



Original operating instructions
CP100S + CR413S
HW version: V2.0.3.x

GB

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at documentation.ifm.com.

1.1 Manufacturer's address

ifm electronic gmbh

Friedrichstraße 1

45128 Essen

Germany

www.ifm.com

info@ifm.com

1.2 Symbols used

- ✓ Requirement
- Instructions
- ▷ Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

1.3 Warnings

Warnings indicate the possibility of personal injury and damage to property. This enables safe product handling. Warnings are graded as follows:



WARNING

Warning of serious personal injury

▷ If the warning is not observed, fatal and serious injuries are possible.



CAUTION

Warning of minor to moderate personal injury

▷ If the warning is not observed, minor to moderate injuries are possible.

ATTENTION

Warning of damage to property

▷ If the warning is not observed, damage to property is possible.

1.4 Safety symbol on the device



Safety symbol on the device:

- ▶ Adhere to the operating instructions for the safe operation of the unit.

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.
- Observe applicable documents.
- Store the device in its original packaging.
- When the device is to be stored again, preferably use the original packaging.
- Otherwise, provide unused connections with either a mating connector or a protective cap and pack the device in suitable packaging.
- When storing, observe the device's protection rating / pollution degree (→ Technical data).

ATTENTION

Excessive current, weld slag and soiling due to welding

▷ Damage to the device, deterioration of the electrical safety

- ▶ Welding work on the chassis frame must only be carried out by qualified personnel.
 - ▶ Remove and cover the plus and minus terminals of the batteries.
 - ▶ Disconnect all contacts of the device from the on-board system prior to welding on the vehicle or machine.
 - ▶ Connect the earth terminal of the welding device directly to the part to be welded.
 - ▶ Do not touch the device or electric cables with the welding electrode or the earth terminal of the welding device.
 - ▶ Protect the device incl. all connectors and all connection cables against weld slag and soiling.
-

3 Intended use

The freely programmable controllers of the “ecomatBasic” series are rated for use under difficult conditions: this includes an extended temperature range, strong vibration, intensive EMC interference.

Permitted use:

- in mobile machines with supply from on-board systems (with battery) of 12 V DC or 24 V DC nominal voltage
- in an industrial environment as a permanently installed device with supply from SELV/PELV according to the technical data



This is a class A product. This product may cause radio interference in domestic areas.

► If required, take appropriate EMC screening measures.

- When the CP100S software is installed, the device is converted into a safety controller that complies with the Machinery Directive.
- Two separately programmable PLCs:
 - Safety PLC for safety-relevant applications up to SIL 2 with certified CP100S software
 - Standard PLC for standard applications
 - CODESYS V3.5 programming system (in a version approved by ifm) for both controllers.
 - The safe controller requires a safety SIL 2 extension for CODESYS.
- For applications operating according to the closed-circuit current principle. The following applies to the safety functions that can be implemented: safe state = power-free state (voltage at the output < 2 V and current at the output < 25 mA).
- For a suitable time interval for the execution of the self-test of the controller, refer to the safety concept or the applicable product standards of the application. If no value can be determined, it is strongly recommended to restart the device after 7 days at the latest (see programming manual).
- The operating mode of the inputs and outputs and their use can be configured via a PLC, for example current, voltage or frequency input; PWM or digital output.
- Sensors and actuators can (depending on the required input or output type) be connected either as single or dual channel.
Which channels can be used safely and how this is implemented is described in the CP100S programming manual for the corresponding device.
- Connection of sensors or actuators via CAN interfaces. Connection to other controllers via CAN. Implementation of safe communication via CANopen Safety.
- Only use the device within the limits of the technical data: → Technical data.
- Mounting location: → Installation location



By default, the device is not intended for direct connection to IT systems. If this application is required, the user has to implement it (e.g. by using their own additional components).

Please observe the following document: “Operating instructions (supplement) - Cyber Security” via documentation.ifm.com

Number of inputs: 16

Number of outputs: 16

Number of output groups: 3 (supplied via VBB_{0...2})

3.1 Conversion into a safety controller

The device is distributed as a standard controller. In combination with the CP100S article, the standard controller can be converted into a safety controller.

CP100S consists of a licence, licence agreement, certificates, user documentation and a software package.

The purchase of the chargeable licence with associated licence agreement together with the software package and documentation entitles the user to convert the standard controller into a safety controller. The licence agreement must be approved and complied with.

The conversion from a standard controller to a safety component is achieved by loading the firmware contained in the software package, the customer's functionally safe IEC application and the documentation. This conversion changes the conformity assessment of the device. In accordance with ifm, the standard controller is converted into a safety component in accordance with No. 21 of Annex IV of the Machinery Directive 2006/42/EC.

All devices converted into safety controllers must be documented in a traceable manner. This applies to prototypes and series production.

