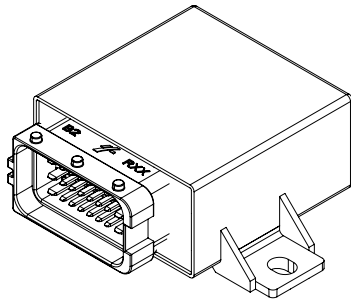
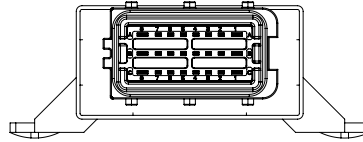


DESCRIPTION



mounting direction



view of plug

The CMM9 is a compact, CAN bus-compatible measurement module that has been specially developed for precise force and moisture measurement in mobile machines and is used in combination with external sensors. It offers two signal amplifier channels for sensors such as load cells with strain gauges and two inputs for resistive moisture measurement.

TECHNICAL SPECIFICATION

| | |
|--|---|
| Housing | plastic PA66 GF30 |
| Connector | automotive connector FCI HCCPHPE 90° 24pol (HCCPH-PE24BKA90F) |
| Weight | 107 g |
| Temperature range acc. to ISO 16750-4 | -40 °C...+85 °C |
| Environmental protection acc. to ISO 20653 | IP6K8 |
| Ext. fuse protection | 1 A + load |
| Total inputs and outputs (total) | max. 16 |
| Inputs | 12 |
| Outputs | max. 4 |
| Supply voltage | 9...32 V (Code C at 12 V, Code E at 24 V acc. to ISO 16750-2) |
| Overvoltage protection | ≥ 33 V |
| Current consumption | 43 mA at 12 V 27 mA at 24 V |
| Quiescent current | 27 µA at 12 V 100 µA at 24 V |
| Reverse polarity protection | available |
| CAN Interfaces | ISO 11898-2 compatible CAN-Bus Transceiver, CAN-FD tolerant |

REGULATORY APPROVALS AND TESTING

| | |
|------------------|---|
| E1 approval | 10 R - 07 10605 |
| Electrical tests | <p>Acc. to ISO 16750: Supply voltage Long term overvoltage at Tmax-20 °C Long term overvoltage, jump start Superimposed alternating voltage Slow decrease and increase of supply voltage Momentary drop in supply voltage Reset behaviour at voltage drop Starting profile (former pulse 4 acc. to ISO 7637) Load dump Reversed voltage Ground reference and supply offset Pin disconnection Connector disconnection Short circuit Storage test at Tmin and Tmax Operation test at Tmin and Tmax Temperature step test Damp heat, steady state test</p> <p>Acc. to ISO 7637-2: Pulse 1, 2a, 2b, 3a, 3b, severity level IV</p> <p>Acc. to ISO 10605: ESD up to ± 15 kV on housing ESD up to ± 8 kV on pins</p> |
| Chemical tests | <p>Acc. to ISO 16750-5: AA, AB, AC, BA, BB, BC, BD, CA, CB, CC, CD, DB, DF, DG, EA</p> |

SOFTWARE/PROGRAMMING

Programming System

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.

INPUT FEATURES - SUMMARY (DEPENDING ON ASSEMBLY VARIANT)

| | | | | | | | |
|--|---|--|---------------------------|---|---|---|---------------------------|
| Pin A2, A3, A4, A5, A6, (B2, C2) | Multifunctional inputs Programmable as analog input | Resolution Accuracy | 12 bit ± 1% full scale | Pin B5 | KL15/AI Programmable as analog- or digital input | Resolution Accuracy | 12 bit ± 1% full scale |
| Voltage input 0...16 V ¹ | Input resistance Input frequency Deviation | 19.2 kΩ f _g ² = 260 Hz ± 3 % FS | | Voltage input 0...32 V ¹ | Input resistance Input frequency Deviation | 31.4 kΩ f _g ² = 600 Hz ± 3 % FS | |
| Voltage input 0...32 V | Input resistance Input frequency Deviation | 1.8 kΩ f _g ² = 260 Hz ± 3 % FS | | ¹ standard configuration ² cutoff frequency (-3 dB), measured with 0-10 V _{PP} ³ When using the standard configuration, see 1 | | | |
| Frequency input 0...16 V | Input resistance Switch-on threshold Switch-off threshold Min. pulse width Measurement range Duty Cycle (at 100 Hz) Deviation | 19.2 kΩ 2.1 V 1.7 V 5 μs 1...99 % ± 3 % FS | | | | | |
| Frequency input 0...32 V ³ | Input resistance Switch-on threshold Switch-off threshold Min. pulse width Measurement range Duty Cycle (at 100 Hz) Deviation | 1.8 kΩ 2.1 V 1.7 V 5 μs 1...99 % ± 3 % FS | | | | | |
| Current input | Current range Input resistance Input frequency Conversion factor | 0...24.5mA 330 kΩ against GND f _g ¹ = 260 Hz 82 digits/mA | | | | | |

