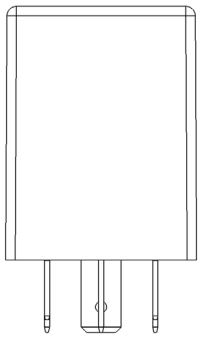
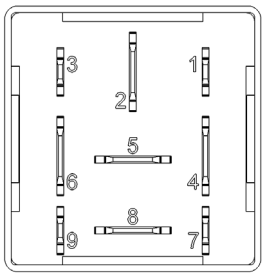


mounting direction



view of plug

DESCRIPTION

The Motor Controller 5 A CAN 32-bit for controlling direct current motors (DC) is the successor to our Motor Controller 5 A CAN. Compared to the previous version, it offers you two multifunctional inputs and even more computing power thanks to the 32-bit processor.

TECHNICAL DATA

Housing	Plastic PA 66GF30
Connector	Relay base plate 9-pin
Weight	40 g
Temperature range (acc. to ISO 16750-4)	-40°C to +85°C
Environmental protection acc. to ISO 20653	IP6K8 without potentiometer with correct mounting position (connection pins vertically downwards) and use of the waterproof socket otherwise IP40/IP20 (without/ with potentiometer)
Overcurrent protection	1 A + load
Total Inputs and outputs	3 (2 inputs, 1 Motor output)
Inputs	Analog input 0...33 V
Outputs	**Configurable as:** 2 half bridges or 1 full bridge
Operating voltage	6...32 V acc. to ISO 16750-2: 12 V (Code A) 24 V (Code E)
Overvoltage protection	≥ 33 V
Current consumption	60 mA at 12 V and 24 V
Quiescent current	30 µA at 12 V 40 µA at 24 V
Reverse polarity protection	yes
CAN interfaces	CAN Interface 2.0 A/B, ISO 11898-2, CAN-FD capable

REGULATORY APPROVALS AND TESTING

E1 approval	10 R - 06 9734
Electrical tests	**Acc. to ISO 16750-2 and ISO 16750-4:** Short circuit Reverse polarity Disconnection pin and connector Long-term overvoltage at $T_{Max-20K}$ Storage test at T_{Max} and T_{Min} Operation test at T_{Max} und T_{Min} Temperature steps Ground offset Superimposed alternating voltage Slow decrease and increase of supply voltage Momentary drop in supply voltage Reset behaviour at voltage drop Starting profile (form. Pulse 4) Load Dump **Acc. to ISO 7637-2 2004 and 2011:** Pulse 1, 2a, 2b, 3a, 3b **Acc. to ISO 10605 2008:** ESD-safe up to 8 kV
Chemical tests (at room temperature, brushed)	acc. to ISO 16750-5:2010 Battery filling agent (22 h) Interieur cleaner (2 h) Glass cleaner (2 h) Acetone (10 min) Ammonuim-containing cleaner (22 h) Denatured alcohol (10 min) Transpiration (22 h) Cosmetic products (Nivea™, 22 h) Refreshment containing caffone and sugar (Cola, 22 h) Cream (condensed milk), coffee whitener (22 h)

SOFTWARE/PROGRAMMING

MRS APPLICS STUDIO
The Applics Studio is the new development and tool platform for our assemblies. Program your MRS controls quickly and easily with our stand-alone software. The focus is on your application.

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INPUT FEATURES - SUMMARY

Pin 1, 3	Programmable as analog or digital input Resolution	 12 Bit
Voltage input 0...33 V (see A)	Input resistance Input frequency[1] Accuracy	28 kΩ f_g = 245 Hz ≤ 3 %
Digital input (see B)	Input resistance Turn-on threshold Turn-off threshold	28 kΩ 5.9 ± 0,3 V 3.9 ± 0,3 V
Frequency input (see C)	Input resistance Turn-on threshold Meas. range PWM Accuracy	28 kΩ 5.2 ± 0,3 V 5-95 % ≥ 1 Hz and ≤ 17 kHz max. ± 3 %

