ifm electronic

CE

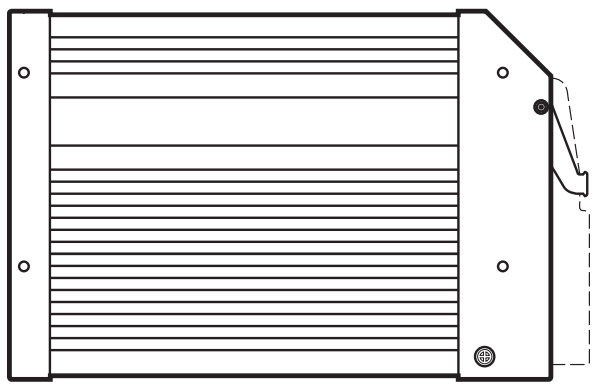
Installation instructions
ClassicController

UK

ecomat100®

CR0032

7390727 / 00 09 / 2008



Inhalt

1 Preliminary note

This document covers units of the type "ClassicController" (art. no.: CR0032).
It is deemed as a part of the unit.

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.

UK

Adhere to the safety instructions.

1.1 Symbols used

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

Important note:
Non-compliance can result in malfunctions or interference.

Information
Supplementary note

1.2 Warning signs used

⚠ 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

This description is part of the device. It contains texts and drawings 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 people and machinery.

2.2 Target group

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

2.3 Electrical connection

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 separation 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 of ifm electronic may be connected.

2.4 Housing temperature

According to the technical specifications below the unit can be operated in a wide operating 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 unit

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

2.6 Electromagnetic compatibility

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

3 Functions and features

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

They are suited for direct installation in machines in mobile and robust applications. Integrated hardware and software functions (operating system) offer high protection for the machine.

The controllers can be used as CANopen master.

⚠ WARNING

The ClassicController series is not approved for safety tasks in the field of safety of persons.

⚠ WARNING

The user is responsible for the safe function of the application programs which he created himself. If necessary, he must additionally carry out an approval test by corresponding supervisory and test organisations according to the national regulations.

4 Installation

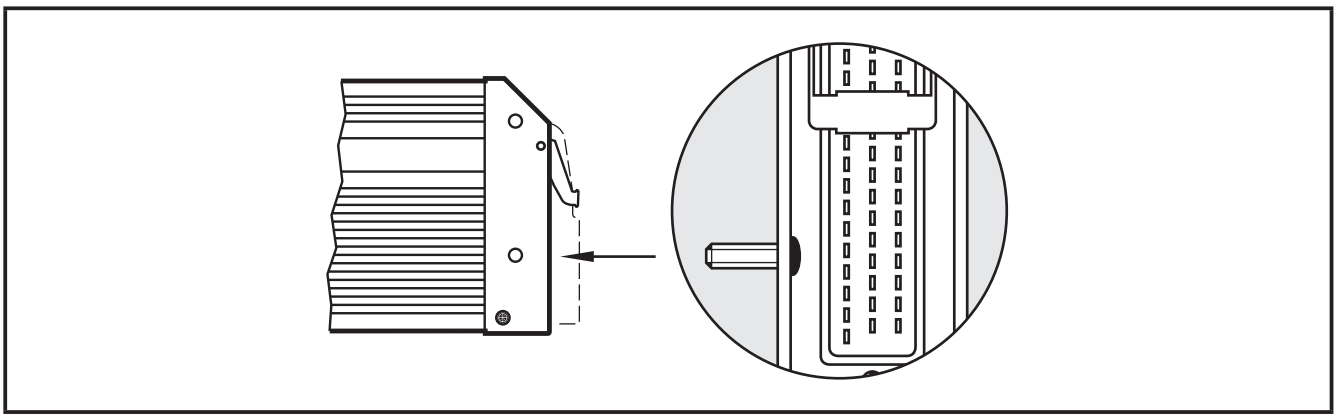
4.1 Fixing

► Fix the controller to a plane surface using 4 M5 screws.
Screw material: steel or stainless steel
Tightening torque: 8 $^{\pm 2}$ Nm

NOTE

Use flat-head screws to avoid that the connector is damaged when placed and locked.

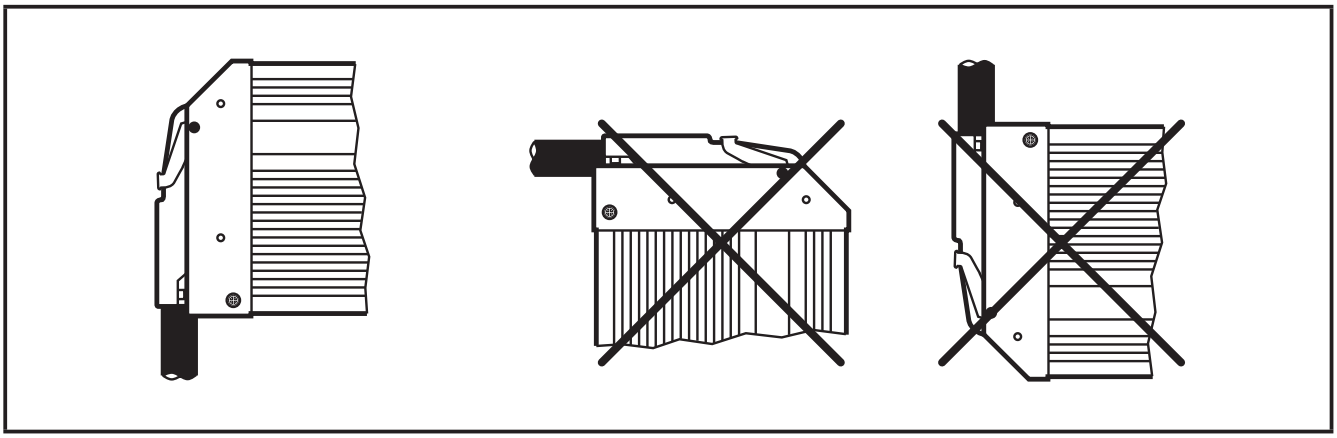
Screws to be used (examples)	Standard
Button head hexagon socket screws (M5 x L)	ISO 7380
Cylinder screws with hexagon socket and low head (M5 x L)	DIN 7984
Cutting screws for metric ISO thread with low head	DIN 7500



Example button head hexagon socket screw

4.2 Installation position

► Align the controller in such a way that the cable entry of the connector faces downwards.



