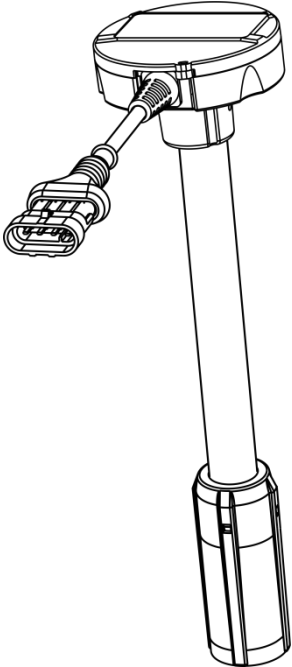
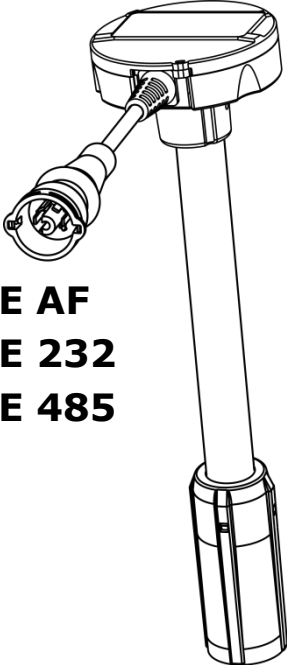




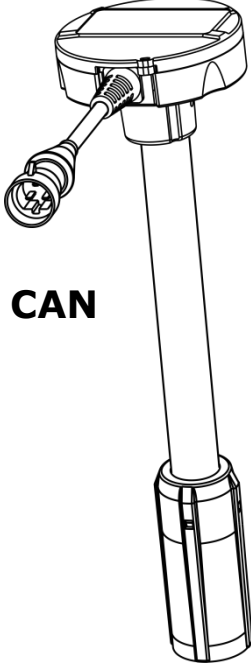
FUEL LEVEL SENSORS



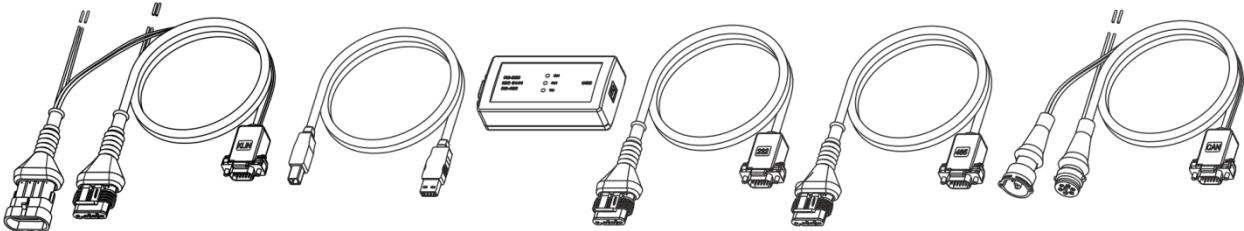
DUT-E AF
DUT-E 232
DUT-E 485



DUT-E CAN



DUT-E A5
DUT-E A10
DUT-E F
DUT-E I



SK DUT-E

OPERATION MANUAL

(includes Service DUT-E software manuals)

Version 8.0



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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">• New design of measurement head of DUT-E.• Changes in delivery set of DUT-E, MK DUT-E.• Addition and updates to description of installation of DUT-E.• Changes in description of Service software.• New packaging of DUT-E.• Methodology of thermal correction coefficient calculation added.• International certificates ISO 9001:2008 (DaKKs) and Customs Union added.
8.0	01.2017	OD	<ul style="list-style-type: none">• Instructions on S6 SK operation while configuring DUT-E CAN added.• Schemes of connection of DUT-E CAN to PC via S6 SK added (including scheme of sensors for configuration within S6 interface).• Terminology updated.• Operation instructions for software Service DUT-E updated.• New accessories for DUT-E added.

Terms and Definitions

ORF 4 — is the Telematics Service by Technoton developed 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.



S6 — is the vehicle onboard data bus developed by **TECHNOTON** to enable integrating the GPS/GLONASS-based vehicle monitoring system into the vehicle electrical equipment. It comprises a set of cables, interfaces and protocols. Physically, it is implemented on the basis of CAN 2.0B (ISO 11898-1:2003) and K-Line (ISO 9141). S6 bus data exchange protocol complies with SAE J1939 International Standard.