Once the standard controller has been converted into a safety controller, it may only be used as a safety controller. It must not be converted back to a standard controller.

If a controller is used exclusively in development, it may be used for development purposes without separate documentation requirements. It may be operated with functionally safe and functionally non-safe firmware.

If a controller has been operated outside the specification, this device may no longer be converted into a safety controller.

Only the HW versions specified in the TÜV certificate included in the package may be used in a safety function.

The system architect must ensure traceability and tracking for all converted controllers. For this purpose, all relevant information must be documented in order to trace the hardware, software and application of each individual device. The following information must be provided by the system architect at ifm's request:

- Licence key with which the functionally safe IEC application was created
- Serial number of the device
- Firmware version used

The following additional documentation requirements are the responsibility of the system architect:

- Codesys packages used
- Libraries used and their versions
- Unique assignment of the device to a machine/system

3.2 Predictive incorrect use

- Continuous operation 24/7 is not permitted in safety-related applications.
- Do not use in safety applications for which the safe state is not the power-free state.
- Do not carry out safety functions on the standard PLC.
- Do not use the controller in an insufficiently protected network environment together with other network-compatible devices.
- Do not update a safety controller with standard software (firmware).
- No installation on the motor/engine.
- No use in an environment with ionising radiation.

4 Items supplied

4.1 Scope of delivery CR413S

CR413S:

- 1 ecomatBasic
- 4 tubular rivets with 4 washers
- CE declaration of conformity
- UK declaration of conformity

► In the event of incomplete or damaged items supplied, please contact ifm.

4.2 Download CP100S software



Documentation and software (device firmware and programming environment) at documentation.ifm.com and in the software package.

► Check online for the latest version.

4.3 Accessories



Information about available accessories at www.ifm.com

5 Installation

5.1 Installation location



The system architect is responsible for the stability of the mounting surface and fastening at the installation location. The weight of the device, environmental conditions of the application and local regulations must be taken into account.

The following installation locations are permitted for mobile use:

- Inside of the cabin
- Body
- Vehicle frame

Installation on the motor/engine is not permitted.

The applicable regulations must be complied with, taking into account the specified environmental conditions.

Environmental conditions: → Technical data

- ▶ Take the protection rating and pollution degree into account.
- ▶ The system architect is responsible for protecting the device in the application if the required protection rating or pollution degree for the device is not met.

5.2 Mounting surface



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

- ▶ Use suitable compensating elements if there is no flat mounting surface available.

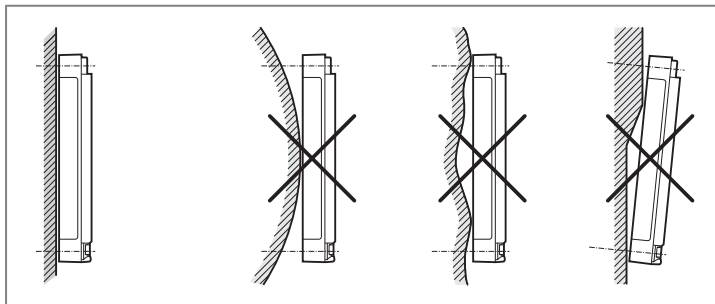


Fig. 1: Mounting surface

- ▶ During installation and storage, ensure that the pollution degree is 2 or better (IEC 60664-1).

5.3 Heat dissipation

The housing can heat up considerably.

- ▶ During installation, ensure sufficient heat dissipation at the installation location.
- ▶ Observe the maximum ambient temperature.
- ▶ Observe the parameters and specifications for temperature, altitude above sea level and frequency of the outputs specified in the technical data.

5.4 Fastening

- Insert the enclosed tubular rivets from the back of the device in the 3 fixing holes.
- Fix the device using 3 washers and M4 cylinder head bolts.
Tightening torque: 1.5 ± 0.2 Nm
Tighten the bolts alternately.

