

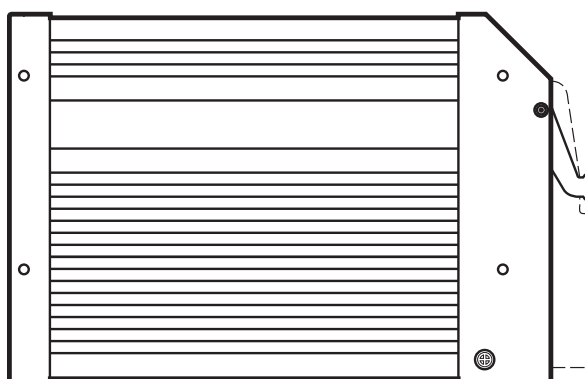


Installation instructions ClassicController

CR0505

UK

7390428 / 02 11 / 2016



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This document is the original instructions.

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1 Preliminary note

This document applies to devices of the type "ClassicController" (art. no.: CR0505).



These instructions are an integral 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.

1.1 Symbols used

- ▶ Instruction
- > Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance can result in malfunction 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

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 device must only be installed, connected and put into operation by a qualified electrician.

2.3 Electrical connection

Disconnect the device 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 of ifm electronic 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 "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

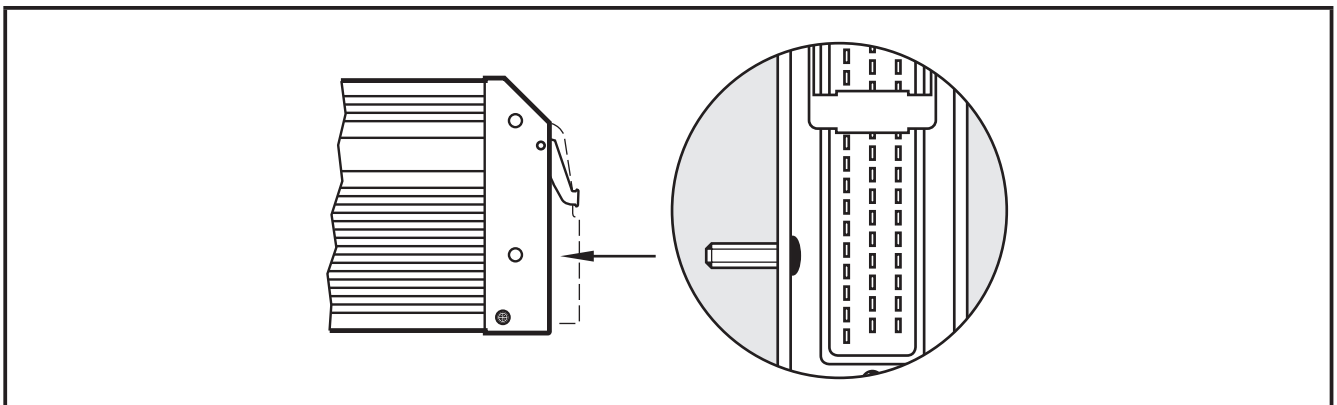
4.1 Fastening

- ▶ Fix the controller to a flat surface using 4 M5 screws.
Screw material: steel or stainless steel
Tightening torque: 8 ± 2 Nm
- ▶ Connect the housing to GND (→ 5.2 Ground connection).

NOTE

Use screws with a low head to avoid that the connector is damaged when placed and locked.

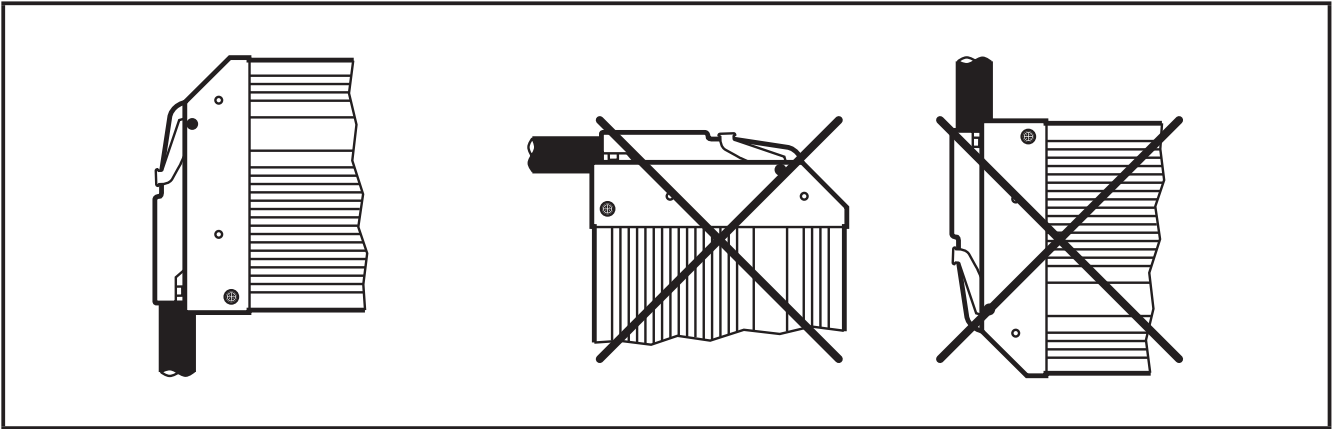
Screws to be used (examples)	Standard
Button head hexagon socket screws (M5 x L)	ISO 7380
Cylinder screws with hexagon socket and low head (M5 x L)	DIN 7984
Cutting screws for metric ISO thread with low head	DIN 7500