To get more details on S6 telematics bus visit <http://s6.jv-technoton.com/en/>

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 ORF4 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).

Server — hardware and software combination of Telematics Service ORF 4, designed for Operation Data processing and storage, also for generation and transfer of Analytical Reports upon User's request.

Telematics terminal (Tracking device) 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 real-time and after trip vehicle monitoring and control. Main vehicle parameters monitored: route, fuel consumption, operation time, technical condition of vehicle, safety. Consists of OE, Communication channels, Telematics service **ORF 4**.


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

Unit — an element of Onboard Equipment of Vehicle, which is connected to Telematics Interface S6. Particularly, in this document Unit means DFM fuel flow meter.

Introduction


The Operation Manual contains guidelines and rules which refer to [DUT-E fuel level sensors](#) (hereinafter DUT-E) and [SK DUT-E service adapter](#) (hereinafter SK DUT-E) developed by JV [Technoton](#), Minsk, Belarus.

The manual contains information on design, operation principle, specifications and instructions on installation, use and maintenance of DUT-E. The manual defines SK DUT-E connection and usage guidelines as well as [Service DUT-E](#) utility (version 3.26 and higher) installation and use.

 **smart sensors for [Telematics systems](#). DUT-E sensors are used for accurate level measurement in fuel tanks of vehicles and stationary units.**

SK DUT-E used for communication of sensor and PC for setting up and configuration.

DUT-E features:

- conformity with European and national automotive standards and directives;
- measuring probe length reduction without min/max recalibration*;
- measuring probe length extension up to 6 m with additional sections;
- ergonomic bayonet mount allows to save installation time;
- unique bottom spring for better mounting rigidity;
- filter for secure protection from water and mud;
- full set of mounting accessories and connection cable included;
- adjustable temperature correction for automatic measurement correction based on ambient temperature**;
- self-diagnostics feature to monitor data validity**;
- possibility of integration into  [Telematics interface](#) (SAE J1939 protocol) ***;
- 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.

* DUT-E A5/A10/F/I.

** DUT-E AF/232/485/CAN.

*** DUT-E CAN.

See Figure 1 for identification codes for [DUT-E](#) ordering.

