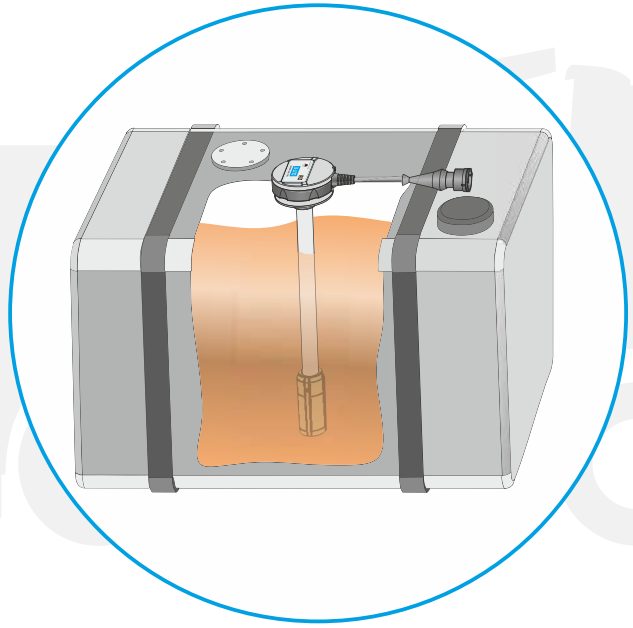
Fuel level sensors



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Tasks	Models	Functionality	Configuration
Application	Design	Interfaces	Business cases
Specifications	Technologies	Installation	Summary

Tasks

Measuring volumes of fuel tank filling-up and draining

Detecting fuel theft

Monitoring fuel consumption from tank

Watch video:
"DUT-E fuel level sensor”

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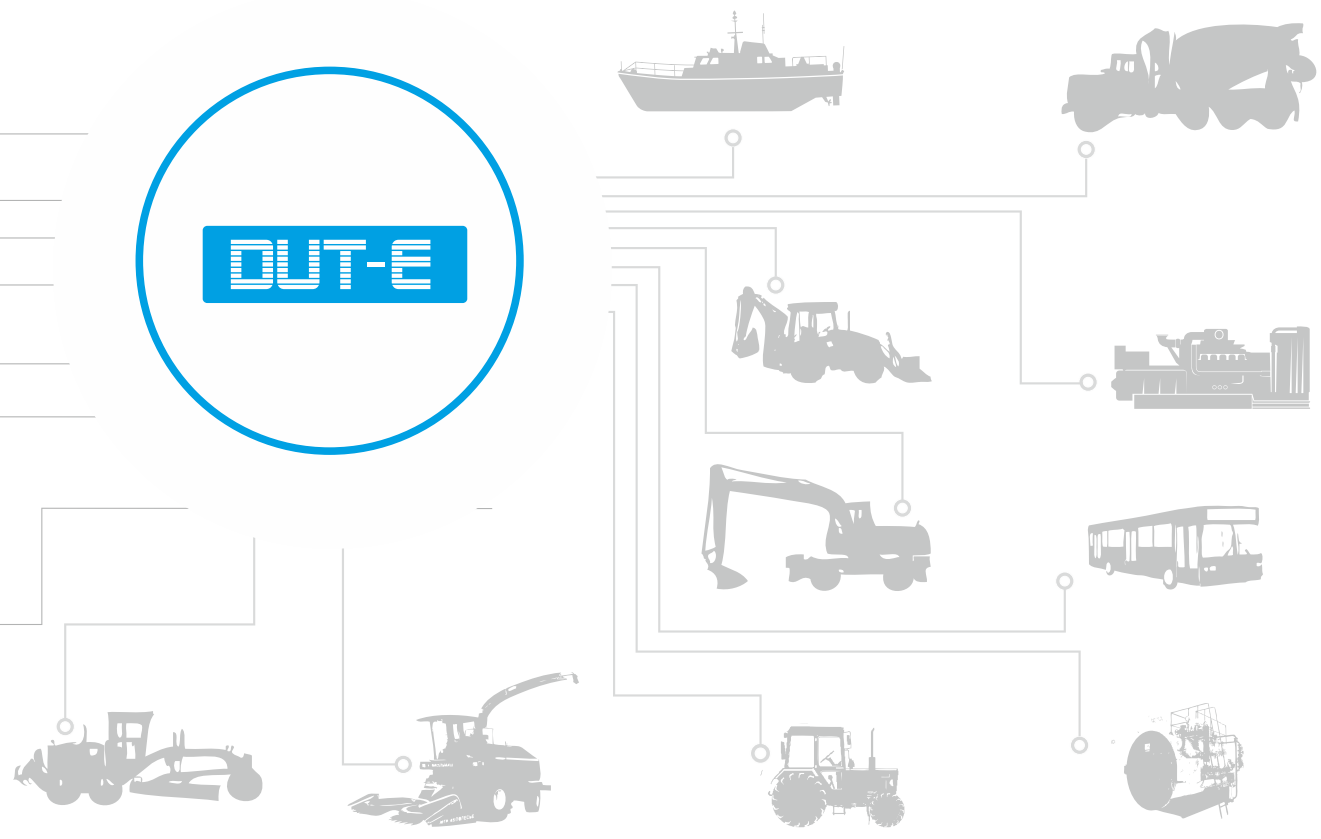
Application

