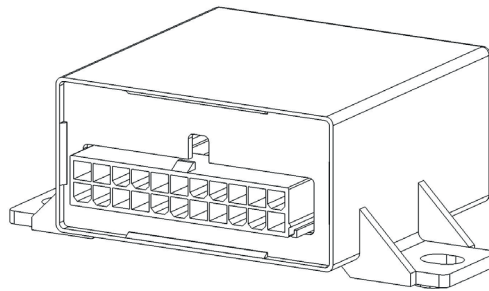


mounting direction



view of plug

DESCRIPTION

The versatile CAN I/O PLC with 14 inputs and outputs impresses with its compact design and its operating voltage range of 9 to 30 volts. It provides 8 I/Os that can be configured as inputs or outputs and 6 analog inputs.

TECHNICAL DATA

Housing	plastic
Connector	22 pin Molex Mini Fit Junior
Weight	75 g
Temperature range (according to ISO 16750-4)	-40 to +85 °C (at +85 °C rated power see page 4)
Environmental Protection	IP53
Current consumption	30 mA
Over-current Protection	2 x 10 A
Total Inputs and outputs	14 (6 inputs, 8 I/O's)
Inputs	Configurable as: Digital, positive encoder signal analog (0...11.4 / 33.68 V) Depending on assembly: Digital, low side switch encoder signal frequency input analog input (0...24.5 mA, PT1000 sensor)
Outputs	Configurable as: Digital, positive switching (high side) Depending on assembly: PWM output (3 Hz...500 Hz) reference voltage source (5 V)
Operating voltage	9–32 V 12 V (Code C) and 24 V (Code E) ISO 16750–2 compliant
Starting voltage	8 V
Overvoltage protection	≥ 33 V
Quiescent current	40 µA (at 12 V); 140 µA (at 24 V)
Reverse polarity protection	Yes
CAN Interfaces	CAN bus interface 2.0 A/B, ISO 11898-2 compliant

REGULATORY APPROVALS AND TESTING

E1 Approval	ECE R10 05 8238 (for rev. F, see label on the back of the housing)
e1 approval	72/245/EG 03 5385 (for rev. E, see label on the back of the housing)
Elektrical tests	According to ISO 16750: Short circuit protection (Exception: RS232 interface) Reverse polarity protection Interruption pin Interruption plug Storage test T_{max} and T_{min} Operation test T_{max} and T_{min} temperature steps Moist heat Reset behavior at voltage drop According to ISO 7637-2: pulse 1, 2a, 2b, 3a, 3b, 4

SOFTWARE/PROGRAMMING

Programming System

MRS Developers Studio

MRS Developers Studio with built-in functions library, similar programming with FUP. Custom software blocks can be integrated into "C-code". Program memory is sufficient for about 300 basic logic components.

INPUT FEATURES - SUMMARY

Pin 3, 4, 5, 6, 7	Usable as analog or digital input Resolution Accuracy	12 Bit $\pm 1\%$ full scale	Frequency input (see D)	Input resistance Input frequency Turn-on threshold Turn-off threshold	22.6 k Ω $\pm 3\%$ accuracy at ≤ 2.2 kHz 7 V 4.5 V
Voltage input 0...11,4 V (see A)	Input resistance Input frequency Accuracy	22.6 k Ω $f_c^* = 60$ Hz $\pm 3\%$	Digital input Positive (see B)	Input resistance Input frequency Turn-on threshold Turn-off threshold	66.6 k Ω $f_c^* = 40$ Hz 19 V 14 V
Current input 0...24,5 mA (see C)	Input resistance Input frequency Conversion factor	500 Ω 40 Hz 1mA \triangleq 475 digits	Pin 13,14,15,16, 18,19	Resolution Accuracy	12 Bit $\pm 1\%$ full scale
Frequency (see D)	Input resistance Input frequency Turn-on threshold Turn-off threshold	22.6 k Ω $\pm 3\%$ accuracy at ≤ 2.2 kHz 7 V 4.7 V	Voltage input 0...11,4 V (see E)	Input resistance Input frequency Accuracy	22.6 k Ω $f_c^* = 60$ Hz $\pm 5\%$
Digital input positive (see A)	Input resistance Input frequency Turn-on threshold Turn-off threshold	22,6 k Ω $f_c^* = 60$ Hz 7 V 4.5 V	Digital input positive (see E)	Input resistance Input frequency Turn-on threshold Turn-off threshold	22.6 k Ω $f_c^* = 60$ Hz 7 V 4,5 V
Pin 2	Usable as analog or digital input Resolution Accuracy	12 Bit $\pm 1\%$ full scale	Pin 20, 21	Usable as digital input Resolution Accuracy	12 Bit $\pm 1\%$ full scale
Voltage input 0...33,68 V (see B)	Input resistance Input frequency Accuracy	66.6 k Ω $f_c^* = 40$ Hz $\pm 3\%$	Digital input Positive (see E)	Input resistance Input frequency Turn-on threshold Turn-off threshold	22.6 k Ω $f_c^* = 60$ Hz 7 V 4,5 V
Current input 0...24,5 mA (see C)	Input resistance Input frequency Conversion factor	470 Ω 40 Hz 1mA \triangleq 475 digits			

