TELEMATICS INTERFACE

CAN j1939/S6

OPERATION MANUAL

Version 5.1

TECHNOTON

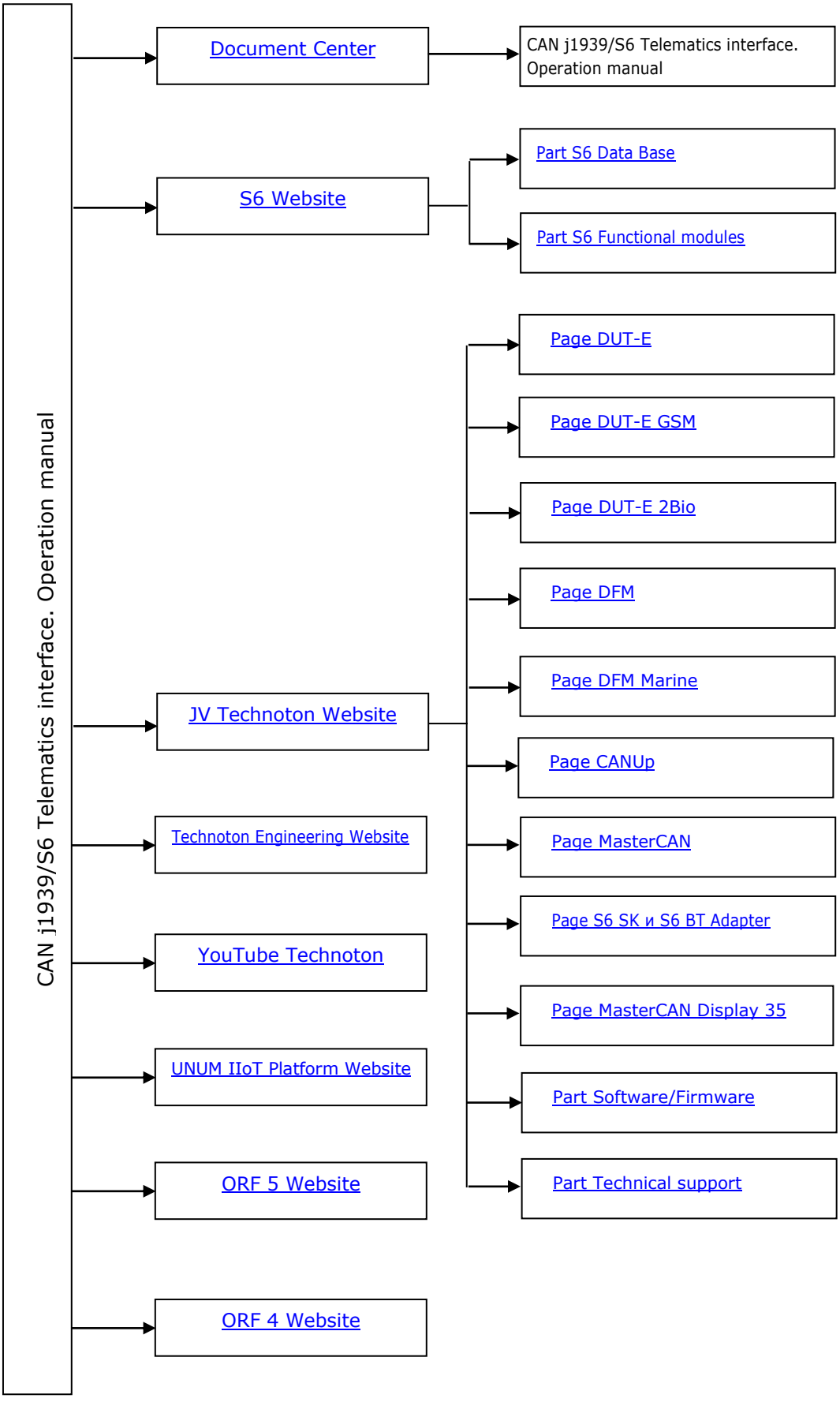
ADVANCED MACHINERY TELEMATICS

Contents

Revision history

Version	Date	Editor	Description of changes
1.0	09.2016	OD	Basic version.
2.0	11.2017	OD	• The range of elements of S6 cable system used for connection of Units is extended. • Examples of Units connection to Telematics Terminals using S6 cable system (including complex mobile objects and fixed installations) are added.
3.0	12.2017	OD	• A description of S6 BT Adapter wireless service adapter is added. • The procedure for Units connection to the Android device via the Bluetooth channel for their setup is described. • The procedure for installation of a service mobile application designed for Units setup on the Android device and its dedicated use is described. • Connection diagrams to connect CANUp 27 online telematics gateway to the PC using S6 SK are added. • Information on new Units (CANUp 27, DUT-E 2Bio, DFM Marine CAN) is added. • The structure of the document external links is added. • The document terminology is updated (S6 Technology and IoT Burger Technology).
4.0	06.2018	OD	• New S6 connectors that have a common MoI 6 pin connector type are introduced due to changes in the concept of S6 cable system for the Vehicle cabin. • Examples of Units connection using new connectors are provided. • A change in S6 SK service adapter is reflected (wires for connection of external power supply are added). • Information on new Units is added (MasterCAN Display 35, MasterCAN DAC2113). • The document terminology is updated (new term CAN j1939/S6 Telematics interface). • The structure of the document external links is introduced.
5.0	03.2021	OD	• New elements of S6 cable system are introduced. • Examples of connection schemes for Units, with using new connectors, are provided. • Detailed technical specifications of S6 cable system are added. • List of S6 Units is updated etc.
5.1	06.2025	OD	• Information has been added noting that selected S6 cable models can now be produced and delivered with external insulation in two versions — a corrugated or a smooth polyethylene tube. Both versions deliver identical performance characteristics. • New elements of S6 cable system are introduced etc.

Structure of external links



Terms and Definitions

IoT Burger is the Technology of creating smart sensors and complex telematics IIoT devices operating in real time with built-in analytic features (further on – IoT Burger). The basis of IoT Burger is the software/hardware core, a set of ready-to-use universal Functional Modules, the database of standartized IoT parameters.

Particular features of IoT Burger:

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

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

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

At present, 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.

For example, the following Units are designed using IoT Burger Technology: MasterCAN Display 35, CANUp 27, DFM CAN, DFM D CAN, DFM Marine CAN, DFM Industrial CAN, DUT-E CAN, DUT-E GSM, DUT-E 2Bio CAN, MasterCAN CAN2RS, MasterCAN RS2CAN, MasterCAN DAC15, MasterCAN DAC2113.

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.

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).

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

Event — relatively rare and sudden change in SPN. For example, applying the magnetic field to the fuel flow meter in order to falsify indications of the hourly fuel consumption is the “Interference” Event. An Event can have one or several characteristics. Thus, the “Interference” Event has the following characteristics: date/time and duration of the interference.

When the Event occurs, a terminal unit registers the time of occurrence, which is later mentioned in a report on the event. Thus, the Event is always attached to exact time and place of occurrence.

Counter — cumulative numerical characteristics of Parameter. Counter is represented by a number, which can only grow in time. Examples of Counters: fuel consumption, engine operation time, total distance and other.

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

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

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

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

Unit is an element of vehicle on-board equipment compatible with S6 bus, which uses S6 Technology.

Introduction

Recommendations and rules set out in this Operation Manual apply to CAN j1939/S6 Telematics interface (further on S6) designed by Technoton company.

The present document contains general concepts on the architecture and S6 Units, information on the purpose, characteristics and composition of the cable system and service adapters; it defines the procedure for connection and use of the service adapters for configuration of Units.

WARNING: It is strongly recommended to strictly follow Manufacturer's instructions of this Manual when operating cabling system, service adapters and the Software.

Manufacturer guarantees S6 cabling system and accessories compliance with the requirements of technical regulations subject to the conditions of storage, transportation and operation set out in this Operation manual.

WARNING: Manufacturer reserves the right to modify cabling system, adapters and Software's specifications that do not lead to a deterioration of consumer qualities without prior customer notice.

See identification codes for S6 cabling system components ordering:

X **Y** **Z**

where **X** – symbol characterizing functional component (e.g. — Extender S6, Cable S6, T-connector S6, Adapter S6, Plug S6 etc.).

Y – symbol characterizing quantity and type of connectors:
- SC – S6 SC connector;
- Mol – Molex connector;
- CW – bare wires.

Z – cable length (can be omitted).

Examples of cabling system components order identification codes:

T-connector S6 3Mol
(t-connector S6 with three Molex connectors).

T-connector S6 3SC
(t-connector S6 with S6 SC connector).

Cable S6 SC-CW-700
(cable S6 with single S6 SC connector and bare, length —700 cm).

1 General concept

1.1 CAN j1939/S6 Telematics interface. Definition, architecture, advantages

CAN j1939/S6 Telematics interface is a software/hardware set designed to collect and integrate data from additional and standard Vehicle onboard equipment into the Telematics system using S6 Technology alongside with reception data from one or several CAN buses, as well as for configuration and power supply of telematics sensors.

Architecture of CAN j1939/S6 telematics interface is based on idea of single cabling system, physical interfaces and protocols (see figure 1).

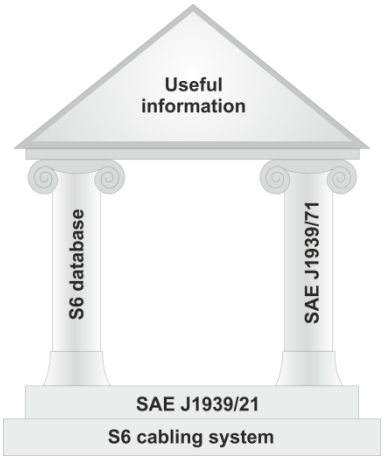


Figure 1 — CAN j1939/S6 Telematics interface architecture

The physical interface CAN 2.0B (ISO 11898-1:2003) is used to exchange data between Units in the CAN j1939/S6 Telematics interface.

The procedure for data transmission using CAN bus is determined by the Data Link Layer, to comply with SAE j1939/21 Standard requirements.

Parameters, structure and content of data which is transfer via CAN bus is defined by Vehicle Application Layer per SAE j1939/71 and S6 Database.

Database of PGN and SPN, which are used in S6, can be found at https://s6.jv-technoton.com/ and includes the following set of parameters:

- S6 — a special set of PGN for Units developed by Technoton. Meets requirements of SAE j1939/71 standard;
- Telematics — a set of telematic PGN developed by Technoton which accumulate basic data on the vehicle performance. Meets requirements of SAE j1939/71 standard;
- FMS — a set of PGN containing basic parameters from onboard data buses of trucks. Meets requirements of FMS-Standard Interface description of leading global truck manufacturers;
- FMSII — set of additional (not included in FMS-Standard Interface description) parameters of onboard informational buses of commercial vehicle. Meets requirements of SAE j1939/71 standard;
- ISOBUS – a set containing 7000+ parameters of farming machinery operation. It complies with ISO 11783 standard;
- DTC — set of active (DM1) and previously active (DM2) trouble codes of Units per SAE j1939/73 standard.

To configure Units using S6 SK and S6 BT Adapter service adapters in CAN j1939/S6 Telematics interface, K-Line physical interface (ISO 14230) is used.

CAN j1939/S6 Telematic interface provides the connection of all Units to one power supply point from the onboard circuit through the common power supply bus; it also provides connection to the "ground" of the Vehicle.

Advantages of CAN j1939/S6 Telematic interface architecture:

- **From Telematics system integrator's point of view**

  - real-time monitoring of large set of parameters of Vehicle with just one onboard Telematics terminal;

  - modular composition makes extension of Telematics system functionality and expandability of Onboard equipment easier;

  - integrated monitoring of Vehicles of any complexity.

- **From circuit design engineer's point of view**

  - compatible with SAE j1939 standard data transfer protocol allows using just one input interface of telematics terminal – CAN.

- **From telematics terminal programmer's point of view**

  - 864 unique telematics SPN informatively supplement Vehicle parameters, monitored through standard SAE j1939 protocol;

  - simple data integration from onboard sensors via CAN interface

- **From installation specialist's point of view**

  - reliable cabling system with joint power supply bus ensures high interference resistance and minimizes probability of incorrect electrical connection of equipment;

  - digital CAN bus allow safe simultaneous connection of various special telematics equipment of Vehicle;

  - joint digital K-Line interface simplifies equipment setting-up process.

Adavantages of CAN j1939/S6 Telematics interface architecture in comparison to traditional telematics architecture are described in animated video.

1.2 S6 Units. Definition, general information, advantages

S6 Units — are telematic sensors and elements of Onboard equipment connected to form a network using S6 Technology to monitor fuel and the Vehicle operation parameters (see figure 2 and table 1).

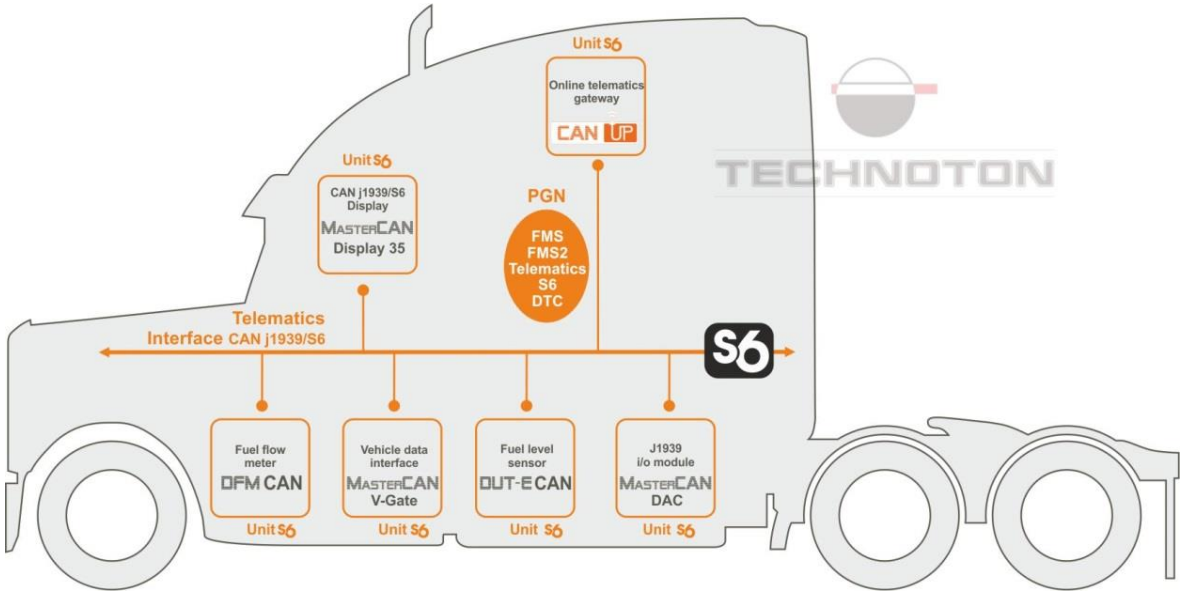


Figure 2 — Connection of Units to form a single network using S6 Technology

Table 1 — Authorized network addresses of Units

Units S6		Maximum quantity at single Object	Authorized Network Addresses (SA)
Type	**Model**		
Telematics gateway	CANUp 27	1	100
CAN j1939/S6 Display	MasterCAN Display 35	2	109, 110
Fuel flow meters	DFM CAN/DFM D CAN	16	0…240 (recommended ranges 111…118, 151…158)
	DFM Marine CAN		
Flow meters	DFM Industrial CAN	8	111…118
Fuel level sensors	DUT-E CAN	16	91…98, 101…108
	DUT-E GSM		
	DUT-E 2Bio CAN		
Data converters	MasterCAN CC	2	122, 142
	MasterCAN C232/485	2	124, 144
	MasterCAN V-Gate	2	125, 145
	MasterCAN CAN2RS	1	135
	MasterCAN RS2CAN	1	134
	MasterCAN P2CAN	1	140
Contactless reader-converter	FMSCrocodile CCAN	1	122
j1939 i/o modules	MasterCAN DAC15	2	126, 146
	MasterCAN DAC2113		127, 147
Position sensor	GNOM DP CAN	1	218, 82…85
Wireless interface	Marker S7 Radiobox CAN	1	131
Signal converter	S7 Radiobox CAN	1	142
Signal converter	GNOM S7 Radiobox CAN	1	148

S6 Units functioning, functionality check of Units, Counters operation, Events registration and Parameters setting-up is ensured by coordinated operation of Functional modules (FM). FM purpose of use, description of their settings and input/output parameters (SPN) can be found at http://s6.jv-technoton.com and also in operation manuals for the respective Unit (see Document center).

Specifications of CAN j1939/S6 interface of Units comply with S6 Technology. Data transfer protocol of Units through CAN interface meets requirements of SAE j1939 standard and S6 Database.
For connection using S6 Technology each Unit must have a unique network address (SA) (see table 1).

WARNING: In case of application of Units in vehicles and tractors, to avoid interference with normal operation of the vehicle CAN-bus, **it is strictly forbidden** to select network addresses for Units from the ranges 0…80 and 164…255.

Units can gather/transfer data either automatically (primary mode) or on request. Baud rate can be selected from the following values: 100; 125; 250; 500; 1000 kbit/s.

Units configuration is carried out through K-Line (ISO 14230) interface with the help of the Software per S6 Service protocol. Current version of Software can be downloaded from https://www.jv-technoton.com/, Software section).

S6 Units advantages:

- conformity with European and national automotive standards;
- common data transfer protocol via CAN j1939/S6 interface, based on PGN and SPN of S6 Database;
- possibility to unite the Units to form a single network using S6 Technology to monitor parameters of operation of sophisticated mobile objects and fixed installations;
- single S6 SK adapter is used for setting-up;
- modular structure of service software simplifies software capabilities capacity;
- designing Units based on IoT Burger Technology:

  - inbuilt analytics of incoming signals and maximum treatment of data within the Unit. Internal filtration and normalization of Parameters, identification of Events, maintenance of Counters simplify the Server operation and economize on traffic;
  - option of ready Reports delivery to the user avoiding server platforms by means of using 2G/3G/4G Technologies by SMS or E-mail;
  - measurement and treatment of "quick" processes which is impossible to implement using the usual cloud technologies;
  - inbuilt system of data authenticity assurance (self-diagnostics, authorization, impact control).
  - flexible system of user customization of Reports which allows to select the optimal ratio of data completeness/volume of traffic;
  - wireless setup via Bluetooth channel using S6 BT Adapter service adapter;
  - creation of devices with extremely low power consumption.

2 S6 cabling system

2.1 Purpose of use and features

S6 cabling system (S6 CS) is designed for data transfer, configuration and power supply of Units connected through S6 Technology (see figure 3).

Features of S6 CS:

- compliance with European automotive standards;
- unified design of cables ensures simplicity and reliability of Units connection through S6 Technology;
- use of T-connectors and cables with single type connectors minimizes the required number of connectors for connecting Units inside the cabin;
- connection between standard and additional Vehicle Onboard equipment using CAN j1939/S6 Telematics interface;
- common power supply bus for all Units connected using S6 Technology S6;
- option to set up all Units by means of connecting the service adapter to any free connector of the cable system.