- Trucks
- Tractors
- Railroad machines
- Boilers
- Burners
- Diesel generators
- Stationary fuel storages



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Specifications

Operating principle	Capacitive
Relative measuring error	1%
Sensitivity to fuel level change	0.1 mm
Power supply voltage range	10–50 V
Temperature range	from -40 to + 85 °C
Current consumption, voltage 12/24 V	< 50/25 mA
Current consumption for DUT-E CAN, voltage 12/24 V	< 150/75 mA
Ingress protection rating	IP 55/57

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Models

DUT-E

Nominal length of the measuring part (mm):

CAN, 232, 485, AF, I: **350; 700; 1000**

X	Y	L

Type of output signal:

CAN – interface CAN j1939/S6
AF – analog, voltage 1 - 9 V; frequency, 500 - 1500 Hz
I – analog, current 4 - 20 mA
232 – interface RS-232, DUT-E COM (extended LLS)
485 – interface RS-485, DUT-E COM (extended LLS)

Symbols for special sensor modifications:

Ex – explosion protection

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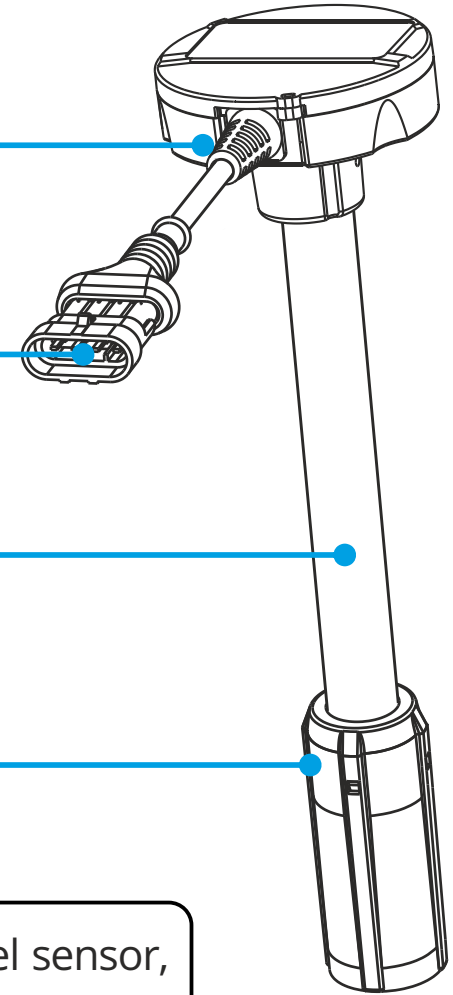
Design

Measuring “head” with microcontroller inside

Interface cable

Measuring part (probe)

Bottom stop and screen filter



Watch video: “DUT-E fuel level sensor, durability tests”

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Design/ Measuring “head”

High-power STM microcontroller is used in DUT-E fuel level sensor for running in-built analytics (edge computing, IoT Burger technology).

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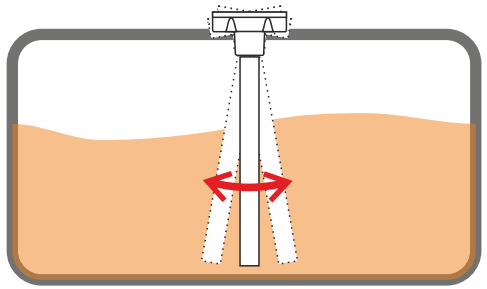
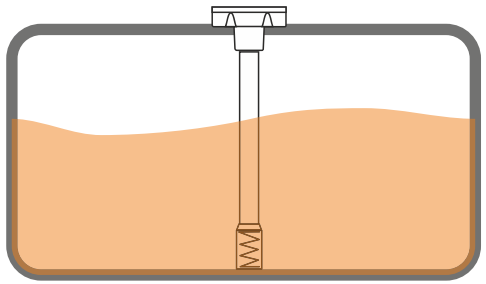
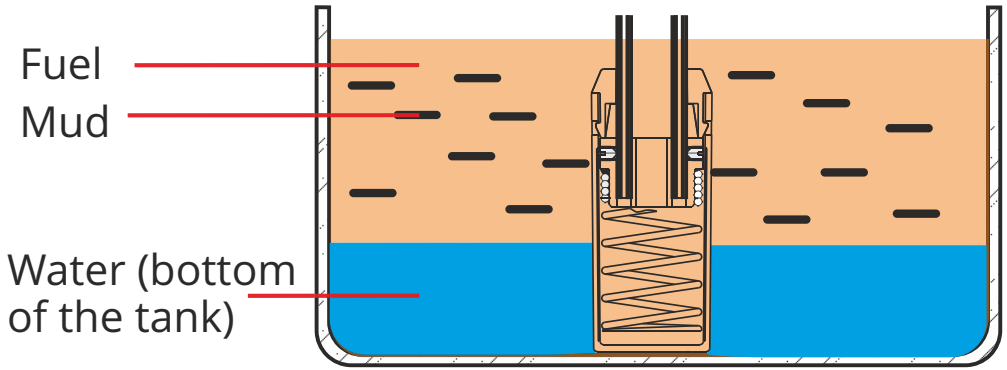
Design/ Bottom stop and screen filter