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 installation position

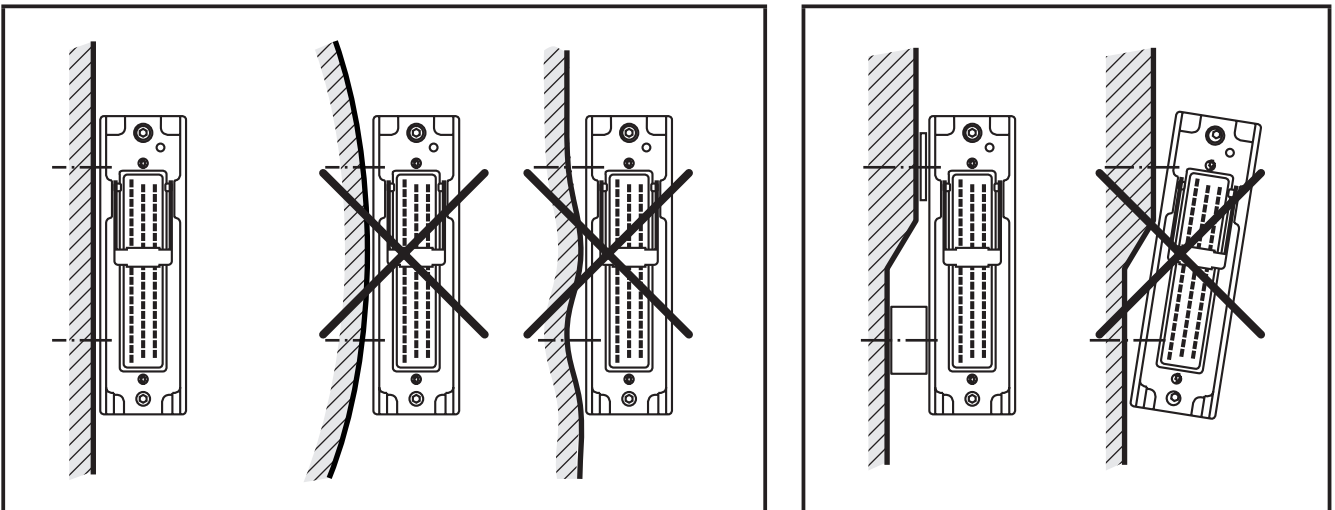
UK

4.3 Mounting surface

NOTE

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

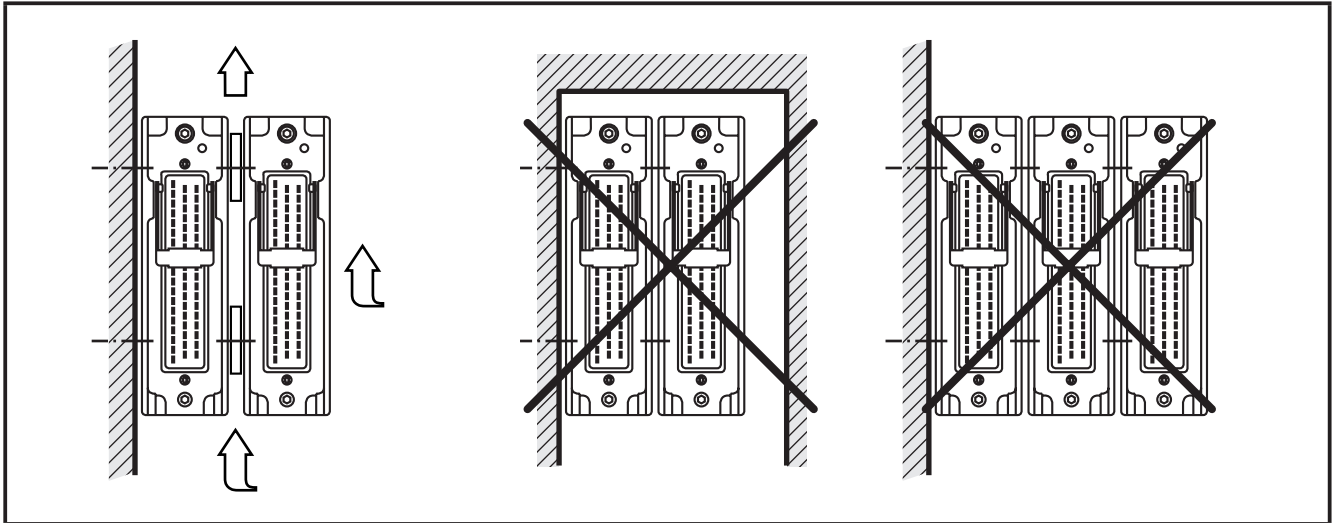
- ▶ Use compensating elements if there is no flat mounting surface available.



