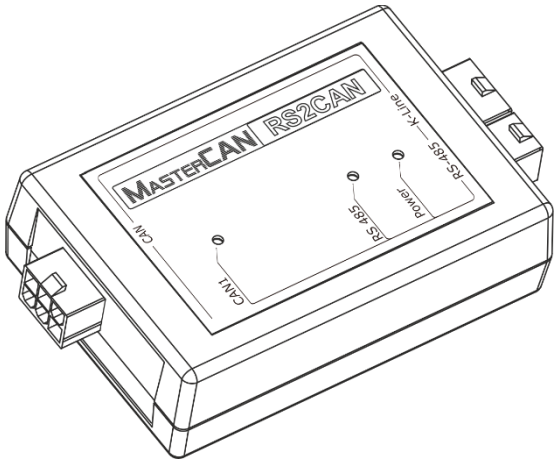
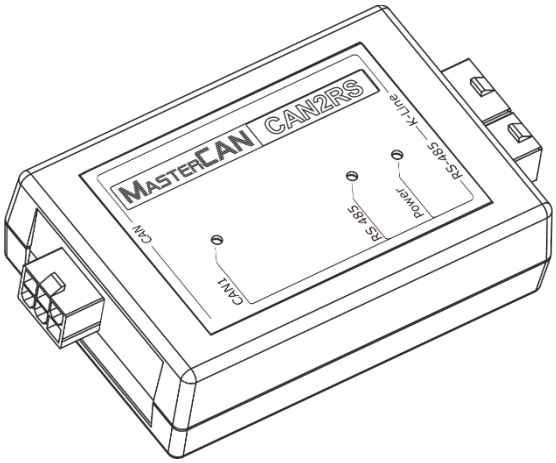
MASTERCAN

DATA CONVERTERS





MasterCAN RS2CAN **MasterCAN CAN2RS**

OPERATION MANUAL

Version 1.0

S6 IoT BURGER

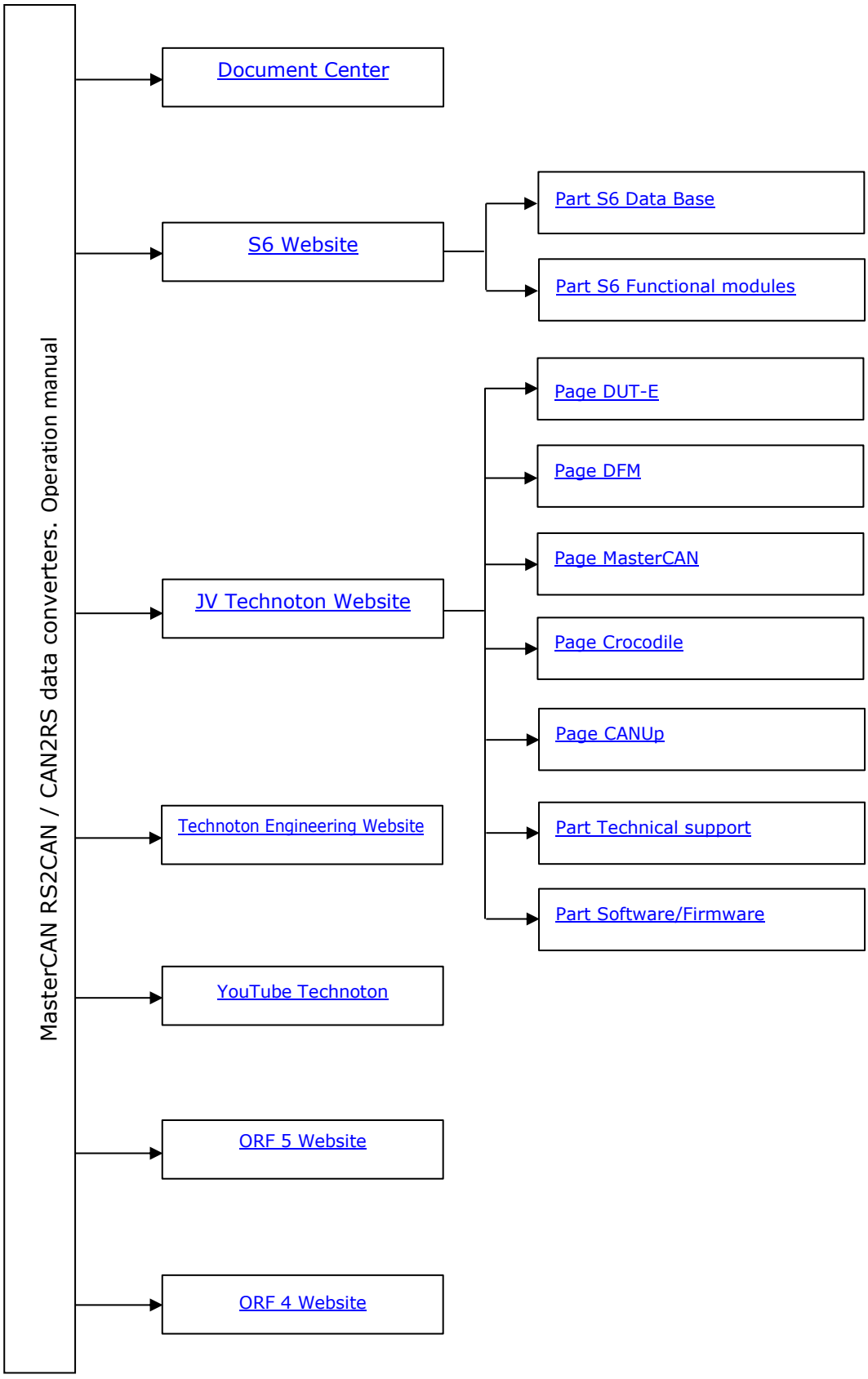
TECHNOTON
ADVANCED MACHINERY TELEMATICS

Contents

Revision history

Version	Date	Editor	Description of changes
1.0	08.2020	OD	Basic version.

Structure of external links



Terms and Definitions

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

Particular features of IoT Burger:

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

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

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

At present, GSM 2G/3G 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.

MasterCAN RS2CAN / CAN2RS converters are implemented based on IoT Burger Technology.

S6 is the Technology of combining smart sensors and other IoT devices within one wire network for monitoring of complex stationary and mobile objects: vehicles, locomotives, smart homes, technological equipment etc. The Technology is based and expands SAE J1939 automotive standards.

Information on cabling system, service adapter and S6 software refer to CAN j1939/S6 Operation manual.

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).

GNSS (Global Navigation Satellite System) — System for area positioning of an object through satellite signal processing. GNSS is composed of space, ground and user segments. Currently, there are several GNSSs: GPS (USA), GLONASS (Russia), Galileo (EU), BeiDou (China).

Analytical report — report generated in ORF 4 / ORF 5 on vehicle or group of vehicles operation for chosen time period (usually a day, week or month). Can be composed of numbers, tables, charts, mapped route of vehicle, diagrams.

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

Parameter — time-varying or space characteristic of the Vehicle (SPN value). For example, speed, fuel volume in the tank, hourly fuel consumption, coordinates. Parameter is usually displayed in the form of graph, or averaged data.

Server (AVL Server) — hardware-software complex of Telematics service ORF 4 / ORF 5, used for processing and storage of Operational data, formation and transmission of Analytical reports through Internet by request of ORF 4 / ORF 5, users.

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 characteristic of Parameter. Counter is displayed by a single number and over time its value is increasing. Examples of counters: fuel consumption, trip, engine hours counter etc.

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

Telematics system — complex solution for vehicle monitoring in real time and trip analysis. The main monitored characteristics of the vehicle: Route, Fuel consumption, Working time, technical integrity, Safety. In includes On-board report, Communication channels, Telematics service ORF 4 / ORF 5.

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

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

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

Introduction

Recommendations and rules contained in this Operation Manual are related to **MasterCAN RS2CAN** / **MasterCAN CAN2RS** data converters (hereinafter converters), models codes: **14** (for MasterCAN RS2CAN), **16** (for MasterCAN CAN2RS), manufactured by JV Technoton, Minsk, Republic of Belarus.
Model code of converter is defined by first two digits of serial number, which is printed on nameplate placed in the lower part of back cover or printed on package label:

The manual contains information on design, operation principle, specifications and instructions on connection, configuration and use of converters.
Data converters are tools serving for secure integration of Onboard equipment with different interfaces to form the integral Telematics system.

Data converters are presented with the following models:

MasterCAN CAN2RS **— are used for data integration from CAN (SAE j1939+S6) interface into RS-485 interface (Modbus RTU).**

MasterCAN RS2CAN **— are used for data integration from RS-485 interface (Modbus RTU) into CAN (SAE j1939+S6) interface.**

Particular features of the data converters:

- configuration of up to 100 slots of input/output data (selection from 10 800+ Parameters of S6 Database);
- work with CAN interface in the following modes — active ("request-response") and secret* ("screening" the bus);
- adjustable baudrate via CAN and RS-485 interfaces;
- simple and secure connection to wires of CAN-bus* with CANCrocodile / FMSCrocodile contactless readers;
- compliance with Units, Database and cabling system S6 Technology;
- implementation based on IoT Burger Technology is the reception of ready data for the Telematics system without using any additional devices;
- simple mounting, the full set of mounting elements in the mounting set;
- power supply from the Vehicle onboard circuit, no additional modules required;
- protection from short circuit polarity reversal of the power supply wires;
- high-quality technical support and documentation;
- conformity with European and national automotive standards.

* Valid only for MasterCAN CAN2RS.

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

For converter configuration using cable connection to the PC you should use S6 SK service adapter (to be purchased separately) and the Service S6 MasterCAN service software (version from 3.15 and higher) (the software current version can be downloaded at https://www.jv-technoton.com/, section Software/Firmware).

ATTENTION: It is strongly recommended to follow strictly the instructions of the present Manual when using, mounting or maintaining converter.

The Manufacturer guarantees converter compliance with the requirements of technical regulations subject to the conditions of storage, transportation and operation set out in this Manual.

ATTENTION: Manufacturer reserves the right to modify converter specifications that do not lead to a deterioration of the consumer qualities without prior customer notice.

1 General information and technical specifications

1.1 Purpose of use, application area, operation principle

MasterCAN CAN2RS is designed for:

Reception and conversion of SPN (SAE j1939+S6 Protocol) into the data of RS-485 interface, with their saving in registers of Modbus RTU Protocol.

MasterCAN RS2CAN is designed for:

Reading registers of Modbus RTU Protocol and conversion of the read data into SPN (SAE j1939+S6 Protocol), with their output into CAN interface.

Area of application — data converters may be employed in Telematics systems for monitoring complicated transport or industrial objects equipped both with CAN-bus, Units of CAN j1939/S6 Telematics interface, and devices using RS-485 interface (see figure 1).

Figure 1 — Employment of data converters

Operation principle:

The input interface of **MasterCAN CAN2RS** CAN data converter is connected to Units and/or the onboard CAN-bus using S6 Technology (see figure 2). In accordance with the user settings, the converter selects the required SPN from input messages (PGN) and converts them into data (up to 100 parameters) of RS-485 interface which are entered into specified registers of Modbus RTU Protocol.

The input interface of RS-485 data converter — **MasterCAN RS2CAN** is connected to the respective Onboard equipment (see figure 3). In accordance with the user settings, the converter reads data from the required Modbus RTU Protocol registers and converts them into the selected SPN (up to 100 pcs.) which it sends to CAN output interface by means of S6 Technology.