Without bottom stop



With bottom stop



Bottom stop
increases durability of fastening, sensor is mounted in tank firmly

Screen filter
protects against water and mud gathering on fuel tank bottom

Watch video: “Screen filter of DUT-E fuel level sensor”

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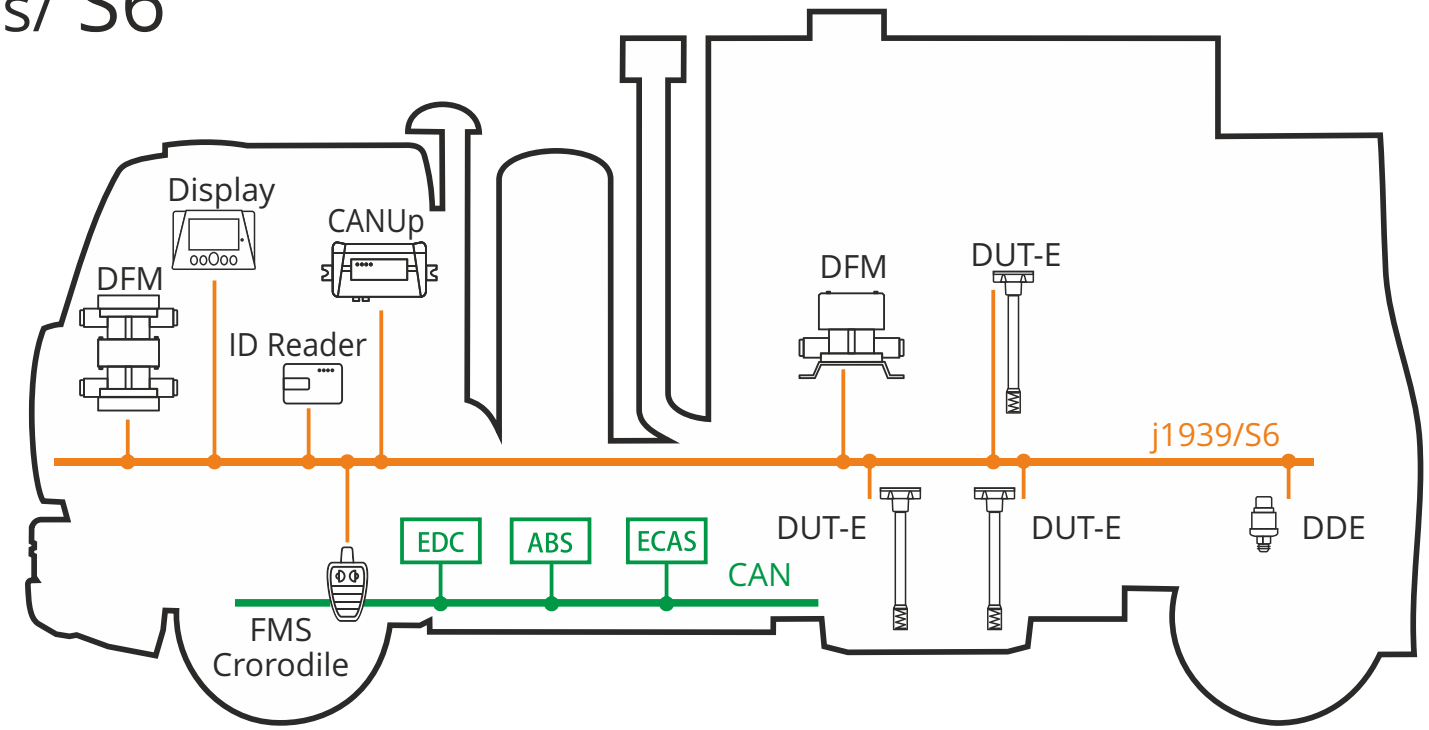
Technologies/ IoT BURGER

IoT Burger technology allows maximum data processing "**on board**".

The technology allows DUT-E sensor to:

- ✓ detect "Fuel fill-up" and "Fuel drain" Events;
- ✓ carry out self-diagnostics, log data and Events to Journal in sensor's memory;
- ✓ adjust signals (filtering, linearization, temperature correction);
- ✓ configure DUT-E over Bluetooth.