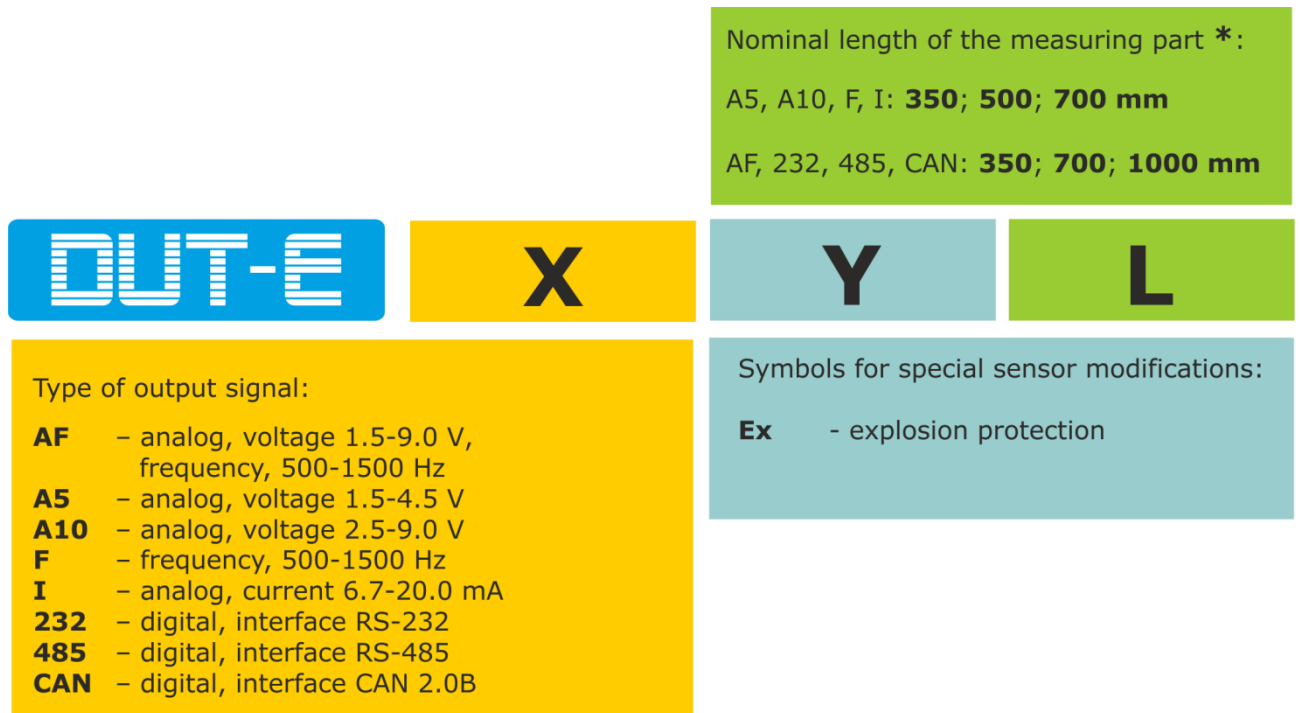


Figure 1 –DUT-E order identification codes

Examples of DUT-E ordering identification codes:

Fuel level sensor DUT-E CAN L=1000 mm,
(CAN 2.0B interface, measuring probe length 1000 mm).

Fuel level sensor DUT-E A10 L=700 mm,
(output voltage from 1.5 to 9.0 V, measuring probe length 700 mm).

* Corresponds to the external height of most common tanks.
Upon Customer request DUT-E sensors can be produced with any measuring probe length up to 1,400 mm with the quarterly order quantity from 500 pcs.
For orders less than 200 units per quarter the price will be 10 % higher.

Configuration of DUT-E AF/232/485/CAN requires [SK DUT-E](#) service adapter, S6 SK service adapter or SK DFM (should be ordered separately).



ATTENTION: It is strongly recommended to follow strictly the instructions of the present Manual when using, mounting or maintaining DUT-E and service adapter

The Manufacturer guarantees DUT-E 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 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 is designed to measure level of liquid fuel and other nonconductive liquids in vehicle and stationary tanks (see figure 2).

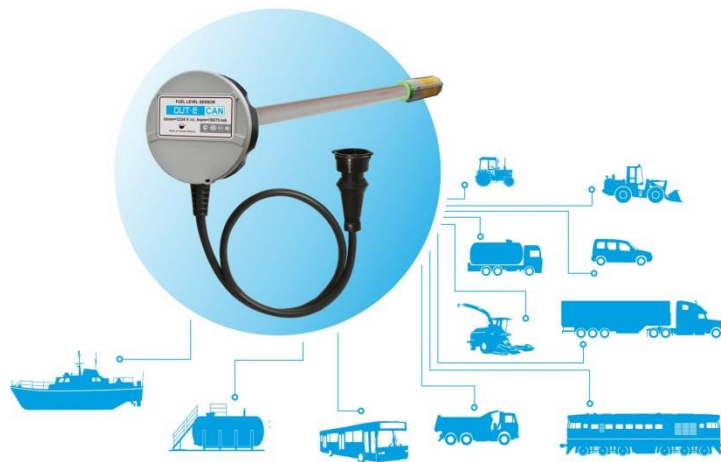


Figure 2 — DUT-E purpose of use

Application area — used in GPS/GLONASS vehicle [Telematics systems](#) as additional fuel sensors or as a replacement of standard (factory built-in) fuel level sensors (see figure 3).