Mounting surface

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

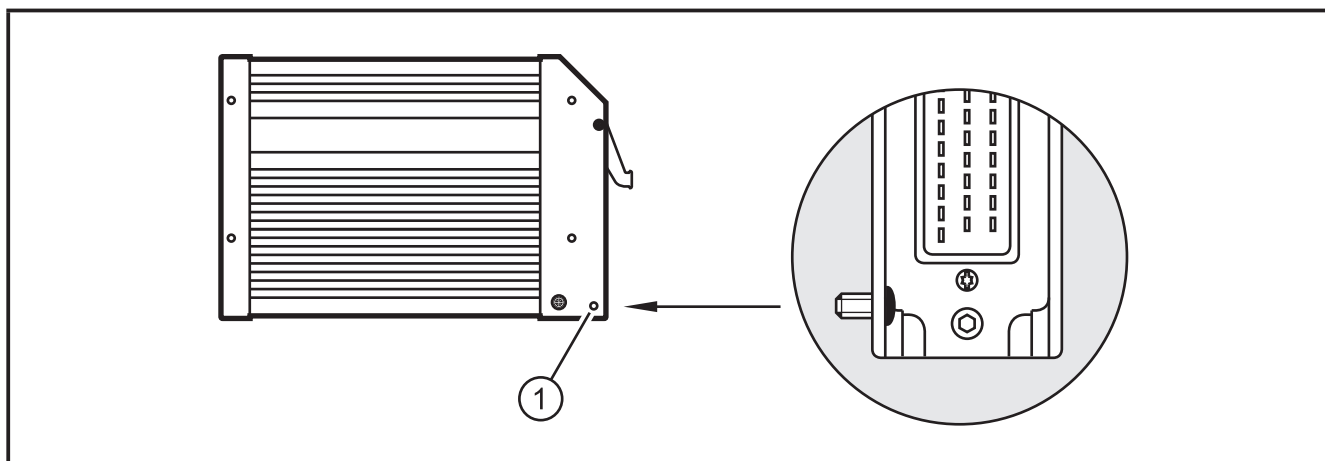
Wiring (→ 7 Technical data)

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

► Connect all supply cables and GND terminals.

5.2 Ground 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 of the vehicle.



1: Drill hole for ground connection

► Establish a connection between the device and the ground of the vehicle using M5 screws. Screws to be used (→ 4.1 Fastening)

5.3 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	23	≤ 2 A T
Supply voltage outputs	VBB _O	05	≤ 15 A
Supply voltage via relay	VBB _R	34	≤ 15 A

5.4 Interaction between the inputs and outputs within one group of connections

In the applications the following must be observed as regards the use of the terminals as input and output:

Within one output group inputs and outputs should not be mixed. One output group is marked by a common VBBX potential.