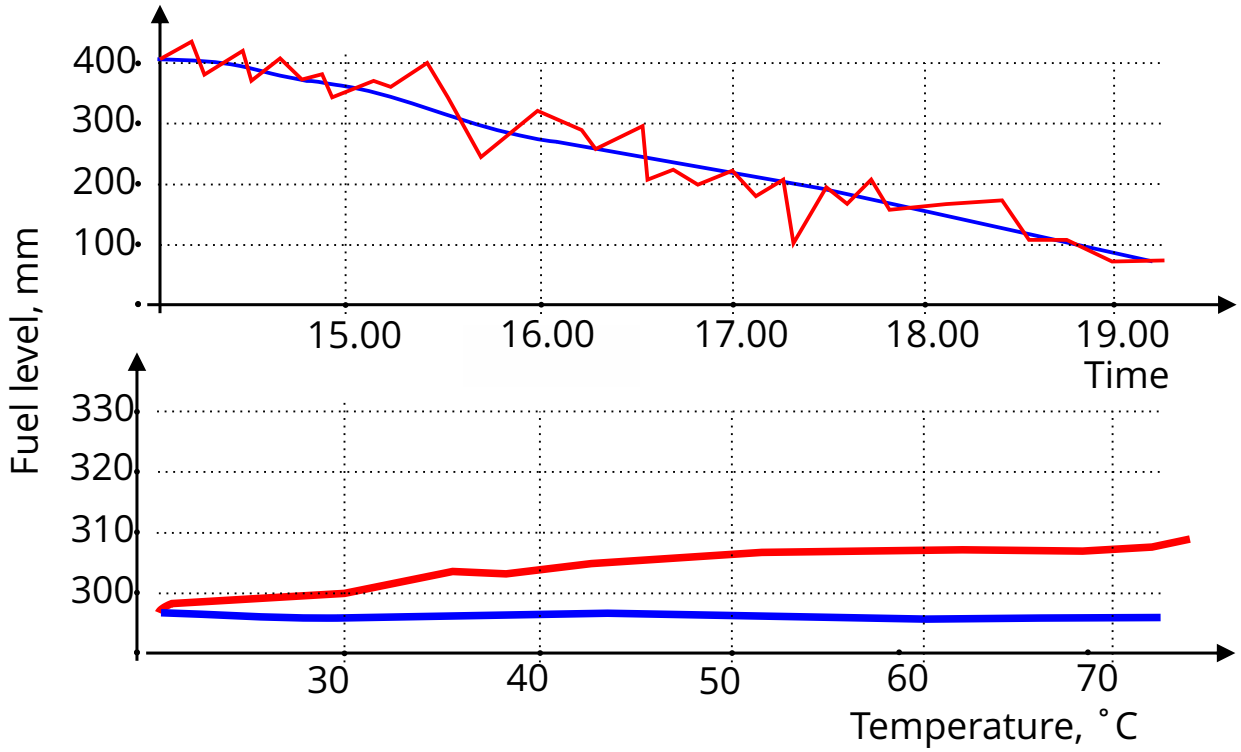
Technologies/ S6



S6 Technology allows to build up telematics system for complex machinery. Advantages:

- ✓ Simultaneous connection of up to 16 DUT-E together with other equipment.
- ✓ Data transfer via a common cable to the only tracker input .
- ✓ Configuration and diagnostics of each sensor in the S6 bus.

Functionality/ Signal adjustment



Signal filtration (averaging function)

Temperature correction

Data from DUT-E

Data from sensor without temperature correction

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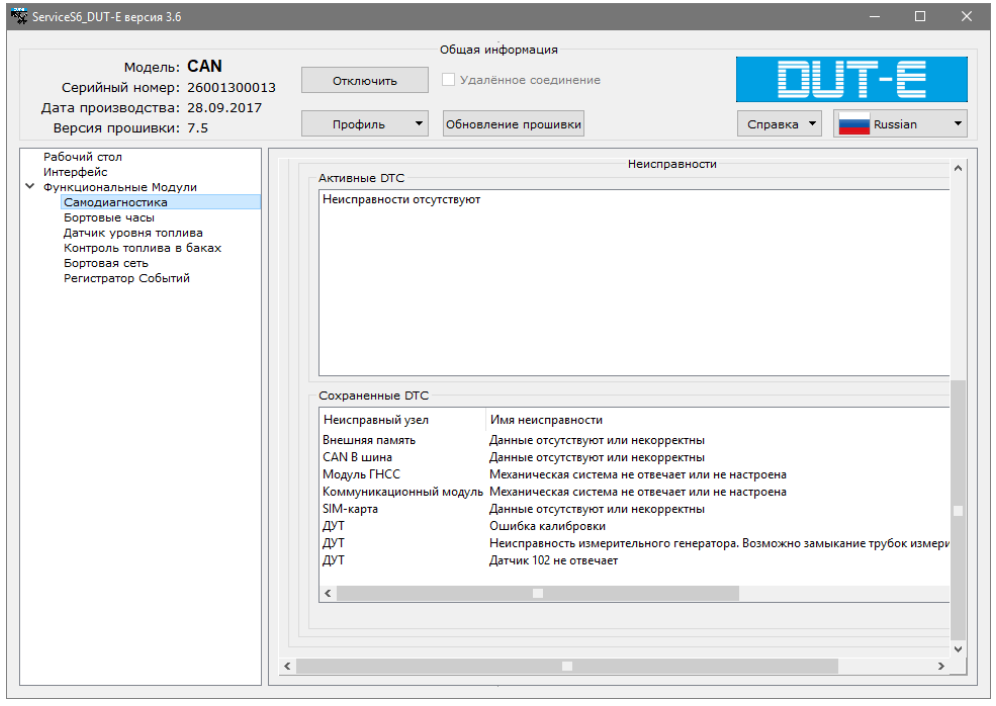
Functionality/ Self-diagnostics and Journal



DUT-E checks the quality of data and its own operability. In case of malfunction detection, sensor will send malfunction code to telematics units. Also, the code will be saved in Journal in sensor's memory.