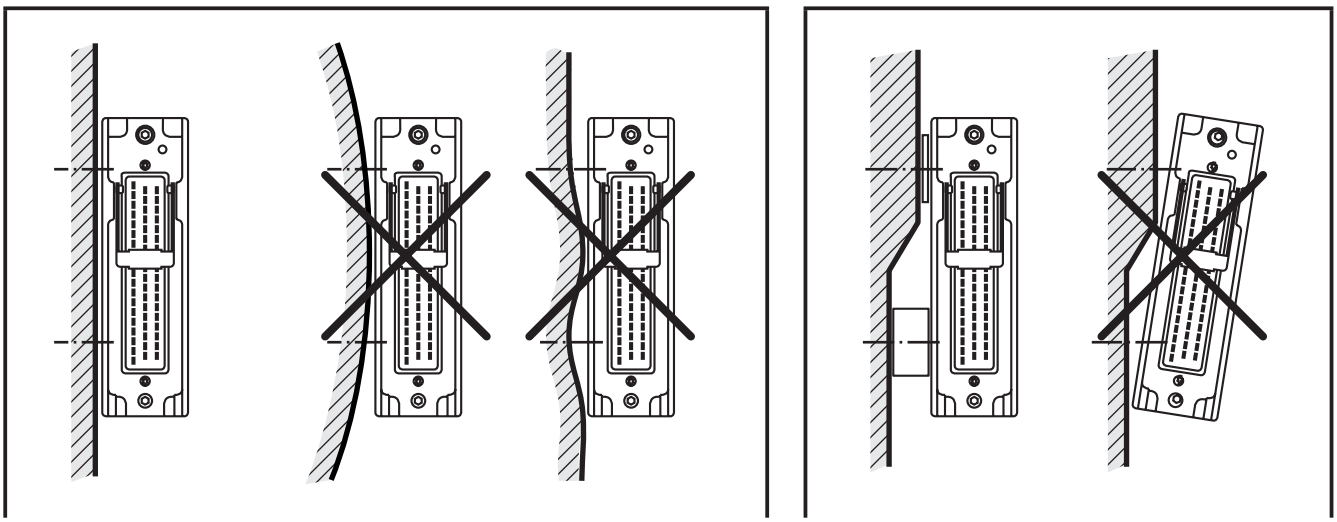
Preferred mounting position

4.3 Mounting surface

NOTE

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

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

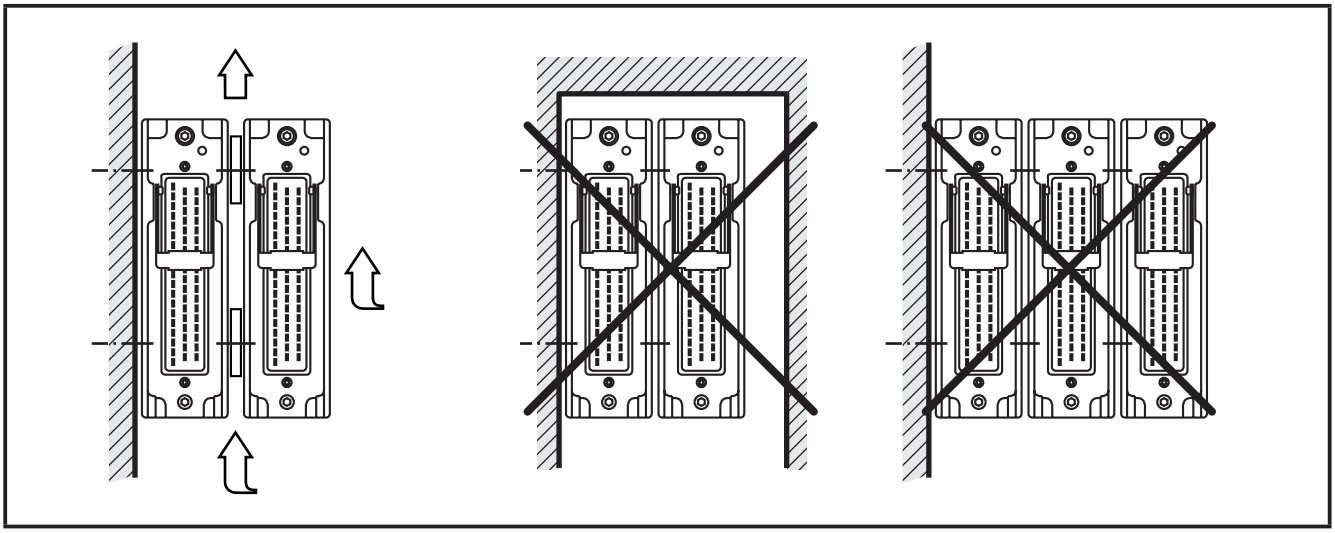


Mounting surface

4.4 Heat dissipation

► Ensure sufficient heat dissipation as the internal heating of the electronics is conducted away via the housing.

► In case of 'sandwich' mounting of controllers use spacers.



