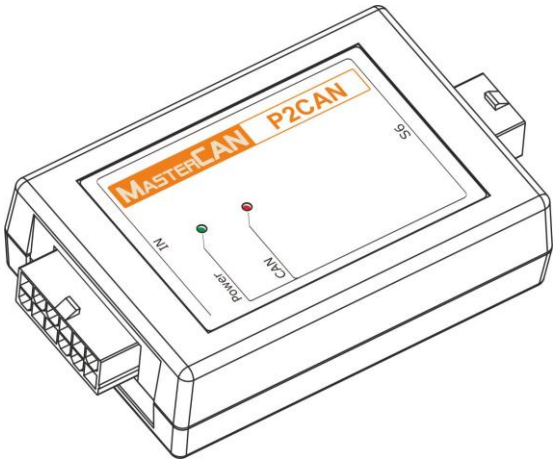
MASTERCAN

DATA CONVERTER



MasterCAN P2CAN

OPERATION MANUAL

Version 1.0

S6 IoT BURGER

TECHNOTON
ADVANCED MACHINERY TELEMATICS

E28 10 R - 05 2192 EAC

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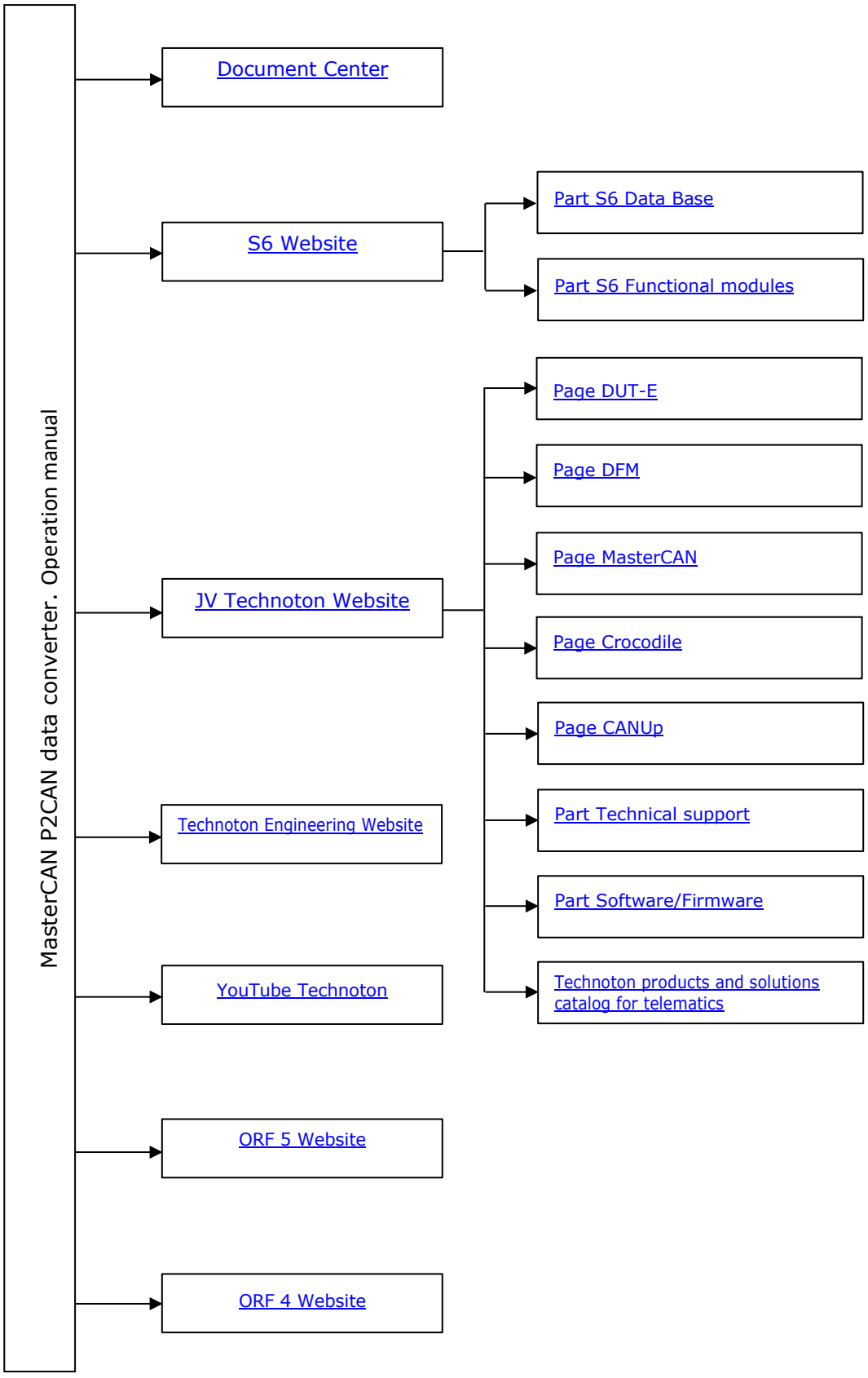
Revision history

Version	Date	Editor	Description of changes
1.0	01.2022	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/LTE 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 P2CAN data converter is designed using IoT Burger Technology.

S6 is the Technology of combining smart sensors and other IoT devices within one wire network for monitoring of complex stationary and mobile objects: vehicles, locomotives, smart homes, technological equipment etc. The Technology is based and expands SAE j1939 automotive standards.

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

MasterCAN P2CAN data converter is designed using S6 Technology.

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.

Onboard reports (the Reports) — information about vehicle which is returned to a user of Telematics system in accordance with inputted criteria. The Reports are generated by a terminal unit both periodically (Periodic reports) and on Event occurrence (Event report).

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

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 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 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 P2CAN data converter** (hereinafter converter), model code **17**, 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 converter.

MasterCAN P2CAN **— is a tool of the Telematics system which serves for secure integration of standard and additional Onboard equipment with pulse output signals into CAN j1939/S6 Telematics interface.**

Particular features of the MasterCAN P2CAN data converter:

- versatility — compatibility with any measuring devices that have a pulse output* (fuel flow meters, water/gas/electricity/etc. accounting devices);
- option of simultaneous pulse signals conversion in four separate **counting inputs**;
- configuration of active level of input signal and of the level of comparation using service software;
- accounting of actual total resource (fuel) consumption and of resource (fuel) consumption duration, with saving all accumulated Counters in the non-volatile memory;
- monitoring petrol and liquid gas consumption by light commercial vehicles (LCV)**;
- 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;
- digital self-diagnostics function for monitoring the quality of the Unit operation;
- option for transit power supply for external devices connected to the converter pulse inputs;
- 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 and polarity reversal of power supply wires;
- high-quality technical support and documentation;
- Conformity with European and national standards and directives.

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* Upon special order, we can manufacture a converter with processing of pulse-width modulation/frequency/discrete input signals.
**In case of using together with NozzleCrocodile or Nozzle BMCrocodile contactless reader.

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 3.26 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 P2CAN **is designed for** conversion of output signals of measuring devices into digital data (SPN) of CAN j1939/S6 Telematics interface:

- hourly resource / fuel consumption;
- total resource / fuel consumption;
- duration of fuel / resource consumption.

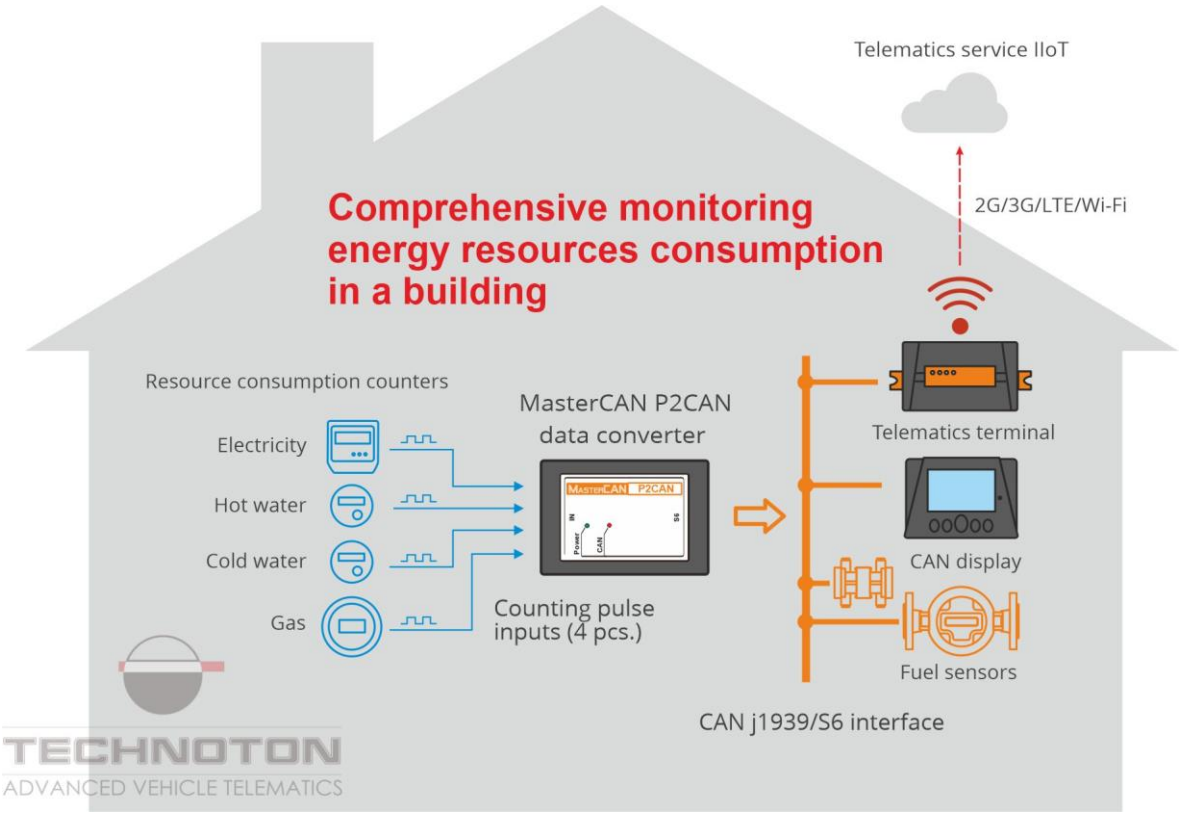
Area of application — Telematics systems for monitoring complex facilities in the field of transport, public utilities or industrial facilities in which digital Onboard equipment united into a single network using S6 Technology is used, alongside with pulse measuring devices.