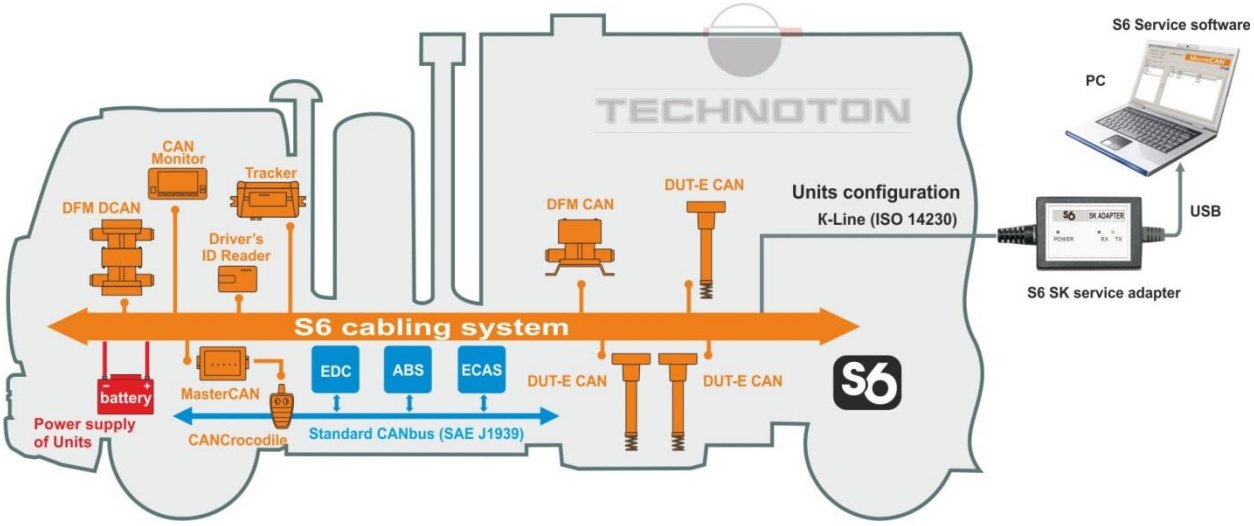


Figure 3 —S6 cablng system purpose of use

2.2 Main specifications

- CS S6 meets the requirements of GOST 23544 "Wire bundles for automobile and tractor equipment" and Technical Conditions TU BY 800003266.009-2016.

  Note — In GOST 23544 requirements regarding stability towards electromagnetic interference are not outlined. However, all S6 Units manufactured by Technoton undergo electromagnetic compatibility tests, in accordance with UN/ECE Rules #10 the respective certificates of which are available. Since CS S6 is used for connection of Units during tests, this implicitly confirms the cables stability towards electromagnetic interference.

  S6 cabling system can be used at any Vehicle, which is operated in moderate and cold climate conditions.
- CS S6 is certified to comply with the Customs Union Technical Regulations (CU TR) 018/2011.
- CS S6 consists of non-reinforced wires joined together and electrical connectors providing the integrity of electric circuits.
- In CS S6, wires of PVA, PVAM or NV grades (GOST 17515) and the solder alloy of POS-61 grade (GOST 21931) are used.
  Note — The employment of acid flux during soldering is not allowed.
- To protect the wire and contact connection points in CS S6, tubes manufactured from 305 TV40 PVC compound (GOST 19034) are used.
- Wires in cables are fixed with clip bands which may be:
  - heat shrink tube made of high-pressure polyethylene composite (GOST 16336, GOST 16337);
  - TV40 tube (GOST 19034);
  - goffered tube.

  Note — It is allowed to connect wires in cables using clamps. Connection of wires inside cables by twisting them up is not allowed.

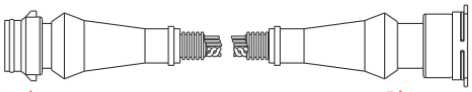
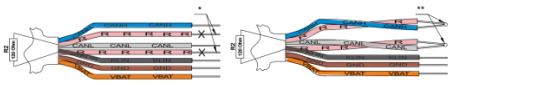
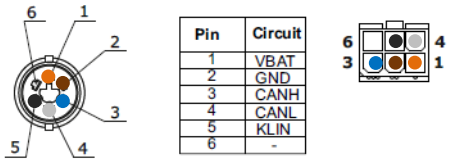
Table 2 — S6 CS technical specifications

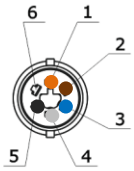
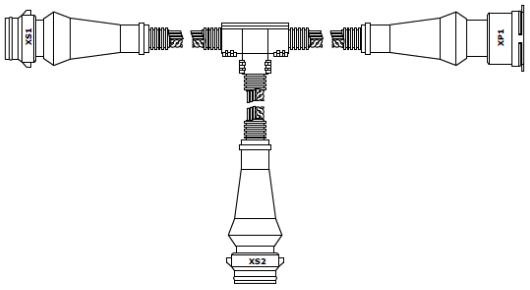
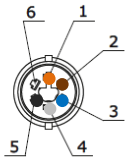
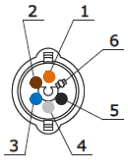
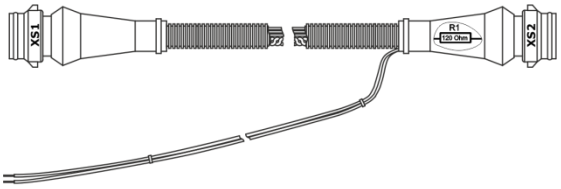
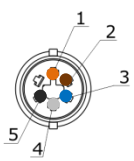
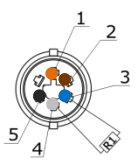
Parameter, measurement units	Value
General specifications	
MAX voltage range, V, not more than	48
Cross-section of each wire in cables, mm^2, not less than	0.35
Length of cables branches, mm, not less than	50
Length of cables branches up to the connection socket, mm, not less than	100
Space between two neighboring cable branches, mm, not less than	10
Lay pitch of wires of SAE j1939 CAN-bus, mm	30
Cables resistance against aggressive environment	fuel/lubricants-resistant
Cables fire resistance	non-inflammable
Minimal time to failure, h, not less than	10000
Average life, years, not less than	10
Climatic specifications	
Ambient operation temperature range, °C	-40…+85
Resistance to short-time impact of high temperature, °C, not more than	+100
Upper limit of relative humidity at 40 °C ambient temperature, %, not more than	98
Lower limit of atmospheric pressure, kPa, not less than	61.5
Mechanical specifications	
Force needed for connector locking, N, not more than	100
Force needed for connector unlocking, N	10…100
Vibration resistance	Maximal acceleration up to 98 m/s^2 at 50 Hz frequency
Shock resistance	10000 blows of 5 ms duration, with acceleration up to 147 m/s^2

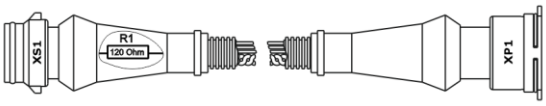
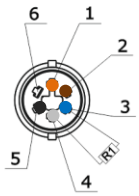
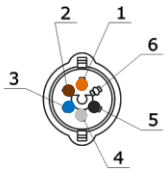
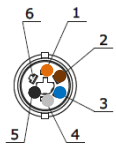
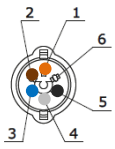
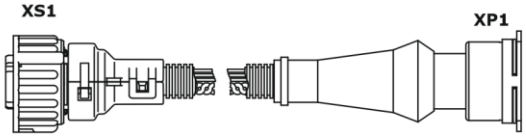
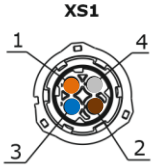
2.3 Selecting cabling system items

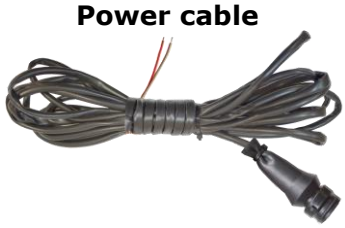
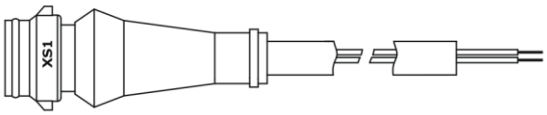
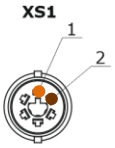
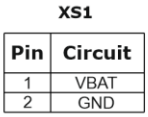
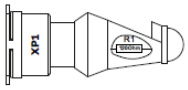
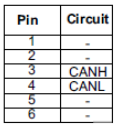
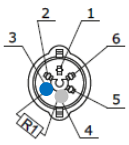
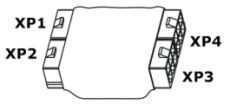
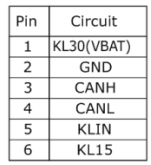
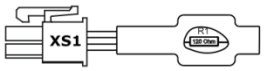
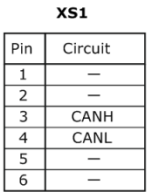
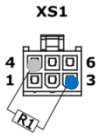
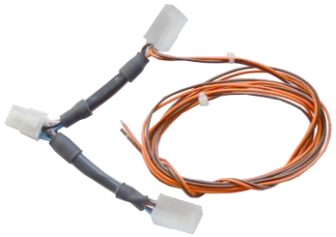
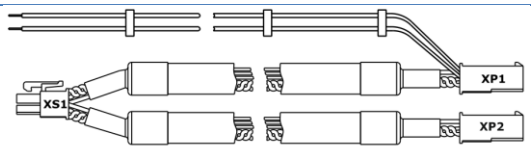
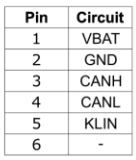
The composition of elements of S6 CS kit for a specific Vehicle is determined depending on the type of the Onboard equipment used. The required length of cables depends on the mounting location of the Unit, dimensions and particular design of the Vehicle which is being equipped.
The Onboard equipment inside the Vehicle cabin is connected using elements of S6 CS with **Molex 6 pin** connector, while the equipment outside the cabin is connected using elements with **S6 SC** connectors.
Examples of connection diagrams of the Vehicle Onboard equipment connection to the Telematics terminals including the specification of the necessary S6 CS elements that need to be ordered are provided in annex A.

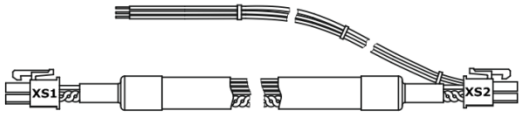
Table 3 — Selection of elements of S6 cable system

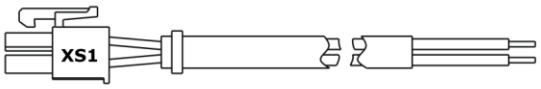
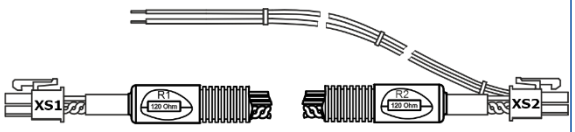
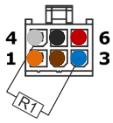
<table>
<tr><th>Name and exterior</th><th>Design**</th><th>Purpose of use and description</th></tr>
<tr><td colspan="3">SC connectors
 
Socket Plug
Molex connectors
 
Socket Plug</td></tr>
<tr><td colspan="3">1) Elements of S6 cable system to connect Units outside the Vehicle cabin</td></tr>
<tr><td>S6 SC-CW-700*
Cable
  </td><td> 
 
Pin | Wire color | Circuit
1 | orange | VBAT
2 | brown | GND
3 | blue | CANH
4 | white | CANL
5 | black | KLIN
6 | - | -
Connecting
without built-in terminal resistor R2 | with built-in terminal resistor R2
 
* Do not connect R2 resistor wires (pink, identification mark R), insulate.
** Connect electrically one of the R2 resistor wires (pink, identification mark R) with CANH wire, and the other - with CANL wire.</td><td>Designed to connect Units with S6 SC connector and CAN j1939/S6 interface (e.g. DFM CAN fuel flow meters, DUT-E CAN fuel level sensors and so on) to tracking devices and to external power supply.
Length 7 m.
Includes two built-in terminating resistors (120 Ohm) between CANH and CANL wires.</td></tr>
<tr><td>S6 SC-Mol-300
S6 SC-Mol-700
Extension cable adapter
  </td><td> 
XS1 | XS1, XP1 | XP1
 
Pin | Circuit
1 | VBAT
2 | GND
3 | CANH
4 | CANL
5 | KLIN
6 | -</td><td>Designed to connect the section of S6 cable system outside the cabin (S6 CS connector) and its section inside the cabin with Molex connector.
Versions with cable length of 3 m and 7 m available.</td></tr>
</table>

Name and exterior	Design**	Purpose of use and description
S6 022* S6 018* **Extension cable adapter** 	 **XS1, XS2** **XS1**  4 1 6 3 **XS2**  6 1 2 3 5 4 **Pin / Circuit** 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 -	Designed to connect the section of S6 cable system outside the cabin (S6 CS connector) and its section inside the cabin with Molex connector. Versions with cable length of 3 m and 7 m available.
S6 3SC **T-connector** 	 **XS1,XS2**  6 1 2 3 5 4 **XS1, XS2, XP1** **Pin / Circuit** 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 - **XP1**  2 1 6 5 3 4	Designed to fork/connect the outside section of S6 cable system and to connect Units with S6 SC connector and CAN j1939/S6 interface (e.g. DFM CAN fuel flow meters, DUT-E CAN fuel level sensors and so on).
S6 2SC-30 power **Extension cable with power wire** 	 **XS1**  1 2 3 5 4 **XS1, XS2** **Pin / Circuit** 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 - **XS2**  1 2 3 5 4	Designed to connect Units with S6 SC connector and CAN j1939/S6 interface (e.g. DFM CAN fuel flow meters, DUT-E CAN fuel level sensors and so on) to tracking devices and external power supply. Length 0.3 m. It has 120 Ohms inbuilt terminal resistor at one end of CANH and CANL wires.

Name and exterior	Design**	Purpose of use and description
S6 020* **Intermediate resistor** 	 XS1  XS1, XP1 Pin / Circuit 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 - XP1 	Designed to generate electrical impedance of CAN j1939/S6 Telematics interface, in accordance with requirements of SAE j1939 standard. Length 0.3 m. It has 120 Ohms inbuilt terminal resistor at one end of CANH and CANL wires.
S6 2SC-100* **S6 2SC-300*** **S6 2SC-700*** **S6 2SC-1200*** **Extension cable** 	 XS1  XS1, XP1 Pin / Circuit 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 - XP1 	Designed to connect Units with S6 SC connector and CAN j1939/S6 interface (e.g. DFM CAN fuel flow meters, DUT-E CAN fuel level sensors and so on) to S6 cable system. Versions with cable length of 1, 3, 7 and 12 m available.
S6 SC DP cable **Cable** 	XS1  XP1  XS1, XP1 Pin / Circuit 1 VBAT 2 GND 3 CANH 4 CANL XS1 	Signal cable of GNOM DP CAN axles load sensor. Designed to connect the sensor to the part of S6 cable system located outside the cabin. Length 2 m.

<table>
<tr><th>Name and exterior</th><th>Design**</th><th>Purpose of use and description</th></tr>
<tr><td>S6 024
Power cable
  </td><td> 
 
  </td><td>Designed to connect S6 cable system to the Vehicle onboard circuit power supply.
Length 7.5 m.</td></tr>
<tr><td>S6 SC
Cable blind cover
  </td><td> 
 
  </td><td>Designed to generate electric impedance of CAN j1939/S6 Telematics interface, in compliance with SAE j1939 Standard requirements.
It has S6 CS connector with the 120 Ohms inbuilt terminal resistor between CANH and CANL contacts.</td></tr>
<tr><td colspan="3">2) Elements of S6 Cable System to connect Units inside the Vehicle cabin</td></tr>
<tr><td>S6 4Mol
Splitter
  </td><td> 
 
  </td><td>Designed to fork/connect the inside section of S6 cable system and to connect FMSCrocodile contactless reader-converter.</td></tr>
<tr><td>S6 Mol
Cable blind cover
  </td><td> 
 
  </td><td>Designed to generate electric impedance of CAN j1939/S6 Telematics interface, in compliance with SAE j1939 Standard requirements.
It has Molex connector with the 120 Ohms inbuilt terminal resistor between CANH and CANL contacts.</td></tr>
<tr><td>S6 023
T-connector with power
  </td><td> 
 
 
  </td><td>Designed to split/connect the part of S6 cable system located inside the cabin, to connect power supply for the Vehicle onboard circuit, to connect elements of S6 cable system with Molex connector.</td></tr>
</table>

Name and exterior	Design**	Purpose of use and description
S6 2Mol-20 **Cable**  **S6 2Mol-100*** **Cable** 	 XS1 XS1, XS2 XS2  4 1 6 3 Pin | Circuit 1 | KL30(VBAT) 2 | GND 3 | CANH 4 | CANL 5 | KLIN 6 | KL15  4 1 6 3	Designed to connect Units with Molex 6 pin connector (of MasterCAN Display 35 display of CAN j1939/S6, the telematics gateway CANUp 27, j1939 i/o modules MasterCAN DAC, data converters MasterCAN CC) to the cabling section of S6 system inside the cabin. Versions with cable length of 0.2 m and 1 m available.
S6 2Mol-20 Power **Cable with power wire**  **S6 2Mol-100 Power*** **Cable with power wire** 	 XS1 XS1, XS2 XS2  4 1 6 3 Pin | Circuit 1 | KL30(VBAT) 2 | GND 3 | CANH 4 | CANL 5 | KLIN 6 | KL15  4 1 6 3	Designed to connect the external section of S6 cabling system and its section inside the cabin, as well as to connect to power supply from the Vehicle onboard circuit. It may be used to connect Units with Molex 6 pin connector (of MasterCAN Display 35 display of CAN j1939/S6, the telematics gateway CANUp 27, the j1939 i/o modules MasterCAN DAC, data converters MasterCAN CC) to the cabling section of S6 system inside the cabin. Versions with cable length of 0.2 m and 1 m available.

Name and exterior	Design**	Purpose of use and description
S6 025 **Connection cable** 	 XS1  XS1 Pin / Circuit 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 KL15	Designed to connect S6 cable system with external devices of other manufacturers. Length 2 m.
S6 027* **Cable with power wire** 	 XS1 / XS1, XS2 / XS2  Pin / Circuit 1 VBAT 2 GND 3 CANH 4 CANL 5 KLIN 6 - 	Designed for direct connection of two Units with a 6-pin Molex connector (of MasterCAN Display 35 display of CAN j1939/S6, the telematics gateway CANUp 27, j1939 i/o modules MasterCAN DAC, data converters MasterCAN) and for connecting onboard power supply. Main section length: 0.25 m; power wires: 1.5 m. There are two built-in 120 Ohms terminal resistors at the ends of the CANH and CANL wires.

Specification of wires of S6 cabling system:

- VBAT (KL30) — "+" power supply voltage (Battery) (9…45) V;
- GND — ground "-";
- CANH — CAN HIGH signal of CAN 2.0B interface(SAE j1939);
- CANL — CAN LOW signal of CAN 2.0B interface(SAE j1939);
- KLIN — K-Line signal K-Line of interface (ISO 14230);
- KL15 — spare wire.

* For the specified S6 cable models, production and delivery are available with external insulation in two variants — a corrugated or a smooth tube made from polyethylene compounds:

-  — corrugated insulation tube;
-  — smooth insulation tube.

Both insulation options fully meet the performance requirements of the S6 cable system.