OVERVIEW OF THE MEASUREMENT FUNCTION

| Pin | Force/DMS | Pin | Moisture |
|----------------------------------|--|-----------------------------------|--|
| B3 ↔ C3 B2 ↔ C2 | Resolution Accuracy | A8 ↔ B8 C8 ↔ C7 | Resolution Accuracy |
| | 24 bit ± 1% full scale | | 12 bit ± 1% full scale |
| DMS evaluation | voltage measurement range | Moisture measurement ⁴ | resistance measurement switchable via software |
| DMS evaluation | difference calculation short circuit protection against GND and U _B Conversion factor | | Range 0 (68 MΩ) MC_DO_RS_MOISTURE_1_EN=0 500 kΩ...110 MΩ Range 1 (47 kΩ) MC_DO_RS_MOISTURE_1_EN=1 0.8 kΩ...1 MΩ Range 2 (180 kΩ) MC_DO_RS_MOISTURE_1_EN=1 5 kΩ...25 MΩ Range 3 (680 kΩ) MC_DO_RS_MOISTURE_1_EN=1 20 kΩ...70 MΩ Range 3 (2.7 MΩ) MC_DO_RS_MOISTURE_1_EN=1 80 kΩ...100 MΩ |
| | B3 ↔ C3 B2 ↔ C2 integrated Calibration via externally connected sensor | | |

⁴ at T_R = 23 °C

OUTPUT FEATURES - SUMMARY (DEPENDING ON ASSEMBLY VARIANT)

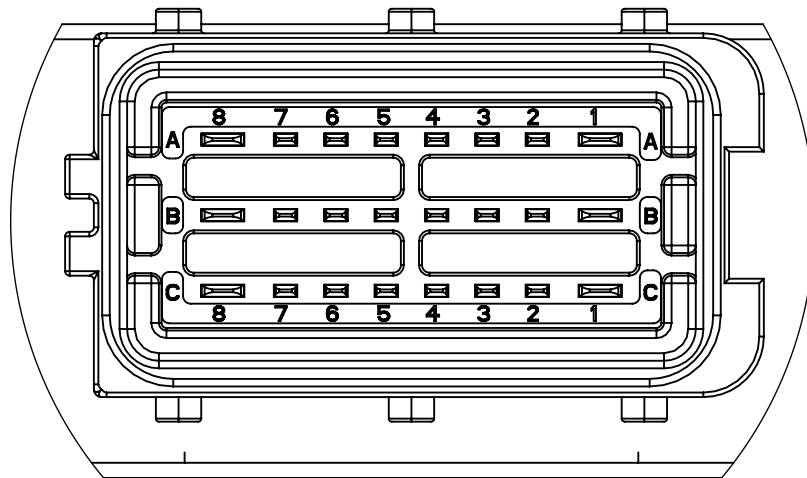
| | | | | | |
|---|--|--|---|--|--|
| Pin A8, C8 Sensor supply Moisture | Short circuit diagnostics | not integrated | Pin B1 DMS Versorgung 1 | Short circuit diagnostics | possible via voltage measurement |
| Digital, plusswitching | Switching voltage | 9 V | Digital, plusswitching | Switching voltage | 5 V |
| | Short circuit protection against ground and U_B | integrated | | Short circuit protection against ground and U_B | Internal overtemperature protection, latch-off can be realized by software application |
| Pin A7 VRef | Short circuit diagnostics | possible via voltage measurement | Overload protection | Internal overtemperature protection, latch-off can be realized by software application | |
| Digital, plusswitching (high side) | Switching voltage | configurable: 5 V, 8.5 V or 10 V (± 200 mV adjustable; max. voltage drop 50 mA) | Pin C1 DMS Versorgung 2 | Short circuit diagnostics | possible via voltage measurement |
| | Switching current | 65 mA@+85 °C | Digital, plusswitching | Switching voltage | configurable: 5 V, 8.5 V or 10 V (± 200 mV adjustable) |
| Short circuit protection against ground and U_B | Internal overtemperature protection, latch-off can be realized by software application | | | Switching current | 65 mA |
| Overload protection | Internal overtemperature protection, latch-off can be realized by software application | | Short circuit protection against ground and U_B | Internal overtemperature protection, latch-off can be realized by software application | |
| | | | Overload protection | Internal overtemperature protection, latch-off can be realized by software application | |

PIN ASSIGNMENT POWER SUPPLY AND INTERFACES

| Pin | Description | Pin | Description |
|----------------|-----------------------------|-----|-------------|
| A1 | Contact 30 / Supply voltage | A7 | VRef |
| B5 | Contact 15 / Ignition / AI | B4 | CAN-H |
| B6, B7, C4, C6 | Contact 31 / GND | C5 | CAN-L |

