Manual

ehb SMARTmodul 04

CANmodul

Gauge-Modul
RPM-Modul
I/O-Modul
Sensor-Modul

(similar to original product)

Version 1.0

Service Personnel

Short manual

Connector:

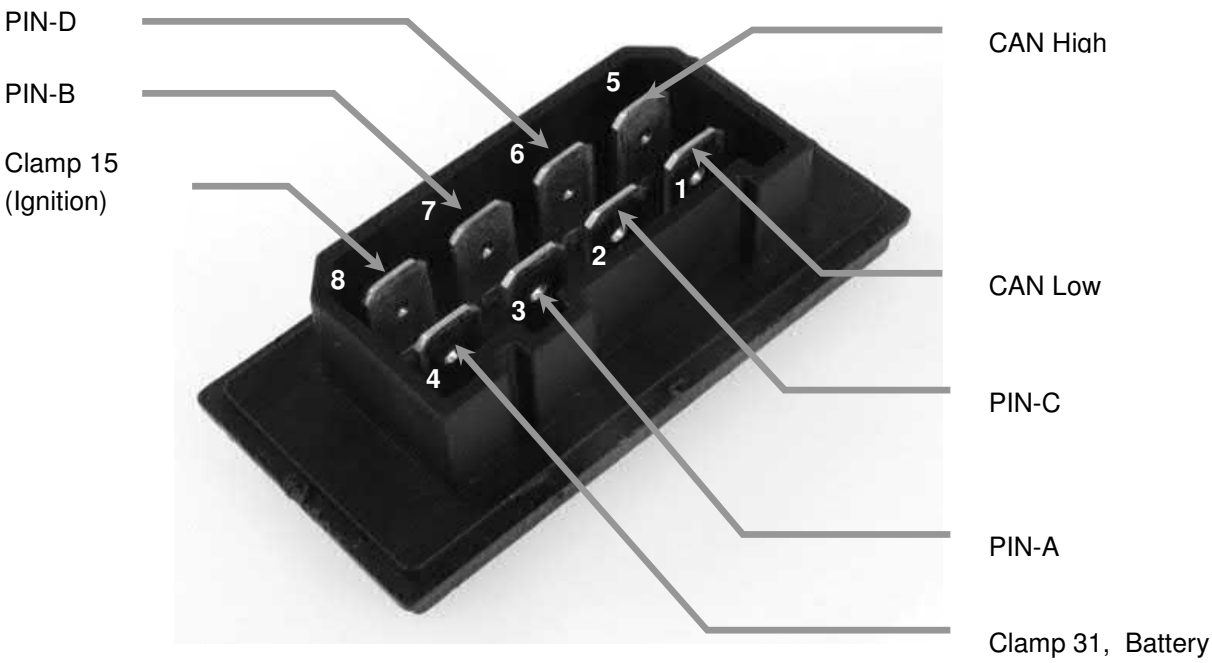


Abb. 1: CANmodul , detail front view

Connector pin assignment several Moduls

connection		RPM-Modul	Gauge-Modul	I/O-Modul	Sensor-Modul
3	**PIN-A**	RPM +	Gauge 1 (oil pressure)	Input 1 or Output 1	Fuel level sensor input
7	**PIN-B**	RPM -	Gauge 2 coolant temperature	Input 2 or Output 2	Coolant level sensor input
2	**PIN-C**	Working speed	gauge 3 oil temperature	Input 3 or Output 3	Hydraulic level sensor input
6	**PIN-D**	Frequency output tachometer	Frequency output tachometer Optional: gauge 4 fuel gauge	Input 4 or Output 4	Hydraulic temperature sensor input

5	**CAN-High**	CAN-High	CAN-High	CAN-High	CAN-High
1	**CAN-Low**	CAN-Low	CAN-Low	CAN-Low	CAN-Low
8	**KL.15**	Clamp 15	Clamp 15	Clamp 15	Clamp 15
4	**KL.31**	Clamp 31	Clamp 31	Clamp 31	Clamp 31

Tabel of contens

1. In general

1.1. Introduction

The CANmodul assisted the CAN protocol system (Controller Area Network) according to SAE J1939.

