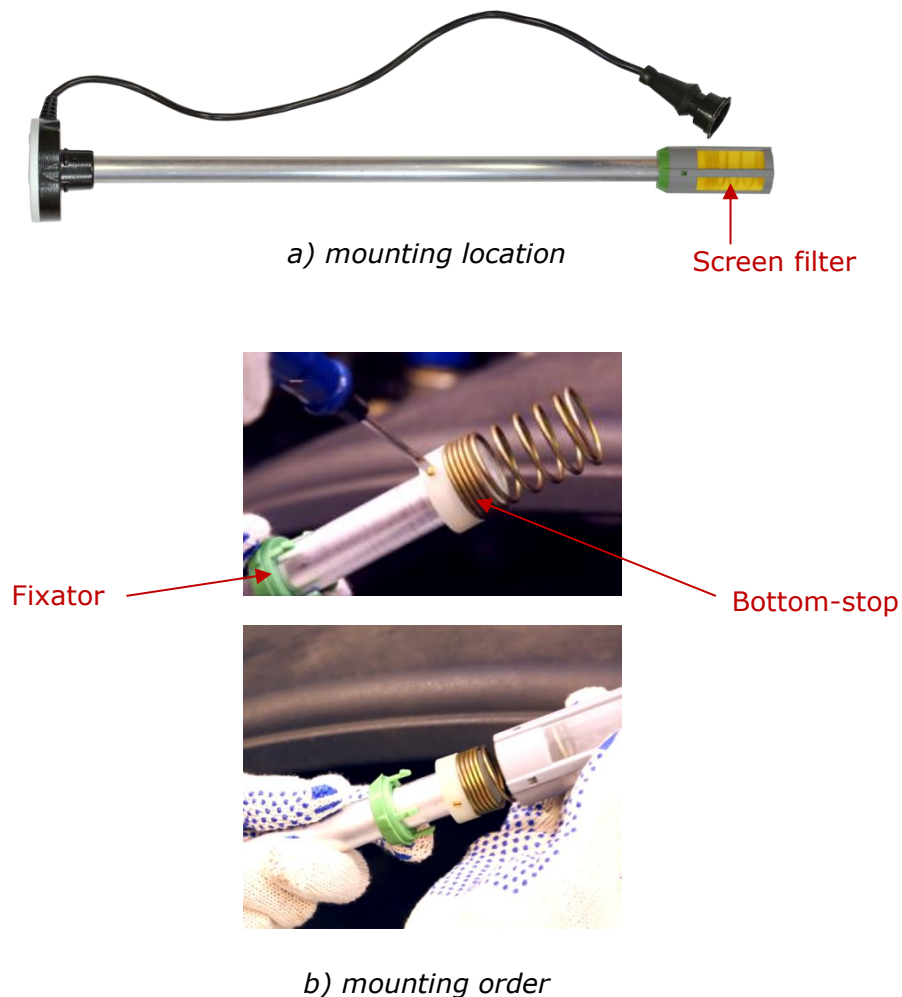


Figure 16 — Mounting a screen filter



**ATTENTION:** Screen filter cannot be used without installed bottom spring stop.

To fix **DUT-E CAN** place the sealing ring into the groove of the mounting plate and put the sensor measuring probe, with the screen filter mounted, down into the hole. Then, press the sensor "head" and fix it by turning it clockwise (see figure 17).



**RECOMMENDATION:** It is recommended to put some oil or fuel on the sealing ring of the mounting plate to prevent its deformation during DUT-E CAN mounting.

The mounting should be carried out so that both sensor and mounting plate sealing holes would match one another after locking the DUT-E CAN.

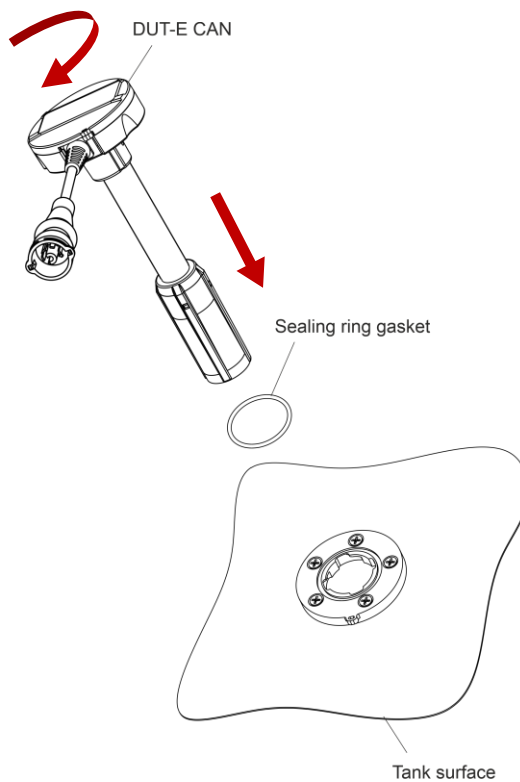


Figure 17 — DUT-E CAN mounting order

## 2.3 Sensor configuration by means of cable connection to the PC

[DUT-E CAN](#) setup is conducted via K-Line interface (ISO 14230) using [S6 SK](#) service adapter which is to be purchased separately. To conduct the setup, connect the sensor to the personal computer (further on PC) using the service adapter.



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

Before starting with service adapter, it is necessary to download software from <https://www.jv-technoton.com/> (section [Software/Firmware](#)) and install it to PC:

- USB driver;
- Service S6 DUT-E software (version 3.15 and higher).

Note — Installation file of software has the view as: ServiceS6\_DUT-E\_X\_X\_Setup.exe. X\_X corresponds to the version of software.



**ATTENTION:** For work with Service S6 DUT-E 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.

S6 SK description can be found in [CAN j1939/S6 Telematics interface Operation Manual](#). See [annex B](#) for DUT-E CAN settings, displayed and/or made by Service S6 software.

### 2.3.1 Connecting sensor to PC



**ATTENTION:** Prior to connecting DUT-E CAN 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 to use service adapter, have a closer look on its elements to detect defects which can occur while service adapter was transported, stored or handled carelessly.

Avoid the following when connecting service adapter to DUT-E CAN, mounted into the tank of the Vehicle:

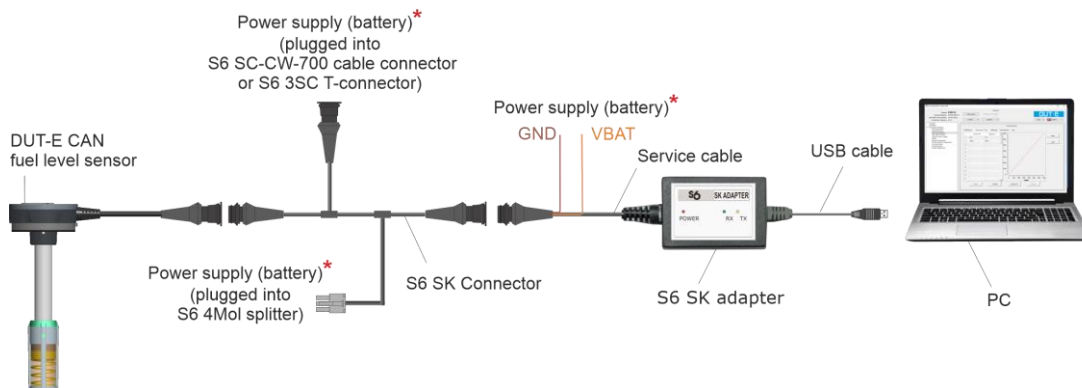
- ingress of fuel and lubricants and moisture to the contact pins of adapter slots or connectors of service cables;
- potential damage of the adapter and cables by the rotating and heating elements of the engine.

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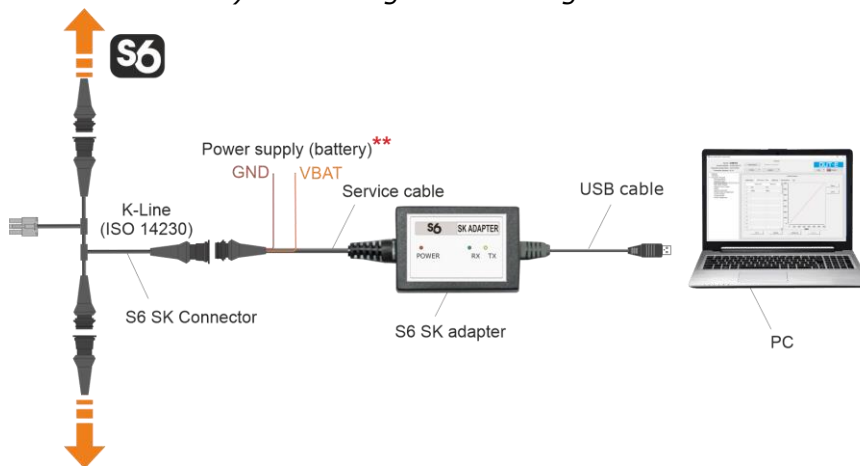
\* When configuring DUT-E CAN installed on Vehicle. When configuring sensors connected by [S6 Technology](#), power supply of onboard network (battery) can be turned on.

**DUT-E CAN** sensors are connected to the PC for their configuration in accordance with diagrams shown in figure 18, in the following order:

- 1) Connect the adapter to sensor:**
  - The connector of the service adapter is to be connected to the sensor interface cable connector by means of the plug connector which is contained in the S6 SK supplied accessories kit (see figure 18 a).  
 Note — During DUT-E CAN configuration you need to provide power supply for the sensor and the adapter from the battery or from a power source. Power is supplied through one of the free input connectors of the connector or via power supply wires of the adapter service cable.
  - During the configuration of DUT-E CAN which operates within the network of [Units](#) based on [S6 Technology](#) we recommend to plug the connector of the adapter service cable into the break in S6 cable system using S6 SK connector instead of any S6 3SC T-connector. In this case, power for the Unit and adapter is supplied through S6 cable system (see figure 18 b).
- 2) Plug the adapter to free USB port of PC with the USB cable.**  
 Note – it is allowed to connect adapter to USB-port of your PC after turning on power supply of sensor and running Service S6 DUT-E software.
- 3) Connect power supply and ground wires to vehicle electrical system or battery.**
- 4) Power on the vehicle (battery).**



a) connecting sensor using S6 SK



b) connecting sensor using S6 SK via S6 Technology

Figure 18– Schemes of DUT-E CAN connection to PC

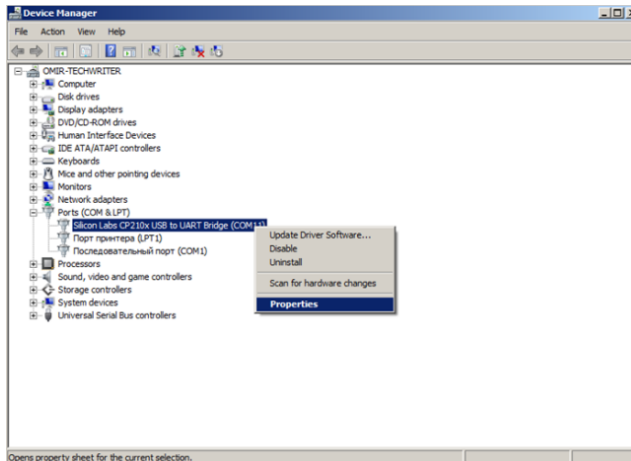
\* For connecting power supply (battery) you can choose any of marked places.

\*\* No need to connect. Power supply (battery) is carried out though S6 cabling system.

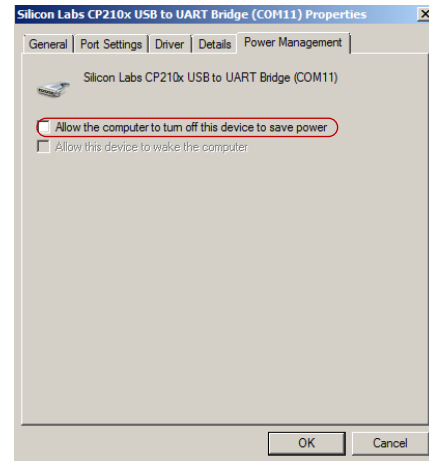
Windows automatically detects adapter connected to PC’s USB port as USB device and enables virtual COM port driver for it. The virtual COM port will be displayed in the list of ports of Windows Device manager (see figure 19).



**ATTENTION:** It is recommended to untick power save check box for Service S6 DUT-E in the virtual COM-port properties for energy safety purpose (see figure 19 b).



a) selecting port properties






b) disabling power save option

Figure 19 — Setting up a virtual COM-port in the Device Manager

Service adapters are ready for use since turning on power supply. LED-indicators’ signal description is specified in table 4.

Table 4 – LED-indicators’ signal description.

S6 SK service adapter – wired configuration of sensor

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	DUT-E CAN data is being received
	No signal		No data from DUT-E CAN
TX		Yellow	Data is being transmitted to DUT-E CAN
	No signal		No data to DUT-E CAN

## 2.3.2 Interface of Service S6 DUT-E software

Service S6 DUT-E software is launched with  desktop shortcut created during installation. The Software interface consists of **Horizontal menu**, **Vertical menu**, **Sensor ID area** and **Information and Configuration area** (see figure 20).

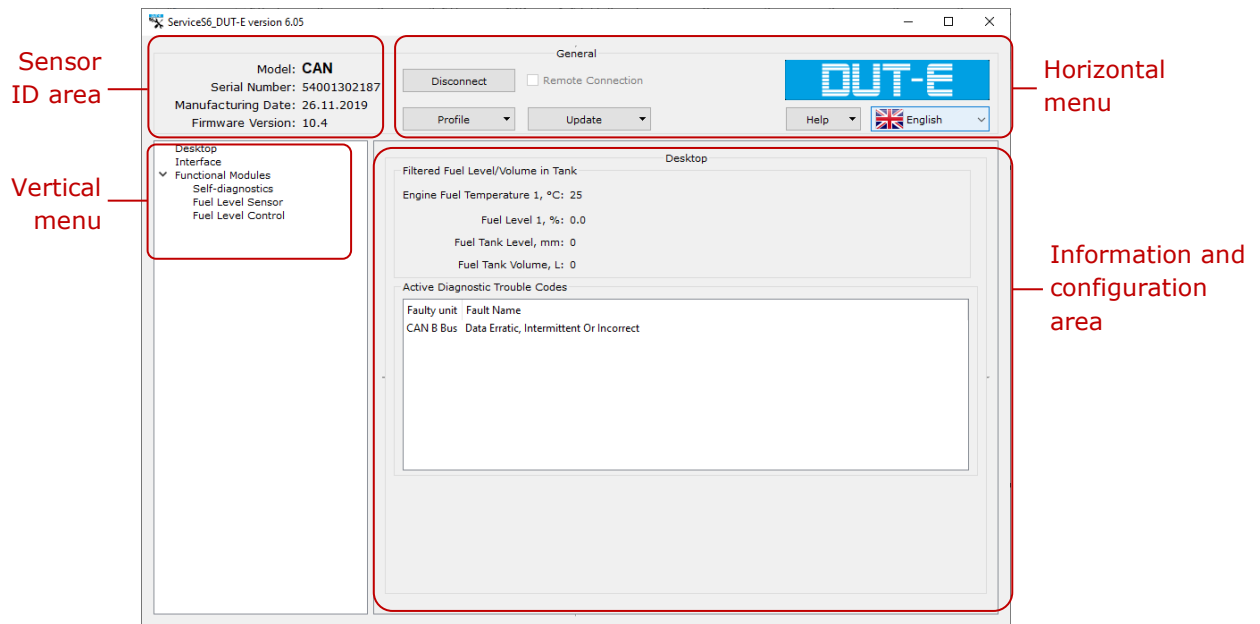


Figure 20 — Interface of Service S6 DUT-E



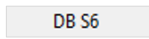
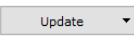
**ATTENTION:** At lower screen resolutions (less than 1024x768) Service S6 DUT-E window is automatically set to full screen. In this case scroll bars are used to display unseen areas.

**Sensor ID area** provides information about the model, serial number, manufacturing date and firmware version of the connected sensor.

**Horizontal menu** provides the following:

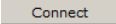
- sensor is connected/disconnected;
- profile options (loading profile, saving profile, and printing profile);
- firmware update;
- update of S6 Database in the service software (in case there is Internet access);
- selection of interface language;
- help and information about the manufacturer.

