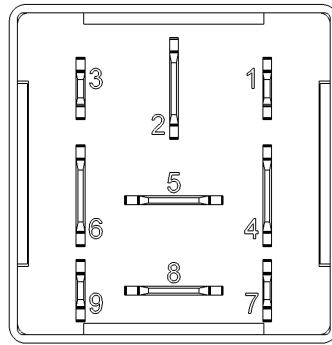


Front view



View of plug

DESCRIPTION

The Motor Controller 10 A CAN PRO is a microcontroller-operated module for automotive and many other applications. The controller can be used in a variety of ways thanks to the inputs that can be configured via software.

TECHNICAL DATA

Housing	PA66GF30
Connector	Base plate 9-pin
Weight	75 g
Temperature range (acc. to ISO 16750-4)	-40 °C...+85 °C
Environmental protection (acc. to ISO 20653)	IP 53
Current consumption	24 mA @ 12 V 26 mA @ 24 V
Fuse protection	max. load, see p. 2
Total inputs and outputs	4 (2 Inputs, 2 Outputs)
Inputs	configurable as: Analog inputs measuring range 0...5 V / 0...11.4 V Digital inputs Current inputs Sensor inputs Frequency inputs
Outputs	configurable as: 2 Motor halfbridges or 1 Motor fullbridge
Operating voltage	8-32 V (Code B @ 12 V and Code E @ 24 V acc. to ISO 16750)
Overvoltage protection	≥ 33 V
Quiescent current	850 µA @ 12 V 1580 µA @ 24 V
Reverse polarity protection	Yes
CAN Interface	CAN Interface 2.0 A/B, ISO 11898-2, ISO 11898-5

REGULATORY APPROVALS AND TESTING

E1 approval	ECE R10 05 7817
Electrical tests	Acc. to ISO 16750 – 2 resp. -4: Operating voltage range Short circuit protection Reverse polarity Interruption pin and connector Long-term overvoltage at $T_{Max-20K}$ Storage test at T_{Max} and T_{Min} Operation test at T_{Max} and T_{Min} Starting profile (form. Pulse 4 Acc. to ISO 7637)
	Acc. to ISO 7637 - 2: Pulse 1, 2a, 2b, 3a, 3b
	Acc. to ISO 10605: ESD up to ± 8 kV
chemical tests (@ room temperature, brushed)	Acc. to ISO 16750-5:2010 Battery liquid (22 h) Interior cleaner (2h) Glass cleaner (2h) Aceton (10 min) Ammoniumcontaining Cleaner (22 h) Denaturated Alcohol (10 min) Transpiration (22 h) Cosmetic products (Nivea Creme, 22 h) Refreshment containing caffeine and sugar (Cola, 22 h) Cream, coffee whitener (22 h)

SOFTWARE/PROGRAMMING

Programming system

MRS Developers Studio with built-in functions library, similar programming with FUP. Custom software blocks can be integrated into "C-code".

INPUT FEATURES - SUMMARY

Pin 1, 3 (X, C)	Programmable as analog- or digital input	
	Resolution	12 Bit
	Accuracy	$\pm 1\%$ full scale
Voltage input 0...5 V (see A)	Input resistance	100 k Ω
	Input frequency	$f_g^1 = 4.7$ kHz
	Conversion factor	1 Digit ≈ 1.22 mV
Voltage input 0...11.4 V (see B)	Input resistance	22.6 k Ω
	Input frequency	$f_g^1 = 5.7$ kHz
	Conversion factor	1 Digit ≈ 2.78 mV
Current input 0...20 mA (see C)	Input resistance	600 Ω vs GND ^{3,4}
	Conversion factor	1 mA ≈ 209 Digit
Sensor input (see D)	Input resistance	4.7 k Ω vs supply voltage
Digital input (see E)	Input resistance	100 k Ω^2 / 22.6 k Ω^3
	Turn-on threshold	2.9 V ² / 6.5 V ³
	Turn-off threshold	2.1 V ² / 4.8 V ³
Frequency input	Input resistance	100 k Ω
	Accuracy	≤ 3.5 kHz max. $\pm 3\%$

¹ Cutoff frequency (-3 dB), measured with 10 V square

² with configuration 0...5 V

³ with configuration 0...11.4 V

⁴ with usage of the pulldown, no higher voltage than 17 V may be connected to the input

