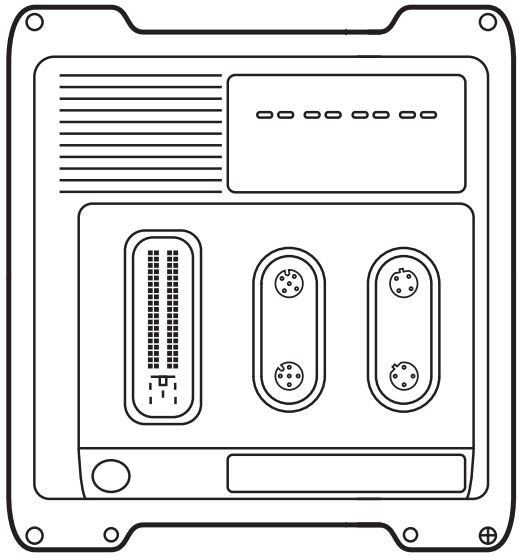
# Installation instructions ecomatController

UK

**M30710**
**M30711**



7391127 / 00 04 / 2017

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# 1 Preliminary note

This document applies to devices of the type "ecomatController" (art. no.: M30710/M30711).
It is part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

Technical data, approvals, accessories and further information at www.ifm.com.

## 1.1 Explanation of symbols

► Instruction
> Reaction, result
[…] Designation of keys, buttons or indications
→ Cross-reference

Important note
Non-compliance may result in malfunction or interference.

Information
Supplementary note

**⚠ WARNING**
Warning of serious personal injury.
Death or serious irreversible injuries may result.

**⚠ CAUTION**
Warning of personal injury.
Slight reversible injuries may result.

**NOTE**
Warning of damage to property.

# 2 Safety instructions

## 2.1 General

These instructions are an integral part of the device. They contain texts and figures concerning the correct handling of the device and must be read before installation or use.

Observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can seriously affect the safety of operators and machinery.



## 2.2 Target group

These instructions are intended for authorised persons according to the EMC and low-voltage directives. The unit must be installed, connected and put into operation by a qualified electrician trained in safety technology.

## 2.3 Electrical connection

The device is designed for supply via a mobile on-board system (12/24 V DC battery operation).

Disconnect the unit externally before handling it. If necessary, also disconnect any independently supplied output load circuits.

If the device is not supplied by the mobile on-board system (12/24 V battery operation), it must be ensured that the external voltage is generated and supplied according to the criteria for safety extra-low voltage (SELV) as this voltage is supplied without further measures to the connected controller, the sensors and the actuators.

The wiring of all signals in connection with the SELV circuit of the device must also comply with the SELV criteria (safety extra-low voltage, safe electrical isolation from other electric circuits).

If the supplied SELV voltage is externally grounded (SELV becomes PELV), the responsibility lies with the user and the respective national installation regulations must be complied with. All statements in this document refer to the device the SELV voltage of which is not grounded.

The connection terminals may only be supplied with the signals indicated in the technical data and/or on the device label and only the approved accessories from ifm electronic gmbh may be connected.

## 2.4 Housing temperature

As described in the technical specifications below the device can be operated in a wide ambient temperature range. Because of the additional internal heating the housing walls can have high perceptible temperatures when touched in hot environments.

### 2.5 Tampering with the device

In case of malfunctions or uncertainties please contact the manufacturer. Any tampering with the device can seriously affect the safety of operators and machinery. This is not permitted and leads to the exclusion of any liability and warranty claims.

### 2.6 Electromagnetic compatibility

This is a class A product. It can cause radio interference in domestic areas. In this case the operator is requested to take appropriate measures.

### 2.7 Electrical welding on vehicles and plants

Welding work on the chassis frame must only be carried out by qualified persons.

Remove and cover the plus and minus terminals of the batteries.
Disconnect all contacts of the controller from the on-board system prior to welding on the vehicle or plant. Connect the earth terminal of the welding device directly to the part to be welded.

Do not touch the controller or electric cables with the welding electrode or the earth terminal of the welding device.

Protect the controller against weld slag.

## 3 Functions and features

The freely programmable controllers of the "ecomatController" series are rated for use under difficult conditions (e.g. extended temperature range, strong vibration, intensive EMC interference).

► Observe the operating conditions.

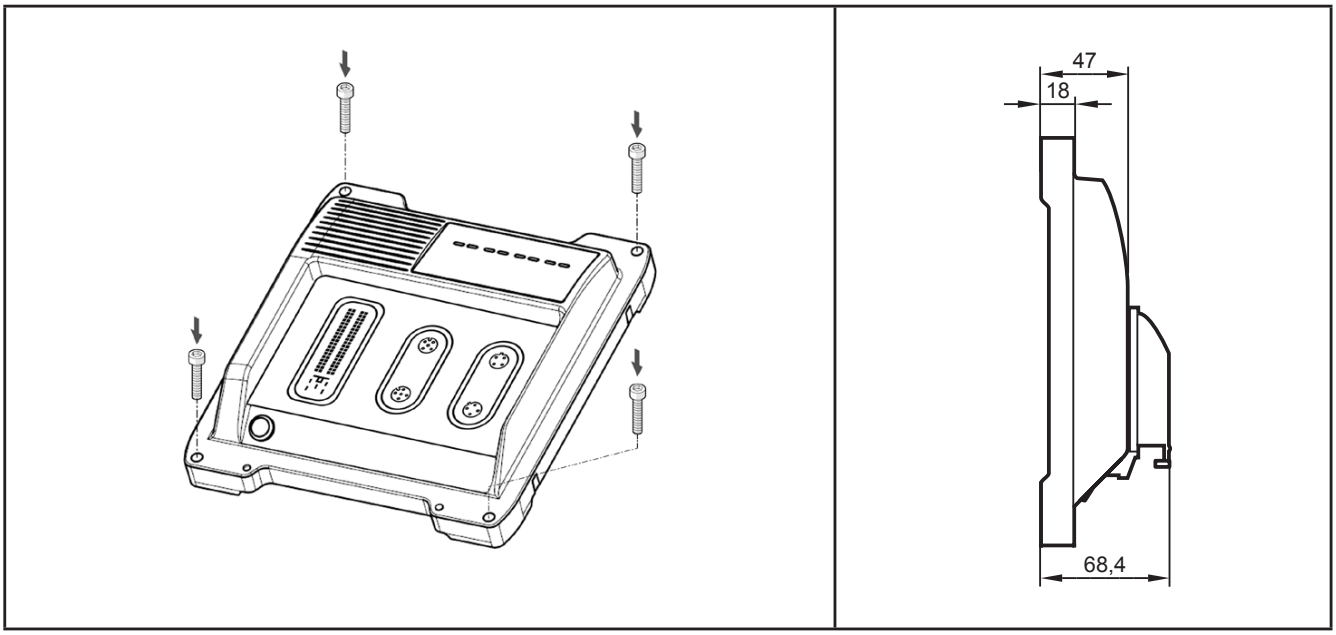
**⚠ WARNING**

- Functions and features
- Programming and important additions to these instructions
- Set-up

# 4 Installation

## 4.1 Fastening

► Fix the controller to a flat surface using 4 galvanized M6 screws.
Tightening torque: 10 ±2 Nm




Installation

Total height with the attached connector.

**NOTE**

To avoid contact corrosion between the mounting screws and the module housing, do not use any stainless steel screws or nickel-plated screws.

In very corrosive environments such as extremely salty air, we recommend to use screws with surface finishing on a zinc/nickel basis with thick-film passivation and sealing. For normal corrosive requirements zinc-plated screws are sufficient.

## 4.2 Installation position

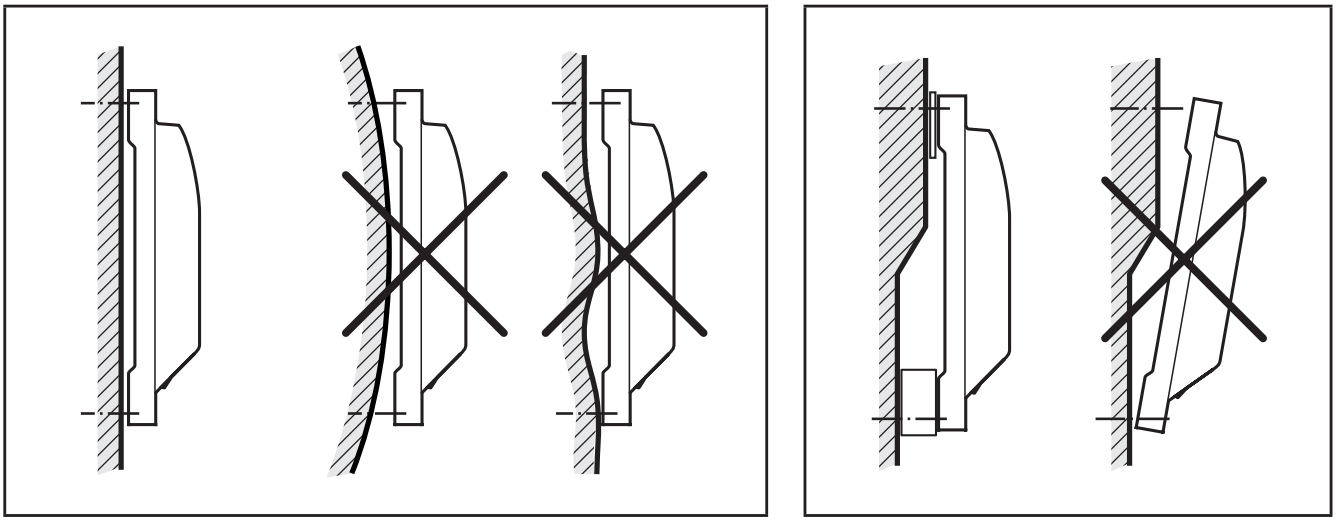
In wet environments, install the controller ensuring that no liquid remains on the connectors.

## 4.3 Mounting surface

**NOTE**

The housing must not be exposed to any torsional forces or mechanical stress.

► Use compensating elements if there is no flat mounting surface available.



Mounting surface

► During installation, ensure that the pollution degree is 2 or better. Pollution degree 2 is a light, common contamination which can be caused by occasional thawing or hand perspiration (DIN EN 60664-1).

## 4.4 Heat dissipation

► Ensure sufficient heat dissipation as the internal heating of the electronics is conducted away via the housing. The heat dissipation mainly takes place via the bottom of the housing. The housing is built in such a way that, when mounted on a flat surface, the heat can be dissipated through the bottom.

