Data converters









Purpose



MasterCAN data converters transform and transmit digital and analog signals of standard and additional equipment of vehicle or stationary object into a telematic system.



Tasks

- ✓ Messages converting between CAN j1939/71, SAE j1587, Modbus RTU protocols.
- ✓ Integration into a combined telematics system:
 - on-board CAN j1939 and j1708 data buses;
 - additional equipment with CAN j1939, RS-232, RS-485 interfaces;
 - analog sensors, lamps, relays.
- Combining data of two CAN j1939 buses: FMS messages are gathered from the first bus, Telematics messages from the second; data from both information buses is simultaneously transmitted to telematics unit.
- Automation of operation of analog devices (relays, executive mechanisms) using CAN messages of the terminal, sensors, j1939 bus.



Tasks/ Fuel counter

In information buses, usually, there is data **only on instant fuel consumption**.

MasterCAN data converter receives this data from information bus of vehicle and calculates total fuel consumption from the time of engine start.

Ready-made data on fuel consumption for a trip are transmitted to telematics unit.





Advantages

- ✓ Versatility can be used for vehicle telematics, IIoT applications, industrial automation projects.
- ✓ Flexible configuration of input/output SPN, Modbus registers, data baud rate.
- ✓ Conformity with automotive standards of the EU and EAEU.
- ✓ Power supply from on-board automotive electrical network without additional power adapters.



Application/ Vehicle telematics



Application/ Industrial automation







Interfaces (protocols) of MasterCAN data converters

| | СС | C 232/485 | V-GATE | RS2CAN | CAN2RS |
|-----------------------------|----|-----------|--------|--------|--------|
| Input interface (protocol) | | | | | |
| CAN (SAE J1939/71) | | | | | |
| J1708 (SAE J1587) | | | | | |
| RS-232 (Modbus RTU) | | | | | |
| RS-485 (Modbus RTU) | | | | | |
| Output interface (protocol) | | | | | |
| CAN (SAE J1939/71) | | | | | |
| RS-232 (Modbus RTU) | | | | | |
| RS-232 (ASCII, DUT-E COM) | | | | | |
| RS-485 (Modbus RTU) | | | | | |
| RS-485 (ASCII, DUT-E COM) | | | | | |



Inputs and outputs of MasterCAN DAC j1939 i/o modules

| | | MasterC | AN DAC15 | MasterCAN DAC2113 | | |
|----------------------------|----------------------|----------------|------------------|-------------------|----------------|--|
| Signal types | Signal types | Inputs, pcs. | Outputs, pcs. | Inputs, pcs. | Outputs, pcs. | |
| CAN j1939/S6 interface | | 1 | 1 | 1 | 1 | |
| Resistive | 0,015 50 kOhm | - | 1 | 2 | 1 | |
| Voltage | 0,5 9 V | 1 | 1 | 4 | 2* | |
| Frequency | 0,01 10 kHz | 1 | 1 | 2 | 2 | |
| Pulse | 0,5 9 V / 40 250 ms | - | 1 | _ | _ | |
| Current | 4 20 mA | - | 1 | 1 | 1 | |
| Discrete | | _ | 2 | 12 | 7 | |
| combined voltage/frequency | y input 🛛 🚺 combined | voltage/freque | ncy/pulse output | * voltage | value 0.5 10 V | |



Examples of collected and converted data

- ✓ Fuel the current volume in the tank, refuelling and draining, hourly consumption.
- Engine operation RPM, current moment, engine operating time.
- ✓ Oils, coolant and other technical fluids temperature, level, pressure.
- ✓ Axle load, weight of the cargo.
- ✓ Work parameters of additional and attached equipment of vehicles.
- Electrical parameters of the diesel power plant alternator.
- ✓ Parameters of the industrial equipment.



MasterCAN service sofwtare

| SPN | 96 Fuel Level 1 / PGN 63087 | Search |
|-----|---|---------------|
| SPN | I/PGN | ^ |
| > | 73 Auxiliary Pump Pressure | |
| > | 74 Maximum Vehicle Speed Limit | |
| > | 75 Steering Axle Temperature | |
| > | 79 Road Surface Temperature | |
| > | 80 Washer Fluid Level | |
| > | 81 Engine Diesel Particulate Filter Intake Pressure | [loction |
| > | 82 Engine Air Start Pressure | CDN Selection |
| > | 84 Wheel-Based Vehicle Speed | SFIL |
| > | 86 Cruise Control Set Speed | 1101 |
| > | 87 Cruise Control High Set Limit Speed | |
| > | 88 Cruise Control Low Set Limit Speed | 1 10,000 |
| > | 90 Power Takeoff Oil Temperature | Linhues |
| > | 91 Accelerator Pedal Position 1 | Value |
| > | 92 Engine Percent Load At Current Speed | |
| > | 94 Engine Fuel Delivery Pressure | |
| > | 95 Engine Fuel Filter Differential Pressure | • |
| Y | 96 Fuel Level 1 | |
| | PGN 63087 - Fuel Level/Volume in Tank | |
| | PGN 63152 - Total Fuel Volume In Tanks | |
| | PGN 63234 - Message 2 | |
| | PGN 65276 - Dash Display | |
| > | 97 Water in Fuel Indicator | |

The MasterCAN converters are configured using the S6 SK service adapter and Service S6 MasterCAN software (for Windows).