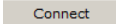
**Vertical menu** is used for selection of [Function modules](#) of [DUT-E CAN](#). Its current parameters and configuration are displayed in **Configuration and Information area**. Function modules of Service S6 DUT-E software are based on [PGN](#) and [SPN](#) messages from **S6 Database** (see [annex B](#)).

To update S6 Database in Service S6 DUT-E service software, press  button in the dropdown menu . The detailed description of S6 Database (further on — BD S6) can be found at <http://s6.jv-technoton.com/> in [S6 Data base](#) section.

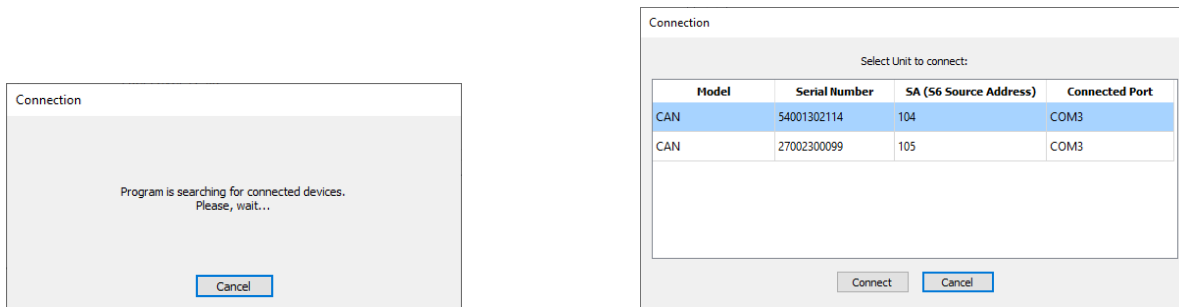
**Information and Configuration** area displays names (PGN) and parameters (SPN) of the messages. Each SPN holds the following: data range, discretion, measuring units.

### 2.3.3 Authorization

To enable connection between [DUT-E CAN](#) and PC, click the button  in **Horizontal menu**. Service S6 DUT-E software will search for the connected sensors (see figure 21 a).

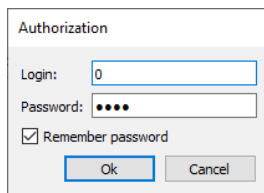
When you connect Service adapter via [S6 Technology](#), which contains more than one [Unit](#), in the **Connection** window from the list choose the unit, that will be used with software and click the button  (see figure 21 b).

Enter Login and Password of the Unit into the appropriate fields of **Authorization** 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 21 c).



a) search for the connected sensors to PC

b) selection of one of the Units connected to the bus S6 to work with software



c) user authorization

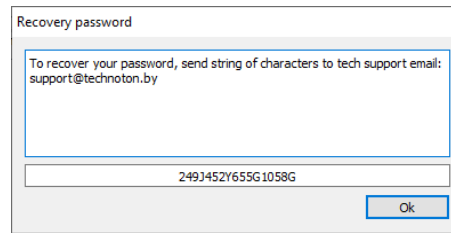
Figure 21 — Enable connection between the sensor and PC

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 **Authorisation** and press **Ctrl+F10** key combination.

Service S6 DUT-E Software will display a code to recover the current password of the Unit (see figure 22). This message is being sent to [Technoton technical department](mailto:support@jv-technoton.com) by e-mail [support@jv-technoton.com](mailto:support@jv-technoton.com) Together with password recovery request.

Requirements for DUT-E CAN password request:

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



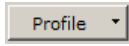
*Figure 22 — Generating password recovery code*

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 20). **Desktop** contains configuration and current parameters of [Function modules](#) of the connected sensor [DUT-E CAN](#) (see [annex B](#)).

### 2.3.4 Operations with the sensor profile

Sensor **profile** is set of [PGN](#) (passport data, counters and settings of [Function modules of DUT-E CAN](#)).

It is possible to manage the profiles in both the sensor DUT-E CAN connected and autonomous mode. The button  with drop down menu is used to choose the options (see figure 23). The profile can be either saved as file on the PC disc, or loaded into the sensor memory, or, if necessary, printed or saved in pdf file.

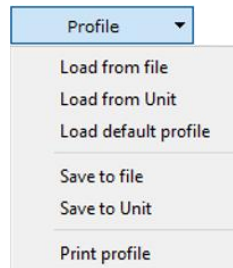
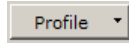


Figure 23 — View of Profile menu

Menu  is divided into the following sections:

**1) Load profile.** The following options of profile loading are available in Service S6 DUT-E 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 (**DUT-E\_\*.prf**).
- Load profile from Unit — is used for loading profile from the connected sensor DUT-E CAN.
- Load default profile — is used for loading profile with default factory settings. With this profile, it is possible to study utility operation without real DUT-E CAN connection. The default file is stored in **DUT-E\_CAN\_Lite\_default.prf** file, in the folder of installation file ServiceS6\_DUT-E.exe.



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

**2) Saving profile.** Service S6 DUT-E 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 according to format **DUT-E\_\*.prf**. Insert the name instead of \*. Prefix **DUT-E\_** and format **.prf** will be inserted automatically.
- Save to Unit — is used for saving modified settings into profile of the connected sensor. It is available only during the time when there an active connection between PC and DUT-E CAN.

If the modified settings were not saved into Unit and  button was pressed or Service S6 DUT-E is being closed there will appear a notification on profile settings saving. Pressing  will save all the unsaved parameters and settings [DUT-E CAN](#).

**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 DUT-E CAN serial number and date when file was created.



**RECOMMENDATION:** It is recommended to attach the hardcopy of the profile to DUT-E CAN specification to log the history of the settings and configurations.

## 2.4 Wireless sensor setup using Android devices


Wireless setup of [DUT-E CAN](#) is conducted by means of its connection via Bluetooth to the smartphone/tablet based on the Android operating system (further on Android device) using [S6 BT Adapter](#) which is to be purchased separately.

**ATTENTION:**



**1)** To eliminate connection failures between the Unit and the Android device, you need to make sure that there are no sources of electromagnetic interference near your working place (radio telephones, video signal transmission units and other wireless devices operating within 2.4 or 5.0 GHz frequency bands, as well as running electric motors, powerful transformers and switching equipment, welding equipment, high-voltage lines etc).

**2)** The maximum allowed distance between the S6 BT Adapter and the Android device depends on the quality of the Bluetooth connection of the Android device. To assure the stable data transmission, it is recommended that this distance should not exceed 10 m.

Before using S6 BT Adapter, please, download Service S6 DUT-E service mobile application (further on application) to the Android device from  (search request "Technoton").

A description of S6 BT Adapter and the installation procedure for application are provided in the [CAN j1939/S6 Telematics Interface Operation Manual CAN j1939/S6](#).

Please, see in [annex B](#) configurations of DUT-E CAN that may be displayed and/or edited using application.

### 2.4.1 Wireless connection of the sensor to the Android device



**ATTENTION:** Prior to connecting DUT-E CAN to the Android device, 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 to use service adapter, have a closer look on its elements to detect defects which can occur while service adapter was transported, stored or handled carelessly.

Avoid the following when connecting service adapter to DUT-E CAN, 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.

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\* When configuring DUT-E CAN installed on Vehicle.

When configuring sensors connected by [S6 Technology](#), power supply of onboard network (battery) can be turned on.

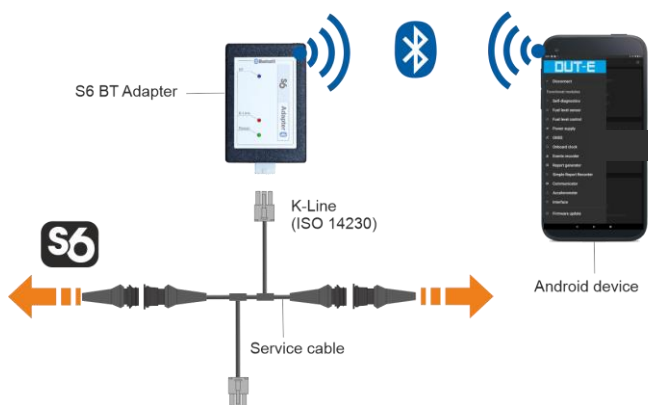
The procedure for [DUT-E CAN](#) wireless connection to the Android device (see figure 24) is as follows:

- 1) Connect the corresponding connector of the service cable to the connector of **S6** adapter.
- 2) Connect the adapter to DUT-E CAN:
  - The service cable connector is input to the interface cable connector of the sensor.  
Note — During the wireless configuration of DUT-E CAN you need to provide power supply for the sensor and the adapter either from the accumulator battery or from the power source. Power supply is provided through any of the free connectors of the connection cord (see figure 24 a).
  - During wireless configuration of DUT-E CAN operating within the network of [Units](#), according to [S6 Technology](#), the service cable may be connected to the break in S6 cable system, instead of any S6 3SC T-connector. In this case, the sensor and adapter are powered through S6 cable system (see figure 24 b).
- 3) Connect power supply and ground wires to Vehicle electrical system or battery.
- 4) Power on the vehicle (battery).

After the power supply is on, the green LED indicator **POWER** is lit. You will also see a blue blinking light of the **BT** LED indicator which means that [S6 BT Adapter](#) is available for connection with Android devices via the Bluetooth channel.



a) connecting sensor using S6 BT Adapter




b) connecting sensor using S6 BT Adapter via S6 Technology

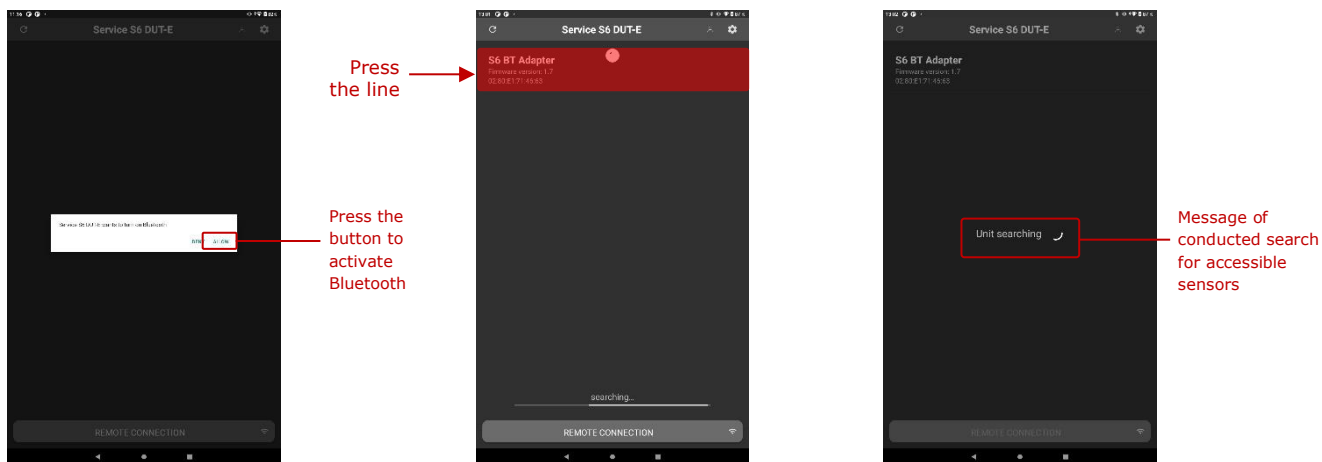
Figure 24 — Schemes of wireless connection of DUT-E CAN to Android device

\* For connecting power supply (battery) you can choose any of marked places.



Start application from the main menu of the Android device with  icon which is created in the process of its installation.

**S6 BT Adapter** is ready for operation from the moment the power supply is on. If the S6 BT Adapter is connected correctly, after its initiation application will offer to allow the activation of Bluetooth. After Bluetooth activation, the adapter which is accessible for wireless connection will be displayed on the screen of the Android device; its firmware version and MAC address will also be displayed. Press the line **S6 BT Adapter**, to establish its connection with the Android device (see figure 25).








a) offer to allow Bluetooth connection      b) adapter selection from the list of accessible devices      c) detection of accessible Units with the help of the adapter

Figure 25 — Example of establishing a wireless connection between DUT-E CAN and Android device

During the operation of S6 BT Adapter signals of LED indicators should comply with those indicated in table 5.

Table 5 — LED-indicators' signal description S6 BT Adapter – wireless configuration of sensor

LED Indicator			Signal description
Marking	Status	Light color	
POWER		Green	Power on
	No signal		Power off or power supply voltage is too low
K-Line		Red	Receiving data via K-Line interface
	No signal		Data are not received over K-Line interface
BT		Blue	S6 BT Adapter is initialized, but no connection with Android-based device (indicator is blinking each 1 s)
			Connection with S6 BT Adapter is established (blinking each 0.5 s)
			S6 BT Adapter is sending data over Bluetooth (blinking each 0.25 s)
	No signal		S6 BT Adapter is not initialized

## 2.4.2 Interface of application

The interface of application consists of **Information and Configuration Area** and **Tools Panel** (see figure 26).

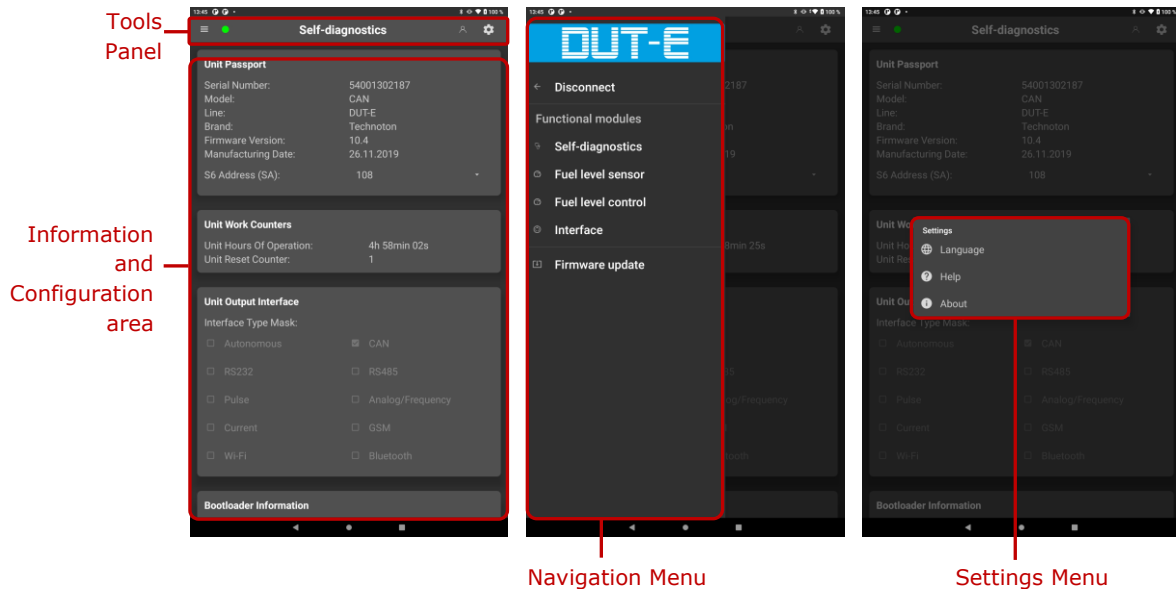
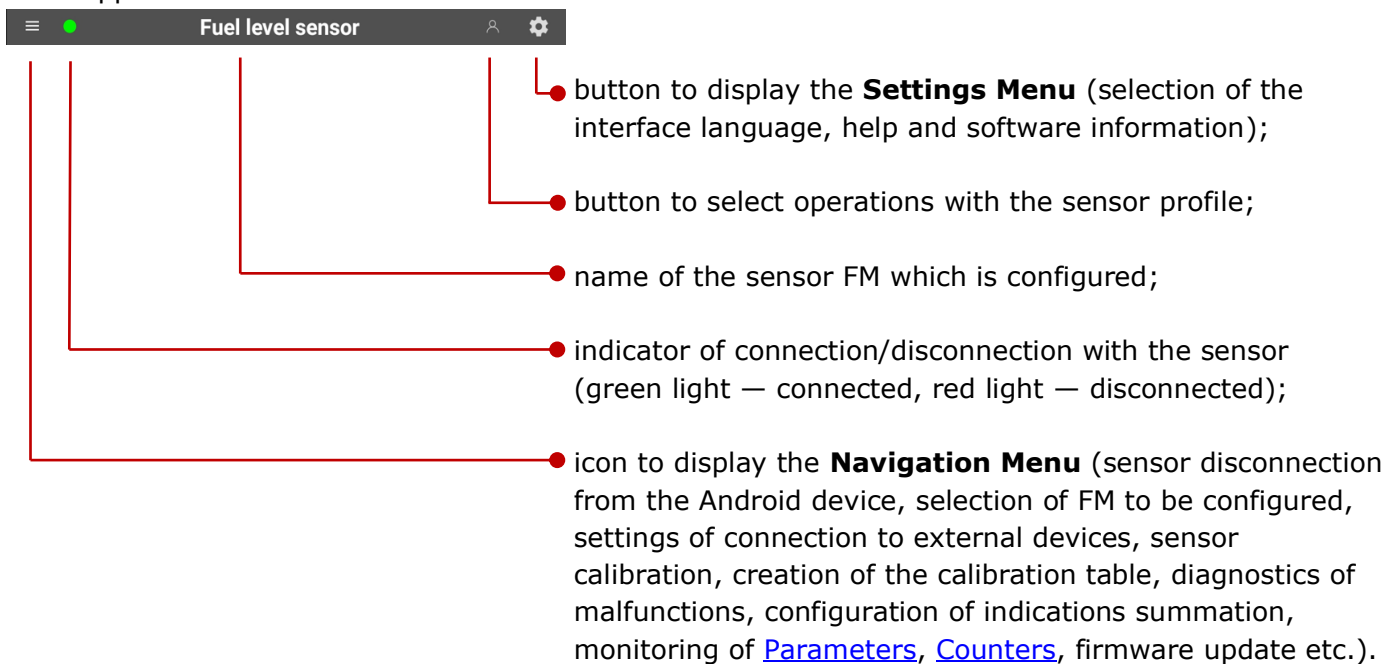


Figure 26 — Interface of Service S6 DUT-E service mobile application

In the **Information and Configuration** area current parameters and settings of the sensor [Functional modules](#) (FM) are displayed.