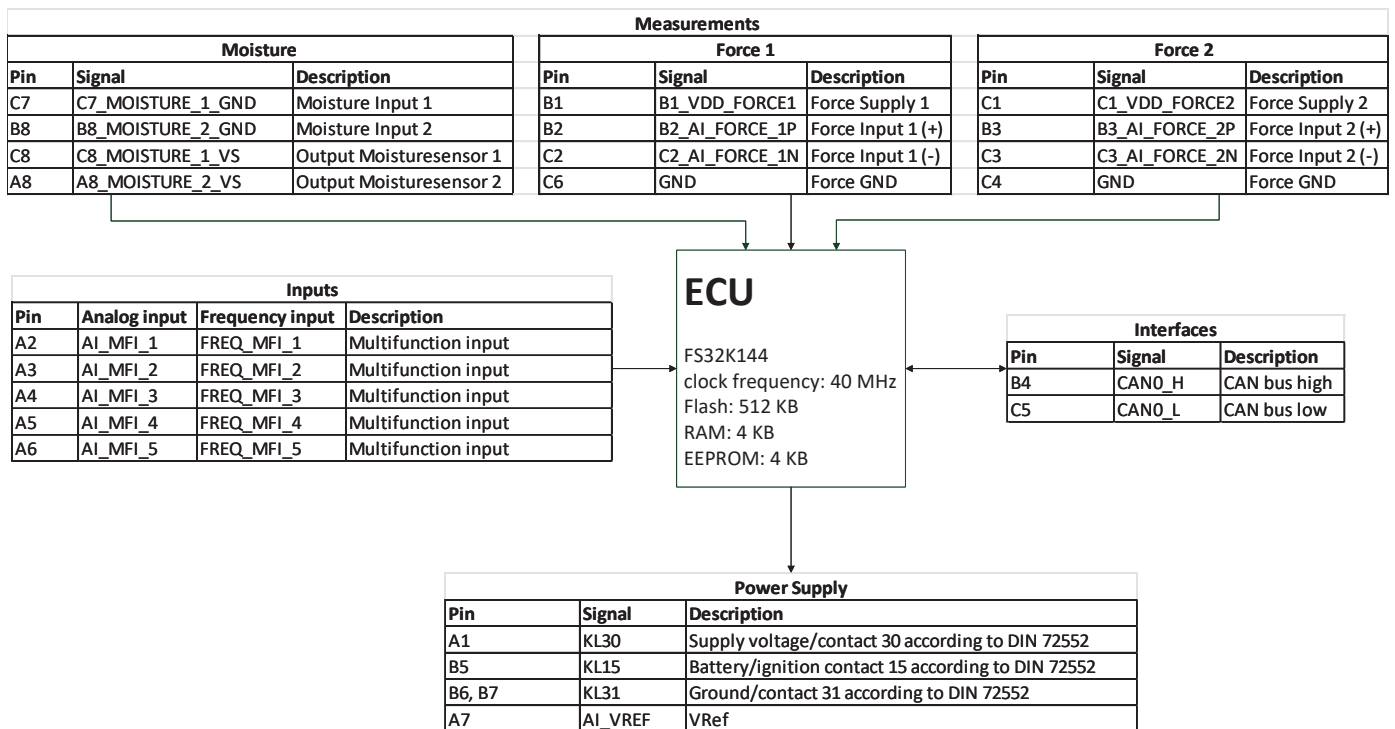
PIN ASSIGNMENT INPUTS AND OUTPUTS

| Pin | Programm Signal | Pin Beschreibung | Pin | Programm Signal | Pin Beschreibung |
|-------------|--|--|-------------|---|---|
| A2 | A2_MFI_1 | Multifunctional input 1 | B1 | B1_VDD_FORCE1 | DMS supply 1 |
| | AI_MFI_1 | Analog input 0-16.2 V | B2 | B2_AI_FORCE_1P | DMS differential input 1 (+) / Multifunctional input 6 |
| | DO_RANGE_30V_MFI_1 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V | | AI_MFI_6 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V |
| | FREQ_MFI_1 | Digital-/frequency input | | DO_RANGE_30V_MFI_6 | Digital-/frequency input |
| | DO_PU_MFI_1 | with switchable PU for low active signals and | | FREQ_MFI_6 | with switchable PU for low active signals and |
| DO_PD_MFI_1 | switchable shunt for current measurement | DO_PU_MFI_6 | | switchable shunt for current measurement | |
| A3 | A3_MFI_2 | Multifunctional input 2 | DO_PD_MFI_6 | | |
| | AI_MFI_2 | Analog input 0-16.2 V | B3 | B3_AI_FORCE_2P | DMS differential input 2 (+) |
| | DO_RANGE_30V_MFI_2 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V | B8 | B8_MOISTURE_2_GND | Moisture sensor input 2 |
| | FREQ_MFI_2 | Digital-/frequency input | | | Measurable via AI_MOISTURE_2 |
| | DO_PU_MFI_2 | with switchable PU for low active signals and | | | Input configurable as: Switching the measuring range via DO_MOISTURE_2_RS_1 to DO_MOISTURE_2_RS_4 |
| DO_PD_MFI_2 | switchable shunt for current measurement | | | Activation of the measuring range extension via DO_RSOMOISTURE_2_EN | |
| | | | | | |
| A4 | A4_MFI_3 | Multifunctional input 3 | C1 | C1_VDD_FORCE2 | DMS supply 2 (ADJ) |
| | AI_MFI_3 | Analog input 0-16.2 V | C2 | C2_AI_FORCE_1N | DMS differential input 1 (-) / Multifunctional input 7 |
| | DO_RANGE_30V_MFI_3 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V | | AI_MFI_7 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V |
| | FREQ_MFI_3 | Digital-/frequency input | | DO_RANGE_30V_MFI_7 | Digital-/frequency input |
| | DO_PU_MFI_3 | with switchable PU for low active signals and | | FREQ_MFI_7 | with switchable PU for low active signals and |
| DO_PD_MFI_3 | switchable shunt for current measurement | DO_PU_MFI_7 | | switchable shunt for current measurement | |
| A5 | A5_MFI_4 | Multifunctional input 4 | DO_PD_MFI_7 | | |
| | AI_MFI_4 | Analog input 0-16.2 V | C3 | C3_AI_FORCE_2N | DMS differential input 2 (-) |
| | DO_RANGE_30V_MFI_4 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V | C7 | C7_MOISTURE_1_GND | Moisture sensor input 1 |
| | FREQ_MFI_4 | Digital-/frequency input | | | Measurable via AI_MOISTURE_1. |
| | DO_PU_MFI_4 | with switchable PU for low active signals and | | | Switching the measuring range via DO_MOISTURE_1_RS_1 to DO_MOISTURE_1_RS_4. |
| DO_PD_MFI_4 | switchable shunt for current measurement | | | Activation of the measuring range extension via DO_RSOMOISTURE_1_EN | |
| | | | | | |
| A6 | A6_MFI_5 | Multifunctional input 5 | C8 | C8_MOISTURE_1_VS | Moisture sensor output 1 |
| | AI_MFI_5 | Analog input 0-16.2 V | | | |
| | DO_RANGE_30V_MFI_5 | Analog input 0-16.2 V Input configurable as: Range switching 0-33.7 V | | | |
| | FREQ_MFI_5 | Digital-/frequency input | | | |
| | DO_PU_MFI_5 | with switchable PU for low active signals and | | | |
| DO_PD_MFI_5 | switchable shunt for current measurement | | | | |
| A8 | A8_MOISTURE_2_VS | Moisture sensor output 2 | | | |