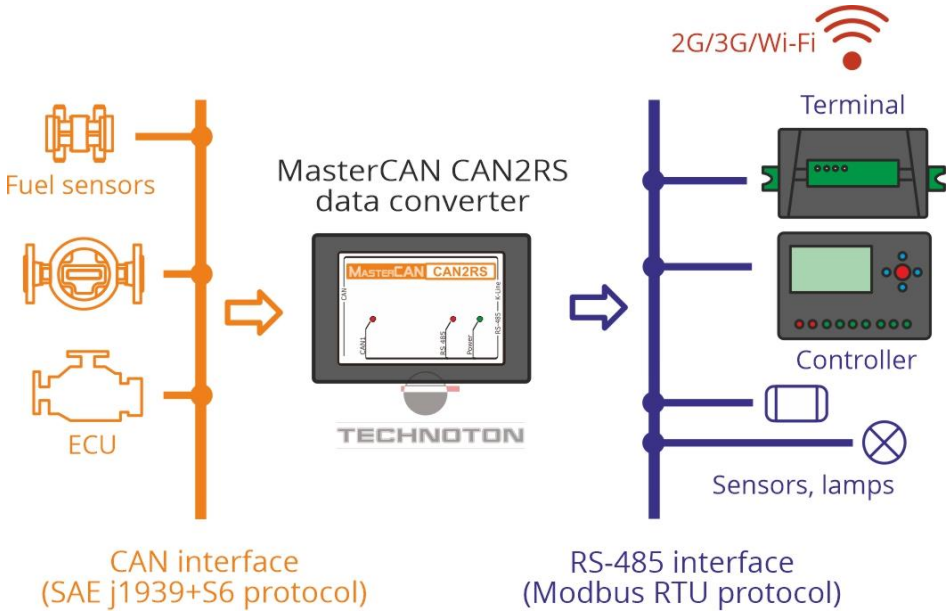


Figure 2 — Example of MasterCAN CAN2RS employment for conversion of data from CAN interface into RS-485 interface

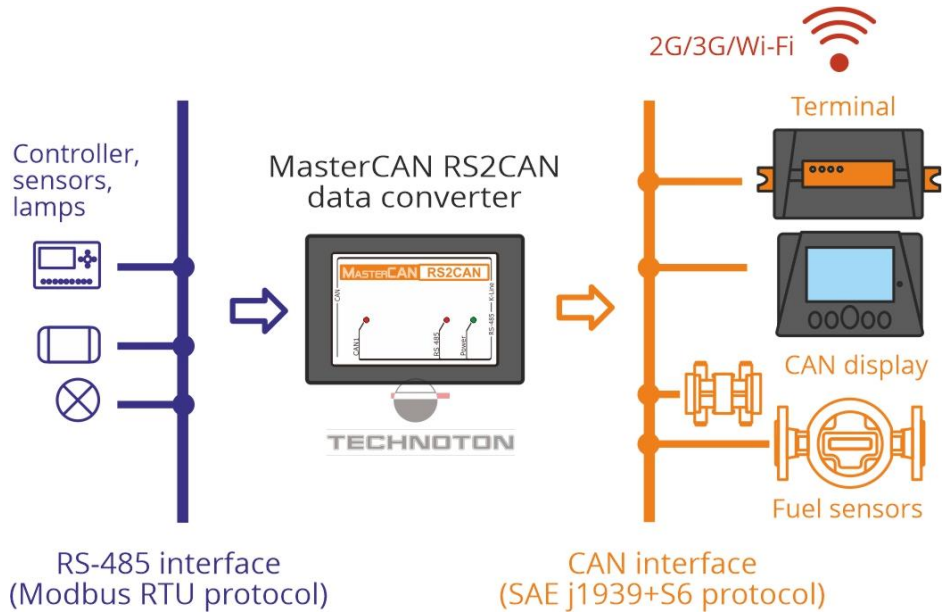
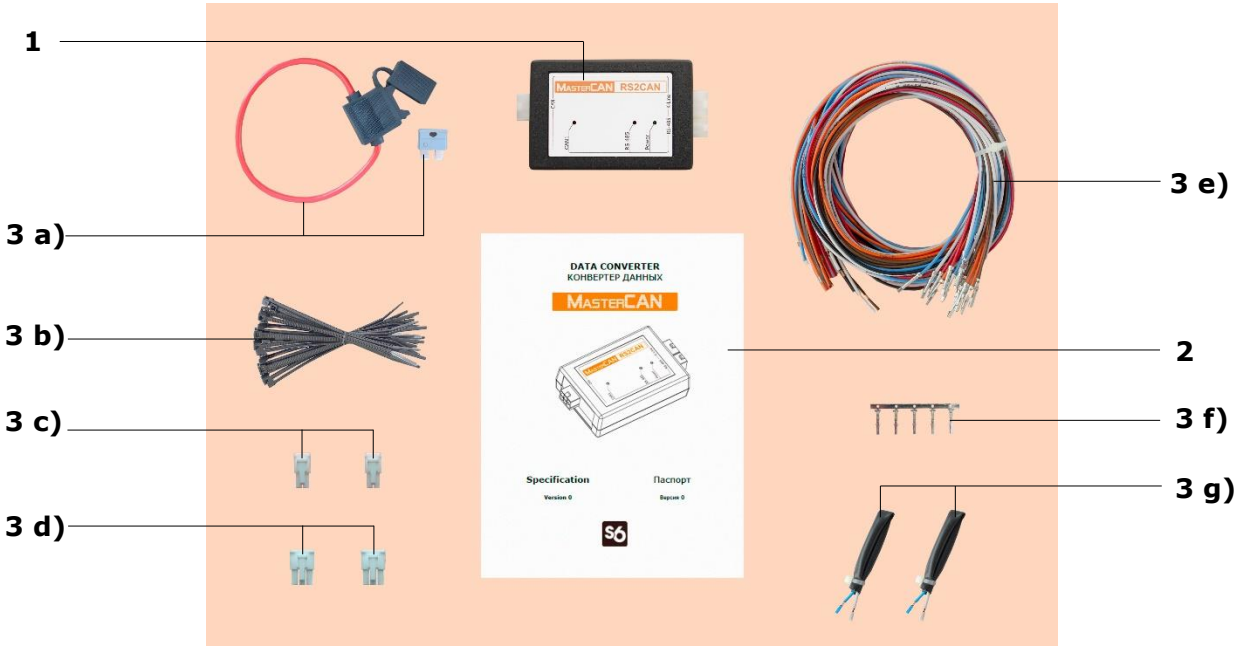


Figure 3 — Example of MasterCAN RS2CAN employment for conversion of data from RS-485 of data from CAN interface

1.2 Delivery set

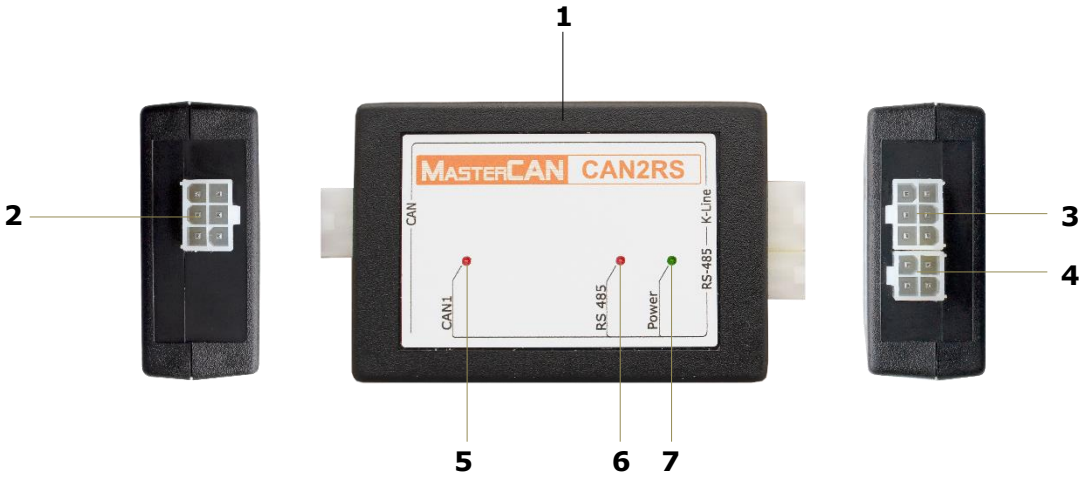


1	Data converter*	– 1 pc.;
2	Passport with a list of factory settings	– 1 pc.;
3	MK VDI Mounting kit (1 pc.) including:	
a)	fuse with holder 2 A (3 A)	- 1 pc.;
b)	cable tie	- 20 pcs.;
c)	molex 4 pin connector	- 2 pcs.;
d)	molex 6 pin connector	- 2 pcs.;
e)	wire	- 17 pcs.;
f)	contact pin	- 5 pcs.;
g)	S6 CW Plug**	- 2 pcs.

Figure 4 — The delivery sets of data converter

* The delivery sets of MasterCAN RS2CAN and MasterCAN CAN2RS models are identical.
** Contains the inbuilt terminal resistor 120 Ohms.

1.3 Exterior view and design



1 – Data converter* casing with the electronic module inside;
2 – **CAN** connector — configurable CAN interface for connection by means of S6 Technology to Units and/or onboard CAN-bus;
3 – **K-Line** connector for connection to S6 SK service adapter connector through which power is supplied and the converter is configured via ISO 14230 interface;
4 – **RS-485** connector — is the configurable RS-485 serial interface;
5 – Red **CAN1** LED indicator for monitoring data exchange via CAN interface.
6 – Red **RS 485** LED indicator for monitoring data exchange via RS-485 interface.
7 – Green **Power** LED indicator for monitoring power supply.

Figure 5 — The exterior view and design of data converter

* The design of MasterCAN RS2CAN and MasterCAN CAN2RS models is identical.

1.4 Technical specifications

1.4.1 Main specifications

Table 1 — Main specifications of data converters

Parameter, measuring unit	Value	
	MasterCAN CAN2RS	MasterCAN RS2CAN
Input interface	CAN	RS-485
Output interface	RS-485	CAN
Service interface	K-Line (ISO 14230)	
Voltage range of external power supply, V	10…45	
Maximal current consumption at supply voltage 12/24 V, mA, not more than	100/50	
Temperature range, °C	-40…+85	
Level of sealing protection from dust and moisture	IP40	
Weight, kg, not more than	0.2	
Overall dimensions, mm, not more than	see figure 6	

1.4.2 Specifications of the configurable CAN interface

The configurable CAN interface is the input interface for MasterCAN CAN2RS data converter and the output interface for MasterCAN RS2CAN data converter. Its specifications correspond to S6 Technology. The data transmission protocol is based on SAE J1939 standard and meets its requirements.

The converters conduct data exchange in the active mode via CAN interface (automatically or upon request). MasterCAN CAN2RS converter can also receive data in the sniffer mode ("sniffering" CAN-bus without detection of the Unit itself).

Configuration of converters connection options via CAN interface (see 3.6) is performed via K-Line interface (ISO 14230) using Service S6 MasterCAN software (version from 3.15 and higher). The software current version can be downloaded at https://www.jv-technoton.com/, section Software/Firmware.

The converters can process any messages (PGN) of S6 Database. You can create up to 100 slots at a maximum for conversion of selected SPN (both in the digital, and in the text format) from/into CAN interface. The maximally allowed number of slots for conversion of text SPN should not exceed 5.

Network addresses of SPN source devices may be selected from the range 0…255.

Baudrate can be selected from the following range of values: 100; 125; 250; 500; 1000 kbit/s (by default — 250 kbit/s).

For its identification by the input interface, MasterCAN CAN2RS has a fixed unique network address — 135.

For its identification by the output interface, MasterCAN RS2CAN has a fixed unique network address — 134.

1.4.3 Specifications of the configurable RS-485 interface

RS-485 configurable interface is the input interface for MasterCAN RS2CAN data converter and the output interface for MasterCAN CAN2RS data converter. Its characteristics meet the standard of RS-485 serial interface.

The converters conduct data exchange via RS-485 interface in the "reponse/request" mode, according to Modbus RTU Protocol.

The connection of the converters via RS-485 interface is configured (see 3.7) via K-line interface (ISO 14230) using Service S6 MasterCAN service software (versions from 3.15 and higher). You can download the software at https://www.jv-technoton.com/.

You can generate maximally up to 100 slots for data conversion to/from RS-485 interface.

During the operation of devices with RS-485 interface in the network MasterCAN RS2CAN is always the Master device. The converter can read data from Slave devices operating in the same network with it from any selected register of Modbus RTU protocol. Network addresses of Slave devices and MasterCAN CAN2RS may be specified from 0…255 range. The network address of MasterCAN CAN2RS by default is 134.

During the transfer of the converted data MasterCAN CAN2RS always operates in the Slave mode. The Master device operating in the same network with it may read data from any selected Modbus RTU register of the converter. MasterCAN CAN2RS network address may be specified from 0…255 range (by default — 135).

Baudrate can be selected from the following values: 2400; 4800; 9600; 19200; 38400; 57600; 115200 bit/s (by default 19200 bit/s).

1.4.4 Overall dimensions

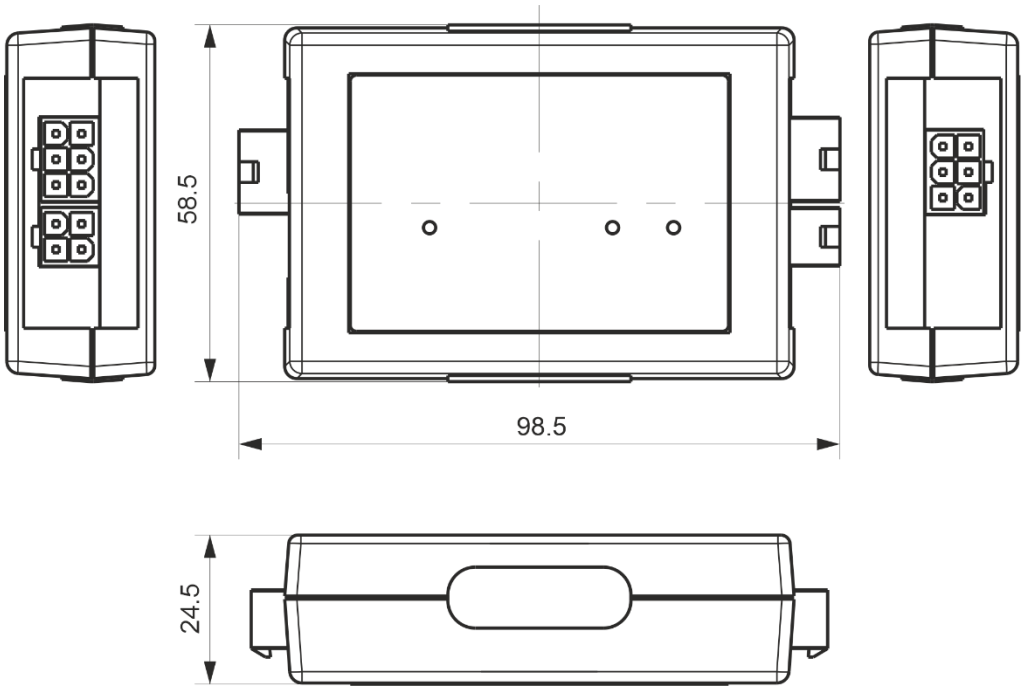


Figure 6 — Dimensions of the data converters

2 Mounting the converters

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

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

2.1 Exterior inspection prior to starting works

It is required to conduct converter exterior inspection for the presence of the possible defects of body or connectors arisen during transportation, storage or careless use.