OUTPUT FEATURES - SUMMARY

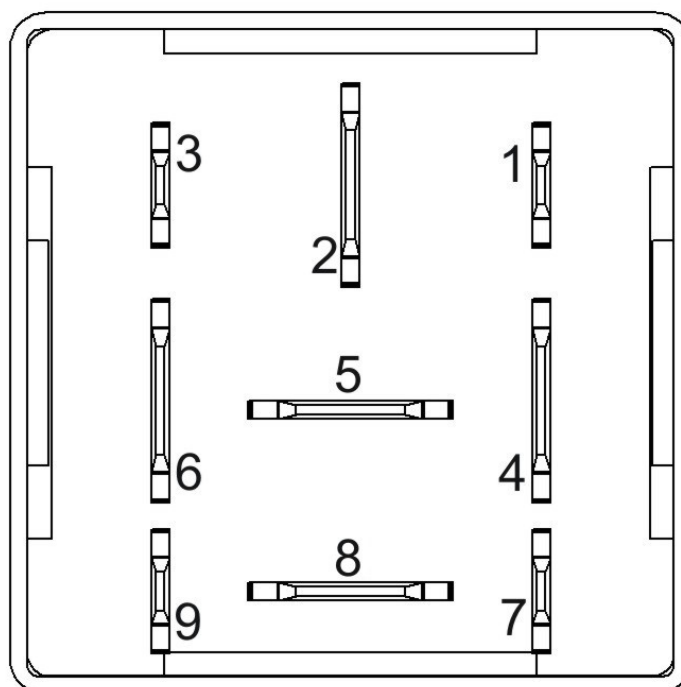
Pin 5, 8 Motor outputs BTN8962TA (M1, M2)		
Motor output (see E)	Switching voltage	8-32 V
	max. switching current	10 A
	duty cycle	0...100%
	PWM-frequency	30 kHz
Short circuit resistance against GND and V_s	Acc. to ISO 16750-2	

PIN ASSIGNMENT POWER SUPPLY AND INTERFACES

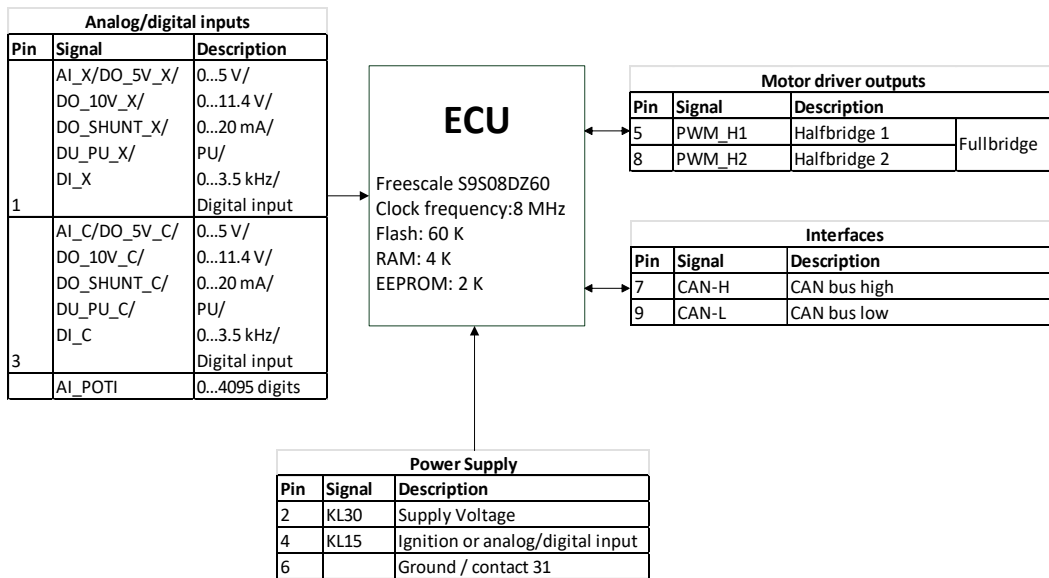
Pin	Pin Description	Pin	Pin Description
2	Operating voltage / contact 30	7	CAN - H
4	Ignition / contact 15	9	CAN - L
6	Ground / contact 31		