** Manufacturer reserves the right to modify wire colors, that is why pay attention to its marking.

3 S6 SK service adapter

3.1 Purpose of use and distinctive features

S6 SK service adapter — designed to connect Units to the personal computer (further on — PC) for their setup, Counters review, diagnostics and data exchange with PC (see figure 3).

Features of S6 SK:

- compliance with European automotive standards;
- adapter is power supplied by USB-port of PC – additional external power supply source is not needed;
- connector in set — a universal tool to connect to Units using S6 Technology;
- configuration of all Units from one point of S6 cable system; no need to connect to each individual Unit;
- option of "hot" connection using S6 Technology for Units configuration; no need to cut off the onboard circuit power supply (Battery).

S6 SK allows setting-up the following Units via K-Line (ISO 14230) interface:

1) One-chamber and Dual-chamber differential DFM fuel flow meters (DFM AK/CK/DK/A232/A485/ACAN/C232/C485/CCAN/D232/D485/DCAN models) (see figure 4).

Figure 4 — Exterior of DFM fuel flow meters with interface cable with S6 SC connector

2) DFM Marine fuel flow meters with display and interface cable (DFM Marine CK/CCAN models) (see figure 5).

Figure 5 — Exterior of DFM Marine fuel flow meters with interface cable

3) DFM Industrial flow meters with display and interface cable (DFM Industrial K/CAN models) (see figure 6).

Figure 6 — Exterior of DFM Industrial flow meters with interface cable

4) DUT-E CAN/DUT-E GSM/DUT-E 2Bio fuel level sensors (see figure 7).

Figure 7 — Exterior of DUT-E/DUT-E GSM/DUT-E 2Bio fuel level sensors

5) MasterCAN CC / MasterCAN C 232/485 /MasterCAN V-GATE / MasterCAN RS2CAN / MasterCAN CAN2RS data converters (see figure 8).

Figure 8 — Exterior of MasterCAN CC /MasterCAN C 232/485/ MasterCAN V-GATE vehicle data interfaces

6) MasterCAN DAC15/MasterCAN DAC2113 j1939 i/o modules (see figure 9).

Figure 9 — Exterior of MasterCAN DAC 15/MasterCAN DAC 2113 j1939 i/o modules

7) CANUp 27 telematics gateway (see figure 10).

Figure 10 — Exterior of CANUp 27 telematics gateway

8) MasterCAN Display 35 CAN j1939/S6 Display (see figure 11).

Figure 11 — Exterior of MasterCAN Display 35 CAN j1939/S6 Display

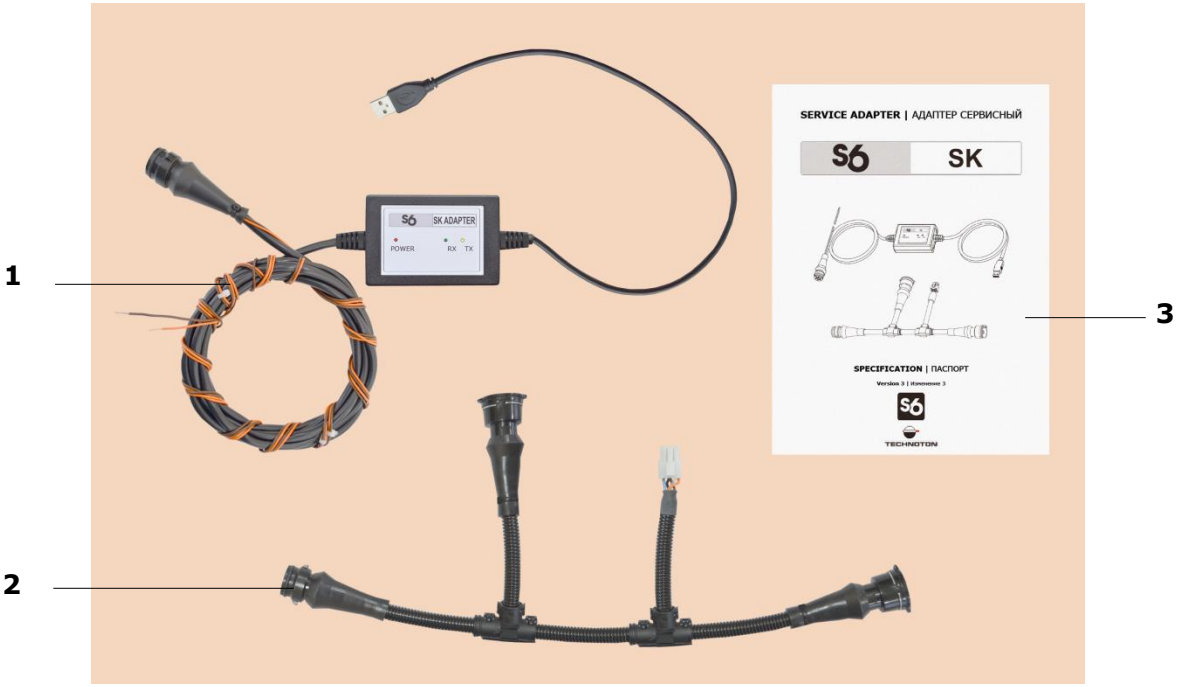
3.2 Main specifications

Table 4 — Main specifications of S6 SK

Parameter, measurement units	Value
Digital interface	K-Line (ISO 14230)
Communication interface with PC	USB
Supply voltage range, V	10…45*
Current consumption at 12/24 V, mA, not more than	20/10*
Ambient operation temperature range, °C	-40…+85
Ingress protection rating	IP45
* If not power supplied from PC USB.	

3.3 S6 SK adapter delivery set

3.3.1 Exterior view of delivery set

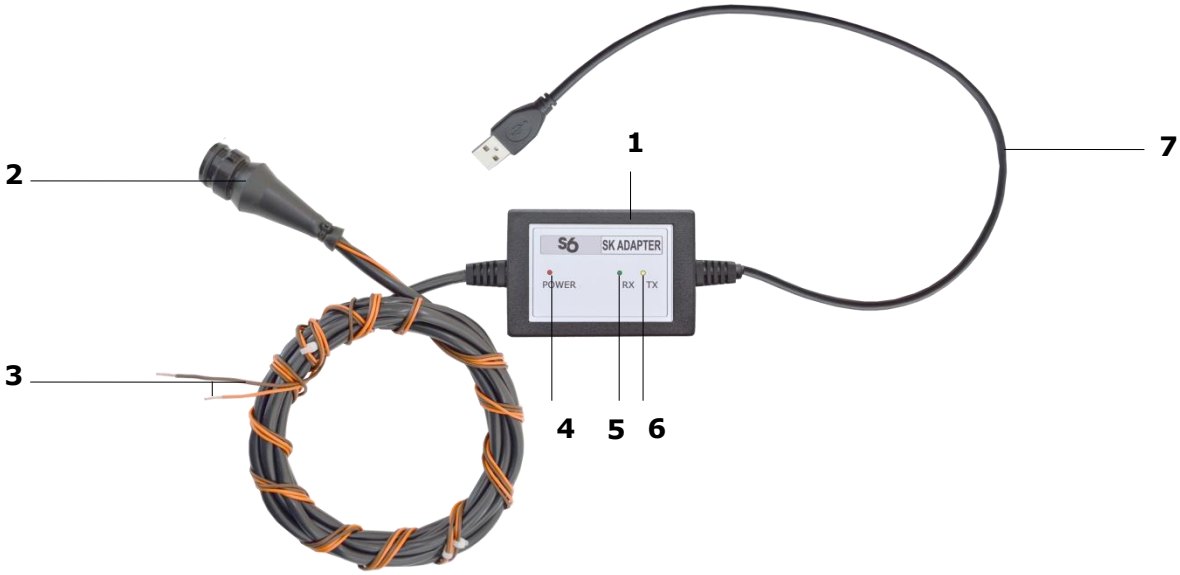


1	S6 SK adapter	– 1 pc.;
2	Connector	– 1 pc.;
3	Specification	– 1 pc.

Figure 12 — Exterior view of S6 SK delivery set

3.3.2 S6 SK adapter

S6 SK adapter (hereinafter adapter) designed to transmit data between Unit and PC.



1 - adapter casing;
2 - service cable to connect to a Unit or for connection using S6 Technology;
3 - wires to connect to power supply for the adapter and Unit from the external power source;
4 - **POWER** red LED indicator of power supply;
5 - **RX** green LED indicator of data received from Unit;
6 - **TX** yellow LED indicator of data transmitted to Unit;
7 - USB A cable for PC connection.

Figure 13 — Adapter exterior view and structure

Table 5 — Service cable pinout and wire assignment

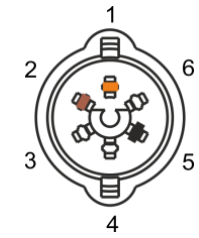
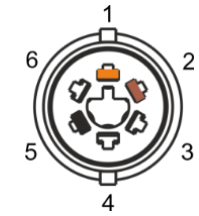
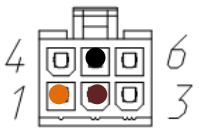
Connector view	Pin number	Wire color		Signal	
				Assignment	Type
	1		Orange	Power supply "+"	Analog, Voltage 10…45 V (8.5 V when powered from USB)
	2		Brown	Ground "-"	-
	5		Black	K-Line	Digital, ISO 14230 Standard

3.3.3 Connector

Connector is used for connection of:

- Unit when being configured;
- adapter to any free connector of cabling system when Units are configured through S6 Technology.

Table 6 — Connector wires assignment

Connector view	Pin number	Wire color		Signal	
				Assignment	Type
	1		Orange	Power supply "+"	Analog, Voltage 10…45 V
	2		Brown	Ground "-"	-
	5		Black	K-Line	Digital, ISO 14230

3.4 S6 SK operation

3.4.1 Exterior inspection prior to connection

It is necessary to conduct S6 SK adapter exterior inspection for the presence of the possible defects arisen during transportation, storage or careless use:

- visible damages of the adapter body;
- connector and insulation damages of cables.

Contact the supplier if any defects detected.

3.4.2 Operation restrictions

Avoid the following when connecting S6 SK adapter to Unit mounted on the Vehicle:

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

ATTENTION: To avoid any S6 SK adapter failures in communication between PC and Unit make sure there are no sources of electromagnetic interference close to the workplace (running electric motors, welding equipment, high-power transformers, power lines, etc.).

3.4.3 Connecting Units to PC

ATTENTION: Prior to connecting Units 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.

Note — When configuring Units connected by S6 Technology, power supply of onboard network (battery) can be turned on.

Units are connected to PC in the following order:

1) Connect the adapter to Unit.
- The adapter service cable connector is plugged through the connector from S6 SK delivery set to the appropriate connector of a Unit. Power for the Unit and adapter is supplied through one of the free input connectors of the connector (see figures 14-21).
  Note — During the setup of MasterCAN DAC15 it is allowed to connect power supply for the Unit using POWER connector, while during the setup of MasterCAN V-Gate you should use CAN or j1708 connectors.
- During the configuration of Units operating within the network based on S6 Technology you may plug the connector of the adapter service cable into the break in S6 cable system using S6 SK connector (e.g. instead of any S6 3SC T-connector). In this case, the power supply for the Unit and adapter is provided through S6 cable system (see figure 22).

2) Plug the adapter to 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 software.

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

4) Power on the vehicle (battery).

LED-indicator of red color (marked **POWER**) placed on the front panel of the adapter will light up after the adapter is connected to PC. In case it is not lit, you should make sure the USB cable is properly connected to the corresponding PC connector.

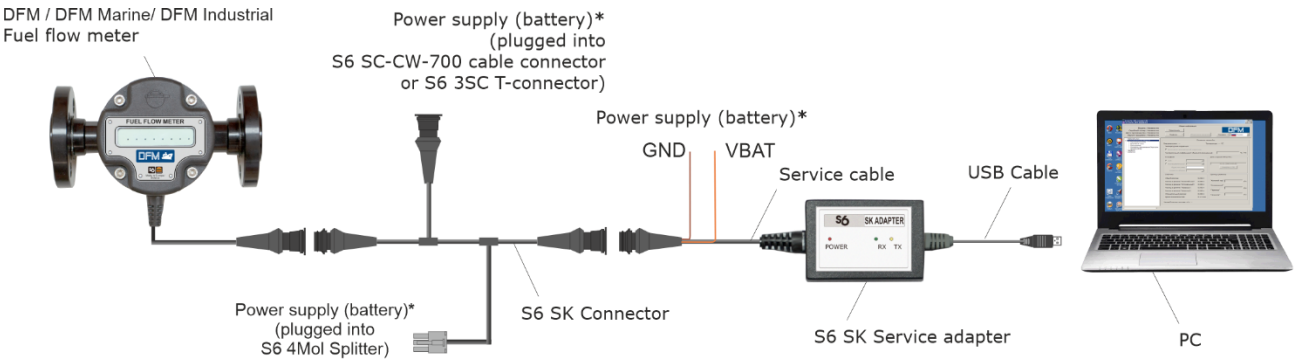


Figure 14 — Connection diagram of DFM/DFM Marine/DFM Industrial Fuel flow meters to the PC

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

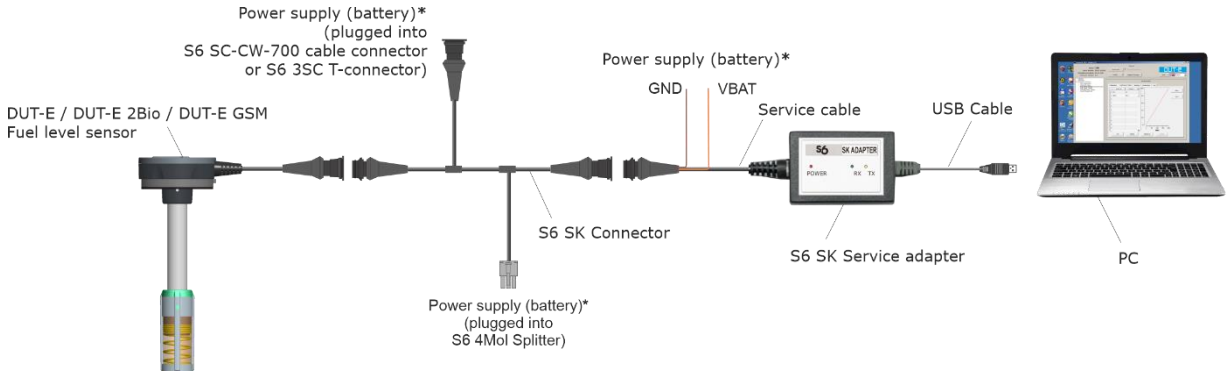


Figure 15 — Connection diagram of DUT-E/DUT-E GSM/DUT-E 2Bio Fuel level sensors to the PC

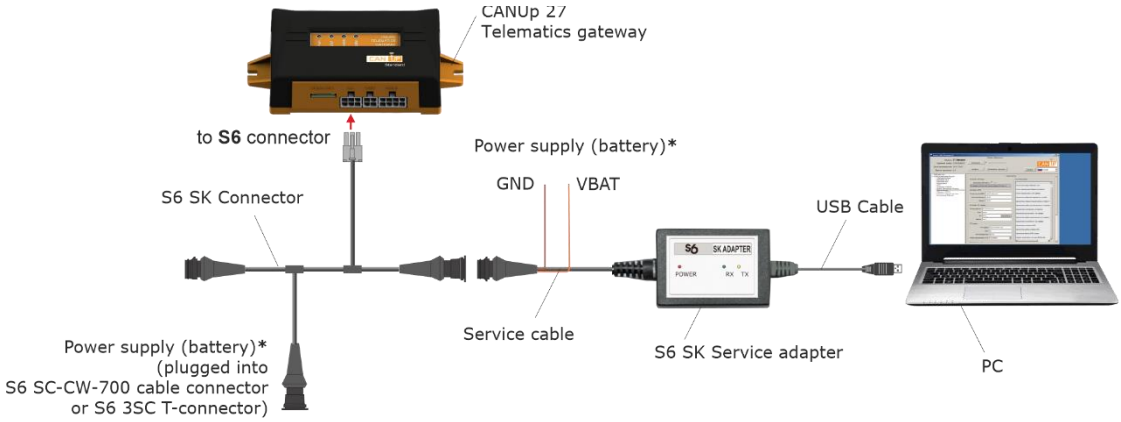


Figure 16 — Connection diagram of CANUp 27 Telematics gateway to the PC

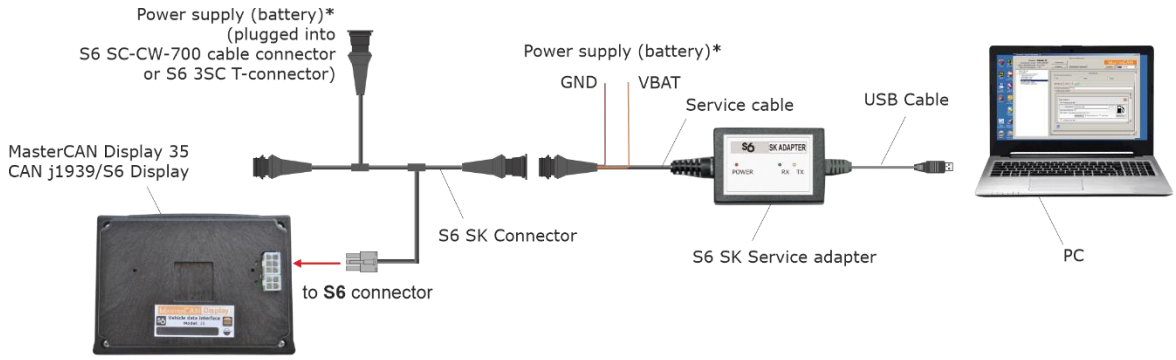


Figure 17 — Connection diagram of MasterCAN Display 35 CAN j1939/S6 Display to the PC

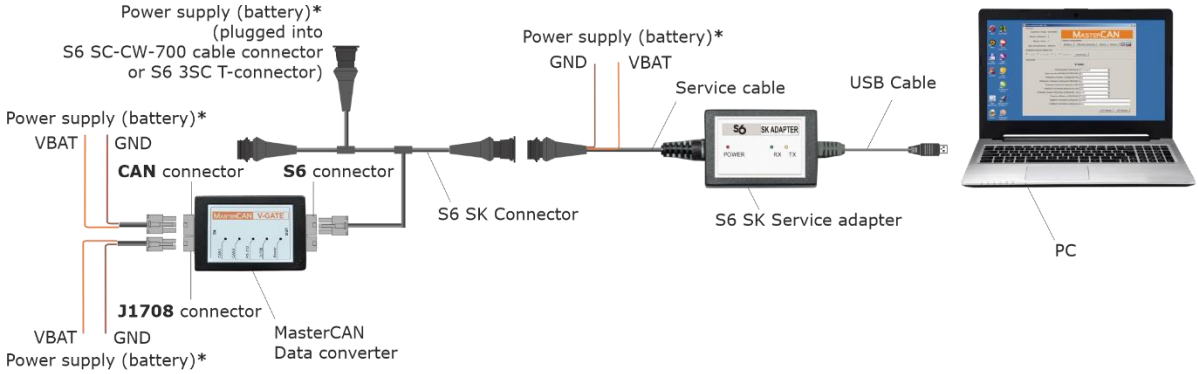


Figure 18 — Connection diagram of MasterCAN V-Gate / MasterCAN C 232/485 / MasterCAN CC Data converters to the PC