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Interfaces/ Comparison of generations

Analog

RS-232/485

CAN J1939/S6

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Interfaces/ CAN vs RS vs analog signal

Parameter	DUT-E AF	DUT-E 232	DUT-E 485	DUT-E CAN
Fuel level in tank, mm	Either volume or level	One of two can be selected		Yes, both
Fuel volume in tank, L				
Fuel volume in relation to total tank, %	–			
Total (sum) fuel volume in several tanks	8 tanks using summator	8 tanks using summator	–	Up to 8 tanks
Simultaneous monitoring of fuel volume in each fuel tank separately	–	–	Up to 4 tanks	Up to 8 tanks
Temperature	–	Yes		Yes
Sensor operability self-check	Yes	Yes		Yes
Sending data on fuel level to vehicle dashboard and LED-indicator of empty tank	–	–		Yes
Supply voltage (onboard network) monitoring	–	–		Yes
Current operation mode of onboard network	–	–		Yes
Operation time monitoring, split by different operation modes of onboard network	–	–		Yes
Event registration and logging (15 important and 15 informational) in nonvolatile memory	–	-		Yes

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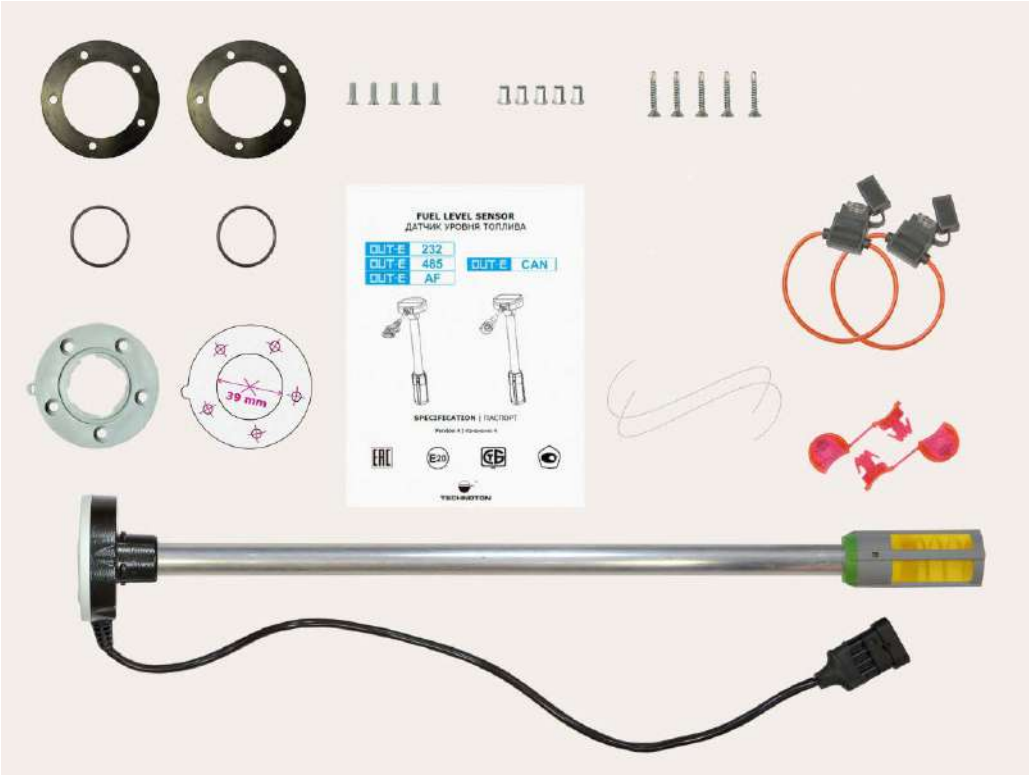
Installation/ Delivery set



Delivery set includes all elements necessary for installation to fuel tank.
Screen filter – purchased separately.