* f_c = cutoff frequency (-3 dB)

OUTPUT FEATURES - SUMMARY

Pin 13, 14	Protective circuit for inductive loads Wire fault diagnostics Short circuit diagnostics	Optional integrated Possible via current sense Possible via current sense	Pin 15, 16, 18, 19, 20, 21	Protective circuit for inductive loads Wire fault diagnostics Short circuit diagnostics	Optional integrated Possible via current sense Possible via current sense
Digital, positive switching (High-Side; see E)	Switching voltage Switching current	9-32 V DC 0.02-2.5 A	Digital, positive switching (High-Side; see E)	Switching voltage Switching current Conversion factor current sense	9-30 V DC 0.02-2.5 A 1 Digit \triangleq 2.26 mA
Short circuit resistance against GND and V_B	The switching-off is controlled by high-side driver (separate for each channel)		PWM-output (see E)	Output frequency Duty cycle Resolution Switching current	500 Hz 0...1000 % 1 % ≤ 2.5 A (see p. 4)
			Short circuit protection against ground and V_B	Switching-off is controlled via high side driver (separate for each channel)	

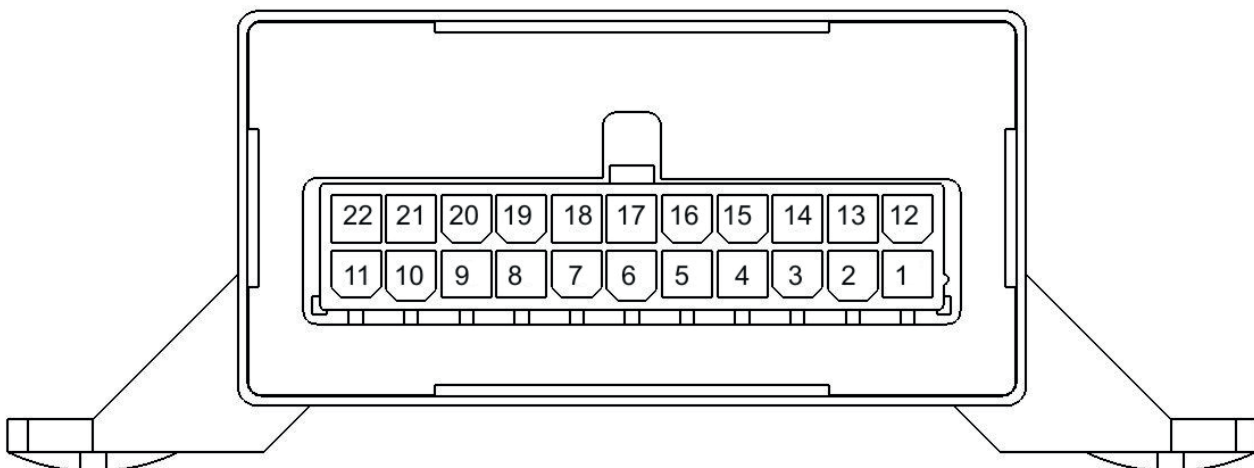
PIN ASSIGNMENT POWER SUPPLY AND INTERFACES

Pin	Description	Pin	Description
1	Ground / contact 31 according to DIN 72552	9	CAN bus high
8	Battery/ignition contact 15 according to DIN 72552	10	CAN bus low
12	Supply voltage for output pins 13 through 16, operating voltage for CPU	11	RS 485 - A / RS232 Tx / ground (assembly option, otherwise not connected)
17	Supply voltage for output pins 18 through 21, operating voltage for CPU	22	RS-485 - B / RS232 Rx / 5 VREF (assembly option, otherwise not connected)