Contact the supplier if any defects are detected.

2.2 Operating limitations

Data converter installation should be done in a dry location protected from aggressive impact of the environment.

Data converter should not be mounted near heating and cooling devices (e.g. the climate control system). Also, it is not recommended to mount converter close to the power electrical circuits.

A suitable location to mount converter on Vehicle is inside driver's cabin. During installation, you need to make sure that under the automobile hood the converter housing and its wires are located at least 30 cm far from engine rotating parts and surfaces.

2.3 Electrical connection

The Data converter is powered from the external power source (accumulator battery).

IMPORTANT:

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

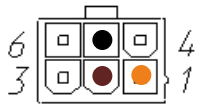
2) It is recommended to use **fuse** (supplied within delivery set) when connecting converter to power supply. Nominal fuse current is 2 A (3 A).

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

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

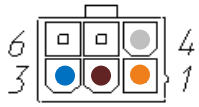
1) The converter is connected to the power source and for its configuration to S6 SK service adapter by means of **K-Line** connector (see 1.3) using Molex 6 pin connector and wires from the delivery set, in accordance with the connectors contacts designation, the colour and marking of the wires, according to table 2.

*Table 2 — Connection of wires to **K-Line** connector of the converter*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
K-Line connector of MasterCAN converter  **Molex 6 pin** connector included into the delivery set 	1	VBAT	Orange	Power "+"	Analog, voltage 9…45 V
	2	GND	Brown	Ground "-"	—
	3	—	—	Reserve	—
	4	—	—	Reserve	—
	5	KLIN	Black	K-Line*	Digital, ISO 14230 Standard
	6	—	—	Reserve	—
* Service interface for configuration and the firmware update of MasterCAN data converter.					

2) The converter is connected to Units and/or to the onboard CAN-bus using **CAN** connector (see 1.3) by means of Molex 6 pin connector and wires from the delivery set, in accordance with the designation of the connectors contacts, the colour and marking of the wires, according to table 3.

*Table 3 — Connection of wires to **CAN** connector of the converter*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
CAN connector of MasterCAN converter  **Molex 6 pin** connector included into the delivery set 	1	VE	Orange	Power Supply Output "+"	Analog, voltage 9…45 V
	2	GND	Brown	Ground "-"	—
	3	CAN1.H	Blue	CAN HIGH	Digital, CAN 2.0B, SAE J1939 Standard
	4	CAN1.L	White	CAN LOW	
	5	—	—	Reserve	—
	6	—	—	Reserve	—
* Transit power supply for CANCrocodile / FMSCrocodile contactless readers for safe connection of MasterCAN CAN2RS to CAN bus wires.					

IMPORTANT: The presence of 120 Ohms terminal resistors between the wires CAN LOW and CAN HIGH wires at the ends of CAN 2.0B (SAE J1939) communication line is the obligatory condition for correct data transfer. In case of converter connection to the Telematics terminal that has no inbuilt terminal resistor, **connect S6 CW plugs** (see delivery set and figure 7).

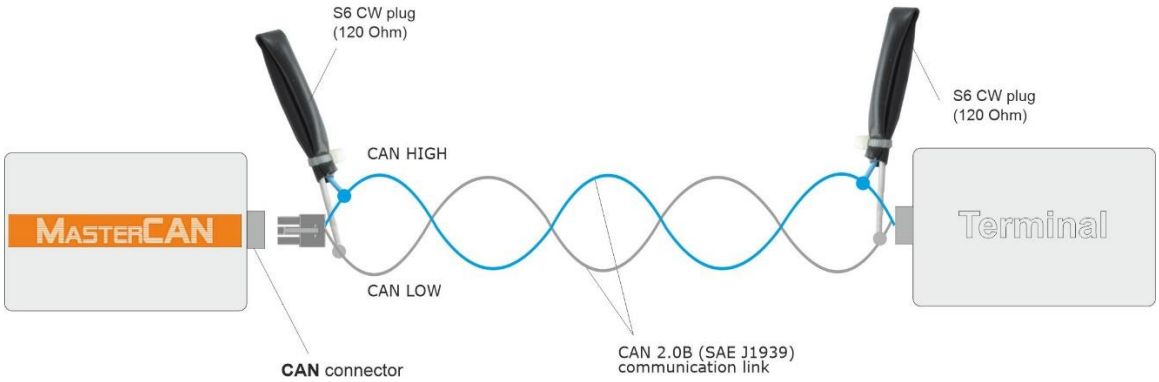
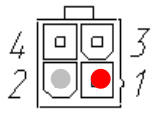
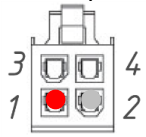


Figure 7 — Connection of data converters by means of S6 Technology to the external device that has no inbuilt terminal resistor

3) The converter is connected to devices via RS-485 serial interface through RS 485 connector (see 1.3) by means of Molex 4 pin connector and wires from the delivery set, in accordance with the designation of the connectors contacts, the colour and marking of the wires, according to table 4.

*Table 4 — Connection of wires to **RS 485** connector of the converter*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
RS 485 connector of MasterCAN converter  **Molex 4 pin** connector included into the delivery set 	1	RS485.B	Red	Data reception/ transmission	Digital, RS-485 Standard
	2	RS485.A	White		
	3	—	—	Reserve	—
	4	—	—	Reserve	—

We recommend to purchase and use connectors for the converter connection to the respective signal wires (see figure 8).

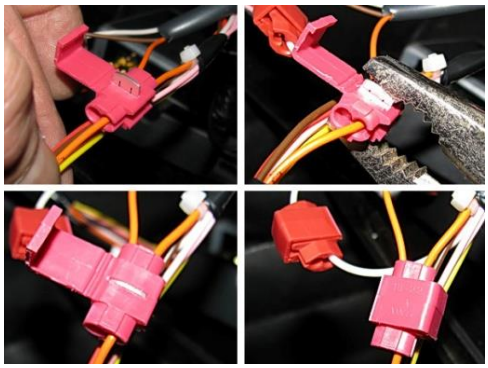


Figure 8 — Connecting signal wires to the converter using connectors

2.4 Connection scheme examples

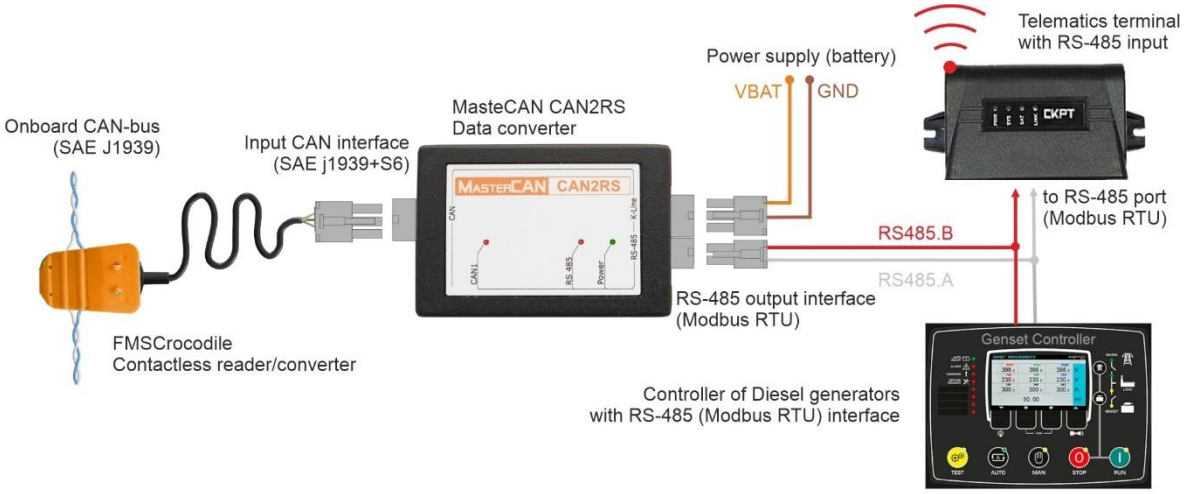


Figure 9 — MasterCAN CAN2RS contactless connection to the onboard CAN-bus for data conversion and their transfer to RS-485 interface of the Telematics terminal

ATTENTION: For secure connection of MasterCAN CAN2RS model via CAN j1939/S6 to the onboard CAN-bus, we recommend to purchase and use CANCrocodile / FMSCrocodile contactless readers (see detailed information in the Crocodile contactless readers Operation Manual).

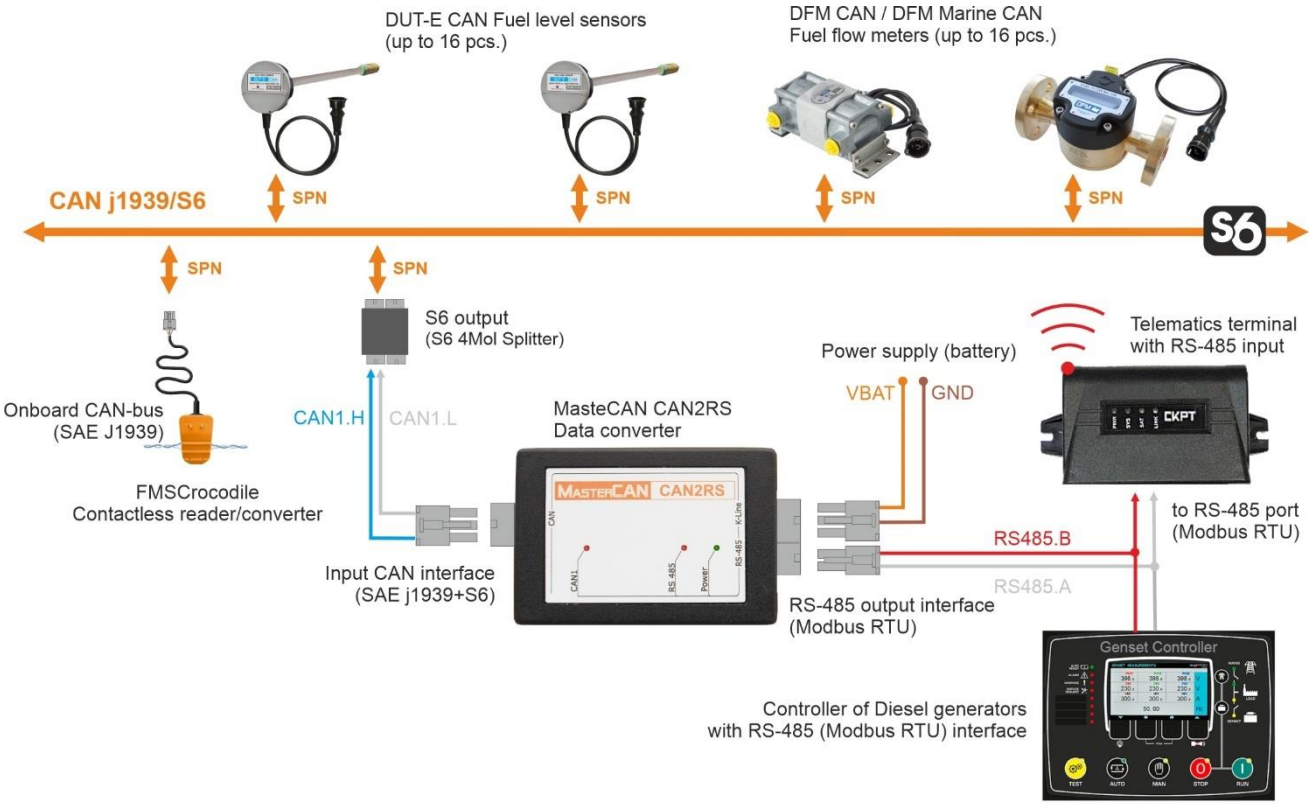


Figure 10 — Connection of MasterCAN CAN2RS to CAN j1939/S6 Telematics interface for transfer of the converted data from Units and the onboard CAN-bus to RS-485 interface of the Telematics terminal