In the **Tools Panel** area there are the following elements for use during work with S6 application:



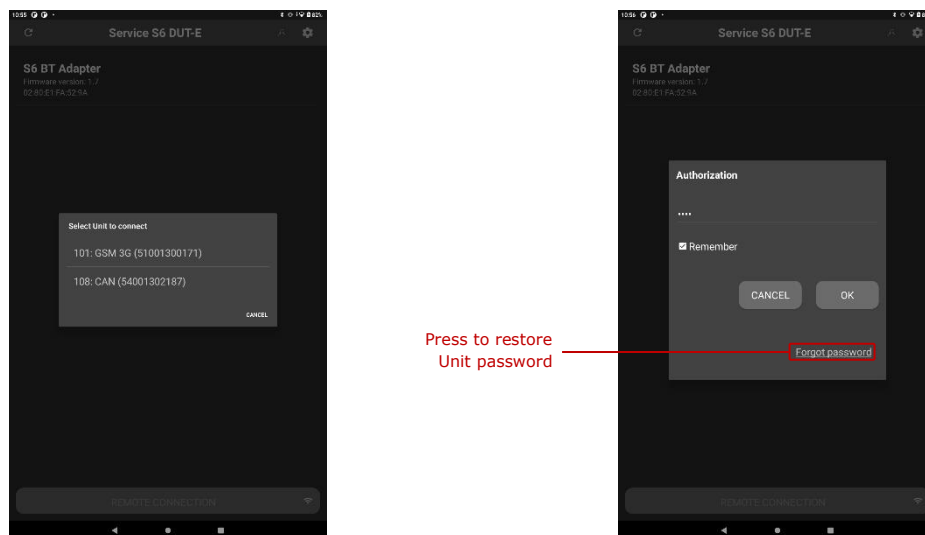
During its work with the FM [DUT-E CAN](#), the application employs data ([PGN](#) and [SPN](#)) from [S6 Database](#). The list of FM with SPN which are displayed and/or edited in the area **Information and settings** is provided in [annex B](#).

### 2.4.3 Authorization

To establish a session of wireless connection between [DUT-E CAN](#) and the Android device, establish connection with **S6 BT Adapter**. The application will automatically detect accessible sensors (see figure 25).

While connecting [S6 BT Adapter](#) to the network consisting of several [Units](#) using [S6 Technology](#), select the sensor required for use in the S6 application from the list displayed (see figure 27 a).

Enter the Unit password into the appropriate boxes of the **Authorisation** window. The password by default is **1111**. To save the password entered (to exclude its entering manually another time during the next session of work with the sensor), checkmark the box **Remember Password** (see figure 27 b).



a) select the required Unit for work with the application

b) enter the Unit password

Figure 27 — Establishing a wireless communication session between DUT-E CAN and the Android device

In case of incorrect entering the password or incorrect connection to the Android device, an error message will appear.

If the user authorisation has been conducted successfully, the loading of the of the connected DUT-E CAN profile will start.

To restore the Unit password (in case it is lost), press the link **Forgot password**.

Application will provide a code to restore the password (see figure 28). This message is being sent to [Technoton technical department](mailto:support@jv-technoton.com) by e-mail [support@jv-technoton.com](mailto:support@jv-technoton.com) together with password recovery request.

Requirements for password recovery request:

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

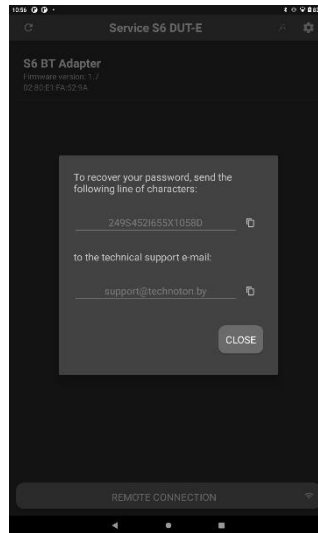



Figure 28 — Generated recovery code window

## 2.4.4 Operations with the sensor profile







Sensor **profile** is set of [PGN](#) (passport data, [Counters](#) and settings of [Function modules](#) of DUT-E CAN).



**ATTENTION:** Any operations with the [DUT-E CAN](#) profile in the service mobile application are possible only during a wireless connection session between the sensor and the Android device. If there is a need to edit the profile in the off-line mode, connect DUT-E CAN to the PC using S6 SK and proceed in accordance with [2.3.4](#).

To perform any operations with the DUT-E CAN profile, the menu **Profile** is used which is opened by pressing the appropriate  button on the **Tools Panel** (see figure 29).

The **Profile** menu contains the following options for operations with the sensor 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 (**DUT-E\_\*.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 sensor connected to the Android device;
-  **Save to Unit** — is used to save the changed settings of the profile in the memory of the connected sensor.
-  **Load default profile** — is used to load the profile with standard factory settings. By default, the profile is recorded in the file **DUT-E\_CAN\_Lite\_default.prf** which is stored in the memory of the Android device.
-  **Print profile** — is used for the profile printout in pdf file.

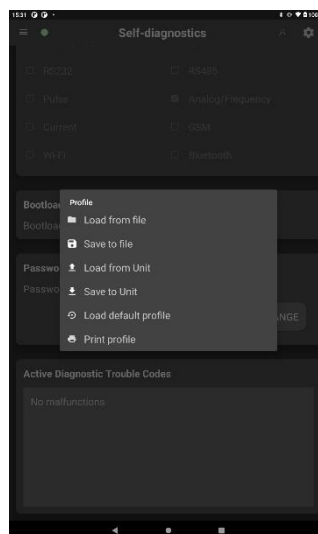


Figure 29 — View of Profile menu

## 2.5 Electrical connection

### ATTENTION:



- 1) To ensure proper operation of [DUT-E CAN](#), it should be electrically connected by specialist, who finished [official technical training](#) and was certified for that.
- 2) When installing DUT-E CAN it is obligatory to follow safety rules on carrying out repair works applicable to the machinery being equipped.

DUT-E CAN is powered from the Vehicle onboard circuit.

In order to electrically connect the sensor, use **signal cable\*** (see [annex E](#)), in accordance with the pinout and designation of the connectors' contacts of the sensor interface cable (see figure 30 and table 6).

### IMPORTANT



- 1) Before mounting and connecting DUT-E CAN 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 DUT-E CAN to onboard electrical network of Vehicle, use **fuses** from [delivery set](#) in accordance to scheme of connection (see figure 31). Nominal fuse current is not more than 2 A.
- 4) **Quick splice connectors** (ordered separately) are recommended for electrical connection of signal cable wires (see figure 32).
- 5) It is **strongly recommended** to lay signal cable together with standard electrical Vehicle wiring with mandatory cable ties fixing of every 50 cm, at a positive ambient temperature (see figure 33).

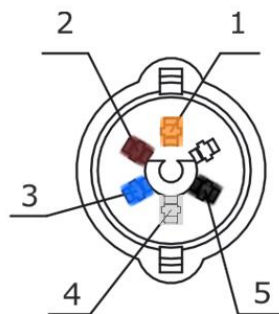


Figure 30 – DUT-E CAN interface cable connector pinout

\* For DUT-E CAN the signal cable is to be purchased separately.

Table 6 – DUT-E CAN interface cable wires assignment

Pin number	Wire marking	Wire color*	Assignment
1	VBAT	Orange 	Power supply "+"
2	GND	Brown 	Ground "-"
3	CANH	Blue 	CAN-High (SAE j1939)
4	CANL	White 	CAN-Low (SAE j1939)
5	KLIN	Black 	Service interface, K-Line (ISO 14230)

\* [Manufacturer](#) reserves the right to modify wire colors, that is why pay attention to its marking.

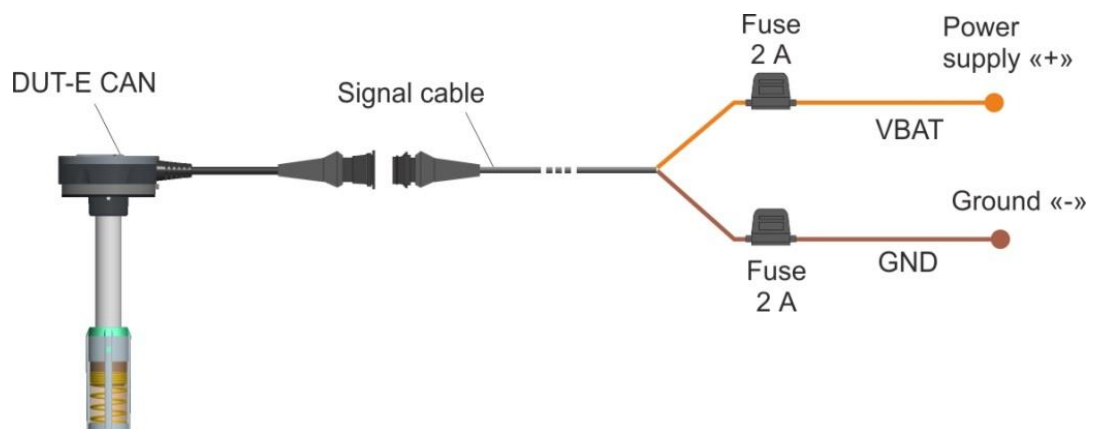


Figure 31 – Sensor to onboard electrical network scheme of connection



**WARNING:** During DUT-E CAN connection to [Units](#) by means of [S6 Technology](#), the availability of two **120 Ohms** terminal resistors between CAN LOW and CAN HIGH wires at both ends of CAN 2.0B (SAE j1939) communication line **is the obligatory condition** for correct data transfer.

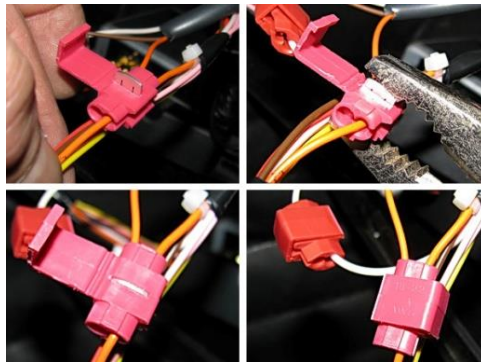


Figure 32 — Using connectors to connect wires of signal cable



**IMPORTANT:** DUT-E CAN body is electrically connected to Ground “-” (brown wire of the connection cable). Electrical isolation between the DUT-E CAN body and the fuel tank is provided by the mounting plate made of dielectric plastic material.

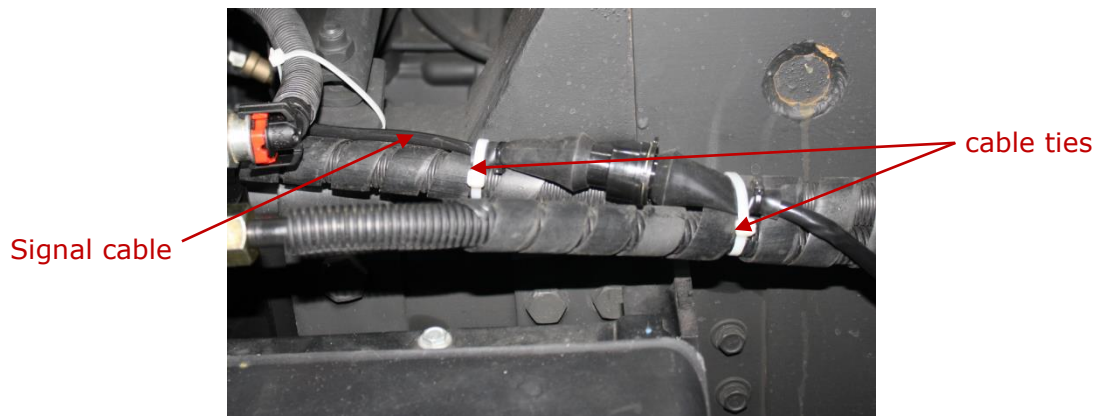


Figure 33 — Laying DUT-E CAN signal cable

Examples of [DUT-E CAN](#) connection to [Telematics terminals](#), with specification of models of cables which need to be ordered, are provided in [annex F](#). See more examples in [CAN j1939/S6 Telematics interface Operation Manual](#).

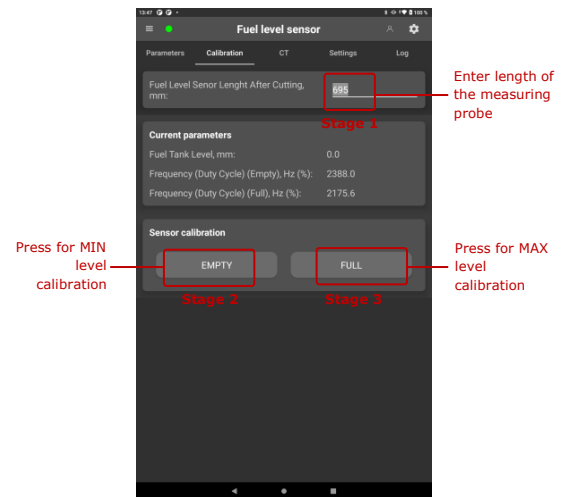
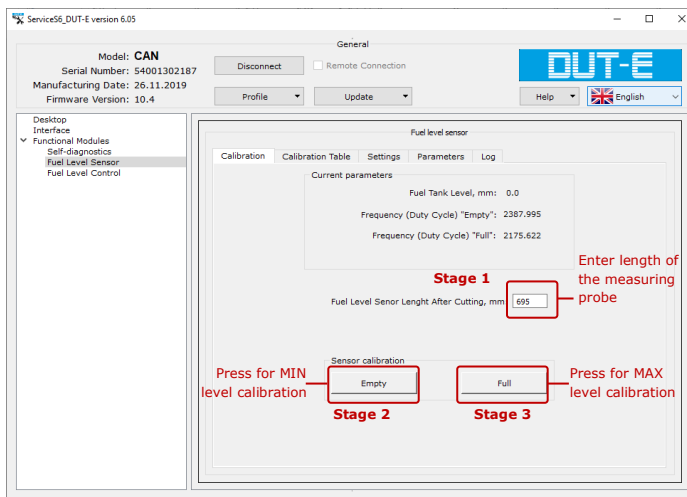
## 2.6 Sensor calibration

**IMPORTANT:**



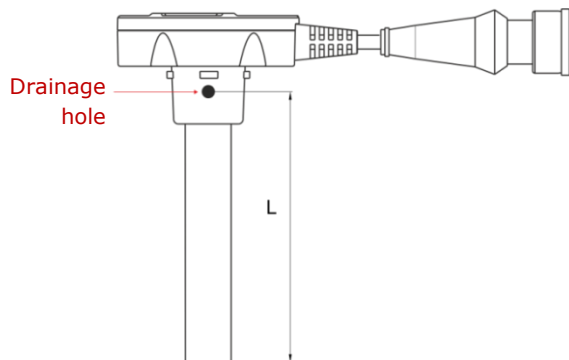
- 1) Before you mount [DUT-E CAN](#) in the tank, sensor calibration for the specific type of fuel used is obligatory!
- 2) The sensor re-calibration is obligatory **after cutting/extension** of its measuring probe.