Heat dissipation and sandwich mounting

5 Electrical connection

5.1 Wiring

Pin connection → 7 Technical data

To ensure the protection of the device against electrical interference, the housing must be connected to GND (e.g. to the ground of the vehicle).

5.2 Fuses

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

Description	Potential	Pin no.	Fuse
Supply voltage sensors/module	VBB_S	10	max. 2 A T
Supply voltage outputs	VBB_O	19	max. 15A
Supply voltage via relay	$VBB_{Repeatability}$	01	max. 15A

5.3 Laying the supply and signal cables

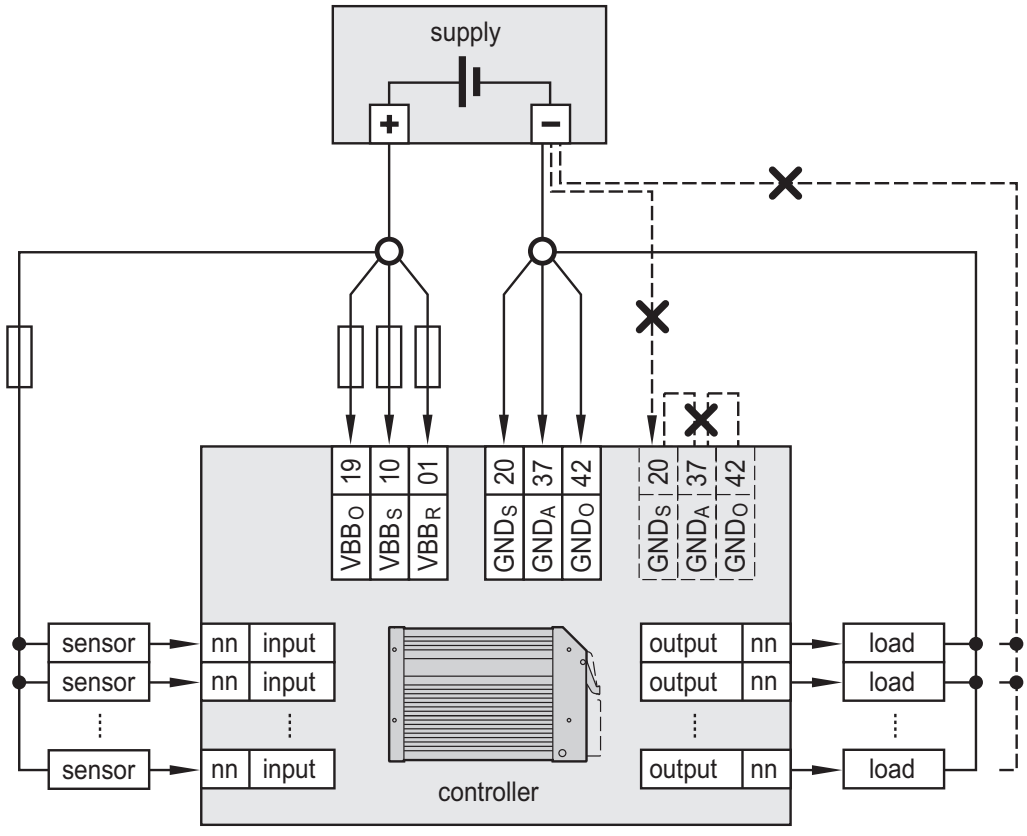
► Basically all supply and signal cables are to be laid separately.

► Screen signal cables in EMC-critical applications.

► Connect supply and ground cables to the controller and the sensors/actuators respectively via a common star point.

⚠ WARNING

The linking of connections in the plug is not permitted and can impact safety of persons and machinery.



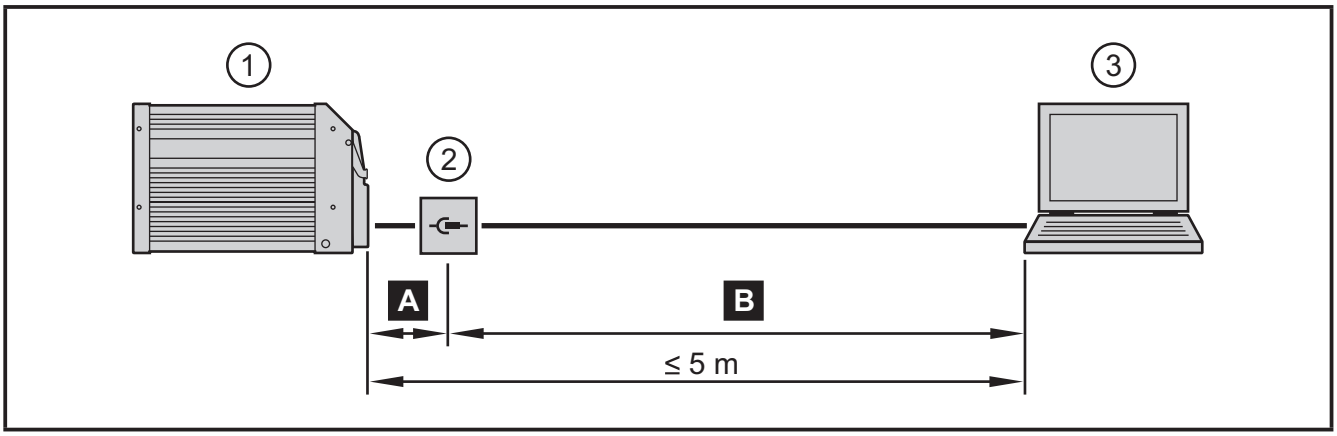
X = not permissible

If a prewired connection cable is used, remove the cores with the unused signal inputs and outputs.
Unused cores, in particular core loops, lead to interference injection that can influence the connected controller.