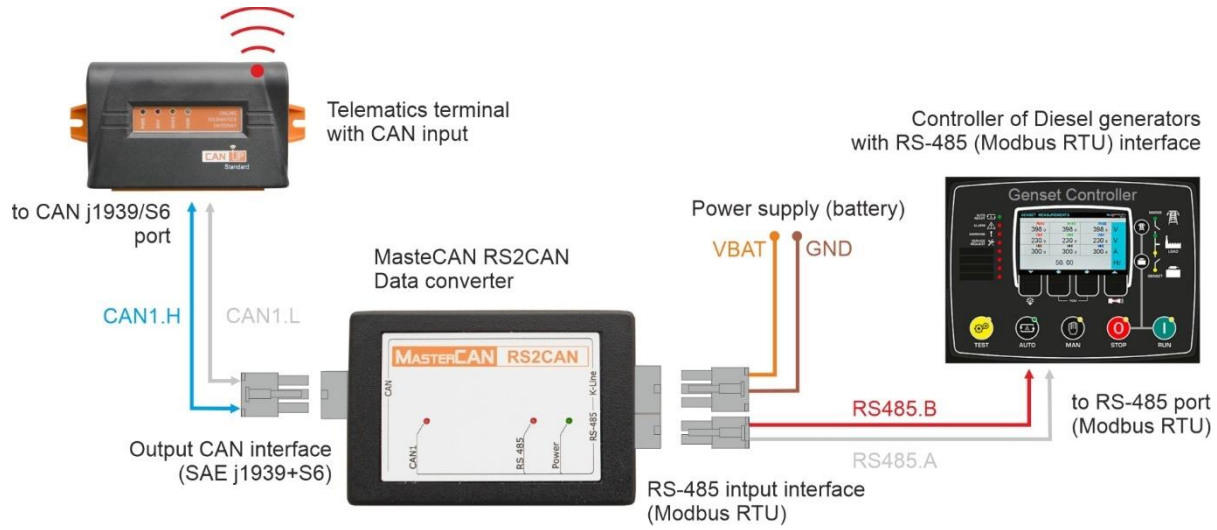


Figure 11 — Connection of MasterCAN RS2CAN to the Telematics terminal with CAN-input for transmission of converted data from RS-485 interface

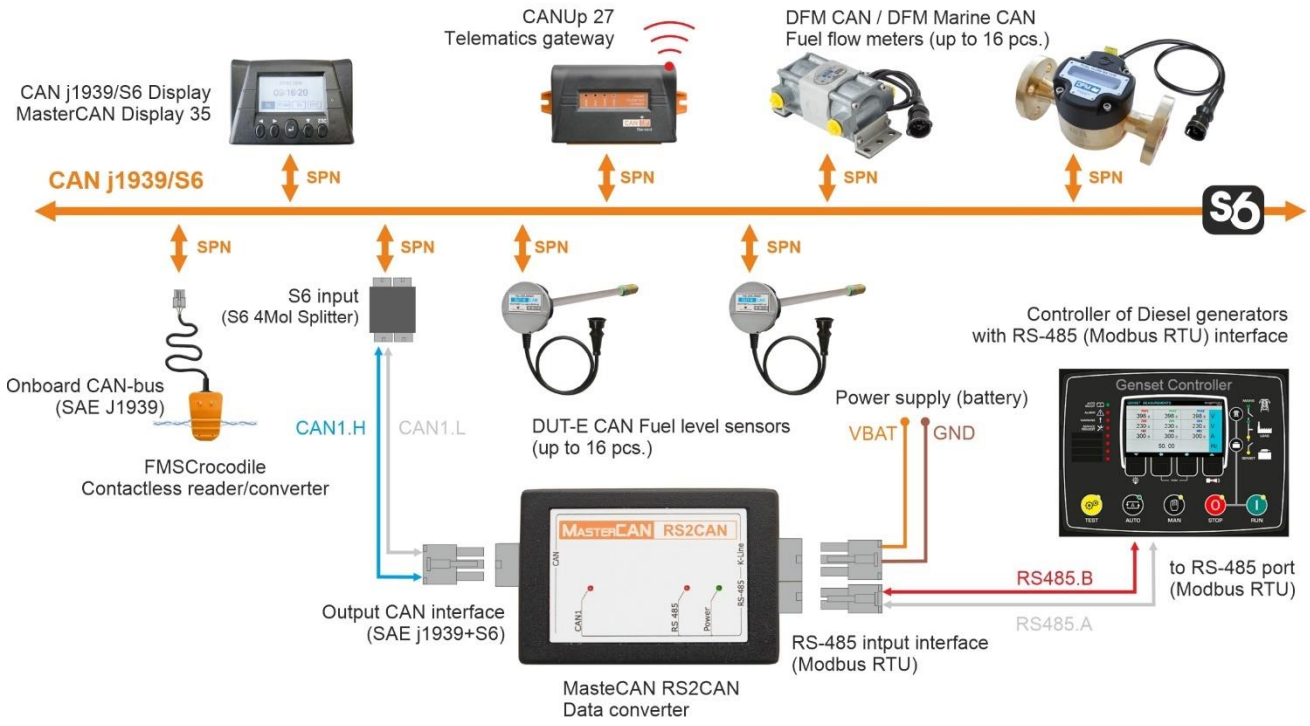


Figure 12 — Connection of MasterCAN RS2CAN to CAN j1939/S6 Telematics interface for the transfer of converted data of RS-485 interface to the Telematics gateway and CAN-display

3 Configuring converters

3.1 Basic provisions

The data converters are configured via K-Line interface (ISO 14230) using S6 SK service adapter which is purchased separately. For configuration, connect the converter to the personal computer (further on — PC) using the service adapter.

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

Before connecting converter to PC via service adapter, please download special software from http://www.jv-technoton.com/ (section Software/Firmware) and install it to your PC:

- USB driver;
- Service S6 MasterCAN (version 3.15 and higher).

Note — Installation file of software has the view as: ServiceS6_MasterCAN_X_X_Setup.exe. X_X corresponds to the version of software.

ATTENTION: For work with Service S6 MasterCAN 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.

Description of S6 SK and requirements for PC can be found in CAN_j1939/S6_Operation manual.

See annex A for converters settings, displayed and/or made by Service S6 MasterCAN software.

3.2 Connecting converters to PC

ATTENTION: Prior to connecting converter to a PC, it is necessary to turn off electrical circuits of the machinery unit (Vehicle)*. To do this, use the battery switch or remove the battery terminals.

Before starting to use service adapter, have a closer look on its elements to detect defects which can occur while service adapter was transported, stored or handled carelessly.

Avoid the following when connecting service adapter to converter, installed on the Vehicle:

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

The converters are connected to the PC for their configuration, in accordance with connection diagrams, provided in figure 13. You need to perform the following operations in the following sequence:

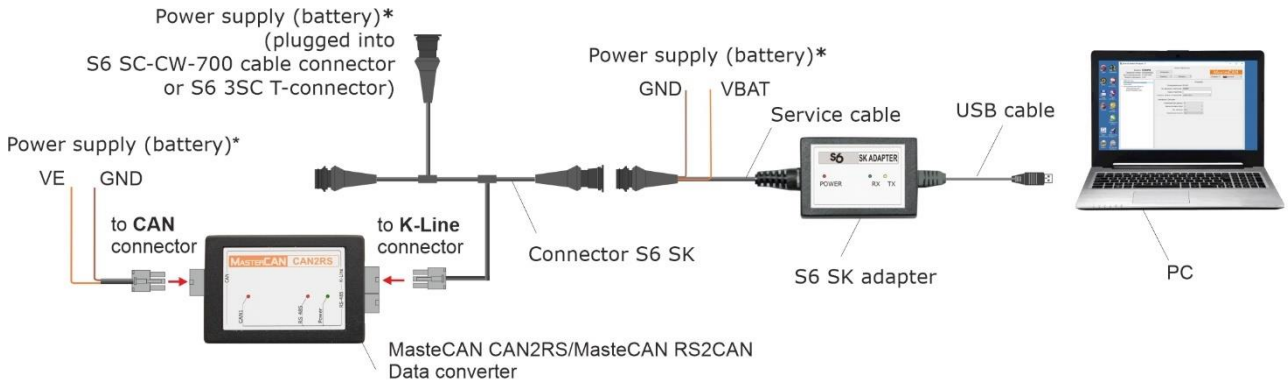
1) Connect the adapter to the converter. For this purpose, connect the adapter service cable connector through to **K-Line** socket of the converter. The converter and adapter can be powered through one of the free S6 SK connectors, through the converter **CAN** connector or by power supply wires of the adapter service cable (see figure 13 a).

Note — During the configuration of a Unit operating by means of S6 Technology the converter and adapter are powered via S6 cable system (see figure 13 b).

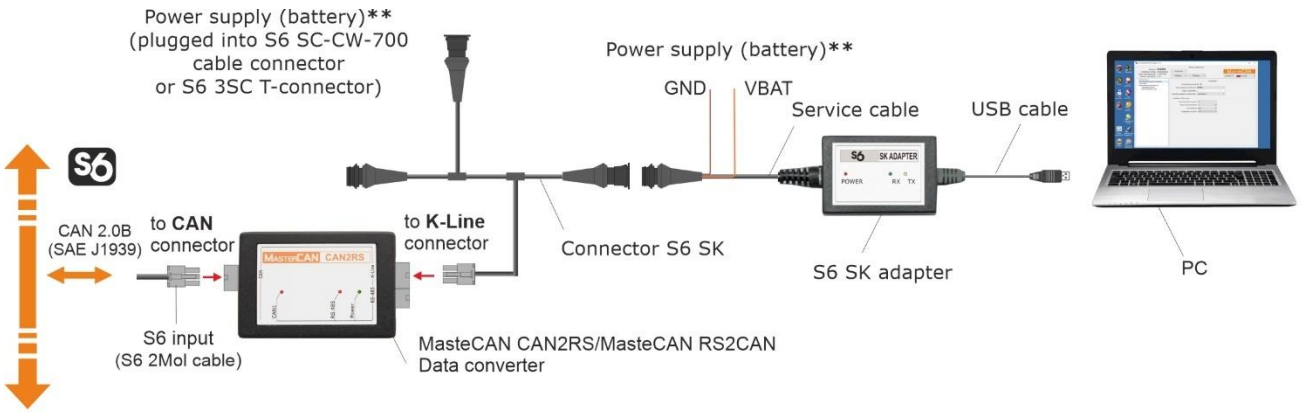
2) Connect the adapter with USB cable to a free USB-port of your PC.
Note — Adapter can also be connected to USB-port of your PC after turning electrical system ON and starting the software.

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

4) Power ON.



a) connecting MasteCAN CAN2RS/MasteCAN RS2CAN using S6 SK



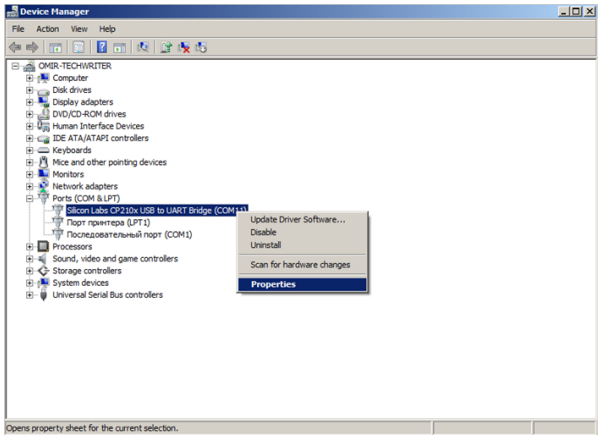
** No need to connect. Power supply (battery) is carried out though S6 cabling system.

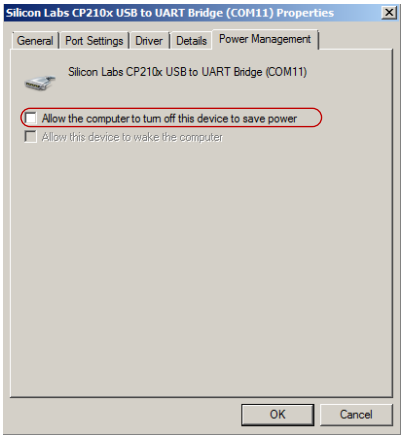
b) connecting MasteCAN CAN2RS/MasteCAN RS2CAN using S6 SK via S6 Technology

Figure 13 — Schemes of converters connection to PC

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 14).

ATTENTION: It is recommended to untick power save check box for Service S6 MasterCAN in the virtual COM-port properties for energy safety purpose (see figure 14 b).





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

Figure 14 — Virtual COM-port configuration in 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 5.

Table 5 — 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	Converter data is being received
	No signal		No data from converter
TX		Yellow	Data is being transmitted to converter
	No signal		No data to converter

3.3 Interface of software

Service S6 MasterCAN software is launched with  desktop shortcut created during installation. Software interface consists of **Horizontal menu**, **Vertical menu, Unit ID area** and **Information and Configuration area** (see figure 15).