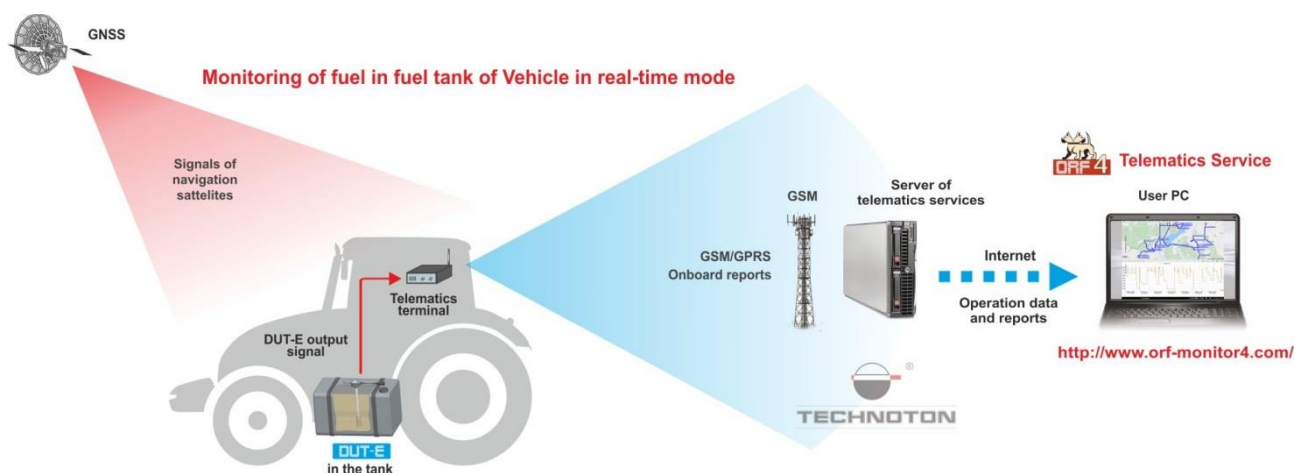


Figure 3 — DUT-E application within GPS/GLONASS vehicle Telematics system

[DUT-E](#) is installed into a fuel tank of a vehicle. The sensor measures fuel level in the tank and generates an output signal to forward it to a vehicle tracking device.

[Telematics terminal](#) 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.

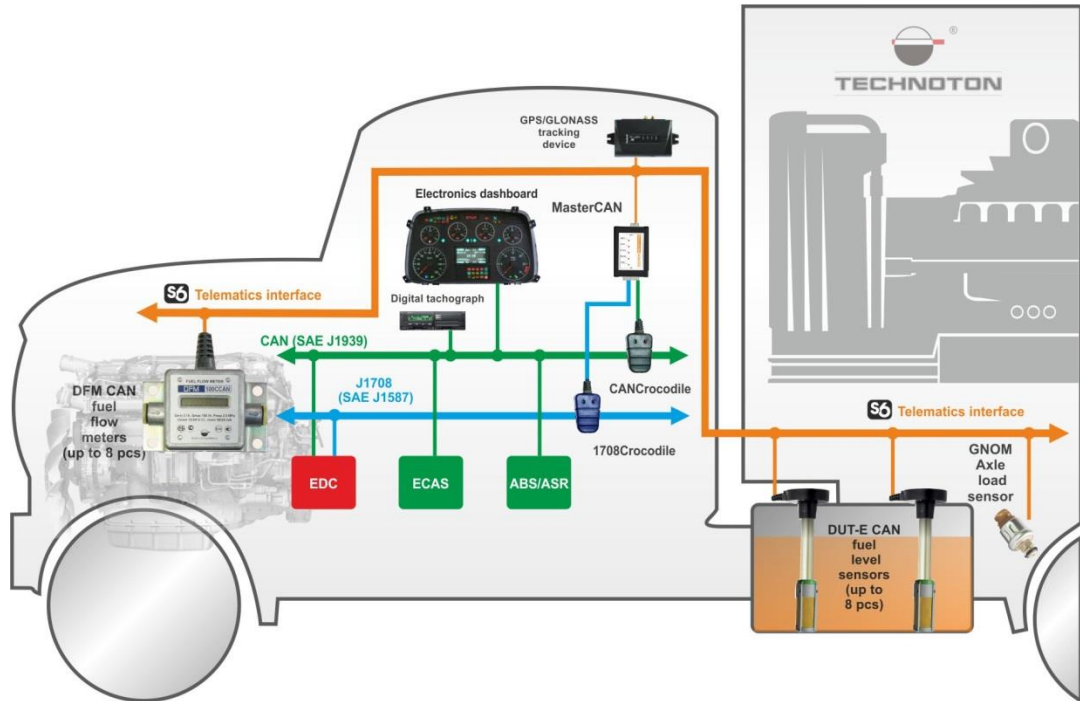


Figure 4 — DUT-E application within S6 Telematics interface*

Using J1939 output protocol makes possible [DUT-E](#) CAN fuel level sensors operation as a part of **S6** [Telematics interface](#) together with [DFM](#) CAN fuel flow meters and other factory-built or additional equipment (see figure 4).