PIN ASSIGNMENT INPUTS AND OUTPUTS

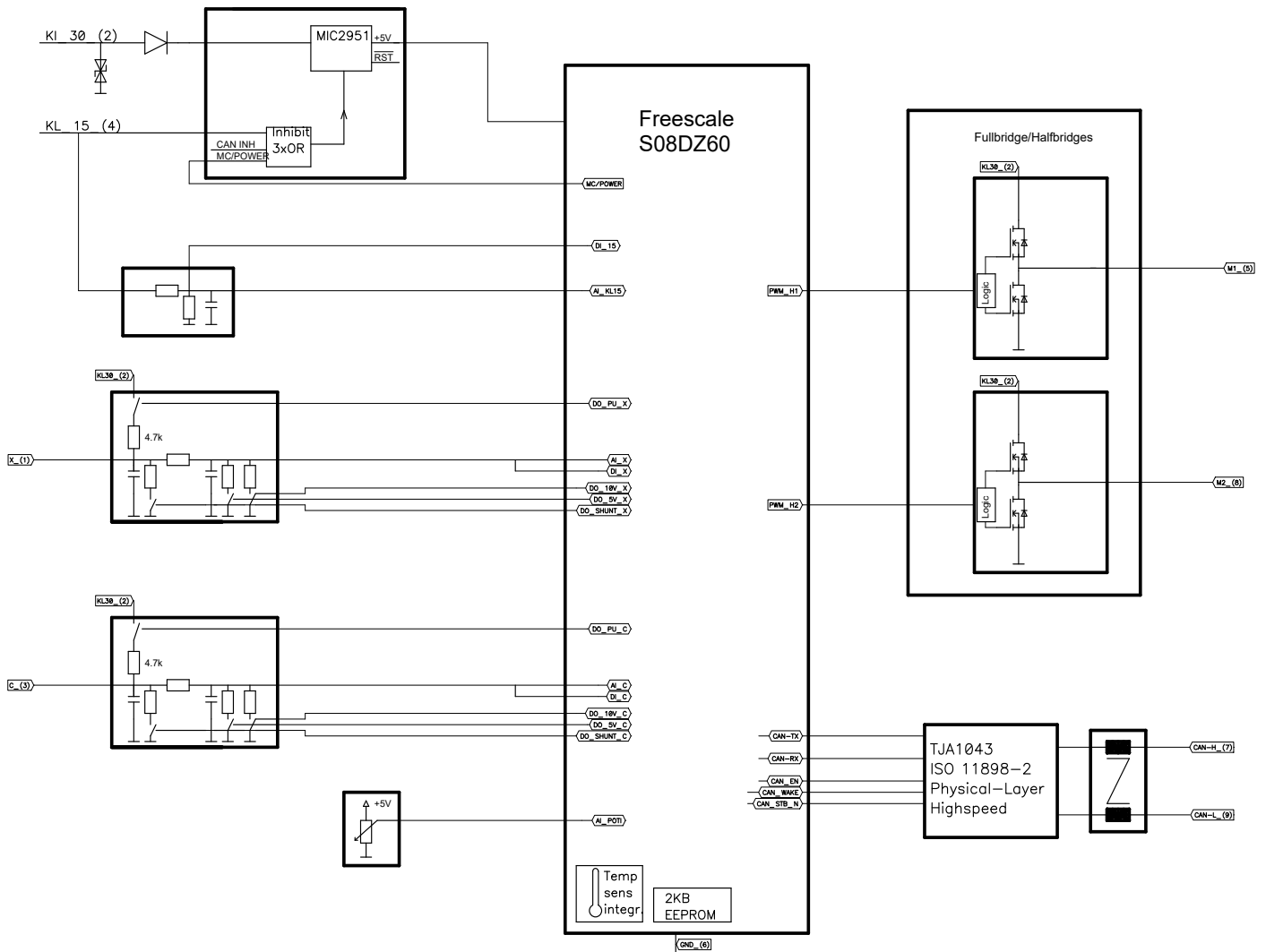
Pin	Signal	Description	Pin	Signal	Description
1	AI_X	Analog input X	5	PWM_H1	Halfbridge 1
	DI_X	Digital or frequency input X		8	PWM_H2
	DO_10V_X	Measuring range changeover 0...11.4 V	Fullbridge		(M)
	DO_5V_X	Measuring range changeover 0...5 V			
	DO_PU_X	Activation Pull-up			
	DO_SHUNT_X	Activation current input			
3	AI_C	Analog input C			
	DI_C	Digital or frequency input C			
	DO_10V_C	Measuring range changeover 0...11.4 V			
	DO_5V_C	Measuring range changeover 0...5 V			
	DO_PU_C	Activation Pull-up			
	DO_SHUNT_C	Activation current input			