Pin 4	Programmable as analog or digital input Resolution	 12 Bit
Voltage input 0...32 V (siehe A)	Input resistance Input frequency[1] Accuracy	54 kΩ f_g = 220 Hz ≤ 3 %

[1] cutoff frequency (-3 dB)

OUTPUT FEATURES - SUMMARY

Pin 5,8	Protective circuit for inductive loads	integrated
	Diagnosis of wire breakage	via current sense
	Diagnosis of short circuit	via current sense
Motor output (see D)	Switching voltage max. switching current Conversion factor	9...32 V see load test no raw values available
Short circuit resistance against GND and V_S	Short-circuit resistance only against GND. Before switching on, check that there is no circuit to V_S	

LOAD TESTS AT $T_{+85\,°C}$ MOTOR OUTPUTS

Test without PWM	Test no.	Load	duration
	1[2]	6.6 A Fullbridge	Permanent
	2[2]	7 A one Half-bridge	Permanent
	3[2]	4.2 A each Halfbridge	Permanent
	4[3]	6.4 A Fullbridge	Permanent
	5[3]	6.7 A one Half-bridge	Permanent
	6[3]	4.1 A each Halfbridge	Permanent

Test with PWM	Test no.	PWM / DC	Load	duration
	1[4]	25 kHz 96 %	5.2 A Fullbridge	Permanent
	2[4]	25 kHz 96 %	5.6 A one Half-bridge	Permanent
	3[4]	25 kHz 96 %	3.3 A each Halfbridge	Permanent
	4[5]	15 kHz 96 %	4.2 A Fullbridge	Permanent
	5[5]	15 kHz 96 %	4.5 A one Half-bridge	Permanent
	6[5]	15 kHz 96 %	4.8 A each Halfbridge	Permanent

[2] resistive load, 14 V V_S
[3] resistive load, 28 V V_S
[4] inductive load, 14 V V_S
[5] inductive load, 28 V V_S

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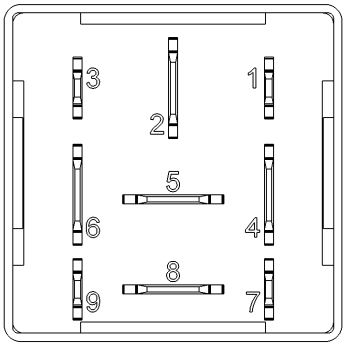
PIN ASSIGNMENT POWER SUPPLY AND INTERFACES

Pin	Description	Pin	Description
2	KL30 / supply voltage	7	CAN0 - H
4	KL15 / ignition	9	CAN0 - L
6	KL31 / GND		

PIN ASSIGNMENT INPUTS AND OUTPUTS

Pin	Signal	Description	Pin	Signal	Description
1	AI_X DI_AI_X FREQ_X	Analog input X or Digital input X or Frequency input X	3	AI_C DI_AI_C FREQ_C	Analog input C or Digital input C or Frequency input C
5	DO_PWM_H1 PWM_H1 DO_PWM_L1 PWM_L1	Digital output Motor output 1 High with PWM High or Digital output Motor output 1 Low with PWM Low	8	DO_PWM_H2 PWM_H2 DO_PWM_L2 PWM_L2	Digital output Motor output 2 High with PWM High or Digital output Motor output 2 Low with PWM Low