5.4 USB interface

5.4.1 Hardware requirement

The USB controller used is USB 2.0 (Full Speed) compatible. The USB interface is provided as virtual COM port under Windows (→ 6.3 Programming via USB interface).



1. Controller (55-pin connector)
2. USB connectors for programming and service purposes
3. Notebook/PC

A Connection controller to USB connector, permanent.

► Position USB connector in immediate vicinity to controller.
The cable length "A" considerably influences the quality of the USB data transmission.

B Connection USB connector to notebook / PC, temporary

► Use connection cable with the designation "Full Speed/High Speed" (USB connection cable with twisted and screened cores).
► Make a connection using several USB connection cables.
► Remove connection cable after the programming or service works.

5.4.2 Short-circuit protection

NOTE

The USB interface is not protected against short circuits with a live wire outside the following voltage ranges:
USB_P: -0.5...3.8 V DC
USB_N: -0.5...3.8 V DC
USB_5V: -0.5...10.0 V DC

A short circuit will destruct the USB interface.

6 Set-up

6.1 Documentation

The user can easily create the application program by means of the IEC 61131-3 compliant programming system CoDeSys 2.3. Further to the programming system CoDeSys, the following documents are required for programming and commissioning of the controller:

- R360 system manual (R360 controller family)
- CR0032 system manual
- Programming manual CoDeSys V2.3
  (alternatively CoDeSys online help)

The documents are available for download on the internet:
www.ifm.com → Data sheet direct → CR0032 → Additional data

CoDeSys online help:
www.ifm.com → Data sheet direct → CR0032 → Download/Software*

*) Download area with registration

6.2 Interfaces and system requirements

Programming can be made out via all interfaces of the controller and can be carried out either with CoDeSys or with the download tool.

System requirements for RS-232 and CAN1-4:
Microsoft Windows XP, SP1/2

System requirements for USB (virtual COM port):
Microsoft Windows XP, SP2

6.3 Programming via USB interface

Note in general:
- The controller can be connected to any USB interface. The number of the COM port does not change.
- Only connect one controller for programming to the PC.
- Special USB and COM port drivers are required.

6.3.1 Install the USB driver

These drivers provide a "virtual COM port", i.e. another artificial serial interface, on the PC.

The drivers can be found on the ifm ecomat mobile CD. As an alternative, the drivers are also available on the internet.
www.ifm.com → Data sheet direct → CR0032 → Download/Software

Changes in the system settings of the PC require extended user rights. Contact your system administrator.

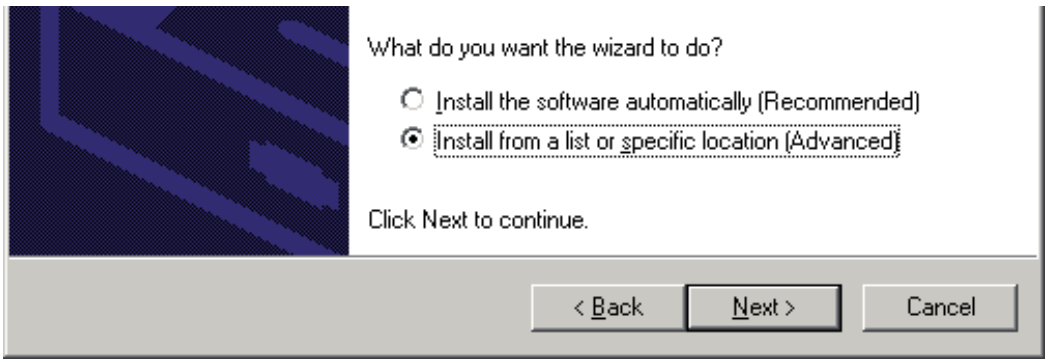
The following descriptions point out the installation under Windows XP. In other Windows versions there may be different menu names or structures.

► Connect the controllers to the PC via the USB interface.

> When started for the first time, the Windows dialogue box "Hardware Update Wizard" automatically appears.

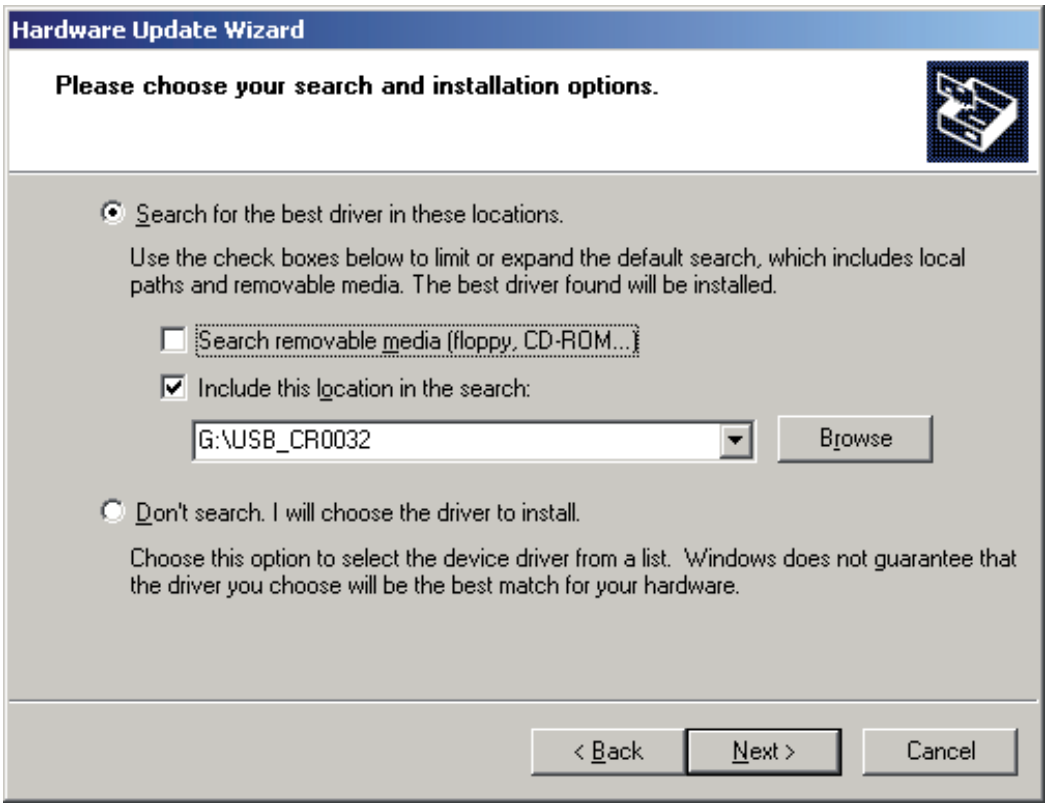
► Select [No, not this time].
(Prevents the automatic search for a new Windows update)