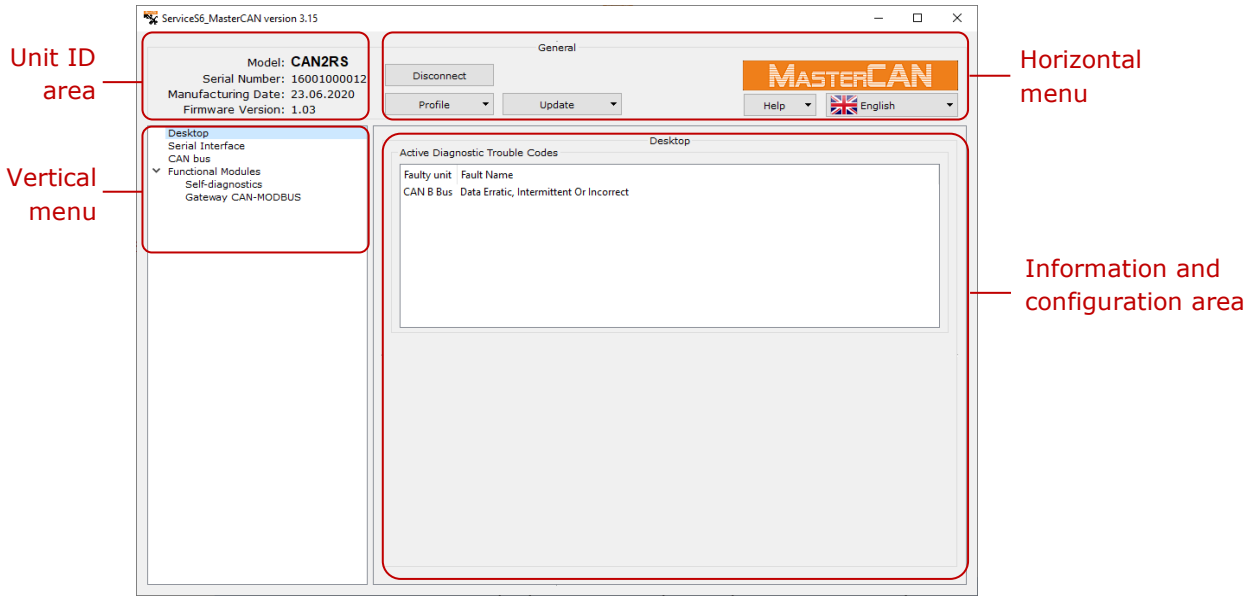


Figure 15 — Interface of Service S6 MasterCAN software

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

Unit ID area provides information about the model, serial number, manufacturing date and firmware version of the connected converter.

Horizontal menu provides the following:

- connection/disconnection of the converter;
- profile options (loading profile, saving profile, printing profile);
- updating firmware of the converter;
- S6 Database update in the service software (in case the PC has Internet access);
- selection of interface language;
- viewing help file and information about the utility.

Vertical menu is used for selection of Function modules of converter. Its current parameters and configuration are displayed in **Configuration and Information area**. Function modules of Service S6 MasterCAN software are based on PGN and SPN messages from **S6 Database** (see annex A).

The detailed description of S6 Database can be found in the web-page https://www.jv-technoton.com/ part Data base.

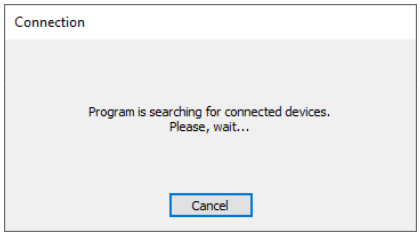
Information and Configuration area displays names (PGN) and parameters (SPN) of the messages. Each SPN holds the following: data range, discretion, measuring units.

3.4 Authorization

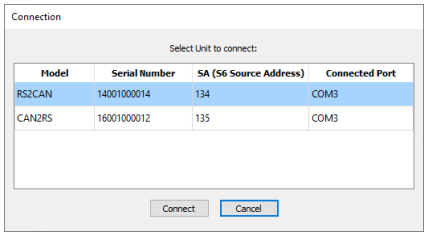
To enable connection between converter and PC, click the button Connect in **Horizontal menu**. Service S6 MasterCAN software will search for the connected Units (see figure 16 a).

When connecting the service adapter by means of S6 Technology to the network comprising several Units, select the Unit which will be used during your work with the software from the list in the window **Connection** of Unit and press Connect button (see figure 16 b).

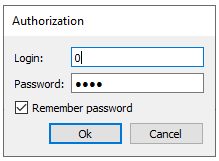
Enter Login and Password of the Unit into the appropriate fields of **Autorization** window. The default **Login** is 0. The default **Password** is 1111. To save a new Password (to avoid entering the password again during connection next time), tick **Remember Password** (see figure 16 c).



a) search for the connected Unit to PC



b) selecting one of several Units connected to S6 bus



c) user authorization

Figure 16 — Enable connection between the converter and PC

To recover the password (in case it is lost) you need to place the cursor into the **Login** or the **Password** field of the window **Authorization** and press **Ctrl+F10** key combination. Service S6 MasterCAN software will display a code to recover the current password of the Unit (see figure 17). This message is being sent to Technoton technical department by e-mail support@technoton.by together with password recovery request.

Requirements for converter 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.

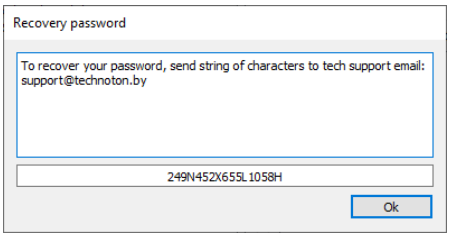


Figure 17 — Generating password recovery code

In case of incorrect Login and Password or incorrect connection to PC the warning error message will appear.

If Authorization is made successfully, then **Desktop** will appear automatically when you run the software (see figure 15). **Desktop** contains configuration and current parameters of Function modules of the connected converter (see annex A).

3.5 Operations with profile of converter

Data converter **Profile** is set of PGN (passport data, counters and settings of Function modules).

It is possible to manage the profiles in both the converter connected and autonomous mode. The button Profile with drop down menu is used to choose the options (see figure 18). Profile can be stored as a file to PC hard drive or loaded into the memory of the Unit. It can be printed as well.

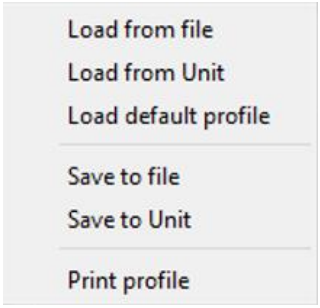


Figure 18 — View of Profile menu

Drop-down menu Profile is divided into the following sections:

1) Load profile. The following options of profile loading are available in Service S6 MasterCAN software:

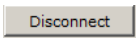
- Load from file — for loading of previously saved profile from the hard drive or removable disk. In the loading window you need to find on the hard disc and select the Profile file for the required converter model (**MasterCAN_CAN2RS_*.prf / MasterCAN_RS2CAN_*.prf**).
- Load from Unit — is used for loading profile from the connected converter.
- Load default profile — is used for loading profile with default factory settings. With this profile, it is possible to study utility operation without real converter connection. By default, depending on the converter model, the Profile is saved in the file **MasterCAN_CAN2RS_default.prf** or **MasterCAN_RS2CAN_default.prf** in the folder of installation file ServiceS6_MasterCAN.exe.

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

2) Saving profile. Service S6 MasterCAN 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.
  In the window that opens, select the location on the disc and assign the Profile file name to the file, in accordance with the template (**MasterCAN_CAN2RS_*.prf / MasterCAN_RS2CAN_*.prf**).
- Save to unit — is used for saving modified settings into profile of the connected Unit. It is available only during the time when there an active connection between PC and converter.

***** Any name specified by the user. The prefixes **MasterCAN_CAN2RS_** / **MasterCAN_RS2CAN_** and **.prf** extension are inserted automatically in the file name.

If the modified settings were not saved into Unit and 

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

will save all the unsaved parameters and converter settings.

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 converter serial number and date when file was created.

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

3.6 Confuiguration of connection by means of CAN interface

To connect the converter to CAN Units or to the onboard CAN-bus by means of S6 Technology using CAN interface, select the title **CAN bus** (see figure 19) in the **Vertical menu** of the software and specify the following settings:

1) In the field **CAN Protocol Type** (SPN 521530) **SAE 1939+S6** data transfer protocol is specified.

2) In the dropdown list **SA Address (SA)** (SPN 521188) the unique network address of the Unit within CAN interface is specified. MasterCAN CAN2RS has the fixed unique network address **135** for its identification by its input interface. MasterCAN RS2CAN has the fixed unique network address **134** for its identification by its output interface.

3) From the dropdown list **CAN Baudrate** (SPN 521531) select the required Baudrate from the following range of values: 100; 125; 250; 500; 1000 kbit/s (by default — 250 kbit/s).

4) From the dropdown list **CAN Mode** select the required mode of data reception in CAN interface:

- **Active (CAN Requests Enable)** — converter generates active requests to Units connected by means of S6 Technology. Active requests are needed to receive data from PGN provided upon request.
  Note: you should bear in mind that in case of connecting converter with CAN interface to a standard CAN-bus, active requests may cause failures of the onboard equipment operation.
- **Silent (Sniffer)** — converter is not identified by its network address by other Units. The data are received in the sniffer mode.

5) From the dropdown list **Enable Termination Resistor*** (SPN 521533) select ON or OFF (OFF by default) of the inbuilt terminal resistor (120 Ohms) between the contacts CAN LOW and CAN HIGH of **S6** connector. Enabling the terminal resistor is the obligatory condition for correct data transfer via CAN 2.0B (SAE J1939) communication line.

6) In the field **PGN Receive Timeout *, s** (SPN 521532) enter the maximum time (by default — **5** s) during which the absence of input PGN selected for conversion into analog signals is allowed. In case the specified pause time is exceeded, the Self-diagnostics FM will provide an error message of CAN communication line.

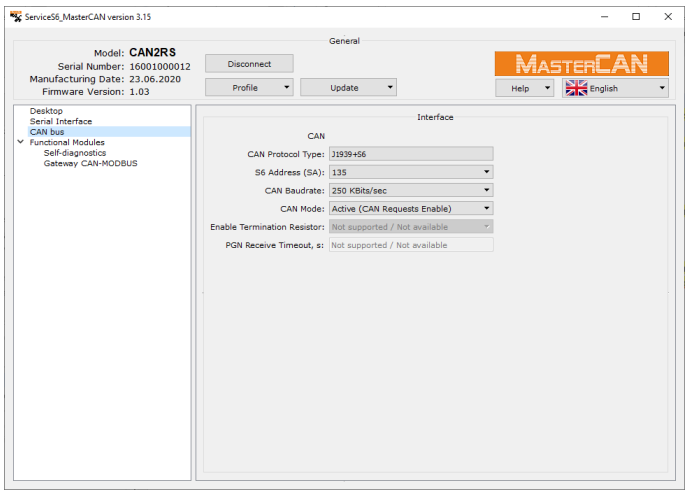


*Figure 19 — Window of the converter connection parameters configuration via CAN interface***

* For the software version 3.15 this setting is not supported.

** The windows of settings for MasterCAN RS2CAN and MasterCAN CAN2RS models are identical.

3.7 Confuiguration of connection by means of RS-485 interface

To connect the converter via RS-485 serial interface to the respective Onboard equipment or to the Telematics terminal , select the title **Serial RS 485** in the **Vertical menu** of the software (see figure 20) and select the following settings:

1) In the field **Output Protocol Type** (SPN 521315) **MODBUS** data transfer protocol is specified.

2) In the field **Device Address** (SPN 521318) select the converter unique network address within RS-485 interface from 0…255 range. By default, MasterCAN CAN2RS has the network address **134**, while MasterCAN RS2CAN has the network address — **135**.

3) From the dropdown list **RS232/485 Baud Rate** (SPN 521326) choose data transfer speed for RS-485 interface: 2400; 4800; 9600; 19200; 38400; 57600; 115200 bit/s (by default — 19200 bit/s).

4) In th area **COM Port Settings** specify data exchange parameters for the converter serial interface:

- In the field **Data bits** (SPN 521285) specify the number of data bits that can be transmitted between the start bit and stop bit (by default — **8 bits**).
- From the dropdown list **Stop bits** (SPN 521286) select the number of stop bits that are needed for correct identification of the byte end from the following range of values: 1; 0.5; 2; 1.5 (by default — **1 bit**).
- From the dropdown list **Parity** (SPN 521287) select the mode of even parity control from the following range of values: No; Even; Odd (by default — **No**).
- From the dropdown list **Flow control*** (SPN 521288) select the data flow monitoring mode from the following range of values: No; Hardware; Software (by default — **No**).

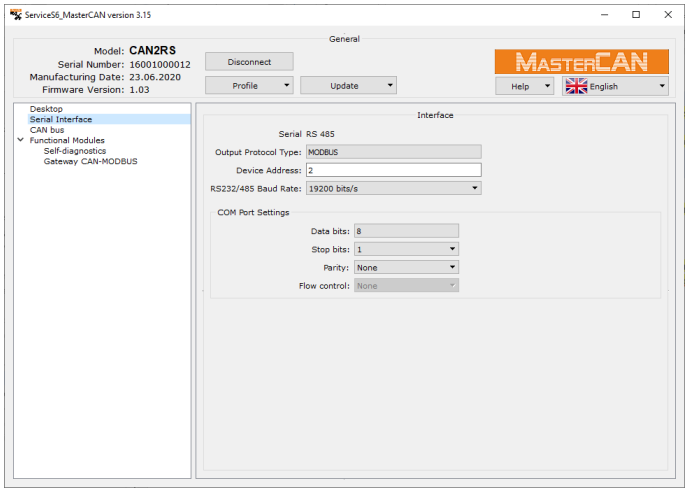


*Figure 20 — Window of the converter connection parameters configuration via RS-485 serial interface***

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* For the software version 3.15 this setting is not supported.