Pin assignment - bottom view

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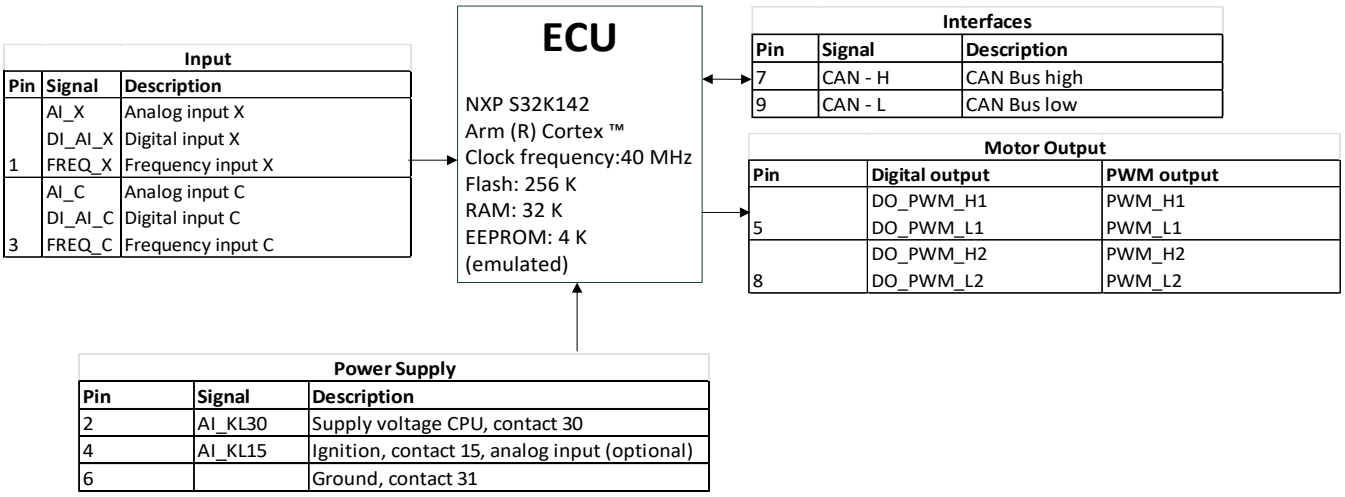
PIN FEATURE MAP



Input

Pin	Signal	Description
	AI_X	Analog input X
	DI_AI_X	Digital input X
1	FREQ_X	Frequency input X
	AI_C	Analog input C
	DI_AI_C	Digital input C
3	FREQ_C	Frequency input C

Interfaces

Pin	Signal	Description
7	CAN - H	CAN Bus high
9	CAN - L	CAN Bus low

Motor Output

Pin	Digital output	PWM output
	DO_PWM_H1	PWM_H1
5	DO_PWM_L1	PWM_L1
	DO_PWM_H2	PWM_H2
8	DO_PWM_L2	PWM_L2

Power Supply

Pin	Signal	Description
2	AI_KL30	Supply voltage CPU, contact 30
4	AI_KL15	Ignition, contact 15, analog input (optional)
6		Ground, contact 31