► Click on [Next] to continue.



► Select [Install from a list or specific location].
(Enables the targeted search and selection of the required driver)

► Click on [Next] to continue.



► In case of installation using the ecomat mobile CD, select "Include this location in the search" → Drive letter:\USB_CR0032.

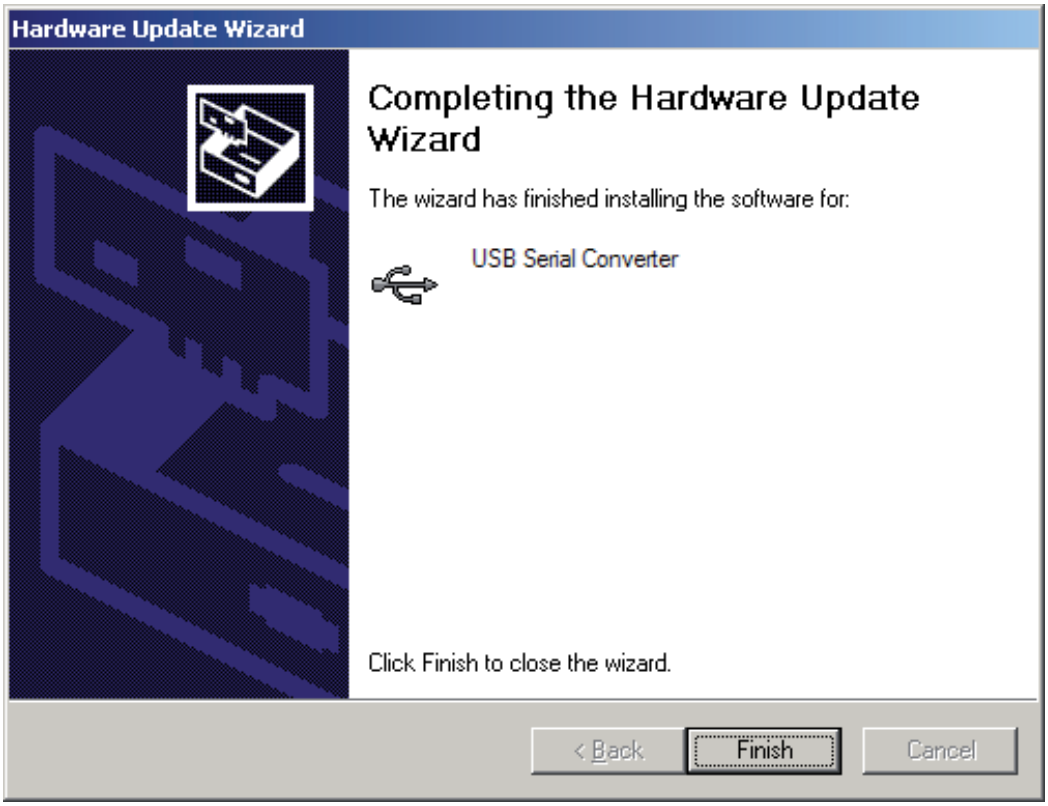
► If the USB driver is located in a hard disk directory (e.g. after an internet download), select the directory using the browser function in the dialogue window. Alternatively, enter the storage location directly.

Only if the Windows installation wizard has found a valid driver file can you change to the next dialogue box with [Next].

Windows carries out a "Windows logo test".
The result of the system-internal tests does not have any effect on the function of the software.

► Acknowledge the possible message "Windows logo test not passed" with [Continue].

> The selected driver is displayed.
> A message appears that installation was carried out correctly.



► Complete the installation with [Finish].

6.3.2 Install and define the virtual COM port

The installation is only necessary when started for the first time. The installation procedure is identical to the previous USB driver installation (→ 6.3.1).

The installation program automatically selects the next free COM port (e.g. COM3) for the driver.

► In case of conflicts with other programs, change the setting for the COM port in the Windows device manager.