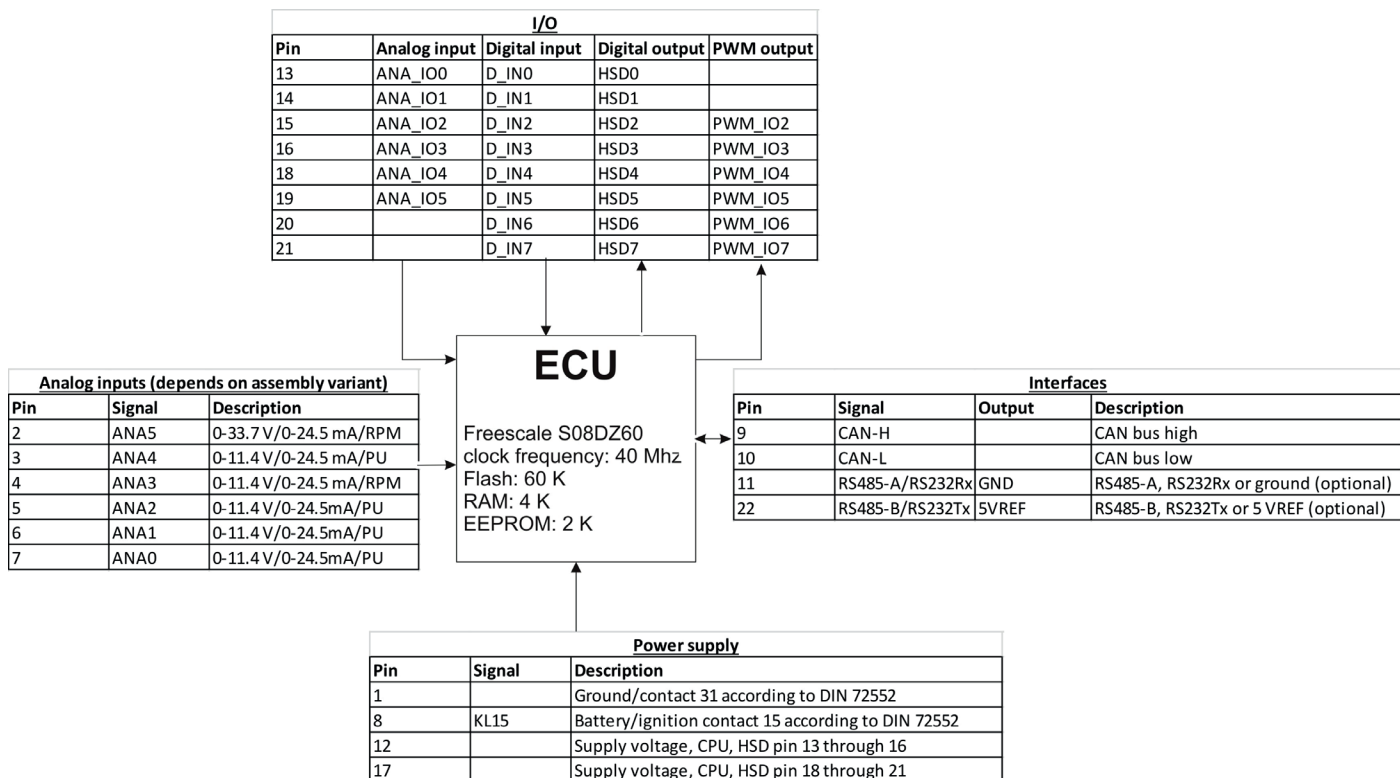
PIN ASSIGNMENT IN- AND OUTPUTS

The alternative functions like frequency/current/pull-up or PT1000-inputs depends on the assembly variants (see table on page 6).