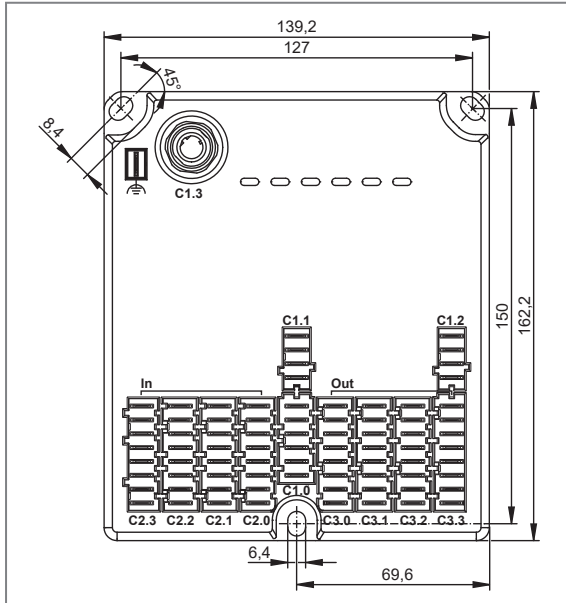


Fig. 2: Dimensions for the drill holes

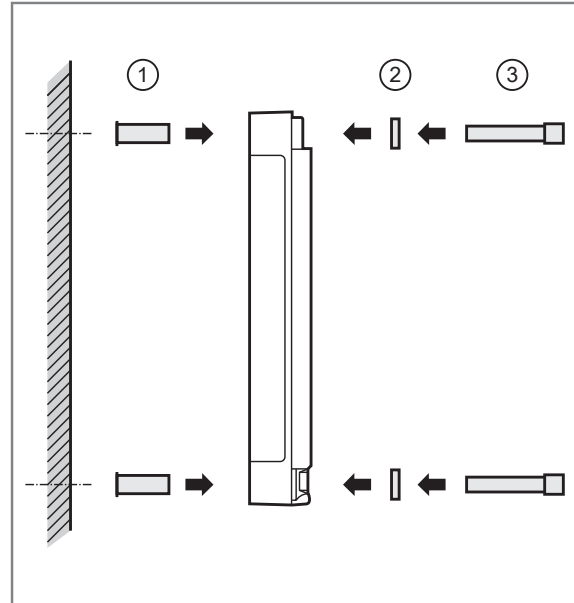


Fig. 3: Insertion of the tubular rivets

- 1: Tubular rivets
- 2: Washers
- 3: Bolts (not included)

6 Electrical connection



- ▶ Disconnect the machine from the mains supply before installation; if necessary, also disconnect any independently supplied input / output load circuits.
- ▶ Observe the national and international regulations for the installation of electrical equipment.
- ▶ Observe the requirements according to EN 60204.

The circuit is insulated from device surfaces that could be touched with basic insulation according to IEC 61010-1 (secondary circuit with max. 32 V DC, supplied from the mains circuit up to 300 V of overvoltage category II).

The basic insulation does not apply to connection areas (IP20).

The external wiring has to be carried out in a way that ensures the required separation from other circuits.

The Ethernet interface is separated from device surfaces that could be touched and from the electric circuit with basic insulation according to EN61010-1 (secondary circuit with max. 32 V DC, supplied from the mains circuit up to 300 V of overvoltage category II).



Observe all notes on connection technology.



Only connect the connector when the supply voltage is disconnected.
"Hot plugging" is not permitted.



The cable cross-sections must be matched to the operating currents/fuse rates.

- ▶ Note the device label.
- ▶ Provide unused connections with unpopulated contact housings.
- ▶ Provide all outgoing cables with suitable strain relief after a maximum of 200 mm. Observe the minimum bending radius of the cables (→ information from the cable manufacturer).

6.1 M12 connector

The threaded connections in the device correspond to the M12 standard. To ensure compliance with the specified protection rating, only cables that comply with this standard may be used. In the case of self-assembled cables, the system manufacturer is responsible for the protection rating.

- ▶ Use connectors with gold-plated contacts.
- ▶ During installation, place the connectors vertically so that the coupling nut will not damage the thread.
- ▶ Observe the coding of the connectors during installation.
- ▶ Tighten the cable plug using 1.3 ± 0.1 Nm.

6.2 Male spade connectors 6.3 x 0.8 mm



The 6.3 x 0.8 mm male spade connectors are tin-plated. Functioning and technical data are guaranteed for up to 10 mating cycles.

Self-assembled cables:

- Contact housings must comply with a flammability classification of at least V-2 (V-0, V-1, V-2) according to IEC 60695.
- Insulated cables must be flame-retardant (VW-1 according to ANSI/UL 2556 or equivalent).

- The maximum temperature for contact housings of ifm accessories is 105 °C. The system architect must guarantee this temperature in the application.
The temperature reached depends on the cable cross-section and the maximum currents.
When using cables with a cross-section of 1.5 mm², the technical data of the contact housing is ensured and the technical data of the device remains valid.
- Observe the maximum number of mating cycles of the connectors.