# 5 Electrical connection

## 5.1 Wiring

Wiring (→ 7 Technical data)

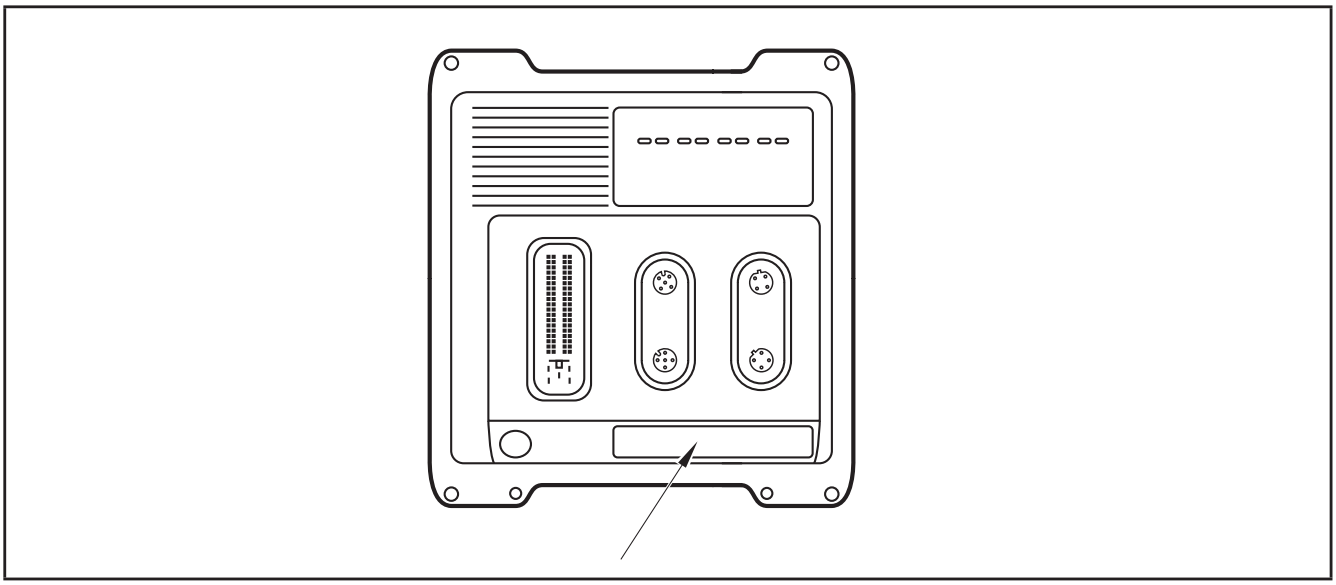
Only connect the connector pins as shown in the pin layout.
Unspecified connector pins remain unconnected.

► Connect all indicated supply cables and GND terminals.

### 5.1.1 Assignment of the connectors

UK

► Note the device label.



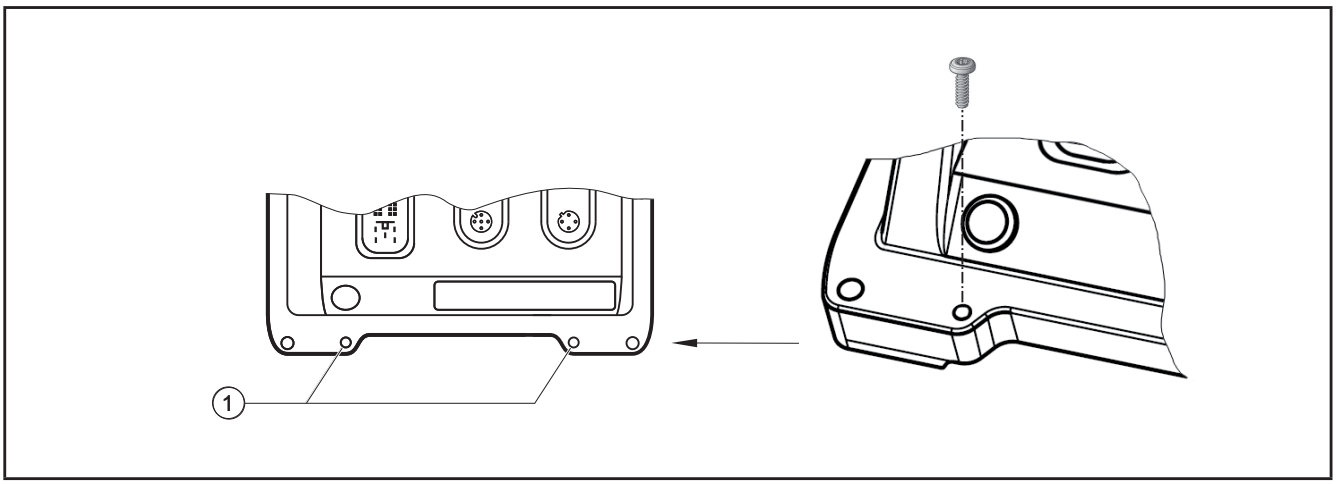
Assignment of the connectors on the device label

► Use the M12 connector with gold-plated contacts.

► Unused sockets are equipped with protective caps (included).

► For protection rating IP 67, use a device with individually sealed cores.

## 5.2 Shield connection




1: Holes for shield connection

To ensure the protection of the device against electrical interference and the safe function of the device, the housing must be connected to the ground / body of the vehicle in the shortest possible way.

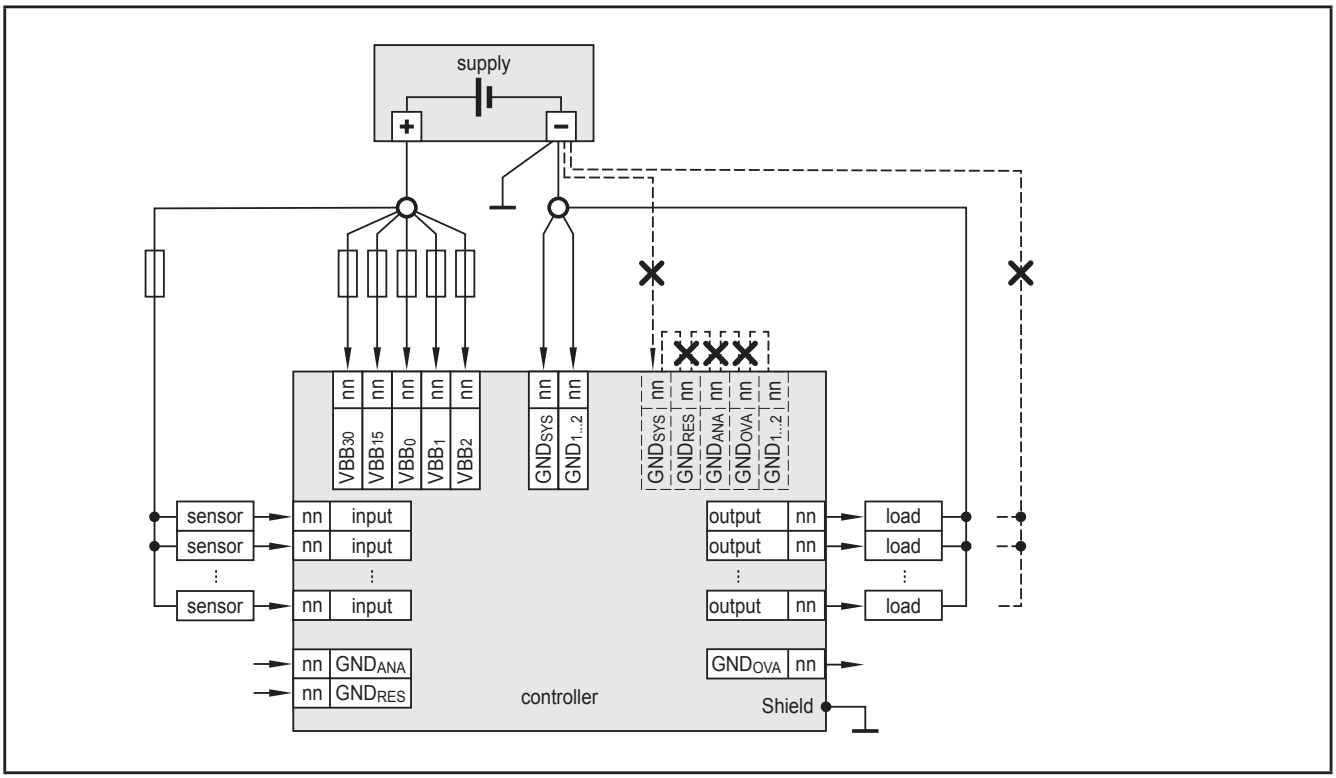
► Connect the device to the ground of the vehicle using the M4 self-tapping screw (included).

## 5.3 Fuses

► The individual electric circuits must be protected in order to protect the whole system.

| Connector | Designation | Potential | Pin no. | Fuse |
|---|---|---|---|---|
| Connector A | Supply voltage sensors/module | $VBB_{30}$ | 30 | ≤ 2 A time-lag |
| | Supply voltage sensors/module | $VBB_{15}$ | 15 | ≤ 2 A time-lag |
| | Supply voltage output group 0 | $VBB_0$ | 04 | ≤ 15 A |
| | Supply voltage output group 1 | $VBB_1$ | 03 | ≤ 15 A |
| | Supply voltage output group 2 | $VBB_2$ | 01 | ≤ 15 A |

## 5.4 Laying the supply and signal cables




Connection of the supply and signal cables (X = not permitted), example M30711

**⚠ WARNING**

The linking of connections in the plug is not permitted and can affect the safety of operators and machinery.

- ► Basically all supply and signal cables must be laid separately.
- ► Connect supply and ground cables to the controller and the sensors/actuators via the respective common star point.

If a prewired connection cable is used, remove the cores with unused signal inputs and outputs.

Unused cores, in particular core loops, lead to interference coupling that can influence the connected controller.

In case of signal failures, operate inputs with shielded cables. Connect the shields to the shield connection on one side.



$VBB_0$ must be connected in order to protect the controller against load dump

**⚠ WARNING**

If $VBB_0$ is not connected, this can affect the safety of operators and machinery.

| Abbreviation | Input / output type |
|---|---|
| A | Analogue |
| $B_H$ | Binary high side (CSO) |
| $B_L$ | Binary low side (CSI) |
| $FRQ_{L/H}$ | Frequency/pulse inputs configurable low side (CSI) / high side (CSO) |
| $PWM_H$ | Pulse width modulation high side (CSO) |
| $PWM_L$ | Pulse width modulation low side (CSI) |
| $PWM_I$ | Pulse width modulation current-controlled |
| R | Resistor input |

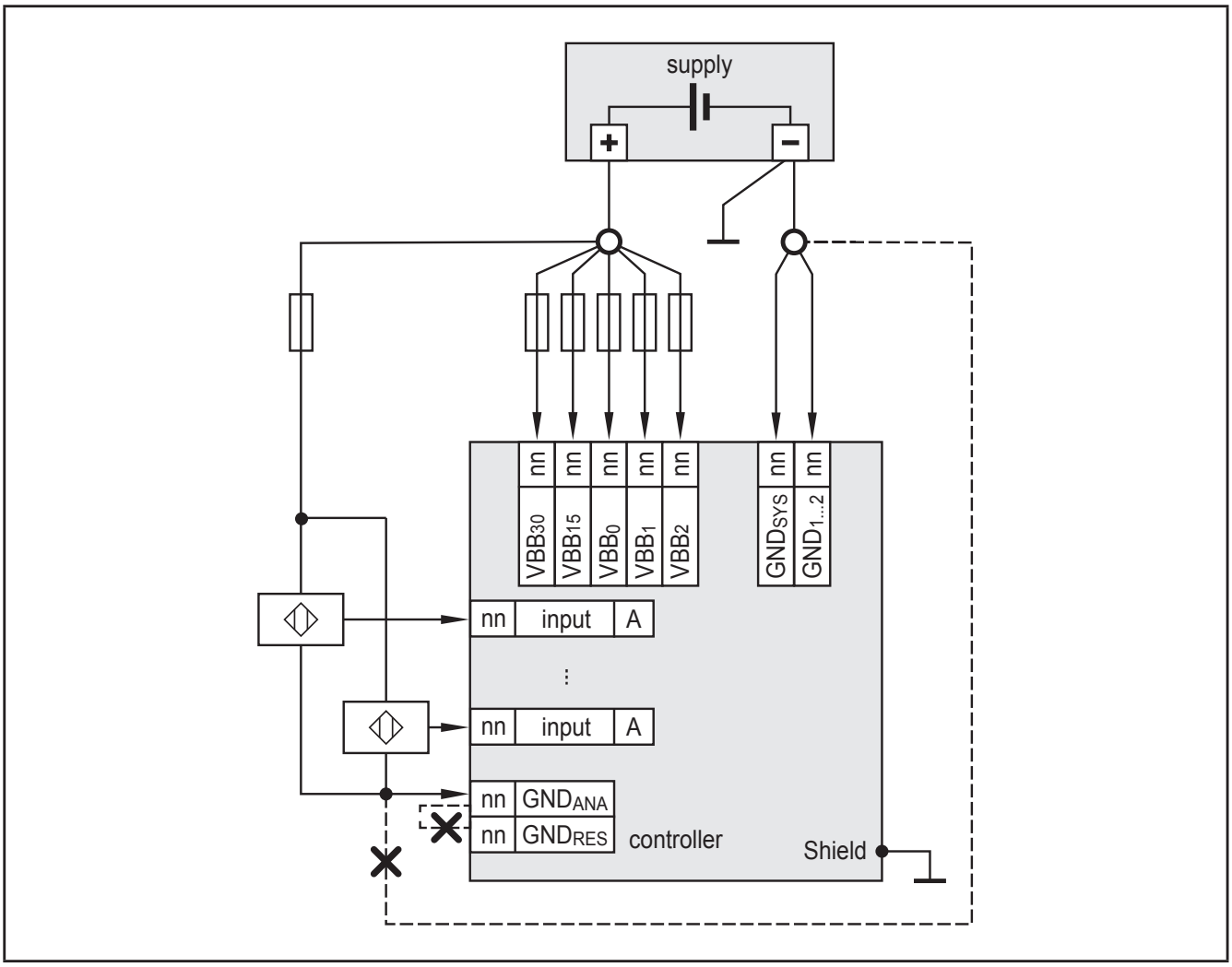
### 5.4.1 GND connections

- ► Connect the $GND_{1...2}$ and $GND_{SYS}$ connectors individually to the common GND star point.
- ► Connect the shield connection of the housing to the ground / body of the vehicle in the shortest possible way.