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

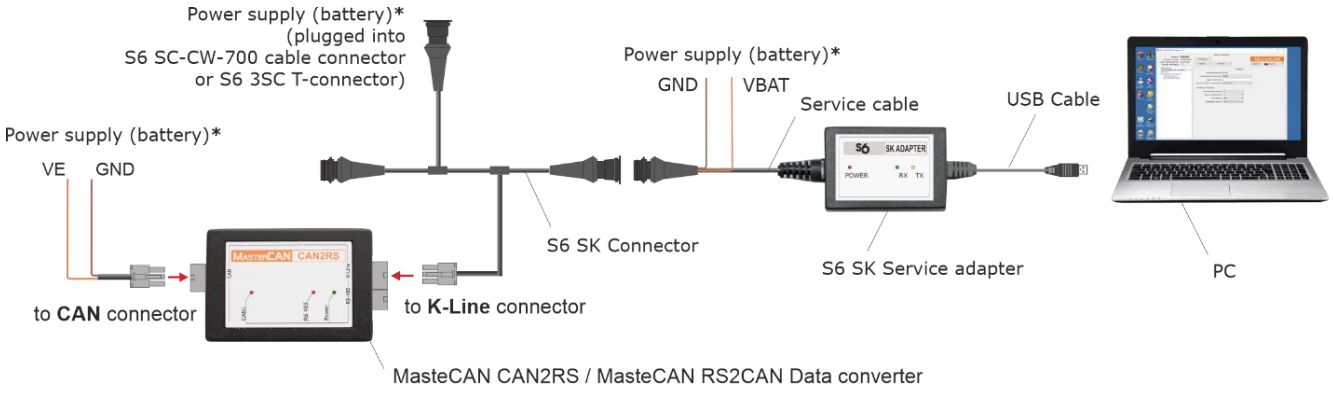


Figure 19 — Connection diagram of MasteCAN CAN2RS / MasteCAN RS2CAN Data converters to the PC

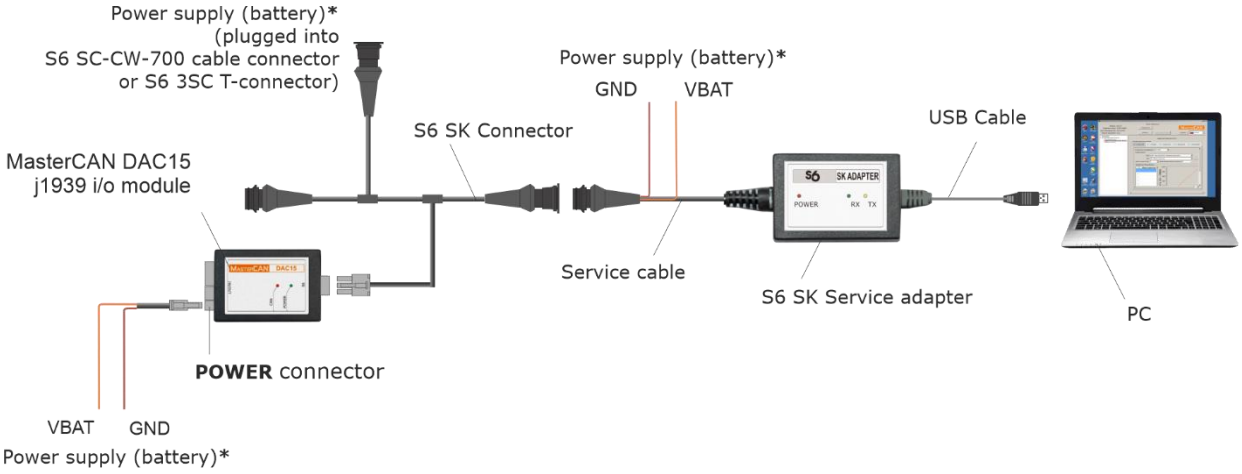


Figure 20 — Connection diagram of MasterCAN DAC15 j1939 i/o module to the PC

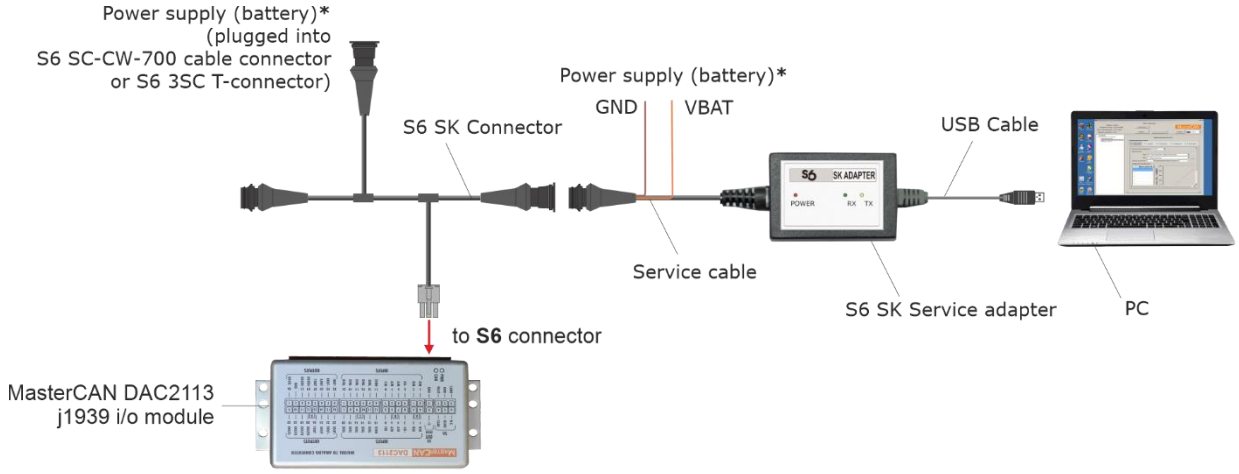


Figure 21— Connection diagram of MasterCAN DAC2113 j1939 i/o module to the PC

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

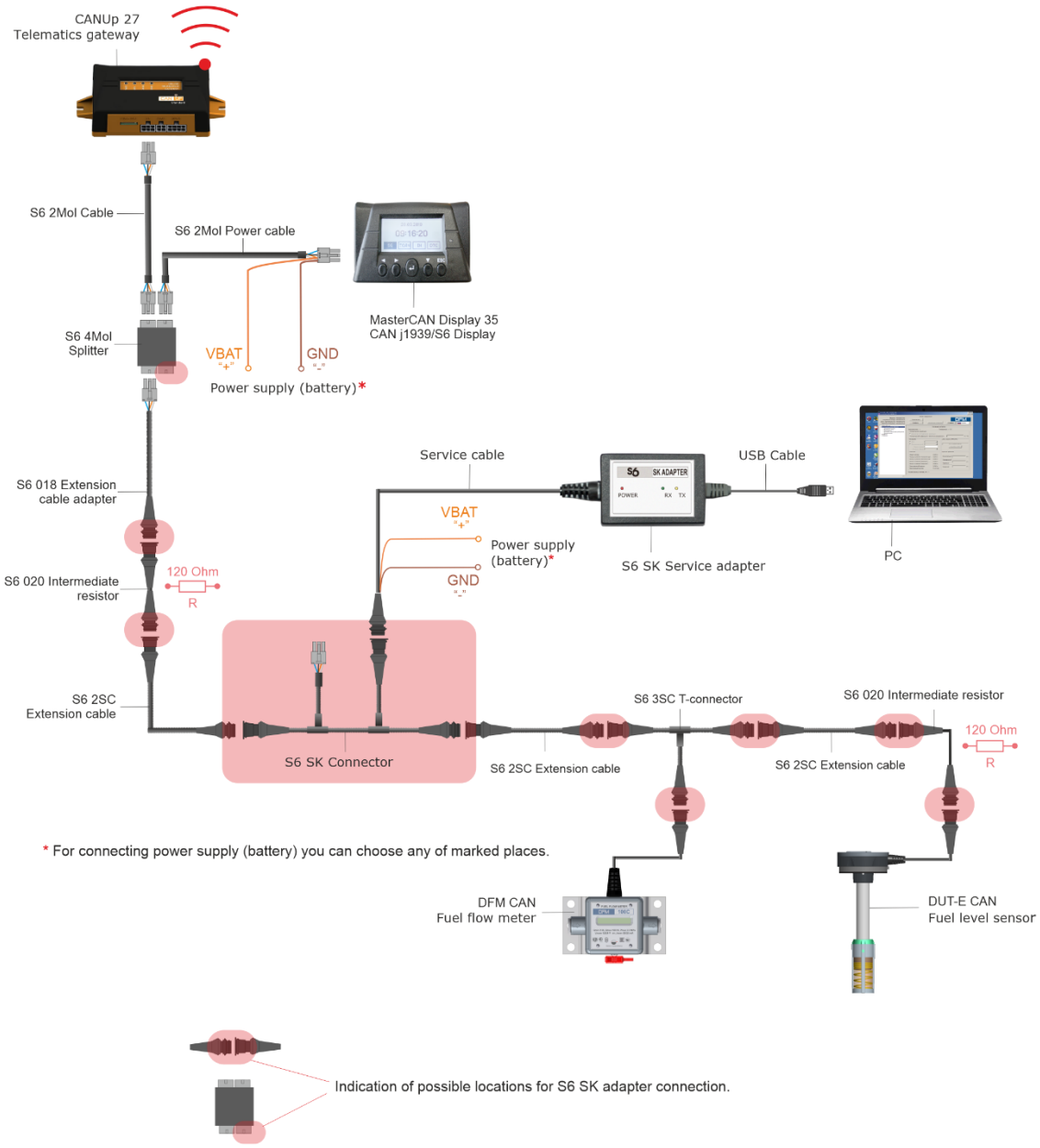
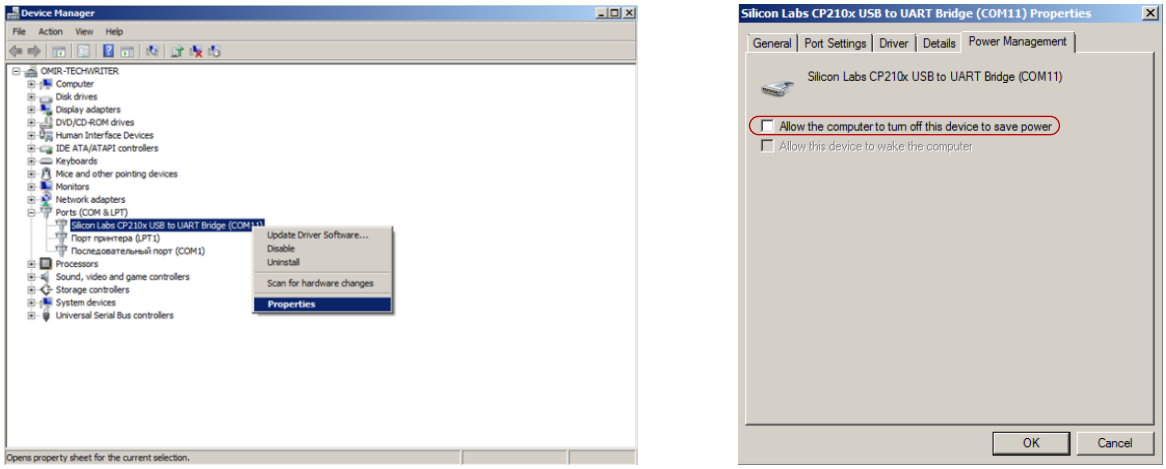


Figure 22 — Example of connection diagram for Units connected using S6 Technology

3.4.4 Operation check

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 23 a).

ATENTION: When operating S6 SK:
1) It is recommended to use the same USB port of the PC for S6 SK connections.
2) Untick power save check box in virtual COM-port properties (see figure 23 b).



a) selecting port properties *b) disabling power save option*

Figure 23 — Setting up a virtual COM-port in the Device Manager

Service adapter is ready for operation straight after power supply connection.

Check for a description of blinking LED-indicators placed on the top of the adapter in table 7.

Table 7 — Description of adapter's LEDs

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	Unit data is being received
	No signal		No data from Unit
TX		Yellow	Data is being transmitted to Unit
	No signal		No data to Unit

3.4.5 S6 SK disconnection

S6 SK disconnection form PC is done in the following order:

1) Save the results of the work.

2) Shutdown Service S6 software.

3) Disconnect service cable from S6 bus input or connector from Unit interface cable.

4) Disconnect USB-A cable from USB port of the PC.

4 S6 Service software for PC

4.1 Service software purpose and user interface

S6 Service software used for checking and configuration of Unit, connected to PC using S6 SK service adapter.

Service software functions:

- viewing Unit specifications;
- checking and modifying Unit settings;
- viewing Unit values of Counters and Events
- working with Unit profile;
- Unit output data control;
- diagnostics of the Unit;
- updating firmware of the Unit

Software is included:

1) USB driver creating virtual COM port for USB-UART CP2102 converter;

2) Service S6 utility for Unit configuration:

- Service S6 DFM (for configuration of DFM AK/CK/DK/A232/A485/ACAN/C232/C485/ CCAN/D232/D485/DCAN fuel flow meters, manufactured after 01.01.2016);
- Service DFM Marine (for configuration of DFM Marine fuel flow meters);
- Service DFM Industrial (for configuration of DFM Industrial flow meters);
- Service CAN UP (for configuration of CANUp 27 telematics gateway);
- Service S6 DUT-E (for configuration of DUT-E CAN/DUT-E GSM/DUT-E 2Bio fuel level sensors, manufactured after 01.11.2017);
- Service MasterCAN (for configuration of MasterCAN CC/MasterCAN C 232/485/ MasterCAN V-GATE data converters);
- Service S6 MasterCAN (for configuration of MasterCAN DAC15/MasterCAN DAC2113/ MasterCAN Display 35/ MasterCAN RS2CAN / MasterCAN CAN2RS Units);

Please, download the USB driver and Service S6 software from https://www.jv-technoton.com/ website (Software/Firmware section) and install it to your PC.

4.2 Hardware requirements

For work with service 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.

4.3 USB driver installation

ATTENTION: S6 SK will not be operable without prior USB driver installation.

1) Download and unzip the file containing USB driver. Run CP210xVCPInstaller_x64.exe (for x64 architecture Windows) and or CP210xVCPInstaller_x86.exe (for x32 architecture Windows) from unzipped folder).

2) Press Next > in CP210x USB to UART Bridge Driver Installer window (see figure 24) to continue installation.

Figure 24 — CP210x USB to UART Bridge Driver Installer window

3) After accepting User License Agreement (see figure 25) the installation process will be continued. During installation, please follow the instructions of Bridge Driver Installer.

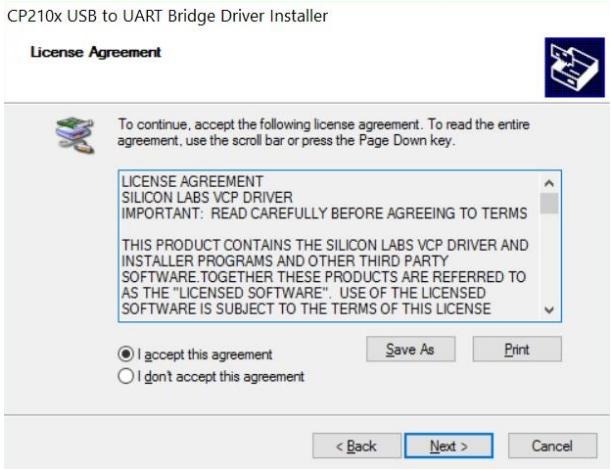


Figure 25 — Acceptance of the License agreement

Figure 26 — Successful installation notification USB driver window

4.4 Service S6 utility installation

1) To install the software, download and run necessary installation file ServiceS6_*_X_X_Setup.exe

Note — X_X corresponds to the version of utility.

2) Select installer language from the drop-down list (see figure 27).

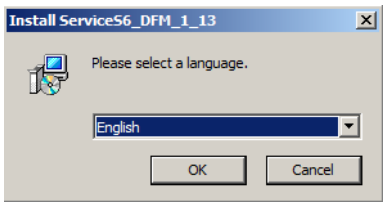


Figure 27 — Installer language selection

3) Press Next > button to start installation of the utility (see figure 28) and follow the instructions.

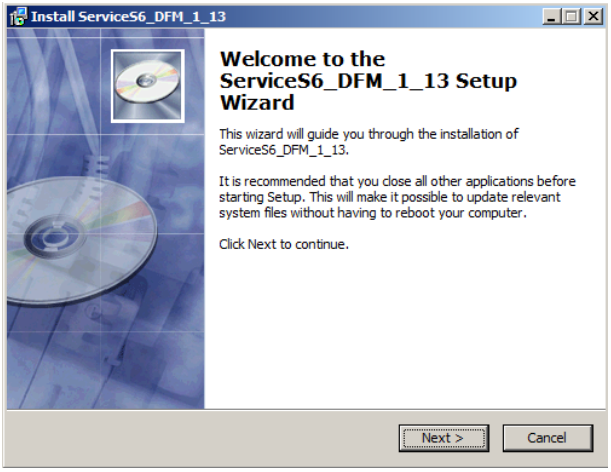


Figure 28 — Service S6 installation wizard window

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* Software installation — described on Service S6 DFM example.
For Service DFM Marine/Service DFM Industrial/Service S6 DUT-E/Service CANUp/ Service S6 MasterCAN software installation process is similar.

The following window will indicate the process of installation of Service S6 files (figure 29).

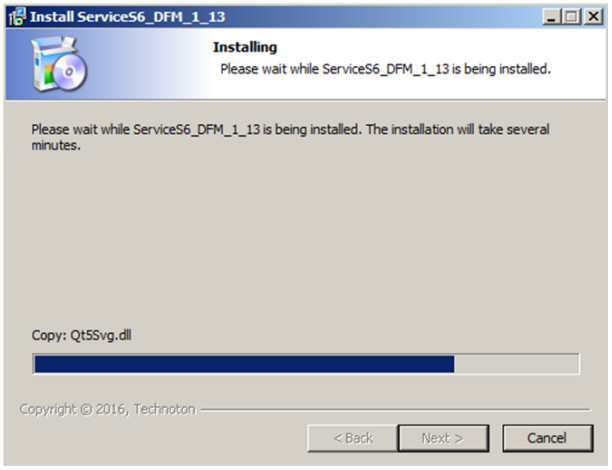


Figure 29 — Installation progress

Since the installation of Service S6 utility is finished PC is ready for S6 SK connection and operation (see figure 30).

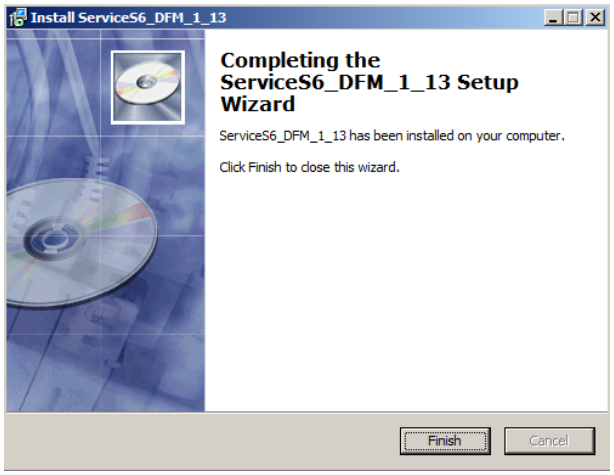


Figure 30 — Successful completion of Service S6 installation

4.5 Service S6 user interface

Service S6* user interface consists of **Horizontal menu**, **Vertical menu, Unit's ID area** and **Information and configuration area** (see figure 31).