Figure 1 — Application of MasterCAN P2CAN data converter

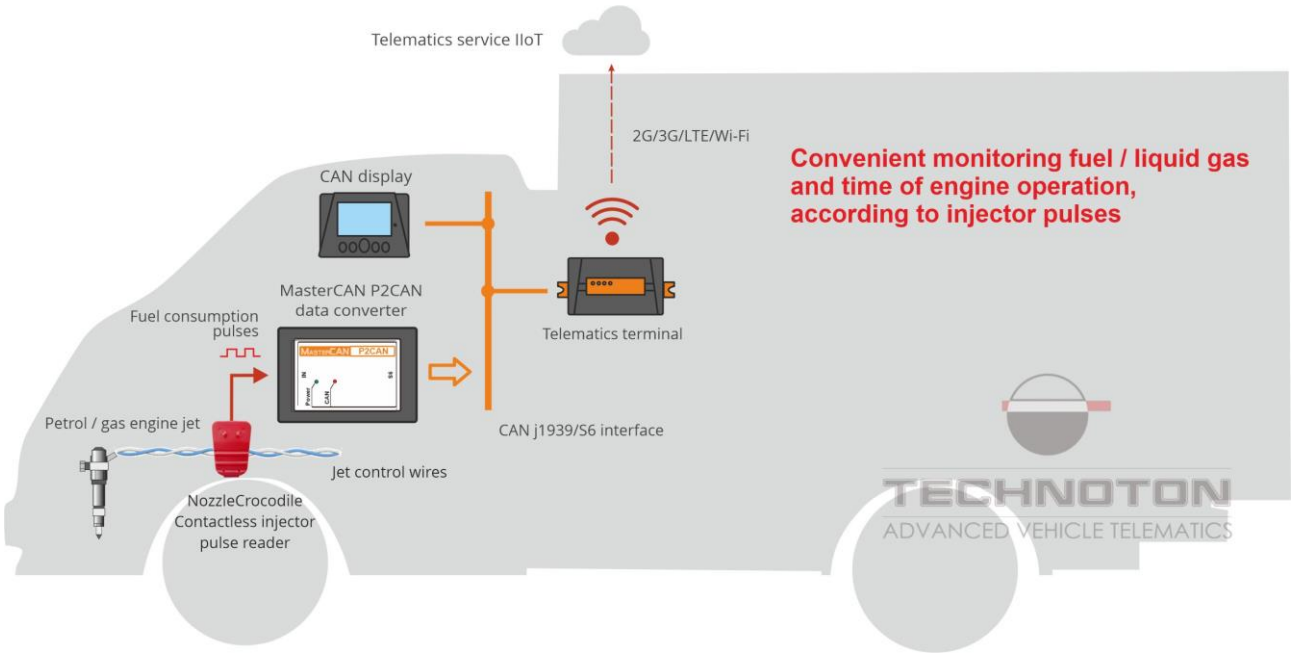
Operation principle:

The pulse output of a resource accounting device (e.g. fuel flow meter, pulse reader of a petrol/gas injector, water/gas/electric power counter etc.) is connected to the counting input of MasterCAN P2CAN data converter. In accordance with user settings, the converter continuously calculates the hourly (instant) resource consumption and provides the increment of total consumption Counters and of Counters that account for resource consumption duration. MasterCAN P2CAN converts calculated data into PGN and transfers them into CAN j1939/S6 output interface, to the monitoring Terminal and/or to CAN-display (see figure 2).

Bringing all readings of measurements to the single standard of S6 Database simplifies further processing and displaying Parameters in IIoT Telematics service.



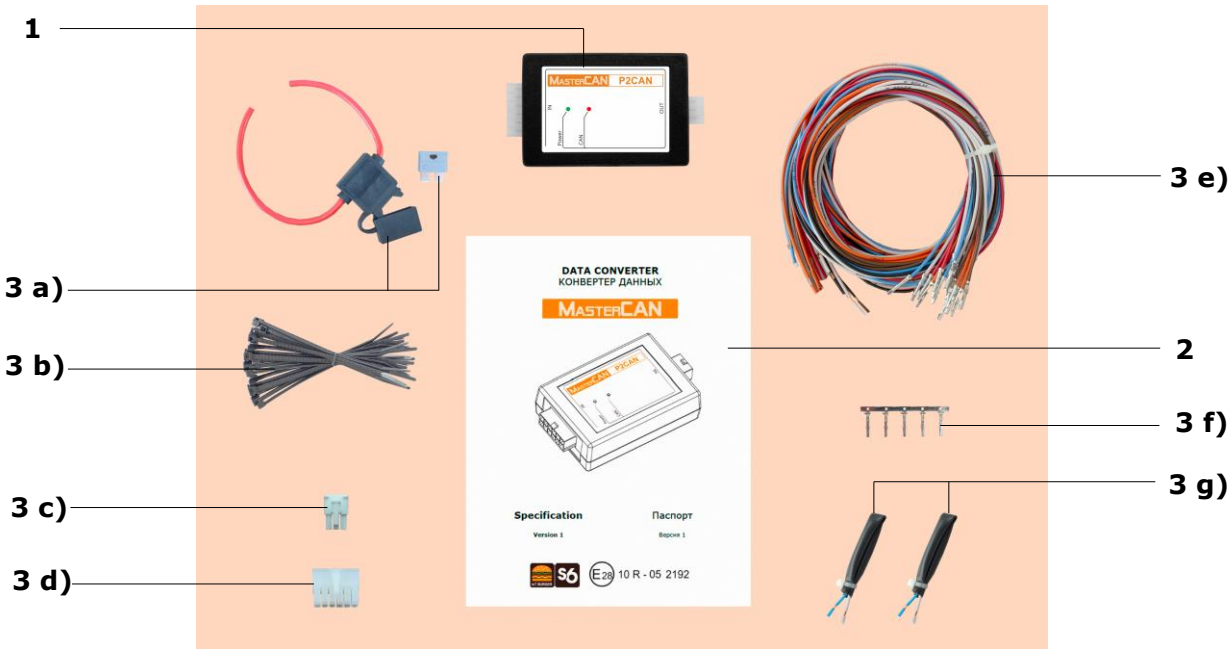
a) for integration of pulse resource accounting devices into CAN j1939/S6 interface in the Telematics system for Housing and Public Utilities



b) for integration of NozzleCrocodile contactless reader into CAN j1939/S6 interface in the Telematics system designed for vehicles

Figure 2 — Examples of MasterCAN P2CAN employment

1.2 Delivery set

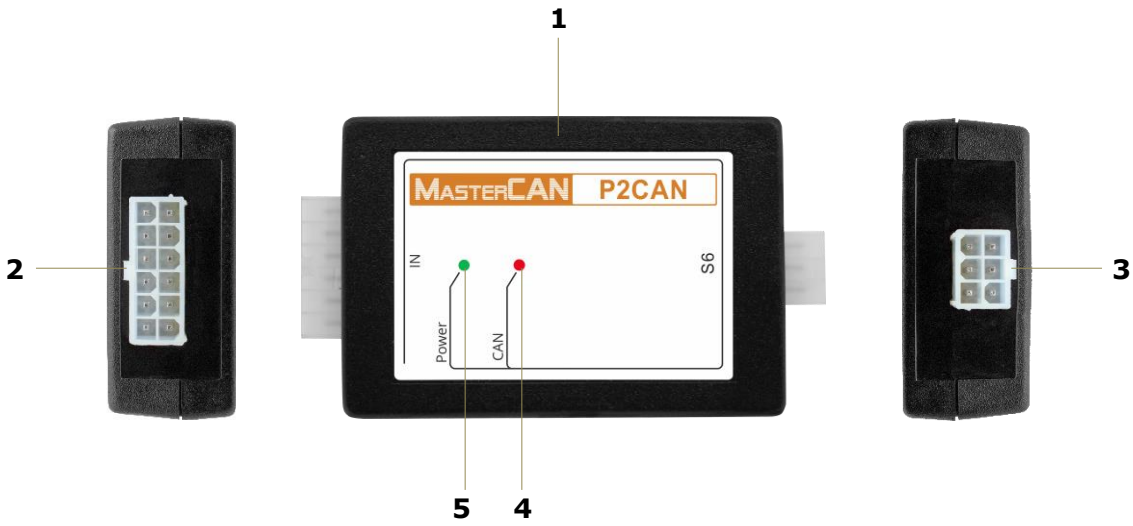


1	MasterCAN P2CAN data converter	- 1 pc.;
2	Passport with a list of factory settings	- 1 pc.;
3	MasterCAN MK P2CAN mounting kit (1 pc.) including:	
a)	fuse with holder 2 A (3 A)	- 1 pc.;
b)	cable tie	- 20 pcs.;
c)	molex 6 pin connector	- 1 pc.;
d)	molex 12 pin connector	- 1 pc.;
e)	wire	- 17 pcs.;
f)	contact pin	- 5 pcs.;
g)	S6 CW plug*	- 2 pcs.

Figure 3 — The delivery sets of MasterCAN P2CAN data converter

* Contains the inbuilt terminal resistor 120 Ohm.

1.3 Exterior view and design



1 MasterCAN P2CAN data converter casing with the electronic module.

2 **IN** connector serves for:
- connection of external devices to configurable pulse inputs of the converter;
- transit power supply for connected external devices.

3 **S6** connector serves for:
- connection of CAN j1939/S6 output interface to Units (e.g. to the Telematics terminal and/or to CAN-display) by means of S6 Technology;
- connection of the converter power supply;
- converter configuration using K-Line interface (ISO 14230) with the help of S6 SK service adapter.

4 Red LED **CAN** indicator for visual monitoring data transfer into CAN j1939/S6 output interface.

5 Green LED **Power** indicator for visual monitoring power supply.

Figure 4 — The exterior view and design of MasterCAN P2CAN data converter

1.4 Technical specifications

1.4.1 Main specifications

Table 1 — Main specifications of MasterCAN P2CAN data converter

Parameter, measuring unit	Value
Physical inputs	Counting, pulse (4 pcs.)
Output interface	CAN j1939/S6
Service interface	K-Line (ISO 14230)
Voltage range of external power supply, V	9…45
Maximal current consumption at supply voltage 12/24 V, mA, not more than	500/250
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 CAN j1939/S6 output interface

CAN j1939/S6 output interface (see 1.3) of MasterCAN P2CAN converter is used for transfer of converted data to the Telematics terminal and/or to CAN-display. The interface specifications correspond to S6 Technology.