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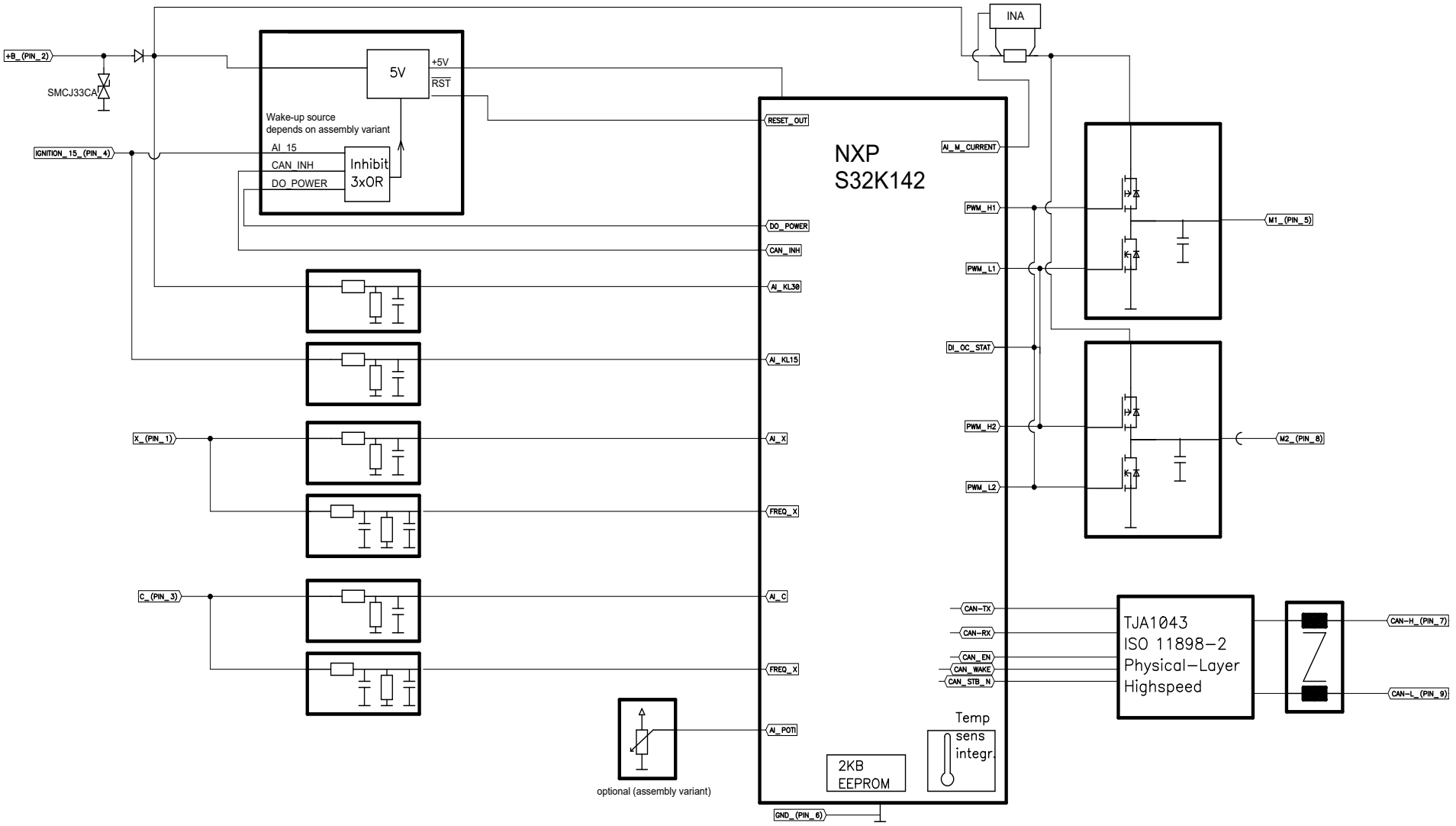
BLOCK FUNCTION DIAGRAM



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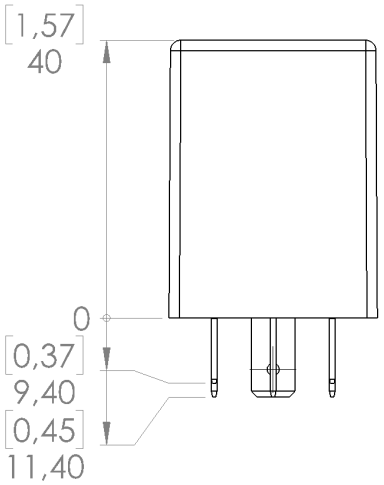
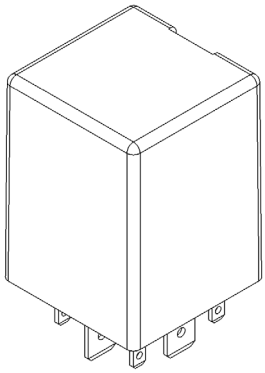
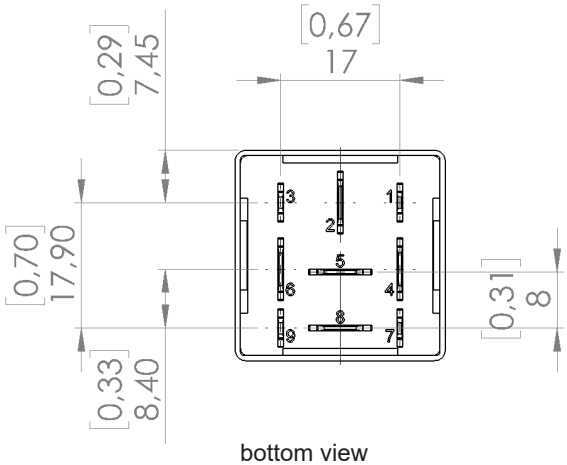
TECHNICAL DRAWING IN MM [INCH], TOLERANCES ACCORDING TO ISO 2768-1 V