ATTENTION: In case you face problems with starting the software in Windows 10, you may need to set starting the software in the mode of compatibility with Windows 7. To accomplish this, perform the following operations:
1) Click the right button of the mouse on the service software icon and select its **Properties**.
2) In **Compatibility** tab tick the field **Run this program in compatibility for** (**Compatibility mode** area).
3) Select Windows 7 from the dropdown list of operating systems.

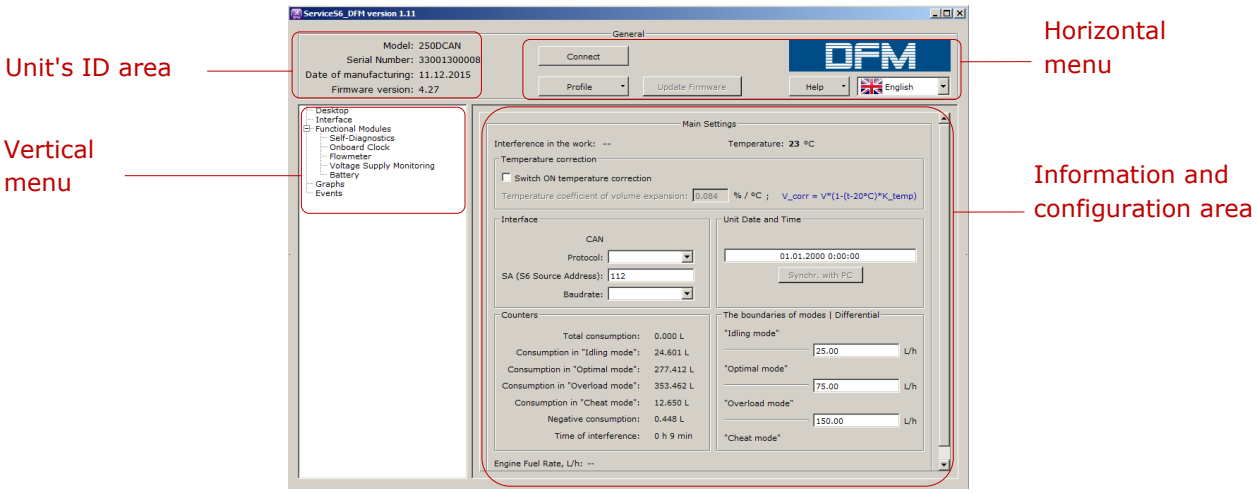


Figure 31 — Service S6 software interface

Unit's ID area displays data on model, serial number, production date and firmware version of the connected Unit.

Horizontal menu provides following options:

- connection/disconnection of the Unit;
- Unit profile options (loading profile, saving profile, printing profile);
- updating firmware of the Unit;
- selection of interface language;
- viewing help file and information about the utility.

Vertical menu is used for selection of Functional modules (FM) of the Unit. The actual parameters of FM and settings are displayed at **Information and configuration area**. Connectivity of software with FM is based on PGNs and SPNs (S6 Database) exchange.

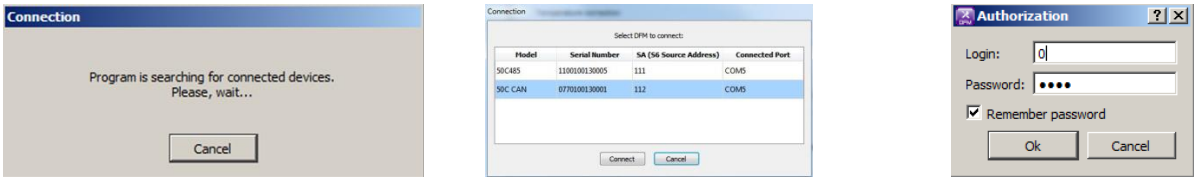
* User interface — described on Service S6 DFM example.
For Service DFM Marine/Service DFM Industrial/Service S6 DUT-E/Service CAN UP/ Service S6 MasterCAN software User interface is similar.

4.6 Authorization

To establish connection with Unit press Connect at **Horizontal menu**. Service S6 will run a search of connected meters (see figure 32 a).

When you connect Service adapter via S6 Technology, which contains more than one Unit, select the required Unit out of the list in **Connection** window and press Connect button (see figure 32 b).

Enter login and password for the Unit in **Authorization** window. Default login is **0**. Default password is **1111**. Tick **Remember password** checkbox to save the password for further launches (see figure 32 c).



a) search of connected Units *b) selecting one of several Units connected to S6 bus* *c) user authorization*

Figure 32 — Establishing connection between PC and Unit

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 software will display a code to recover the current password of the Unit (see figure 33). This message is being sent to Technoton technical department by e-mail support@jv-technoton.com Together with password recovery request.

Requirements for Unit password request:

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

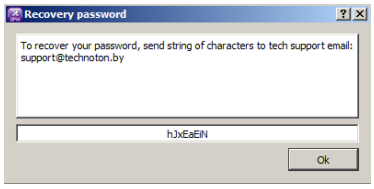
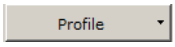


Figure 33 — Generated recovery code window

In case of entering incorrect login/password or in case of wrong connection to PC the software will show an error message.
In case of successful authorization with login and password the software will automatically prompt **Desktop** window, which displays currently connected Unit's configurations and parameter values of Functional modules.

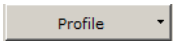
4.7 Operations with the Unit profile

Profile of Unit is represented by a set of PGNs (specifications, counters and configuration of Functional modules of Unit).

For managing Unit profile 

button with drop-down list is used (see figure 34). This button is placed in **Horizontal menu** of Service S6 software. Profile can be stored as a file to PC hard drive or loaded into the memory of the meter. It can be printed as well.

Figure 34 — Profile menu



menu has following options:

1) Load profile. Service S6 software has following options of flow meter profile load:

- Load from file — for loading of previously saved profile from the hard drive or removable disk. Select the ***.prf** file of the flow meter profile in the appeared Open window.
- Load from Unit — used for loading profile from the connected Unit.
- Load default profile — is used for loading profile with default factory settings. With this profile it is possible to study utility operation without real Unit connection. Default profile is stored in **default.prf** file in the folder of Service S6 software.

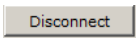
ATTENTION: In autonomous mode, only default profile or previously saved profile is available for loading.

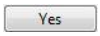
2) Saving profile. Service S6 software has following profile saving options:

- Save to file — for saving profile to the hard drive or removable disk. This option is available only for profile loaded from file or Unit.
  Select the location and give a name to file according to format ***.prf**.

ATTENTION: Saved profile can be afterwards loaded only when Unit with the corresponding output interface is connected.

- Save to Unit — is used for saving modified settings into profile of the connected Unit. It is available only during the time when there is an active connection between PC and Unit.

If the modified settings were not saved into Unit and 

button was pressed or Service S6 software is being closed there will appear a notification on profile settings saving. Pressing 

will save all the unsaved parameters and settings Unit.

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 Unit serial number and date when file was created.

RECOMMENDATION: It is recommended to attach the hardcopy of the profile to Unit specification to log the history of the settings and configurations.

4.8 Unit firmware upgrade

ATTENTION: Unit firmware update should be done only for implementation of improvements, recommended by Manufacturer.

To upgrade the firmware:

1) Connect Unit to PC with the help of service kit and establish connection session between Unit and PC.

ATTENTION: Unit power supply voltage should be within the range stated in its operation documentation.

2) Press Update firmware button in Service S6 software.
3) Choose firmware upgrade file (in ***.blf3** format) from PC or memory stick.
4) Press Open button, that will start firmware file downloading into Unit's memory.
After automatic check for firmware file integrity and compatibility is done by Service S6 Software, window of firmware uploading into Unit memory will appear. In case of any errors the Software will send warning message.
To cancel firmware upgrade it is needed to press Stop button.

ATTENTION: Before the end of the update process and automatic Service S6 software reset it is **forbidden:**
1) To disconnect Unit from the adapter.
2) To disconnect adapter from the PC.
3) To turn PC power off.
4) To run any resource-intensive applications at the PC.

Service S6 software will display appropriate message and will automatically disconnect Unit from PC in case the update is successful. Unit is ready for further operation.
Service S6 software will display a new firmware version with the next connection session between PC and Unit.

In case of any error occur that leaded to the damage of present Unit firmware check all cables and adapter connections and retry. In this case the internal firmware loader is activated and will try to fix Unit operation performance. Contact Technoton technical support at support@jv-technoton.com if another try is also unsuccessful.

4.9 Uninstalling Service S6 software

To uninstall Service S6 software follow the instructions:

1) Select menu of Windows:

Start → All Programs → ServiceS6_*_X_X

2) Run 

shortcut in the selected folder.

3) Follow the instructions of the uninstallation wizard.

All the files related to utility will be deleted from the PC when the uninstallation process finishes.

***** Software uninstallation - described on Service S6 DFM example.
For Service DFM Marine/Service DFM Industrial/Service S6 DUT-E/Service CAN UP/ Service S6 MasterCAN software uninstallation process is similar.

5 S6 BT Adapter service adapter

5.1 Purpose of use and distinctive features

Service Adapter S6 BT Adapter is designed to connect via Bluetooth Units to the device based on the Android operating system (smartphone, tablet) (further on Android device).

You can conduct wireless setup of the following Units using S6 BT Adapter and Android device:

1) One-chamber and Dual-chamber differential DFM fuel flow meters with interface cable, manufactured after 01.01.2016 (DFM AK/CK/DK/A232/A485/ACAN/C232/C485/CCAN/D232/D485/DCAN models).

2) Fuel level sensors:
- DUT-E CAN (manufactured after 01.09.2017)
- DUT-E GSM;
- DUT-E 2Bio.

Features of S6 BT Adapter:

- compliance with European automotive standards;
- wireless setup of Units using Android devices of any world producers;
- power is supplied from the Vehicle onboard circuit using S6 Technology, no need for additional power supply units;
- service cable included into the supplied accessories kit — a universal tool to connect the adapter to Units using S6 Technology;
- convenience of conducting the Units setup from one point of S6 cable system; no need to connect to each individual Unit;
- option of “hot” connection using S6 Technology for the Units configuration; no need to cut off the onboard circuit power supply (battery).

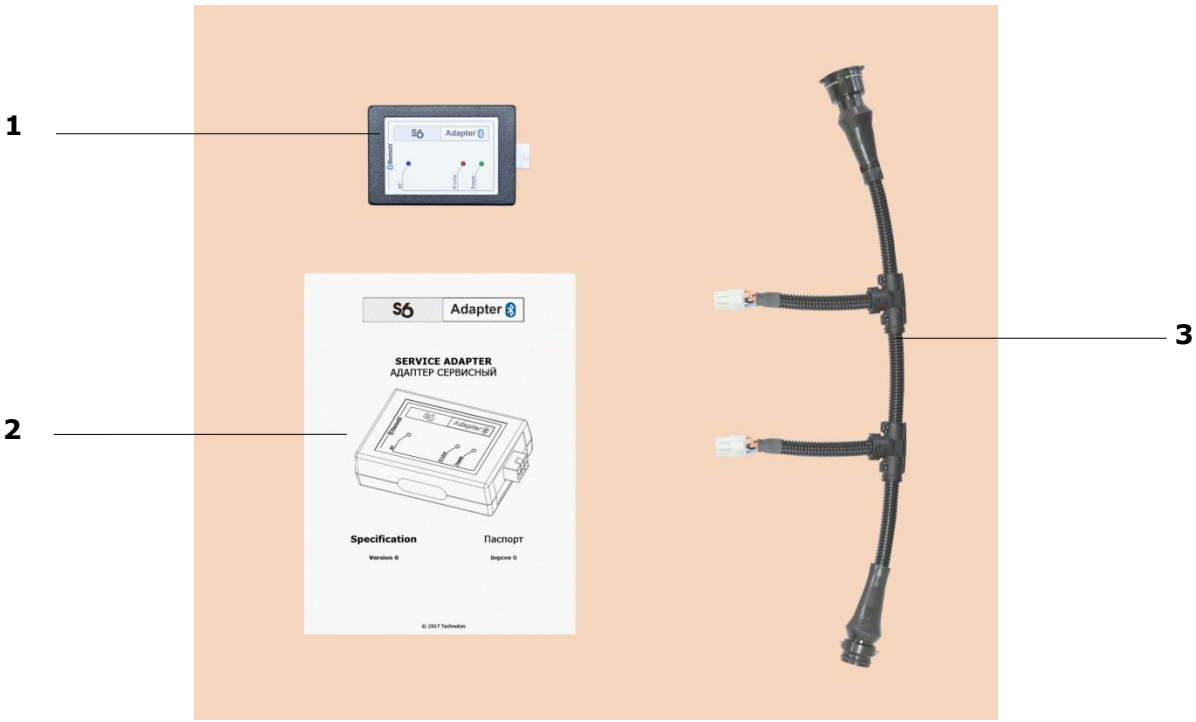
5.2 Main specifications

Table 8 — Main specifications of S6 BT Adapter

Parameter, measurement units	Value
Digital interface	K-Line (ISO 14230)
Specification of the wireless communication channel with the Android device	Bluetooth 4.0
Supply voltage range, V	9…45
Current consumption at 12/24 V, mA, not more than	40/20
Ambient operation temperature range, °C	-40…+85
Ingress protection rating	IP40

5.3 S6 BT Adapter delivery set

5.3.1 Exterior view of delivery set

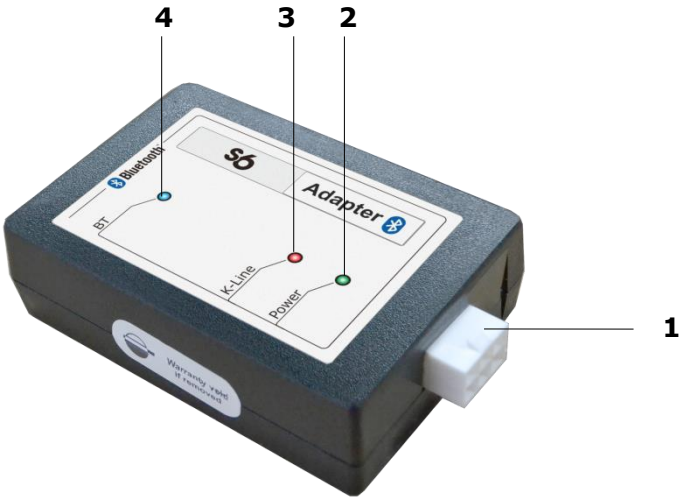


1	S6 BT Adapter	– 1 pc.;
2	Specification	– 1 pc.;
3	Service cable	– 1 pc.

Figure 35 — Exterior view of S6 BT Adapter delivery set

5.3.2 S6 BT Adapter

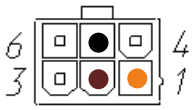
S6 BT Adapter is designed for wireless data exchange via the Bluetooth channel between the Unit which is being set up and the Android device.



1 - **S6** connector to connect to the Unit or for connection using S6 Technology;
2 - green **POWER** LED indicator of power supply;
3 - red **K-Line** LED indicator to transmit data via K-Line interface (ISO 14230);
4 - blue **BT** LED indicator to transmit data via the Bluetooth channel.

Figure 36 — S6 BT Adapter exterior view and structure

*Table 9 — Designation of contacts of **S6** connector*

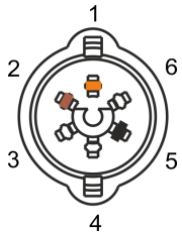
Connector Pinout	Connector Contact Number	Signal designator	Wire color	Signal Designation	Signal Parameters
	1	VBAT	Orange	Power supply "+"	Analog, voltage 9…45 V
	2	GND	Brown	Ground "-"	—
	5	KLIN	Black	K-Line	Digital, ISO 14230 Standard

5.3.3 Service cable

Service cable is used for connection of S6 BT Adapter to:

- Unit when being configured;
- adapter to any free connector of cabling system when Units are configured through S6 Technology.

Table 10 — Service cable pinout and wire assignment

Connectors view	Pin number	Signal designator	Wire color	Signal Designation	Signal Parameters
	1	VBAT	Orange	Power supply “+”	Analog, voltage 9…45 V
	2	GND	Brown	Ground “-”	—
 	5	KLIN	Black	K-Line	Digital, ISO 14230 Standard

5.4 S6 BT Adapter operation

5.4.1 Exterior inspection prior to connection

It is necessary to conduct S6 BT Adapter exterior inspection for the presence of the possible defects arisen during transportation, storage or careless use:

- visible damages of the adapter body;
- connector and insulation damages of cables.

Contact the supplier if any defects detected.

5.4.2 Operation restrictions

Avoid the following when connecting S6 BT Adapter to Unit mounted on the Vehicle:

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

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 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.

5.4.3 Wireless connection of Units to the Android device

ATTENTION: Prior to connecting Units 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.

The wireless connection of Units to the Android device for their setup is performed in the following order:

1) Connect the corresponding connector of the service cable to the connector of **S6** adapter.

2) Connect the adapter to Unit:
- The service cable connector is connected to the corresponding connector of the Unit. Power supply for the Unit and the adapter may be connected to any of the free connectors of the service cable (see figures 37, 38).
- During the wireless setup of Units connected using S6 Technology the connector of the service cable can be input to any free connector of S6 CS. Power supply for the Unit and adapter is provided through S6 CS (see figure 39).

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.

---

* When configuring Unit installed on Vehicle. When configuring Units connected by S6 Technology, power supply of onboard network (battery) can be turned on.