The application level of the data transfer protocol is based on SAE j1939 standard and corresponds to S6 Database (see details at http://s6.jv-technoton.com/; you need to get registered to work with BD S6. Data can be transferred automatically or upon request. The list of the converter output messages is provided in table 2.

Configuration of converters connection options via CAN j1939/S6 interface (see 3.6) is performed via K-Line interface (ISO 14230) using Service S6 MasterCAN software (version from 3.26 and higher). The software current version can be downloaded at https://www.jv-technoton.com/, section Software/Firmware.

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

For the converter identification by CAN j1939/S6 output interface, it has a fixed unique network address — 140.

Table 2 — Data composition in output messages of MasterCAN P2CAN data converter

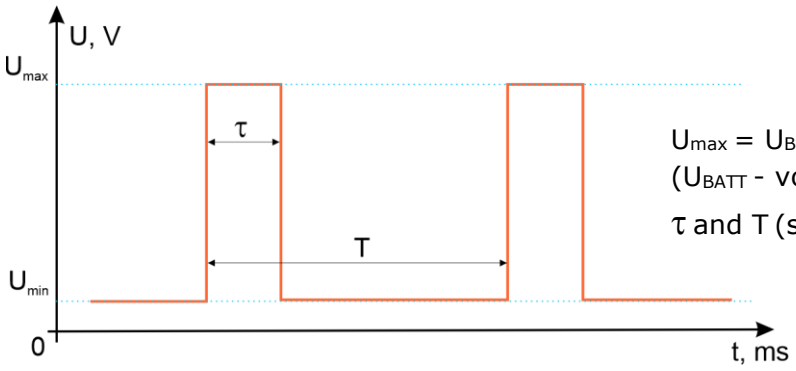
Field number	Length	Parameter	Description	Rules of output
Unit Work Counters PGN 62994 (0xF612)				On request
1	4 bytes	SPN 521116	Unit Hours Of Operation	
Active Diagnostic Trouble Codes PGN 65226 (0xFECA)				1000 ms
3	3 bytes	SPN 521044	Fault Identifier (SID+FMI)	
Unit Passport PGN 62995 (0xF613)				On request
1	16 bytes	SPN 521123	Line	
17	16 bytes	SPN 521344	Brand	
33	16 bytes	SPN 521345	Model	
49	16 bytes	SPN 521120	Serial Number	
65	8 bytes	SPN 521121	Firmware Version	
73	4 bytes	SPN 521125	Manufacturing Date	
77	1 byte	SPN 521188	S6 Address (SA)	
Bootloader Information PGN 63009 (0xF621)				On request
1	8 bytes	SPN 521122	Bootloader Version	
Engine Hours Of Operation/Total Fuel Used PGN 63236 (0xF704)				1000 ms
1	4 bytes	SPN 521171	Flowmeter Hours Of Operation	
5	4 bytes	SPN 5054	High Resolution Engine Total Fuel Used	
Total Resource Used And Use Duration. Input 1 PGN 63529 (0xF829)				1000 ms
1	4 bytes	SPN 521732/33.1	Total Resource Used. Input 1	
5	4 bytes	SPN 521733/33.1	Resource Use Duration. Input 1	

Field number	Length	Parameter	Description	Rules of output
Total Resource Used And Use Duration. Input 2 PGN 63530 (0xF82A)				1000 ms
1	4 bytes	SPN 521732/33.2	Total Resource Used. Input 2	
5	4 bytes	SPN 521733/33.2	Resource Use Duration. Input 2	
Total Resource Used And Use Duration. Input 3 PGN 63531 (0xF82B)				1000 ms
1	4 bytes	SPN 521732/33.3	Total Resource Used. Input 3	
5	4 bytes	SPN 521733/33.3	Resource Use Duration. Input 3	
Total Resource Used And Use Duration. Input 4 PGN 63532 (0xF82C)				1000 ms
1	4 bytes	SPN 521732/33.4	Total Resource Used. Input 4	
5	4 bytes	SPN 521733/33.4	Resource Use Duration. Input 4	
Total Resource Used And Use Duration. Input 1. Clearable PGN 63533 (0xF82D)				1000 ms
1	4 bytes	SPN 521732/33.1/28.0	Total Resource Used. Input 1. Clearable	
5	4 bytes	SPN 521733/33.1/28.0	Resource Use Duration. Input 1. Clearable	
Total Resource Used And Use Duration. Input 2. Clearable PGN 63534 (0xF82E)				1000 ms
1	4 bytes	SPN 521732/33.2/28.0	Total Resource Used. Input 2. Clearable	
5	4 bytes	SPN 521733/33.2/28.0	Resource Use Duration. Input 2. Clearable	
Total Resource Used And Use Duration. Input 3. Clearable PGN 63535 (0xF82F)				1000 ms
1	4 bytes	SPN 521732/33.3/28.0	Total Resource Used. Input 3. Clearable	
5	4 bytes	SPN 521733/33.3/28.0	Resource Use Duration. Input 3. Clearable	
Total Resource Used And Use Duration. Input 4. Clearable PGN 63536 (0xF830)				1000 ms
1	4 bytes	SPN 521732/33.4/28.0	Total Resource Used. Input 4. Clearable	
5	4 bytes	SPN 521733/33.4/28.0	Resource Use Duration. Input 4. Clearable	
Hourly Resource Consumption. Input 1,2 PGN 63537 (0xF831)				1000 ms
1	4 bytes	SPN 521734/33.1	Hourly Resource Consumption. Input 1	
5	4 bytes	SPN 521734/33.2	Hourly Resource Consumption. Input 2	
Hourly Resource Consumption. Input 3,4 PGN 63538 (0xF832)				1000 ms
1	4 bytes	SPN 521734/33.3	Hourly Resource Consumption. Input 3	
5	4 bytes	SPN 521734/33.4	Hourly Resource Consumption. Input 4	
Fuel Economy (Liquid) PGN 65266 (0xFEF2)				100 ms
1	2 bytes	SPN 183	Engine Fuel Rate	
Resettable Counters of the converter. In order to reset them, you may use: - PGN 63080 (0xF668) command from the external device (e.g. MasterCAN Display 35 display) connected to the converter by means of CAN j1939/S6 interface; - Service S6 MasterCAN service software (see 3.7).				

1.4.3 Specifications of pulse inputs

MasterCAN P2CAN converter has 4 pcs. of physical pulse inputs for counting output pulses of connected measuring devices. The converter can work with any devices whose output pulse signal meets specifications, in accordance with figure 5 and table 3.

Activation and configuration of each of the converter inputs are exercised separately, using Service S6 MasterCAN software (versions from 3.26 and higher). The current software version can be downloaded at https://jv-technoton.com/, section Software/Firmware).



U_{max} = U_{BATT}, but not higher than 45 V (U_{BATT} - voltage of on-board electrical system).

τ and T (see table 3).

Figure 5 — View of the input pulse signal of MasterCAN P2CAN data converter

Table 3 — Parameters of pulse inputs of MasterCAN P2CAN data converter

Parameter, measuring unit	Value
Periodicity of pulses (T), ms, no less than	10
Pulse length (τ), ms	(0.1…0.99) T
Active level of signal*	Low (level "0")/High (level "1")
For active level "0"	
Input impedance, kOhm, no less than	100
Active level voltage range, V	from 0 to threshold level (0.4...3.0)
For active level "1"	
Input impedance, kOhm, no less than	6.5
Active level voltage range, V	from (0.4...3.0) to threshold level 45

* The input signal level which is set using the service software (see 3.7) according to which the input counts each new pulse.
Whenever you set the active level "0", the input pull-up must be activated in the service software, while when you set active level "1", — the input pull-up must be de-activated.

1.4.4 Overall dimensions

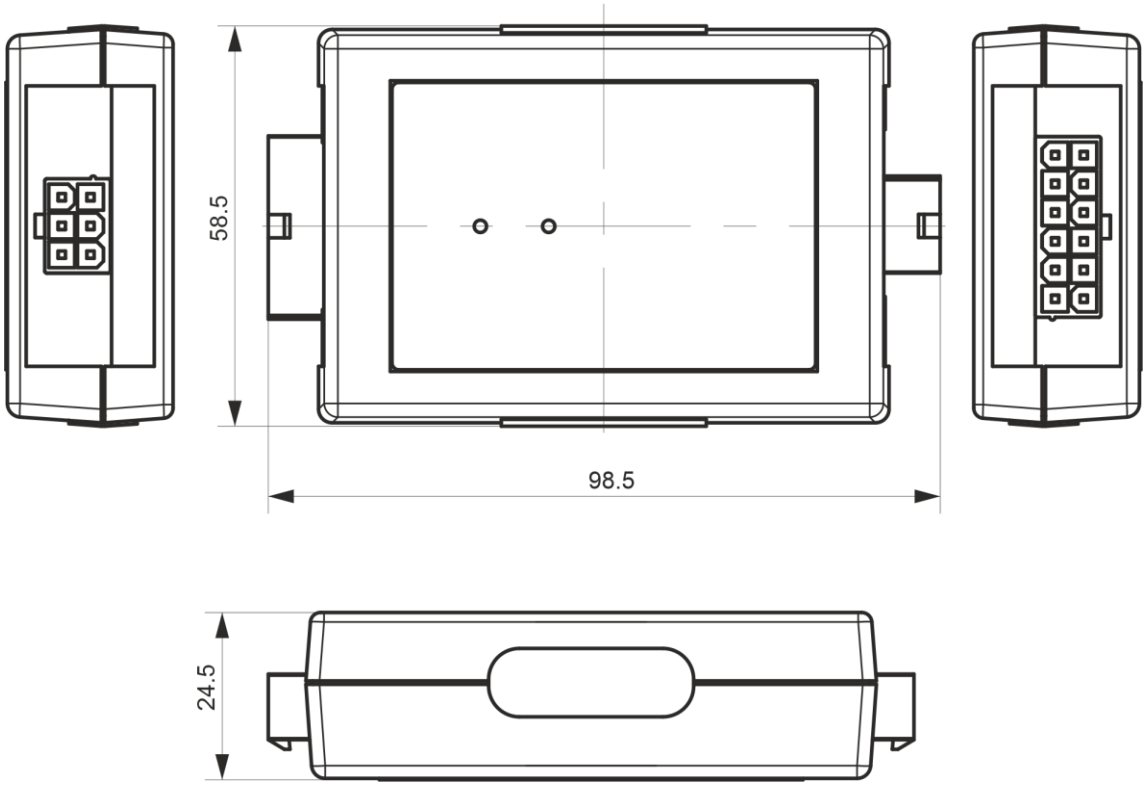


Figure 6 — Dimensions of MasterCAN P2CAN data converter

2 Mounting the converter

ATTENTION:
1) When mounting MasterCAN P2CAN 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 power supply of the data converter should be connected to the external power source (e.g. to the onboard circuit). When the converter operates within the network of Units by means of S6 Technology, power is supplied through S6 cable system.