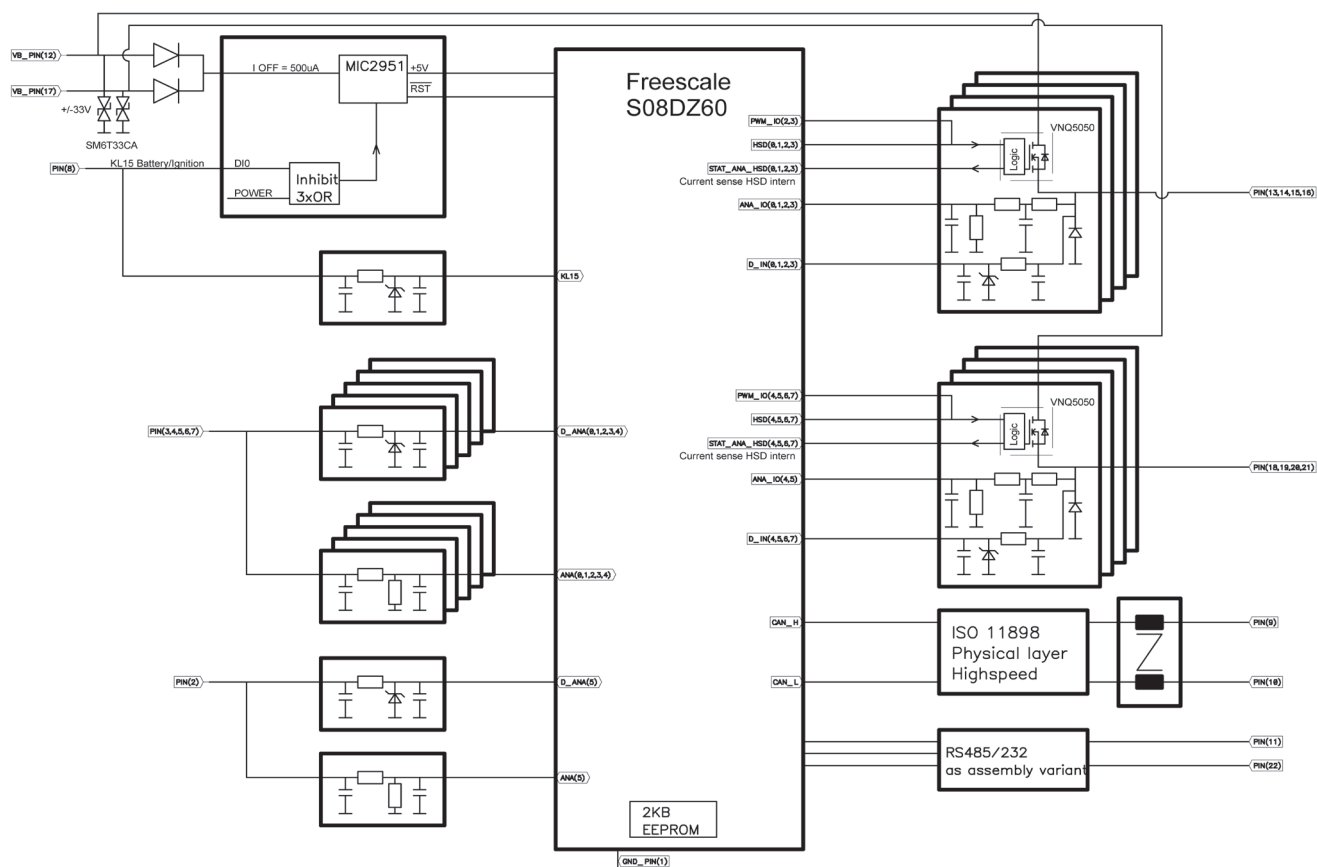
Pin	Signal	Description	Pin	Signal	Description
2	ANA5 / D_ANA5	Analog input 5; 0-33.68 V can also be used as digital input	15	ANA_IO2 / D_IN2 OUT_HSD2	Analog/digital input IO2; 0-11.4 V or digital output DO2 with PWM capability
3	ANA4 / D_ANA4	Analog input 4; 0-11.4 V can also be used as digital input	16	ANA_IO3 / D_IN3 OUT_HSD3	Analog/digital input IO3; 0-11.4 V or digital output DO3 with PWM capability
4	ANA3 / D_ANA3	Analog input 3; 0-11.4 V can also be used as digital input	18	ANA_IO4 / D_IN4 OUT_HSD4	Analog/digital input IO4; 0-11.4 V or digital output DO4 with PWM capability
5	ANA2 / D_ANA2	Analog input 2; 0-11.4 V can also be used as digital input	19	ANA_IO5 / D_IN5 OUT_HSD5	Analog/digital input IO5; 0-11.4 V or digital output DO5 with PWM capability
6	ANA1 / D_ANA1	Analog input 1; 0-11.4 V can also be used as digital input	20	D_IN6 OUT_HSD6	Digital input IO6; 0-11.4 V or digital output DO6 with PWM capability
7	ANA0 / D_ANA0	Analog input 0; 0-11.4 V can also be used as digital input	21	D_IN7 OUT_HSD7	Digital input IO7; 0-11.4 V or digital output DO7 with PWM capability
13	ANA_IO0 / D_IN0 OUT_HSD0	Analog/digital input IO0 or digital output DO0			
14	ANA_IO1 / D_IN1 OUT_HSD1	Analog/digital input IO1; 0-11.4 V or digital output DO1			