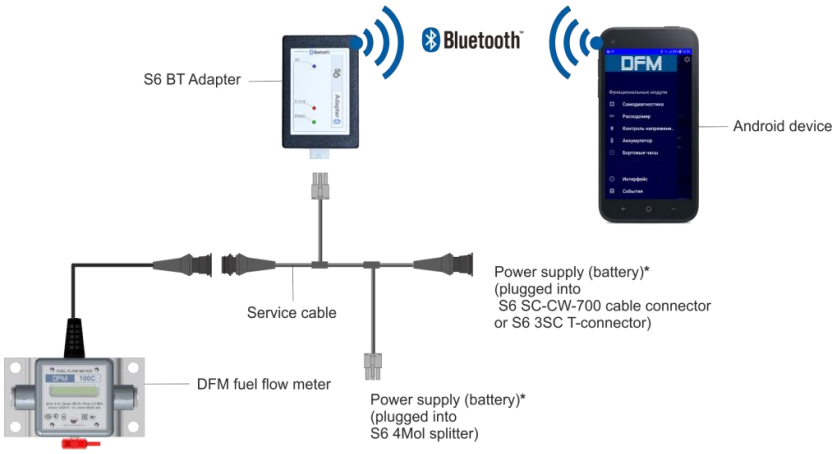


Figure 37 — Connection diagram for wireless setup of DFM fuel flow meter

Figure 38 — Connection diagram for wireless setup of DUT-E CAN/DUT-E GSM/DUT-E 2Bio fuel level sensor

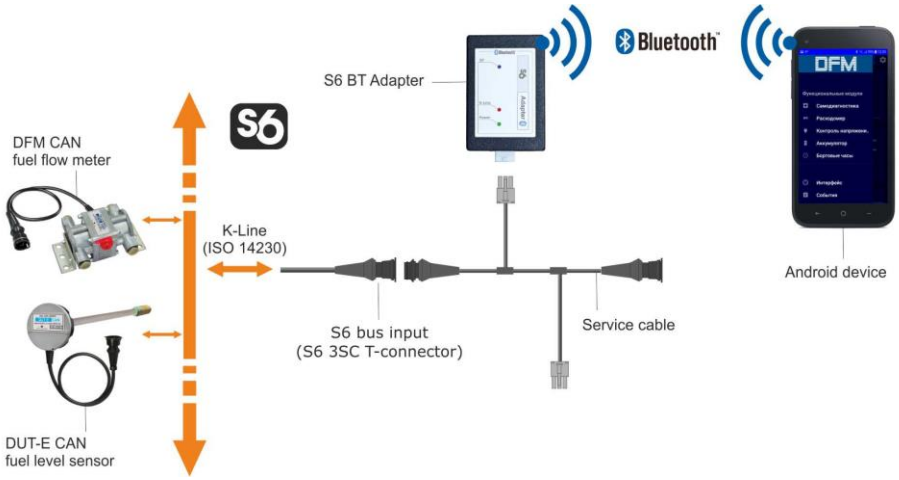
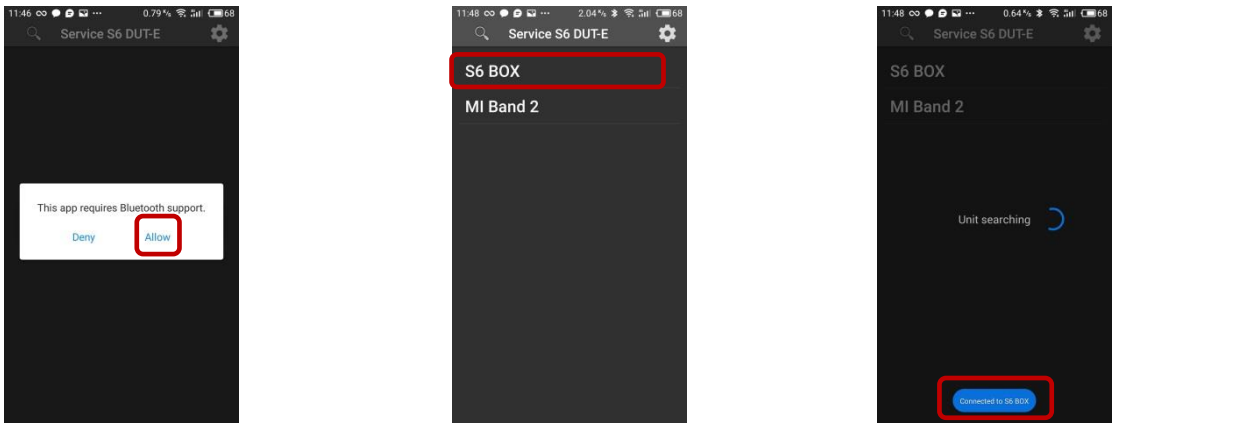


Figure 39 — Connection diagram for wireless setup of Units connected using S6 Technology

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

5.4.4 Operation check

S6 BT Adapter is ready for operation from the moment the power supply is on.
If S6 BT Adapter is connected correctly, Service S6 mobile application (further on S6 application) installed on the Android device in advance (see 6) will automatically offer you to start Bluetooth. After the Bluetooth is activated, a list of all devices available for wireless connection will appear on the display of the Android device. Select **S6 BOX** to connect the Android device to Unit (see figure 40)



a) authorization of the Bluetooth activation in the Android device

b) selection of S6 Units from the list of available Bluetooth devices

c) message of establishing a connection of the Android device to Unit

Figure 40 — Example of the sensor functioning check using the Service S6 service mobile application

During the operation of S6 BT Adapter signals of LED indicators should comply with those indicated in table 11.

Table 11 – LED-indicators' signal description S6 BT Adapter

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 Andorid-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

5.4.5 S6 BT Adapter disconnection

S6 BT Adapter is disconnected in the following order:

1) Save the results of the working session with the Unit in the S6 application.

2) Close S6 application.

3) Disconnect the service cable from the input connector of S6 CS.

4) Disconnect the service cable from S6 BT Adapter connector.

6 Service S6 service mobile application for Android devices

6.1 S6 application purpose

Service S6 service mobile application (further on S6 application) is designed for wireless configuration and monitoring the Unit operation using the Android device via the Bluetooth channel.

S6 application functions:

- viewing Unit specifications;
- checking and modifying Unit settings;
- viewing Unit values of Counters and Events
- working with Unit profile;
- Unit output data control;
- diagnostics of the Unit;
- updating firmware of the Unit

The following S6 applications are available to conduct the setup of Units using Android devices:

- Service S6 DFM (Android) (for wireless configuration of DFM);
- Service S6 DUT-E (Android) (for wireless configuration of DUT-E CAN/DUT-E GSM/DUT-E 2Bio).

The current versions of S6 mobile applications may be found at 

, search request "Technoton".

6.2 Requirements for the Android device

To install and use S6 service mobile application, you need a smartphone or a tablet of any producer that meets the following requirements:

- Android Operating System — version not earlier than 4.4;
- Bluetooth — version not earlier than 4.0.

RECOMMENDATION: For convenience of using S6 service mobile application the user is recommended to employ the tablet with no less than 7-inch screen.

6.3 Installation of S6 application

From the main menu of the Android device enter the Google Play through Play Store and enter the search request "Technoton". Select and install the required S6 service mobile application from the list of search results displayed (see figure 41).

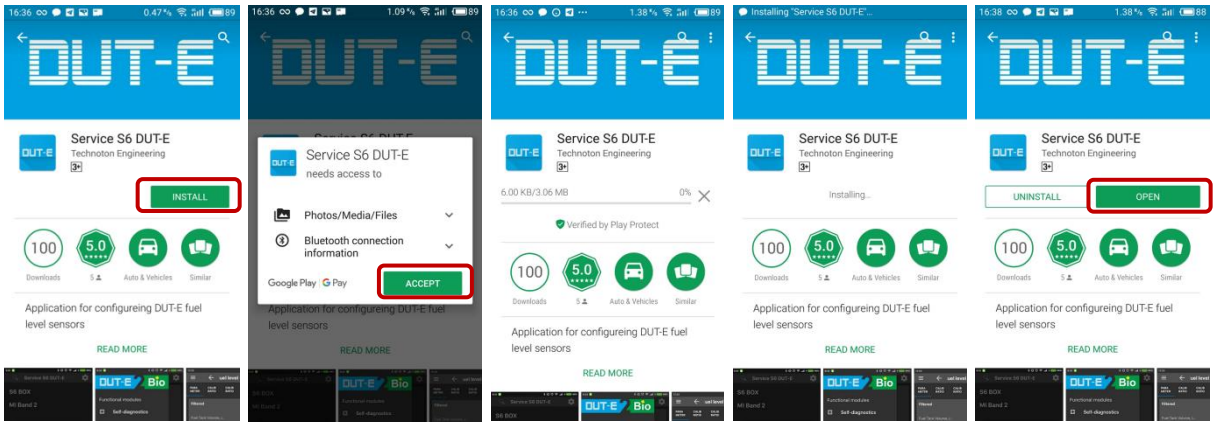


*Figure 41 — Procedure for S6 application installation**

After the successful installation of S6 application its shortcut will appear on the menu of the Android device. The Android device is now ready for the wireless setup of the Unit using S6 BT Adapter.

---

* Service S6 DUT-E (Android) is taken as an example for S6 application installation. For Service S6 DFM (Android) the installation procedure is similar.

6.4 Interface of S6 application

S6 application is activated from the main menu of the Android device with icon , created during its installation.

The interface of S6 application consists of **Information and Configuration Area** and **Tools Panel** (see figure 42).

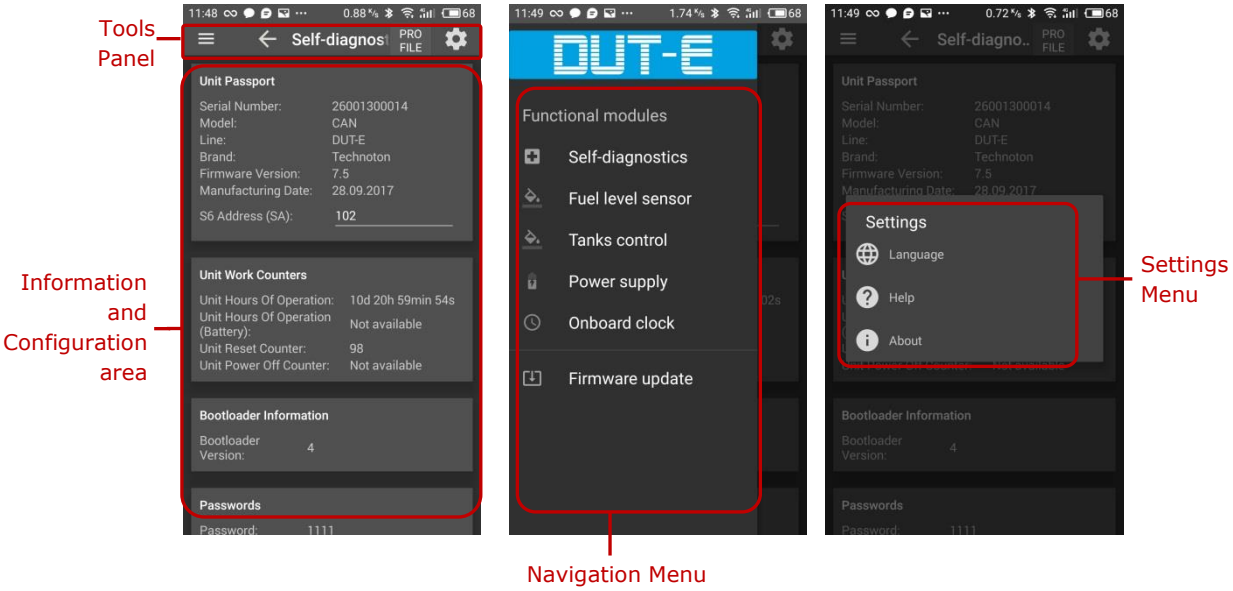


*Figure 42 — Interface of Service S6 service mobile application**

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:

- button to display the **Settings Menu** (selection of the interface language, help and software information);
- button to select operations with the Unit Profile;
- name of the Unit FM which is configured;
- icon to disconnect the Bluetooth channel;
- icon to display the **Navigation Menu** (selection of FM, functioning check, Counters review, firmware update).

When working with Unit, the Service S6 (Android) mobile app operates with data (PGN and SPN) from S6 databases.

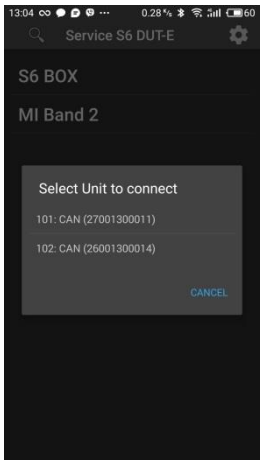
* Here and further on Service S6 DUT-E (Android) is taken as an example for the description of S6 interface. The interface of Service S6 DFM (Android) has similar tools and areas.

6.5 Authorization

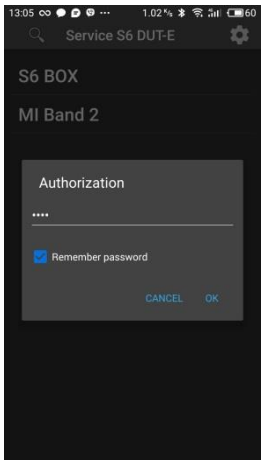
To establish a wireless connection session between Unit and the Android device, select **S6 BOX** from the list of devices available for connection via the Bluetooth channel. S6 application will automatically carry out the search and connection of Unit (see figure 40).

While connecting S6 BT Adapter to the network consisting of several Units using S6 Technology, select the Unit required by Unit for the use of S6 application from the list displayed (see figure 43 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 43 b).



a) selection of one of the Units connected using S6 Technology for work with the application



b) entering the Unit password

Figure 43 — Establishing a wireless communication session between Unit 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 Unit Profile will start.

To restore the Unit password (in case it is lost), you should connect Unit to the PC using S6 SK and proceed in accordance with 4.6.

6.6 Operations with the Unit profile

The Unit **Profile** is a set of PGN containing the Unit passport data, counters and settings of its Functional modules.

ATTENTION: Any operations with the Unit Profile in the S6 service mobile application are possible only during a wireless connection session between the Unit and the Android device. If there is a need to edit the Profile in the off-line mode, connect Unit to the PC using S6 SK and proceed in accordance with 4.7.

To perform any operations with the Unit Profile, the menu **Profile** is used which is opened by pressing the appropriate button on the **Tools Panel** (see figure 44).

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

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

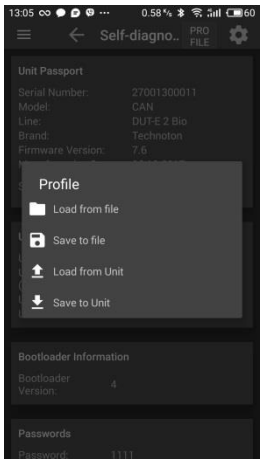


Figure 44 — View of Profile menu

6.7 Unit firmware upgrade

WARNING: Unit firmware update should be carried out **only** for implementing improvements, recommended by the Manufacturer.

To upgrade firmware the following actions should be made:

1) Connect the Unit to the Android device using S6 BT Adapter service adapter (see 5.4.3). Establish a connection between the Unit and the Android device via the Bluetooth channel (see 6.5).

IMPORTANT: The Unit power supply voltage must be within the limits specified in its Operation manual.

2) Click ☰ on the **Tools Panel** of S6 application and select Firmware update in the opened **Navigation Menu** (see figure 45).

3) Select the firmware update file in the memory of the Android device **(*.blf3)**.

4) Start the firmware file loading into the Unit memory by pressing LOAD button.

After the automatic check of the firmware file by S6 application for its integrity and compatibility the window of the firmware file loading process into the Unit memory will appear. In case of any errors, S6 application will display the appropriate warning.

In case you need to cancel the firmware update procedure, press the button ABORT.

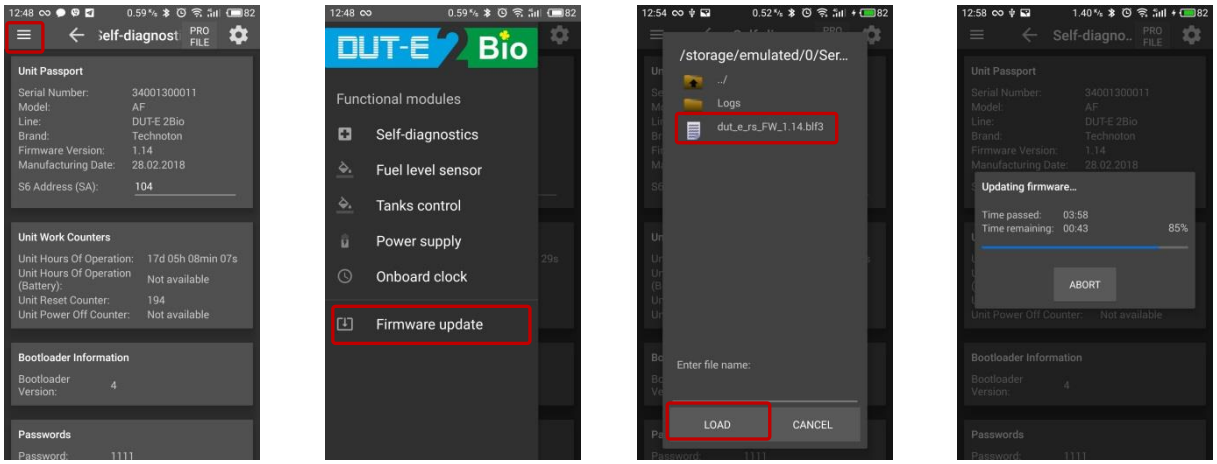


Figure 45 — Procedure for the Unit firmware update

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

- to switch off the Android device;
- to switch off the power supply for the Unit;
- to disconnect the Unit from the service adapter and the adapter from the Android device;
- to connect to the Unit using S6 SK service adapter (cable) and S6 BT Adapter service adapter (wireless) at one time.

After the completion of the firmware update procedure the Unit disconnects from S6 BT Adapter. The connection with S6 BT Adapter is re-established after a repeated selection of **S6 BOX** (see 5.4.4).

In case the firmware update is a success, the Unit is ready for use again. During the next communication session between the Android device and the Unit the new firmware version will be displayed in S6 application.

In case of any error occur that leaded to the damage of present Unit firmware check all cables and adapter connections and retry. In this case the internal firmware loader is activated and will try to fix Unit operation performance. Contact Technoton technical support at support@jv-technoton.com if another try is also unsuccessful.

6.8 Deletion of S6 application

To delete S6 application from the Android device, press for a few seconds the icon of S6 application in the main menu of the Android device. The Trash icon will appear up the screen. Drag and drop S6 application into the Trash; confirm the deletion. S6 application will be deleted from the Android device.

7 Packaging

S6 cabling system items are supplied in plastic bag. Each bag contains a label, where item name, design scheme of item and its connectors, QC stamp and date of manufacture are specified.

S6 SK and S6 BT Adapter delivery sets come in cardboard boxes of the following shape (figure 46).

Figure 46 — S6 SK and S6 BT Adapter packaging

Label sticker with information containing product name, serial number, firmware version, manufacture date, weight and also Quality Control stamp and QR code is placed on two sides of S6 SK and S6 BT Adapter boxes (see figure 47).

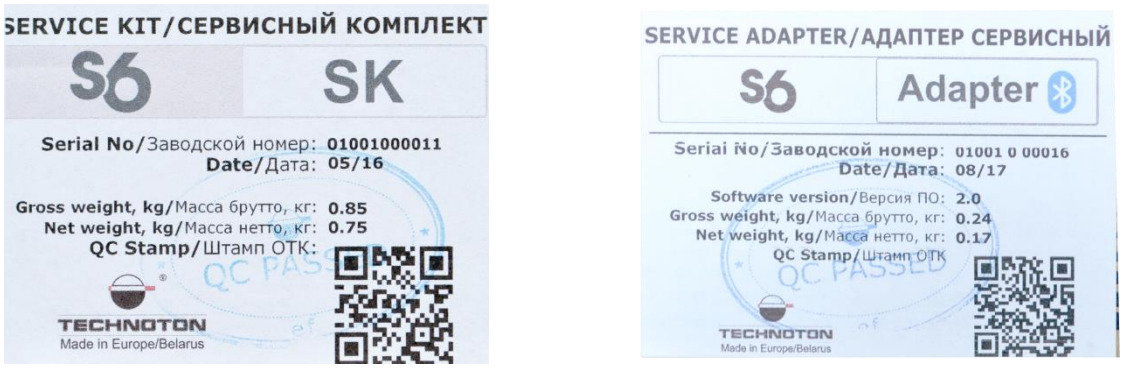


Figure 47 — Label stickers of S6 SK and S6 BT Adapter boxes

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

8 Storage

S6 cabling system, S6 SK and S6 BT Adapter is recommended to be stored in dry closed places.

S6 cabling system, S6 SK and S6 BT Adapter 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 S6 cabling system, S6 SK and S6 BT Adapter in the same room with substances that cause metal corrosion and/or contain aggressive impurities.