**Calibration** is required for correct operation of DUT-E CAN. In the process of calibration the minimal and maximal levels of the fuel measurement in the [Vehicle](#) tank are recorded into the memory of the sensor using Service S6 DUT-E service software or Service S6 DUT-E (Android) mobile application ([Fuel Level Sensor FM](#) submenu, **Calibration** tab) (see figure 34).



a) in Service S6 DUT-E software

b) in Service S6 DUT-E (Android) app



c) measuring probe length of sensor

Figure 34 — DUT-E CAN calibration

For DUT-E CAN calibration make the following steps:

**1)** While using Service S6 DUT-E software, connect the sensor to the PC using S6 SK service adapter (see [2.3.1](#)) and establish a communication session between DUT-E CAN and PC (see [2.3.3](#)).

In case of wireless sensor setting using Service S6 DUT-E (Android) application, connect DUT-E CAN to the Android device using S6 BT Adapter (see [2.4.1](#)). Establish a connection between the sensor and the Android device via the Bluetooth channel (see [2.4.3](#)).

**2)** Get the sensor out of the fuel tank and wait for (30...60) seconds so that all fuel run off the probe.

**3)** Measure sensor probe length L (mm) from ending of tubes to draining hole (see figure 34 c) and enter the measured value in **Fuel Level Sensor Length After Cutting, mm** field ([Fuel Level Sensor FM](#) submenu, **Calibration** or **Settings** tabs).

**4)** To calibrate minimum (lowest) point of level measurement, press **Empty**



**ATTENTION:** When calibrating sensor to minimum level, there should not be fuel residues on surface of tubes of probe.

**5)** Dip the probe's tubes fully into the fuel. Wait for (3...5) seconds for sensor readings stabilization.

**6)** To calibrate maximum (highest) point of level measurement, press **Full**.

**7)** Calibration is finished. Save Profile to sensor's memory.

## 2.7 Fuel tank calibration table

[DUT-E CAN](#) recalculates the measured value of fuel level into the fuel volume in the tank according to the calibration table. To set up calibration table it is required to carry out **calibration of fuel tank**.

Calibration procedure is a sequence of fuel fillings by fixed portions from empty to full state of the fuel tank (see video [Fuel level DUT-E installation](#)).



**IMPORTANT:** To measure the volume of fuel portions it is necessary to use measuring reservoir with inaccuracy not more than **0.25 %**.

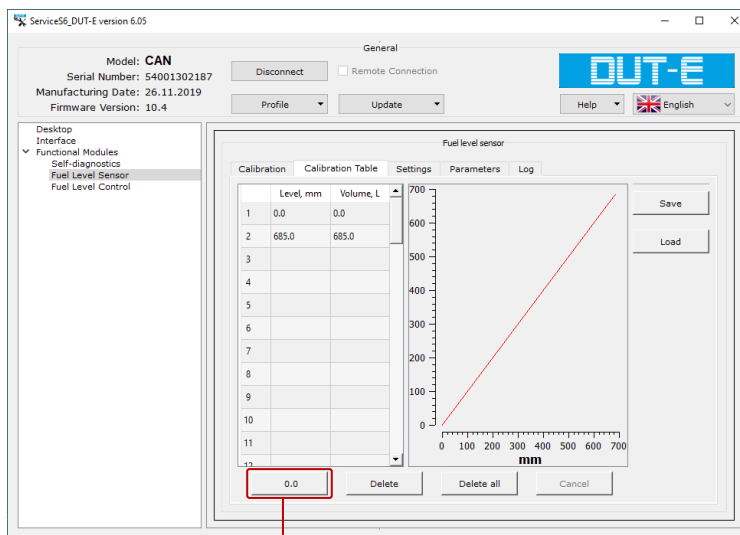
To make fuel tank calibration correctly, where the sensor is installed, it is required to follow the procedure:

- vehicle being equipped should not be loaded and should be parked on even horizontal surface;
- fuel tank should be empty;
- vehicle's tires should be of standard size and type for this model (replacement of standard wheels by wheels of non-standard type and size after the calibration procedure is performed results in decreasing accuracy of measurement or another calibration is needed);
- pressure in tires should be within allowed range for this model;
- vehicle should not move, ignition is turned on, engine not running;
- between to consequent tank refilling operations, please, wait at least 60 seconds.



**RECOMMENDATION:** Tank calibration using [DUT-E ATS automatic calibration station](#) reduces the calibration error down to  $\pm 0,5 \%$  of the tank volume; labor input and time needed for the tank calibration are reduced by 2...3 times (see [DUT-E ATS Operation manual](#)).

Calibration table is saved to internal memory of DUT-E CAN using Service S6 DUT-E software or Service S6 DUT-E (Android) mobile app ([Fuel Level Sensor FM](#) submenu, **Calibration Table** or **CT** tab) (see figure 35).



Current value of fuel level

a) in Service S6 DUT-E software



Current value of fuel level

b) in Service S6 DUT-E (Android) app

Figure 35 — Making fuel tank calibration table

To record the calibration table using Service S6 DUT-E service software, connect the sensor to the PC using S6 SK service adapter (see [2.3.1](#)) and establish a communication session between DUT-E CAN and PC (see [2.3.3](#)).

In case of wireless sensor configuration using Service S6 DUT-E (Android) application, connect DUT-E CAN to the Android device using S6 BT Adapter (see [2.4.1](#)). Establish a connection between the sensor and the Android device via the Bluetooth channel (see [2.4.3](#)).

The data is entered as a table of correspondence between measured fuel level value (**Fuel level (mm) field**) and fuel volume in the tank (**Volume (L) field**).

- Click **0.0** button to insert a new entry into the table. When refilling with new portion of fuel, every time this button will show the current value of fuel level in the tank. When clicking on this button, the value is automatically entered into the next field of the table **Level, mm**.



**RECOMMENDATION:** When creating the calibration table, we recommend to enter for its first point (0.0 mm level) the value of fuel volume which is equal to the fuel volume not used which is remaining in the tank. Because the end of the mounted sensor measuring probe is located 20...30 cm from the tank bottom, there are normally 10...30 l of fuel not used in the dead zone beyond the limit of monitoring.

- New entries are automatically sorted from low to high fuel level value. To delete an entry highlight it and click **Delete** button. Button **Delete all** is used for deleting all entries of calibration table.
- Clicking **Save** button will allow saving the table as a **\*.ttr** file to PC disk or in the memory of the Android device.
- To load previously saved table from file click **Load** (for example, in case of replacement of fuel level sensor).
- Save profile to sensor's memory.



**ATTENTION:**

**1)** The number of calibration points is proportional to the measurement accuracy of fuel volume. The recommended number of calibration points is **not less than 15**. The maximum possible number of calibration points in sensor is **60**.

**2)** The maximum possible fuel volume value that can be entered into the calibration table is limited by the value of **6553 l**.

**3)** When creating the calibration table for the tank of **6553 l capacity and higher**, we recommend **to divide by 10** fuel volume values in each calibration point. Each of these values has **to be multiplied by 10** respectively at the [Server](#) for their correct displaying (see detailed recommendations in [annex G](#)).

## 2.8 Adaptation of sensor to specific conditions of operation

Adaptation of [DUT-E CAN](#) to specific conditions of operation is conducted using Service S6 DUT-E software or Service S6 DUT-E (Android) mobile application ([Fuel Level Sensor FM](#) submenu, **Settings** tab) (see figure 36).

In case of using Service S6 DUT-E software, connect the sensor to the PC using S6 SK service adapter (see [2.3.1](#)) and establish a communication session between DUT-E CAN and PC (see [2.3.3](#)).

In case of wireless sensor configuration using Service S6 DUT-E (Android) application, connect DUT-E CAN to the Android device using S6 BT Adapter (see [2.4.1](#)). Establish a connection between the sensor and the Android device via the Bluetooth channel (see [2.4.3](#)).

DUT-E CAN has the following settings for adjustment under specific operation conditions:

**1) Function Thermal correction** compensate the thermal expansion/contraction of the fuel.



**ATTENTION:** Thermal expansion/contraction of the fuel caused by the temperature deviation, alters the volume of fuel in the tank. As consequence, the sensor transmits a significant increase or decrease of fuel level to the tracking device.

Automatic thermal compensation is disabled by default. To enable it, tick the checkbox **On** in **Temperature correction** tab, then insert the required coefficient value into the field **Temperature Correction Coefficient, %/°C**. To turn off the thermal compensation insert the coefficient value **0.0**, or untick the checkbox **On**.

Thermal correction coefficient  $K_{\text{ther.corr.}}$  is defined, **when the feature of thermal correction is disabled**, according to formula (1):

$$K_{\text{ther.corr.}} = (-1) \cdot \frac{(V_{T_{\text{max}}} - V_{T_{\text{min}}}) \cdot 100}{(T_{\text{max}} - T_{\text{min}}) \cdot V_{T_{\text{min}}}} \quad (1)$$

where  $T_{\text{min}}$  and  $T_{\text{max}}$  — respectively the minimum and the maximum measured values of fuel temperature in the tank during 24 hours;

$V_{T_{\text{min}}}$  and  $V_{T_{\text{max}}}$  — measured values of fuel volume in the tank with minimum and maximum fuel temperature respectively.

### IMPORTANT:

- 1) It is recommended to determine Values  $V_{T_{\text{min}}}$ ,  $V_{T_{\text{max}}}$ ,  $T_{\text{min}}$ ,  $T_{\text{max}}$  by data on [Server](#).
- 2) When measuring values  $V_{T_{\text{min}}}$ ,  $V_{T_{\text{max}}}$ ,  $T_{\text{min}}$ ,  $T_{\text{max}}$  during 24 hours follow the requirements:

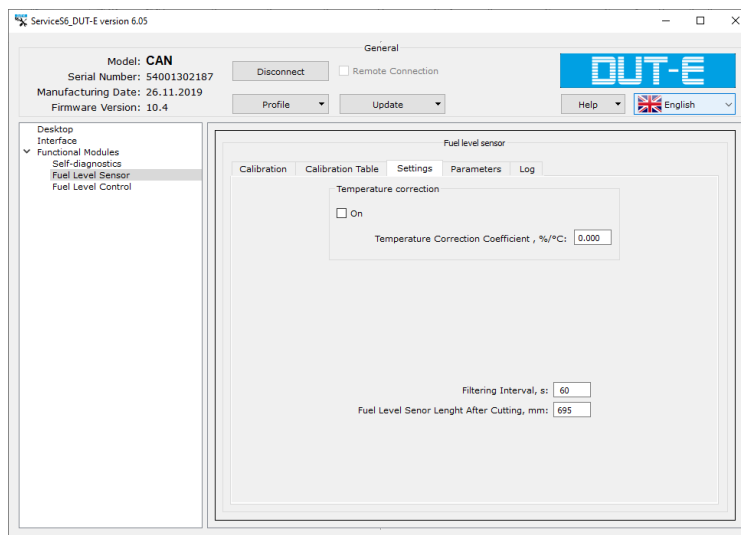


- thermal correction feature must be off in the sensor which is being configured;
- Vehicle is not moving with engine off.
- Ambient temperature should correspond to normal operating conditions of the [Vehicle](#).
- Tank should be filled with fuel not less than 10 % of the total fuel volume.
- There should be the same fuel volume in the tank (refueling or draining is not allowed).

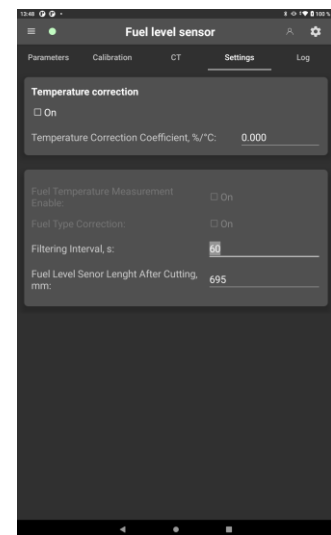
**2)** In the field **Filtering Interval, s** it is possible to set up time interval, preceding the data transmission, when fuel level value is smoothed during this interval. Parameter value range (by default it is 60 sec) is 0...300 with 1 s step.

**ATTENTION:** Filtered information of fuel level in the tank transmitted by DUT-E CAN to Server is not instantaneous value. It is averaged value during some time interval. Filtration is important for DUT-E CAN mounted on vehicles operated on hilly surfaces (because of intense fluctuation of fuel level).

Save the changed Profile settings in the [DUT-E CAN](#).



a) in Service S6 DUT-E software



b) in Service S6 DUT-E (Android) app

Figure 36 — Adaptation of sensor to specific conditions of operation

## 2.9 Connection parameters for CAN j1939/S6 interface

To connect [DUT-E CAN](#) to the external device or by means of [S6 Technology](#), you need to configure parameters of CAN j1939/S6 interface in the **Interface** submenu of Service S6 DUT-E software or of Service S6 DUT-E (Android) mobile application (see figure 37):

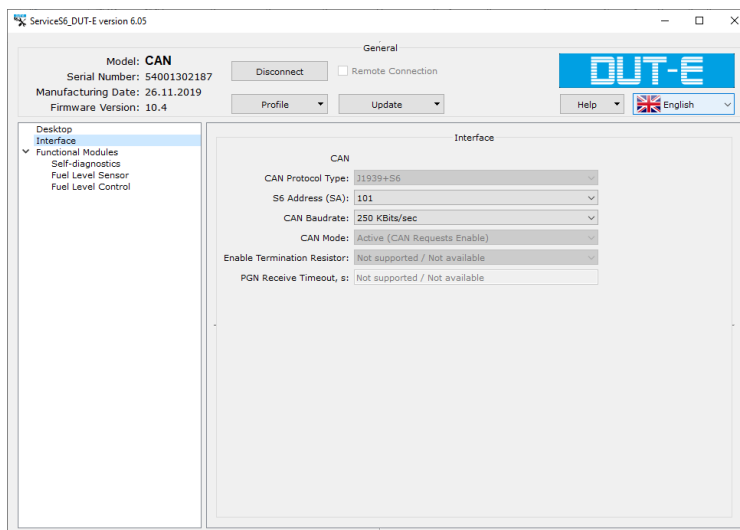
- 1) To identify the sensor within the network of several [Units](#) connected by means of S6 Technology, select the unique network address of the sensor in the dropdown list **S6 Address (SA)** ([SPN 521188](#)) from the range of fixed values\*: **91; 92; 93; 94; 95; 96; 97; 98; 101; 102; 103; 104; 105; 106; 107; 108** (by default — **101**).

Note — You can also change the sensor network address in the settings of [Self-diagnostics FM](#).

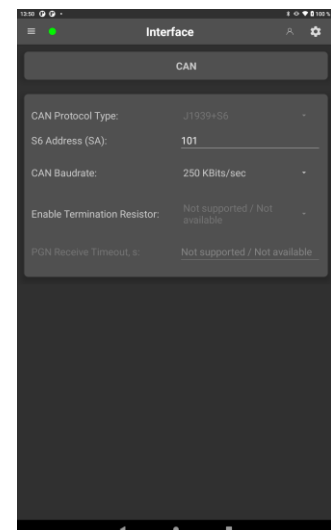


**IMPORTANT:** To be able to configure the summation of readings of several DUT-E CAN, the sensors selected for summation (see [2.10](#)) should be assigned network addresses only from 101...108 range.