6.3 Wiring

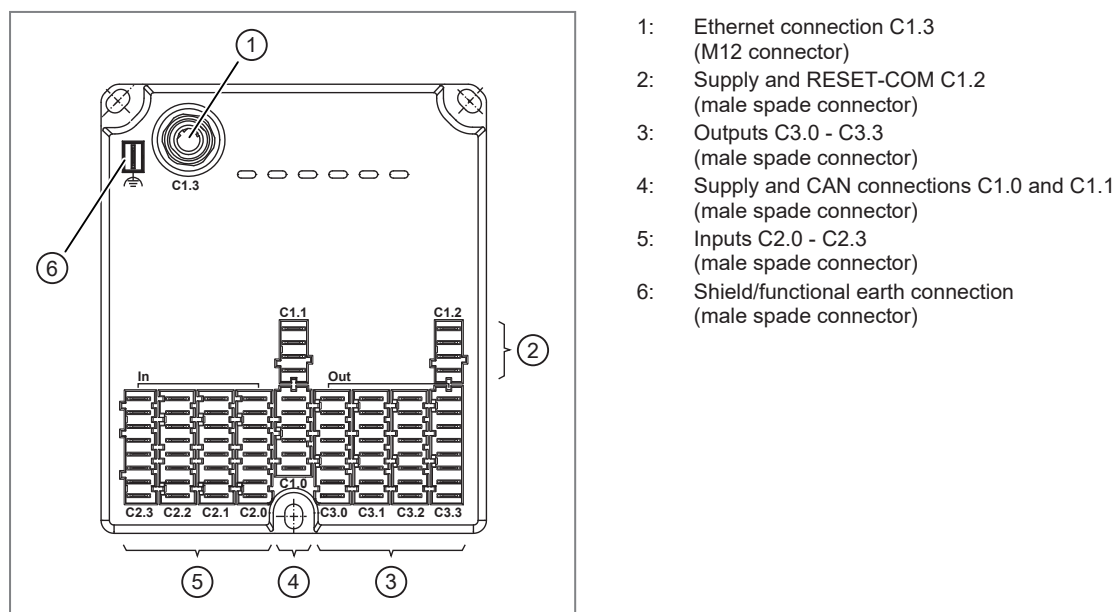


Fig. 4: Connectors

Assignment of the terminal blocks:

All VBB₃₀ connections of the terminal blocks are connected to each other in the device.

Designation of the inputs and outputs:

IN xx yy
 yy = number of the input channel, 00...yy
 xx = number of the input group, 00...xx
 IN = type: input

OUT xx yy
 yy = number of the output channel, 00...yy
 xx = number of the output group, 00...xx
 OUT = type: output

Terminal blocks C1.0, C1.1, C1.2

Terminal block	Connection	Function
C1.0	VBB ₃₀	Controller supply
	VBB ₀	Output group 0 supply
	VBB ₁	Output group 1 supply
	GND ₀	Controller GND
	CAN0_H	CAN interface 0 (high)

Terminal block	Connection	Function
C1.0	CAN0_L	CAN interface 0 (low)
C1.1	VBB ₃₀	Controller supply
	GND ₁	Controller GND
	CAN1_H	CAN interface 1 (high)
	CAN1_L	CAN interface 1 (low)
C1.2	VBB ₂	Output group 2 supply
	GND ₂	Controller GND
	NC	not used
	RESET-COM	Service input of the controller

Terminal block	Connection	Function
C2.0	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
	IN0400	Frequency input (IN FREQUENCY-B)
	IN0401	Frequency input (IN FREQUENCY-B)
	GND	Sensor GND
	GND	Sensor GND
	IN0500	Frequency input (IN FREQUENCY-B)
	IN0501	Frequency input (IN FREQUENCY-B)
	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
C2.1	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
	IN0200	Resistor input (IN RESISTOR-A)
	IN0201	Resistor input (IN RESISTOR-A)
	GND	Sensor GND
	GND	Sensor GND
	IN0300	Resistor input (IN RESISTOR-A)
	IN0301	Resistor input (IN RESISTOR-A)
	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
C2.2	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
	IN0000	Multi-function input (IN MULTIFUNCTION-A)
	IN0001	Multi-function input (IN MULTIFUNCTION-A)
	GND	Sensor GND
	GND	Sensor GND
	IN0100	Multi-function input (IN MULTIFUNCTION-A)
	IN0101	Multi-function input (IN MULTIFUNCTION-A)
	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
C2.3	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)
	IN0600	Multi-function input (IN MULTIFUNCTION-A)
	IN0601	Multi-function input (IN MULTIFUNCTION-A)
	GND	Sensor GND
	GND	Sensor GND
	IN0700	Multi-function input (IN MULTIFUNCTION-A)
	IN0701	Multi-function input (IN MULTIFUNCTION-A)
	VBB ₃₀	Sensor supply (fed from VBB ₃₀ of C1.0 / C1.1)