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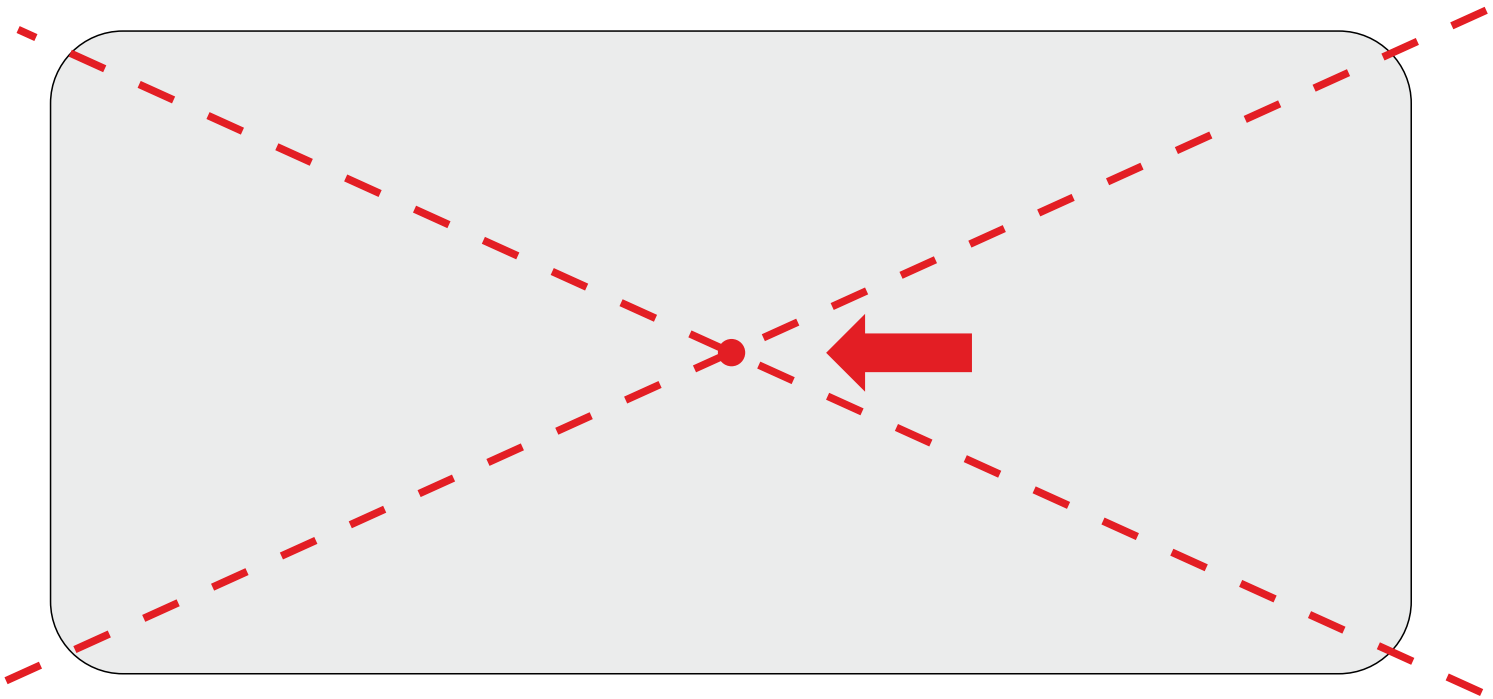
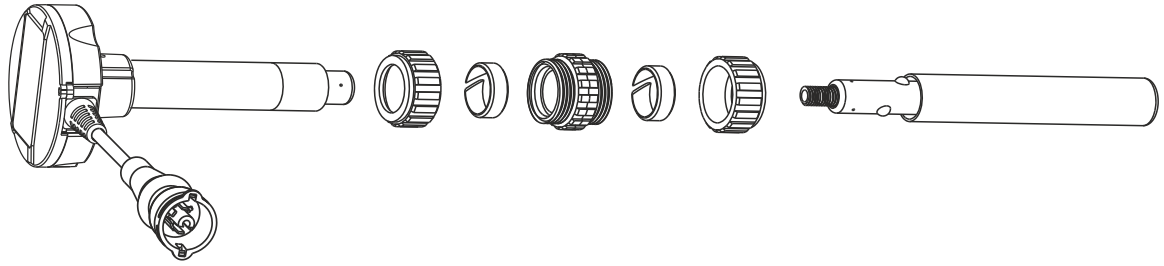
Installation/ Choosing place in fuel tank

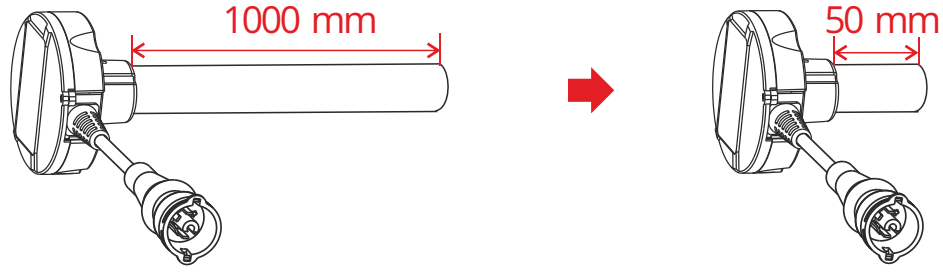


Installation to a geometrical center of the fuel tank is recommended.

Installation/ Shortening and extending length



Measuring part length is extended up to 6000mm by using additional sections.



Measuring part can be shortened to any length by cutting probe.