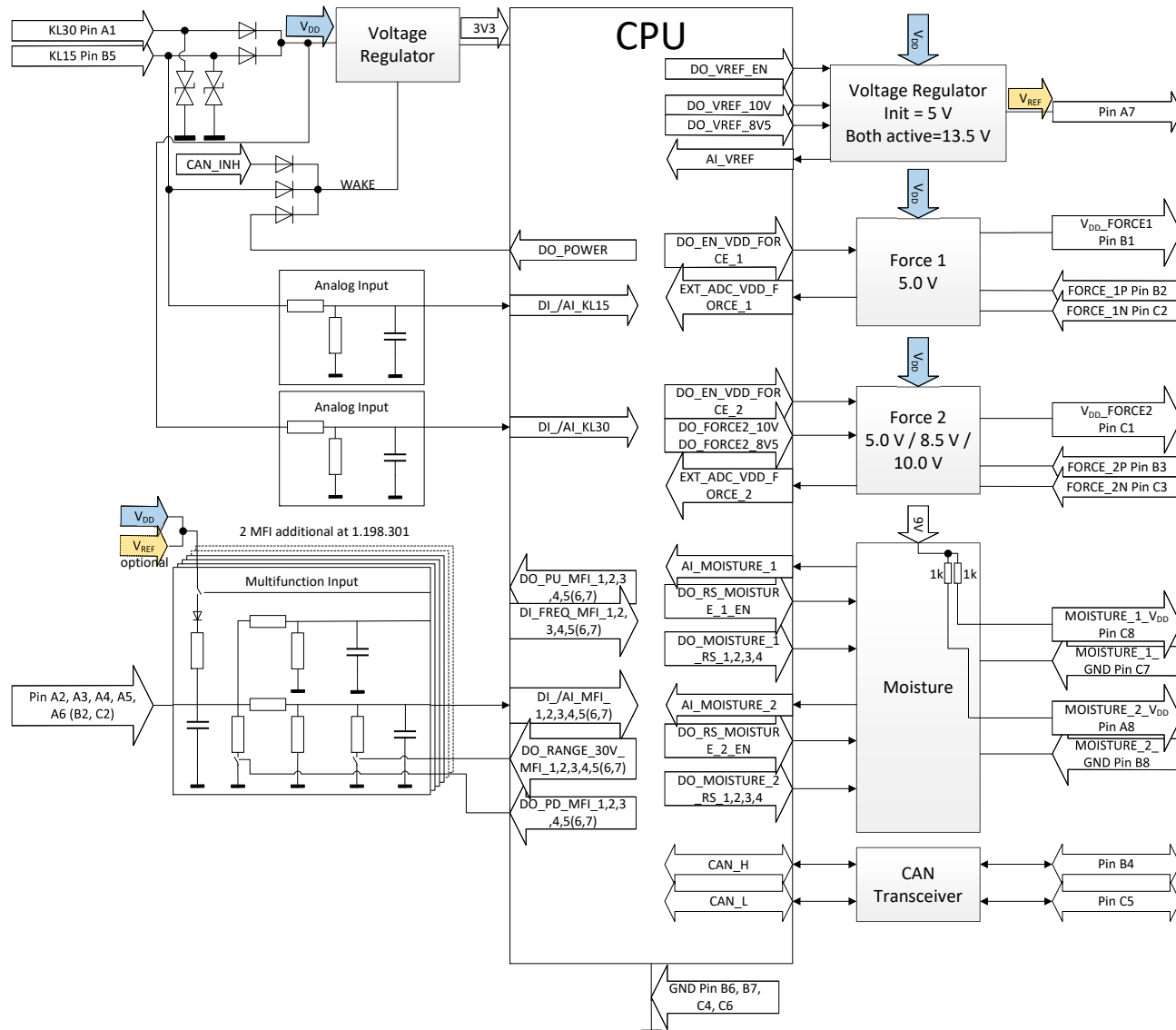


Pin assignment

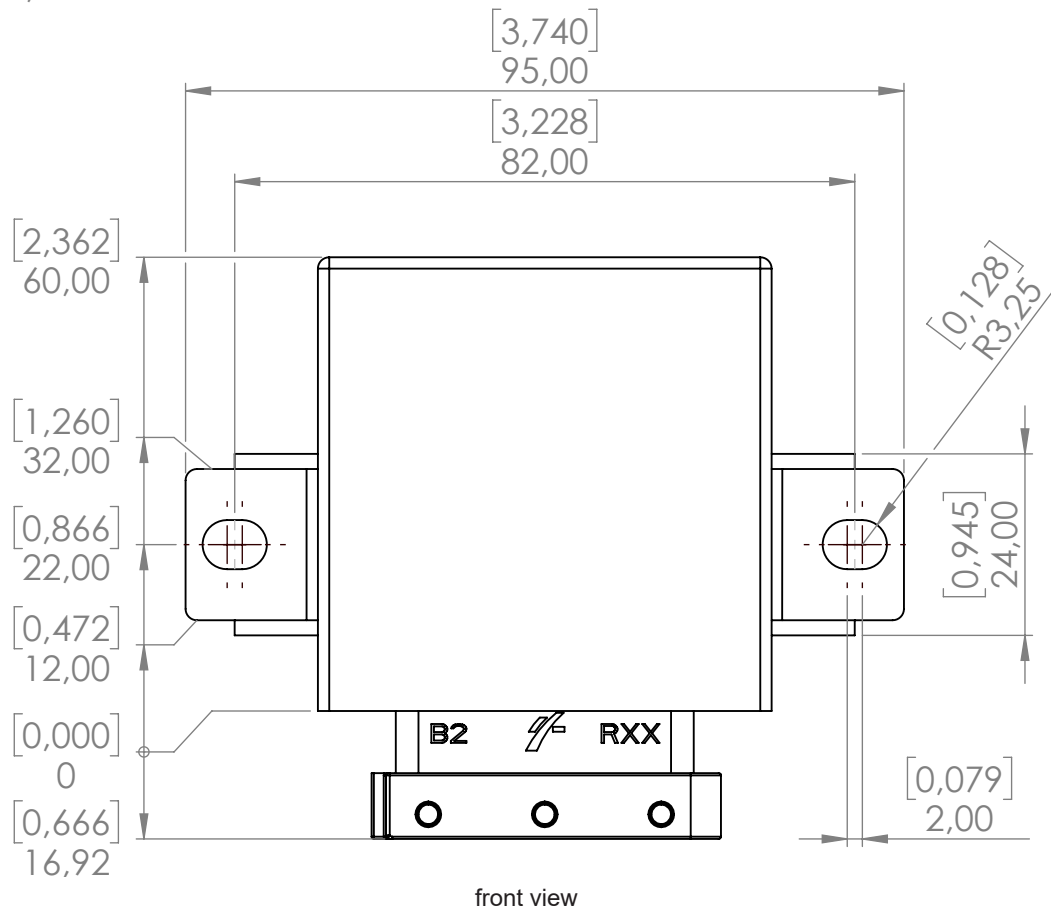