CAN j1939 parameters (SPN) or RS-232/485 parameters (Modbus register map) are configurable with maximum flexibility.



Configuration/ MasterCAN CC, C232/485, V-GATE

J1939/S6 input/output setup:

- permission to send FMS and Telematics messages;
- permission to send active requests to the CAN bus.

RS-232/485 input/output setup:

- ✓ selecting output protocol type Modbus, text (ASCII), DUT-E COM;
- setting the interval and other parameters for messages transfer using the ASCII protocol;
- ✓ selection of the baud rate via RS-232/485;
- ✓ automatic calculation of trip fuel consumption (by input SPN 183).



Configuration/ MasterCAN RS2CAN, CAN2RS

J1939/S6 input/output setup:

- ✓ SPN selection (from 10,000+ values) for input/output data;
- indication of addresses of devices connected via the S6 interface;
- ✓ selection of data baud rate.
- RS-232/485 input/output setup:
- ✓ selection of Modbus register for reading/writing data;
- ✓ selection of data baud rate.





| omed /la | | Usidette | Romere | | | |
|---|---|---|--|-----------------------------|--|------|
| | | | | | Analoo Getzwar | |
| ebLit | | | | | rt volue | |
| arrel In | gul/Gulp | t Coie | Type | Pies 1 | | |
| 1 B B | - #1 | Rich | Resistive insut (15.0 St k0) | - A2,A4 | 1 009 | 1 |
| | +1 | Rol | Fessive row (15-0-51 k0) | * A1,A3 | | |
| | •T | 2nh | Comment input (4-20 mA) | . 14,20 | 809 | |
| | | Un4 | Analog Hout (0.5-10 V) | T B7 | (m) | |
| | •I | | Text suspended // Art evoluble | = et | G | |
| | -1 | | Not supported //let available | el m | 400 | |
| | | | Potsuccorted /Net available | - n: | | |
| | -1 | | Test is provided (74ct available | 1 1 | 200 | |
| | •7 | | Instance of the system | | | |
| | | | Los and the second seco | 24 W1 | | |
| trut del | nare (0. 51% (0. | 444 Esc 9 Dages | etwork Digne Controller 1 c Turuse Pusit 권 Aliak Jending Partiel, mp: 50 | | 1 | 3 |
| Adires | terree Na | t s.epert | ted / Not available * Battery Voltage Dependence: 11 | 1107100 - 02112 | | |
| Address ration o | terre N | t support | ted / Not available 🔄 Battery Voltage Dependence: 🕅 🖉 | an sel serie | 4 | |
| Address ration of armol Ga | epree No abratum fa Hessive | t suspert De | ed / fot analole 🔄 Buttery Voltage Dependence: 💷 s | no nd / fet | - | |
| Address patients annel Ga | HERRICAN 11- Represe The addression for Messione | t suspert Die Die (2000) 121-00 | ed / fot analotie ▲] Battery Voltage Dependence: [k = 1 t 50000) Engine targue Model, (1 10) t | and white | 1 2 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 | |
| Address ration d annel Gr 4 2 | HERE N | t susport cm xRm [32 33-09 53/00.0 | End Front enable Interview | ano met / Marta | | |
| Address Systems annel Co 4 2 2 | epree Na abrotun fa Hessitve | t support per strem (32 33-00 53/000.0 | Image: Second | ano est _e Aquita | Model in the second sec | |
| Adiment rotion d annel Gr 4 2 2 3 | epres No abratum fa Accestve | t support cm s7m (s) s3.00 53000.0 | ed/Tot avaide ■ Bibler / Wate Seedows: 1 | | Form Torus Mode And State | |
| Address Station C arrel Ca 4 2 4 | HEAD [14] Repres No abrodum fa Head two | t support cm ; cRm (2) ; 33:00 ; 53:000-0 | de/ Tot avaide | | L Entre Den Contra | |

MasterCAN DAC works simultaneously in two modes: digital-analog, analog-digital.

Service S6 MasterCAN configures both modes: SPN conversion to the desired type of analog signal (voltage, frequency, current, discrete, resistive) and reverse conversion.



Configuration/ MasterCAN DAC 2113, DAC 15

J1939/S6 input/output setup:

✓ SPN selection (from 10,000+ values) for input/output data.

Analog inputs/outputs setup:

- selection of the required type of input/output signal (voltage, frequency, pulse, current, discrete, resistive);
- ✓ setting the limit values of the output analog signals.



Business cases/ City buses



Fuel data (consumption, tank fuel level) is read from the CAN bus. They are converted to RS-485 and transmit to the corresponding terminal input.



Business cases/ Fuel pumping automation



The onboard equipment of genset monitoring system exchanges data via CAN j1939/S6 bus. MasterCAN converter turns on/off the pump power relay depending on the data of fuel level sensor about the remaining fuel in the supply tank.



Summary

- MasterCAN converters intelligent converters of digital messages and analog signals used in machinery telematics and stationary object monitoring systems (IIoT).
- ✓ The converters combine on-board data buses, analog sensors, and other peripherals with different digital interfaces into a single network.
- Converters collect data, which are transmitted over various communication protocols, and analog signals for transformation and sending uniformed messages to a telematics service.