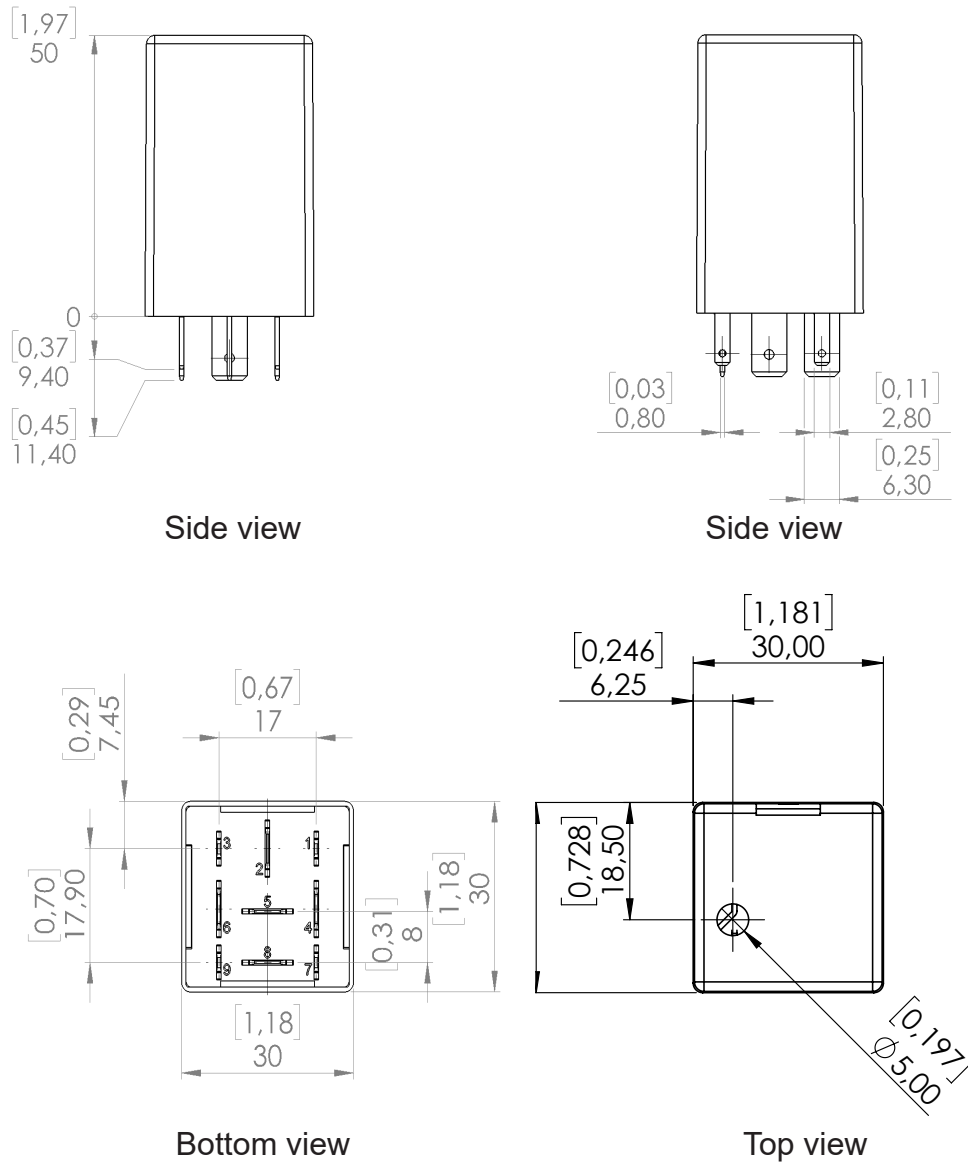
PIN - FEATURE MAP



BLOCK FUNCTION DIAGRAM



TECHNICAL DRAWING IN MM [INCH]





ASSEMBLY VARIANTS AND ORDERING INFORMATIONS

Drawing no.	Pin enumeration inputs						Pin enumeration outputs	Interface
	A Voltage 0...5 V	B Voltage 0...11.4 V	C Current 0...20 mA	D Sensor Inputs 4.7 kΩ pull-up	E Digital inputs	F Frequency inputs		
1.123.300.00	1, 3	1, 3	1, 3	1, 3	1, 3	1, 3	5, 8	7, 9