**⚠ WARNING**

Do not connect the $GND_{ANA}$, $GND_{RES}$ and $GND_{OVA}$ connectors to the common GND star point, but to the GND of the signal source or of the connected device.

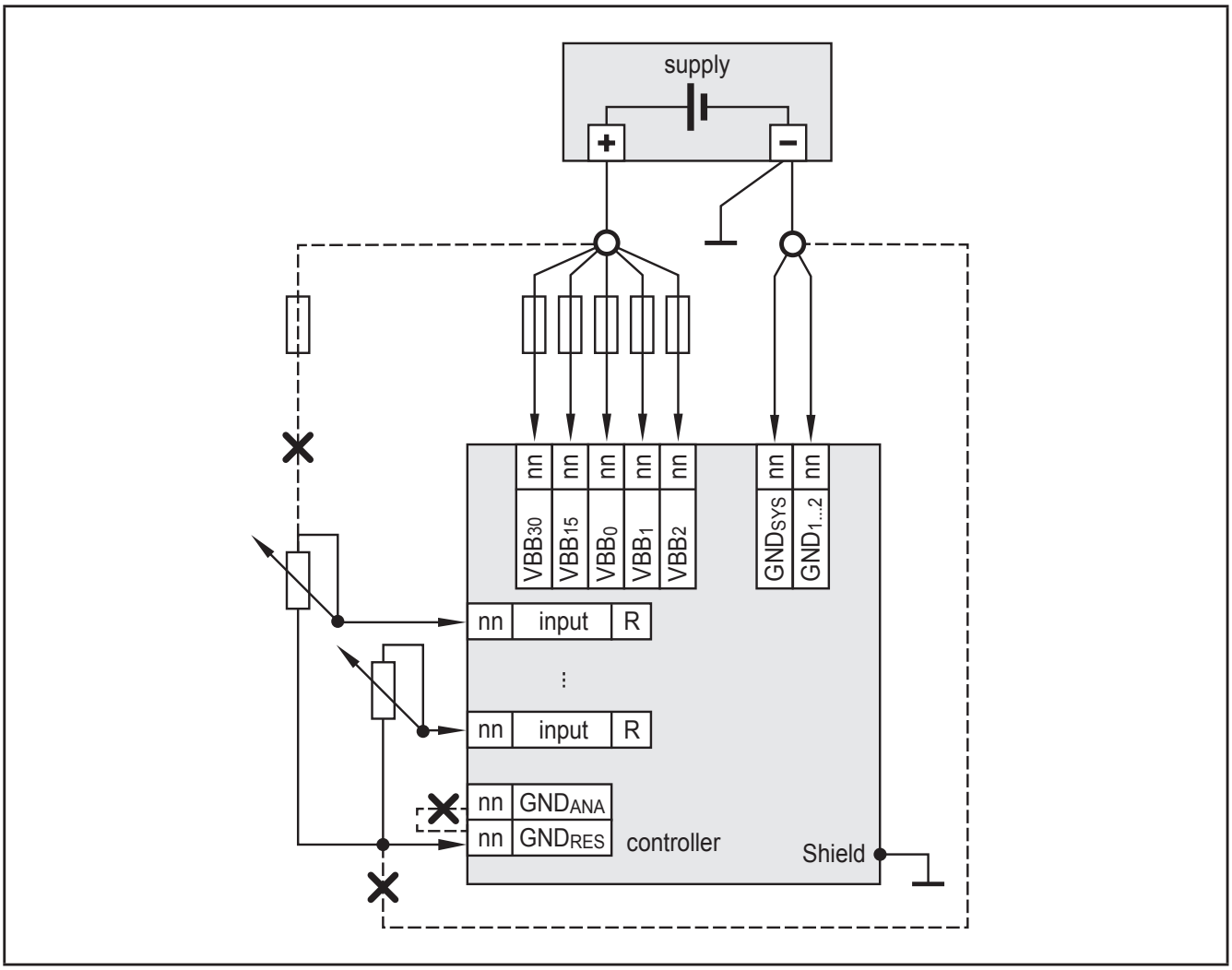
## 5.5 Analogue inputs




Connection of the analogue inputs (A)

► Connect $GND_{ANA}$ to the GND of the signal source.
Do not connect $GND_{ANA}$ to other GND connectors or to the GND star point.

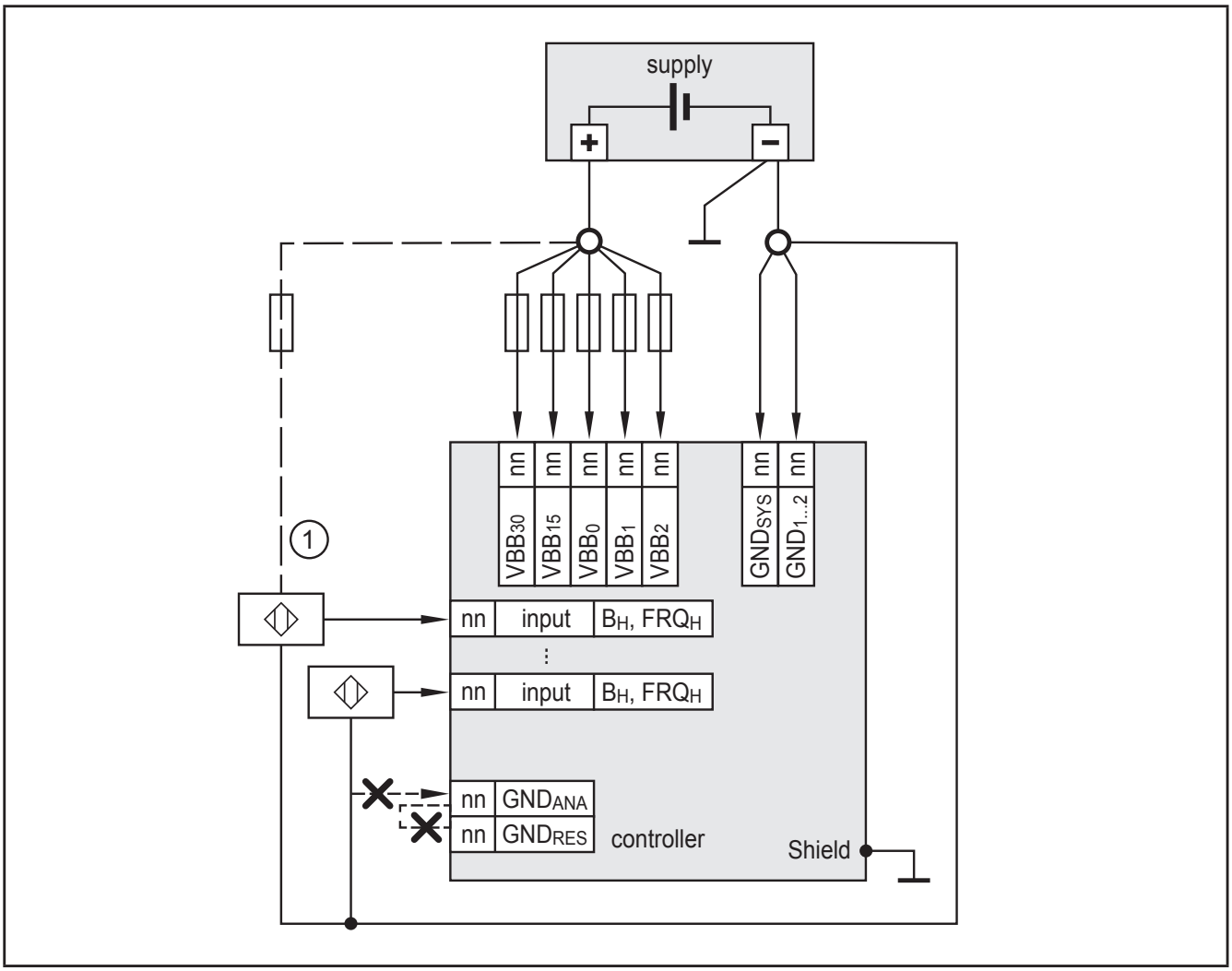
## 5.6 Resistor inputs




Connection of the resistor inputs (R)

► Connect $GND_{RES}$ to the GND of the signal source.
Do not connect $GND_{RES}$ to other GND connectors or to the GND star point.

## 5.7 High side digital inputs (CSO)

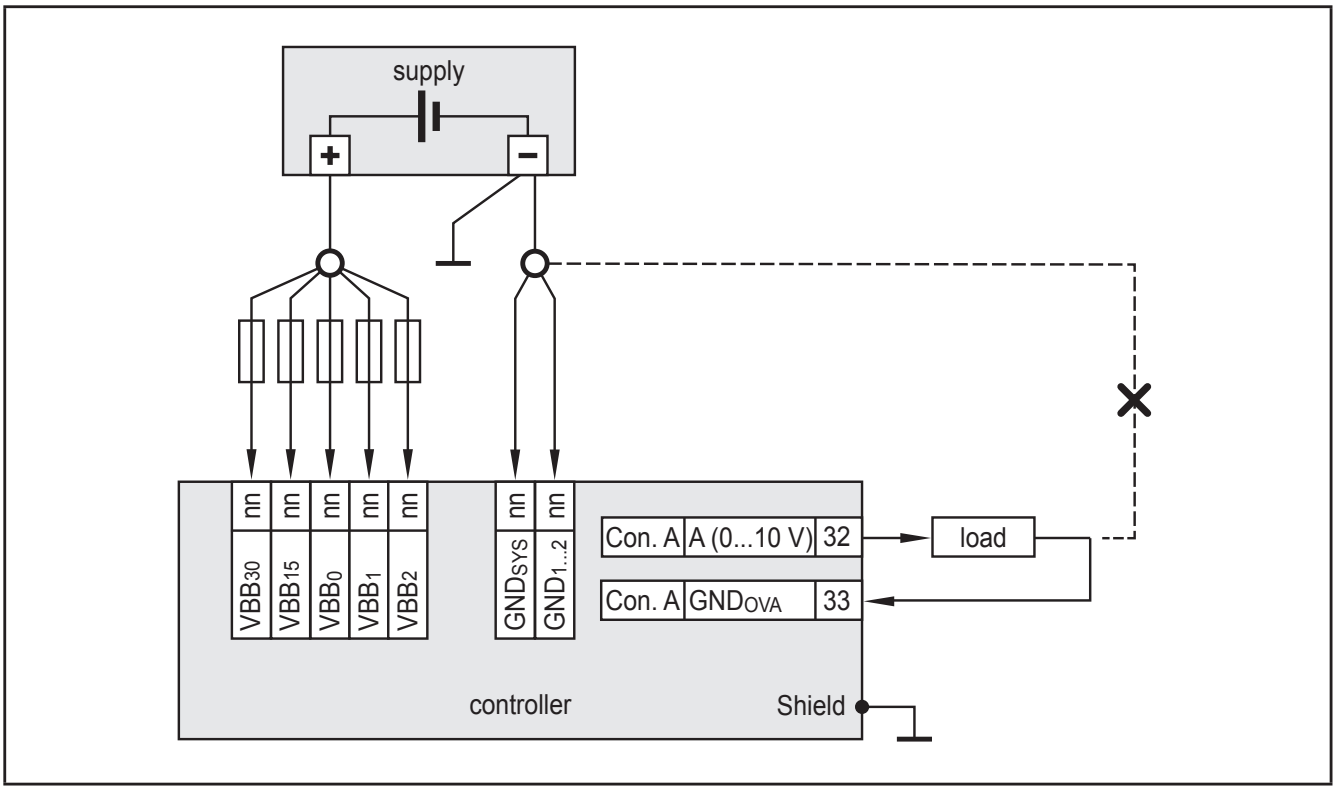



Connection of the high side inputs ($B_H$, $FRQ_H$)