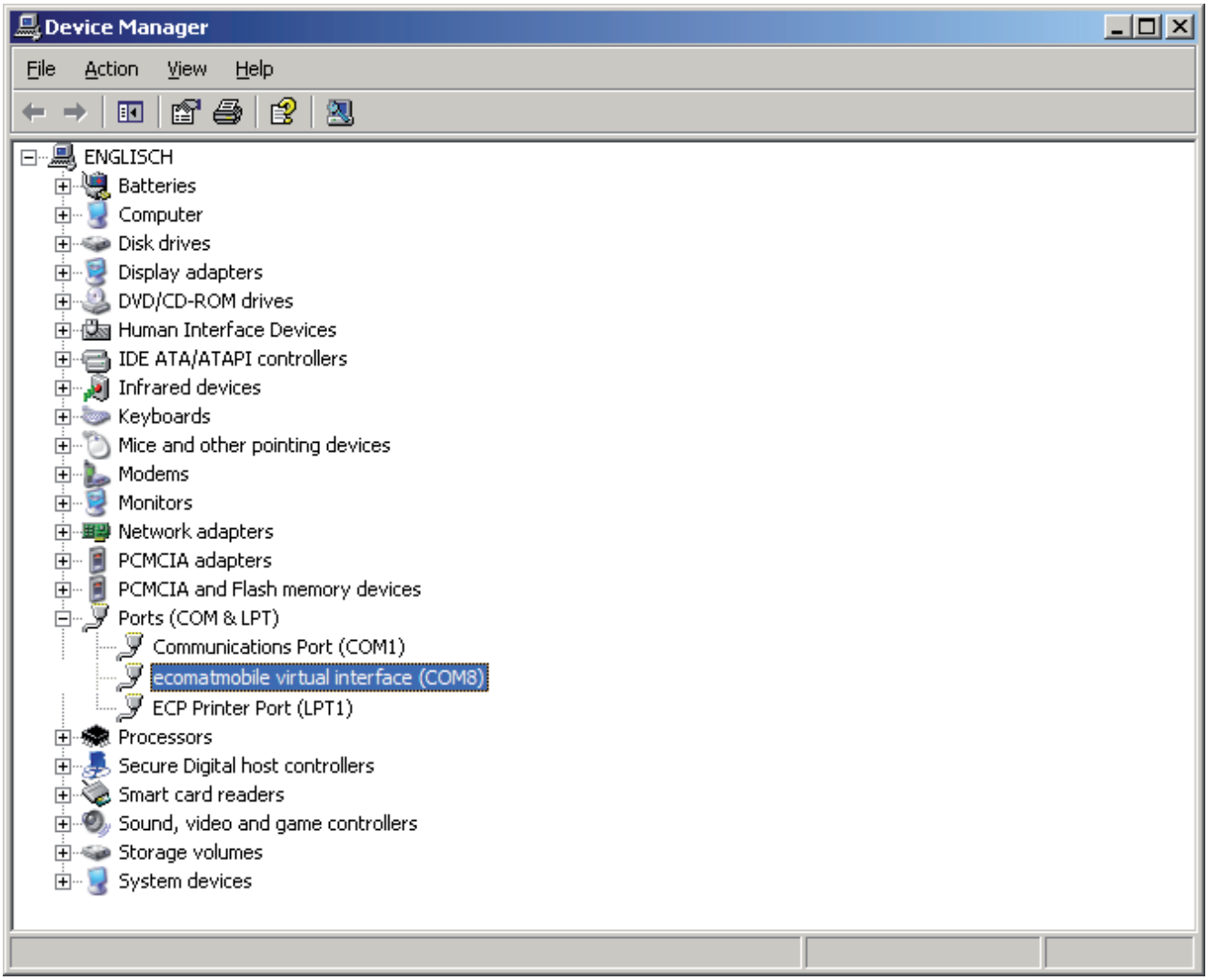
1. Open the device manager.
   The service program device manager can for example be accessed via Start → Control Panel → Device Manager.
2. Select the entry with a double click in the directory "Ports (COM & LPT)".
   As an alternative: Right mouse click → Properties.
3. Click on [Port settings] in the following dialogue box.

4. Select ["Advanced…"] and redefine the COM port in the "Advanced Settings" menu (e.g. COM8), if necessary.

Do not use a COM port which is already used by another device. In most computers COM1 and COM2 are already assigned by the hardware interfaces.

► Confirm the setting with [OK].

> The new COM port is indicated in the device manager following the driver name.



6.4 Deinstall the driver

If a driver is to be updated, the installed drivers have to be deinstalled first of all.

► Disconnect the USB connection between the controller and the PC.

► Open the service program "Software" via the start menu → Control Panel.

► Deinstall the drivers successively with [Change/Remove].