Watch video: “Installing DUT-E 485 fuel level sensor”

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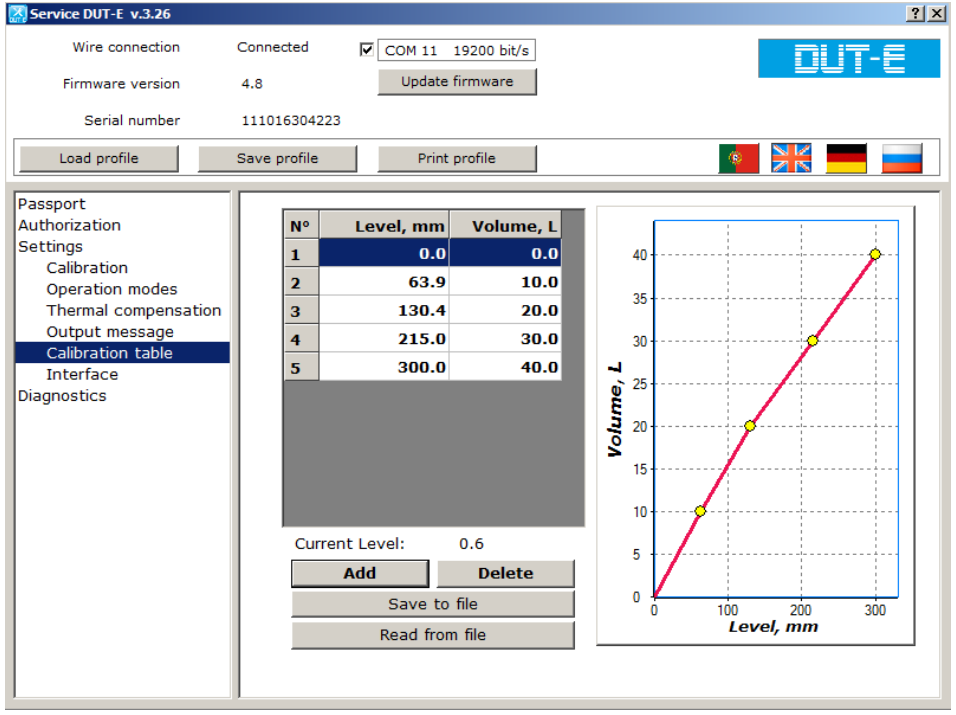
Configuration/ Service software



- Inspecting and changing current settings of sensor.
- Carrying out sensor calibration.
- Making up tank calibration table.
- Saving sensor configuration profile to file on local drive.
- Loading configuration profile to sensor from file on local drive.
- Updating embedded software of sensor.
- Checking sensor output data.
- Running sensor diagnostics.

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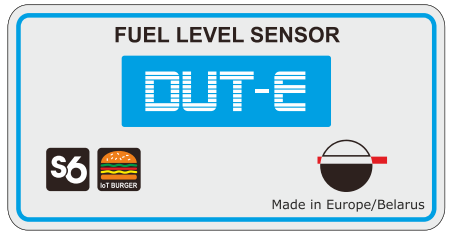
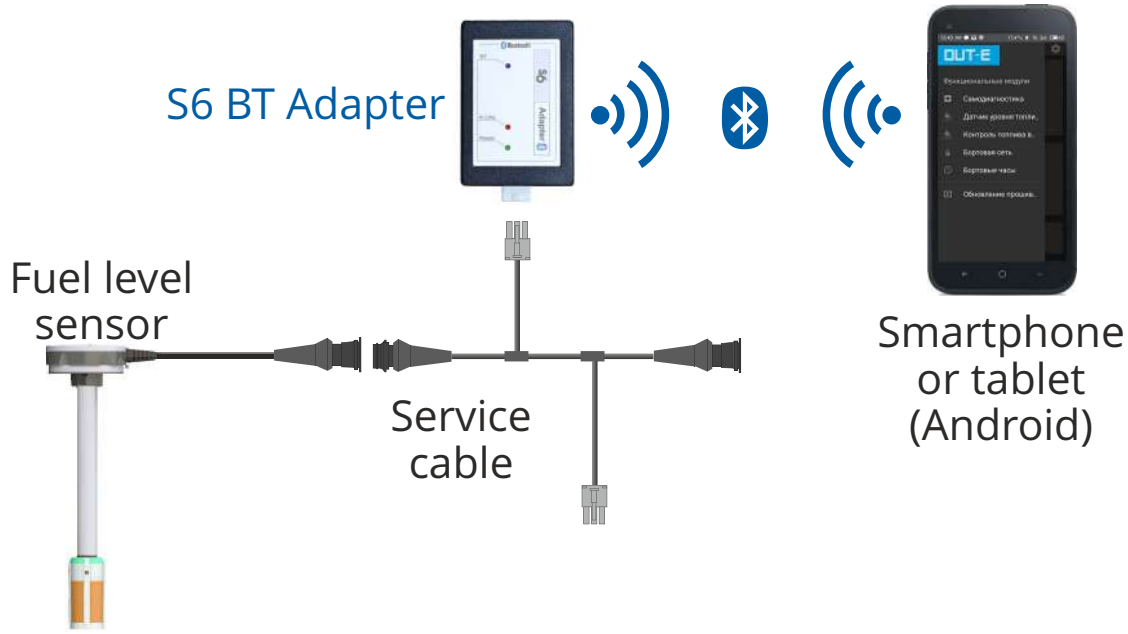
Configuration/ Over Bluetooth





DUT-E fuel level sensors marked with IoT Burger Technology logo can be configured over Bluetooth using Android-smartphone or tablet. To do that, S6 BT Adapter should be connected to sensor.