1: Connection for 3-wire sensors

► Connect the GND of the signal source with the common GND star point.Do not connect the GND of the signal source to $GND_{RES}$ or $GND_{ANA}$.

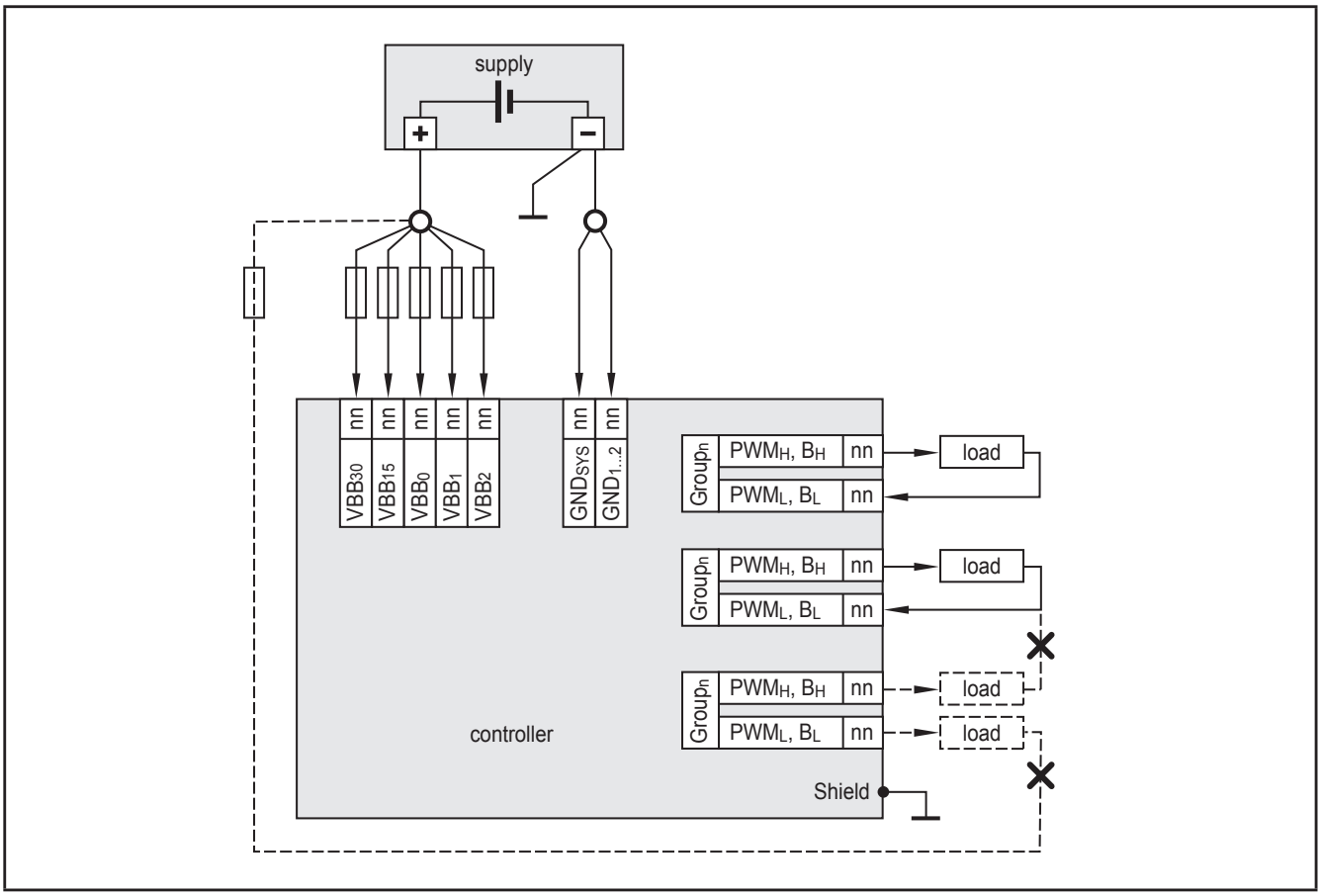
## 5.8 Analogue outputs




Connection of the analogue outputs (A)

► Connect the GND of the load to $GND_{OVA}$.
Do not connect the GND of the load to other GND connections or to the common GND star point.

## 5.9 Low side digital outputs (CSI) / H-bridge



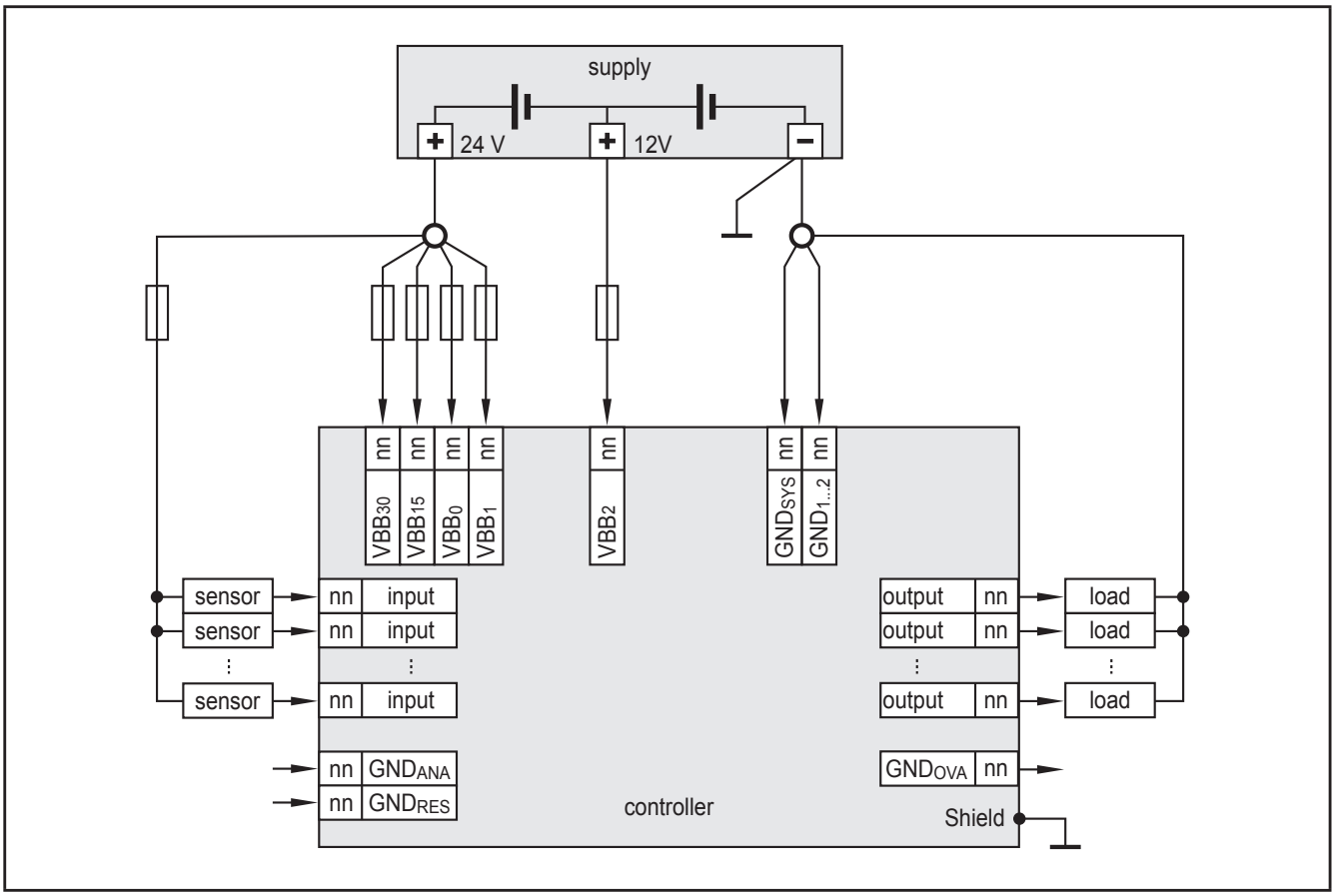

Connection of the low side digital outputs ($PWM_L$, $B_L$)

► Supply low-side outputs ($B_L$) via a high side output ($B_H$) of the same output group.

**⚠ WARNING**

Impermissible connection configurations of the low side outputs can affect the safety of operators and machinery.

## 5.10 Mixed operation (12 V / 24 V)




Example connection to 24 V and 12 V power supply combined

The operation of the output groups is possible with different supply voltages.

► $VBB_0$, $VBB_{30}$ and $VBB_{15}$ must be connected at the common star point.

## 5.11 Connection technology

**NOTE**

Only connect the 81-pole connectors when the supply voltage is disconnected. "Hot plugging" is not permitted.

► Use twisted-pair cables for the CAN connection.

► Use a min. category 5 (Cat 5) cable for the Ethernet connection.

The RS-232 interface serves only as a service interface (e.g. for firmware updates).

# 6 Set-up

**⚠ WARNING**

Note the following:
- Functions and features
- Programming and important additions to these instructions
- Set-up

## 6.1 Interfaces and system requirements

The programmer creates the application program with the IEC 61131-3 compliant programming system CODESYS and loads the applications via the Ethernet, RS-232 or CAN interface to the controller.

System requirement for CODESYS 3.5 SP10:
Microsoft Windows 7, SP1 or higher

For applicable CODESYS versions see the ecomatController M30710 / M30711 system manual.

## 6.2 General

As delivered, the device is prepared for programming with CODESYS version 3.5 SP10 or higher.

Factory settings:
IP address: 192.168.82.247
Subnet mask: 255.255.255.0

The user is responsible for the safe function of the application programs which he created himself. If necessary, he must also obtain an approval from the supervisory and test organisations according to the national regulations.

## 6.3 Getting started

► Check if the pre-installed, latest version of the ifm operating system is required. If necessary, download and install a different version via TFTP.
► Connect the device to the notebook/PC via the Ethernet interface.
► Switch on the notebook/PC; Check the IP settings of the notebook/PC and change them if necessary.