7 Technical data

CR0032

Mobile controller
ClassicController

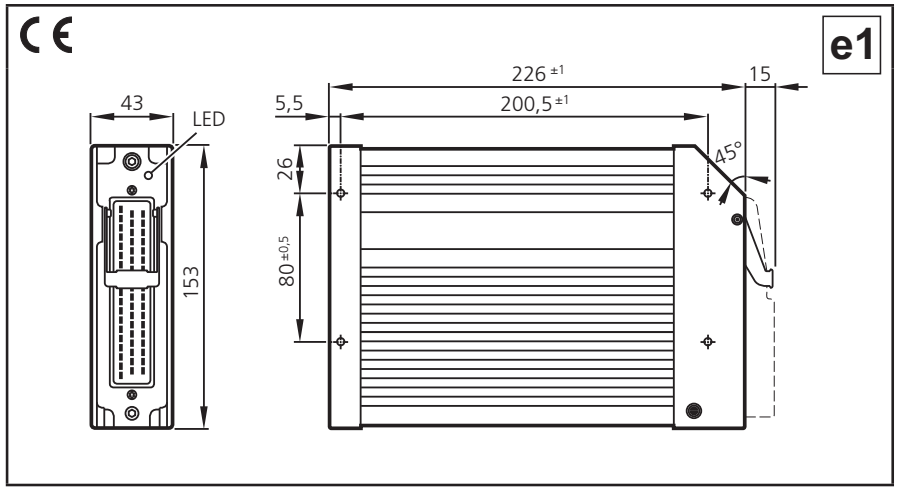
32-bit processor

16 inputs
16 outputs

4 CAN interfaces

CoDeSys 2.3

10...32 V DC



UK

Technical data	Controller as black-box system to implement a central or decentralised system design
Housing	closed, screened metal housing with flange fastening
Dimensions (H x W x D)	153 x 226 x 43 mm
Installation	screw connection by means of 4 M5 x L screws to DIN 7500 or DIN 7984 mounting position horizontal or vertical to the mounting wall
Connection	1 55-pin connector, latched, protected against reverse polarity, type AMP or Framatome AMP junior timer contacts, crimp connection 0.5/2.5 mm²
Weight	1.2 kg
Housing/storage temperature	– 40...85 °C (depending on the load) / – 40...85 °C
Protection rating	IP 67 (for inserted connector with individually sealed cores, e.g. EC2084)
Input/output channels	32 (16 inputs / 16 outputs)
Inputs	configurable digital for positive/negative sensor signals, positive with diagnostic capabilities analogue (0...10/32 V, 0...20 mA, ratiometric) frequency (≤ 30 kHz)
Outputs	configurable digital positive/negative switching (high/low side) PWM output (20...250 Hz, 8 x max. 4 A, 8 x max. 2 A) current-controlled (8 x 0.02...4 A, 8 x 0.01...2 A)
Operating voltage Overvoltage Undervoltage detection Switching-off in case of undervoltage	10...32 V DC 36 V for t ≤ 10 s at U_B ≤ 10 V at U_B ≤ 8 V
Reverse polarity protection	yes
Current consumption	≤ 160 mA (without external load at 24 V DC)
CAN interfaces 1...4 Baud rate Communication profile	CAN interface 2.0 A/B, ISO 11898 50 Kbits/s...1 Mbits/s (default 125 Kbits/s) CANopen, CiA DS 301 version 4, CiA DS 401 version 1.4 or SAE J 1939 or free protocol
Serial interface Baud rate Topology Protocol	RS-232 C 9.6...115.2 Kbit/s (default 115.2 Kbits/s) point-to-point (max. 2 participants); master-slave connection predefined ifm protocol (INTELHEX)
Virtual COM port	USB, max. 1 MBaud
Processor	32-bit CPU Infineon TriCore 1796
Device monitoring	undervoltage monitoring watchdog function checksum test for program and system excess temperature monitoring

CR0032	Technical data
Process monitoring concept	second switch-off mode for 8 outputs each via monitoring relays

Memory (usable)

Program memory	Flash	1.25 Mbytes
Data memory	RAM	256 Kbytes
	FRAM (via FB)	16 Kbytes
	FRAM	32 Kbytes
Data memory (retain data)	FRAM	2 x 4 Kbytes

Status indication: three-colour LED (R/G/B)

Operating states

LED colour	Status	Description
–	out	no operating voltage
yellow	1 x on	initialisation or reset checks
orange	on	error in the start-up phase
green	5 Hz	no operating system loaded
	2.0 Hz	run
	on	stop
red	2.0 Hz	run with error
	on	fatal error or stop with error

Test standards and regulations

Climatic test	● damp heat to EN 60068-2-30, test Db (≤ 95 % rel. humidity, non-condensing) ● salt mist test to EN 60068-2-52, test Kb, severity level 3 ● degree of protection test to EN 60529
Mechanical stability	● vibration to EN 60068-2-6, test Fc ● bump to EN 60068-2-29, test Eb ● random vibration to EN 60068-2-64, test Fh
Immunity to conducted interference	● to ISO 7637-2: 2004, pulses 2a, 3a, 3b, severity level 4, function state A ● to ISO 7637-2: 2004, pulse 1, 2b, severity level 4, function state C ● to ISO 7637-2: 2004, pulse 5, severity level 3, function state C
Immunity to interfering fields	● to directive 2006/28/EC at 100 V/m (e1 type approval) ● EN 61000-6-2: 2005 (CE)
Interference emission	● to directive 2006/28/EC (e1 type approval) ● EN 61000-6-4: 2007 (CE)
Tests for approval for railway applications	● to BN 411 002 (DIN EN 50155 clause 10.2)

CR0032	Technical data

Characteristics of the inputs

Resolution	12 bits
Accuracy	± 1 % FS
Measuring ranges	0...10 V, 0...30 V, 0...20 mA, ratiometric

Current input 0...20 mA (A)

Input resistance	390 Ω
Input frequency	50 Hz / 1 kHz (selectable via software)

Voltage input 0...10 V (A)

Input resistance	65.6 kΩ
Input frequency	50 Hz / 1 kHz (selectable via software)

Voltage input 0...32 V (A)

Input resistance	50.7 kΩ
Input frequency	50 Hz / 1 kHz (selectable via software)

Voltage input ratiometric (A)

Input resistance	50.7 kΩ
Input frequency	50 Hz / 1 kHz (selectable via software)

Frequency input (FRQ)

Input resistance	3.2 kΩ
Input frequency	≤ 30 kHz
Switch-on level	> 0.35...0.48 U_B
Switch-off level	< 0.29 U_B
Function block	Frequency, Period, Inc_Encoder

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

Input resistance	3.2 KΩ
Input frequency	50 Hz / 1 kHz (selectable via software)
Switch-on level	> 0.7 U_B
Switch-off level	< 0.3 U_B
Diagnosis wire break	> 0.95 U_B
Diagnosis short circuit	< 1 V

Test input	During the test mode (e.g. programming) the connector pin must be connected to VBB_S (10...32 V DC). During the "RUN" mode the test input must not be connected.
NAMUR inputs	Digital inputs with diagnostic capabilities can be used as NAMUR inputs when used with an external resistor wiring. Supply voltage 5...25 V, e.g. ifm NAMUR sensors NT5001...NN5002