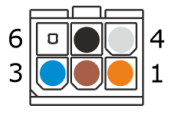
IMPORTANT:
1) Before mounting and connecting converter switch off power supply electrical circuits of the equipped object. To do this switch off the battery switch or release the terminals of the wires connected to the battery.
2) It is recommended to use **fuse** (supplied within delivery set) when 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 power supply (battery) must not exceed **1 Ohm**.

1) The power source and Units are connected to the converter by means of S6 Technology through **S6** connector (see 1.3) using Molex 6 pin connector and wires from the delivery set, in accordance with the designation of the connectors pins, the color and marking of wires, in accordance with table 4.

The converter is also configured through **S6** connector using S6 SK service adapter.

To configure the converter which operates using S6 Technology, S6 SK adapter can be connected to any free connector of S6 system.

*Table 4 — Connection of wires to **S6** connector of the converter*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
S6 connector of converter  **Molex 6 pin** connector included into the delivery set 	1	VBAT	Orange	Power "+"	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	KLIN	Black	K-Line*	Digital, ISO 14230 Standard
	6	—	—	Reserve	—
* Service interface for configuration and the firmware update of data converter.					

We recommend to purchase and use connectors for the converter connection to the respective signal wires (see figure 7).

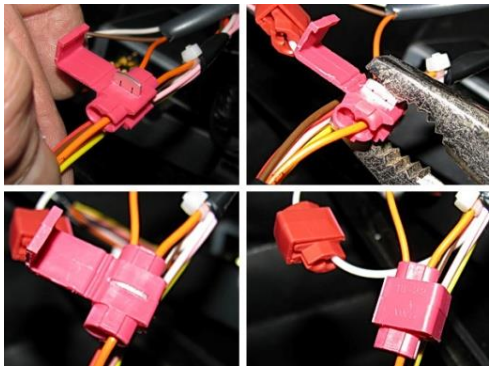


Figure 7 — Connecting signal wires to the converter using connectors

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 8).

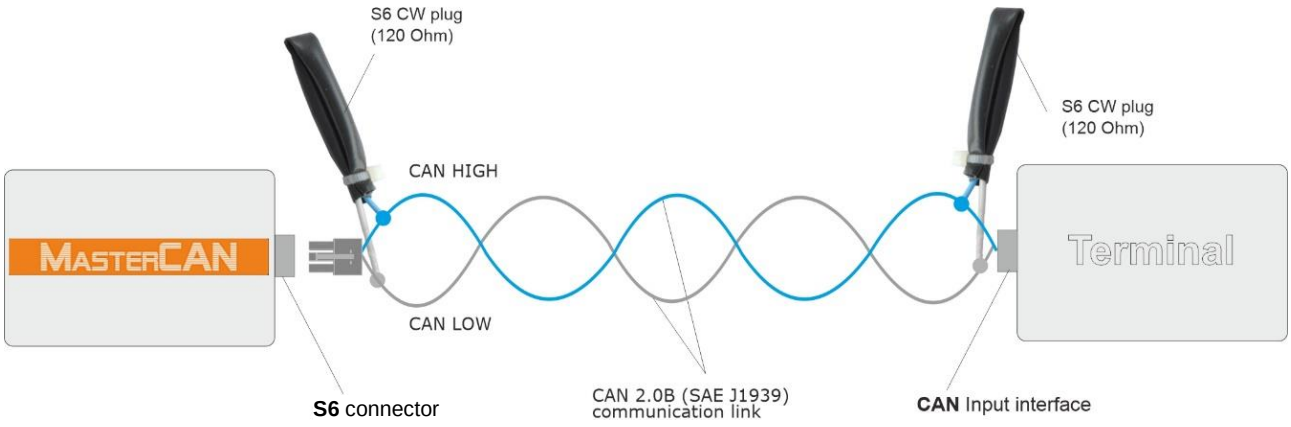
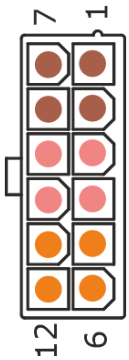
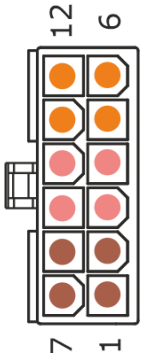


Figure 8 — Connection of data converters by means of S6 Technology to the external device that has no inbuilt terminal resistor

3) External devices are connected to pulse inputs of the converter through **IN** connector (see 1.3) using Molex 12 pin connector and wires from the delivery set, in accordance with the designation of the connectors pins, color and marking of wires, in accordance with table 5.

*Table 5 — Connection of wires to **IN** connector of the converter*

Connector Pinout	Connector Contact Number	Wire Marking	Wire Color	Circuit Designation	Signal Parameters
IN connector of converter 	1	GND	Brown	Ground "-"	—
	2	GND			
	3	IN4	Pink	Counting pulse inputs	Pulse, see 1.4.3
	4	IN2			
	5	VE	Orange	Transit power supply for external devices*	Analog, voltage 9…45 V
	6	VE			
Molex 12 pin connector included into the delivery set 	7	GND	Brown	Ground "-"	—
	8	GND			
	9	IN3	Pink	Counting pulse inputs	Pulse, see 1.4.3
	10	IN1			
	11	VE	Orange	Transit power supply for external devices*	Analog, voltage 9…45 V
	12	VE			

* Each of the 4 power supply outputs has self-healing protection against surpassing absorbed current 120 mA.

2.4 Connection schemes examples

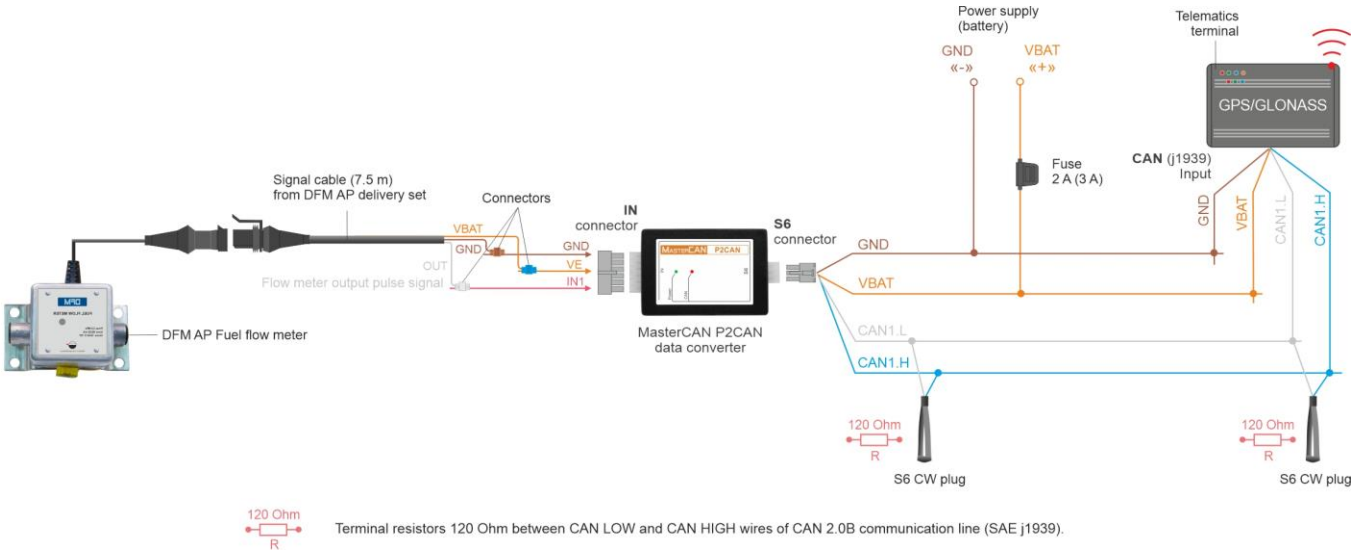


Figure 9 — Example of MasterCAN P2CAN data converter connection to the Telematics terminal with CAN-input for monitoring fuel consumption according to the output pulse from DFM AP flow meter

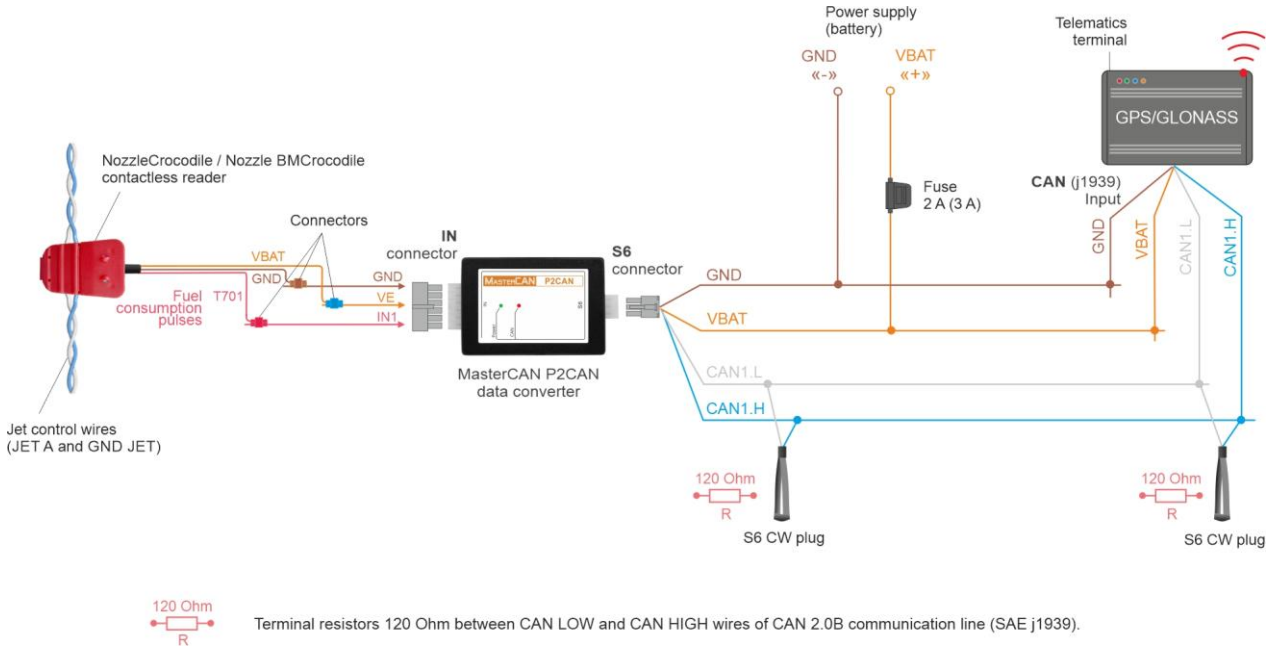


Figure 10 — Example of MasterCAN P2CAN data converter connection to the Telematics terminal with CAN-input for monitoring petrol/liquid gas consumption according to command pulses from the engine injector that are read using NozzleCrocodile/NozzleBMCrocodile contactless reader

ATTENTION: See detailed description of NozzleCrocodile/NozzleBMCrocodile contactless reader, as well as the procedure for its connection to the injector wires in the Crocodile contactless readers operation manual.