- 2) From the dropdown list **CAN Baudrate** ([SPN 521531](#)) select Baudrate for j1939/S6 interface from the range of fixed values: **100; 125; 250; 500; 1000 kbit/s** (by default — **250 kbit/s**).



a) in Service S6 DUT-E software



b) in Service S6 DUT-E (Android) app

Figure 37 — Configuration of the sensor connection parameters via CAN j1939/S6 interface

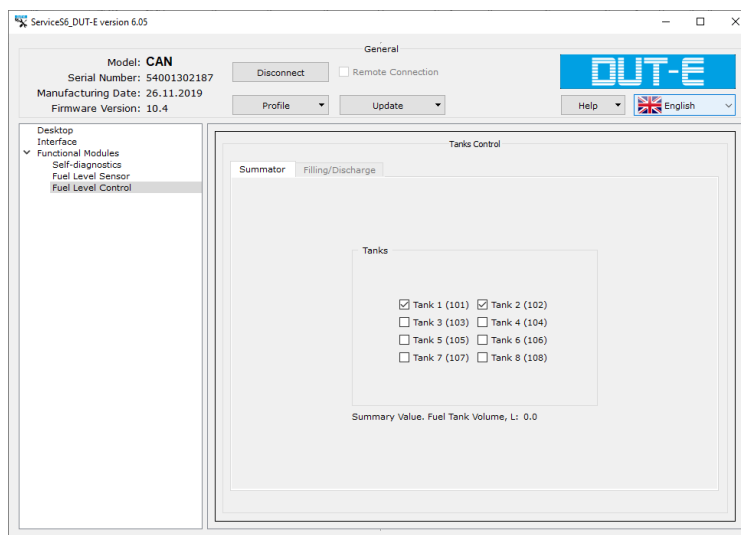
\* You may specify addresses from range 91...98 only for DUT-E CAN, version of firmware not lower than 10.2, when using Service S6 DUT-E (Android) software, version from 3.00.05 and higher.

## 2.10 Summation of data

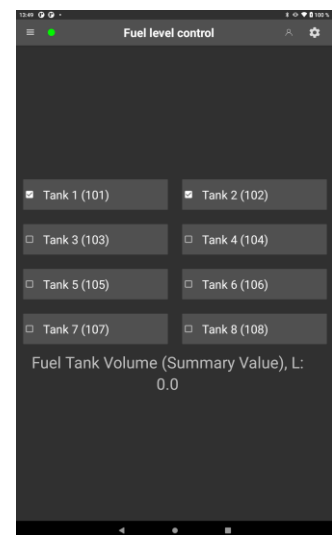
The summation of the fuel volume values in the tanks is set in the settings of the [Fuel Level Control FM](#) using Service S6 DUT-E software or Service S6 DUT-E (Android) application. In settings of sensor, which will send totalized signal (Master sensor), tick the boxes of sensors, which data should be totalized (Slave sensors). After saving Master sensor's Profile, **Summary Value. Fuel Tank Volume, L** field will show actual totalized value of fuel volume in selected tanks (see figure 38).



**IMPORTANT:** It is necessary to save calibration table of the corresponding fuel tank in the internal memory of each of the sensor in advance.



a) in Service S6 DUT-E software



b) in Service S6 DUT-E (Android) app

Figure 38 — Configuration of the fuel volume summation in several tanks

[S6 Technology](#) enables to sum up fuel volume readings from up to 8 DUT-E CAN sensors. [DUT-E CAN](#) can also operate together with other models of sensors that have CAN j1939/S6 interface ([DUT-E GSM](#) and [DUT-E 2Bio CAN](#)) for summation of readings.

Each sensor should be assigned with unique network address from the range 101...108 (see [2.9](#)). Maximum quantity of connected fuel level sensors (any combination of models) using S6 Technology – 8 units.

An example of a connection diagram for DUT-E GSM and DUT-E CAN sensors connection by means of S6 Technology for summation of fuel volume in several tanks, with specification of cables that need to be ordered, is provided in [annex F](#) (see other examples in [CAN j1939/S6 Telematics interface Operation Manual](#)).

### 3 Sealing

It is required to seal the sensor and cable connector with sealing cords and disposable plastic seals to prevent fuel thefts or unauthorized interference into [DUT-E CAN](#) operation. Seals and cord are included into DUT-E CAN [delivery set](#) (see figure 39).



**ATTENTION:** Security sealing of sensors cable connector should be carried out after the configuration and calibration are finished.

To seal the sensor put the sealing cord through the special holes of the mounting plate and DUT-E CAN body. Then put the ends of the cord through the holes in the center of the plastic seal body. Latching the seal will lock the cord. Seal removal will be impossible without its damaging.

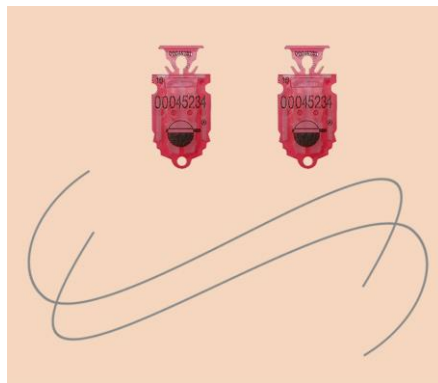


Figure 39 — Plastic seals\* and sealing cord



**WARNING:** Sealing rope should not touch the fuel tank body!

\* Design of the seal supplied within the delivery set can differ from the one displayed in figure 39.

## 4 Measurement accuracy check

### 4.1 Basic principles

DUT-E CAN accuracy check test is conducted to determine the reduced and absolute error of fuel volume measurement on the particular vehicle fuel tank.

The procedure of DUT-E CAN accuracy check requires filling/draining of the fuel tank and comparing sensor data with the actual amounts of filling/draining.

Fuel drain is carried with manual or mechanical pump.

Calibrated measuring containers must be used to determine the exact amount of drained/refilled fuel.



**ATTENTION:** The amount of any fuel filling/draining during the accuracy test should not be less than 20 % of total tank capacity.

## 4.2 Check tests procedure

Check tests should be carried out in the following order:

- 1)** Drain a fixed volume of fuel.
- 2)** Determine the exact amount of drained fuel with the calibrated measuring container.
- 3)** Record the data into the Check test report.
- 4)** Wait for the fuel getting still in the tank (for stable [DUT-E CAN](#) readings).
- 5)** Refuel the tank with the previously drained fuel.
- 6)** Record the data into the Check test report.
- 7)** When analyzing accuracy errors, "Drain" and "Refill" are estimated as a percentage relative to the total tank capacity.

See [annex A](#) for check test report template and error calculation formula.

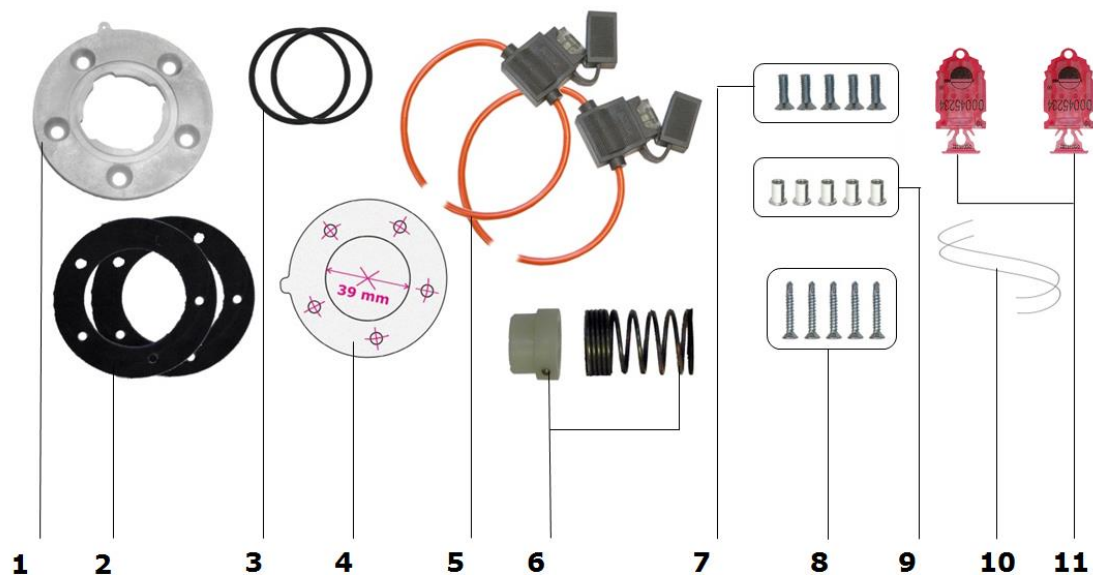
## 5 Accessories

[Technoton](#) offers **high quality accessories** for mounting, connection and operation of [DUT-E CAN](#) sensors.

### 5.1 MK DUT-E mounting kit

**DUT-E mounting kit** (hereinafter [MK DUT-E](#)) is used for sensor mounting into the fuel tank of vehicle or stationary tank. MK DUT-E is included into DUT-E CAN delivery set. Extra mounting kits can be ordered separately if required. DUT-E sensor is mounted quickly and accurately with MK DUT-E. See figure 40 for MK DUT-E components.

Mounting plate with SAE 5 bolt standard bore position can be preordered.



<b>1</b>	- plastic mounting plate	- 1 pc.;
<b>2</b>	- rubber gasket	- 2 pcs.*;
<b>3</b>	- sealing rubber ring	- 2 pcs.*;
<b>4</b>	- hole placement template	- 1 pc.;
<b>5</b>	- fuse with holder (2 A)	- 2 pcs.;
<b>6</b>	- DUT-E bottom stop	- 1 pc.;
<b>7</b>	- bolt	- 5 pcs.;
<b>8</b>	- self-tapping screw	- 5 pcs.;
<b>9</b>	- threaded rivet	- 5 pcs.;
<b>10</b>	- sealing cord	- 2 pcs.;
<b>11</b>	- plastic seal	- 2 pcs.**

Figure 40 — MK DUT-E mounting kit

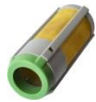

\* 1 pc. – used for DUT-E CAN installation and 1 pc. is a spare part.  
Could be complemented with 4 mm thick gasket.

\*\* Exterior of seal can be different.

## 5.2 Additional accessories

Additional accessories may be required for [DUT-E CAN](#) mounting on a [Vehicle](#) (see table 7).

Table 7 — DUT-E CAN additional accessories

View	Name	Description	Application
	Filter DUT-E	Screen filter	For protecting electrodes (tubes) against water and mud in tanks' bottom
	FTP DUT-E	Fuel tank plug	Bayonet plug for temporary sensor replacement
	Plug	Plug for sensor mounting hole	To plug fuel tank opening
	Gasket	Rubber gasket 2 mm	Rubber gasket under mounting plate
	DUT-E WP-11	Adaptor plate with 4 holes	To mount the sensor in the tank in the place for the Omnicomm sensor
	SAE 5 bolt	Mounting plate	Mounting plate with SAE 5 bolt standard bore position
	DUT-E FP CT	Mounting plate for barrel-shaped tanks	Mounting plate for sensors installation on barrel-shaped fuel tanks
	DUT-E TAM-d105	Mounting plate	Special duralumin mounting plate for 6 screws
	DUT-E WP-10	Wedge-shaped fastening plate	Fastening plate for sensors installation on fuel tanks with inclined surface (10-degree angle)
	DUT-E WP-12	Mounting plate with a hidden lock pin	Sensor mounting plate with a lock pin for sensor protection from theft and vandalism
	DUT-E Bracket	Protective bracket	Bracket to protect sensor from theft and vandalism

## 6 Diagnostics and troubleshooting

[DUT-E CAN](#) operability is tested using Service S6 DUT-E software or Service S6 DUT-E (Android) application (see the settings of [Self-diagnostics FM](#)) by means of the sensor connection to the PC with a cable (see [2.3](#)) or, respectively, by means of the sensor wireless connection to the Android device via Bluetooth (see [2.4](#)).

In case of any malfunction first of all examine condition of [Vehicle](#) power supply system and power supply pins condition of the DUT-E CAN connector.



**WARNING:**

- 1)** Severe contact corrosion of chassis ground connection switch or its malfunction can seriously affect DUT-E CAN output signal.
- 2)** DUT-E CAN readings will be invalid if the measuring tubes are closed by conducting mud or water.

## 7 Maintenance

### 7.1 General instructions

We recommend to conduct the external inspection of [DUT-E CAN](#) and its serviceability check at least once a year.



**IMPORTANT:** It is recommended to periodically (once per year) check calibration of sensor for minimum and maximum values of fuel level (given the shape of fuel tank was not changed). In case of incorrect values, make calibration once again according to [2.6](#). Repeated calibration of fuel tank of [Vehicle](#) in this case is not needed.

DUT-E CAN repair works are carried out only by certified [Regional Service Centers](#) (hereinafter, RSCs). Full RSCs list can be found <https://www.jv-technoton.com/>.

## 7.2 Demounting

Before [DUT-E CAN](#) demounting:

- Clean the tank surface nearby the mounting location before DUT-E CAN demounting.
- Prepare a clean napkin to clean the fuel from the sensor probe.
- Cut the sealing cord carefully, with no damage to connection cable.
- Disconnect DUT-E CAN cable connector.
- Unfasten DUT-E CAN by turning its body counterclockwise.
- Mount the fuel tank plug (be ordered separately) for protection from any possible clogging through mounting opening.
- Remove screen-filter and bottom stop from the end of measuring tubes.

**ATTENTION:**



- 1)** During DUT-E CAN dismantling, don't pull it by the interface cable. Doing so, you may damage the cable and/or the sensor electronic module.
- 2)** Screen-filter dismantling should be done carefully to avoid breaking latches of fixator.
- 3)** In case of repeated installation of DUT-E CAN – replace the old rubber gasket with a new one.

## 7.3 Examination

Since [DUT-E CAN](#) is demounted conduct a visual examination to detect the following defects:

- visible damages of the sensor head body, measuring probe, interface cable, cable;
- backlash of measuring unit tubes relative to each other and/or the body;
- presence of mud or paraffin between the tubes of the measuring probe;
- damage of the plastic mounting plate and traces of fuel leaks through the rubber gasket of the mounting plate.

Contact [RSC](#) (see [7.1](#)) or [Manufacturer](#) if the defects detected.

## 7.4 Cleaning

During [DUT-E CAN](#) operation mud or paraffin formation is possible on the surface of the measuring probe pipes. Pollution of the cavity between the pipes of the measuring probe can lead to significant increase of accuracy error.



**ATTENTION:** Mud coating inside the inner measuring tube does not affect DUT-E CAN normal operation. Examine the space between two tubes of measuring part for mud and paraffin.

To clean the tubes wash them with the clean fuel. If there is paraffin in the cavity between the tubes, it is necessary to slightly warm the measuring part with a heat gun to remove it. It is also recommended to wash the [screen filter](#) as well.



**ATTENTION:** Avoid fuel getting on DUT-E CAN head body, interface cable and its connector when washing the tubes.

## 8 Packaging

[DUT-E CAN](#) delivery sets come in cardboard boxes of the following shape (figure 41)



Figure 41 — DUT-E CAN packaging

Label sticker with information on the product name, certificates, serial number, firmware version, manufacture date, implemented technologies, certificates, weight as well as Quality Control seal and QR code is stuck on two sides of the DUT-E CAN box (see figure 42).

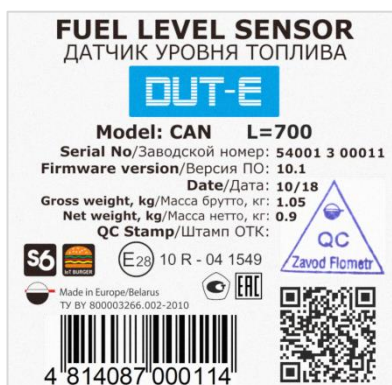


Figure 42 — DUT-E CAN Packaging label

Note — label design and contents can be modified by the [Manufacturer](#).

## 9 Storage

[DUT-E CAN](#) is recommended to be stored in dry enclosed areas.

DUT-E CAN storage is allowed only in original packaging at temperature range from -50 to +40 °C and relative humidity up to 100 % at +25 °C.

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

DUT-E CAN shelf life must not exceed 24 months.

## 10 Transportation

Transportation of [DUT-E CAN](#) is recommended in closed transport that provides protection for DUT-E CAN from mechanical damage and precipitation.

When transporting by air, DUT-E CAN 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 DUT-E CAN sensors should be sealed.

## 11 Utilization/re-cycling

[DUT-E CAN](#) does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

DUT-E CAN does not contain precious metals in amount that should be recorded.