** The windows of settings for MasterCAN RS2CAN and MasterCAN CAN2RS models are identical.

3.8 MasterCAN RS2CAN configuration for data conversion from Modbus RTU registers into SPN

The submenu of MODBUS-CAN Gate FM of Service S6 MasterCAN software serves to configure the conversion into SPN the content of Modbus RTU protocol registers from devices connected to MasterCAN RS2CAN converter by means of RS-485 interface. Using its settings, the user can generate up to **100** slots for conversion of data from registers.

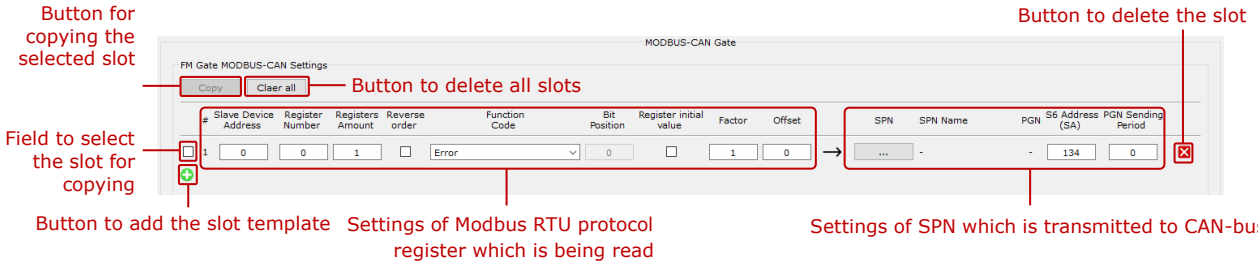


Figure 21 — Slot template for conversion of data from Modbus RTU registers into SPN

To add a slot template for data conversion, press button.

1) In the left portion of the slot template (before → character) there are settings of Modbus RTU protocol registers that are read by the converter (see figure 21):

- Field **Slave Device Address** (SPN 521269) is designed to specify the unique network address of data source device (Slave) which is connected to the converter (always Master) via RS-485. The network address of the Slave device may be specified from the range 0…255 (by default — **0**).

IMPORTANT: During the configuration of registers make use of the information on the data transfer protocol via RS-485 protocol (table of Modbus RTU registers) provided in the operation documentation of the respective Slave devices.

- The field **Register Number** (SPN 521683) serves to specify the address of the requested register which may be specified from the range 0…65535 (by default — **0**).
- The field **Register Amount** (SPN 521684) serves to specify the total number of several registers read in succession in which the data to be selected for conversion are contained (by default — **1**).
  Notes
  1 The value of the number of registers for data contained in lines are specified from the range 1…125.
  2 The value of the number for registers containing the data "whole number" or "number with the floating point" is specified from 1…2 range.
  3 For the function codes (SPN 521682) "Reading registers of coils (01)" or "Reading discrete inputs (02)" you can specify maximally 1 register.
- If needed, you can change the standard (direct) order of reading the serial registers content of 4 bytes size by ticking the **Reverse Order** (SPN 521701) field. By default, it is not ticked; that is, the direct order of reading the serial registers is used.
  Note — You need to switch the reverse order, for example, when working with DUT-E 2Bio 485 fuel level sensors.

- The dropdown list **Function Code** (SPN 521682) serves to select the required function of reading Modbus RTU registers (if the value is not specified, the **Error** is displayed) (see the admissible values of the function code in table 6).

Table 6 — Feature codes of reading Modbus RTU registers

Feature code	Command name	Type of value	Access type
"Reading coil registers (01)" (0x01)	Read Coil Status	Discrete	Reading
"Reading discrete inputs (02)" (0x02)	Read Input Status	Discrete	Resding
"Reading storage registers (03)" (0x03)	Read Holding Registers	16 bit	Resding
"Reading input registers (04)" (0x04)	Read Input Registers	16 bit	Resding

- The field **Bit Position** (SPN 521685) serves to specify the specific bit position number in the register of 1 byte size for codes of the function "Reading coil registers (01)" or "Reading discrete inputs (02)". This field is inaccessible for other function codes. The bit position may be specified from 0…7 range (by default — **0**).
- If needed, you can save the data read from the register without any conversion in the output SPN (for example, when reading registers from DUT-E 2Bio 485 fuel level sensors) by ticking the **Register Initial Value** (SPN 521278) field.
  By default, it is not ticked; so the data read from the register are converted, in accordance with the specified values of attributes of factor and offset for the respective Modbus RTU register and are transferred into the output CAN interface in SAE J1939 format.
- The fields **Factor** (SPN 521296) and **Offset** (SPN 521295) are designed to enter attributes that are necessary for calculation of values of the register read by the converter.
  Below there is the formula (1) to recalculate the read out values of Modbus RTU register into SPN, with respect to attributes of the registers conversion and to the SPN format, in accordance with SAE J1939 standard.

  $$SPN=REG\_VALUE * (factor_{rg} / factor_{SPN}) - ((offset_{SPN} – offset_{rg}) / factor_{SPN}) \quad (1)$$

  where

  REG_VALUE - the Modbus RTU register value read by the converter;

  $factor_{rg}$ and $offset_{rg}$ - values of attributes specified by the user in the fields **Factor** and **Offset** respectively (see the operation documentation (list of Modbus RTU registers) of the corresponding data source device). In case the parameter is not converted during saving in the register, the attributes by default will assume the following values: $factor_{rg} = 1$ and $offset_{rg} = 0$;

  $factor_{SPN}$ and $offset_{SPN}$ - values of SPN attributes automatically selected by the converter from S6 Database (BD S6).

Note — You should take note that given different physical values, the additional conversion for the attributes $factor_{rg}$ and $offset_{rg}$ should be performed in Modbus RTU register and in the selected output SPN.

Examples:
a) In case the value of the Parameter from the register is read in bars and the output SPN is specified in kPa, then, taking into account the correlation 1 bar=100 kPa, the *factor*$_{rg}$ base value should be multiplied by 100.
b) To recalculate the temperature Parameter from K into °C, you need to deduct 272.15 from *offset*$_{rg}$.

2) In the right portion of each slot (after the character →) there are settings of SPN in which the converted data will be transferred into CAN iterface (see figure 21):

- By pressing ... button, select the required SPN from S6 Database into which the data conversion from Modbus RTU register is to be performed (see figure 22).
  For your convenience, search the SPN by the SPN number or name entered into the search bar of **Select SPN/PGN** window. Highlight the PGN in which the required SPN will be transmitted and confirm its selection by pressing OK button.
  After that, both the number, and the name of the selected SPN, as well as the PGN number (SPN 521150) will be displayed in the slot.

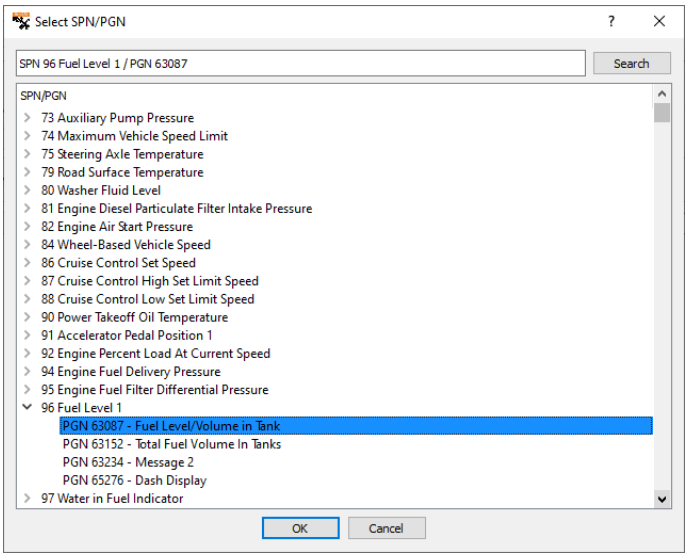


Figure 22 — Window of SPN selection from the list of BD S6

WARNINGS:
1) In case the data type of the selected SPN does not match the code of "Reading coil registers (01)" function or "Reading discrete inputs (02)" function, we recommend to select SPN only with whole numbers values (factor coefficient — 1).
2) When the selected SPN is changed, the number of registers is automatically reset to 1 and the correction of the value in **Register Number** (SPN 521684) field may be needed by replacing it with the source device value, according to Modbus RTU list of registers.
3) For values of SPN that are less than 8 bits long, you need to specify the function codes "Reading coil registers (01)" or "Reading discrete inputs (02)"; otherwise the notification of incompatibility will be displayed.
4) The value of **Offset** setting for Modbus RTU registers must be within the admissible SPN change range. Then, during the conversion of the register value into the output SPN there will be no overfill and no incorrect SPN value will be received.

- The field **S6 Address (SA)** (SPN 521188) serves to specify the unique network address of CAN j1939/S6 Telematics interface Unit which generates the selected SPN or for which the request for reading the selected SPN is needed. The network address may be specified from 0…250 range (by default — **134**).
- The field **PGN Sendings Period** (SPN 521362) serves to specify the output order of the message (PGN) containing SPN with the converted data into CAN output interface by the converter. Depending on the selected SPN, the value of the period is entered automatically, in accordance with S6 Database.
  The period of sending may be changed for the value from 0…30000 range (0 value indicates that the selected SPN is read upon request, other value indicates the interval (in milliseconds) of automatic output of PGN containing the selected SPN into CAN-bus).

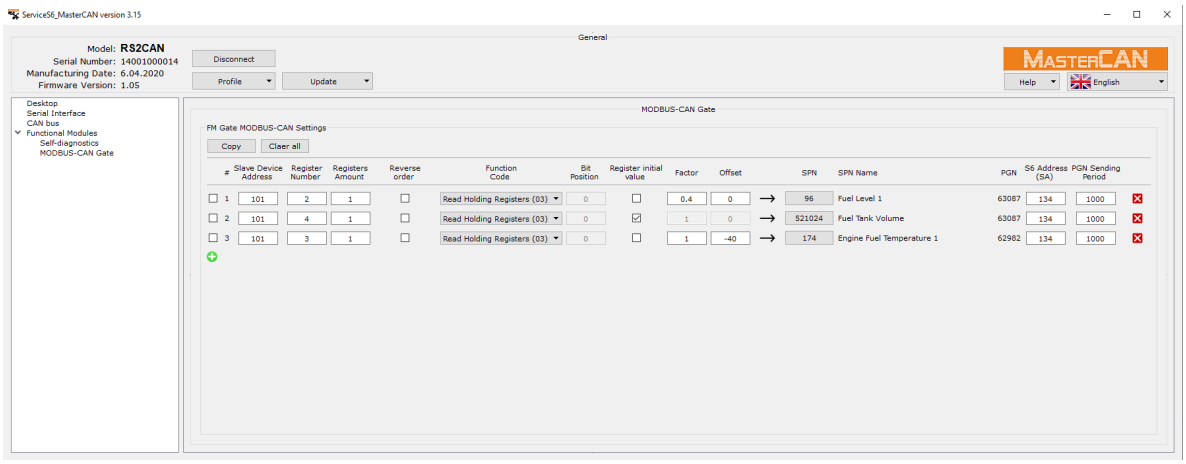


Figure 23 — Example of configured slots for conversion of data from Modbus RTU registers into SPN

In order to copy the settings of the slot created earlier into the new slot, tick the field to the left from the number of the slot which is to be copied and press Copy button. For this operation, you may highlight only one slot for copying (see figure 23).
To delete one specific slot, use button, to the right of its settings. To delete all created slots, press Claer all button.

In Service S6 MasterCAN software for each SPN, whenever you place the cursor on its name, prompts containing its number, data range etc. are displayed. The automatic control of correctness of values entered is provided in the fields for editing settings. The corresponding prompts appear, whenever you place the cursor on the field with the value to be edited.

During work with MODBUS-CAN Gate FM of MasterCAN RS2CAN converter the software operates with the data of S6 Database (PGN and SPN). The list of SPN of MasterCAN RS2CAN FM which are configured and/or displayed using the software is provided in annex A.

To update S6 Database in Service S6 MasterCAN software, press DB S6 in the dropdown menu Update. The detailed description of S6 Database can be found at https://www.jv-technoton.com/.

3.9 Configuration of MasterCAN CAN2RS for data conversion from SPN into Modbus RTU registers

The submenu of MODBUS-CAN Gate FM of Service S6 MasterCAN software serves to configure the conversion into the content Modbus RTU protocol registers SPN from devices connected MasterCAN CAN2RS converter by means of CAN interface. Using its settings, the user can generate up to **100** slots for conversion of data from CAN-bus.

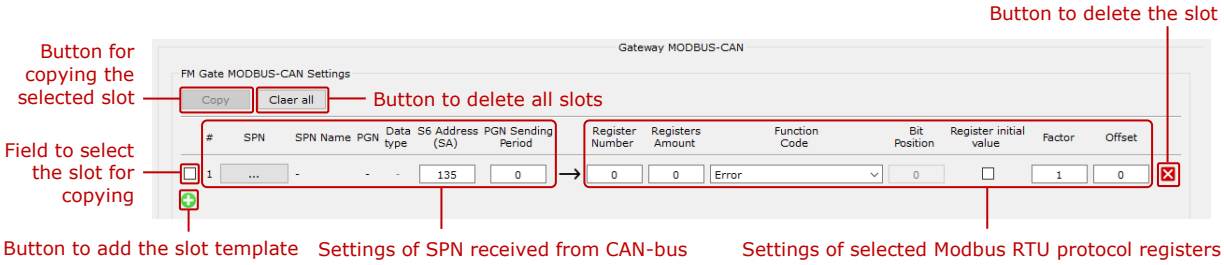


Figure 24 — Slot template for data conversion from SPN into Modbus RTU registers

To add a slot template for data conversion, press button.