S6 cabling system, S6 SK and S6 BT Adapter shelf life must not exceed 24 months.

9 Transportation

Transportation of S6 cabling system, S6 SK and S6 BT Adapter is recommended in closed transport that provides protection from mechanical damage and precipitation.

When transporting by air, S6 cabling system, S6 SK and S6 BT Adapter should be stored in heated pressurized compartments.

Air environment in transportation compartments should not contain acid, alkaline and other aggressive impurities.

Shipping containers with packed S6 cabling system, S6 SK and S6 BT Adapter should be sealed.

10 Utilization/re-cycling

S6 cabling system, S6 SK and S6 BT Adapter does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

S6 cabling system, S6 SK and S6 BT Adapter does not contain precious metals in amount that should be recorded.

Contacts

Distribution, technical support and service

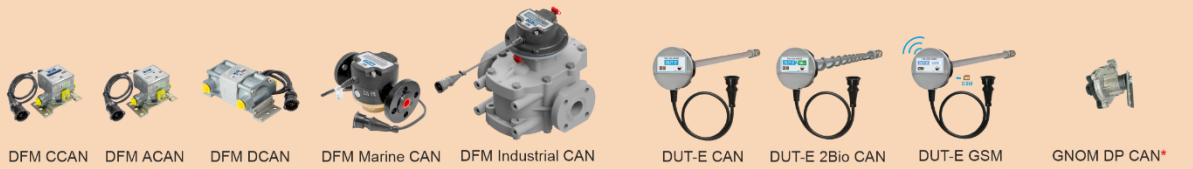
sales@jv-technoton.com

support@jv-technoton.com

Annex A

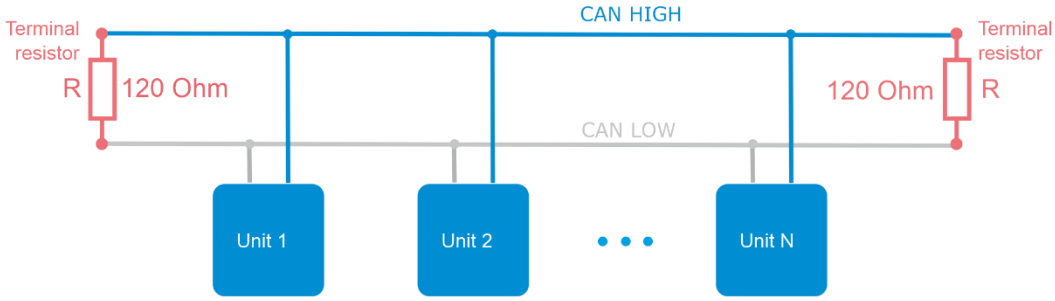
Units connection diagrams examples

ATTENTION: All schemes provided below are valid for connection of any of these Units.



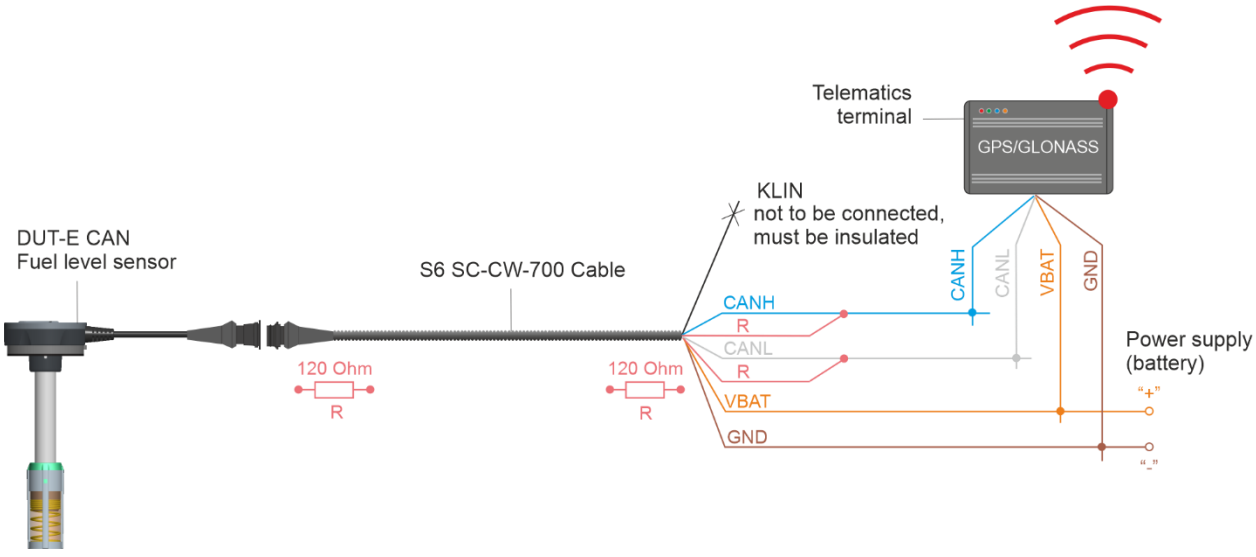
* In order to connect GNOM DP CAN sensor, you need to purchase additionally the signal cable: – S6 SC DP cable (length – 2 m).

Scheme of CAN 2.0B (SAE j1939) communication line layout in CAN j1939/S6 Telematics interface

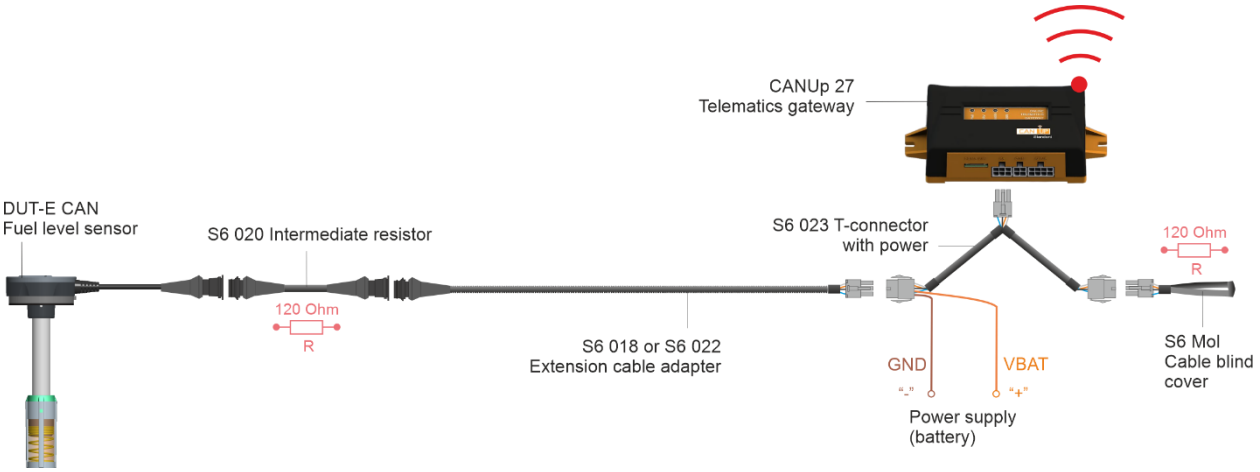


When the cable system length is increased, the maximum Baudrate of Units is reduced:
in the cable system 50 m long – down to 1000 kbit/s; in the cable system 100 m long – down to 500 kbit/s;
in the cable system 200 m long – down to 250 kbit/s; in the cable system 400 m long – down to 125 kbit/s.

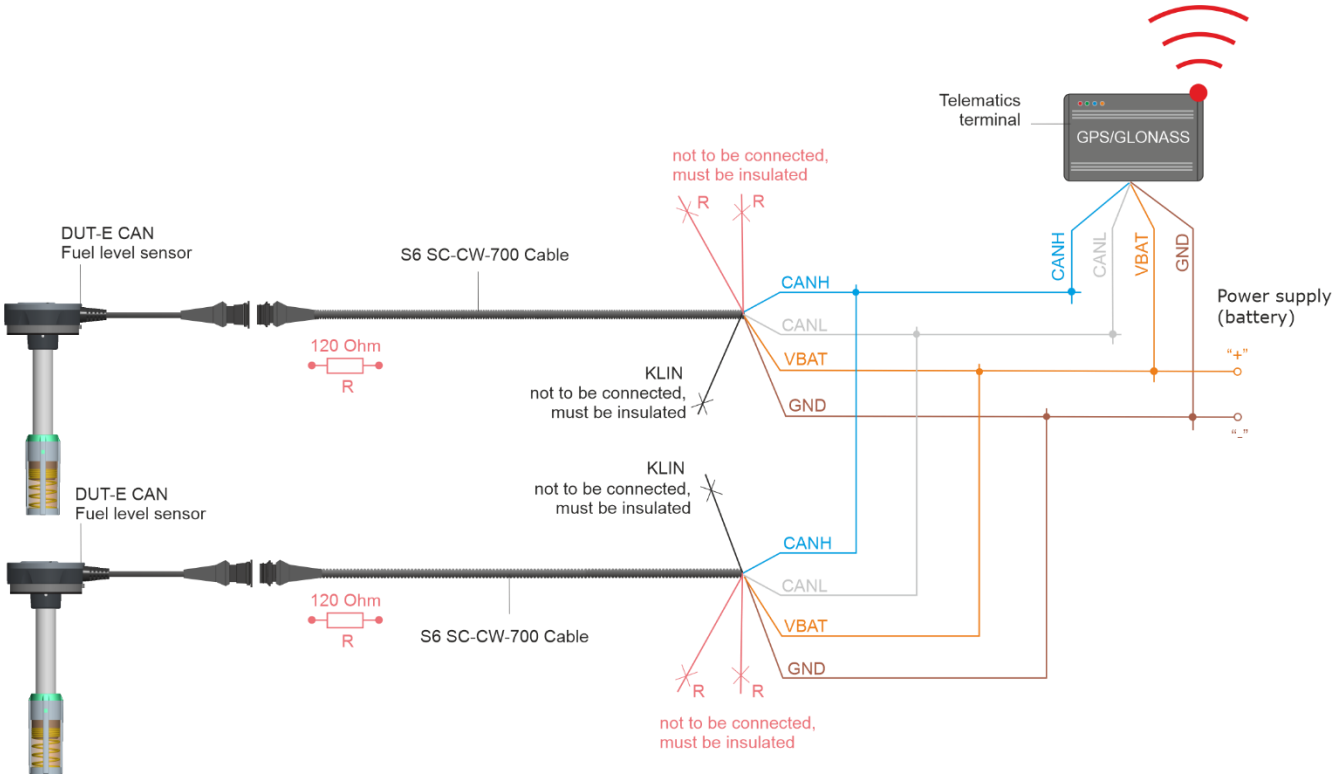
A.1 Connection of one DUT-E CAN sensor to the Terminal which is incompatible with S6 cable system



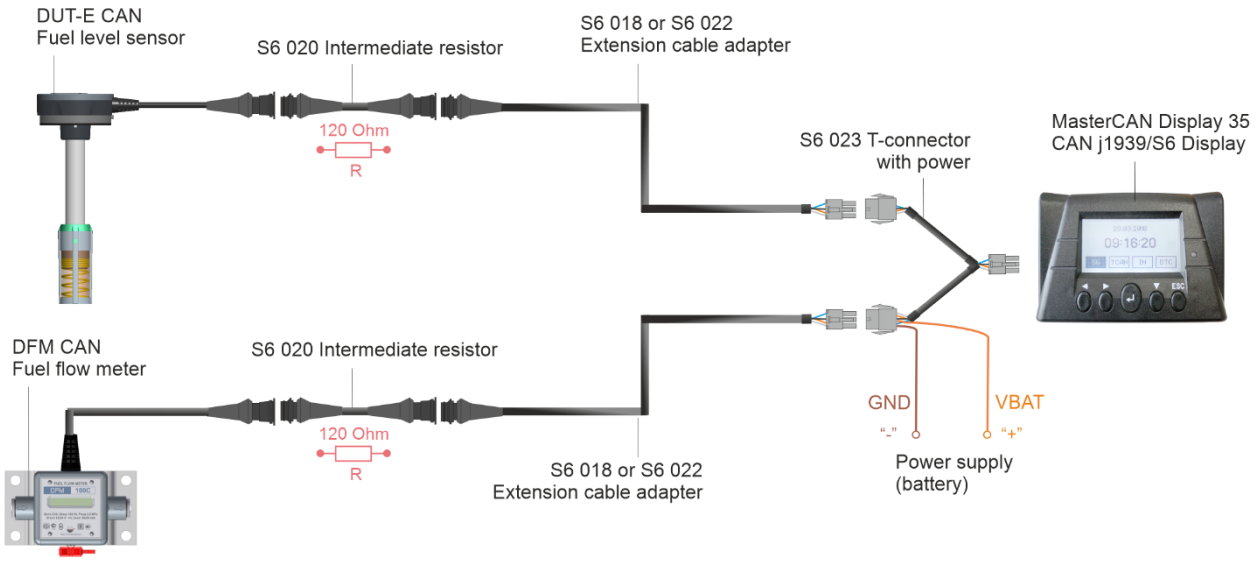
A.2 Connection of one DUT-E CAN sensor to the Terminal which is compatible with S6 cable system



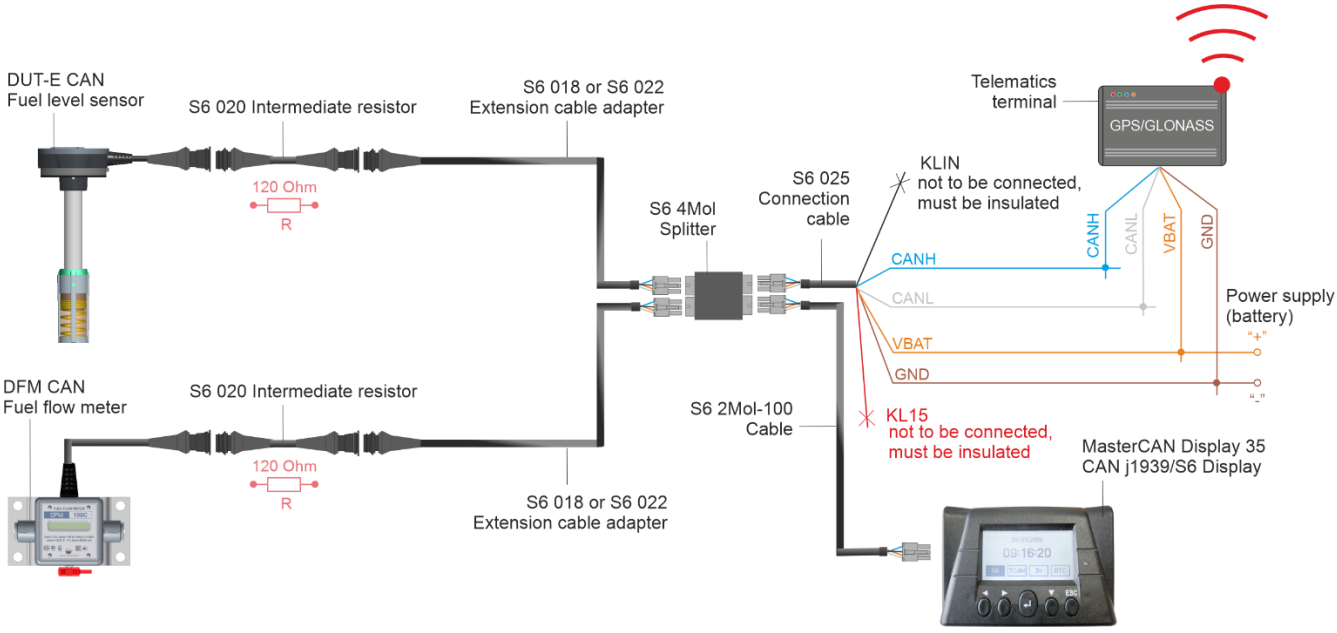
A.3 Connection of two DUT-E CAN sensors to the Terminal which is incompatible with S6 cable system



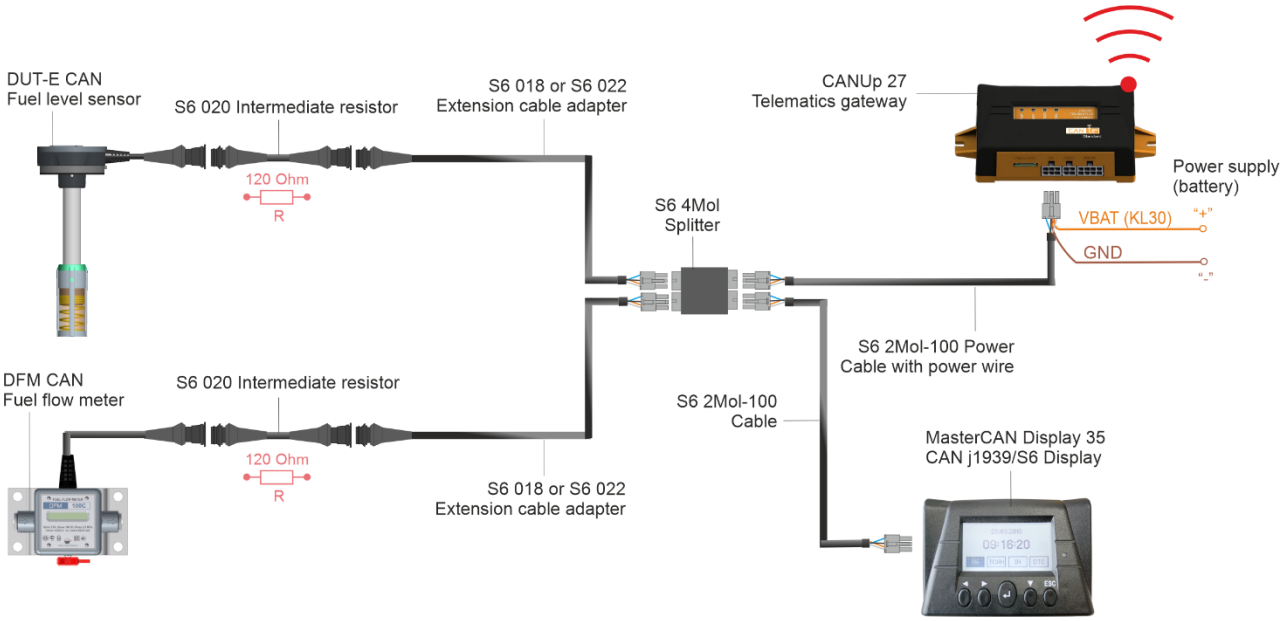
A.4 Connection of DUT-E CAN sensor and DFM CAN flow meter to CAN-display which is compatible with S6 cable system