## Contacts

### Distribution, technical support and service



[sales@jv-technoton.com](mailto:sales@jv-technoton.com)

[support@jv-technoton.com](mailto:support@jv-technoton.com)



## Annex A

# Template of check test report

### Report

Date: \_\_\_\_\_

Sensor model and serial number	
Vehicle type, model, registration number	
Tracking/displaying device model and serial number	

<b>Drainage volume</b>	According to calibrated container $V_M$ , liters	
	According to tracking device $V_{\text{track}}$ , liters	
<b>Accuracy error</b>	Absolute error $\Delta = V_{\text{track}} - V_M$ , liters	
	Normalized to total tank volume $\delta = \frac{V_{\text{track}} - V_M}{V_{\text{total\_volume}}} \cdot 100\%$	

<b>Refueling volume</b>	According to calibrated container $V_M$ , liters	
	According to tracking device $V_{\text{track}}$ , liters	
<b>Accuracy error</b>	Absolute error $\Delta = V_{\text{track}} - V_M$ , liters	
	Normalized to total tank volume $\delta = \frac{V_{\text{track}} - V_M}{V_{\text{total\_volume}}} \cdot 100\%$	

### Resume:

The results of drain measurement **match/do not match** specifications.

The results of refueling measurement **match/do not match** specifications.

Comments: \_\_\_\_\_

representative of the CUSTOMER: \_\_\_\_\_/\_\_\_\_\_

representative of the CONTRACTOR: \_\_\_\_\_/\_\_\_\_\_

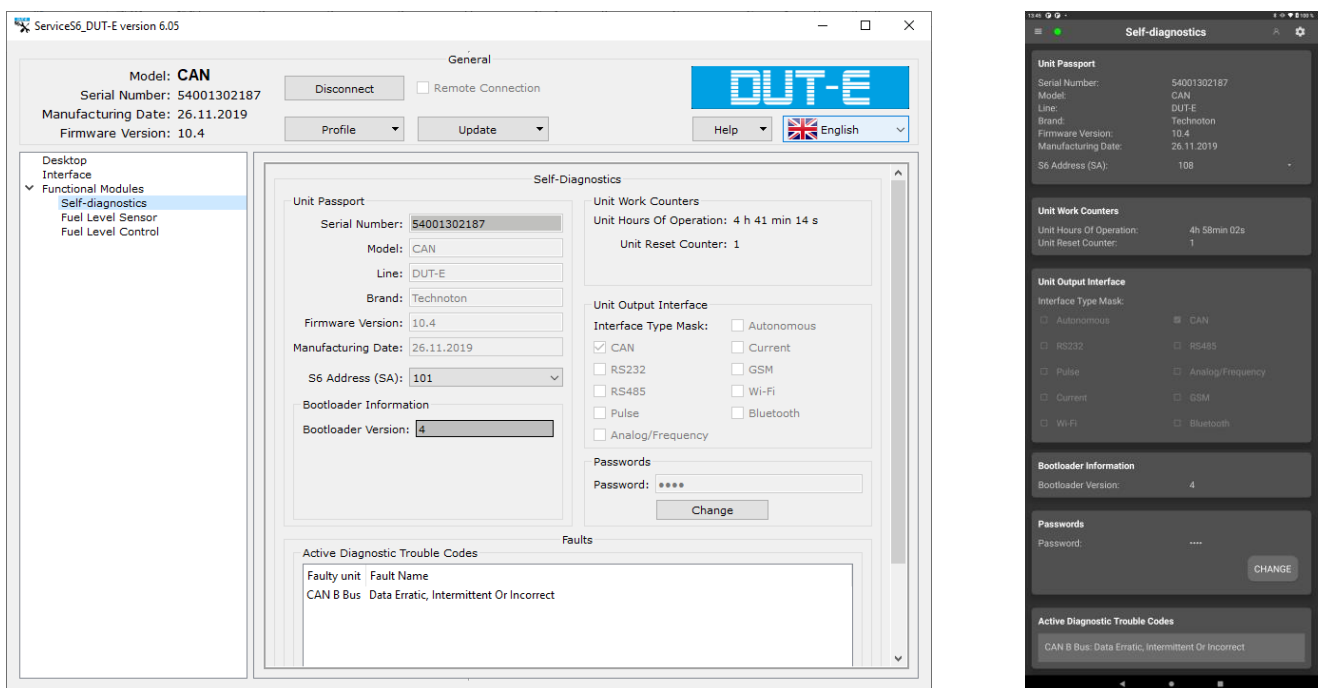
## Annex B SPN of DUT-E CAN Functional modules

Reception and treatment of data on the fuel level, monitoring of [Counters](#), setup of [Parameters](#) and self-diagnostics of DUT-E CAN are ensured by the coordinated operation of its [Functional modules](#) (FM).

Parameter form ([SPN](#)) of FM [DUT-E CAN](#) matches with [Data base](#) (DB) [S6 Technology](#).

### B.1 Self-diagnostics FM

[Self-diagnostics FM](#) — is designed for user authorization, identification of DUT-E CAN passport data, accounting of the operation period and active malfunctions.



a) in Service S6 DUT-E software

b) in Service S6 DUT-E (Android) app

Figure B.1 — Example of the window of settings of FM Self-diagnostics

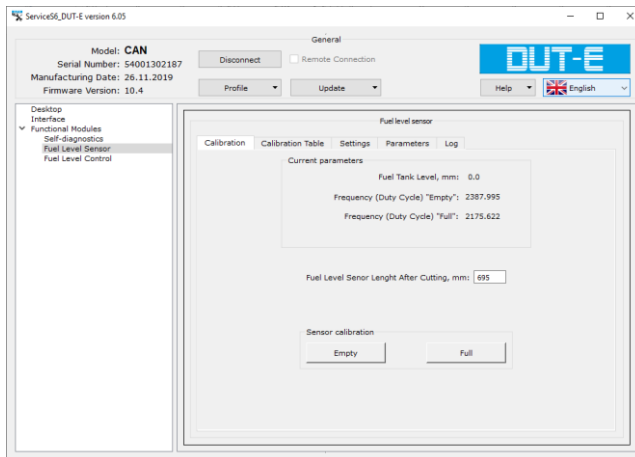
Table B.1 — Self-diagnostics FM. Displayed and/or editable SPN with the help of Service S6 DUT-E software or Service S6 DUT-E (Android) app

SPN	Name	Factory value	Unit of measure	Clarification
Unit passport <a href="#">PGN 62995</a>				
<a href="#">521120</a>	Serial number	On the fact	No	Serial number is a set of numbers that is used for identification of specific sensor. Serial number DUT-E CAN has the following format: ABBBB C DDDDD, where: AA – code of DUT-E model; BBB – digits that reflect changes product changes; C – Manufacturer code; DDDDD – sequential number. The data are inaccessible for editing.

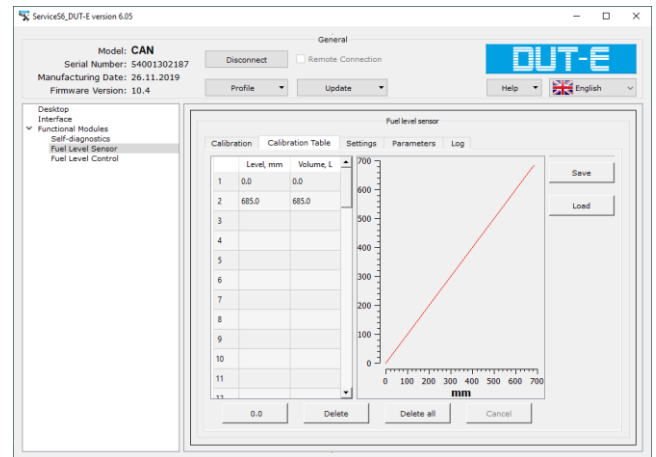
SPN	Name	Factory value	Unit of measure	Clarification
<a href="#">521345</a>	Model	On the fact	No	Model – this is version of the sensor inside of DUT-E product line. Each model has its own functional and constructive features. For example, DUT-E CAN characteristic – data transfer via CAN j1939/S6 interface. The data are inaccessible for editing.
<a href="#">521123</a>	Line	DUT-E	No	Name of the product line. The line represents a group of similar products – fuel level sensors produced under general trademark <a href="#">DUT-E</a> . The data are inaccessible for editing.
<a href="#">521344</a>	Mark	TECHNOTON	No	Name of sensor Manufacturer. The data are inaccessible for editing.
<a href="#">521121</a>	Firmware Version	On the fact	No	Version of built in software DUT-E CAN. Setting is not available for editing.
<a href="#">521125</a>	Date Of Production	On the fact	No	Date (day, month, year) of sensor production. The data are inaccessible for editing.
<a href="#">521188</a>	Address at S6 (SA) Bus	101	No	Network address sensor which is connected via <a href="#">S6 Technology</a> . Value of the network address can be selected by the user from the ranges: 91...98* and 101...108.
Unit Work Counters <a href="#">PGN 62994</a>				
<a href="#">521116</a>	Unit Hours Of Operation	On the fact	s	Counter of summarized working time of the sensor since its production moment. The user cannot reset the value of this counter. It can be reset by the <a href="#">Manufacturer</a> or <a href="#">RSC</a> only.
<a href="#">521118</a>	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. Counter values is always "1" since it always nulled when Unit is powered off.
Passwords <a href="#">PGN 63017</a>				
<a href="#">521593/3.3</a>	Password/ 3.3 Installer	1111	No	Password is entered for user authorization while establishing connection session between DUT-E CAN and service Software for configuring the sensor. Password is a specific combination of four digits. By default, used: Login – 0, password – 1111. User can change password of the sensor. After entering and confirming the new password is recorded into internal memory of the sensor.
Active diagnostic trouble codes <a href="#">PGN 65226</a>				
<a href="#">521044</a>	Fault identifier (SID+FMI)	On the fact	No	List of current sensor 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 DUT-E CAN working performance. In case of lack of active malfunctions, the following message is displayed "No malfunctions".
Bootloader information <a href="#">PGN 63009</a>				
<a href="#">521122</a>	Bootloader Version	On the fact	No	Displays current version of the bootloader used for the correct start of service software, as well as when updating firmware of the Unit.
* You may specify addresses from range 91...98 only for DUT-E CAN, version of firmware not lower than 10.2, when using Service S6 DUT-E (Android) software, version from 3.00.05 and higher.				

## B.2 Fuel level sensor FM

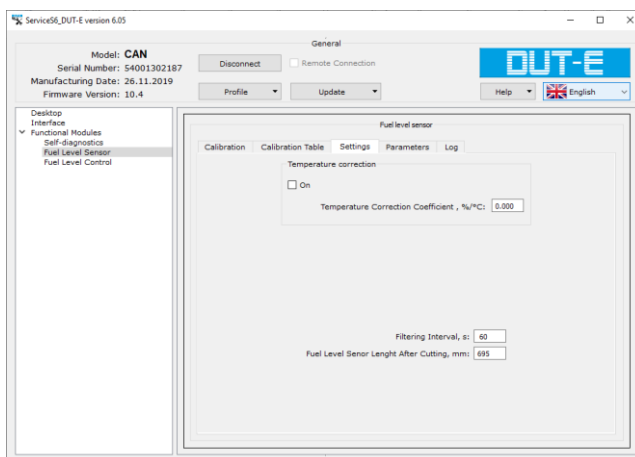
[Fuel level sensor FM](#) — designed for measuring of present values of level, volume and temperature of fuel inside of Vehicle’s fuel tank, sensor calibration, creating calibration table of the fuel tank, filtering and temperature compensating of measuring results.



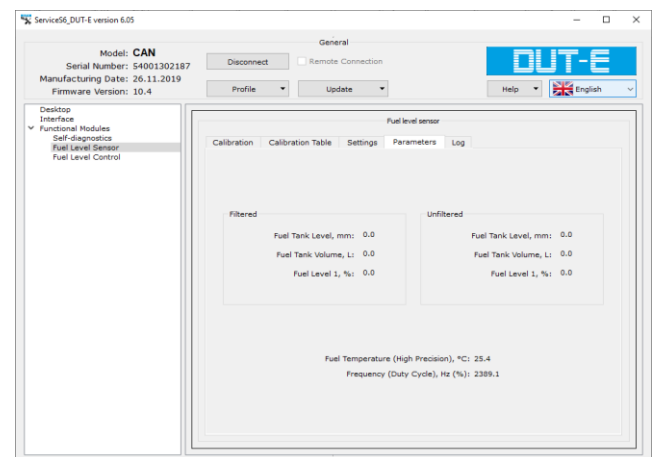
**Calibration tab**



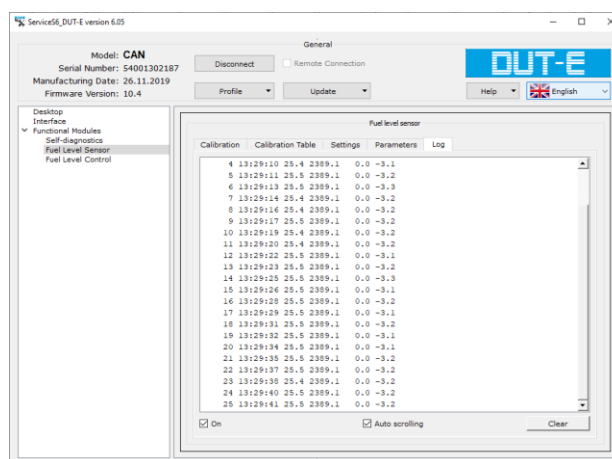
**Calibration Table tab**



**Settings tab**

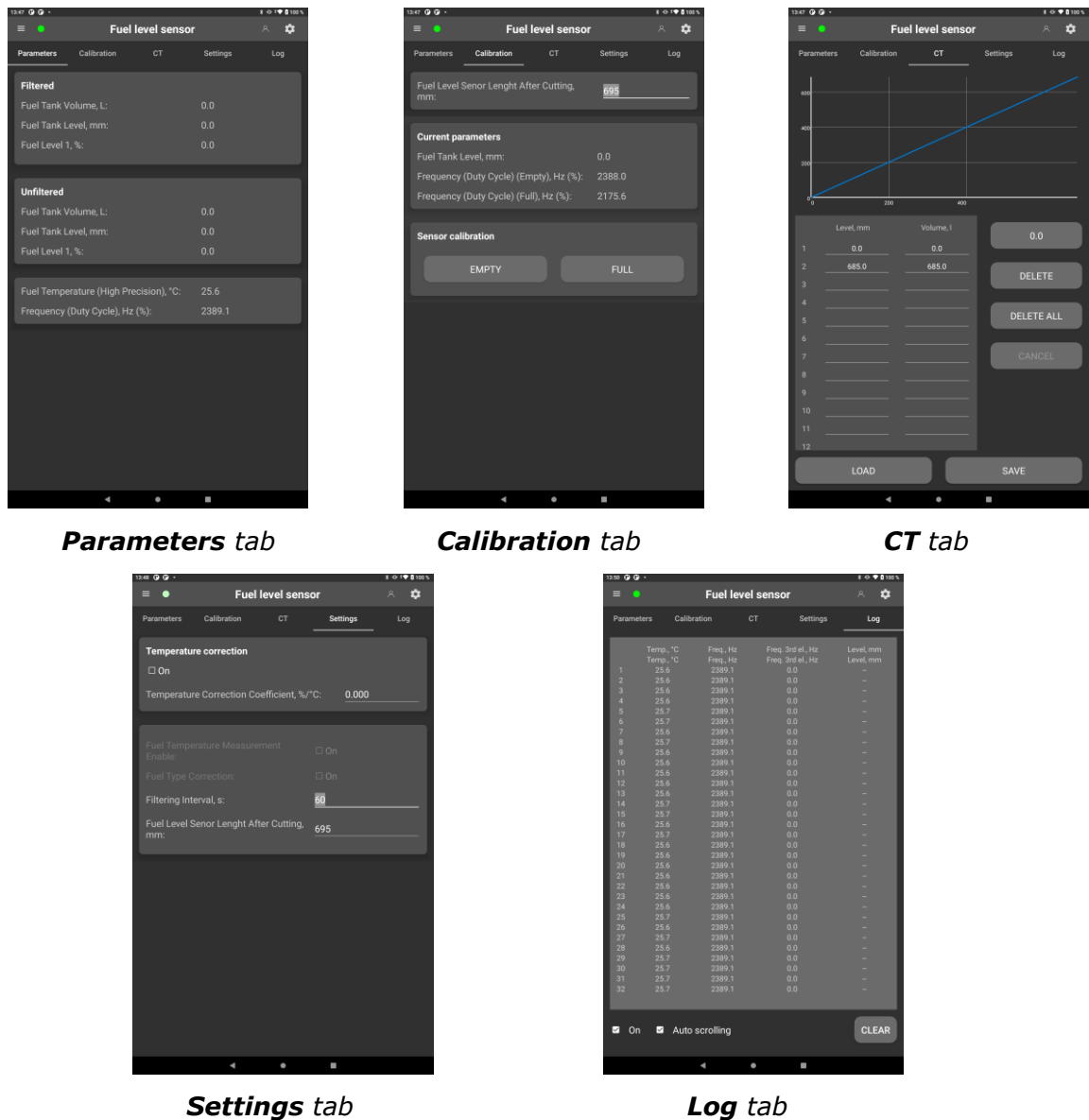


**Parameters tab**



**Log tab**

a) in Service S6 DUT-E software



**Parameters tab**

**Calibration tab**

**CT tab**

**Settings tab**

**Log tab**

*b) in Service S6 DUT-E (Android) app*

**Figure B.2 — Example of the window of settings of Fuel level sensor FM**

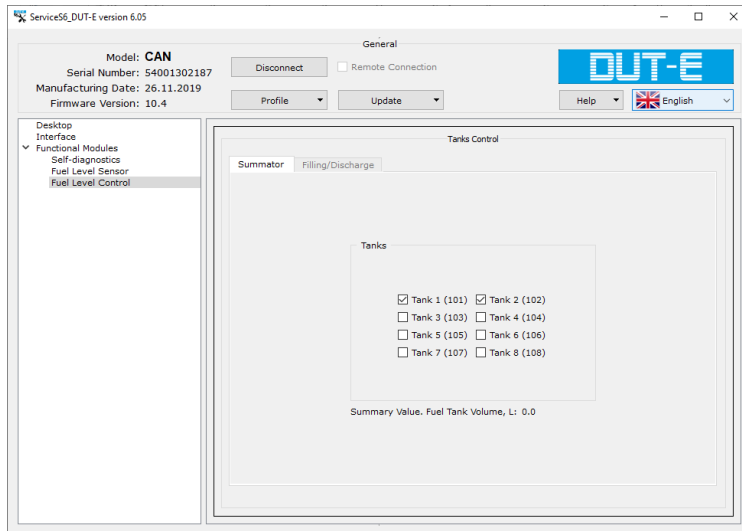
**Table B.2 — Fuel level sensor FM. Displayed and/or editable SPN with the help of Service S6 DUT-E software or Service S6 DUT-E (Android) app**