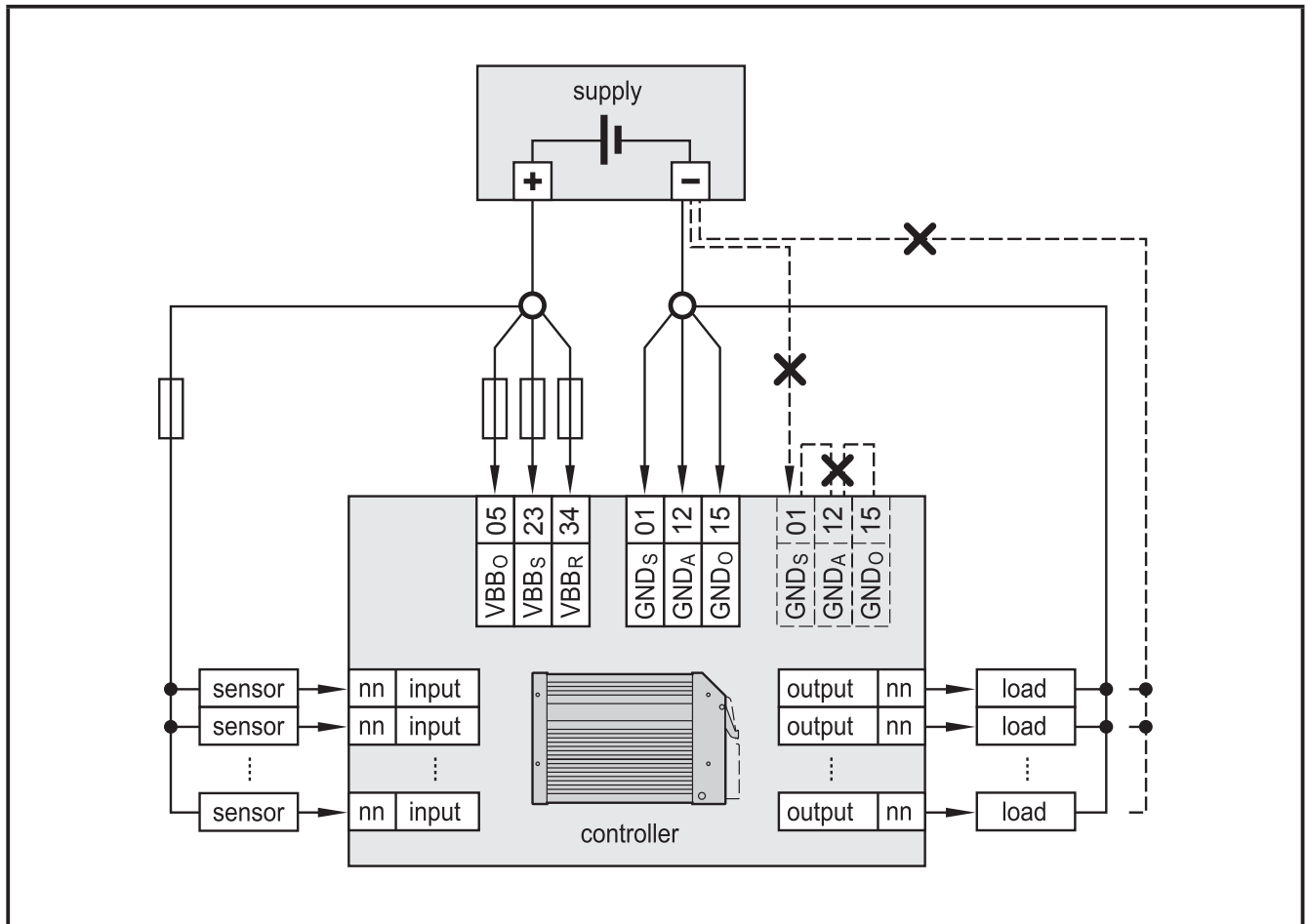
The background is a possible internal cross-connection of the outputs from the externally supplied inputs. This may occur unexpectedly if the supply to the outputs is switched off externally. Should a mixture still be carried out for reasons of optimising the terminals, please inform yourself in detail about the situations described in the system manual and the restrictions resulting from this. Follow these instructions for your application and keep records of this.

5.5 Laying the supply and signal cables

- ▶ Basically all supply and signal cables must be laid separately.
- ▶ Screen signal cables in EMC critical applications.
- ▶ Connect supply and ground cables to the controller and the sensors/actuators via the respective common star point.

⚠ WARNING

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



X = not permissible



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.

5.6 Frequency and analogue inputs

- ▶ Operate inputs with screened cables, so that useful signals are not affected by external interference.
- ▶ Connect screens to ground on one side.

UK

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. In addition to the programming system CODESYS, the following documents are required for programming and commissioning of the controller:

- System manual CR0505
(alternatively CODESYS 2.3 online help)
- Manual on PLC programming with CODESYS 2.3
(alternatively CODESYS 2.3 online help)

The system manual CR0505 is available for download on the internet:

www.ifm.com → Data sheet search → CR0505 → Operating instructions

The manual on PLC programming with CODESYS 2.3 and the online help are automatically installed on the PC upon installation of the CODESYS package from the *ecomatmobile* DVD.