Tab. 1: Terminal blocks C2.0, C2.1, C2.2, C2.3

Terminal block	Connection	Function
C3.0	OUT0000	Digital / PWM / PWM-I output 2.5 A (OUT PWM-25-A)
	GND	Actuator GND
	OUT0001	Digital / PWM / PWM-I output 2.5 A (OUT PWM-25-A)
	GND	Actuator GND
	OUT0002	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND
	OUT0003	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND
C3.1	OUT0004	Digital / PWM output 1 A (OUT PWM-10-D)
	GND	Actuator GND
	OUT0005	Digital / PWM output 1 A (OUT PWM-10-D)
	GND	Actuator GND
	OUT0006	Digital / PWM output 1 A (OUT PWM-10-D)
	GND	Actuator GND
	OUT0007	Digital / PWM output 1 A (OUT PWM-10-D)
	GND	Actuator GND
C3.2	OUT0100	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND
	OUT0101	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND
	OUT0102	Digital / PWM output 4.0 A (OUT PWM-40-B)
	GND	Actuator GND
	OUT0103	Digital / PWM output 4.0 A (OUT PWM-40-B)
	GND	Actuator GND
C3.3	OUT0200	Digital / PWM / PWM-I output 2.5 A (OUT PWM-25-A)
	GND	Actuator GND
	OUT0201	Digital / PWM / PWM-I output 2.5 A (OUT PWM-25-A)
	GND	Actuator GND
	OUT0202	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND
	OUT0203	Digital / PWM output 2.5 A (OUT PWM-25-B)
	GND	Actuator GND

Tab. 2: Terminal blocks C3.0, C3.1, C3.2, C3.3



The connection terminals may only be supplied with the signals specified in the technical data.

ATTENTION

Absence of reverse polarity protection for $VBB_{0...2}$

- ▷ Reverse polarity protection is only ensured in case of supply via the on-board system (via a battery), if the polarity of the supply is reversed as a whole (battery connected incorrectly). The basic principle of the reverse polarity protection is that the upstream fuses are quickly switched off in case of excessive current caused by reverse polarity.
- ▷ In case of supply via SELV/PELV, reverse polarity protection is not ensured.
- ▷ Damage to the device
- ▶ Ensure proper connection to the connector before connecting the latter to the device, also in case of supply via the on-board system.



The device is designed for supply via a mobile on-board system (12/24 V DC nominal voltage) or SELV/PELV according to the technical data and national regulations. The supply is directly transferred to the connected sensors/actuators without electrical separation.

**WARNING**

Risk of confusing C1.1 and C1.2 connectors

Risk of confusing C2.0, C2.1, C2.2 and C2.3 connectors

Risk of confusing C3.0, C3.1, C3.2 and C3.3 connectors

- ▷ Loss of fire protection
- ▷ Malfunctions
- ▷ Loss of the system functionality, damage to the system possible
- ▶ Ensure correct wiring and correct functioning.

6.3.1 Ethernet connection

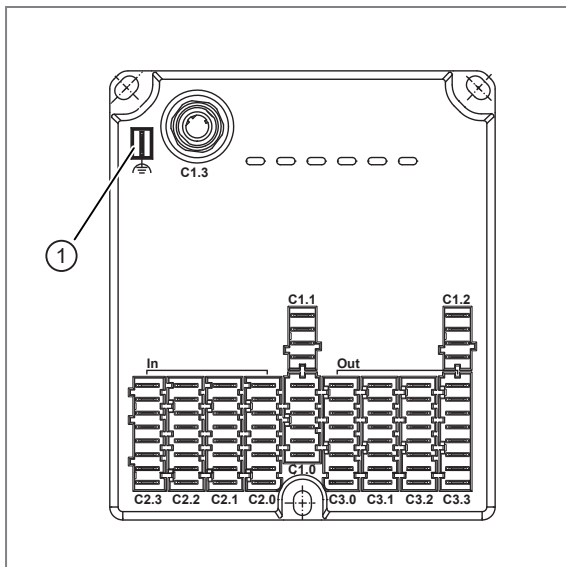
Wiring (M12, D-coded):



- 1: TD +
- 2: RD +
- 3: TD -
- 4: RD -
- 5: not used

- ▶ Connect the device via the Ethernet connection (M12 connector C1.3).
- ▶ For the Ethernet connection, use a minimum category 5 (Cat 5) cable.

6.3.2 Shield/functional earth connection



1: Shield/functional earth connection



To ensure the protection of the device against electrical interference as well as its intended function and safe operation, connect the shield/functional earth connection to the body (on-board system) – or, for stationary installations, to earth – using the shortest possible route.

Otherwise the safety function is not ensured!

6.4 Fuses



CAUTION

The input currents of the operating voltages are not limited.

- ▷ No fire protection without external fuses.
- ▶ Protect circuits.

- ▶ The individual electric circuits must be protected in order to protect the whole system. Automotive blade-type fuses are recommended.

Connection	Nominal value fuse	Required triggering characteristics
VBB ₃₀	2 A	$T_{fuse} \leq 120$ s at max. 6.25 A
VBB ₀	≤ 15 A	-
VBB ₁	≤ 15 A	-
VBB ₂	≤ 15 A	-
Supply sensors (with direct connection to supply)	≤ 2 A	$T_{fuse} \leq 120$ s at max. 6.25 A



Protection against load dump:

Load dump protection for the VBB₁ connection is integrated into the device.