SPN	Name	Factory value	Unit of measure	Range	Clarification
Calibration Settings <a href="#">PGN 63076</a>					
<a href="#">521440/22.0</a>	Frequency (Duty Cycle)/ 22.0 Empty	On the fact	%	0...4294967	This setting displays duty cycle of signal of measuring generator DUT-E CAN for empty fuel tank. Based on this value we can estimate if the sensor has been calibrated correctly to minimum fuel level.
<a href="#">521440/22.1</a>	Frequency (Duty Cycle)/ 22.1 Full	On the fact	%	0...4294967	This setting displays duty cycle of signal of measuring generator DUT-E CAN for full fuel tank. Based on this value we can estimate if the sensor has been calibrated correctly to maximum fuel level.

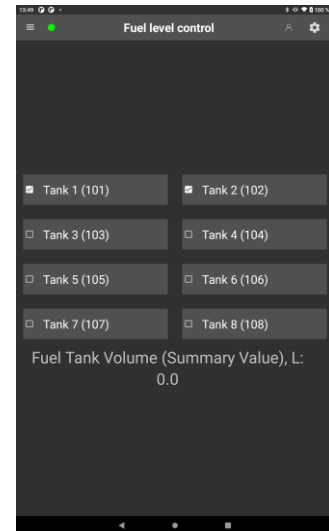
SPN	Name	Factory value	Unit of measure	Range	Clarification
Calibration Table. Fuel Tank 1 <a href="#">PGN 63036</a>					
<a href="#">521355</a>	Array Elements Count	2	pcs.	1...60	Number of points of calibration table, created during the fuel tank normalization process. Recommended number of calibration points – no less than 15.
<a href="#">521023</a>	Fuel Tank Level	On the fact	mm	0...6425.5	Values of fuel level in the tank corresponding with points of calibration table.
<a href="#">521024</a>	Fuel Tank Volume	On the fact	l	0...6425.5	Values of fuel volume of the tank corresponding with points of calibration table.
Filtered Fuel Level/Volume in Tank <a href="#">PGN 62982</a>					
<a href="#">521023/2.10</a>	Fuel Tank Level/ 2.10 Filtering	On the fact	mm	0...6425.5	Displays the value of the fuel level in Vehicle tank filtered according to the preset time interval.
<a href="#">521024/2.10</a>	Fuel Tank Volume/ 2.10 Filtering	On the fact	l	0...6425.5	Displays the value of the fuel volume in <a href="#">Vehicle</a> tank filtered according to the preset time interval.
<a href="#">174</a>	Engine Fuel Temperature 1	On the fact	°C	-40...210	This setting displays present value of fuel temperature in the vehicle's tank.
Dash Display <a href="#">PGN 65276</a>					
<a href="#">96</a>	Fuel Level 1	On the fact	%	0...100	This setting displays value (in %) of present fuel level in the tank in relation to the level of full vehicle's tank.
FM Fuel Level Sensor Settings <a href="#">PGN 63029</a>					
<a href="#">521433</a>	Temperature Correction Coefficient	0	%/°C	-32...32	Field for entering temperature correction coefficient that provides temperature compensation of fuel expansion/compression inside of vehicle's fuel tank.
<a href="#">521444</a>	Filtering Interval	60	s	0...64255	Field for entering time interval value during which DUT-E CAN calculates smoothed fuel level of vehicle's fuel tank before transmitting out coming data to the <a href="#">Server</a> .
<a href="#">521093</a>	Fuel Level Sensor Length After Cutting	On the fact	mm	0...64255	Field for entering of sensor's measuring length for what calibration table has been made before installation into the vehicle's fuel tank.
<a href="#">521311</a>	Temperature Correction Enable	Off	No	On/Off	Field for activation/ deactivation of temperature correction function that provides compensation of fuel expansion/compression inside of the vehicle's fuel tank.
■ – Essential settings, required for DUT-E CAN performance.					

## B.3 Fuel level control FM

[Fuel Level Control FM](#) is designed to receive data on measured total fuel volume in two or more tanks of the Vehicle via [CAN j1939/S6 interface](#).



a) in Service S6 DUT-E software



b) in Service S6 DUT-E (Android) app

Figure B.3 — Example of the window of settings of Fuel level control FM

Table B.3 — Fuel level control FM. Displayed and/or editable SPN with the help of Service S6 DUT-E software or Service S6 DUT-E (Android) app

SPN	Name	Factory value	Unit of measure	Range	Clarification
Total Fuel Volume In Tanks <a href="#">PGN 63152</a>					
<a href="#">521024/2.11</a>	Fuel Tank Volume/ 2.11 Summary Value	On the fact	l	0...6425.5	Displays the value of total fuel volume in tanks, selected for summation.
Summation Settings DUT <a href="#">PGN 63149</a>					
<a href="#">521259/27.0</a>	Fuel Level Sensor Summation Enable/ 27.0 DUT 1	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 101), which is set in Tank 1 of the Vehicle.
<a href="#">521259/27.1</a>	Fuel Level Sensor Summation Enable/ 27.1 DUT 2	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 102), which is set in Tank 2 of the Vehicle.
<a href="#">521259/27.2</a>	Fuel Level Sensor Summation Enable/ 27.2 DUT 3	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 103), which is set in Tank 3 of the Vehicle.
<a href="#">521259/27.3</a>	Fuel Level Sensor Summation Enable/ 27.3 DUT 4	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 104), which is set in Tank 4 of the Vehicle.

SPN	Name	Factory value	Unit of measure	Range	Clarification
<a href="#">521259/27.4</a>	Fuel Level Sensor Summation Enable/ 27.4 DUT 5	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 105), which is set in Tank 5 of the Vehicle.
<a href="#">521259/27.5</a>	Fuel Level Sensor Summation Enable/ 27.5 DUT 6	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 106), which is set in Tank 6 of the Vehicle.
<a href="#">521259/27.6</a>	Fuel Level Sensor Summation Enable/ 27.6 DUT 7	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 107), which is set in Tank 7 of the Vehicle.
<a href="#">521259/27.7</a>	Fuel Level Sensor Summation Enable/ 27.7 DUT 8	Off	-	On/Off	A field for turning on / off summation of fuel volume measured by the fuel level sensor (network address 108), which is set in Tank 8 of the Vehicle.

Detailed parameters description ([SPN](#)), structure and content of messages ([PGN](#)) of [FM DUT-E CAN](#) are placed at the following web site <http://s6.jv-technoton.com/> (to access [S6 DB](#) registration is required).

## Annex C

### Sensor firmware upgrade



**WARNING:** [DUT-E CAN](#) firmware update should be carried out **only** for implementing improvements, recommended by the [Manufacturer](#).

To upgrade firmware the following actions should be made:

**1)** In case you use Service S6 DUT-E software, connect the sensor to the PC using [S6 SK](#) service adapter (see [2.3.1](#)) and establish a communication session between DUT-E CAN and PC (see [2.3.3](#)).

In case you use Service S6 DUT-E (Android), connect the sensor to the Android device using [S6 BT Adapter](#) service adapter (see [2.4.1](#)). Establish a connection between the sensor and the Android device via the Bluetooth channel (see [2.4.3](#)).



**WARNING:** When re-uploading firmware, power supply voltage of DUT-E CAN should not drop out of 10...45 V range.

**2)** Start the firmware update procedure.

**3)** Select the firmware file (**\*.bif3**) on the PC disc or in the memory of the Android device.

**4)** Start loading the firmware file into the DUT-E CAN memory.

After firmware file integrity and compatibility check by Service S6 DUT-E software or Service S6 DUT-E (Android) mobile app window of firmware uploading into DUT-E CAN 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.



**WARNING:** To avoid DUT-E CAN failure, before the end of the firmware upgrade process **is forbidden**:

- to switch off PC (in case you use Service S6 DUT-E software) or the Android device (in case you use Service S6 DUT-E (Android));
- to switch off the power supply for the [Unit](#);
- to disconnect the Unit from the service adapter and the adapter from the PC or the Android device;
- to connect to the Unit using S6 SK service adapter (cable) and S6 BT Adapter service adapter (wireless) at one time;
- Run any resource-intensive applications on the PC (in case you use Service S6 DUT-E software).

After the successful completion of the firmware update procedure, the appropriate message will appear. DUT-E CAN is ready for further operation. During the next communication session between the sensor and the PC or the Android device the new firmware version will be displayed in the software or in the mobile application, respectively.

If the DUT-E CAN 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 DUT-E CAN operability. If the repeated attempt fails, we recommend to consult [Technoton Technical Support Service](#) by e-mail [support@jv-technoton.com](mailto:support@jv-technoton.com).

## Annex D

### Electromagnetic compatibility specifications

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

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

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


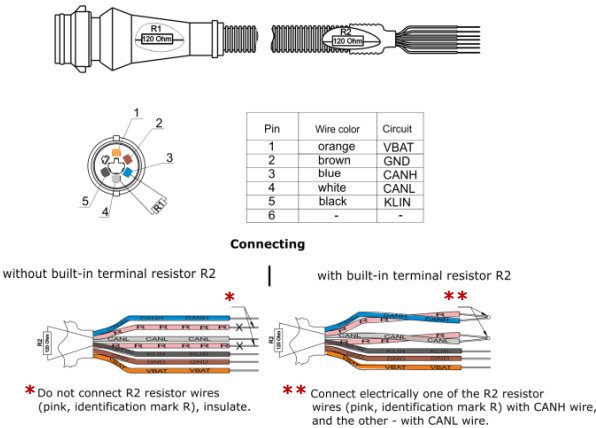

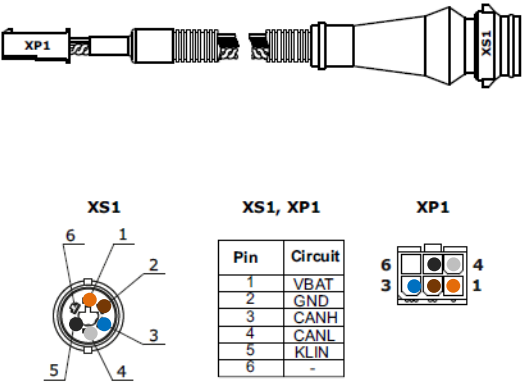
Test pulse	Test level	U <sub>s</sub> tested level, V for supply voltage	
		12 V	24 V
Pulse "a" of short duration	IV	-60	-80
Pulse "b" of short duration	IV	+40	+80
Positive pulse of long duration (DCC)	IV	+30	+45
Negative pulse of long duration (DCC)	IV	-30	-45
Positive pulse of long duration (ICC)	IV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

Table D.3— DUT-E CAN 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 $\mu$ V/m		Average value of field strength of radio interference, dB $\mu$ V/m	
	Horizontal polarization	Vertical polarization	Horizontal polarization	Vertical polarization
30...34	27	25	20	20
34...45	23	21	16	18
45...60	18	18	13	14
60...75	17	16	10	9
75...100	11	13	7	8
100...130	12	14	7	9
130...170	22	16	18	12
170...225	24	18	18	13
225...300	32	24	27	11
300...400	19	21	13	14
400...525	22	24	16	15
525...700	24	27	23	23
700...850	34	32	25	27
850...1000	35	33	27	26

## Annex E Sensor signal cables

Table E.1 — DUT-E CAN signal cables

Name and exterior	Design	Purpose of use and description														
<p><b>S6 SC-CW-700 Cable</b></p> 	 <p><b>Connecting</b></p> <p>without built-in terminal resistor R2   with built-in terminal resistor R2</p> <p>* 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.</p>	<p>Designed to connect DUT-E CAN to tracking devices, as well as to the external power supply. Length: 7 m. It has 2 pcs. of 120 Ohms inbuilt terminal resistors at both ends of CANH and CANL wires.</p>														
<p><b>S6 SC-Mol-300 S6 SC-Mol-700 Extension cable adapter</b></p> 	 <p><b>XS1</b>      <b>XS1, XP1</b>      <b>XP1</b></p> <table border="1" data-bbox="837 1368 965 1505"> <thead> <tr> <th>Pin</th> <th>Circuit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>VBAT</td> </tr> <tr> <td>2</td> <td>GND</td> </tr> <tr> <td>3</td> <td>CANH</td> </tr> <tr> <td>4</td> <td>CANL</td> </tr> <tr> <td>5</td> <td>KLIN</td> </tr> <tr> <td>6</td> <td>-</td> </tr> </tbody> </table>	Pin	Circuit	1	VBAT	2	GND	3	CANH	4	CANL	5	KLIN	6	-	<p>It is designed to connect DUT-E CAN to the section of cable system located inside the cabin using <a href="#">S6 Technology</a> through Molex connector. Versions of 3 m and 7 m length are available.</p>
Pin	Circuit															
1	VBAT															
2	GND															
3	CANH															
4	CANL															
5	KLIN															
6	-															

## Annex F

### Examples of diagrams for DUT-E CAN connection to Telematics terminals

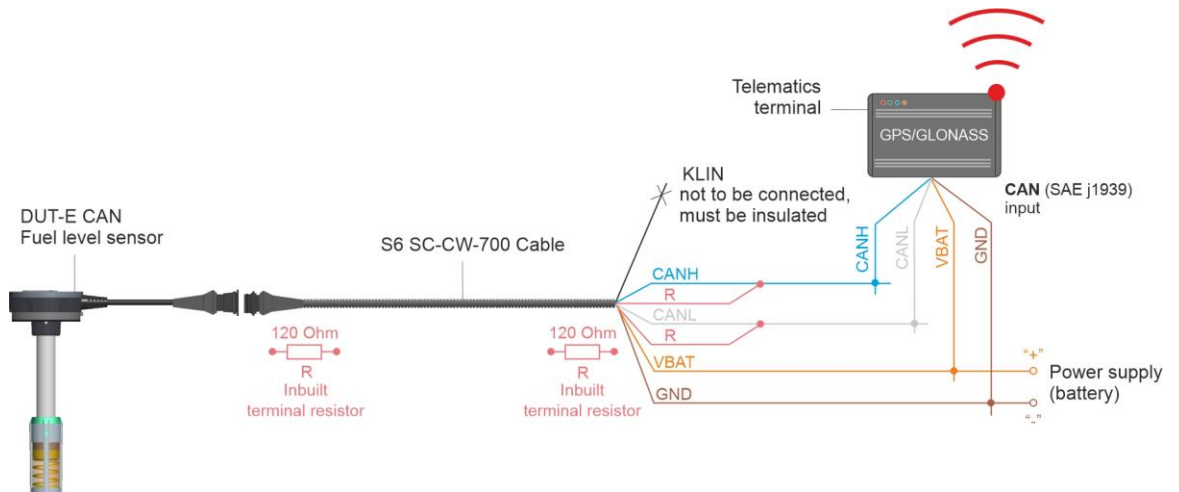


Figure F.1 — Example of connection for one DUT-E CAN to the Terminal which is incompatible with S6 cable system