1) In the left portion of each slot (before → character) there are settings of SPN received from the onboard CAN-bus or from Units of CAN j1939/S6 Telematics interface (see figure 24):

- By pressing ... button, select the required SPN which is to be converted into data of RS-485 interface from S6 Database (see figure 24).
  For your convenience, search the SPN by the SPN number or name entered into the search bar of **Select SPN/PGN** window. Highlight the PGN in which the required SPN will be received and confirm its selection by pressing OK button.
  After that, both the number, and the name of the selected SPN as well as the PGN number (SPN 521150) and data type (SPN 521462) will be displayed in the slot.

WARNINGS:
1) In case the data type of the selected SPN does not match the code of "Reading coil registers (01)" function or "Reading discrete inputs (02)" function, we recommend to select SPN only with whole numbers values (factor coefficient — 1).
2) While changing the selected SPN, you may need to change the initially specified value in **Register Number** field (SPN 521684).
3) For values of SPN that are less than 8 bits long, you need to specify the function codes "Reading coil registers (01)" or "Reading discrete inputs (02)"; otherwise the notification of incompatibility will be displayed.
4) The value of the **Offset** setting for Modbus RTU registers must be within the admissible range of SPN change, to avoid the register overfill and incorrect data saving.

- The field **S6 Address (SA)** (SPN 521188) serves to specify the unique network address of CAN j1939/S6 Telematics interface Unit or the device on the onboard CAN-bus which generates the selected SPN or for which the request for reading the selected SPN is needed. The network address may be specified from 0…250 or 255 range (by default — **135**).
  If the address 255 is specified, the data may be received from any device of CAN-bus.

- The field **PGN Sendings Period** (SPN 521362) serves to specify the order of the sending a request to CAN-bus by the converter for the reception of message (PGN) containing the selected SPN for conversion.
- Depending on the selected SPN, the value of the period from 0…30000 range is defined, in accordance with S6 Database, in the following way:
  - 0 value is displayed for periodically sent PGN and indicates the waiting period for PGN from CAN-bus. Now the field **PGN Sendings Period** becomes inactive. In case you need to change 0 value, click twice by the mouse button on this field;
  - other value (e.g. 1000) corresponds to the order of sending a request to CAN-bus — 1000 ms.

2) In the right portion of the slot template (after the character →) there are settings of Modbus RTU register of the converter into which the converted SPN must be saved (see figure 24):

- The field **Register Number** (SPN 521683) serves to specify the register address for saving the converted data. The register address may be specified from the range 0…65535 (by default — **0**).
- The field **Register Amount** (SPN 521684) serves to specify the total number of several serial registers in which the converted data must be saved (by default — **1**).

  Notes
  1 The value of the number of registers for data contained in lines is specified from the range 1…125.
  2 The value of the number of registers for registers containing the data "whole number" or "number with the floating point" is specified from 1…2 range.
  3 For the function codes (SPN 521682) "Reading coils registers (01)" or "Reading discrete inputs (02)" you can specify maximally 1 register.

  The dropdown list **Function Code** (SPN 521682) serves to select the required function of reading from Modbus RTU registers of the converter (if the value is not specified, the **Error** is displayed) (see the admissible values of the function code in table 6).

- The field **Bit Position** (SPN 521685) serves to specify the specific bit position number in the register of 1 byte size (only for the function codes "Reading coil registers (01)" or "Reading discrete inputs (02)". This field is inaccessible for other function codes. The bit position may be specified from 0…7 range (by default — **0**).
- If needed, you can save data converted from SPN in the register by ticking **Register Initial Value** (SPN 521278) field without any conversion.
  By default, it is not ticked; so the SPN is converted, in accordance with specified values of attributes of factor and offset for the respective Modbus RTU register.
- The fields **Factor** (SPN 521296) and **Offset** (SPN 521295) are designed to enter attributes that are necessary for calculating by the converter values of the register which is being recorded.
  Below there is the formula (2) to recalculate SPN values into Modbus RTU register, with respect to attributes of the registers conversion and the SPN format, in accordance with SAE J1939 standard.

$$REG\_VALUE = SPN * factor_{SPN} / factor_{rg} - ((offset_{rg} - offset_{SPN}) / factor_{rg}) \quad (2)$$

where

SPN - value of the selected SPN;

$factor_{SPN}$ and $offset_{SPN}$ - values of SPN attributes automatically selected by the converter from S6 Database (DB S6);

$factor_{rg}$ and $offset_{rg}$ - values of register attributes specified by the user in the fields **Factor** and **Offset** respectively (see the operation documentation (list of Modbus RTU registers) of the corresponding receiving device). In case the parameter is not converted during saving in the register, the attributes by default will assume the following values: $factor_{rg}$ = 1 and $offset_{rg}$ = 0;

Note — You should take note that given different physical values, the additional conversion for the attributes $factor_{spn}$ and $offset_{spn}$ should be performed in the selected input SPN and in the specified Modbus RTU register.

Examples:
a) In case the value of the Parameter in the input SPN is specified in kPa and the value for the register — in bar, then, taking into account the correlation 1kPa = 0.01 bar, =100 kPa, the $factor_{spn}$ base value should be divided by 100.
b) To recalculate the temperature Parameter from °C into K, you need to add 272.15 to the $offset_{spn}$ value.

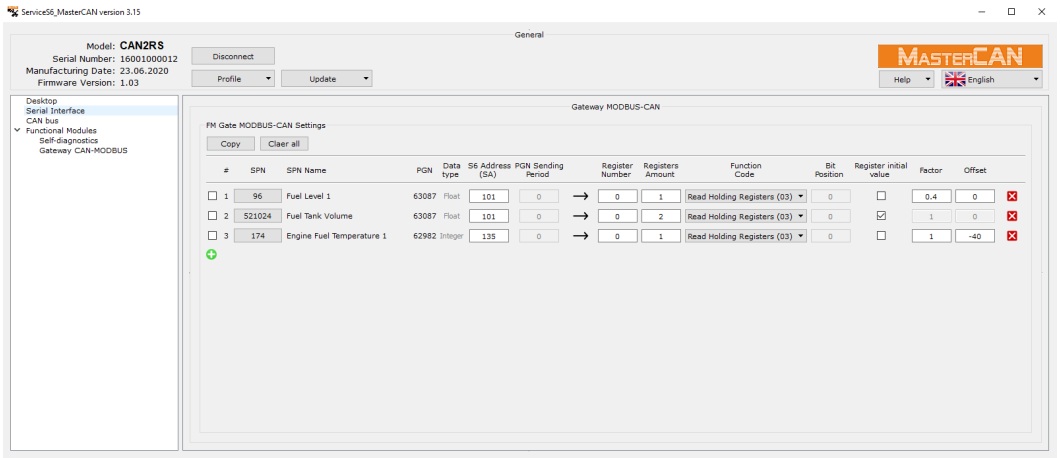


Figure 25 — Example of slots for conversion of data from SPN into Modbus RTU registers

In order to copy the settings of the slot created earlier into the new slot, tick the field to the left from the number of the slot which is to be copied and press Copy button. For this operation, you may highlight only one slot for copying (see figure 25).
To delete one specific slot, use button, to the right of its settings. To delete all created slots, press Claer all button.

In Service S6 MasterCAN software for each SPN, whenever you place the cursor on its name, prompts containing its number, data range etc. are displayed. The automatic control of correctness of values entered is provided in the fields for editing settings. The corresponding prompts appear, whenever you place the cursor on the field with the value to be edited.

During work with MODBUS-CAN Gate FM of the converter MasterCAN CAN2RS the software operates with the data of S6 Database (PGN and SPN). The list of SPN of the converter MasterCAN CAN2RS, FM which are configured and/or displayed using the software is provided in annex A.

To update S6 Database in Service S6 MasterCAN software, press DB S6 in the dropdown menu Update. The detailed description of S6 Database can be found at https://www.jv-technoton.com/.

3.10 Function test

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

During the converter operation the LED indicators located on its front panel must be on (see table 7). Also, the converter must provide converted data into the respective output interface.

Table 7 – Designation of signals of the converters LED indicators

LED Indicator			Signal description
Marking	**Status**	**Light color**	
POWER		Green	Power supply is on
	No signal		Power supply is off (or voltage is less than minimum required)
For model MasterCAN RS2CAN			
RS 485		Red	Data reception from the input RS-485 interface
			Connection failure
CAN1		Red	Data transmission to the output CAN interface
			Connection failure
For model MasterCAN CAN2RS			
CAN1		Red	Data reception from the input CAN interface
			Connection failure
RS 485		Red	Data transmission to the output RS-485 interface
			Connection failure

4 Packaging

Data converters sdelivery sets come in cardboard boxes of the following shape (see figure 26):

a) MasterCAN CAN2RS *b) MasterCAN RS2CAN*

Figure 26 — Packaging data converters

Label sticker with information on the product name, certificates, serial number, firmware version, manufacture date, weight as well as Quality Control seal and QR code is stuck on two sides of the data converters box (see figure 27).

a) MasterCAN CAN2RS *b) MasterCAN RS2CAN*

Figure 27 — Data converters packaging label

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

5 Storage

Data converter is recommended to be stored in dry closed places.

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

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

Data converter shelf life must not exceed 24 months.

6 Transportation

Transportation of Data converter is recommended in closed transport that provides protection from mechanical damage and precipitation.

When transporting by air, data converter must be stored in heated pressurized compartments.

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

Shipping containers with packed data converter should be sealed.

7 Utilization/re-cycling

Data converter does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

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

Contacts

Manufacturer

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

https://www.jv-technoton.com/

http://s6.jv-technoton.com/

E-mail: marketing@technoton.by

Technical support

E-mail: support@technoton.by

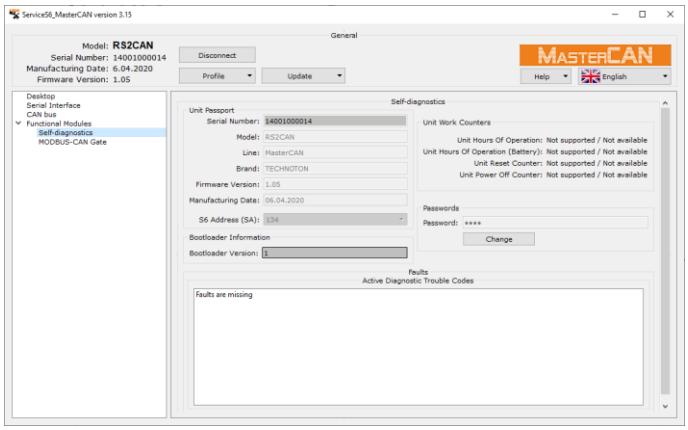
Annex A

SPN of converters Functional modules

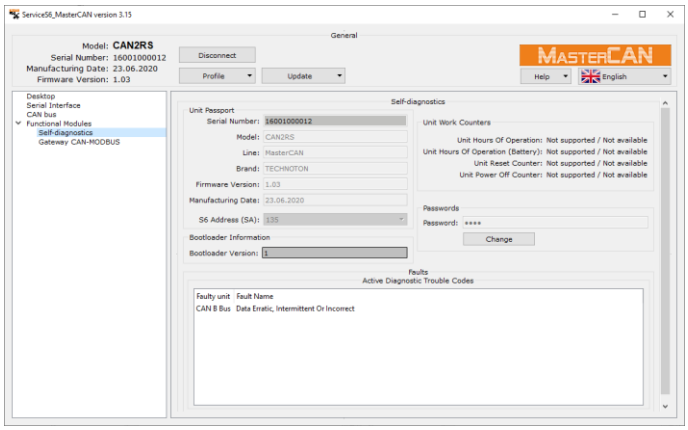
Data conversion, configuration and self-diagnostics are ensured by the well-concerted operation of the data converters Functional modules (FM).
The format of parameters (SPN) of FM data converter corresponds to S6 Database (S6 DB).