With DUT-E CAN in S6 Telematics interface it is possible to obtain real-time monitoring of:

- fuel tank level and volume;
- total volume of fuel in up to 8 tanks and a separate volume value for each of the tanks;
- fuel temperature;
- sensor specification data (passport);
- presence of water in fuel;
- sensor malfunctions.

Tracking device can receive data from up to 8 DUT-E CAN sensors and up to 8 DFM CAN fuel flow meters via a single CAN interface port. This feature is very important for complicated applications like special utility vehicles as it provides ability to receive fuel monitoring data from vehicle itself as well as from special equipment mounted on the vehicle.

* DUT-E CAN only.

[ORF-4 Telematics service](#) allows convenient analysis of fuel volume inside tank of [Vehicle](#) (see figure 5).

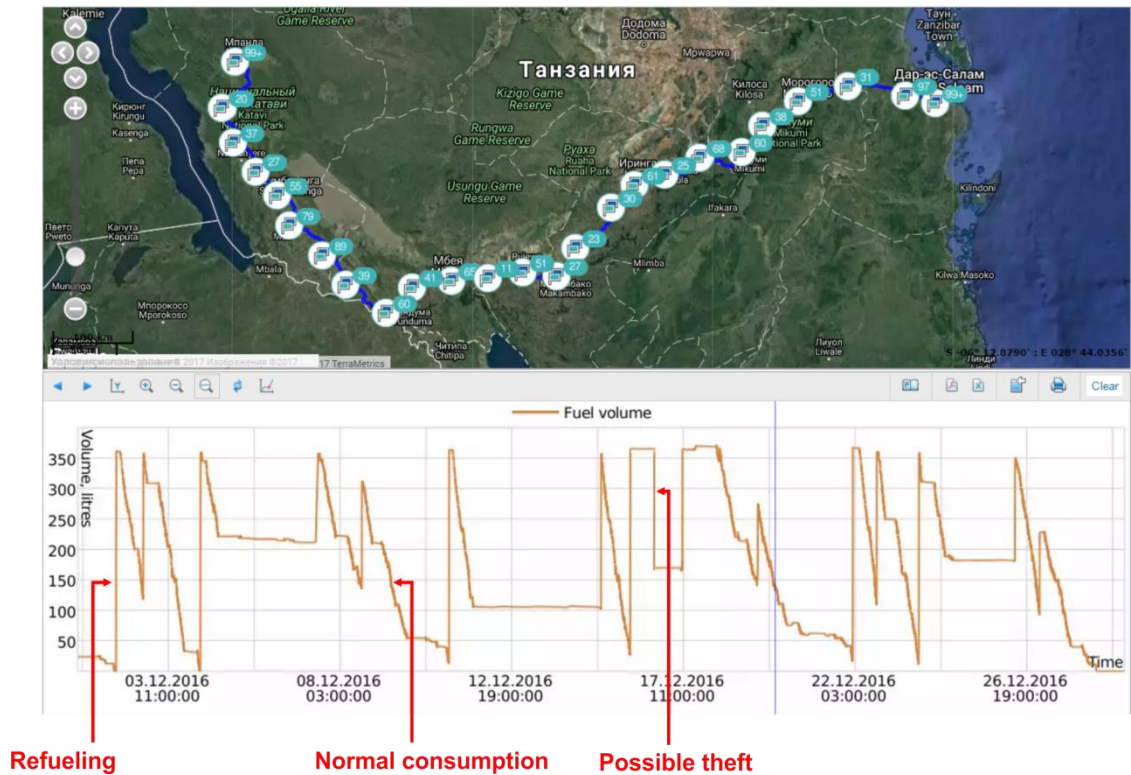


Figure 5 — Example of Analytical report generated in ORF 4 software, based on the DUT-E data

DUT-E application as a part of vehicle [Telematics system](#) allows operator to:

- receive accurate information on the current amount of fuel in the tank;
- determine exact refueling amount;
- reveal fuel theft facts;
- monitor fuel consumption rate.