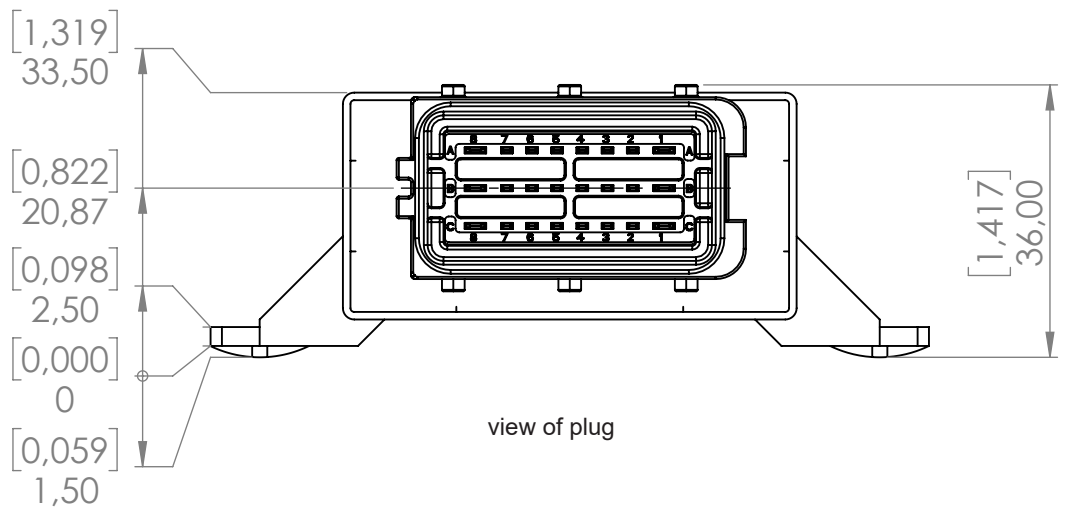
PIN FEATURE MAP