As an alternative, the CODESYS package can be downloaded from the internet:

www.ifm.com → Service → Download → Systems for mobile machines*

*) Download area with registration

7 Technical data

7.1 Mechanical and electric data

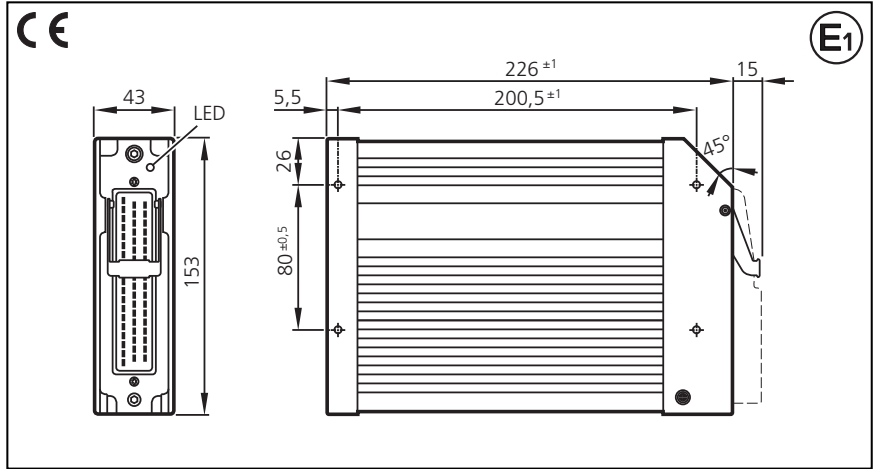
CR0505

Mobile controller
ClassicController

2nd CAN interface
for gateway function
according to SAE J 1939

Programming
according to IEC 61131-3

Operating voltage
10...32 V DC



Technical data

Housing

Dimensions (H x W x D)

Mounting

Connection

Weight

Housing / storage temperature

Protection

Input/output channels
total

Inputs
possible configurations

*) only positive sensor signals with diagnostic capability

Outputs
possible configurations

- Abbreviations
- A = analogue
 - B_H = binary High Side
 - B_L = binary Low Side
 - FRQ/CYL = frequency inputs
 - I_H = pulse High Side
 - I_L = pulse Low Side
 - PWM = pulse width modulation
 - PWM_I = current-controlled output
 - %IWx = IEC address for analogue input
 - %IX0.xx = IEC address for binary input
 - %QX0.xx = IEC address for binary output

**Controller as black box system
for the implementation of a central or decentralised system design**

closed, screened metal housing with flange fastening

153 x 226 x 43 mm

screw connection by means of 4 M5xL screws according to DIN 7500 or DIN 7984
mounting position horizontal or vertical to the mounting wall

55-pin connector, latched, protected against reverse polarity, type AMP or Framatome
AMP junior timer contacts, crimp connection 0.5/2.5 mm²

1.2 kg

-40...85 °C (depending on the load) / -40...85 °C

IP 67 (for inserted plug with individually sealed cores e.g. EC2084)

max. 24 (the total number which is available depends on the wiring and configuration of the controller)

max. 24 (corr. to 0 outputs)

Number	Signal	Version	
8 or	digital analogue	for positive sensor signals, with diagnostic capability 0...10/32 V DC, 0/4...20 mA or ratiometric	B _L A
8	digital	for positive sensor signals	B _L
4 or	digital frequency	for positive sensor signals, with diagnostic capability max. 50 kHz	B _L I _L
4 or	digital frequency	for positive/negative sensor signals, with diagnostic capability * max. 1 kHz	B _{LH} I _L

max. 8 (corr. to 16 inputs)

Number	Signal	Version	
8 or or	digital PWM current-controlled	positive switching (High Side), with diagnostic capability PWM frequency 20...250 Hz 0,1...4 A	B _H PWM PWM _I