Internet protocol: TCP/IP
IP address: 192.168.82.xxx (except for .247, s.a.)
Subnet mask: 255.255.255.0
Gateway IP address: 192.168.82.21

► Switch on the operating voltage of the device.
> After the operating voltage has been applied, a project can be loaded.

## 6.4 Required documentation

In addition to the CODESYS programming system, the following documents are required for programming and set-up of the device:

- Programming manual CODESYS V3.5
  (alternatively as online help)

The manuals can be downloaded from the internet:
www.ifm.com → Search → Art. no. → Documents & downloads

CODESYS online help:
www.ifm.com → Service → Download → Control systems*

*) Download area with registration

# 7 Technical data

## 7.1 M30710

### 7.1.1 Mechanical and electric data

**M30710**

ecomatController/37

32-bit CPU TriCore processor

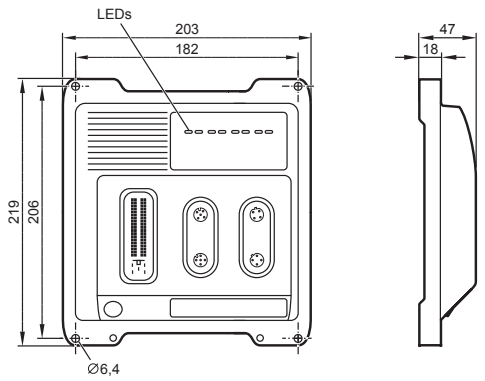
37 inputs/outputs

4 CAN interfaces

Ethernet interface

CODESYS 3.5

8...32 V ⎓




| Technical data | Controller as black box system<br>for the implementation of a central or decentralised system design |
|---|---|
| Mechanical data | |
| Housing | closed, screened metal housing with screw connection |
| Dimensions (H x W x D) | 219 x 203 x 47 mm |
| Mounting | screw connection by means of 4 M6 |
| Connection | 1 x connector 81-pole, locked, mechanical reverse polarity protection, type Tyco / AMP<br>contacts AMP-Junior-Timer, crimp connection 0.5/0.75/2.5 mm²<br>2 x M12 connector 4 poles, D-coded<br>2 x M12 connector 5 poles, A-coded<br>Shield connection Ø 4 mm for self-tapping screw |
| Weight | 1.4 kg |
| Housing/storage temperature | – 40...85 °C (depending on the load) / – 40...85 °C |
| Max. perm. relative humidity | 90 % (not condensing) |
| Height above sea level | max. 3000 m |
| Protection rating | IP 65 / IP 67 (for inserted connectors with individually sealed cores and inserted M12 connectors/sealing caps) |
| | |
| **Electrical data** | |
| Input/output channels total | 37 (20 inputs / 17 outputs) |
| Inputs | configurable, with diagnostic capability<br>8 x A (0...10/32 V, 0...20 mA, ratiometric) / $B_L$<br>8 x $FRQ_{L/H}$ (≤ 30 kHz) / $B_{L/H}$<br>4 x R (0.016...30 kOhm) / $B_L$ |
| Outputs | configurable, with diagnostic capability<br>4 x $PWM_{H/L}$ / $PWM_I$ / $B_{H/L}$ (20...2000 Hz, 4.0 A, H-bridge)<br>12 x $PWM_H$ / $PWM_I$ / $B_H$ (20...2000 Hz, 2.5 A)<br>6 x $PWM_H$ / $B_H$ 2.5 A<br>1 x A (0...10 V) |
| Sensor supply | 1 x 5/10 V, max. 2 W configurable |
| | for the number of inputs/outputs and configuration options also see the wiring diagrams |
| Operating voltage<br>Overvoltage | 8...32 V ⎓<br>36 V for t ≤ 10 s |
| Reverse polarity protection | yes |
| Current consumption $VBB_{30}$ | max. 600 mA at 12 V<br>max. 400 mA at 24 V |

| M30710 | Technical data |
|---|---|
| CAN interfaces 0...3<br>Baud rate<br>Communication protocol | CAN interface 2.0 A/B, ISO 11898<br>20 Kbits/s...1 Mbit/s (default 250 Kbits/s)<br>CANopen, CiA DS 301 V4.2, CiA DS 401 V 1.4<br>SAE J 1939 / free protocol |
| Serial interface<br>Baud rate<br>Topology | RS-232<br>9.6...115.2 Kbits/s (default 115.2 Kbits/s)<br>point-to-point (max. 2 participants); master-slave connection |
| Ethernet interface<br>Transmission rate<br>Protocols | 1 interface with int. switch and 2 ports<br>10/100 Mbits/s<br>TCP/IP, UDP/IP, Modbus UDP |
| Processor | 32-bit TriCore CPU Infineon AURIX™ |
| Device monitoring | overvoltage and undervoltage monitoring<br>watchdog function<br>check sum test for program and system<br>excess temperature monitoring |
| Process monitoring concept | second switch-off way per output group via semiconductor switch |
| Physical memory | flash: 9 Mbytes<br>RAM: 2.7 Mbytes<br>remanent memory: 10 Kbytes |
| Memory allocation | see system manual<br>www.ifm.com |
| | |
| **Software/programming** | |
| Programming system | CODESYS version 3.5 (IEC 61131-3) |
| | |
| **Indicators** | |
| Status LED | 2 x two-colour LED (R/G) for SYS0 and SYS1 |
| Ethernet LED | 2 x LED (G) for ETH0 and ETH1 |
| Application LED | 4 x three-colour LED (R/G/B) for APP0, APP1, APP2 and APP3 |
| | |

**M30710** | **Technical data**

Operating states of the system

| LED SYS0 | | LED SYS1 | | System state |
|---|---|---|---|---|
| Colour | Status | Colour | Status | |
| – | off | – | off | no operating voltage |
| green | 5 Hz | – | off | no operating system loaded |
| red | on | – | off | hardware error (fatal error+) |
| red | on | red | on | system error (fatal error) |
| green / yellow | 2 Hz | green / yellow | 2 Hz | update |

Operating states PLC / application

| LED | Co-lour | Status | Description | |
|---|---|---|---|---|
| SYS0 | green | on | Standard PLC | no application |
| | | 2 Hz | | run |
| | red | 10 Hz | | error application (serious error) |
| | yellow | 2 Hz | | debug run |
| | | on | | debug stop |
| SYS0 | green | on | Safe PLC | no application |
| | | 2 Hz | | run |
| | red | 10 Hz | | error application (serious error) |
| | yellow | 2 Hz | | debug run |
| | | on | | debug stop |
| ETH0 | green | flashing | data transmission Ethernet | |
| | | on | Ethernet connection OK, no data transfer | |
| ETH1 | green | flashing | data transmission Ethernet | |
| | | on | Ethernet connection OK, no data transfer | |
| APP0 ... APP3 | red | on | status display of the application, freely programmable | |
| | green | on | status display of the application, freely programmable | |
| | blue | on | status display of the application, freely programmable | |

## 7.1.2 Test standards and regulations

| M30710 | Technical data | |
|---|---|---|
| **Test standards and regulations** | | |
| CE marking | EN 61000-6-2 | Electromagnetic compatibility (EMC)<br>Noise immunity |
| | EN 61000-6-4 | Electromagnetic compatibility (EMC)<br>Radiation of interference |
| | EN 61010 | Safety requirements for electrical equipment for measurement, control and laboratory use |
| E1 marking | UN/ECE-R10 | Radiation of interference<br>Immunity with 100 V/m |
| Electrical tests | ISO 7637-2 | Pulse 1, severity level: IV; function state C<br>Pulse 2a, severity level: IV; function state A<br>Pulse 2b, severity level: IV; function state C<br>Pulse 3a, severity level: IV; function state A<br>Pulse 3b, severity level: IV; function state A<br>Pulse 4, severity level: IV; function state A<br>Pulse 5, severity level: III; function state A<br>(data valid for the 24 V system)<br>Pulse 4, severity level: III; function state A<br>(data valid for the 12 V system) |
| Climatic tests | EN 60068-2-30 | Damp heat, cyclic<br>Upper temperature 55°C, number of cycles: 6 |
| | EN 60068-2-78 | Damp heat, steady state<br>Test temperature 40°C / 93% RH<br>Test duration: 21 days |
| | EN 60068-2-52 | Salt spray test<br>Severity level 3 (vehicle) |
| Mechanical tests | ISO 16750-3 | Test VII; Vibration, random<br>Mounting location: vehicle body |
| | EN 60068-2-6 | Vibration, sinusoidal<br>10...500 Hz; 0.72 mm/10 g; 10 cycles/axis |
| | ISO 16750-3 | Bump<br>30 g/6 ms; 24,000 shocks |

## 7.1.3 Connector A / input characteristics

| M30710 | Connector A / input characteristics | |
|---|---|---|
| **Connector A:**<br>**IN0100...0103**<br>**IN0600...0603**<br>**Multifunction inputs analogue / digital**<br>**(IN MULTIFUNCTION-A)** | Resolution | 12 bits |
| | Input frequency | < 330 Hz |
| | Accuracy | ± 1% FS |
| | Measuring ranges | 0...10 V, 0...32 V, 0...20 mA, ratiometric, binary low side |
| | Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |
| Current input 0...20 mA (A) | Input resistance | 298 Ω |
| | Range diagnostics min - max. | 0 mA / 20 mA (default) |
| Voltage input 0...10 V (A) | Input resistance | 67.6 kΩ |
| | Range diagnostics min - max. | 0 V / 10 V (default) |
| Voltage input 0...32 V (A) | Input resistance | 51.0 kΩ |
| | Range diagnostics min - max. | 0 V / 32 V (default) |
| Voltage input ratiometric (A) | Input resistance | 51.0 kΩ |
| | Range diagnostics min - max. | 0 ‰ / 1000 ‰ (default) |
| Digital input ($B_L$) | Input resistance | 9.5 kΩ |
| | Switch-on level | > 0.7 $VBB_{30}$ |
| | Switch-off level | < 0.3 $VBB_{30}$ |
| | Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |
| **Connector A:**<br>**IN0000...0003**<br>**IN0500...0503**<br>**Digital inputs, frequency measurement**<br>**(IN FREQUENCY-A)** | Resolution | 12 bits |
| Frequency input ($FRQ_{L/H}$) | Input resistance | 10 kΩ |
| | Input frequency | ≤ 30 kHz |
| | Switch-on level | > 0.7 $VBB_{30}$ |
| | Switch-off level | < 0.3 $VBB_{30}$ |
| | Accuracy | ± 10 µs |

**M30710**

**Connector A / input characteristics**

Digital input ($B_{L/H}$)

| | |
|---|---|
| Input resistance | 10 k Ω |
| Input frequency | < 330 Hz |
| Switch-on level | > 0.7 $VBB_{30}$ |
| Switch-off level | < 0.3 $VBB_{30}$ |
| Accuracy $B_{L/H}$ | ± 1 % |
| Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |
| Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |

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**Connector A:**

**IN0400...0401**
**IN0900...0901**

**Digital/ resistor inputs (IN RESISTOR-A)**

| | |
|---|---|
| Resolution | 12 bits |
| Input frequency | < 330 Hz |
| Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |

Digital input ($B_L$)

| | |
|---|---|
| Input resistance | 10 k Ω |
| Switch-on level | > 0.7 $VBB_{30}$ |
| Switch-off level | < 0.3 $VBB_{30}$ |
| Accuracy $B_L$ | ± 1 % |
| Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |

Resistor input (R)

| | |
|---|---|
| Measuring current | < 2.0 mA |
| Measuring range | 0.016...30 kΩ |
| Accuracy | ± 2% FS: 0.016...3 kΩ<br>± 5 % FS: 3...15 kΩ<br>± 10 % FS: 15...30 kΩ |
| Range diagnostics min - max. | 0 Ω / 31 kΩ (default) |

