

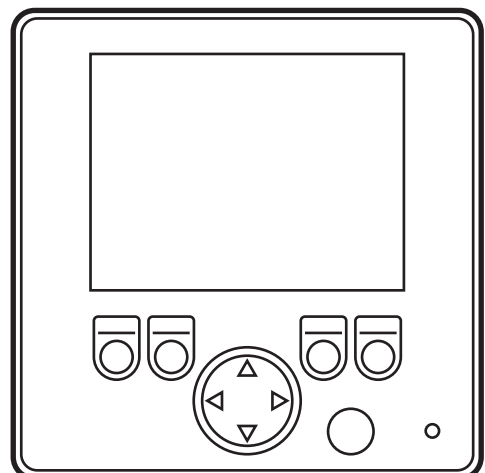


Installation instructions
BasicDisplay

ecomat100[®]

UK

CR0451



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1 Preliminary note



This document applies to devices of the type "BasicDisplay" (art. no.: CR0451). 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.

Adhere to the safety instructions.

1.1 Symbols used

- ▶ Instructions
- > Reaction, result
- [...] Designation of pushbuttons, 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 In general

These instructions 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 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 connections 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 Tampering with the device

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

3 Functions and features

BasicDisplay is a programmable graphic display for controlling, parameter-setting and operation of mobile machines and plants.

Communication with other system components is ensured via a CAN interface.

Application-specific extensions and adaptations are possible in conjunction with additional devices of the modular Basic products.

⚠ WARNING

The device is not approved for safety-related tasks in the field of operator protection.

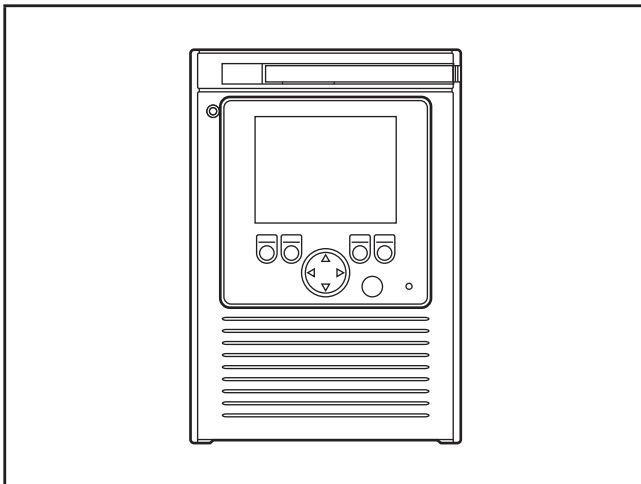
ATTENTION

The device is intended for installation in vehicle bodies, not in engines.

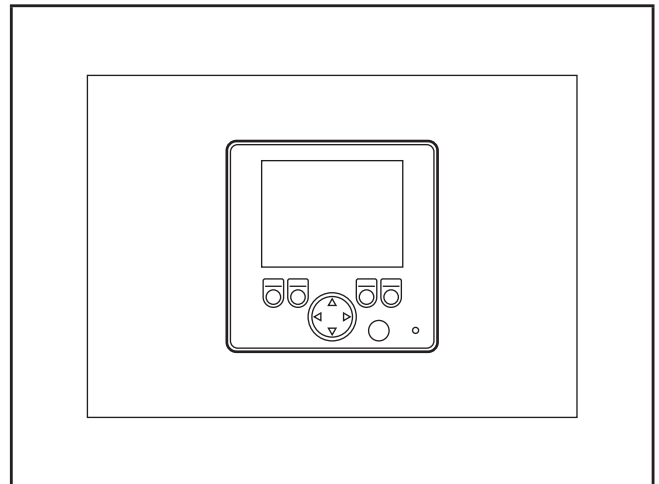
3.1 Features at a glance

- 2.8" colour display
- 5 freely programmable backlit function keys
- rocker switch for cursor function
- CAN interface
- freely programmable in accordance with IEC 61131-3 with target visualisation

3.2 Application examples



Use with BasicController and cover



Stand-alone display in panel

3.3 Devices of the Basic products (examples)

- BasicController (art. no.: CR040x)
mobile controller, freely programmable to IEC 61131-3
2 CAN interfaces (incl. interface for CR0451 BasicDisplay)
configurable inputs/outputs
- BasicRelay (art. no.: CR0421)
freely wirable relay and fuse carrier for 6 automotive relays and 10 automotive fuses
- Cover with built-in display recess (art. no.: EC0402)
incl. cable seal to obtain IP 54 protection
- Connection cable (art. no.: EC0452)
for connection of a BasicDisplay to a BasicController with cover (EC0402)
- RAM® mount set (art.-no.: EC0405)
For BasicDisplay CR0451

For information about the available Basic family see:
www.ifm.com → Products → Control systems
or directly
www.ifm.com → data sheet search → e.g. CR0451

4 Installation

4.1 General installation instructions

4.1.1 Types of mounting and required accessories

Mounting type		Required accessories	Art. no.
Installation	e.g. in a panel	mounting frame	EC0403
RAM® mount	e.g. as desktop unit that can be aligned in various directions	RAM® mount set	EC0405
Structure	e.g. on a control panel	–	–
Combination	with CR040x BasicController	cover with built-in display recess	EC0402

4.1.2 Items supplied

The device is supplied with an M52 nut.