CR0505	Technical data																		
Operating voltage U_B	10...32 V DC																		
overvoltage undervoltage detection switching-off in case of undervoltage	36 V for $t \leq 10$ s for $U_B \leq 10$ V for $U_B \leq 8$ V																		
Current consumption	≤ 160 mA (without external load at 24 V DC)																		
CAN interface 1 Baud rate Communication profile	CAN interface 2.0 B, ISO 11898 50 kbits/s...1 Mbits/s (default setting 125 kbits/s) CANopen, CiA DS 301 version 4, CiA DS 401 version 1.4																		
Node-ID (CANopen)	hex 7F (= dec. 127)																		
CAN interface 2 Baud rate Communication profile	CAN interface 2.0 A/B, ISO 11898 50 kbits/s...1 Mbit/s (default setting 125 kbits/s) SAE J 1939 or free protocol																		
Serial interface Baud rate Topology Protocol	RS-232 C 9.6 / 19.2 / 28.8 / 38.4 / 57.6 kBit/s (default setting 57.6 kbits/s) point-to-point (max. 2 participants); master-slave connection predefined ifm protocol (INTELHEX)																		
Processor	CMOS microcontroller 16 bits C167CS cycle frequency 20/40 MHz																		
Device monitoring	undervoltage monitoring watchdog function check sum test for program and system excess temperature monitoring																		
Process monitoring concept	Two relays according to EN 954 monitor two groups of 4 outputs each																		
Physical memory	Flash: 2 MByte RAM: 256 kByte Remanent memory: 32 kByte																		
Memory allocation	See system manual www.ifm.com → Data sheet search → CR0505 → More information																		
Status indication	three-colour LED (R/G/B)																		
Operating states (Status-LED)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: black; color: white;">LED colour</th> <th style="background-color: black; color: white;">Status</th> <th style="background-color: black; color: white;">Description</th> </tr> </thead> <tbody> <tr> <td>–</td> <td>off</td> <td>no operating voltage</td> </tr> <tr> <td>yellow</td> <td>1 x on</td> <td>initialisation or reset checks</td> </tr> <tr> <td>green</td> <td>5 Hz</td> <td>no operating system loaded</td> </tr> <tr> <td>green</td> <td>2.0 Hz on</td> <td>Run Stop</td> </tr> <tr> <td>red</td> <td>2.0 Hz on</td> <td>Run with error fatal error or stop with error</td> </tr> </tbody> </table>	LED colour	Status	Description	–	off	no operating voltage	yellow	1 x on	initialisation or reset checks	green	5 Hz	no operating system loaded	green	2.0 Hz on	Run Stop	red	2.0 Hz on	Run with error fatal error or stop with error
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7.2 Test standards and regulations

	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 to EN 60529
Mechanical resistance	Vibration to EN 60068-2-6, test Fc Shock to EN 60068-2-27, test Ea
Immunity to conducted interference	to ISO 7637-2, pulses 2, 3a, 3b, severity level 4, function state A to ISO 7637-2, pulse 5, severity level 1, function state A to ISO 7637-2, pulse 1, severity level 4, function state C
Immunity to interfering fields	according to UN/ECE-R10 at 100 V/m (E1 type approval) and EN 61000-6-2 (CE)
Interference emission	according to UN/ECE-R10 (E1 type approval) and EN 61000-6-3 (CE)
Tests for the approval for railway applications	to BN 411 002 (DIN EN 50155 clause 10.2)