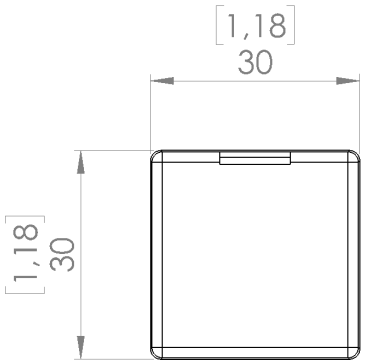
side view



isometric view
(without potentiometer)



bottom view



aerial view
(without potentiometer)

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ASSEMBLY OPTIONS AND ORDER INFORMATION

	Pin numbering of the inputs			Pin numbering of the outputs	Wake up sources	CAN	Short Circuit Restart		Potentiometer	Remarks
	A voltage 0...33 V	B Digital input	C frequency 1 Hz...17 kHz	D Motor outputs		High-Speed, CAN-FD capable	Automatic	Software		
1.180.300.0000	1, 3	1, 3	1, 3	5, 8	CAN, KL15, DO_POWER	X	X		X	
1.180.300.0410	1, 3	1, 3	1, 3	5, 8	KL30	X	X			
1.180.300.0200	1, 3	1, 3	1, 3	5, 8	KL15	X	X			

SCIP-number: 90d09377-6272-4e2a-8bd0-536d7d7c1aa4

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ACCESSORIES

Description	Order number
Applics Studio Bundle	1.100.200.00
Waterproof socket bundle 40 mm	1.017.010.040
Socket	1.017.002.00
Tab receptacle 2.8 mm / 0.5 – 1.0 mm²	105292
Tab receptacle 6.3 mm / 1.0 mm²	102355
PCAN-USB Interface FD	503750
Cable Set	109446

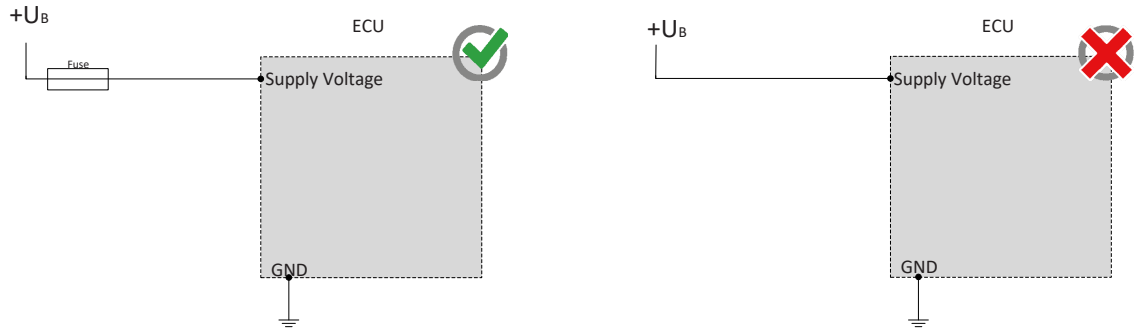
Illustration likewise

MANUFACTURER

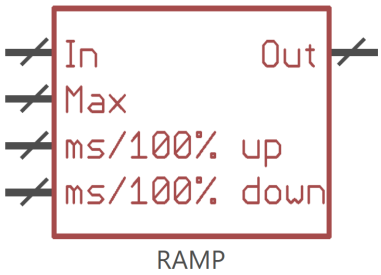
MRS Electronic, Inc.
6680 Poe Avenue Suite 100
Dayton OH, 45414
USA