The CANmodule have been developed to be responsible for supporting and expanding existing CANbus systems. The using of these modules can make the communication with the engine management system of an electronically controlled engine easier for the operator of a machine or an aggregate.

The engine management systems (ECU) of individual motor manufacturers have not only a engine controll function, they also provide information of operating values, such as Oil pressure, temperature, speed, operating hours and more on the CAN bus. This information will be received and processed in the CANmodules.

2. Service

If there is a repair needed, then please send the unit to:

ehb electronics GmbH
Hans-Böckler-Str. 20
30851 Langenhagen

Please describe the failure as detailed as possible and put the written paper into the box.

Warning

When replacement parts are required, ehb electronics recommends using replacement parts supplied only by ehb electronics. Failure to heed this warning can lead to premature failure, product damage, personal injury or death.

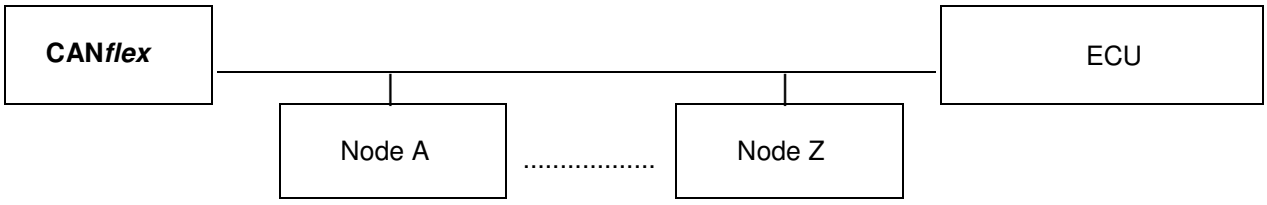
ehb electronics GmbH is exclusively responsible for the professional execution of the works, as well as for the normal condition of the assigned material. Claims of compensation, e.g. substitution of lost of profit or the substitution of direct or indirect consequential loss, e.g. the loss of data are excluded.

NOTE!

Damage by improper packing of the equipment with the dispatch and/or foreign interferences lets the warranty expire!

3. CAN-BUS wiring

The CANbus wiring have to be in lines as for example in a two-spot bonding between the CAN*flex* and the engine management system. If further nodes (CANmoduls) are to be connected, these must be attached in accordance with the following diagram:



Only the two outside bus participants should be equipped with 120R terminating resistances.

For the wiring we recommend a protected twisted 2 core cable, with a cross section of at least 0,5mm² (mechanical stability). Thus data transmission rates of 250 kBit/s can be realized on a distance up to 100m without any problems.

In order to obtain an optimal effect of the screen, this may be attached only at one side to ground (see connection diagram).

4. Handling of CANmoduls

4.1. Start and stop of CANmoduls

The CANmodul will be switch on and off like the ECU with clamp 15 of the ignition start switch.

5. Function of the Gauge-Modul

The most engine manufacturer are produce engines with ECU with SAE J1939 CAN-BUS protocol. The CANmodule can receive all information which is send by the ECU, if the information base on SAE J1939 protocol. Much of this information is not necessary for the everyday operation.
The gauge module with the standard software supports the following gauges.

- Engine oil-pressure, VDO 350 030 025
- Coolant temperature, VDO 310 030 023
- Engine oil-temperature, VDO 310 030 003
- RPM VDO 333 035 029 (or optional Fuel level gauge VDO 301 030 001)

.
For the connection of conventional gauges can be used 12V and 24V gauges (depending on battery voltage). The gauges have to be compatible with VDO temperature and oil-pressure sensors. If you use other sensors, the characteristic must be factory-adjusted.