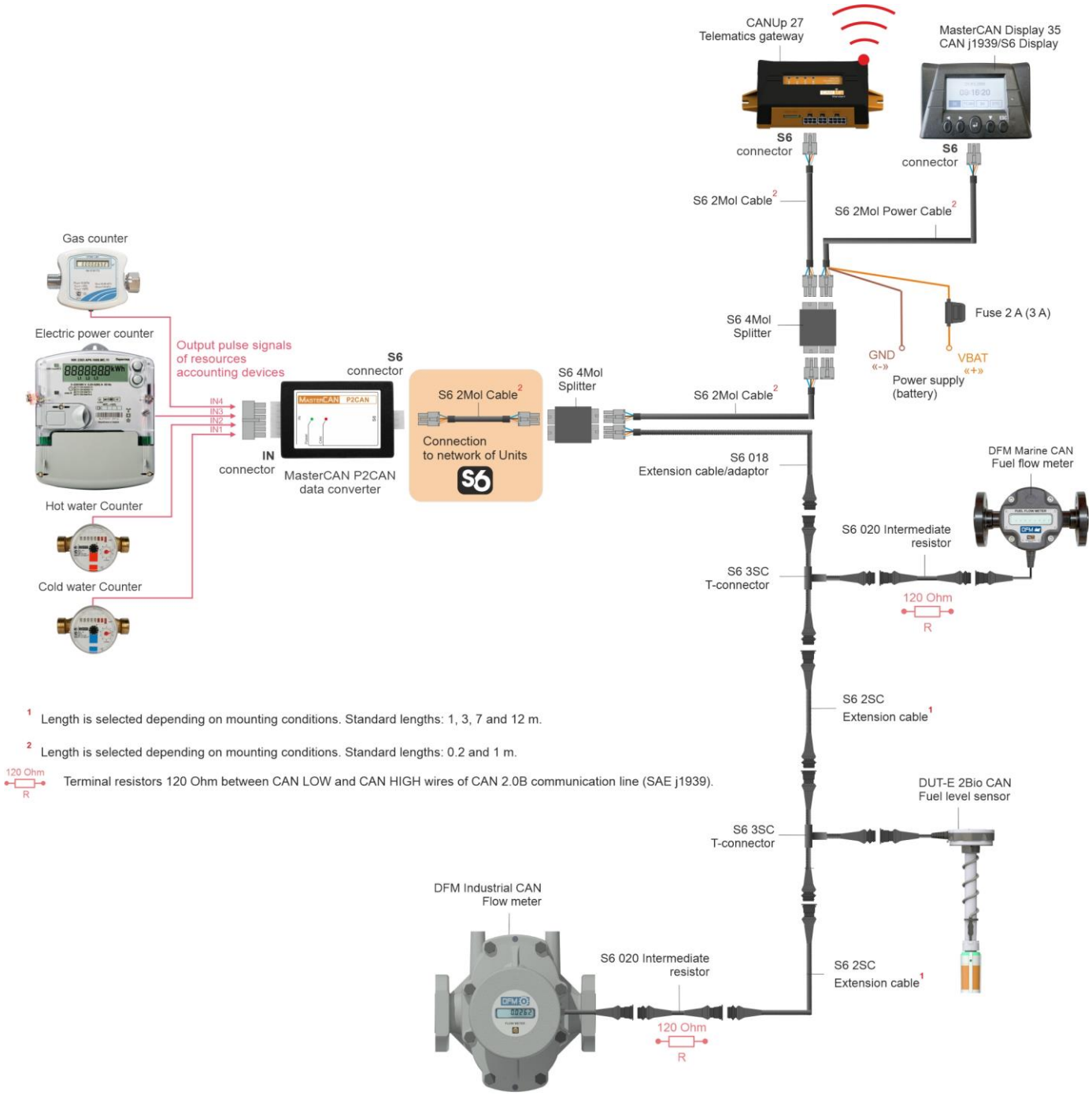


Figure 11 — Example of MasterCAN P2CAN data converter connection to CAN j1939/S6 Telematics interface for conversion of output pulse signals from various resource accounting devices and their transfer to the Telematics gateway and CAN-display

3 Converter configuration

3.1 Basic provisions

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

ATTENTION: To avoid any communication disruption in the communication line between the converter and the PC, you need to make sure there are no sources of electromagnetic interference close to the location where the converter is being configured (running electric motors, high-power transformers and switching equipment, welding equipment, high voltage 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 3.26 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 converter 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.
When configuring converter connected by S6 Technology, power supply of onboard network (battery) can be turned on

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 12. 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 S6 SK connector to S6 socket of the converter.
The converter and adapter can be powered through one of the free S6 SK connectors, through the converter S6 connector or by power supply wires of the adapter service cable (see figure 12 a).

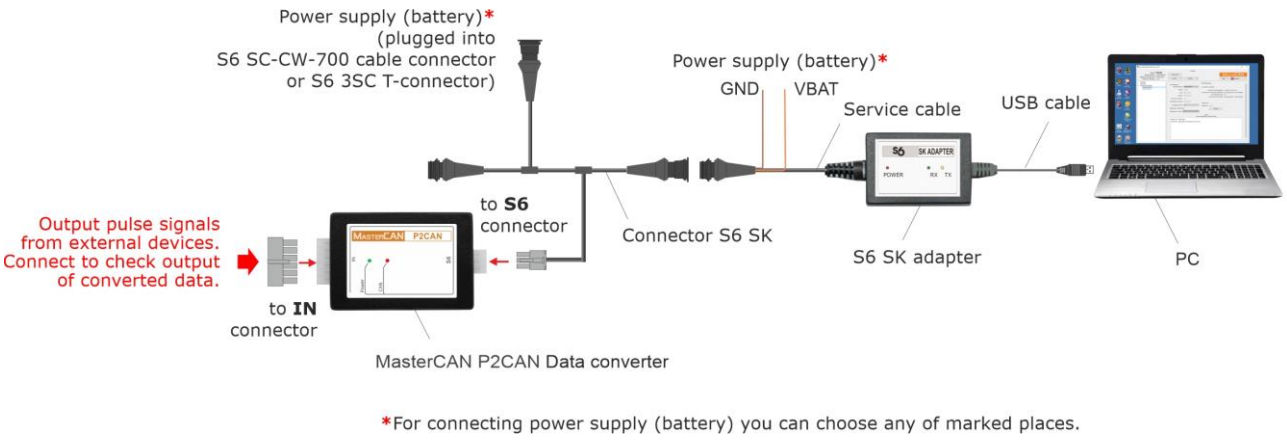
During the configuration of the converter operating within the network of Units by means of S6 Technology, the connector of the adapter service cable may be connected into the break in S6 cable system using S6 SK connector (e.g. instead of any S6 3SC T-connector). In this case, power is supplied to the converter and adapter through S6 cable system (see figure 12 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.

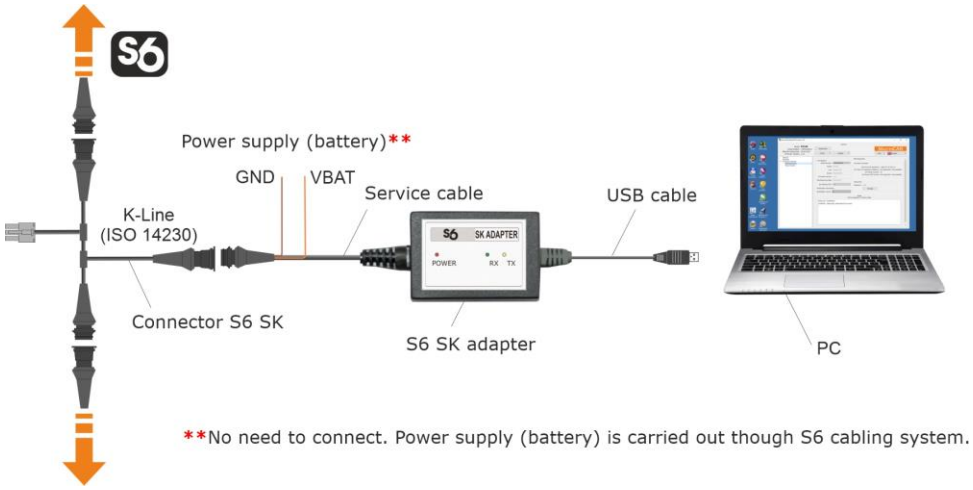
3) Connect power supply and ground wires to electrical system or battery.

4) Switch power on (battery).

RECOMMENDATION: In order to check the converted data output, we recommend that during the configuration of MasterCAN P2CAN pulse inputs you should send output signals from external devices that would operate subsequently together with the converter to the respective inputs of **IN** connector.