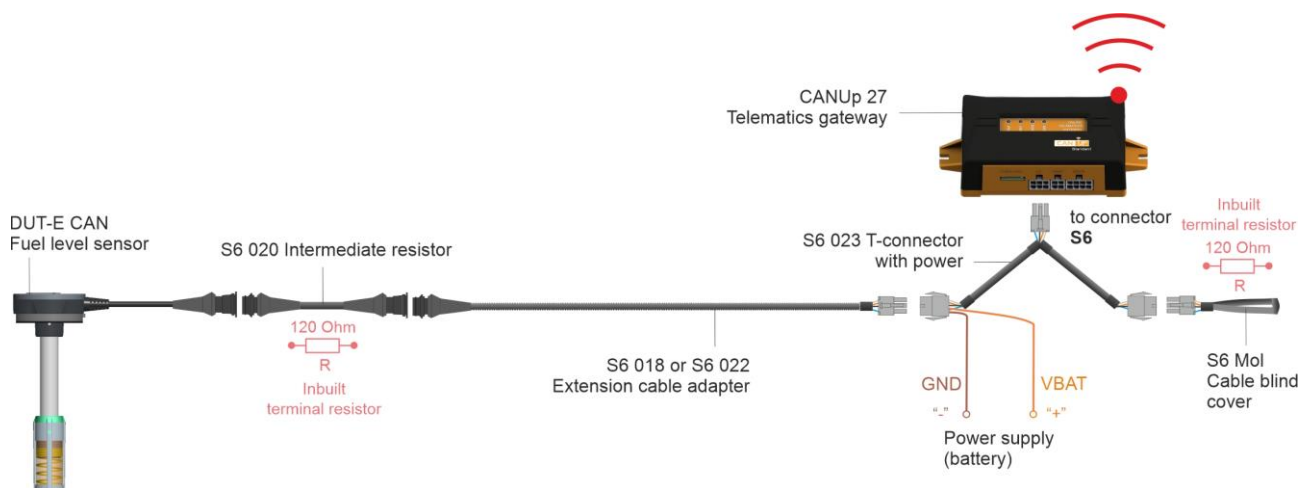


Figure F.2 — Example of connection for one DUT-E CAN to the Terminal which is compatible with S6 cable system

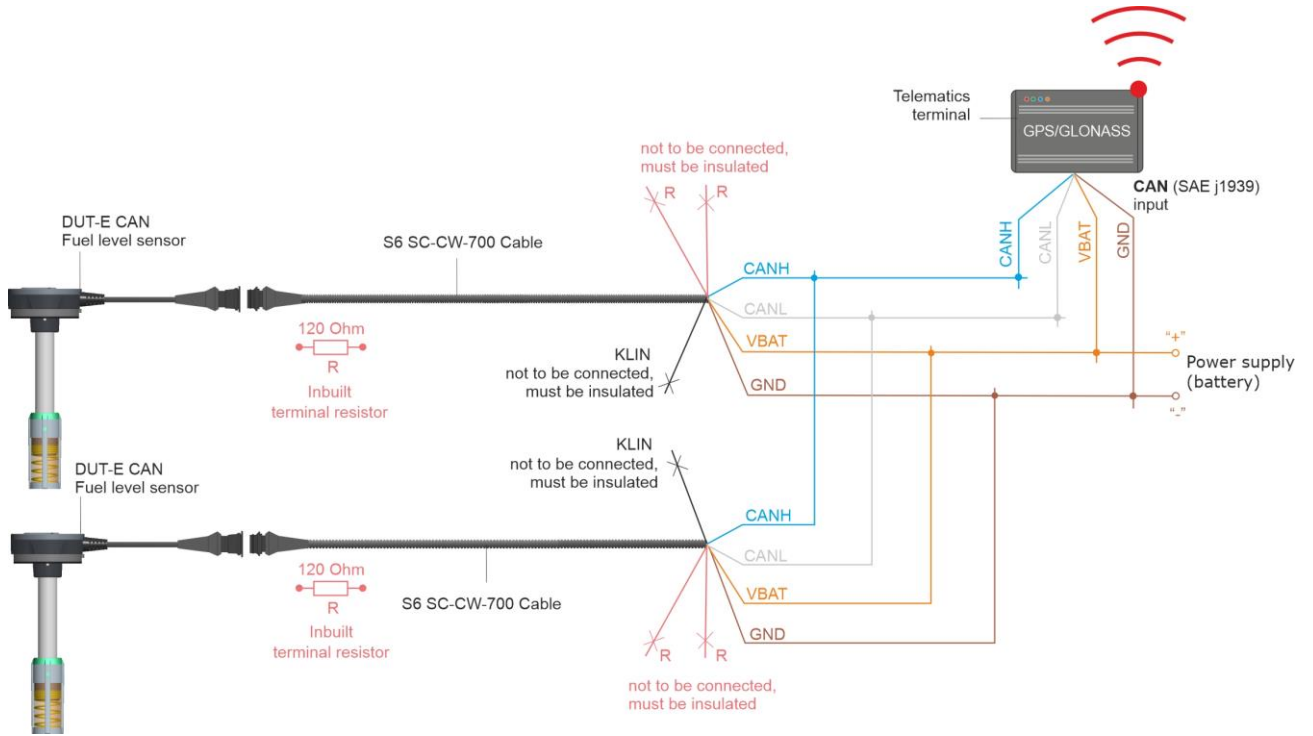
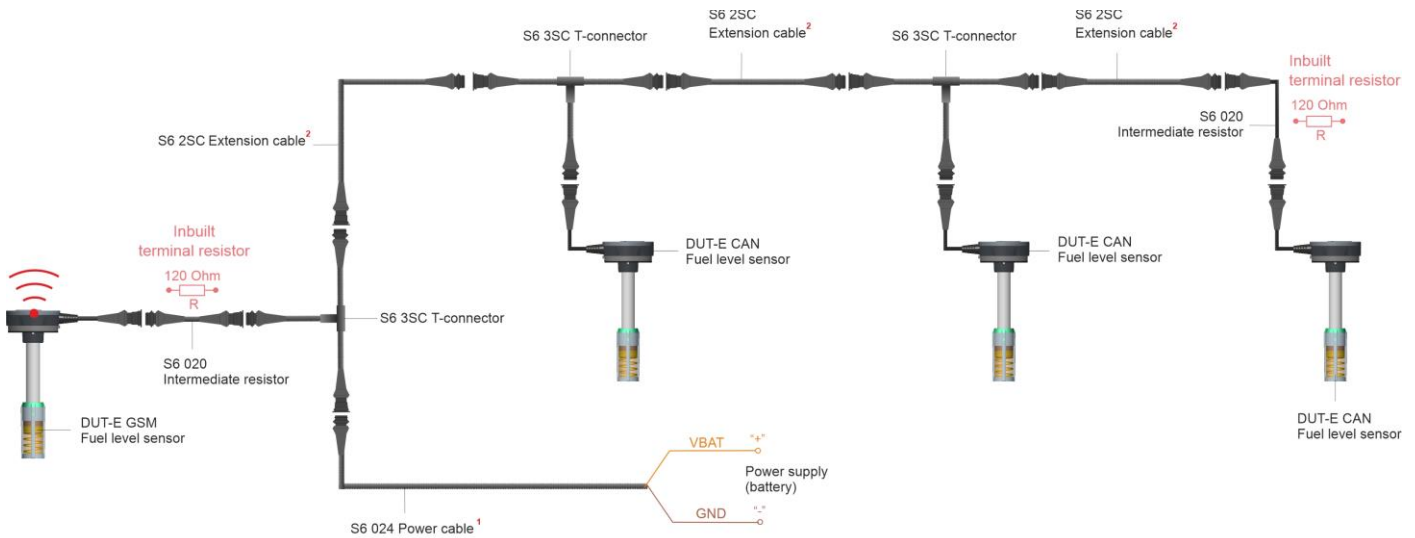


Figure F.3 — Example of connection for two DUT-E CAN to the Terminal which is incompatible with S6 cable system



<sup>1</sup> Cable is included into DUT-E GSM delivery set. Length: 7.5 m.

<sup>2</sup> The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

Figure F.4 — Connection of DUT-E CAN and DUT-E GSM sensors for monitoring fuel in several tanks

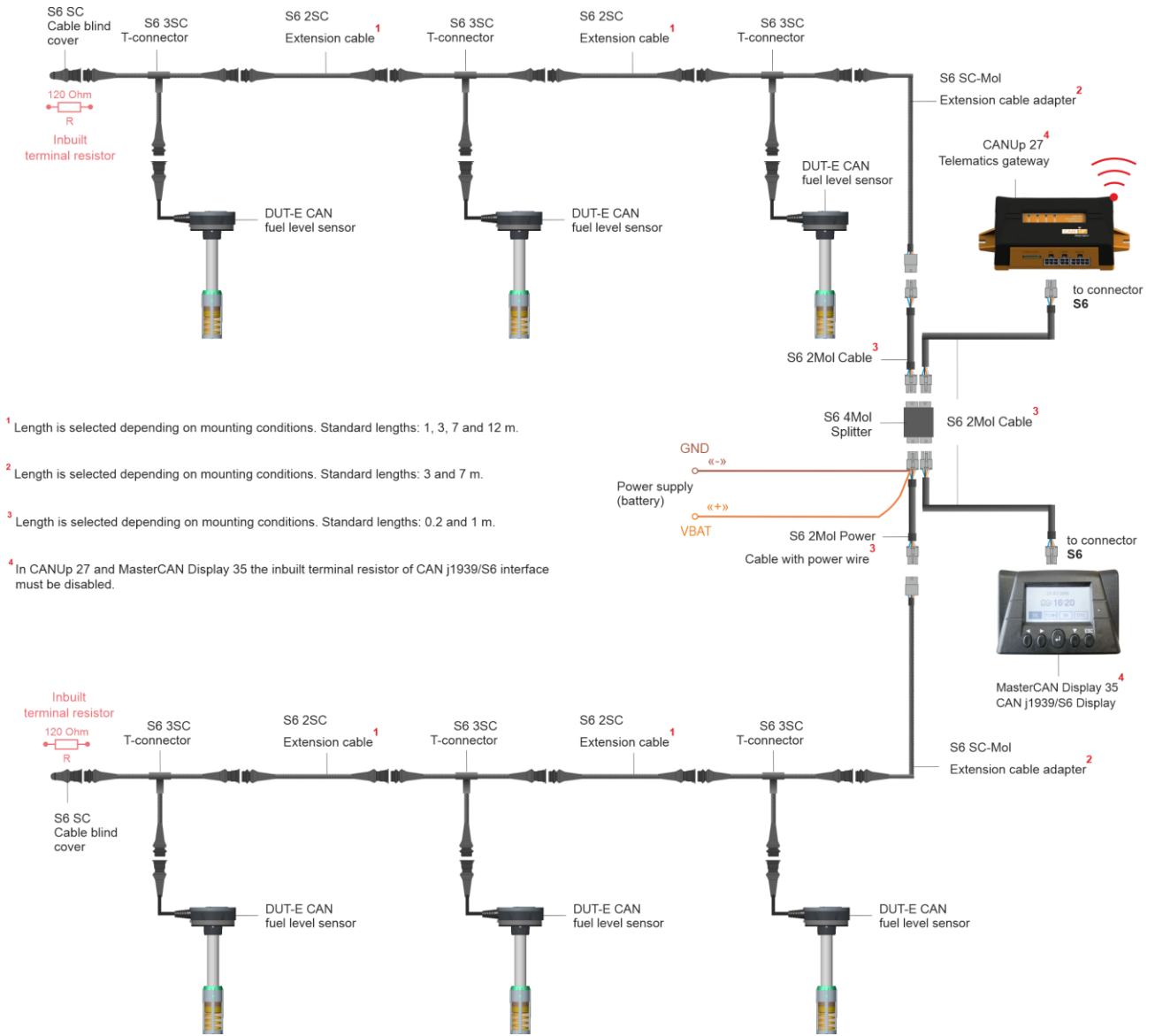


Figure F.5 — Example of connection of several DUT-E CAN to the Terminal and CAN display which are compatible with S6 cable system

## Annex G

### Method of recording the calibration table for tanks of great capacity

For calibration of tanks (fixed tanks) of 6553.5 l capacity and higher, you need to change digit capacity of fuel volume values in all points of the calibration (column **Volume, l**).

The actual position of the decimal divider of the whole and fractional parts is ignored in volume values.

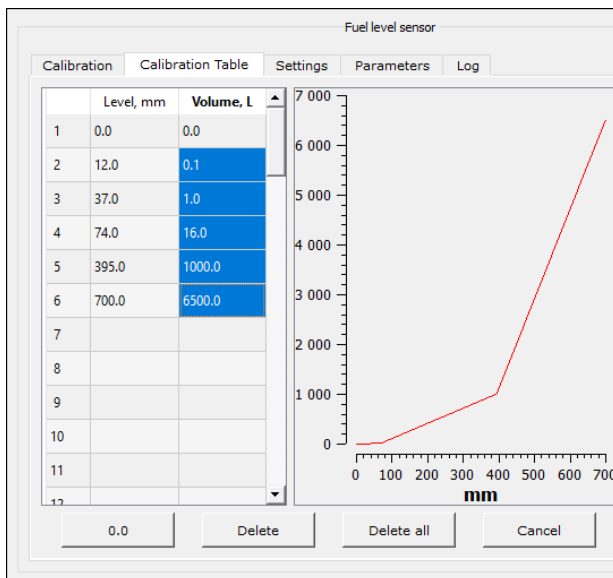
The discreteness of volume measurement in calibration points is changed from 0.1 liter to 1.0 liter.

The maximum possible volume value in the calibration table — 65535 l.

After the transfer of fuel volume data to the [Server](#) or to the tracking device, you don't have to multiply the value by 0.1 coefficient.



**WARNING:** For calibration of a tank (fixed tank) of greater than 6553.5 l capacity, you need to send fuel level values to the Server **in millimeters**. It is sufficient to create the calibration table only at the Server. No need to record the calibration table into the sensor memory.



Actual fuel volume values	Modified fuel volume values for recording into the calibration table
0 liter	0.0
1 liter	0.1
10 liters	1.0
160 liters	16.0
10000 liters	1000.0
65000 liters	6500.0

Figure G.1 — Example of recording of fuel volume values with changed discreteness into the calibration table with the help of Service S6 DUT-E software

## Annex H Videography

**1) Video clip DUT-E ATS-1 automatic tank calibration station.**

Check out the link:  <https://youtu.be/uFF1mG-iz6A>

**2) Animation Wireless fuel level sensor DUT-E S7.**

Check out the link:  [https://youtu.be/MnbGXn9JX\\_g](https://youtu.be/MnbGXn9JX_g)

**3) Animation DUT-E 2Bio fuel level sensor.**

Check out the link:  <https://www.youtube.com/watch?v=WR1556gaN7o>

**4) Animation DUT-E GSM fuel level sensor.**

Check out the link:  <https://www.youtube.com/watch?v=ixBaKMzKtG8>

**5) Video clip DUT-E 485 fuel level sensor installation.**

Check out the link:  <https://www.youtube.com/watch?v=X0gUSF3dRWk>

**6) Video clip Length extension of measurement part DUT-E Using measuring sections KDC**

Check out the link:  [https://www.youtube.com/watch?v=dWuY\\_JJfhFw](https://www.youtube.com/watch?v=dWuY_JJfhFw)

**7) Video clip Filter Screen of DUT-E fuel level sensor**

Check out the link:  <https://www.youtube.com/watch?v=B5dcYxGfSqQ>

**8) Other [Technoton](#) videos are on the YouTube channel which is regularly updated:**

 <https://www.youtube.com/channel/UCq7EF3DHrgl7fOWB2yNSR-A>