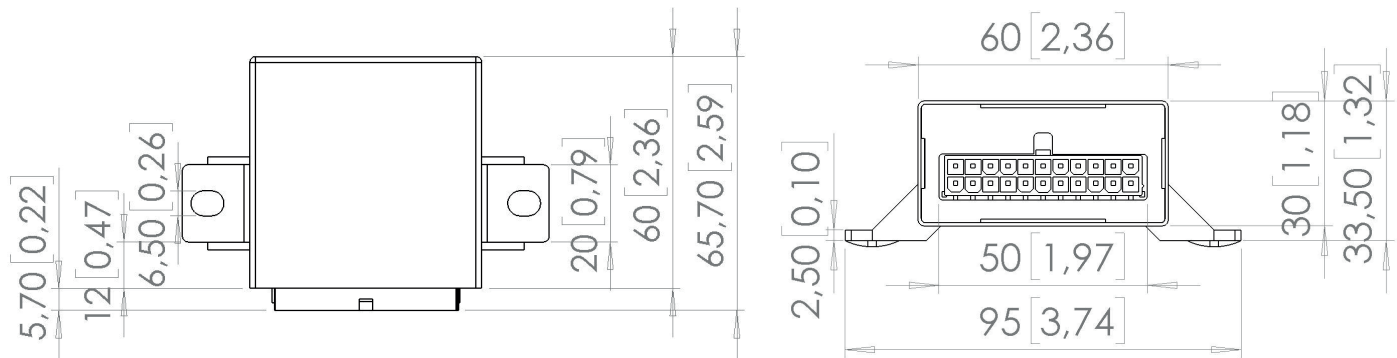
PIN FEATURE MAP



BLOCK FUNCTION DIAGRAM



TECHNICAL DRAWING IN MM [IN INCH]



ASSEMBLY VARIANTS AND ORDERING INFORMATION

	INPUT PINS						OUTPUT PINS		CAN BUS		INTERFACE		DC/DC
	A Voltage 0 - 11,4 V	B Voltage 0 - 33 V	C Current 0 - 24,5 mA	D Frequen- cy	Sensor 10kΩ Pull-up	Inputs PT1000 1kΩ Pull- up	E I/O's (can be used as analog or digital inputs or as digital outputs)	F PWM ≤ 500 Hz	High Speed	CAN open	RS485	RS232	5 Volt Referen- ce
1.033.300.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21		X				
1.033.302.0001	3,5,6,7			2,4			13,14,15,16,18,19,20,21		X				
1.033.303.0001	3,4	2	5,6,7				13,14,15,16,18,19,20,21		X				
1.033.304.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				
1.033.305.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				22/11
1.033.306.0001	3,4	2	5,6,7				13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				
1.033.308.0001		2,3,4,5,6,7					13,14,15,16,18,19,20,21		X				
1.033.309.0001	3,5,6,7			2,4			13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				
1.033.30B.0001	3,4	2			5,6,7		13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				22/11
1.033.30C.0001	3,4	2			5,6,7		13,14,15,16,18,19,20,21		X				
1.033.30D.0001	3,4	2				5,6,7	13,14,15,16,18,19,20,21		X				
1.033.30E.0001	3,5,6,7			2,4 (beide 4,5 V)			13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				
1.033.30K.0001	3,5,6,7			2,4			13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				22/11
1.033.30P.0001	3,4	2				5,6,7	13,14,15,16,18,19,20,21	15,16,18,19,20,21	X				
1.033.320.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21		X		X		
1.033.330.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21		X			X	
1.033P.300.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21		X	X			
1.033P.305.0001	3,4,5,6,7	2					13,14,15,16,18,19,20,21	15,16,18,19,20,21	X	X			22/11

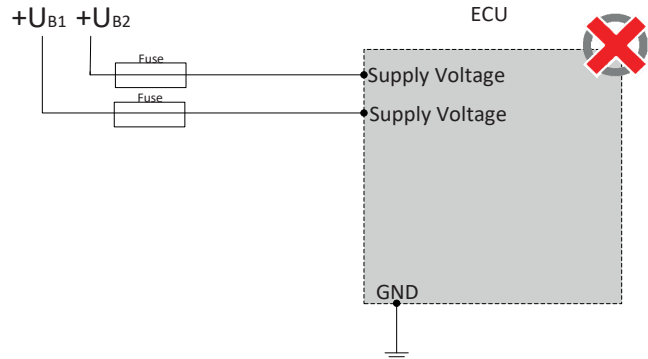
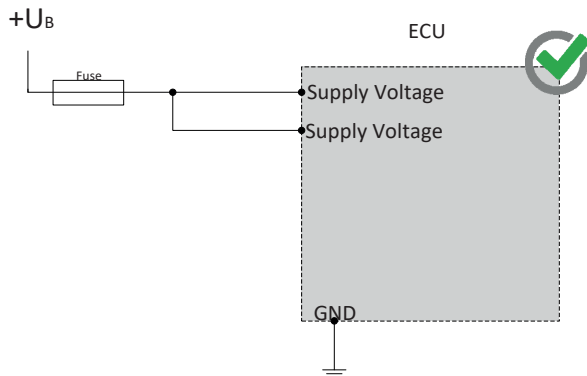
Description	Order Number
Programming tool MRS Developer Studio	1.100.100.09
Cable set CAN I/O	106817
Connector package CAN I/O	106940
PCAN-USB Interface	105358