The following standard sensors are reproduced or simulated:

1. Connection PIN-A: Oil-pressure sensor: 0...10bar, 10-184 Ohm

Pressure in Bar	0	2	6	10
Resistance in Ohm	10	52	124	184

2. Connection PIN-B: Temperature sensor VDO 92-027-004 (coolant temperature)

Temperature in °C	-40	25	90	150
Resistance in Ohm	17162	543,54	51,21	10,96

3. Connection PIN-C: Temperature sensor VDO 92-027-006 (Oil temperature)

Temperature in °C	-40	25	120	180
Resistance in Ohm	36563	926,71	36,51	10,24

4. Connection PIN-D: Tachometer VDO 333 035 029 with 8 pulses per revolution

Speed in UPM	0	800	1000	2000	3000	4000
Frequency in Hz	0	106,7	133,3	266,7	400	533,3

Note: The frequency is independent of the number of cylinders of the engine. So even at 4 or 6 cylinder engines 8 pulses per revolution!

4b. **Optional:** connection PIN-D: Float operated sensor for fuel level VDO 226 801 015 001

Füllstand in %	empty 0%	full 100%
Resistance in Ohm	3	180

6. Function oft he RPM Modul

In addition to the receiving operation values sends the CAN module speed requirements on the CAN bus to the ECU.

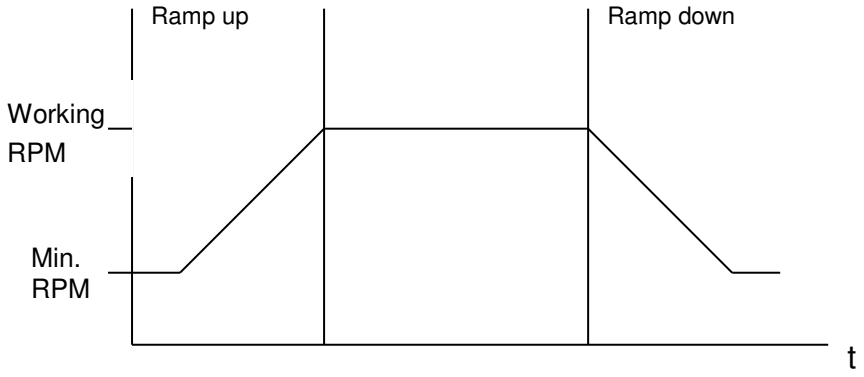
Note: Some EMR need for change in the speed over the CAN-bus a special release from the service of the engine manufacturer. Please see also hints in the handbook of ECU / engine.

Speed adjustment:

With the help of inputs UPM + (PIN-A) and UPM-(PIN-B) the engine speed can change within the limits of the min and max speed manually. In inching mode, the speed change gradually by 40 RPM. (inching mode = Unique inching UPM+ or UPM-)

Working RPM (Ramp function):

If the input working RPM (PIN-C) is active, the current RPM will increased in the period T = 10s until the programmed value of "working RPM" is reached. This speed is kept as long as until the working RPM input (PIN-C) is disabled. Then the RPM drops down until the minimum RPM is reached during the period of T = 10s.



This ramp function is especially relevant for water pumps, as a sudden speed changes can lead to a set-back in the water cycle.

Set working RPM:

By pressing the buttons RPM+ and RPM- for min. 3 sec, the current speed is stored as new working RPM, and is also saved after turning off. (Teach in method)

Tachometer:

For the visualization of the current speed a tachometer VDO 333 035 029 can be connected at PIN D.

Speed in RPM	0	800	1000	2000	3000	4000
Frequency in Hz	0	106,7	133,3	266,7	400	533,3

Note: The frequency is independent of the number of cylinders of the engine. So even at 4 or 6 cylinder engines 8 pulses per revolution!

7. Function of I/O-Modul

The number of inputs and outputs is limited to four.

Inputs:
With the help of the digital inputs (PIN A, PIN B, PIN and PIN-C-D) measured values can be transferred via the CANbus and for example evaluated and displayed by the CANmonitor with CANmd. (end-, level-, temperature and pressure switch)

Outputs:
About the CANbus received parameters are evaluated and issued on the outputs. The outputs are dimensioned with per 2A (BTS721).