BLOCK FUNCTION DIAGRAM



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

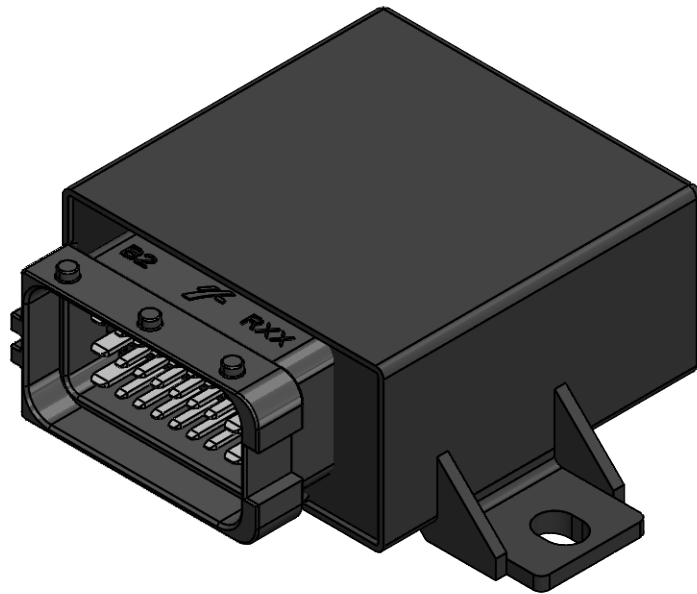


ASSEMBLY OPTIONS AND ORDER INFORMATION

| | Inputs | | | | Outputs | | CAN Bus | Wake up sources | Remarks | SCIP-Nr. |
|-----------------------|--------|------------------------------|----------------|----------------|-----------------|------------|------------|-----------------|--------------------------------|--------------------------------------|
| | supply | Multifunctional input | Moisture input | DMS input | Moisture supply | DMS supply | High-Speed | | | |
| 1.198.300.0000 | A1 | A2, A3, A4, A5, A6 | C7, B8 | B2, C2, B3, C3 | A8, C8 | B1, C1 | B4, C5 | B5 (KL15), CAN | Force and Moisture measurement | 6c3e3af9-77ab-4d22-9180-0c2f4f94c075 |
| 1.198.301.0000 | A1 | A2, A3, A4, A5, A6 B2, C2 | C7, B8 | - | A8, C8 | - | B4, C5 | B5 (KL15), CAN | Moisture measurement | 87511917-d809-433f-af51-3dc70a07b279 |
| 1.198.302.0000 | A1 | A2, A3, A4, A5, A6 | - | B2, C2, B3, C3 | - | B1, C1 | B4, C5 | B5 (KL15), CAN | Force measurement | 336e4ce6-e088-40d7-8c15-3abd26e12499 |

ACCESSORIES

| Description | Order number |
|-------------------------------------|--------------|
| Programming tool MRS Applies Studio | 1.100.200.01 |
| Cable set | tbd |
| Connector package | 110421 |
| PCAN-USB FD Interface | 503750 |

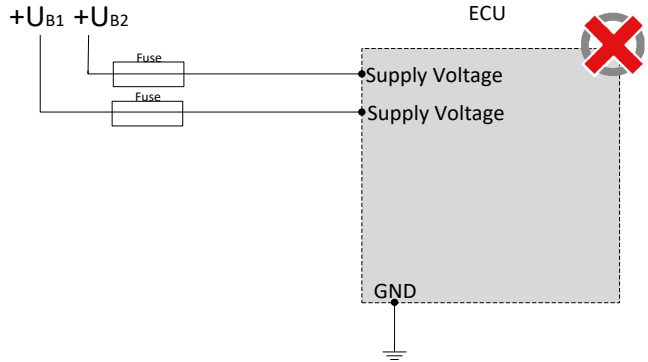
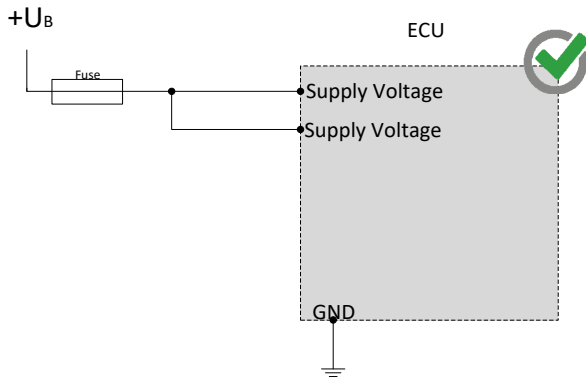