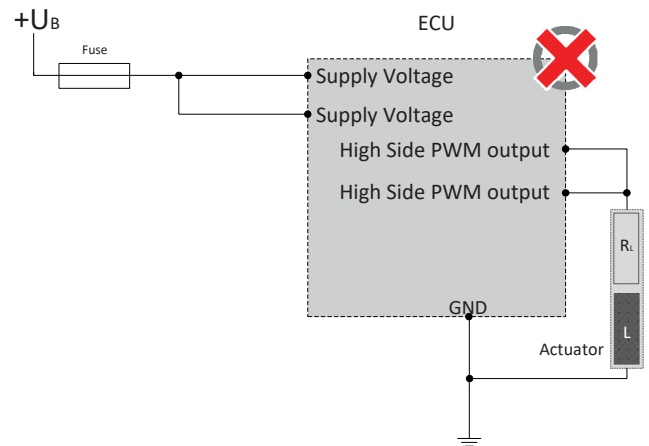
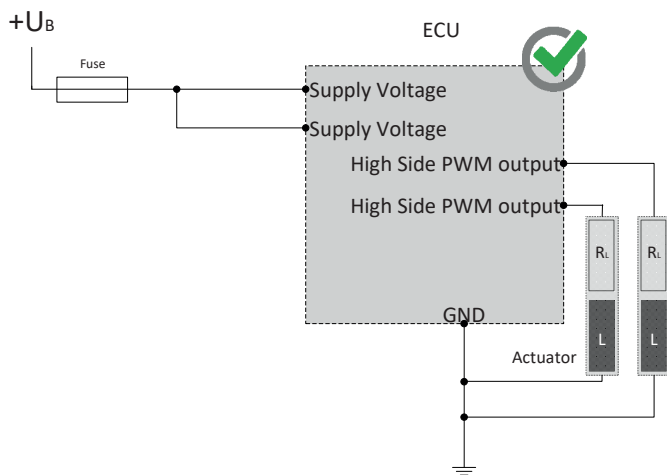
MRS Electronic GmbH & Co. KG
Klaus-Gutsch-Str. 7
78628 Rottweil

NOTES ON WIRING AND CABLE ROUTING

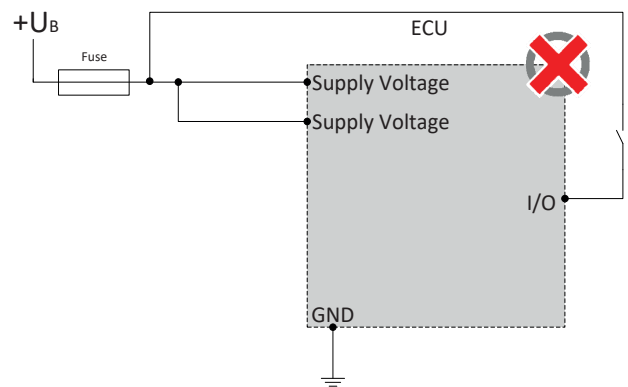
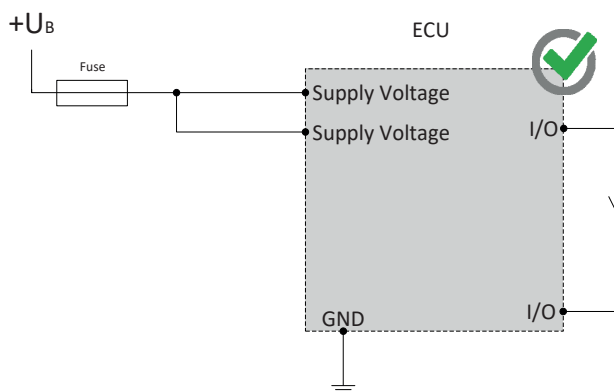
The electronic system and the power outputs of a control unit must be supplied by the same power supply system.



PWM outputs may not be connected with each other or bypassed.