- ▶ VBB₁ must be connected for protection against load dump.
- ▶ For protection against load dump, use a 15 A fuse and cable with a cross-section of 1.5 mm².
- ▶ Load dump protection for VBB₃₀ is only available when VBB₁ and VBB₃₀ are connected to the same potential.

6.5 Laying of the supply and signal cables

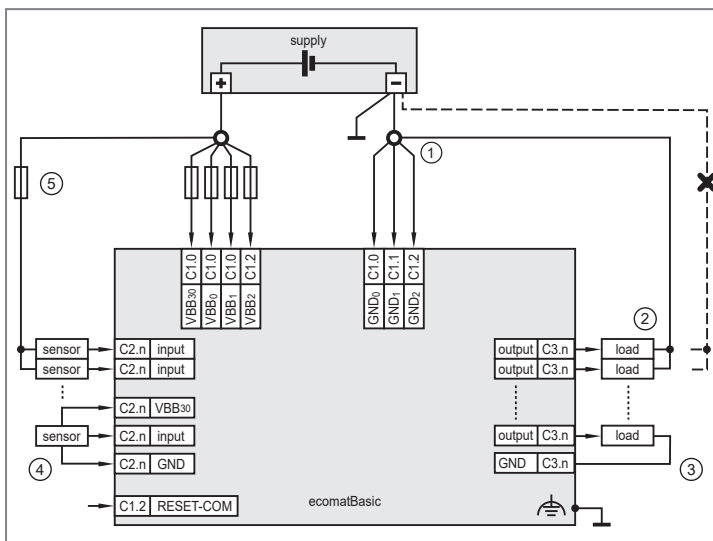


Fig. 5: Connection of the supply and signal cables (X = not permitted)

- 1: GND star point
- 2: Load return to the common star point
- 3: Load return via the associated GND pin of terminal blocks C3.n
- 4: Supply of the sensors via the VBB₃₀ and GND contacts of terminal blocks C2.n
- 5: Supply of the sensors via fuse: [Fuses](#) (→ [16](#))



Bridging of connections in the connectors is not permitted.

RESET-COM is a service input for resetting the communication parameters (see programming manual).

► For the operation of the controller, connect RESET-COM to the GND star point ①.



Faulty laying of the supply and signal cables

▷ Deterioration of EMC may occur

- Lay supply and signal cables separately, take EMC / application into account
- Connect supply and ground cables to the controller and to the sensors / actuators via the respective common star point or via the corresponding terminal blocks C2.x / C3.x.



If a prewired connection cable is used, remove unused cores.

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



WARNING

Overvoltage > 36 V (unprotected)

- ▷ Risk of personal injuries and/or damage to property.
- ▷ Uncontrollable and unpredictable dangerous behaviour of the controller, e.g. all outputs activated.
- Provide external protection against overvoltage.

The CAN bus is internally protected against short circuit to VBB and GND.



For CAN cables ≥ 30 m, ensure appropriate protection (e. g. shielded cables).

VBB₃₀ is protected against reverse polarity.

- Connect all required supply lines ($V_{BB_{30}}$, V_{BB_0} , V_{BB_1} , V_{BB_2}).
 $V_{BB_{30}}$ can be connected to C1.0 or C1.1.

6.5.1 GND connections



CAUTION

Incorrect GND connection

- Not all GND connections of the controller ($GND_{0...2}$) are connected to the star point ①
- Different cable cross-sections
- Different cable lengths

▷ Risk of fire

▷ Inadmissible heating

► Connect all GND connections of the controller ($GND_{0...2}$) to the GND star point ①.

► Use the same cable cross-section for all GND connections of the controller.

► Use the same cable length for all GND connections of the controller.

- Connect the controller connections ($GND_{0...2}$) individually to the common GND star point ①.
- Connect the GND connections of the sensors to the GND connections of the corresponding terminal block.
- Connect the GND connections of the actuators (loads) to the common GND star point or to the GND connections of the corresponding terminal block.

All GND connections are connected to each other in the device.



GND of the supply is connected to the shield / functional earth connection of the device via EMC suppression capacitors.

6.6 Analogue inputs

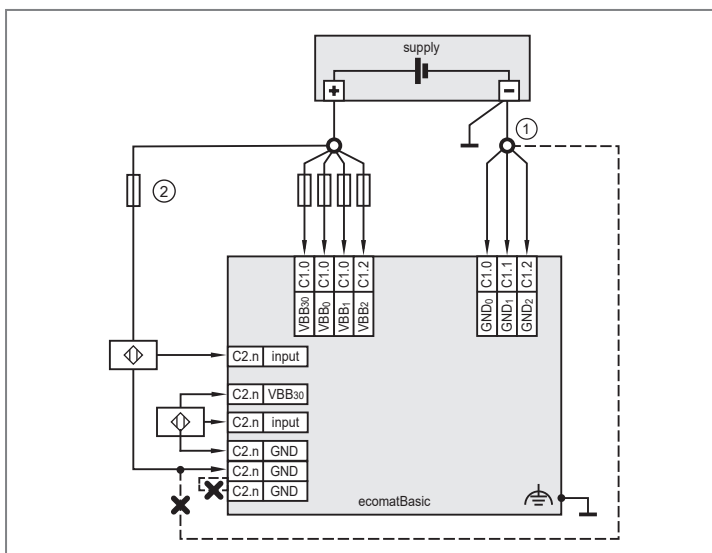


Fig. 6: Connection of the analogue inputs (X= not permitted)