*a) connection of MasterCAN P2CAN by means of S6 SK through **S6** connector*

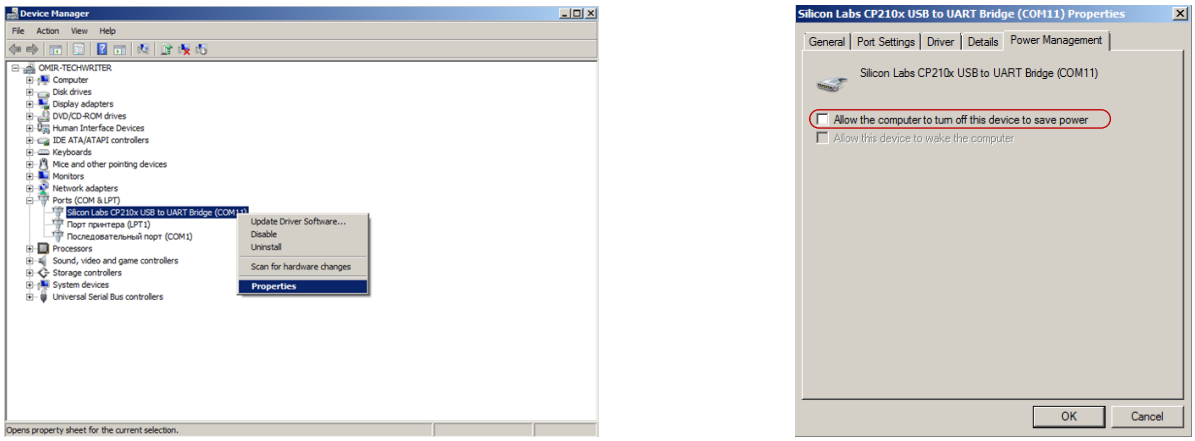


b) connection of MasterCAN P2CAN by means of S6 SK via S6 Technology

Figure 12 — Schemes of converter 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 13).

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 13 b).



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

Figure 13 — 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 6.

Table 6 – Description of service 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 14).

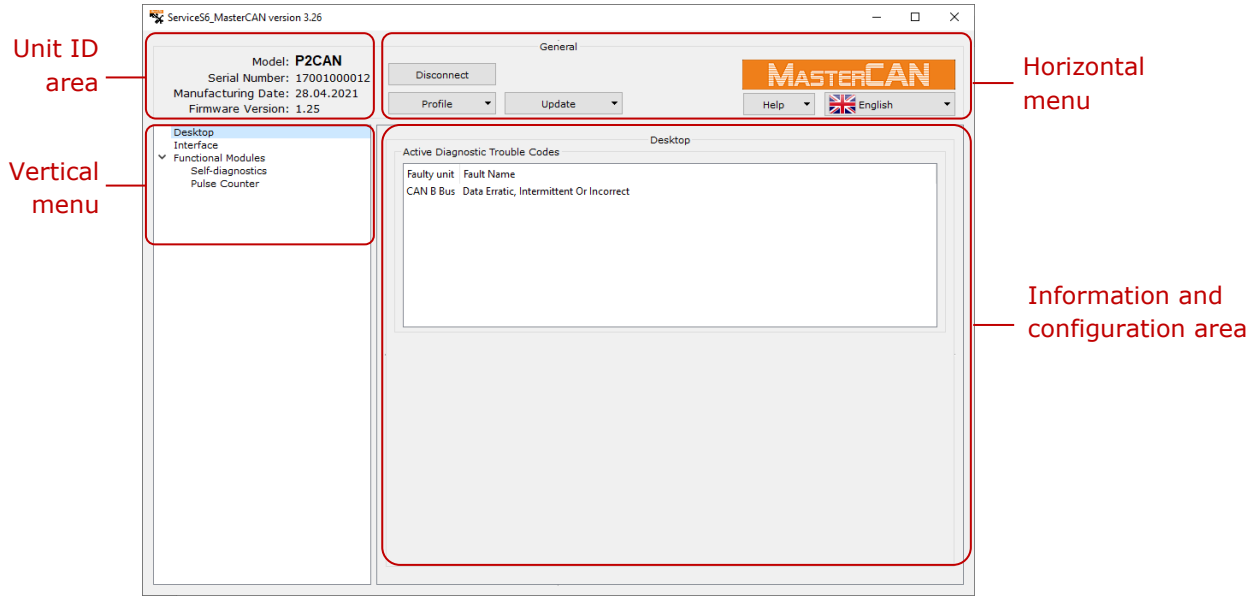


Figure 14 — Interface of Service S6 MasterCAN software

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;
- configuration of pulse signal conversion;
- 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 http://s6.jv-technoton.com/ part Data base.

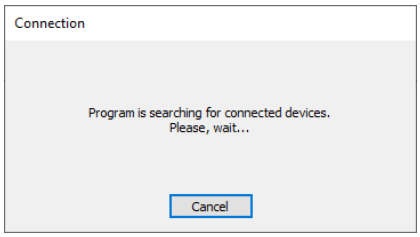
Information and Configuration area displays names (PGN) and parameters (SPN) of the messages. Each SPN holds the following: data range, discretion, measuring units.

3.4 Authorization

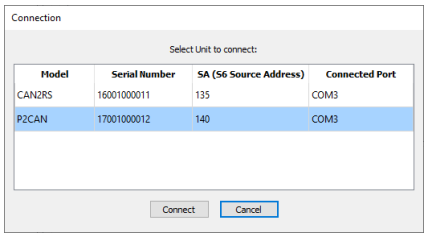
To enable connection between converter and PC, click the button Connect in **Horizontal menu**. Service S6 MasterCAN software will search for the connected Units (see figure 15 a).

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 15 b).

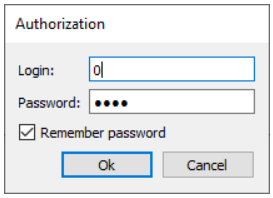
Enter Login and Password of the Unit into the appropriate fields of **Autorization** window. The default **Login** is 0. The default **Password** is 1111. To save a new Password (to avoid entering the password again during connection next time), tick **Remember Password** (see figure 15 c).



a) search for the connected Unit to PC



b) selecting one of several Units connected to S6 bus



c) user authorization

Figure 15 — 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 16). 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.

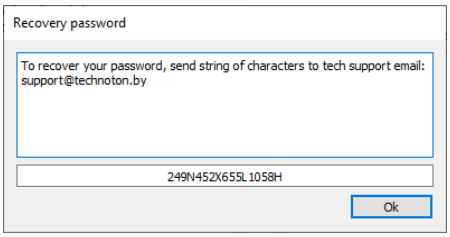


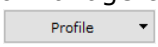
Figure 16 — Generating password recovery code

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 14). **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 and diagnostic data, settings of Function modules).

It is possible to manage the profiles in both the converter connected and autonomous mode. The button 

with drop down menu is used to choose the options (see figure 17). 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.

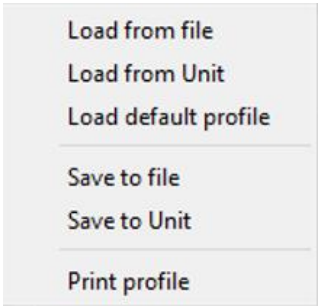
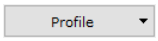


Figure 17 — View of Profile menu

Drop-down menu 

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 window for loading of the file you are to find on the disc and select the converter profile file (**MasterCAN_P2CAN_*.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_P2CAN_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_P2CAN_*.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. Prefix **MasterCAN_P2CAN_** and **.prf** extension are automatically added to the file name.

If the modified settings were not saved into Unit and Disconnect button was pressed or Service S6 MasterCAN software is being closed there will appear a notification on profile settings saving. Pressing Yes 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 j1939/S6 interface

To connect the converter to Units by means of S6 Technology using CAN j1939/S6 interface, select the title **Interface** (see figure 18) in the **Vertical menu** of the software and specify the following settings:

1) In the field **CAN Protocol Type** (SPN 521530) **J1939+S6** data transfer protocol is specified.

2) In the field **S6 Address (SA)** (SPN 521188) the unique network address of the Unit within CAN j1939/S6 interface is specified. For its identification by the output interface MasterCAN P2CAN converter has a fixed unique network address — **140**.

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

4) From the dropdown list **Enable Termination Resistor** (SPN 521533) select **ON** or **OFF** (by default — **OFF**) of the inbuilt terminal resistor (120 Ohm) 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.

5) The field **PGN Receive Timeout, s** (SPN 521532) — this setting is not supported for MasterCAN P2CAN data converter.

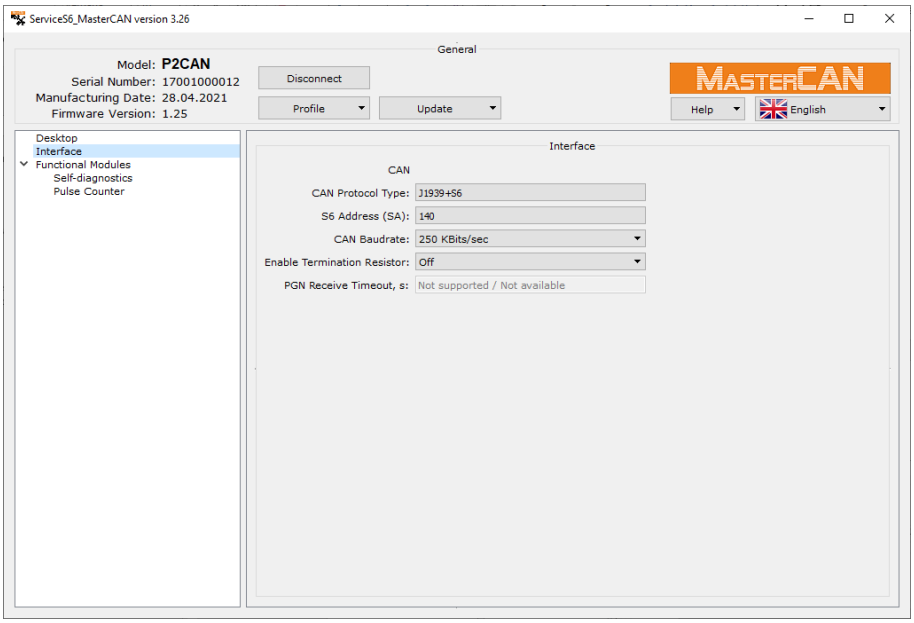


Figure 18 — Window of MasterCAN P2CAN data converter connection parameters configuration via CAN j1939/S6 interface

3.7 Configuration of MasterCAN P2CAN for conversion of pulse signals into SPN

Pulse Counter FM submenu serves to configure the convertion of input pulse signals into SPN (see A.2); it contains four identical sections with settings of counting inputs of MasterCAN P2CAN data converter (see figure 19).