ACCESORIES

Description	Order number
Programming tool MRS Applies Studio / Developers Studio bundle	1.100.200.00
Wire harness for programming	109446
Socket 9 pin	1.017.002.00
PCAN-USB Interface	1.017.09
Tab receptacle 2.8 mm 0.5 – 1.0 mm ²	105292
Tab receptacle 6.3 mm for 1.0 mm ²	102355
Tab receptacle 6.3 mm for 1.5–2.5 mm ²	103064

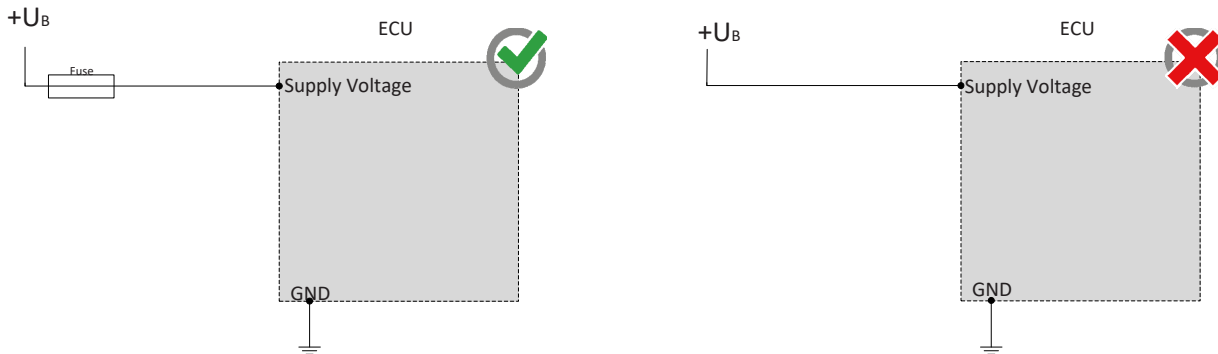


MANUFACTURER

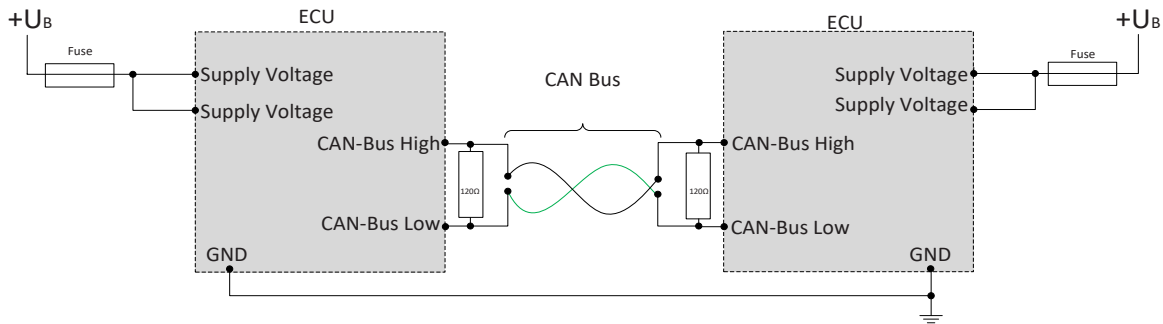
MRS Electronic, Inc.
 6680 Poe Avenue Suite 100
 Dayton OH, 45414
 USA

NOTES ON WIRING AND CABLE ROUTING

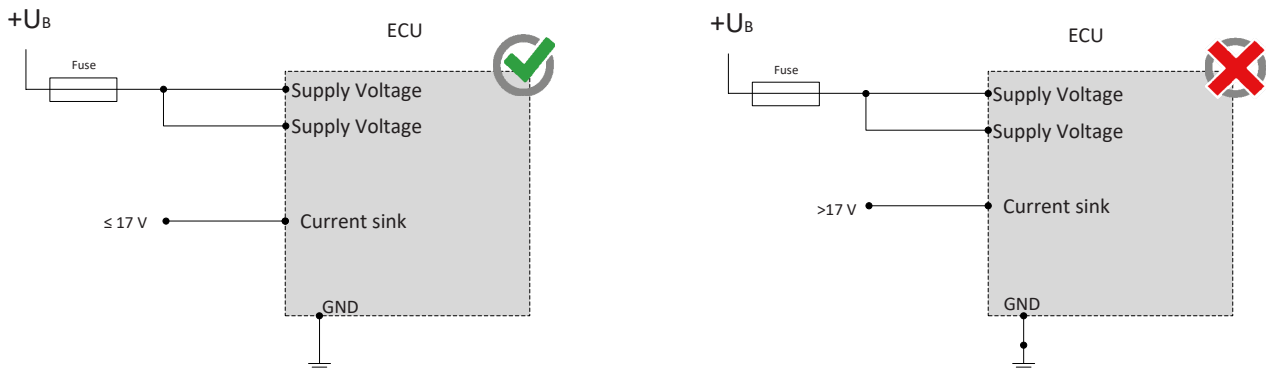
The control must be protected against overload (see performance data)