Observe the notes on the configuration of the inputs/outputs!
(Programming manual "ecomatController M30710")

Abbreviations

| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $FRQ_{L/H}$ | frequency/pulse inputs configurable low side (CSI) / high side (CSO) |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| R | resistance input |
| $VBB_{0/1}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

## 7.1.4 Connector A / output characteristics

| M30710 | Connector A / output characteristics | |
|---|---|---|
| **Connector A:**<br>**OUT0006...0007**<br>**OUT0106...0107**<br>**Digital / PWM outputs**<br>**4.0 A, H-bridge**<br>**(OUT PMW-40-BRIDGE-A)** | Switching current | 0.025...4 A |
| | Protective circuit for inductive loads | integrated |
| | Accuracy current feedback | 1 % |
| | Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| | Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |
| Digital output ($B_H$) | Switching voltage | 8...32 V ⎓ |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| Digital output ($B_L$) | Functions | as H-bridge |
| PWM output ($PWM_H$) | Output frequency | 20...2000 Hz (per channel) |
| | Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| | Resolution | 1 ‰ (at 20...250 Hz) |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| PWM output ($PWM_L$) | Output frequency | 20...500 Hz (per channel) |
| | Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| | Resolution | 1 ‰ (at 20...250 Hz) |
| Current-controlled output ($PWM_I$) | Output frequency | 20...2000 Hz (per channel) |
| | Control range | 0.05...4 A |
| | Setting resolution | 1 mA |
| | Control resolution | 2 mA |
| | Load resistance | ≥ 3 Ω (at 12 V ⎓)<br>≥ 6 Ω (at 24 V ⎓) |
| | Accuracy | ± 1.5 % FS (for inductive loads) |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| **Connector A:**<br>**OUT0000**<br>**OUT0002**<br>**OUT0004**<br>**OUT0100**<br>**OUT0102**<br>**OUT0104**<br>**Digital / PWM outputs 2.5 A**<br>**(OUT PMW-25-A)** | Switching voltage | 8...32 V ⎓ |
| | Switching current | 0.025...2.5 A |
| | Protective circuit for inductive loads | integrated |
| | Accuracy current feedback | 1 % |
| | Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| | Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |
| Digital output ($B_H$) | Range diagnostics min - max. | 0 A / 2.5 A (default) |

| M30710 | Connector A / output characteristics |
|---|---|

PWM output ($PWM_H$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| Resolution | 1 ‰ FS (at 20...250 Hz) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

Current-controlled output ($PWM_I$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Control range | 0.05...2.5 A |
| Setting resolution | 1 mA (at 20...250 Hz) |
| Control resolution | 2 mA |
| Load resistance | ≥ 4.8 Ω / (at 12 V ⎓)<br>≥ 9.6 Ω / (at 24 V ⎓) |
| Accuracy | ± 1.5 % FS (for inductive loads) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

**Connector A:**

**OUT0001**
**OUT0003**
**OUT0005**
**OUT0101**
**OUT0103**
**OUT0105**

**Digital outputs 2.5 A**
**(OUT PMW-25-B)**

| | |
|---|---|
| Switching voltage | 8...32 V ⎓ |
| Switching current | 0.025...2.5 A |
| Protective circuit for inductive loads | integrated |
| Accuracy current feedback | 5 % |
| Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |

Digital output ($B_H$)

| | |
|---|---|
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

PWM output ($PWM_H$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| Resolution | 1 ‰ FS (at 20...250 Hz) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

**Connector A:**

**OUT3000**

**Sensor supply**
**(OUT SUPPLY-A)**

for sensors and joysticks
5 V, 400 mA / 10 V, 200 mA, accuracy ± 5 %
short-circuit proof and overload protected

**Connector A:**

**OUT3001**

**Analogue outputs**
**(OUT VOLTAGE-A)**

| | |
|---|---|
| **Voltage range** | 8...32 V |
| Current rating | < 5 mA |
| Output voltage | 0...10 V |
| Accuracy | ± 5 % FS |

**Output groups $VBB_{0/1}$**

Load current per output group: ≤ 12 A

| M30710 | Connector A / output characteristics |
|---|---|
| Internal semiconductor switches | One switch in series of 8 semiconductor outputs each.<br>Forced controlling by means of hardware<br>and additional controlling by means of user program. |

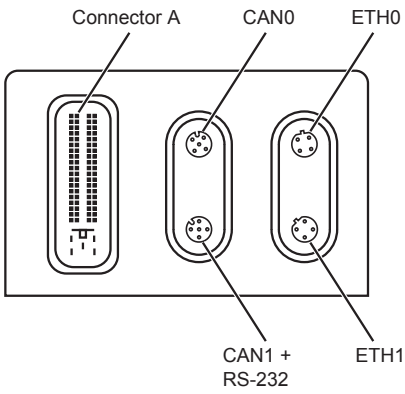
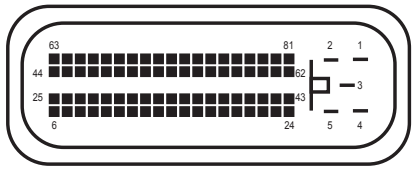
| | |
|---|---|
| Switching current | 0.1...12 A |
| Current diagnostics (excessive current) | > 12 A |

| | |
|---|---|
| Short-circuit strength to GND | Switch-off of the outputs is carried out via the output driver |

Abbreviations

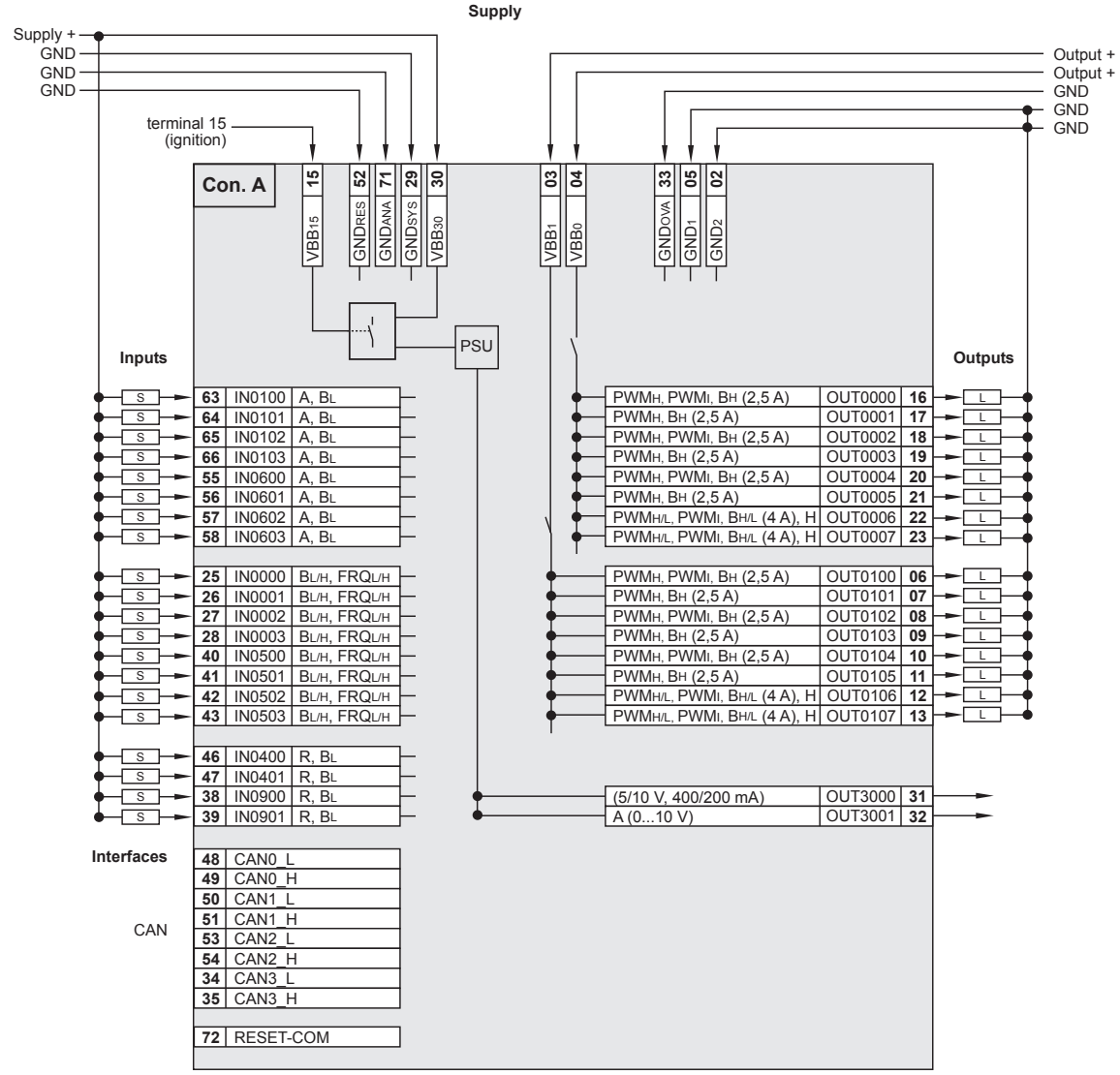
| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| $VBB_{0/1}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

## 7.1.5 Connectors

| M30710 | Technical data |
|---|---|
| **Connectors** |  |
| CAN0 | M12 socket, 5 poles, A-coded<br>1: not used:<br>2: not used:<br>3: CAN0_GND<br>4: CAN0_H<br>5: CAN0_L<br> |
| CAN1 + RS-232 | M12 socket, 5 poles, A-coded<br>1: RS-232_TxD<br>2: RS-232_RxD<br>3: CAN1_GND<br>4: CAN0_H<br>5: CAN0_L<br> |
| ETH0 / ETH1 | M12 socket, 4 poles, D-coded<br>1: TxD+<br>2: RxD+<br>3: TxD-<br>4: RxD-<br> |
| Connector A | AMP, 81-pole, A-coded<br>1-81: see wiring connector A<br> |

## 7.1.6 Connector A / wiring

| M30710 | Technical data |
|---|---|
| Wiring | Connector A |




Abbreviations

| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $FRQ_{L/H}$ | frequency/pulse inputs configurable low side (CSI) / high side (CSO) |
| H | H-bridge function |
| PSU | pulse width modulation for the system |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| R | resistance input |
| $VBB_{0/1}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