CR0032	Technical data

Characteristics of the outputs

Accuracy	± 2 % FS
Protective circuit for inductive loads	integrated
Diagnosis via current feedback	wire break/short circuit

PWM output (PWM)

Output frequency	20...250 Hz (per channel)
Pulse/pause ratio	1...1000 ‰
Resolution	1 ‰
Switching current	8 x 0.01...2 A / 0.02....4 A 8 x 0.01...2 A (4 of these outputs with H-bridge function)

Digital output (B_H and $B_{H/L}$)

Switching voltage	10...32 V DC
Switching current	8 x ≤ 2 A 8 x ≤ 4 A (4 of these outputs with H-bridge function)

Current-controlled output (PWM_I)

Output frequency	20...250 Hz (per channel)
Control range	8 x 0.01...2 A / 0.02....4 A 8 x 0.01...2 A
Setting resolution	1 mA
Control resolution	1 / 2 mA
Load resistance	≥ 3 Ω (at 12 V DC) ≥ 6 Ω (at 24 V DC)

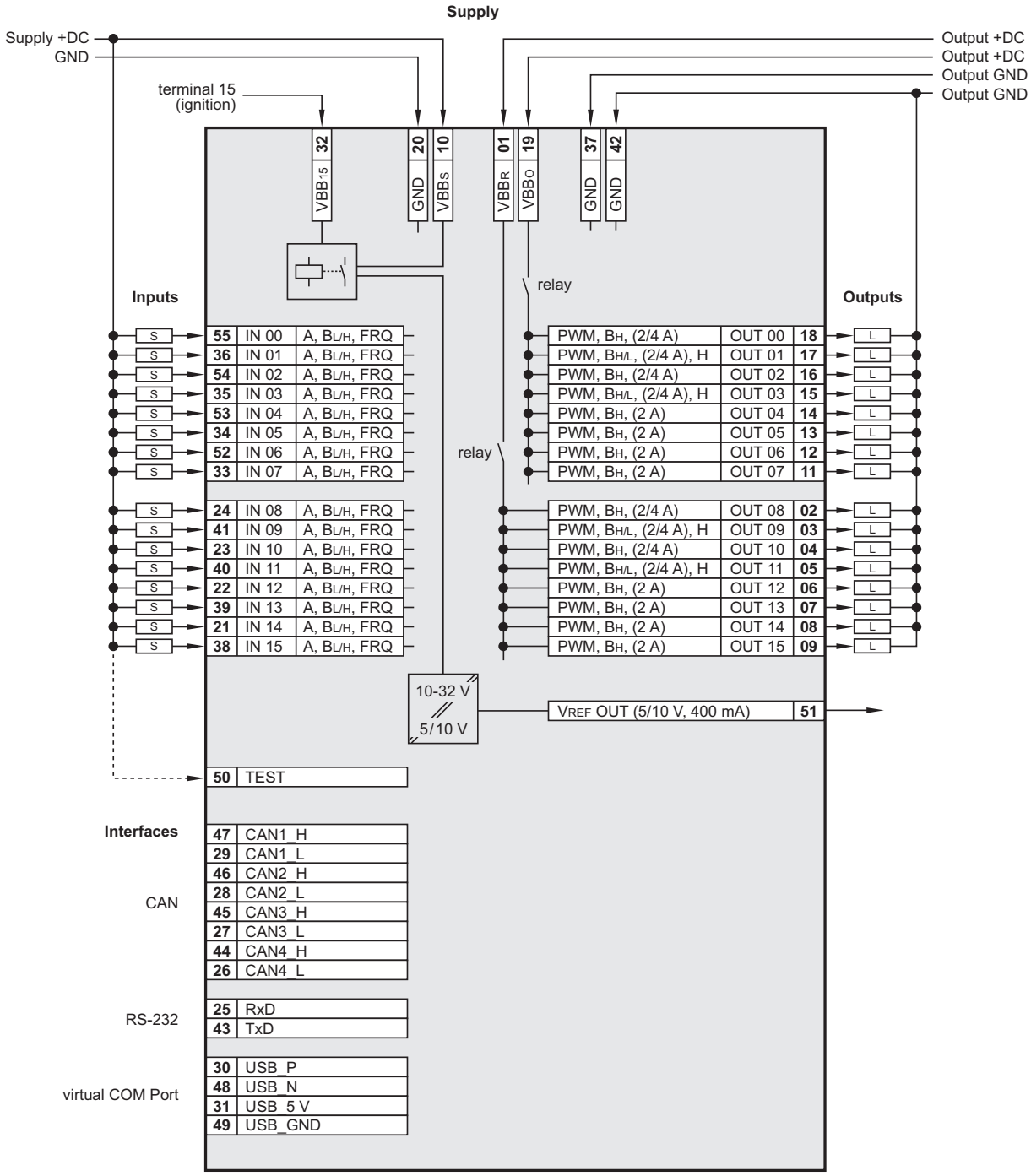
Reference voltage V_{REF} OUT

for sensors and joysticks
5/10 V, 400 mA
short-circuit proof and overload protected
(10 V reference only from a supply voltage U_B ≥ 13 V)

CR0032 | **Technical data**

UK

Wiring



Abbreviations

A = analogue
B_H = binary high side
B_L = binary low side
FRQ = frequency/pulse inputs
H = H-Bridge function
PWM = pulse width modulation
VBB_O = supply outputs
VBB_S = supply sensors/module
VBB_R = supply via relay

8 Maintenance, repair and disposal

The device is maintenance-free.

► Do not open the housing, as the device does not contain any components which must 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 CE declarations of conformity and approvals can be found at:
www.ifm.com → Data sheet direct: → CR0032 → Approvals