MANUFACTURER

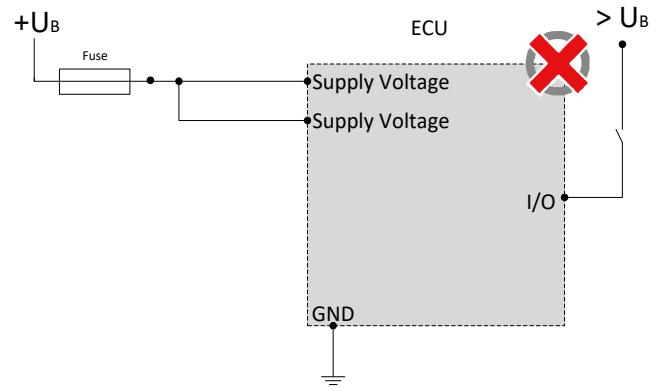
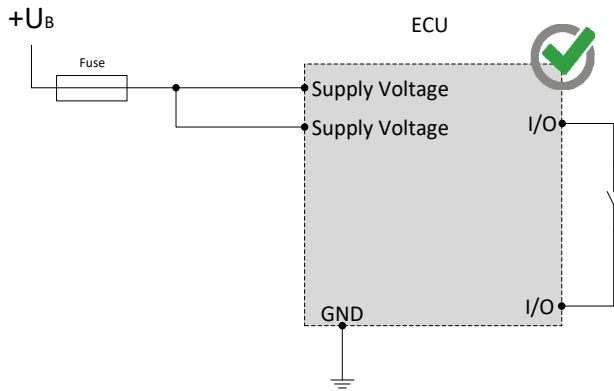
MRS Electronic GmbH & Co. KG
Klaus-Gutsch-Str. 7
78628 Rottweil
Germany

NOTES ON WIRING AND CABLE ROUTING

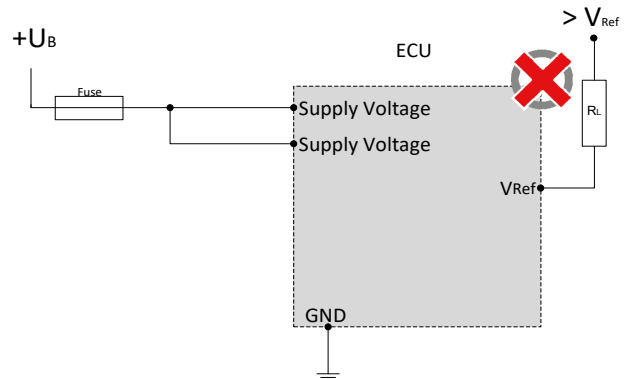
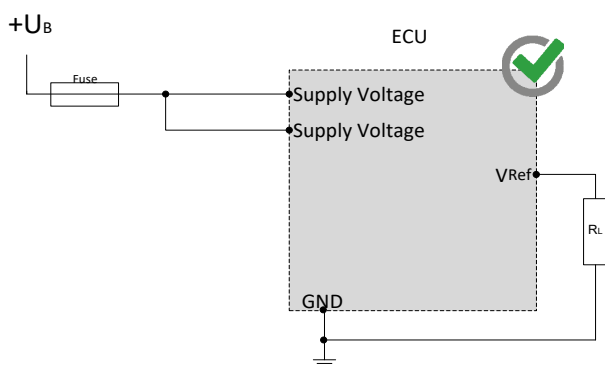
The electronic system and the power outputs of a control unit must be supplied by the same power supply system.



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

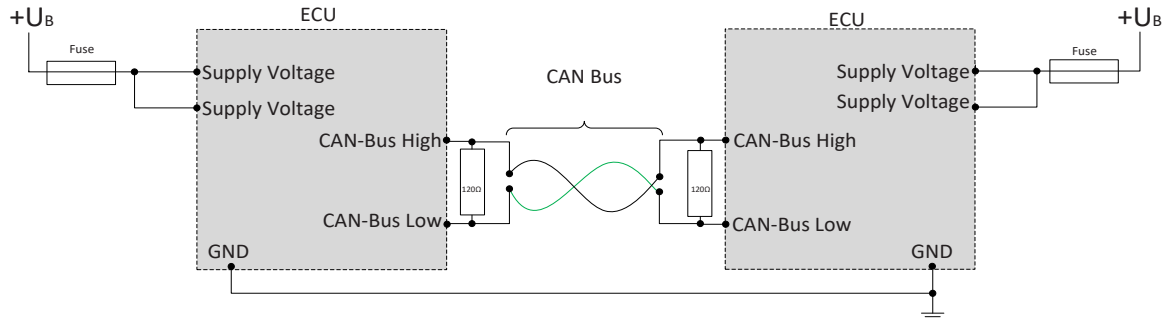


The sensor supplies can be "lifted" through an external circuitry, for example the creation of higher voltage, as they only work as a voltage source but not as voltage drain. The lift of a voltage source may lead to unforeseen malfunctions and damages of the control unit in case of permanent operation.