NOTES ON WIRING AND CABLE ROUTING

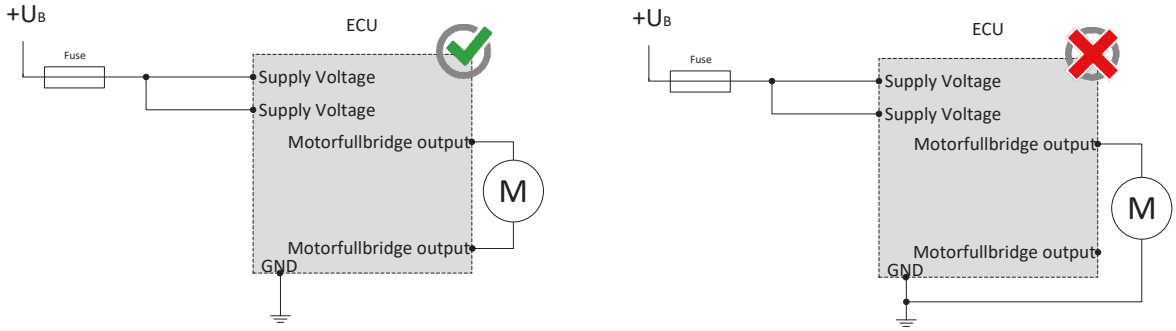
The controller must be appropriately protected against overload (see performance data)



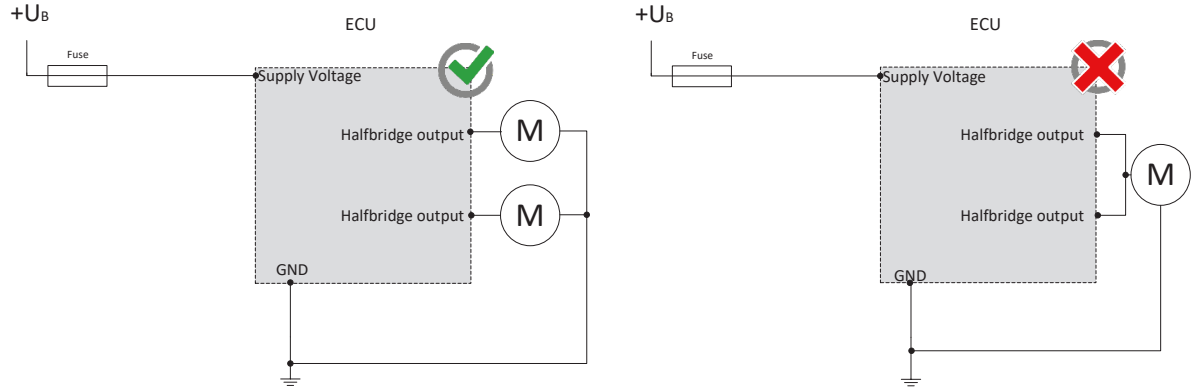
Use a ramp-up function to prevent hardware damage



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



Halfbridge outputs must not be connected in parallel



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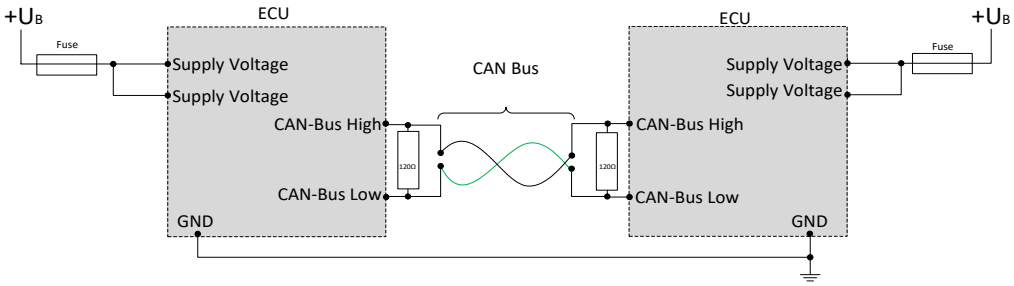
NOTES ON WIRING AND CABLE ROUTING

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.com

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.