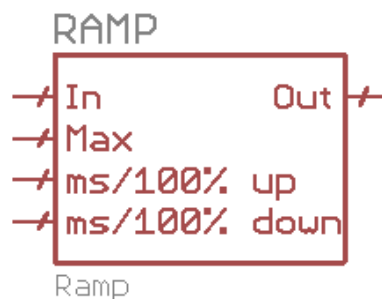
CAN bus communication is the main communication between the control unit and the vehicle. Therefore, connect the CAN bus with special care and check the correct communication with the vehicle to avoid undesired behavior.



When using the input with pull-down resistance (using DO_SHUNT_X or DO_SHUNT_C), you must not connect a greater voltage than 17 V to the input.

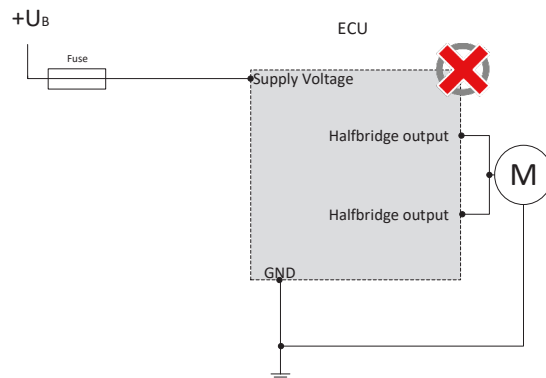
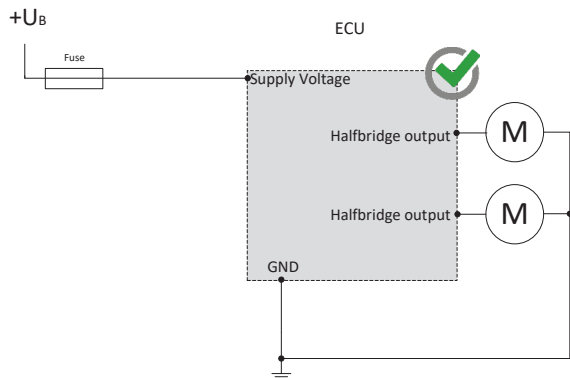


To prevent damage to the hardware, a ramp function, e.g. via the graphic programming block "Ramp", must be used. The description for this is stored in the Developers Studio.

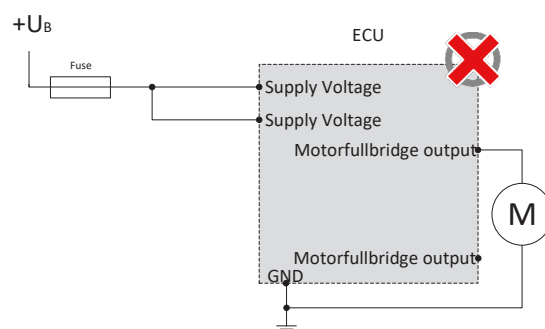
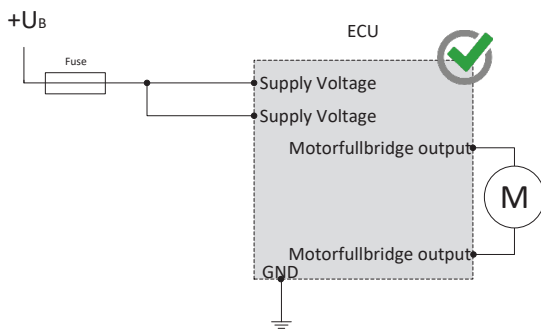


NOTES ON WIRING AND CABLE ROUTING

Halfbridge outputs must not be connected in parallel



The full bridge motor outputs may only be interconnected against each other.



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

- i 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.