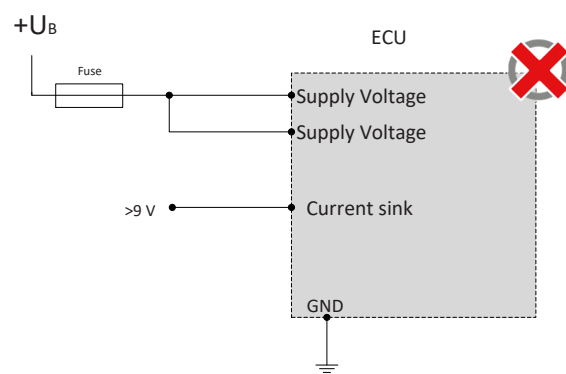
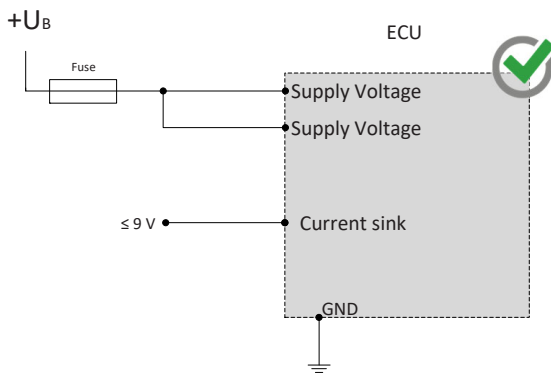


NOTES ON WIRING AND CABLE ROUTING

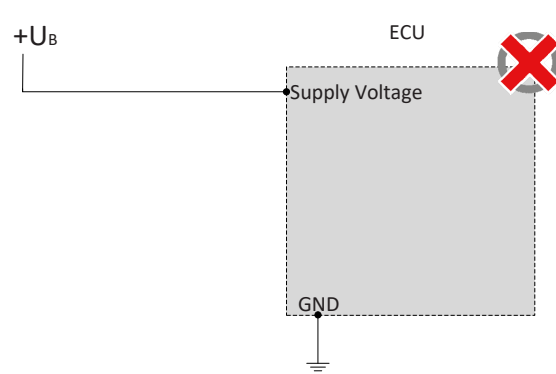
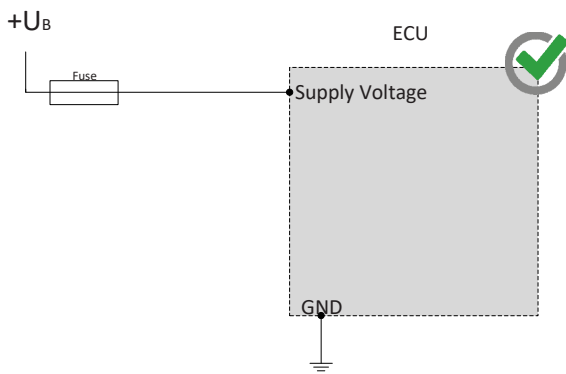
CAN bus communication is the main communication between the control unit and the vehicle. Therefore, connect the CAN bus with special care and check the correct communication with the vehicle to avoid undesired behavior.



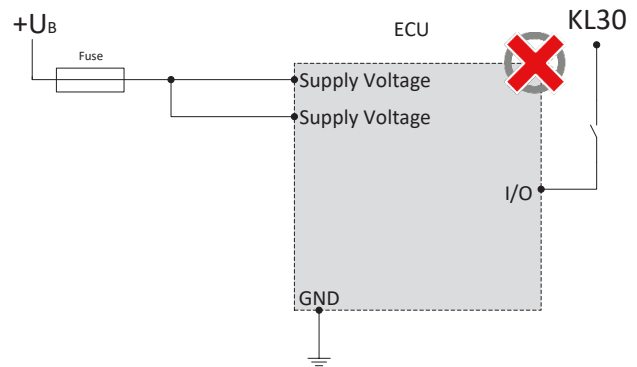
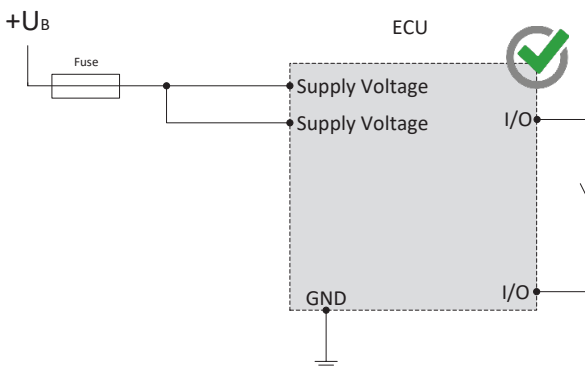
When using the input with pull-down resistance (using DOM_PD), you must not connect a greater voltage than 9 V to the input.



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



The I/Os must not be connected against KL30, otherwise the reverse polarity protection can no longer be guaranteed.



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.