Example1:
With the help of an I / O module, the switching states of the connections PIN A, PIN B, PIN and PIN-C-D are queried by a CANmonitor over greater distances.
As required, the same connections through a CANbus CANmonitors are switched with the command + UB.

Example2:
Conceivable also a misalignment of intelligence (software) would be into the CAN module. Simple example would be a level monitoring with two level switches, and an exit for a pump control. Over the CAN bus a status message is then only sent.

8. Function of Sensor-Modul

Sensor inputs:
With the help of the analog inputs (PIN A, PIN B, PIN and PIN-C-D) actual measured values are transfer on the bus and for example evaluated and displayed by a CANmonitor with CANmd.

The following characteristic are supported:

- Float operated sensor for fuel level VDO 226 801 015 001

Level in %	empty 0%	full 100%
Resistance in Ohm	3	180

- Coolant level sensor VDO 226 801 015 001 → 0-100%

Level in %	empty 0%	full 100%
Resistance in Ohm	3	180

- Hydraulic oil-pressure, active 4-20mA sensor

Pressure in Bar	0			1285
Current in mA	4			20

- Hydraulic oil-temperature, temperature sensor VDO 92-027-006 (oil-temperature)

Temperature in °C	-40	25	120	180
Resistance in Ohm	36563	926,71	36,51	10,24

Example:

Most industrial engines are delivered with a MMS, which does not support the connections of an external tank sensor.

With the help of the sensor module and a conventional tank sensor can be supplied the level into the CAN bus and indicated and evaluated with the CANmonitor and display.

Since the CAN module CAN-protocol after SAE J1939 supported these sensor messages can be used also in connection with third party supplier and their CAN visualization systems.

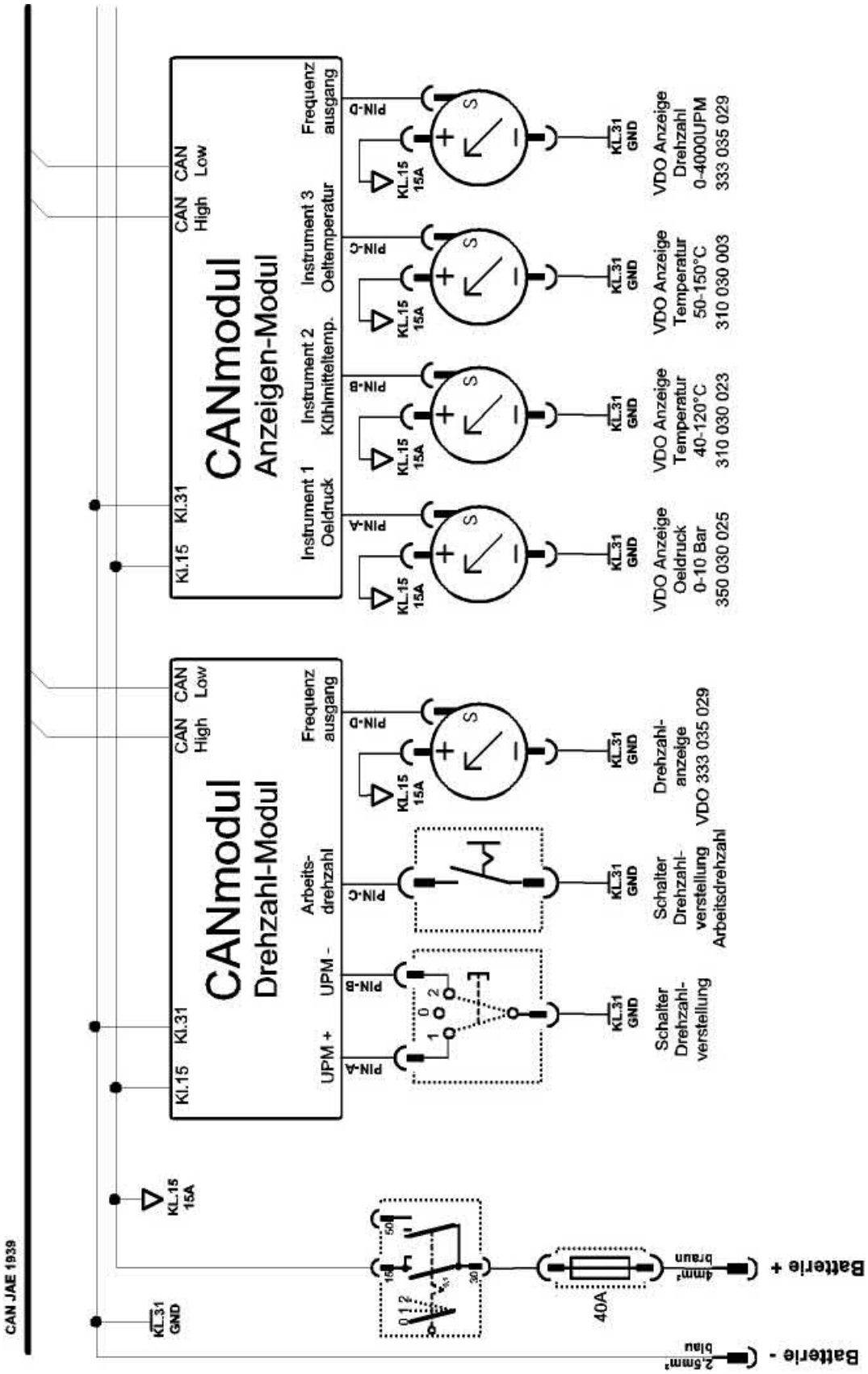
Compare in addition the SPN and PGN parameter numbers supported listed in the user manual of the foreign manufacturer.