1: GND star point

2: Fuse for the supply of the sensors: [Fuses](#) (→ [16](#))

- Connect the GND of the signal source to the corresponding GND connection of terminal block C2.n.

Do not connect the GND of the signal source to the common GND star point ①.

6.7 Resistor inputs

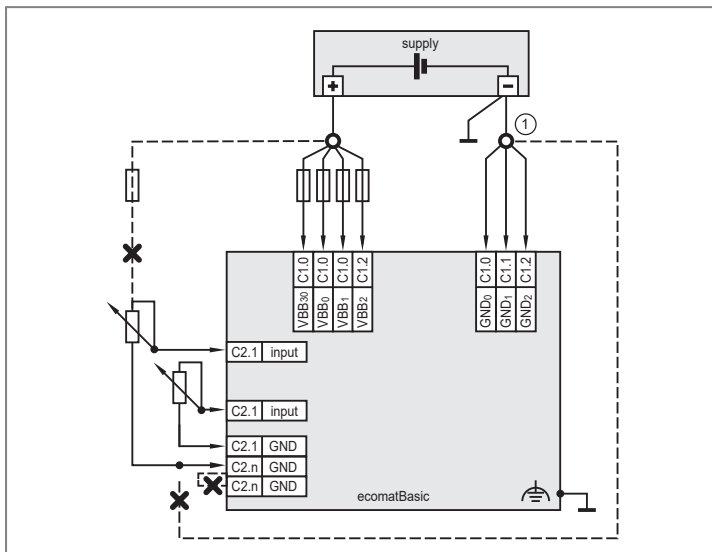


Fig. 7: Connection of the resistor inputs (X= not permitted)

1: GND star point

- Connect the GND of the signal source to the corresponding GND connection of terminal block C2.n.
Do not connect the GND of the signal source to the common GND star point ①.
- Do not connect the resistor inputs to a VBB.

6.8 High-side digital inputs (CSO)

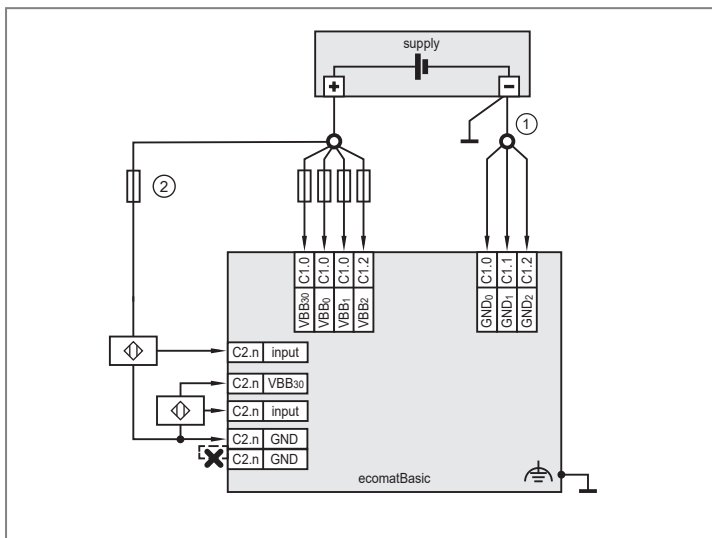


Fig. 8: Connection of the high-side inputs (X = not permitted)

1: GND star point

2: Fuse for the supply of the sensors: [Fuses \(→ 16\)](#)

- Connect the GND of the signal source to the corresponding GND connection of terminal block C2 or the common GND star point.