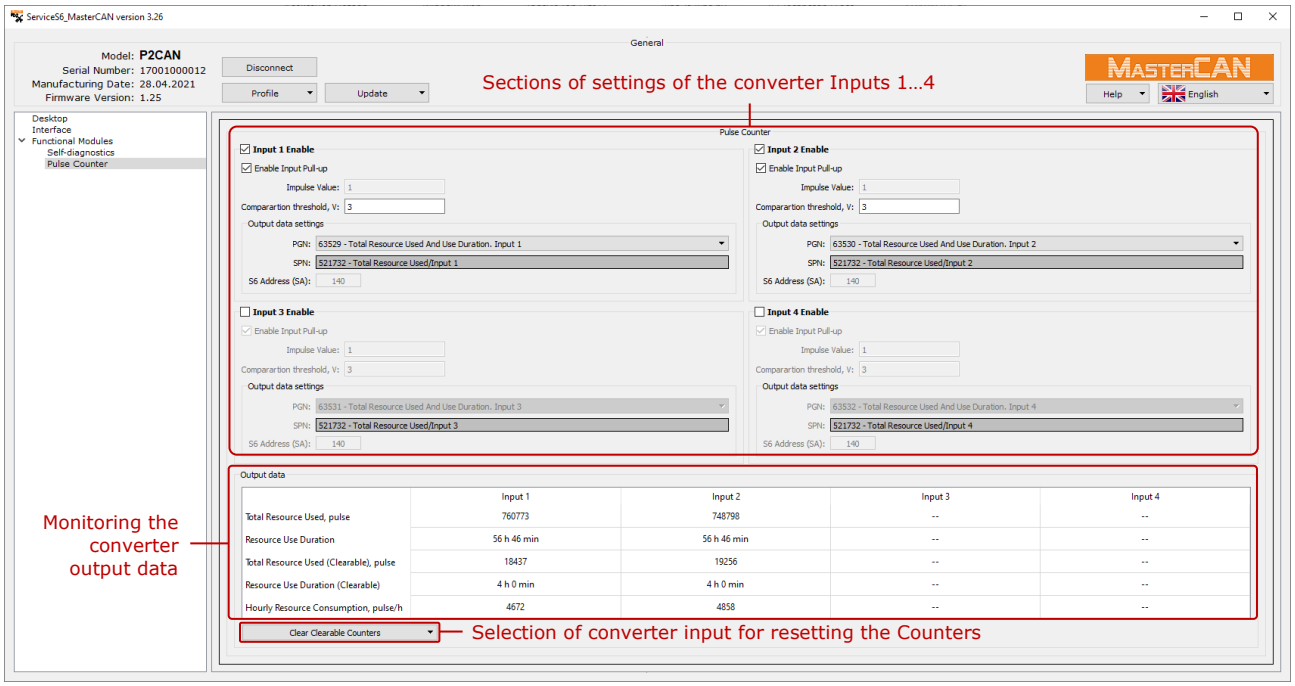


Figure 19 — Example of the window of settings for the converter inputs for conversion of pulse signals into SPN

Procedure for configuration of a specific input:

1) Activate the section of the converter input to be configured by ticking the appropriate field **Input 1/2/3/4 Enable** (SPN 521735).

2) If necessary, change the active level of the input signal according to which the converter would count each new incoming pulse (see table 3).
To change for the active level of the signal Low (level "0"), tick the field **Enable Input Pull-up** (SPN 521736). For the active level of the signal High (level "1") the tick must be deleted.

3) In the field **Impulse Value** (SPN 521274) enter the coefficient which defines the value of fuel volume corresponding to one output pulse of the flow meter connected to the converter input to be configured. The admissible range of values: **0...4294967295 l/pulse** (by default — **1 l/pulse**).

Remarks
1 The field for entering the pulse value is accessible only when the converter processes the output signal of the fuel flow meter, and when PGN 63236 is selected as the converter output data for the input to be configured. In case the converter processes output signals from the equipment that measures other resources (water/gas/electricity etc.), the pulse value is always equal to 1 l/pulse.

2 As for the flow-type fuel consumption sensor (e.g. DFM fuel flow meter), the value of fuel volume which is equal to the rated value of its measuring chamber corresponds to its single output pulse. The pulse value or sometimes value of the number of output signal pulses per 1 l are normally indicated in the passport for a specific flow meter.

3 In case NozzleCrocodile contactless reader is connected to the converter input to be configured, you are to enter the value of the calibration coefficient for a specific vehicle, as pulse value (see calibration methods in the Crocodile contactless readers operation manual).

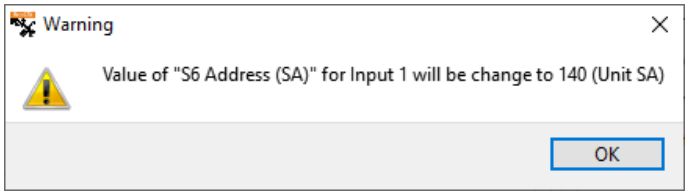
4) In the field **Comparation Threshold, V** (SPN 521678), enter the minimal value of the input signal amplitude; in case of its exceeding, this signal will be counted as pulse. The admissible range of values: **0.5…3.3 V** (by default — **3 V**).

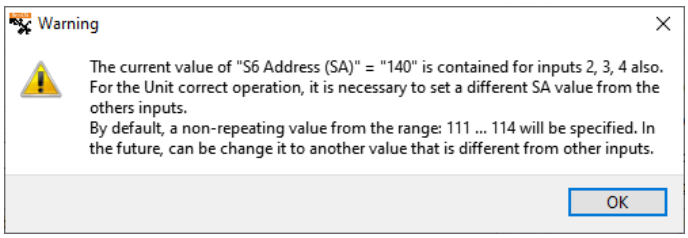
5) In the area **Output Data Settings**, from the dropdown list **PGN** select the output message which the converter is to transfer to CAN j1939/S6 interface:

- **Engine Hours Of Operation/Total Fuel Used** (PGN 63236) — this message is selected in cases, when a flow-type fuel sensor (e.g. DFM fuel flow meter) or a pulse reader of a petrol/gas injector (e.g. NozzleCrocodile contactless reader) is connected to the converter input which is being configured;
- **Total Resource Used And Use Duration. Input 1** (PGN 63529) / **Input 2** PGN 63530 / **Input 3** PGN 63531 / **Input 4** PGN 63532 — this message is selected in cases, when any resource measuring device (water/gas/electric power etc.) is connected to the input which is being configured.

In **SPN** field, the fixed SPN which contains converted data which must be transferred in the selected output message (PGN) is specified.

6) In **S6 Address (SA)** field, whenever you select the converter output message PGN 63529 / PGN 63530 / PGN 63531 / PGN 63532, the fixed network address **140** is automatically set for the respective input **140** (see figure 20 a).
In case you select the converter output message PGN 63236, the network address of the respective input in field **S6 Address (SA)** is automatically changed for unique address from range **111…114**. If necessary, it can be changed manually for any other vacant address from **0…253** range (see figure 20 b).





a) in case of changing for a fixed address *b) in case of changing for an address from the range*

Figure 20 — Warnings of automatic changing network addresses for the converter inputs which are being configured

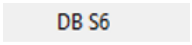
In the area **Output data** (lower portion of the window Pulse Counter FM) you may view in real time values of current Parameters and Counters transferred by MasterCAN P2CAN converter into CAN j1939/S6 output interface.

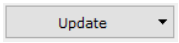
In case you need to reset the resettable Counters "Total resource consumption" and "Duration of resource consumption", select the appropriate converter input from the dropdown list 

.

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 FM Pulse counter of MasterCAN P2CAN converter, the service software operates using data from S6 Database (PGN and SPN). The list of SPN of the converter FM that are configured and/or displayed using the software is provided in annex A.

To update S6 Database in Service S6 MasterCAN software, press 

in the dropdown menu 

. The detailed description of S6 Database can be found at https://jv-technoton.com/.

3.8 Function test

If the MasterCAN P2CAN 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 converter 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).
CAN		Red	Transfer of converted data via CAN j1939/S6 interface is in progress.
	No signal		No data transfer via CAN j1939/S6 interface.

4 Packaging

MasterCAN P2CAN data converters delivery sets come in cardboard boxes of the following shape (figure 21).

Figure 21 — Packaging MasterCAN P2CAN data converter

Labels containing information on the product name, its serial number, date of manufacturing, version of the inbuilt software, weight, Technologies, QC department stamp and QR code are fixed on the converters' packages (see figure 22).

Figure 22 — MasterCAN P2CAN data converter packaging label

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

5 Storage

MasterCAN P2CAN 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 MasterCAN P2CAN 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

MasterCAN P2CAN 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

marketing@technoton.by

Technical support

E-mail: support@technoton.by

Annex A

SPN of MasterCAN P2CAN data converter Functional modules

Conversion of pulse signals, configuration and self-diagnostics are ensured by coordinated operation of Functional modules (FM) of MasterCAN P2CAN data converter.
The format of parameters (SPN) of FM MasterCAN P2CAN data converter corresponds to S6 Database (S6 DB).