connection	Sensor	value	SPN	PGN
PIN-A	Fuel level	0-100%	SPN96	PGN65276
PIN-B	coolant level	0-100%	SPN111	PGN65263
PIN-C	Hydraulic oil-pressure	0 – 128,510 kPa	SPN1762	PGN61448
PIN-D	Hydraulic oil-temperature	-273 – +1735°C	SPN1638	PGN65128

9. Technical specifications

Parameter	condition	limits			remarks
		Min.	Typ	Max.	
Voltage UB		8V	12...24V	32V	
Interference voltage UB	6Vss, 50Hz	14V		28V	
Voltage peak UB	2ms		200V		
Current consumption at UB 8-24V terminal 30 (battery +)	ignition on/off	< 5mA		200 mA	Current consumption can accelerate with different switched Outputs
Analog outputs PIN-A gauge 1 PIN-B gauge 2 PIN-C gauge 3 PIN-D gauge 4	input max. 14V max. 100 mA	10 Ω		10 MΩ	Sensor emulation against GND
Digital outputs aktiv High PIN-A output 1 PIN-B output 2 PIN-C output 3 PIN-D output 4	TA 25°C		2A 2A 2A 2A		Short-circuit-proof
PIN-D Frequency			100mA		Square wave signal for tachometer IPU 8 short-circuit-proof
Digitalinputs aktiv Low PIN-A input 1 (RPM+) PIN-B input 2 (RPM-) PIN-C input 3 (G/S)	UB > 5V UB = 5V UB = 12V UB = 24V	19% 0,95 V 2,28 V 4,56 V	21% 1,05 V 2,52 V 5,04 V	23% 1,15 V 2,76 V 5,52 V	Level Detection depending on the Battery voltage
CAN-Bus-Interface			250kBit/s		CAN 2.0B, SAE J1939
Operating temperature Temperature at stock		-40°C -55°C		+105°C +105°C	
Humidity (not condense)	48h		95%		SAE J1378
Vibration	6h, 10-80Hz		20g		SAE J1378
Shock	72x, 9-13ms	44g		55g	SAE J1378
Size	LxBxH	75mm x 95mm x 35mm			
Protection		IP53			contacts are not protect
Mounting		8 x Amp Positiv Lock			

10. Wiring diagram



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