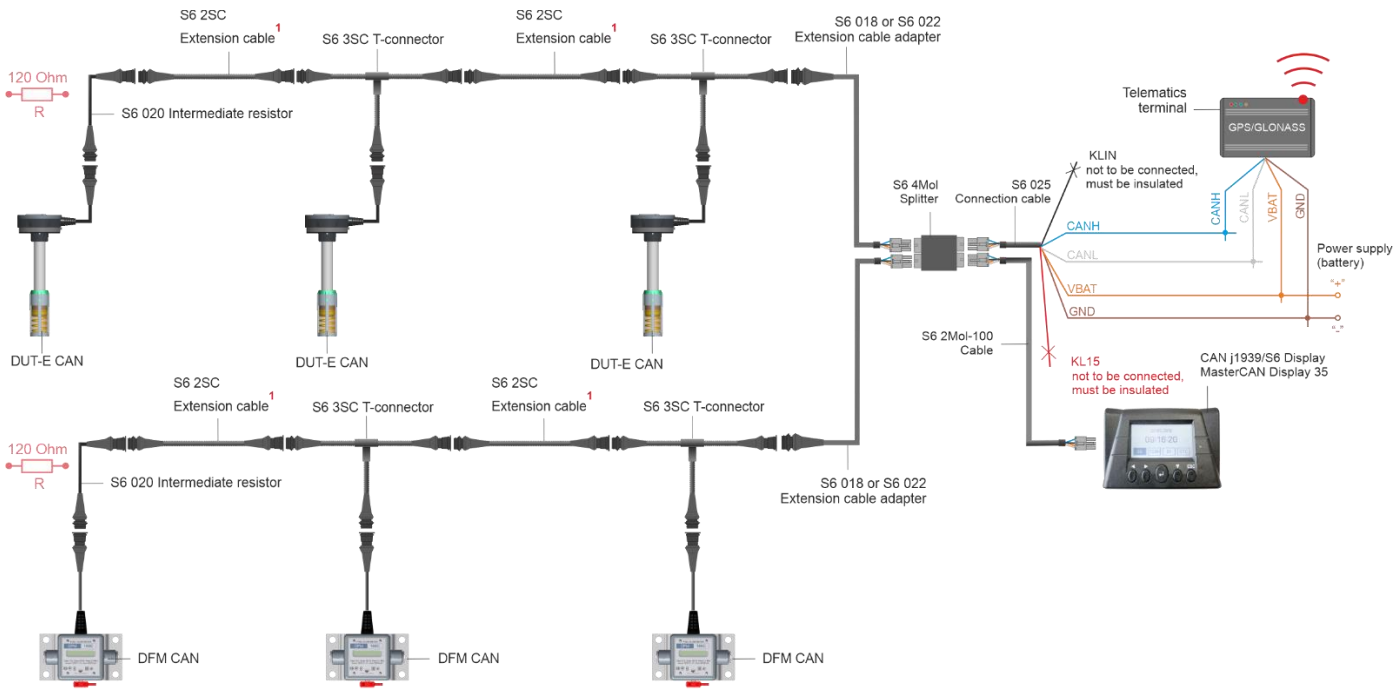
A.5 Connection of DUT-E CAN sensor and DFM CAN flow meter to the Terminal which is incompatible with S6 cable system and to CAN-display which is compatible with S6 cable system



A.6 Connection of DUT-E CAN sensor and DFM CAN flow meter to the Terminal and CAN-display which are compatible with S6 cable system

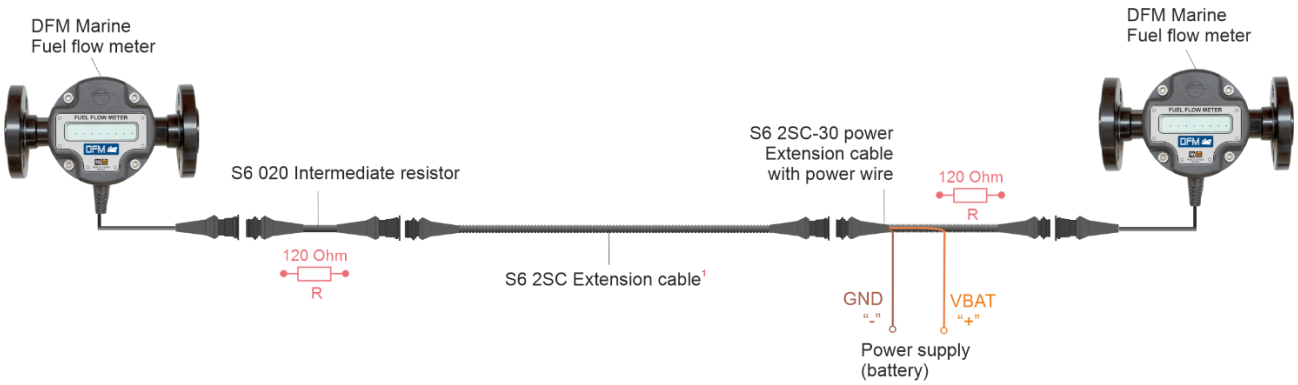


A.7 Connection of several DUT-E CAN sensors and DFM CAN flow meters to the Terminal which is incompatible with S6 cable system and to CAN-display which is compatible with S6 cable system



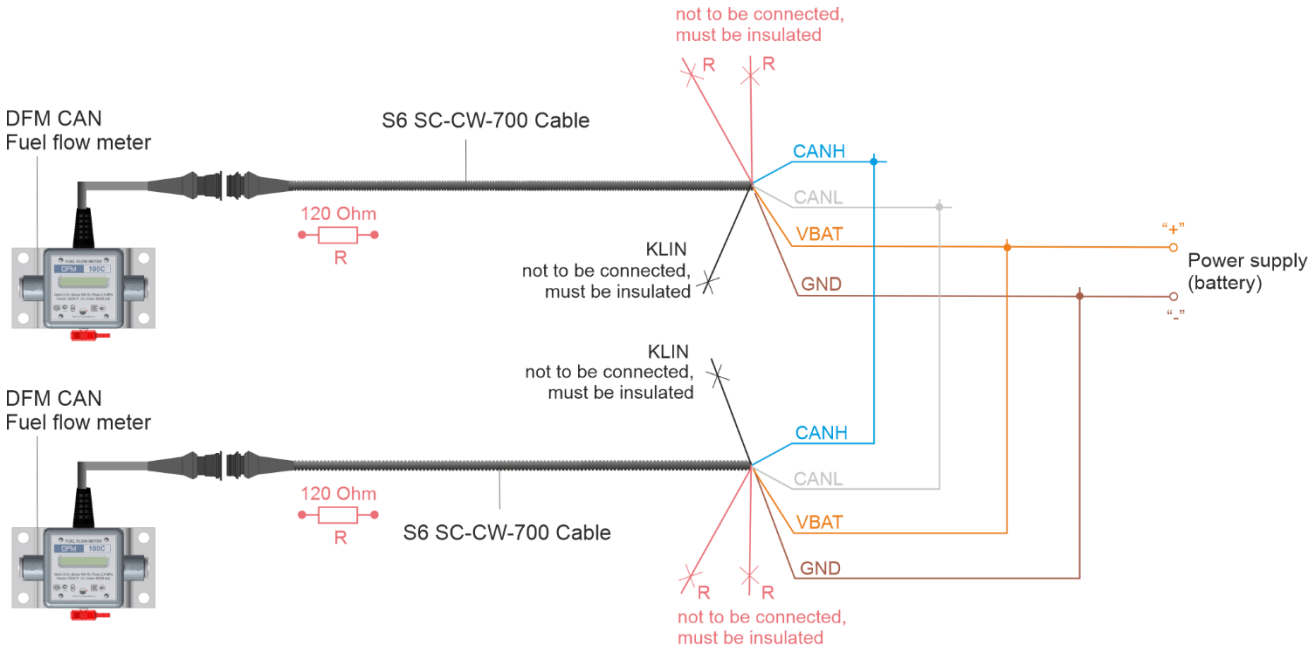
[1]The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

A.8 Independent connection of two DFM Marine CAN flow meters for differential measurement/summation of fuel consumption indications

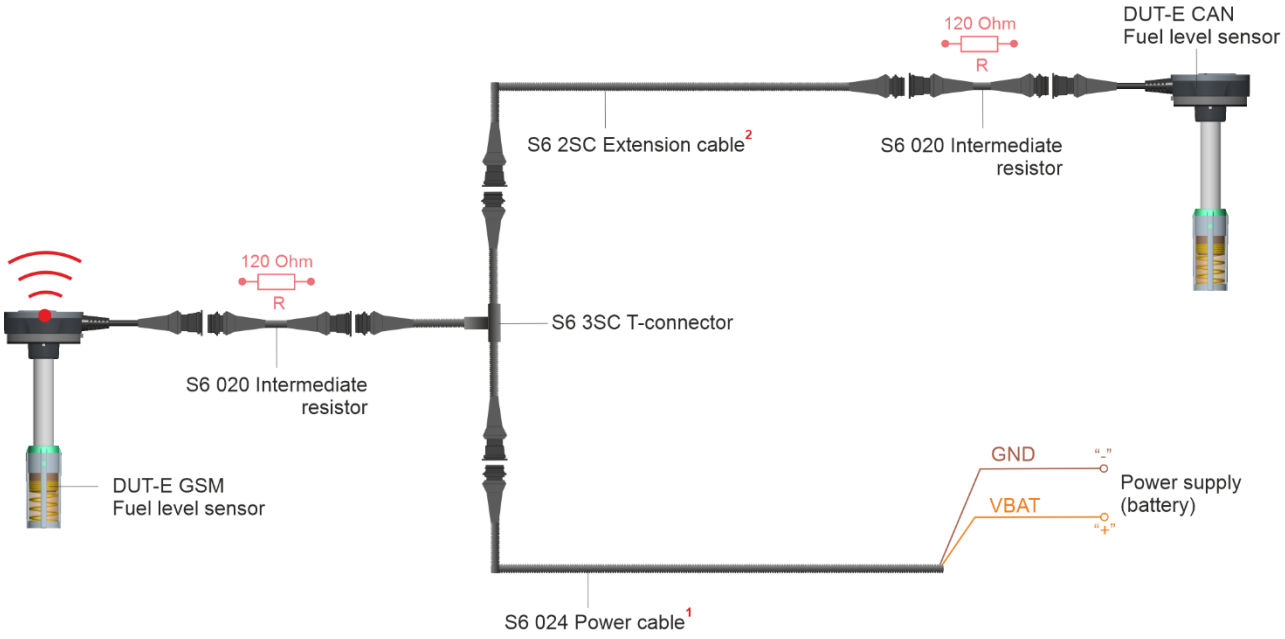


[1]The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

A.9 Independent connection of two DFM CAN flow meters for differential measurement/summation of fuel consumption indications in a large-size engine



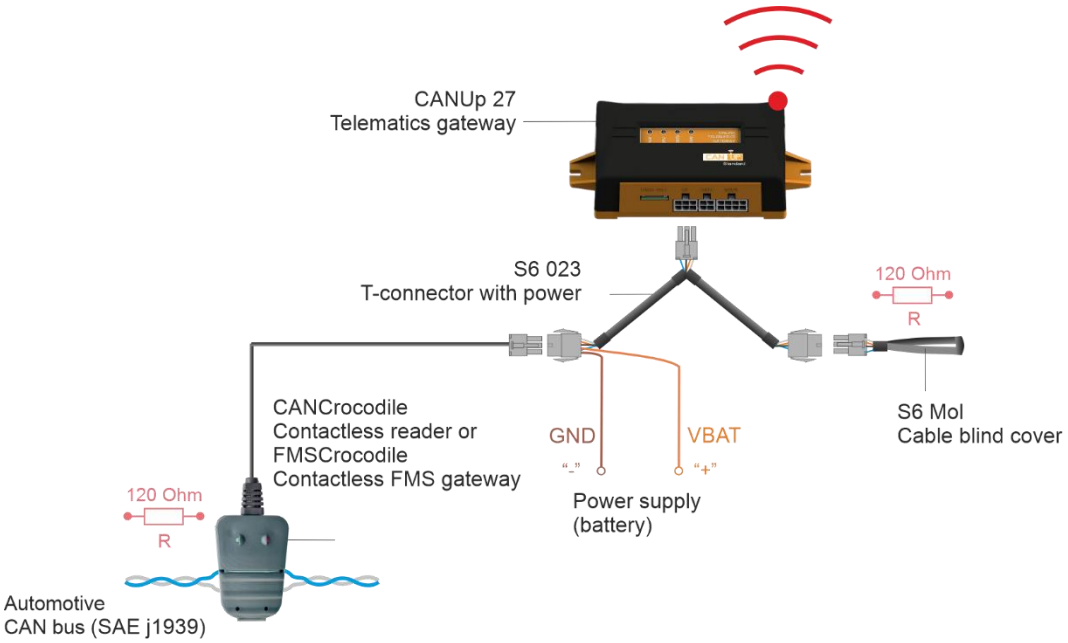
A.10 Connection of DUT-E GSM and DUT-E CAN sensors for monitoring fuel in two tanks



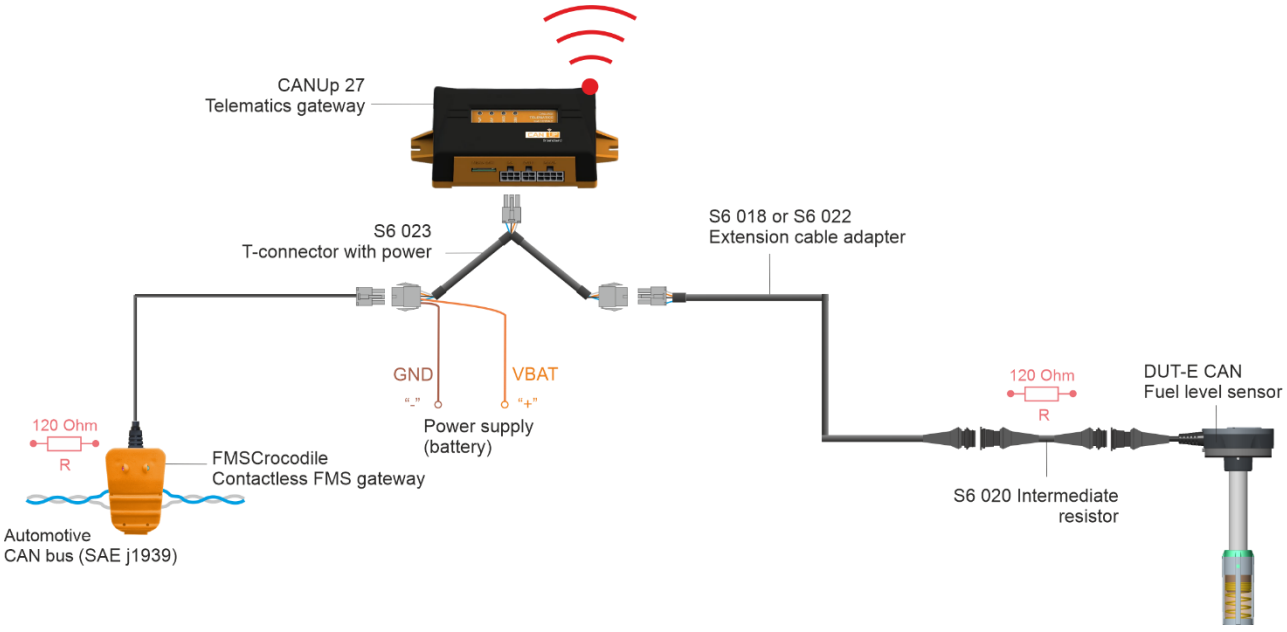
[1]The cable is included into the delivery set for DUT-E GSM sensor. Length – 7.5 m .

[2]The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

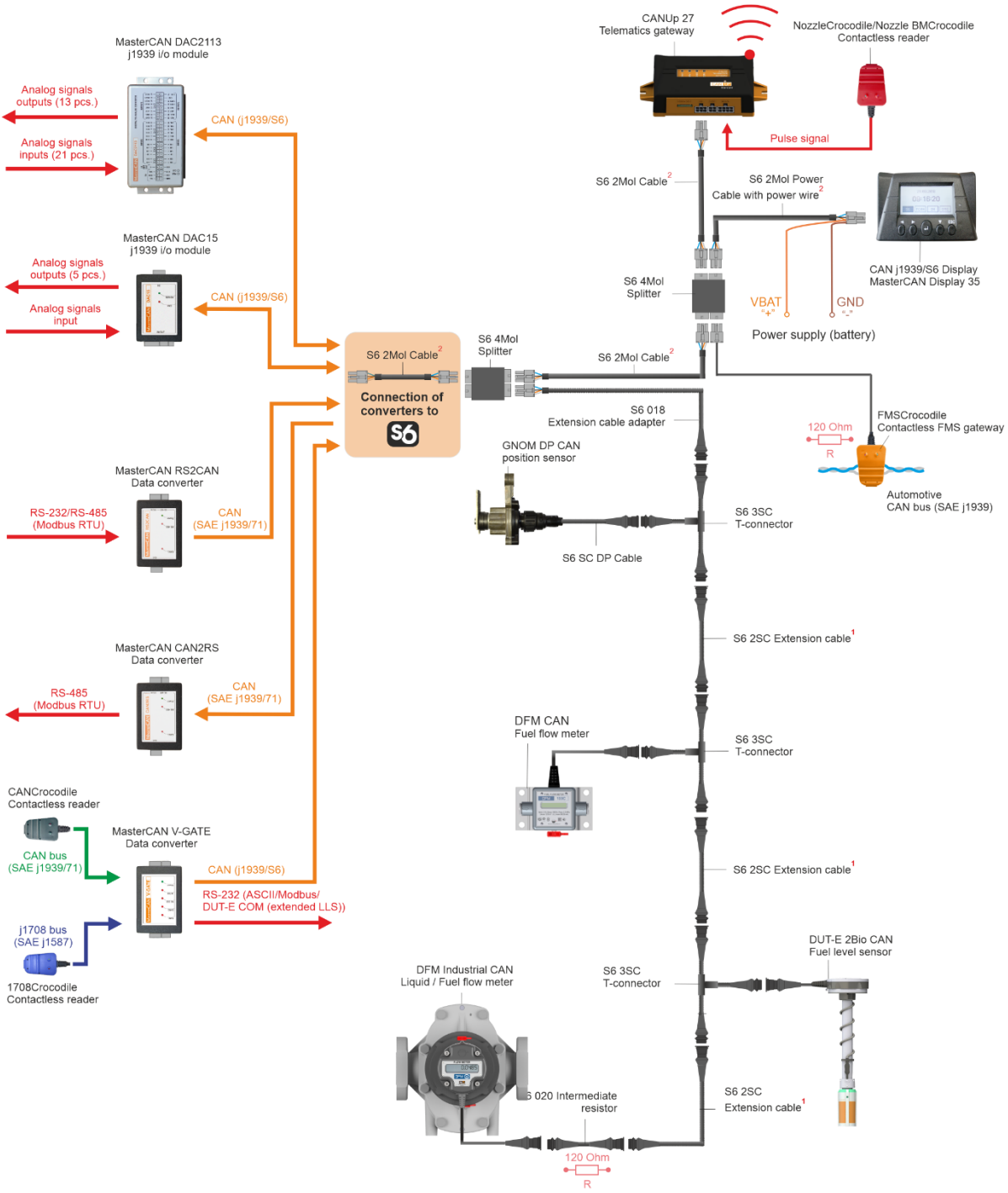
A.11 Contactless connection of the vehicle CAN-bus to the Terminal which is compatible with S6 cable system



A.12 Connection of DUT-E CAN sensor and contactless connection of the vehicle CAN-bus to the Terminal which is compatible with S6 cable system



A.13 Connection of different Units aimed at comprehensive monitoring of parameters of a complicated fixed facility to the Telematics terminal and CAN-display which are compatible with S6 cable system



[1]The length is selected according to installation conditions. Standard lengths are 1, 3, 7 and 12 m.

[2]The length is selected according to installation conditions. Standard lengths are 0.2 and 1 m.