A.1 Self-diagnostics FM

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



a) for MasterCAN RS2CAN



b) for MasterCAN CAN2RS

Figure A.1 — Example of the window of settings of FM Self-diagnostics in Service S6 MasterCAN software

Table A.1 — Self-diagnostics FM. Displayed and/or editable SPN with the help of Service S6 DUT-E software

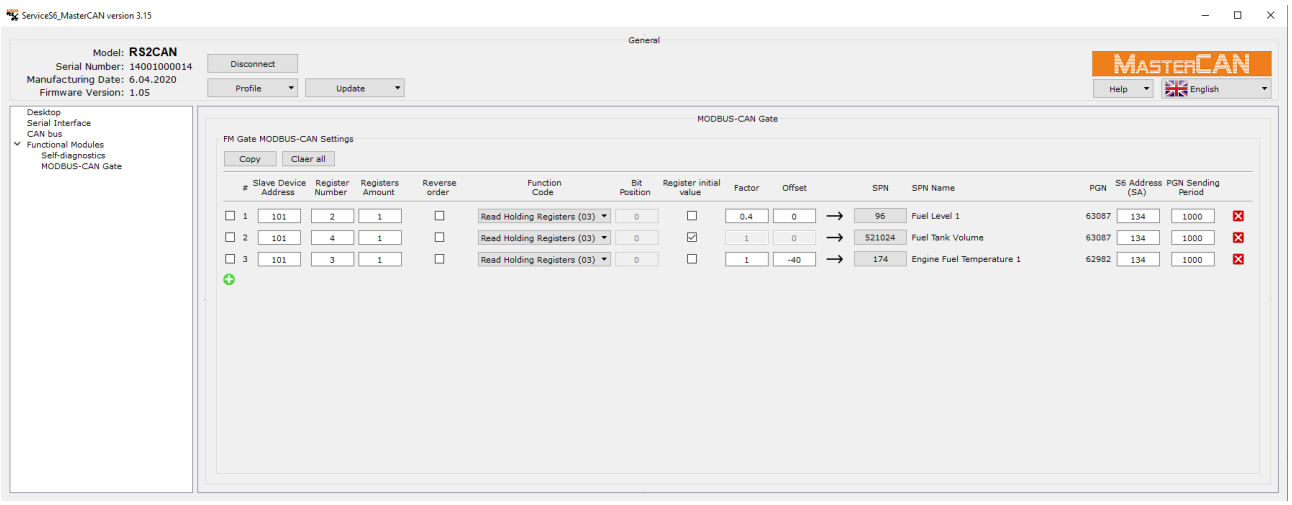
SPN	Name	Factory value	Unit of measure	Clarification
Unit passport PGN 62995				
521120	Serial number	On the fact	No	Serial number is a set of numbers that is used for identification of specific Unit. MasterCAN serial number has the following format: AABBB C DDDDD, where: AA – code of converter model; BBB – digits that reflect changes product changes; C – Manufacturer code; DDDDD – sequential number. Setting is not available for editing.
521345	Model	On the fact	No	Model – this is version of the converter inside of MasterCAN product line MasterCAN. Each model (MasterCAN RS2CAN or MasterCAN CAN2RS) has its own functional and constructive features. Setting is not available for editing.
521123	Line	MasterCAN	No	Name of the product line. The line represents a group of similar products – produced under general trademark MasterCAN. Setting is not available for editing.
521344	Mark	TECHNOTON	No	Name of converter Manufacturer. Setting is not available for editing.
521121	Firmware Version	On the fact	No	Version of built in Software converter. Setting is not available for editing.

SPN	Name	Factory value	Unit of measure	Clarification
521125	Date Of Production	On the fact	No	Date (day, month, year) of converter production. Setting is not available for editing.
521188	Address at S6 (SA) Bus	100	No	Network converter address at CAN j1939/S6 Telematics interface. Converters have fixed network addresses: - 134 (for MasterCAN RS2CAN); - 135 (for MasterCAN CAN2RS)
Unit. Counters PGN 62994*				
Passwords PGN 63017				
521593/3.3	Password/ 3.3 Installer	1111	No	Password is entered for user authorization while establishing connection session between fuel flow meter and service Software for configuring the converter. Password is a specific combination of four digits. By default used: Login – 0, password – 1111. User can change password of the converter. After entering and confirming the new password is recorded into internal memory of the converter.
Active diagnostic trouble codes PGN 65226				
521044	Fault identifier (SID)	On the fact	No	List of current converter malfunctions are displayed at the settings field (in case of its presence — up to 10). For each active malfunction is indicated following: - faulty nod; - malfunction name. This setting allows to monitor converter working performance. In case of lack of active malfunctions the following message is displayed “No malfunctions”.
Bootloader Information PGN 63009				
521122	Bootloader Version	On the fact	No	Displays current version of the bootloader used for the correct start of service software, as well as when updating firmware of the Unit.
* Not supported.				

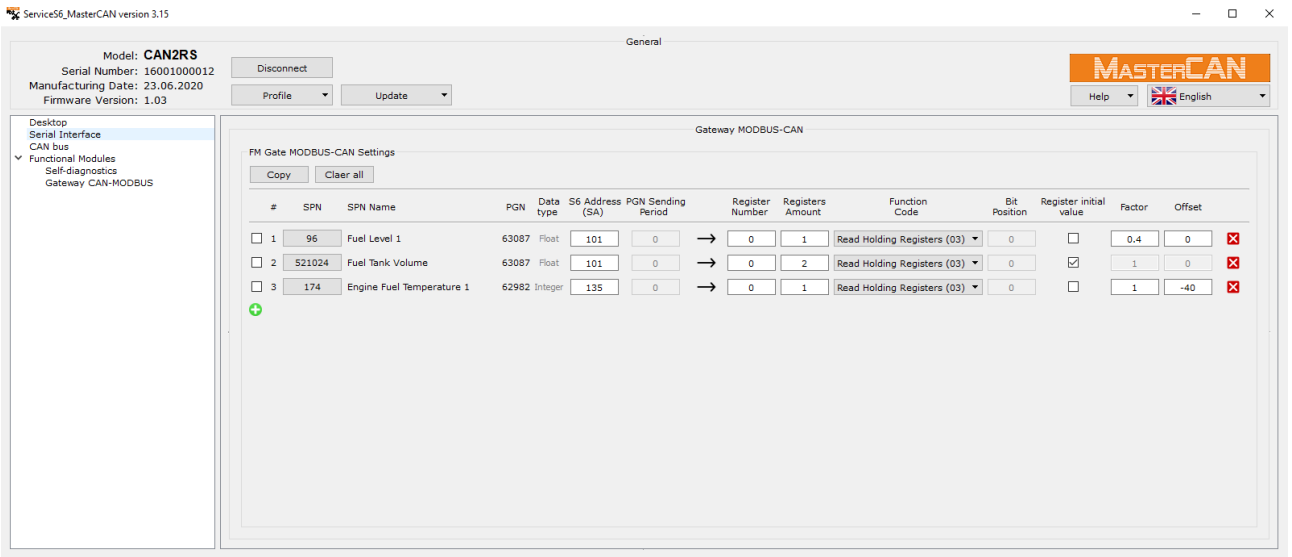
A.2 MODBUS-CAN Gate FM

MODBUS-CAN Gate FM is designed for:

- In MasterCAN RS2CAN converter — reception of data from RS-485 input interface according to Modbus RTU protocol, their conversion into SPN (SAE j1939+S6 protocol) and transfer into CAN output interface;
- In MasterCAN CAN2RS converter — reception of SPN data (SAE j1939+S6 protocol) from CAN input interface, their conversion into RS-485 output interface data and their transfer by means of Modbus RTU protocol.



a) for MasterCAN RS2CAN



b) for MasterCAN CAN2RS

Figure A.2 — Example of the window of settings of MODBUS-CAN Gate FM in Service S6 MasterCAN software

Table A.2 — MODBUS-CAN Gate FM. Displayed and/or editable SPN with the help of Service S6 DUT-E software

SPN	Name	Factory value	Unit of measure	Range	Clarification
FM Gate MODBUS-CAN Settings (PGN 63514) (for MasterCAN RS2CAN data converter)					
521269	Slave Device Address	0	No	0…255	Field to specify the unique network address of the data source device (Slave) connected to the data converter (Master) by means of RS-485.
521683	Register Number	0	No	0…65535	Field to specify the address of the requested Modbus RTU register.
521684	Registers Amount	1	pcs.	0…255	Field to specify the total number of several Modbus RTU serial registers in which data to be selected for conversion are recorded. The value of the number of registers for data contained in lines is specified from the range 1…125. The value of the number for registers with the data "whole number" or the "number with the floating point" is specified from 1…2 range. For function codes (01) or (02) you can specify maximally 1 register.
521701	Reverse Order	Off	No	On/Off	If needed, you can change the standard (direct) order of reading the serial registers content of 4 bytes size by ticking this field. By default, it is not ticked; so the direct order of reading the serial registers is used. You need to switch the reverse order, for example, when working with DUT-E 2Bio 485 fuel level sensors.
521682	Function Code	No	No	0…4	Dropdown list for selecting the required function of reading Modbus RTU registers (in case the value is not specified, the "Error" is displayed) (see the admissible values of the function code in table 6)
521685	Bit Position	0	No	0…7	Field to specify the position number of the specific bit in the register of 1 byte size for feature codes (01) or (02). For other function codes this field is inaccessible.
521278	SPN Value View Format (Register Initial Value)	Off	No	On/Off	By ticking this field, you can, if necessary, save the data read from the register in the output SPN without any conversion (for example, during reading of registers from DUT-E 2Bio 485 fuel level sensors).
521296	Factor	1	On the fact	0…4294970000	Field to enter the factor attribute for calculation of values of the register which is being read by the converter (see formula 1).
521295	Offset	0	On the fact	0…4294970000	Field to enter the offset attribute for calculation of values of the register which is being read by the converter (see formula 1).
521150	PGN	0	On the fact	0…65535	Display of the message (SAE J1939) selected from S6 Database in which the selected SPN is to be transmitted to the output CAN interface by the converter.
521188	S6 Address (SA)	134	No	0…250	Field to specify the unique network address of a Unit of CAN j1939/S6 Telematics interface which generates the selected SPN or for which the request for reading the selected SPN is needed.
521362	PGN Sending Period	1000	ms	0…30000	Field to specify the order of the message (PGN) output by the converter to the output CAN interface; this message contains SPN with converted data. Depending on the selected SPN, the value of the period is entered automatically, in accordance with S6 Database. The perid of sending may be changed for any value from 0…30000 range (0 value indicates that the selected SPN is being read upon request, other value specifies the interval (in milliseconds) of automatic transfer of PGN with the selected SPN into the CAN-bus).

SPN	Name	Factory value	Unit of measure	Range	Clarification
FM Gate MODBUS-CAN Settings (PGN 63514) (for MasterCAN CAN2RS data converter)					
521150	PGN	0	On the fact	0…65535	Display of the message (SAE J1939) selected from S6 Database in which the selected SPN is to be received by the converter via the input CAN interface.
521188	S6 Address (SA)	134	No	0…250	Field to specify the unique network address of a Unit of CAN j1939/S6 Telematics interface or a device on the onboard CAN-bus which generates the selected SPN or for which the request for reading the selected SPN is needed.
521362	PGN Sending Period	1000	ms	0…30000	Field to specify the order of sending a request to CAN-bus by the converter for the reception of a message (PGN) containing the selected SPN for conversion. Depending on the selected SPN, the value of the period is defined, in accordance with S6 Databse, in the following way: - 0 is entered for periodically sent PGN and indicates an expected PGN from CAN-bus. At this moment, the field for the period configuration becomes inactive. If you need to change 0 value, click the field twice by the mouse; - other value (e.g. 1000) corresponds to the order of sending a request to CAN-bus — 1000 ms.
521683	Register Number	0	No	0…65535	Field to specify the Modbus RTU register to save the converted data.
521684	Registers Amount	1	pcs.	0…255	Field to specify the total number of several Modbus RTU serial registers in which the converted data must be saved. The value of the number of registers for data contained in lines is specified from 1…125 range. The value of the number of registers for registers with the data "whole number" or "number with the floating point" is specified from 1…2 range. For function codes (01) or (02) you can specify maximally 1 register.
521682	Function Code	No	No	0…4	Dropdown list to select the required function of reading by an external device from Modbus RTU registers of the converter (in case the value is not specified, "Error" is displayed) (see the admissible values of the function code in table 6).
521685	Bit Position	0	No	0…7	Field to specify the position number of a specific bit in the register of 1 byte size (only for function codes (01) or (02); this field is inaccessible for other function codes).
521278	SPN Value View Format (Register Initial Value)	Off	No	On/Off	By ticking this field, you can, if necessary, save the data converted from SPN without any conversion. By default, the field is not ticked, that is, the SPN is converted in accordance with specified attributes of factor and offset for the respective Modbus RTU register.
521296	Factor	1	On the fact	0…4294970000	Field to enter the factor attribute for calculation of values of the register to be recorded by the converter (see formula 2).
521295	Offset	0	On the fact	0…4294970000	Field to enter the offset attribute for calculation values of the register to be recorded by the converter (see formula 2).

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

Annex B

Converters firmware upgrade

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

To upgrade converter firmware the following actions should be made:

1) Connect converter to PC with the help of service adapter S6 SK.

ATTENTION: When re-uploading firmware, power supply voltage of converter should not drop out of 10…45 V range.

2) After login press Unit firmware button in the dropdown menu Update.

3) Choose firmware upgrade file **(*.blf3)** on PC disk or memory stick.

4) Press Open button, that will start firmware file downloading into converter memory.

After firmware file integrity and compatibility check by Service S6 MasterCAN software window of firmware uploading into converter 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 MasterCAN software reset it is **forbidden**:

1) Power down the PC.
2) Power down the converter.
3) Disconnect converter from the adapter and adapter from the PC.
4) Run any resource-intensive applications on the PC.

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

If the converter firmware update has been completed incorrectly and the current version of the inbuilt software has been damaged, the firmware update procedure has to be repeated. In this case, the inbuilt firmware loader is activated which enables to recover converter operability. If the repeated attempt fails, we recommend to consult Technoton Technical Support Service by e-mail support@technoton.by.

Annex C
Videography

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

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