Mobile application Service S6 DUT-E is free for download from Google Play.

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Business cases/ Road trucks

150 trucks in Mexico are equipped with DUT-E 232. Fuel theft was stopped, what resulted in 25% fuel expenses decrease.

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Business cases/ Light masts

DUT-E 485 и спутниковый терминал

Fuel tanks of 150 autonomous light masts were equipped with DUT-E 485. Light masts are used in quarries (in Australia) as main light sources. Result – fuel and maintenance expenses decreased by 20%.

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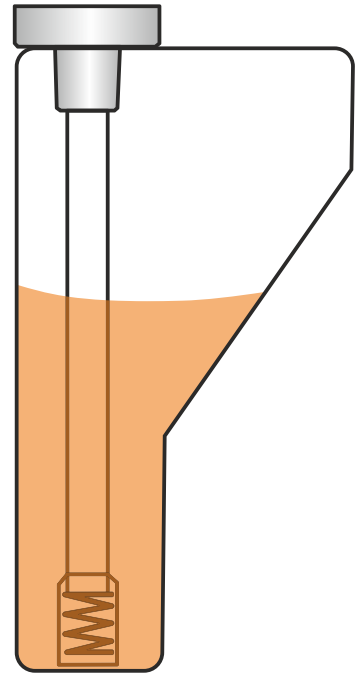
Business cases/ Airport bus

DUT-E AF in complex-shaped fuel tank



DUT-E AF are installed in bus factory as a standard sensor for some models of buses.
DUT-E has no moving parts - optimal solution for fuel tanks of unusual shapes.

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Business cases/ Construction machines

DUT-E are installed on 300+ of vehicles in PMK construction company. Result – minimization of fuel thefts resulted in 15% fuel economy for tippers, 30-40% for special machines.

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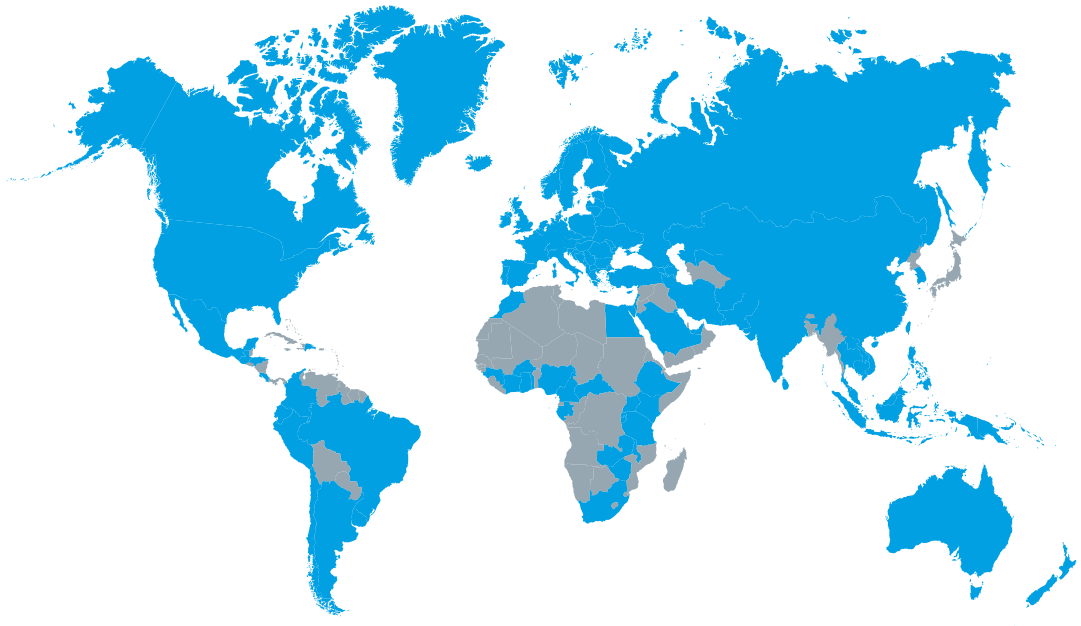
Popularity



140 Countries

Countries, where DUT-E fuel level sensor are used

CAN UP GALILEOSKY LOCARUS Queclink mapon TELTONIKA ... and others

50+ manuals on connection and configuration to telematics units of various manufacturers

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Summary

Sends up to 25 parameters and Events: fuel level in mm, fuel volume in liters and % of total tank volume, temperature.

Allows fuel monitoring in 8 fuel anks simultaneously - total fuel volume and volume in each tank separately.

Supports S6 Technology - can be used with other S6-compatible devices for building up telematics system for complex machinery. All devices are connected through S6 send data and get power supply over a single cable.

Protected with screen filter from water and mud on the bottom of fuel tank. Bottom stop ensures rigidity of fixation inside fuel tank.

Universal for any fuel tank - can be cut to any length or extended up to 6000 mm. No movable parts – can be installed in complex-shaped fuel tanks.