6.9 Digital / PWM outputs

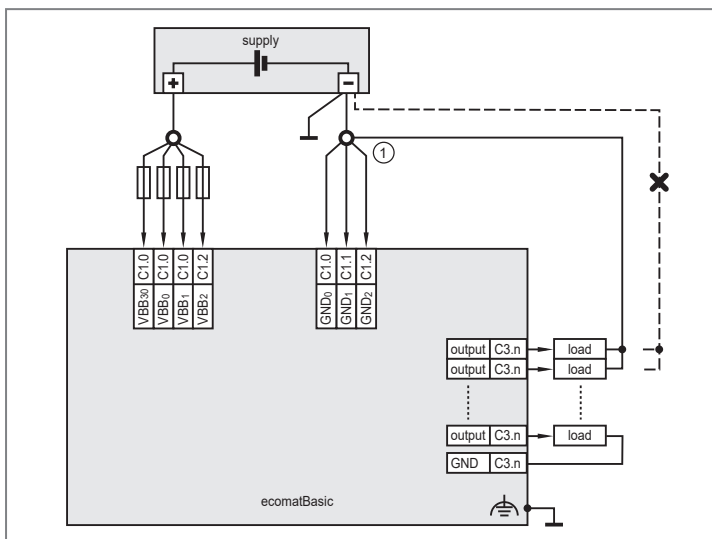


Fig. 9: Connection of the high-side digital outputs (X = not permitted)

1: GND star point



WARNING

Disconnection of the GND star point while loads connected to the outputs are still connected to GND of the supply (see figure above, dashed line)

This may cause fault currents to flow through the controller and load which lead to an undefined state of the controller and the system.

▷ Loss of the safety function

► Always connect the ground cable of the controller and the loads (actuators) via the common GND star point ① (see image above).

▷ This ensures that the loads are no longer connected to GND if the line to the supply is interrupted.

The controller can be connected to the following loads:

- resistive loads
- capacitive loads (adapt diagnostic settings to the load, see programming manual)
- inductive loads

The connected load must not exceed the maximum permissible values of the respective output (→ Technical data).



Deviating connections are not permitted.

6.10 Mixed operation (12 V / 24 V)



Mixed operation is not permissible when supplied by SELV/PELV.

Mixed operation is only permissible when supplied by an on-board system.

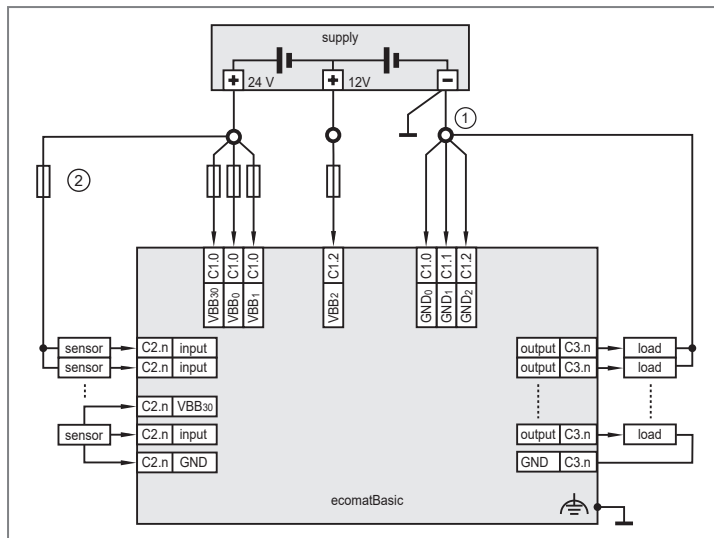


Fig. 10: Example connection to 24 V and 12 V power supply combined

1: GND star point

2: Fuse for the supply of the sensors: [Fuses \(→ 16\)](#)

7 Set-up

7.1 Interfaces and system requirements



The users are responsible for the safe function of the application programs which they created themselves. If necessary, they must additionally carry out an approval by corresponding supervisory and test organisations according to the national regulations.

The programmer creates the application program with the IEC 61131-3 compliant CODESYS programming system and loads the applications to the controller via the Ethernet or CAN interface. For the required information about installation and set-up, see the programming manual.

Required components:

- Suitable CODESYS version (→ Programming manual)
- CODESYS plug-ins
- CODESYS package for the controller
- Firmware (note: check firmware version!)
- Release notes

To program the controller, the persons should be familiar with the CODESYS software and the CODESYS Safety SIL 2 extension.

Moreover, they should be familiar with the following topics:

- Requirements on safety-related programming
- Required user-specific standards

7.2 Required documentation

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

- Programming manual for the firmware version used
- Operating instructions (supplement) - Cyber security



Documentation and software (device firmware and programming environment) at documentation.ifm.com and in the software package.

► Check online for the latest version.

CODESYS online help: contained in CODESYS installation (documentation.ifm.com).

8 Maintenance, repair and disposal

The unit is maintenance-free.

- ▶ Contact ifm in case of malfunction.

It is not possible to repair the unit.

Delete all data before disposing of or returning the device:

- ▶ If necessary, create a data backup before deleting: Backup and restore
- ▶ Delete all passwords on the device, e.g. by resetting to factory settings (Factory Reset).
- ▶ Delete all programs and user data on the device, e.g. by resetting to factory settings (Factory Reset).

Disposal:

- ▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

Cleaning the unit:

- ▶ Disconnect the unit from the voltage supply.
- ▶ Clean the unit from dirt using a soft, chemically untreated and dry micro-fibre cloth.