## 7.2 M30711

### 7.2.1 Mechanical and electric data

**M30711**

ecomatController/60

32-bit CPU TriCore processor

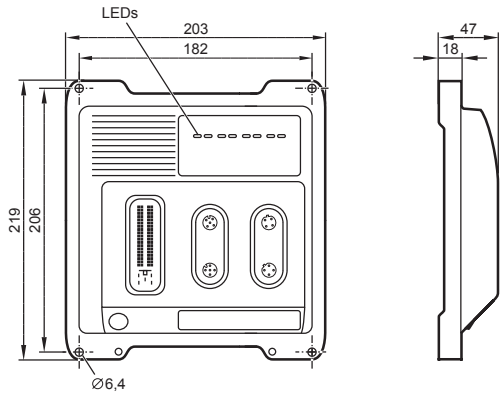
60 inputs/outputs

4 CAN interfaces

Ethernet interface

CODESYS 3.5

8...32 V ⎓




| Technical data | Controller as black box system<br>for the implementation of a central or decentralised system design |
|---|---|
| Mechanical data | |
| Housing | closed, screened metal housing with screw connection |
| Dimensions (H x W x D) | 219 x 203 x 47 mm |
| Mounting | screw connection by means of 4 M6 |
| Connection | 1 x connector 81-pole, locked, mechanical reverse polarity protection, type Tyco / AMP<br>contacts AMP-Junior-Timer, crimp connection 0.5/0.75/2.5 mm²<br>2 x M12 connector 4 poles, D-coded<br>2 x M12 connector 5 poles, A-coded<br>Shield connection Ø 4 mm for self-tapping screw |
| Weight | 1.4 kg |
| Housing/storage temperature | – 40...85 °C (depending on the load) / – 40...85 °C |
| Max. perm. relative humidity | 90 % (not condensing) |
| Height above sea level | max. 3000 m |
| Protection rating | IP 65 / IP 67 (for inserted connectors with individually sealed cores and inserted M12 connectors/sealing caps) |
| | |
| **Electrical data** | |
| Input/output channels total | 60 (32 inputs / 28 outputs) |
| Inputs | configurable, with diagnostic capability<br>16 x A (0...10/32 V, 0...20 mA, ratiometric) / $B_L$<br>8 x $FRQ_{L/H}$ (≤ 30 kHz) / $B_{L/H}$<br>4 x R (0.016...30 kOhm) / $B_L$<br>8 x $B_L$ (impedance ≤ 3.2 kOhm) |
| Outputs | configurable, with diagnostic capability<br>8 x $PWM_{H/L}$ / $PWM_I$ / $B_{H/L}$ (20...2000 Hz, 4.0 A, H-bridge)<br>4 x $PWM_H$ / $PWM_I$ / $B_H$ (20...2000 Hz, 4.0 A)<br>12 x $PWM_H$ / $PWM_I$ / $B_H$ (20...2000 Hz, 2.5 A)<br>12 x $PWM_H$ / $B_H$ 2.5 A<br>1 x A (0...10 V) |
| Sensor supply | 1 x 5/10 V, max. 2 W configurable |
| | for the number of inputs/outputs and configuration options also see the wiring diagrams |
| Operating voltage<br>Overvoltage | 8...32 V ⎓<br>36 V for t ≤ 10 s |
| Reverse polarity protection | yes |
| Current consumption $VBB_{30}$ | max. 600 mA at 12 V<br>max. 400 mA at 24 V |

| M30711 | Technical data |
|---|---|
| CAN interfaces 0...3<br>Baud rate<br>Communication protocol | CAN interface 2.0 A/B, ISO 11898<br>20 Kbits/s...1 Mbit/s (default 250 Kbits/s)<br>CANopen, CiA DS 301 V4.2, CiA DS 401 V 1.4<br>SAE J 1939 / free protocol |
| Serial interface<br>Baud rate<br>Topology | RS-232<br>9.6...115.2 Kbits/s (default 115.2 Kbits/s)<br>point-to-point (max. 2 participants); master-slave connection |
| Ethernet interface<br>Transmission rate<br>Protocols | 1 interface with int. switch and 2 ports<br>10/100 Mbits/s<br>TCP/IP, UDP/IP, Modbus UDP |
| Processor | 32-bit TriCore CPU Infineon AURIX™ |
| Device monitoring | overvoltage and undervoltage monitoring<br>watchdog function<br>check sum test for program and system<br>excess temperature monitoring |
| Process monitoring concept | second switch-off way per output group via semiconductor switch |
| Physical memory | flash: 9 Mbytes<br>RAM: 2.7 Mbytes<br>remanent memory: 10 Kbytes |
| Memory allocation | see system manual<br>www.ifm.com |
| | |
| **Software/programming** | |
| Programming system | CODESYS version 3.5 (IEC 61131-3) |
| | |
| **Indicators** | |
| Status LED | 2 x two-colour LED (R/G) for SYS0 and SYS1 |
| Ethernet LED | 2 x LED (G) for ETH0 and ETH1 |
| Application LED | 4 x three-colour LED (R/G/B) for APP0, APP1, APP2 and APP3 |
| | |

| M30711 | Technical data |
|---|---|

Operating states of the system

| LED SYS0 | | LED SYS1 | | System state |
|---|---|---|---|---|
| Colour | Status | Colour | Status | |
| – | off | – | off | no operating voltage |
| green | 5 Hz | – | off | no operating system loaded |
| red | on | – | off | hardware error (fatal error+) |
| red | on | red | on | system error (fatal error) |
| green / yellow | 2 Hz | green / yellow | 2 Hz | update |

Operating states PLC / application

| LED | Co-lour | Status | Description | |
|---|---|---|---|---|
| SYS0 | green | on | Standard PLC | no application |
| | | 2 Hz | | run |
| | red | 10 Hz | | error application (serious error) |
| | yellow | 2 Hz | | debug run |
| | | on | | debug stop |
| SYS0 | green | on | Safe PLC | no application |
| | | 2 Hz | | run |
| | red | 10 Hz | | error application (serious error) |
| | yellow | 2 Hz | | debug run |
| | | on | | debug stop |
| ETH0 | green | flashing | data transmission Ethernet | |
| | | on | Ethernet connection OK, no data transfer | |
| ETH1 | green | flashing | data transmission Ethernet | |
| | | on | Ethernet connection OK, no data transfer | |
| APP0 ... APP3 | red | on | status display of the application, freely programmable | |
| | green | on | status display of the application, freely programmable | |
| | blue | on | status display of the application, freely programmable | |

UK

## 7.2.2 Test standards and regulations

| M30711 | Technical data | |
|---|---|---|
| **Test standards and regulations** | | |
| CE marking | EN 61000-6-2 | Electromagnetic compatibility (EMC)<br>Noise immunity |
| | EN 61000-6-4 | Electromagnetic compatibility (EMC)<br>Radiation of interference |
| | EN 61010 | Safety requirements for electrical equipment for measurement, control and laboratory use |
| E1 marking | UN/ECE-R10 | Radiation of interference<br>Immunity with 100 V/m |
| Electrical tests | ISO 7637-2 | Pulse 1, severity level: IV; function state C<br>Pulse 2a, severity level: IV; function state A<br>Pulse 2b, severity level: IV; function state C<br>Pulse 3a, severity level: IV; function state A<br>Pulse 3b, severity level: IV; function state A<br>Pulse 4, severity level: IV; function state A<br>Pulse 5, severity level: III; function state A<br>(data valid for the 24 V system)<br>Pulse 4, severity level: III; function state A<br>(data valid for the 12 V system) |
| Climatic tests | EN 60068-2-30 | Damp heat, cyclic<br>Upper temperature 55°C, number of cycles: 6 |
| | EN 60068-2-78 | Damp heat, steady state<br>Test temperature 40°C / 93% RH<br>Test duration: 21 days |
| | EN 60068-2-52 | Salt spray test<br>Severity level 3 (vehicle) |
| Mechanical tests | ISO 16750-3 | Test VII; Vibration, random<br>Mounting location: vehicle body |
| | EN 60068-2-6 | Vibration, sinusoidal<br>10...500 Hz; 0.72 mm/10 g; 10 cycles/axis |
| | ISO 16750-3 | Bump<br>30 g/6 ms; 24,000 shocks |

# 7.2.3 Connector A / input characteristics

| M30711 | Connector A / input characteristics | |
|---|---|---|
| **Connector A:**<br>**IN0100...0103**<br>**IN0200...0203**<br>**IN0600...0603**<br>**IN0700...0703**<br>**Multifunction inputs analogue / digital**<br>**(IN MULTIFUNCTION-A)** | Resolution | 12 bits |
| | Input frequency | < 330 Hz |
| | Accuracy | ± 1% FS |
| | Measuring ranges | 0...10 V, 0...32 V, 0...20 mA, ratiometric, binary low side |
| | Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |
| Current input 0...20 mA (A) | Input resistance | 298 Ω |
| | Range diagnostics min - max. | 0 mA / 20 mA (default) |
| Voltage input 0...10 V (A) | Input resistance | 67.6 kΩ |
| | Range diagnostics min - max. | 0 V / 10 V (default) |
| Voltage input 0...32 V (A) | Input resistance | 51.0 kΩ |
| | Range diagnostics min - max. | 0 V / 32 V (default) |
| Voltage input ratiometric (A) | Input resistance | 51.0 kΩ |
| | Range diagnostics min - max. | 0 ‰ / 1000 ‰ (default) |
| Digital input ($B_L$) | Input resistance | 9.5 kΩ |
| | Switch-on level | > 0.7 $VBB_{30}$ |
| | Switch-off level | < 0.3 $VBB_{30}$ |
| | Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |
| **Connector A:**<br>**IN0000...0003**<br>**IN0500...0503**<br>**Digital inputs, frequency measurement**<br>**(IN FREQUENCY-A)** | Resolution | 12 bits |
| Frequency input ($FRQ_{L/H}$) | Input resistance | 10 kΩ |
| | Input frequency | ≤ 30 kHz |
| | Switch-on level | > 0.7 $VBB_{30}$ |
| | Switch-off level | < 0.3 $VBB_{30}$ |
| | Accuracy | ± 10 µs |

UK

**M30711**

**Connector A / input characteristics**

Digital input ($B_{L/H}$)

| | |
|---|---|
| Input resistance | 10 k Ω |
| Input frequency | < 330 Hz |
| Switch-on level | > 0.7 $VBB_{30}$ |
| Switch-off level | < 0.3 $VBB_{30}$ |
| Accuracy $B_{L/H}$ | ± 1 % |
| Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |
| Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |

**Connector A:**

**IN0400...0401**
**IN0900...0901**

**Digital/ resistor inputs**
**(IN RESISTOR-A)**

| | |
|---|---|
| Resolution | 12 bits |
| Input frequency | < 330 Hz |
| Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |

Digital input ($B_L$)

| | |
|---|---|
| Input resistance | 10 k Ω |
| Switch-on level | > 0.7 $VBB_{30}$ |
| Switch-off level | < 0.3 $VBB_{30}$ |
| Accuracy $B_L$ | ± 1 % |
| Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |

Resistor input (R)

| | |
|---|---|
| Measuring current | < 2.0 mA |
| Measuring range | 0.016...30 kΩ |
| Accuracy | ± 2% FS: 0.016...3 kΩ<br>± 5 % FS: 3...15 kΩ<br>± 10 % FS: 15...30 kΩ |
| Range diagnostics min - max. | 0 Ω / 31 kΩ (default) |

**Connector A:**

**IN0300... 0301**
**IN0800... 0801**

**Digital inputs 2-wire sensor**
**(IN DIGITAL-B)**

| | |
|---|---|
| Resolution | 12 bits |
| Input frequency | < 330 Hz |
| Impedance | ≤ 3.2 k Ω |
| Range diagnostics | configurable minimum and maximum values for the measuring range to detect short circuit to VBB and short circuit to GND / wire break |

Digital input ($B_L$)

| | |
|---|---|
| Input resistance | 3.2 k Ω |
| Switch-on level | > 0.7 $VBB_{30}$ |
| Switch-off level | < 0.3 $VBB_{30}$ |
| Accuracy $B_L$ | ± 1 % |
| Range diagnostics min - max. | 1 V / 0.95 $VBB_{30}$ (default) |

Observe the notes on the configuration of the inputs/outputs!
(Programming manual "ecomatController M30711")

**M30711**

Abbreviations

**Connector A / input characteristics**

| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $FRQ_{L/H}$ | frequency/pulse inputs configurable low side (CSI) / high side (CSO) |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| R | resistance input |
| $VBB_{0...2}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