7.3 Input characteristics

CR0505	Characteristics of the inputs																												
Digital/analogue inputs (B _L , A) %IW03...10 %IX0.00...07 can be configured as ...	<ul style="list-style-type: none"> ■ Voltage inputs <table border="0" style="margin-left: 20px;"> <tr><td>input voltage</td><td>0...10/32 V</td></tr> <tr><td>resolution</td><td>12 bits</td></tr> <tr><td>precision</td><td>± 1.0% FS</td></tr> <tr><td>input resistance</td><td>50/30 kΩ</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> ■ Current inputs <table border="0" style="margin-left: 20px;"> <tr><td>input current</td><td>0/4...20 mA</td></tr> <tr><td>resolution</td><td>12 bits</td></tr> <tr><td>precision</td><td>± 1.0% FS</td></tr> <tr><td>input resistance</td><td>400 Ω</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> ■ Digital inputs for positive sensor signals, with diagnostic capability *) <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.7 U_B</td></tr> <tr><td>switch-off level</td><td>0.4 U_B</td></tr> <tr><td>input resistance</td><td>30 kΩ</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> 	input voltage	0...10/32 V	resolution	12 bits	precision	± 1.0% FS	input resistance	50/30 kΩ	input frequency	50 Hz	input current	0/4...20 mA	resolution	12 bits	precision	± 1.0% FS	input resistance	400 Ω	input frequency	50 Hz	switch-on level	0.7 U _B	switch-off level	0.4 U _B	input resistance	30 kΩ	input frequency	50 Hz
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Digital inputs (B _L) %IX0.08...11 %IX1.00...03 can be configured as ...	<ul style="list-style-type: none"> ■ Digital inputs for positive sensor signals <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.43...0.73 U_B</td></tr> <tr><td>switch-off level</td><td>0.29 U_B</td></tr> <tr><td>input resistance</td><td>3.21 kΩ</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> 	switch-on level	0.43...0.73 U _B	switch-off level	0.29 U _B	input resistance	3.21 kΩ	input frequency	50 Hz																				
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input frequency	50 Hz																												
Digital inputs (B _L , I _L) %IX0.12...15 can be configured as ...	<ul style="list-style-type: none"> ■ Digital inputs for positive sensor signals, with diagnostic capability *) <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.7 U_B</td></tr> <tr><td>switch-off level</td><td>0.4 U_B</td></tr> <tr><td>input resistance</td><td>2.86 kΩ</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> ■ Frequency inputs for positive sensor signals with diagnostic capability, evaluation with integrated comparator <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.43...0.73 U_B</td></tr> <tr><td>switch-off level</td><td>0.29 U_B</td></tr> <tr><td>input resistance</td><td>2.86 kΩ</td></tr> <tr><td>input frequency</td><td>max. 50 kHz</td></tr> </table> 	switch-on level	0.7 U _B	switch-off level	0.4 U _B	input resistance	2.86 kΩ	input frequency	50 Hz	switch-on level	0.43...0.73 U _B	switch-off level	0.29 U _B	input resistance	2.86 kΩ	input frequency	max. 50 kHz												
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switch-off level	0.29 U _B																												
input resistance	2.86 kΩ																												
input frequency	max. 50 kHz																												
Digital inputs (B _{LH} , I _L) %IX1.04...07 can be configured as ...	<ul style="list-style-type: none"> ■ Digital inputs for positive/negative sensor signals, positive with diagnostic capability* <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.7 U_B</td></tr> <tr><td>switch-off level</td><td>0.4 U_B</td></tr> <tr><td>input resistance</td><td>3.21 kΩ</td></tr> <tr><td>input frequency</td><td>50 Hz</td></tr> </table> ■ Frequency inputs for positive sensor signals with diagnostic capability, evaluation with integrated comparator <table border="0" style="margin-left: 20px;"> <tr><td>switch-on level</td><td>0.43...0.73 U_B</td></tr> <tr><td>switch-off level</td><td>0.29 U_B</td></tr> <tr><td>input resistance</td><td>3.21 kΩ</td></tr> <tr><td>input frequency</td><td>max. 1 kHz</td></tr> </table> 	switch-on level	0.7 U _B	switch-off level	0.4 U _B	input resistance	3.21 kΩ	input frequency	50 Hz	switch-on level	0.43...0.73 U _B	switch-off level	0.29 U _B	input resistance	3.21 kΩ	input frequency	max. 1 kHz												
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input frequency	max. 1 kHz																												
Test input	During the test mode (e.g. programming) the "TEST" connection must be connected to VBB _S (10...32 V DC). For the "RUN" mode the test input must not be connected. input resistance 3.21 kΩ																												
*) NAMUR inputs	<ul style="list-style-type: none"> ■ Digital inputs with diagnostic capability can be used as NAMUR inputs when used with an external resistor connection. supply voltage 5...25 V; e.g. ifm NAMUR sensors NT5001...NN5002 																												
	wiring see page 5																												

7.4 Output characteristics

CR0505

Characteristics of the outputs

Outputs (B_H , PWM, PWM_I)
%QX0.00...07
can be configured as ...

- Semiconductor outputs, with diagnostic capability
positive switching (high side), short-circuit and overload protected
switching voltage 10...32 V DC
switching current max. 4 A
output frequency max. 100 Hz (depending on the load)
- PWM outputs, diagnosis via current feedback
PWM frequency max. 250 Hz
mark-to-space ratio 1...99 %
resolution depends on the PWM frequency
load current max. 4 A
integrated pull-down resistor (4.7 kΩ) to trigger valves (Danfoss type PVH)
- Current-controlled outputs, diagnosis via current feedback
load current 0,1...4 A
load resistance min. 3 Ω (at $U_B = 12$ V DC)
min. 6 Ω (at $U_B = 24$ V DC)
setting resolution 1 mA
control resolution 5 mA
accuracy ± 2% FS

Overload protection
(valid for all outputs)

max. 5 minutes (at 100%)

Internal relay outputs
for electrically isolated
deactivation of the outputs

Normally open contacts in series to 2 groups of 4 semiconductor outputs.
Sustained forcing by means of hardware and additional controlling
by means of user program.

The relays must always be switched without load!