A.1 Self-diagnostics FM

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

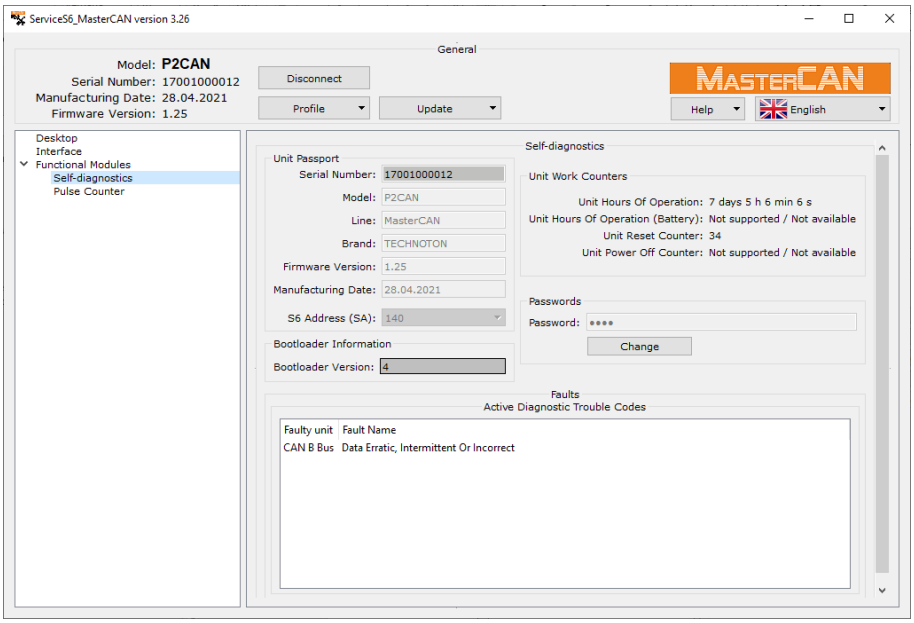


Figure A.1 — Example of the window of settings of Self-diagnostics FM for MasterCAN P2CAN in software Service S6 MasterCAN

Table A.1 — Self-diagnostics FM. Displayed and/or editable SPN with the help of Service S6 MasterCAN 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 product line MasterCAN. Each model has its own functional and constructive features. Setting is not available for editing.

SPN	Name	Factory value	Unit of measure	Clarification
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.
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	On the fact	No	Network address of converter which is connected via S6 Technology. Network address value can be 140 only. Setting is not available for editing.
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+FMI)	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.

A.2 Pulse Counter FM

Pulse Counter FM — is designed for reception of pulse signals according to counting inputs (Inputs 1…4), their conversion into digital data (SPN) and transfer into CAN j1939/S6 ouput interface.

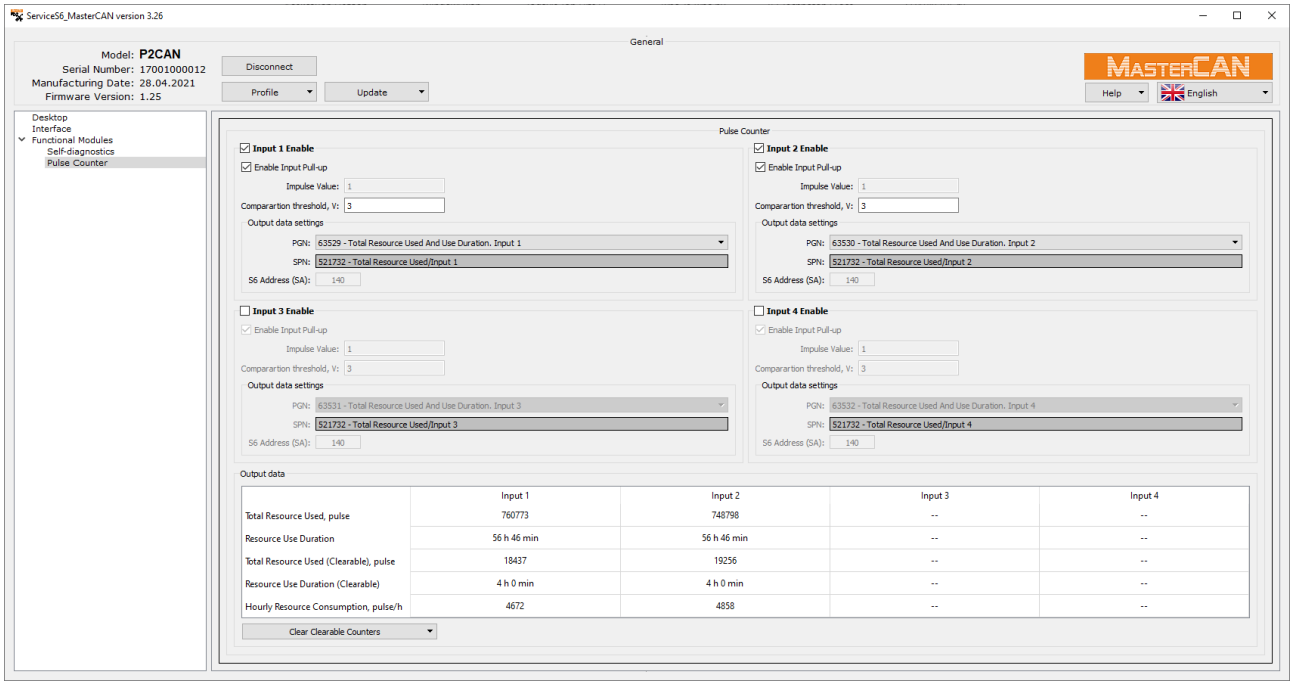


Figure A.2 — Example of the window of settings of Pulse Counter FM for MasterCAN P2CAN in software Service S6 MasterCAN

Table A.2 — Pulse Counter FM. Displayed and/or editable SPN with the help of Service S6 MasterCAN software

SPN	Name	Factory value	Unit of measure	Range	Clarification
Pulse Inputs Settings* PGN 63539					
521363	Inputs Quantity	4	pcs.	1…4	Number of configured physical inputs of the converter.
521735	Enable Input	On	No	On/Off	Field to activate section of settings of the respective physical input of the converter.
521736	Enable Input Pull-up	Off	No	On/Off	Field to change active level of input signal according to which the converter must count each new incoming pulse. To change for the Low active signal level (level “0”), tick it. For the High active signal level (level “1”), the tick must be deleted.
521274	Impulse Value	1	l/pulse	0…4294967295	Coefficient defining the quantity of the physical value corresponding to one input pulse is specified. E.g. one pulse of DFM flow meter corresponds to the volume of fuel that has passed through its measuring chamber. The pulse value of the flow meter is indicated in its operational documentation.
521678	Comparation threshold	3	V	0…3212.75	Minimal value of input signal amplitude is set; in case it is surpassed, the input signal is counted as pulse.

SPN	Name	Factory value	Unit of measure	Range	Clarification
Inputs Settings* PGN 63100					
521363	Inputs Quantity	4	pcs.	1…4	Number of physical inputs of MasterCAN P2CAN
521364	Input Number	Input 1/ Input 2/ Input 3/ Input 4	No	Input 1… Input 4	Number of converter input selected for configuration
521150	PGN	Total consumption and duration of resource conumption. Input 1 PGN 63529/ Input 2 PGN 63530/ Input 3 PGN 63531/ Input 4 PGN 63532	On the fact	0…65535	From the dropdown list, converter output message (PGN) is selected which is then transferred to CAN j1939/S6 output interface. This message incorporates the parameter (SPN) converted from input pulse signal. Message specified by default is used in cases, when any resource counter is connected to the converter input which is being configured (water/gas/electric power etc.). The message Operation time/Fuel consumption by engine (PGN 63236) is selected in cases, when flow-type fuel sensor is connected to the converter input which is being configured (e.g. DFM fuel flow meter) or petrol/gas injector pulse reader (e.g. NozzleCrocodile contactless reader).
1214	SPN	Total Resource Used Input 1 SPN 521732/33.1 Input 2 SPN 521732/33.2 Input 3 SPN 521732/33.3 Input 4 SPN 521732/33.4	pulse	0…4294967295	SPN converted from the input pulse signal.
521188	S6 Address (SA)	140	No	0…253	Field for Unit unique network address within Telematics interface which generates SPN or request to which for reading out SPN is needed. The address stated by default is generated automatically, when choosing the converter output message PGN 63529 / PGN 63530 / PGN 63531 / PGN 63532 for the respective input. When choosing the converter output message PGN 63236, the network address of the respective input is automatically changed for a unique address from 111…114 range and, if necessary, it can be changed manually for another vacant address from 0…253 range.
Engine Hours Of Operation/ Total Fuel Used** PGN 63236					
521171	Flowmeter Hours Of Operation	On the fact	s	0…4211081215	Current value of Total operation time Counter which is output by the converter is displayed. Counter increment starts from the moment of the converter manufacturing and cannot be reset by the user.
5054	High Resolution Engine Total Fuel Used	On the fact	l	0…4211081.215	Current value of Total fuel consumption Counter which is output by the converter is displayed. Counter increment starts from the moment of the converter manufacturing and cannot be reset by the user.
Total Resource Used And Use Duration** Input 1 PGN 63529 / Input 2 PGN 63530 / Input 3 PGN 63531 / Input 4 PGN 63532					
521732/ 33.1…33.4	Total Resource Used/ 33.1 Input 1… 33.4 Input 4	On the fact	pulse	0…4211081215	Current value of Total resource consumption Counter for input 1…4 which is output by the converter is displayed. Counter increment starts from the moment of the converter manufacturing and cannot be reset by the user.
521733/ 33.1…33.4	Resource Use Duration/ 33.1 Input 1… 33.4 Input 4	On the fact	s	0…4211081215	Current value of resource consumption duration Counter for input 1…4 which is output by the converter is displayed. Counter increment starts from the moment of the converter manufacturing and cannot be reset by the user.

SPN	Name	Factory value	Unit of measure	Range	Clarification
Total Resource Used And Use Duration. Clearable** Input 1 PGN 63533 / Input 2 PGN 63534 / Input 3 PGN 63535 / Input 4 PGN 63536					
521732/28.0/ 33.1…33.4	Total Resource Used/ 28.0 Clearable/ 33.1 Input 1… 33.4 Input 4	On the fact	pulse	0…4211081215	Current value of resource total consumption resettable Counter for input 1…4 which is output by the converter is displayed. Counter can be reset by user.
521733/28.0/ 33.1…33.4	Resource Use Duration/ 28.0 Clearable/ 33.1 Input 1… 33.4 Input 4	On the fact	s	0…4211081215	Current value of resource consumption duration resettable Counter for input 1…4 which is output by the converter is displayed. Counter can be reset by user.
Hourly Resource Consumption** Input 1,2 PGN 63537 / Input 3,4 PGN 63538					
521734/ 33.1…33.4	Hourly Resource Consumption/ 33.1 Input 1… 33.4 Input 4	No	pulse/h	0…4294967295	Current value of hourly (instant) resource consumption for input 1…4 which is output by the converter is displayed.
* Sections of settings for inputs 1…4 are identical. **Output data for inputs 1…4.					

Detailed parameters description (SPN), structure and content of messages (PGN) of FM MasterCAN P2CAN data converter are placed at the following web site https://s6.jv-technoton.com/ (to access S6 DB registration is required).

Annex B
Converters firmware upgrade

WARNING: MasterCAN P2CAN 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 9…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