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## 7.2.4 Connector A / output characteristics

| M30711 | Connector A / output characteristics | |
|---|---|---|
| **Connector A:**<br>**OUT0006...0007**<br>**OUT0106...0107**<br>**OUT0206...0207**<br>**Digital / PWM outputs 4.0 A, H-bridge (OUT PMW-40-BRIDGE-A)** | Switching current | 0.025...4 A |
| | Protective circuit for inductive loads | integrated |
| | Accuracy current feedback | 1 % |
| | Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| | Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |
| Digital output ($B_H$) | Switching voltage | 8...32 V ⎓ |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| Digital output ($B_L$) | Functions | as H-bridge |
| PWM output ($PWM_H$) | Output frequency | 20...2000 Hz (per channel) |
| | Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| | Resolution | 1 ‰ (at 20...250 Hz) |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| PWM output ($PWM_L$) | Output frequency | 20...500 Hz (per channel) |
| | Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| | Resolution | 1 ‰ (at 20...250 Hz) |
| Current-controlled output ($PWM_I$) | Output frequency | 20...2000 Hz (per channel) |
| | Control range | 0.05...4 A |
| | Setting resolution | 1 mA |
| | Control resolution | 2 mA |
| | Load resistance | ≥ 3 Ω (at 12 V ⎓)<br>≥ 6 Ω (at 24 V ⎓) |
| | Accuracy | ± 1.5 % FS (for inductive loads) |
| | Range diagnostics min - max. | 0 A / 4 A (default) |
| **Connector A:**<br>**OUT0008**<br>**OUT0108**<br>**OUT0208**<br>**Digital / PWM outputs 4.0 A (OUT PMW-40-A)** | Switching voltage | 8...32 V ⎓ |
| | Switching current | 0.025...4 A |
| | Protective circuit for inductive loads | integrated |
| | Accuracy current feedback | 1 % |
| | Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| | Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |
| Digital output ($B_H$) | Range diagnostics min - max. | 0 A / 4 A (default) |

| M30711 | Connector A / output characteristics |
|---|---|

PWM output ($PWM_H$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| Resolution | 1 ‰ (at 20...250 Hz) |
| Range diagnostics min - max. | 0 A / 4 A (default) |

Current-controlled output ($PWM_I$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Control range | 0.05...4 A |
| Setting resolution | 1 mA |
| Control resolution | 2 mA |
| Load resistance | ≥ 3 Ω / (at 12 V ⎓)<br>≥ 6 Ω / (at 24 V ⎓) |
| Accuracy | ± 1.5 % FS (for inductive loads) |
| Range diagnostics min - max. | 0 A / 4 A (default) |

**Connector A:**

**OUT0000**
**OUT0002**
**OUT0004**
**OUT0100**
**OUT0102**
**OUT0104**
**OUT0200**
**OUT0202**
**OUT0204**

**Digital / PWM outputs 2.5 A (OUT PMW-25-A)**

| | |
|---|---|
| Switching voltage | 8...32 V ⎓ |
| Switching current | 0.025...2.5 A |
| Protective circuit for inductive loads | integrated |
| Accuracy current feedback | 1 % |
| Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |

Digital output ($B_H$)

| | |
|---|---|
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

PWM output ($PWM_H$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| Resolution | 1 ‰ FS (at 20...250 Hz) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

Current-controlled output ($PWM_I$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Control range | 0.05...2.5 A |
| Setting resolution | 1 mA (at 20...250 Hz) |
| Control resolution | 2 mA |
| Load resistance | ≥ 4.8 Ω / (at 12 V ⎓)<br>≥ 9.6 Ω / (at 24 V ⎓) |
| Accuracy | ± 1.5 % FS (for inductive loads) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

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| M30711 | Connector A / output characteristics |
|---|---|

**Connector A:**

**OUT0001**
**OUT0003**
**OUT0005**
**OUT0101**
**OUT0103**
**OUT0105**
**OUT0201**
**OUT0203**
**OUT0205**

**Digital outputs 2.5 A**
**(OUT PMW-25-B)**

| | |
|---|---|
| Switching voltage | 8...32 V ⎓ |
| Switching current | 0.025...2.5 A |
| Protective circuit for inductive loads | integrated |
| Accuracy current feedback | 5 % |
| Diagnostics current feedback | configurable minimum and maximum values to detect short circuit and wire break |
| Diagnostics status feedback | detection of short circuit to VBB and short circuit to GND |

Digital output ($B_H$)

| | |
|---|---|
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

PWM output ($PWM_H$)

| | |
|---|---|
| Output frequency | 20...2000 Hz (per channel) |
| Pulse/pause ratio | 1...1000 ‰ (adjustable via software) |
| Resolution | 1 ‰ FS (at 20...250 Hz) |
| Range diagnostics min - max. | 0 A / 2.5 A (default) |

**Connector A:**

**OUT3000**

**Sensor supply**
**(OUT SUPPLY-A)**

for sensors and joysticks
5 V, 400 mA / 10 V, 200 mA, accuracy ± 5 %
short-circuit proof and overload protected

**Connector A:**

**OUT3001**

**Analogue outputs**
**(OUT VOLTAGE-A)**

| | |
|---|---|
| **Voltage range** | 8...32 V |
| Current rating | < 5 mA |
| Output voltage | 0...10 V |
| Accuracy | ± 5 % FS |

**Output groups $VBB_{0...2}$**

Load current per output group: ≤ 12 A

Internal semiconductor switches: One switch in series of 9 semiconductor outputs each.
Forced controlling by means of hardware
and additional controlling by means of user program.

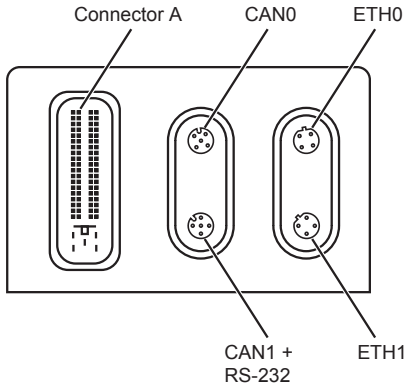
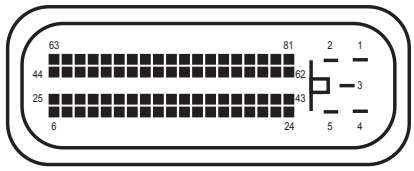
| | |
|---|---|
| Switching current | 0.1...12 A |
| Current diagnostics (excessive current) | > 12 A |

Short-circuit strength to GND: Switch-off of the outputs is carried out via the output driver

Abbreviations

| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| $VBB_{0...2}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

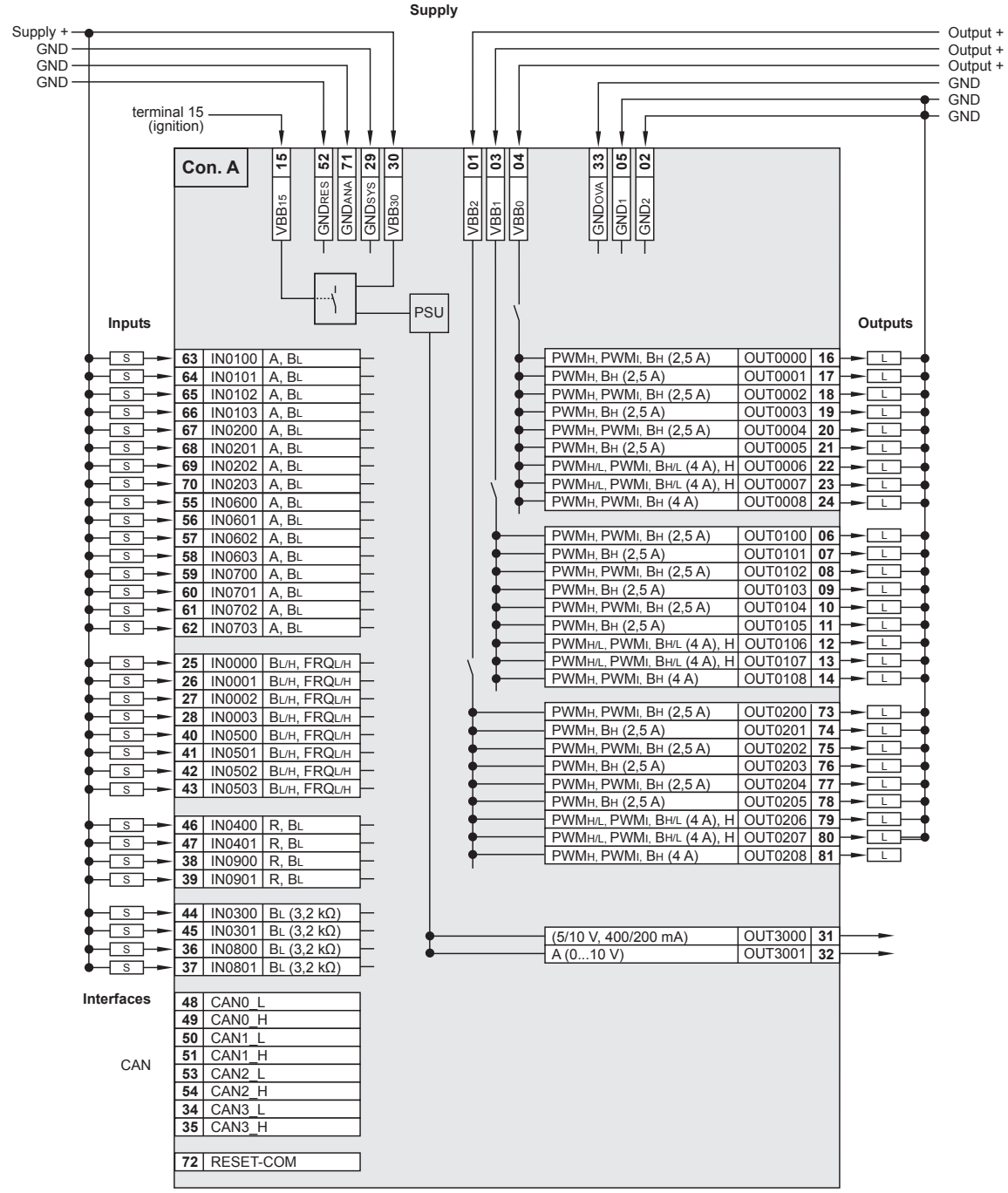
## 7.2.5 Connectors

| M30711 | Technical data |
|---|---|
| **Connectors** |  |
| CAN0 | M12 socket, 5 poles, A-coded<br>1: not used:<br>2: not used:<br>3: CAN0_GND<br>4: CAN0_H<br>5: CAN0_L<br> |
| CAN1 + RS-232 | M12 socket, 5 poles, A-coded<br>1: RS-232_TxD<br>2: RS-232_RxD<br>3: CAN1_GND<br>4: CAN0_H<br>5: CAN0_L<br> |
| ETH0 / ETH1 | M12 socket, 4 poles, D-coded<br>1: TxD+<br>2: RxD+<br>3: TxD-<br>4: RxD-<br> |
| Connector A | AMP, 81-pole, A-coded<br>1-81: see wiring connector A<br> |

UK

# 7.2.6 Connector A / wiring

| M30711 | Technical data |
|---|---|
| Wiring | Connector A |




Abbreviations

| | |
|---|---|
| A | analogue |
| $B_H$ | binary high side (CSO) |
| $B_L$ | binary low side (CSI) |
| $FRQ_{L/H}$ | frequency/pulse inputs configurable low side (CSI) / high side (CSO) |
| H | H-bridge function |
| PSU | pulse width modulation for the system |
| $PWM_H$ | pulse-width modulation high side (CSO) |
| $PWM_L$ | pulse-width modulation low side (CSI) |
| $PWM_I$ | pulse-width modulation current-controlled |
| R | resistance input |
| $VBB_{0...2}$ | supply output group via semiconductor switch |
| $VBB_{30}$ | supply sensors/module |

# 8 Maintenance, repair and disposal

The unit is maintenance-free.

► Do not open the housing as the device does not contain any components which can be maintained by the user. The device must only be repaired by the manufacturer.

► Dispose of the device in accordance with the national environmental regulations.



# 9 Approvals/standards

Test standards and regulations (→ 7 Technical data)

The EC declaration of conformity and approvals can be found at:
www.ifm.com → Search → Art. no. → Documents & downloads