- total current max. 12 A per group
- switching current 0.1...15 A
- overload current 20 A
- number of operating cycles $\geq 10^6$ (without load)
- switching-time constant ≤ 3 ms

Output Error

- Semiconductor output, positive switching (high side)
switching voltage 10...32 V DC
switching current max. 100 mA
overload current 0.5 A
switching function OFF (0 V) in case of an error

wiring see page 5

Abbreviations

- A = analogue
- B_H = binary High Side
- B_L = binary Low Side
- FRQ/CYL = frequency inputs
- I_H = pulse High Side
- I_L = pulse Low Side
- PWM = pulse width modulation
- PWM_I = current-controlled output
- %IWx = IEC address for analogue input
- %IX0.xx = IEC address for binary input
- %QX0.xx = IEC address for binary output

7.5 Wiring

ANSCHLUSSBELEGUNG / wiring / branchement							
Pin	Potential	Bezeichnung / description			Bemerkung / note		
23	VBB _S (10...32 V DC)	Versorgung Sensoren und Modul / supply sensors and module					
05	VBB _O (10...32 V DC)	Versorgung Ausgänge / supply outputs			relaisgeschaltet / relay switched (1)		
34	VBB _R (10...32 V DC)	Versorgung über Relais / supply via relay			relaisgeschaltet / relay switched (2)		
01	GND _S	Masse Sensoren und Modul / ground sensors and module					
15	GND _O	Masse Ausgänge / ground outputs					
12	GND _A	Masse Analogeingänge / ground analogue outputs					
CAN, RS-232, ERROR, TEST							
Pin	Potential	Bezeichnung / description			Bemerkung / note		
14	CAN 1 _H	CAN-Interface 1 (High)					
32	CAN 1 _L	CAN-Interface 1 (Low)					
26	CAN 2 _H	CAN-Interface 2 (High)			SAE J 1939		
25	CAN 2 _L	CAN-Interface 2 (Low)			SAE J 1939		
33	GND	Masse / ground (RS-232/CAN)					
06	RxD	RS-232 Interface (Programmierung / programming)			Pin 03, PC D-Sub (9 pin)		
07	TxD	RS-232 Interface (Programmierung / programming)			Pin 02, PC D-Sub (9 pin)		
13	ERROR	Fehlerausgang B _H / error output B _H					
24	TEST	TEST-Eingang / test input					
EIN-/AUSGÄNGE / inputs/outputs / entrées/sorties							
Pin pin	EINGÄNGE INPUTS	Konfiguration configuration	AUSGÄNGE OUTPUTS	Konfiguration configuration		diagnosefähig* diagnostic capability* INPUT / OUTPUT	relaisgeschaltet relay switched
08	%IX0.00 / %IW03	B _L A	–	–		• / –	
27	%IX0.01 / %IW04	B _L A	–	–		• / –	
09	%IX0.02 / %IW05	B _L A	–	–		• / –	
28	%IX0.03 / %IW06	B _L A	–	–		• / –	
10	%IX0.04 / %IW07	B _L A	–	–		• / –	
29	%IX0.05 / %IW08	B _L A	–	–		• / –	
11	%IX0.06 / %IW09	B _L A	–	–		• / –	
30	%IX0.07 / %IW10	B _L A	–	–		• / –	
44	%IX0.08	B _L	%QX0.00	B _H	PWM PWM _I	– / •	VBB _O (1)
45	%IX0.09	B _L	%QX0.01	B _H	PWM PWM _I	– / •	VBB _O (1)
46	%IX0.10	B _L	%QX0.02	B _H	PWM PWM _I	– / •	VBB _O (1)
47	%IX0.11	B _L	%QX0.03	B _H	PWM PWM _I	– / •	VBB _O (1)
20	%IX0.12	B _L I _L (FRQ 0)	–	–		• / –	
02	%IX0.13	B _L I _L (FRQ 1)	–	–		• / –	
21	%IX0.14	B _L I _L (FRQ 2)	–	–		• / –	
38	%IX0.15	B _L I _L (FRQ 3)	–	–		• / –	
36	%IX1.00	B _L	%QX0.04	B _H	PWM PWM _I	– / •	VBB _R (2)
54	%IX1.01	B _L	%QX0.05	B _H	PWM PWM _I	– / •	VBB _R (2)
17	%IX1.02	B _L	%QX0.06	B _H	PWM PWM _I	– / •	VBB _R (2)
53	%IX1.03	B _L	%QX0.07	B _H	PWM PWM _I	– / •	VBB _R (2)
19	%IX1.04	B _{L/H} I _L (CYL 0)	–	–		• / –	
55	%IX1.05	B _{L/H} I _L (CYL 1)	–	–		• / –	
18	%IX1.06	B _{L/H} I _L (CYL 2)	–	–		• / –	
37	%IX1.07	B _{L/H} I _L (CYL 3)	–	–		• / –	

Note the double pin connection of inputs/outputs.

*) only positive sensor signals with diagnostic capability

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8 Maintenance, repair and disposal

The device is maintenance-free.

- ▶ Do not open the housing as the device does not contain any components which can be repaired 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 → Data sheet search → CR0505 → More information