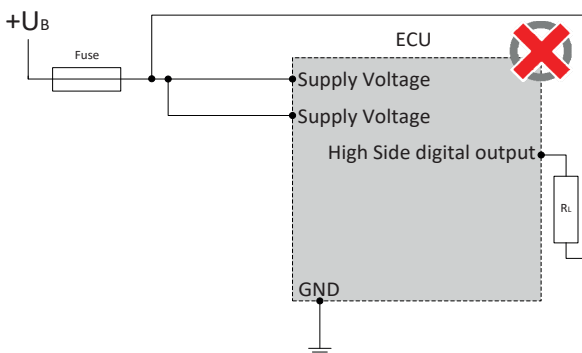
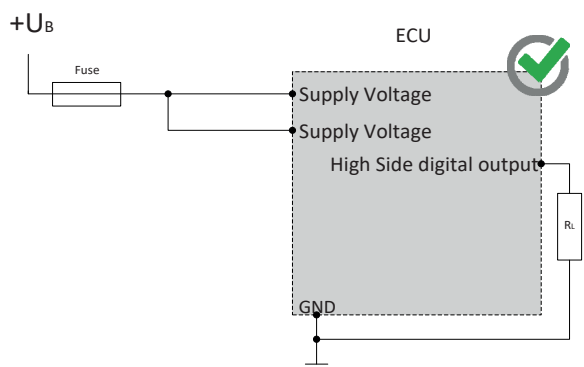
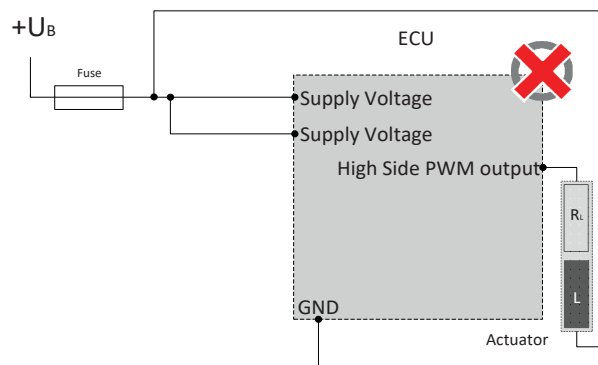
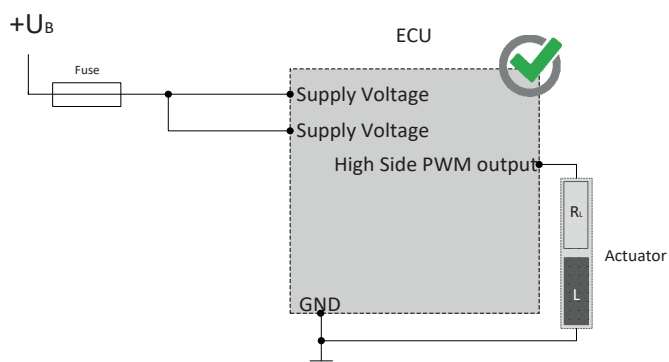


The pins (I/Os) can be used in combination and may not be switched externally against supply voltage.

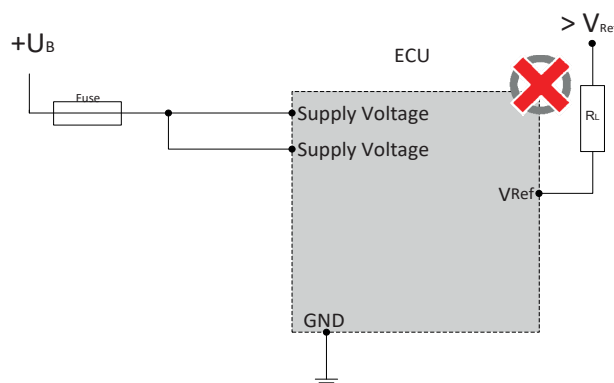
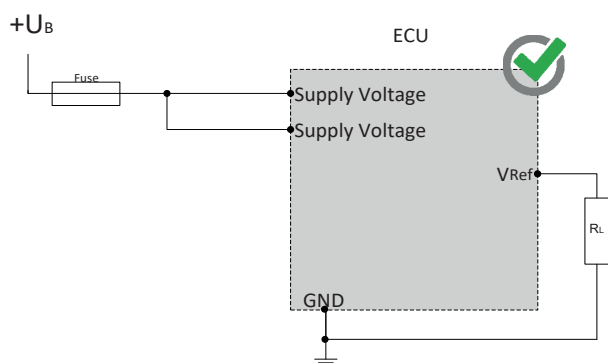