1.2 Exterior view and delivery set

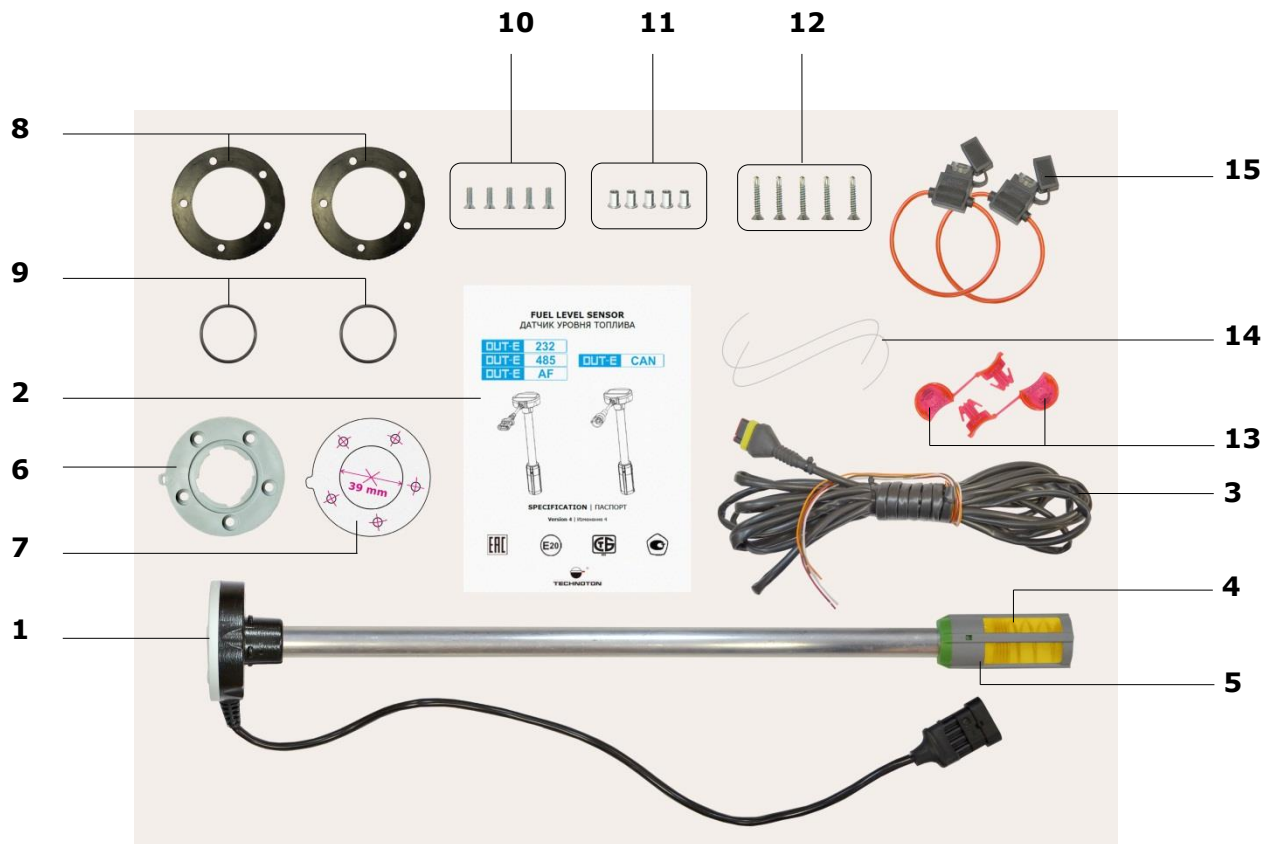


Figure 6 — DUT-E delivery set

1	- DUT-E fuel level sensor	- 1 pc.;
2	- specification	- 1 pc.;
3	- connection cable* (7.5 m)	- 1 pc.;
4	- bottom stop	- 1 pc.;
5	- screen filter	- 1 pc.;
6	- plastic mounting plate	- 1 pc.;
7	- hole placement template	- 1 pc.;
8	- rubber gasket	- 2 pcs.**;
9	- sealing rubber ring	- 2 pcs.**;
10	- bolt	- 5 pcs.;
11	- threaded rivet	- 5 pcs.;
12	- self-tapping screw	- 5 pcs.;
13	- plastic seal	- 2 pcs.***;
14	- sealing cord	- 2 pcs.;
15	- fuse with holder (2 A)	- 2 pcs.

* Ordered separately for DUT-E CAN.

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

*** Exterior of seal can be different.

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