NOTES ON WIRING AND CABLE ROUTING

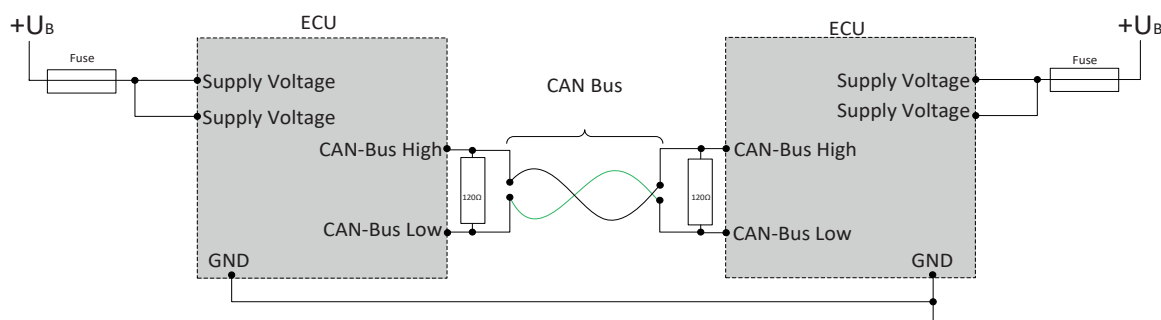
Hightside outputs may only be switched to ground.



The sensor supplies can be "lifted" through an external circuitry, for example the creation of higher voltage, as they only work as a voltage source but not as voltage drain. The lift of a voltage source may lead to unforeseen malfunctions and damages of the control unit in case of permanent operation.



CAN bus communication is the main communication between the control unit and the vehicle. Therefore, connect the CAN bus with special care and check the correct communication with the vehicle to avoid undesired behavior.



SAFETY AND INSTALLATION INFORMATION

It is essential to read the instructions in full thoroughly before working with the device.

Please note and comply with the instructions in the operating instructions and the information in the device data sheet, see www.mrs-electronic.de

Staff qualification: Only staff with the appropriate qualifications may work on this device or in its proximity.

SAFETY



WARNING! Danger as a result of a malfunction of the entire system.

Unforeseen reactions or malfunctions of the entire system may jeopardise the safety of people or the machine.

- Ensure that the device is equipped with the correct software and that the wiring and settings on the hardware are appropriate.



WARNING! Danger as a result of unprotected moving components.

Unforeseen dangers may occur from the entire system when putting the device into operation and maintaining it.

- Switch the entire system off before carrying out any work and prevent it from unintentionally switching back on.
- Before putting the device into operation, ensure that the entire system and parts of the system are safe.
- The device should never be connected or separated under load or voltage.



CAUTION! Risk of burns from the housing.

The temperature of the device housing may be elevated.

- Do not touch the housing and let all system components cool before working on the system.

PROPER USE

The device is used to control or switch one or more electrical systems or sub-systems in motor vehicles and machines and may only be used for this purpose. The device may only be used in an industrial setting.



WARNING! Danger caused by incorrect use.

The device is only intended for use in motor vehicles and machines.

- Use in safety-related system parts for personal protection is not permitted.
- Do not use the device in areas where there is a risk of explosion.

Correct use:

- operating the device within the operating areas specified and approved in the associated data sheet.
- strict compliance with these instructions and no other actions which may jeopardise the safety of individuals or the functionality of the device.

Obligations of the manufacturer of entire systems

It is necessary to ensure that only functional devices are used. If devices fail or malfunction, they must be replaced immediately.

System developments, installation and the putting into operation of electrical systems may only be carried out by trained and experienced staff who are sufficiently familiar with the handling of the components used and the entire system.

It is necessary to ensure that the wiring and programming of the device does not lead to safety-related malfunctions of the entire system in the event of a failure or a malfunction. System behaviour of this type can lead to a danger to life or high levels of material damage.

The manufacturer of the entire system is responsible for the correct connection of the entire periphery (e.g. cable cross sections, correct selection/connection of sensors/actuators).

Opening the device, making changes to the device and carrying out repairs are all prohibited. Changes or repairs made to the cabling can lead to dangerous malfunctions. Repairs may only be carried out by MRS.

Installation

The installation location must be selected so the device is exposed to as low a mechanical and thermal load as possible. The device may not be exposed to any chemical loads.

Install the device in such a manner that the plugs point downwards. This means condensation can flow off the device. Single seals on the cables/leads must be used to ensure that no water gets into the device.

Putting into operation

The device may only be put into operation by qualified staff. This may only occur when the status of the entire system corresponds to the applicable guidelines and regulations.

FAULT CORRECTION AND MAINTENANCE



NOTE The device is maintenance-free and may not be opened.

- If the device has damage to the housing, latches, seals or flat plugs, it must be taken out of operation.

Fault correction and cleaning work may only be carried out with the power turned off. Remove the device to correct faults and to clean it.

Check the integrity of the housing and all flat plugs, connections and pins for mechanical damage, damage caused by overheating, insulation damage and corrosion. In the event of faulty switching, check the software, switches and settings.

Do not clean the device with high pressure cleaners or steam jets. Do not use aggressive solvents or abrasive substances.