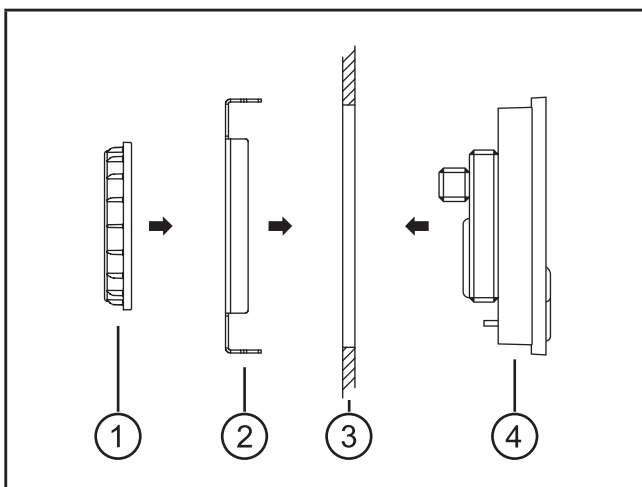
This nut is principally required for all types of mounting

You can find more information about the available accessories at:
www.ifm.com → data sheet search → CR0451 → Accessories

4.2 Panel mounting

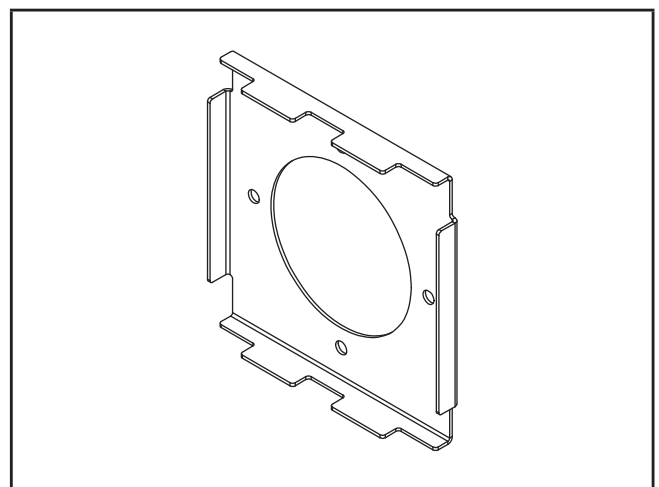
Suitable for material thicknesses up to 3 mm.

- ▶ Make a square-shaped cutout.
Cutout for panel mounting (→ 8 Technical data)
- ▶ Remove the M52 nut from the device.
- ▶ Insert the device into the cutout.
- ▶ Place the mounting frame onto the device from the back.
- ▶ Screw the M52 nut onto the device and tighten by hand.



Mounting principle

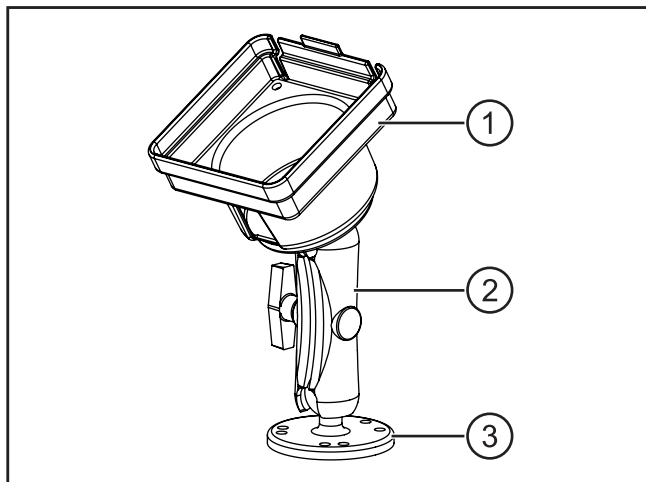
- 1: M52 nut
- 2: mounting frame
- 3: panel
- 4: BasicDisplay



EC0403 mounting frame

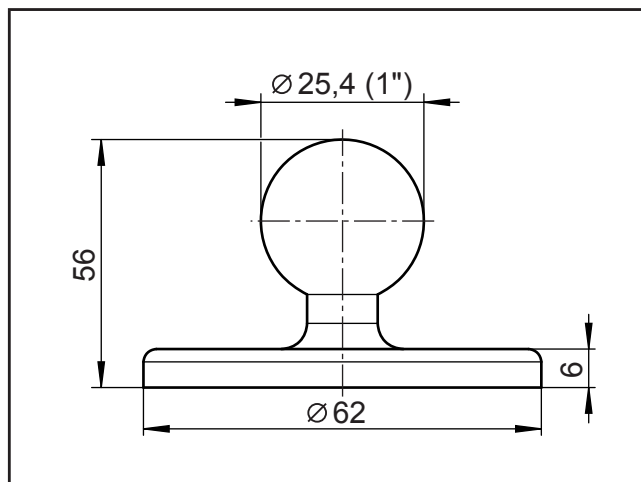
4.3 RAM® mount

Using the RAM® mount set, available as accessories, the device can be used as a firmly mounted desktop unit. Two balls allow a variable orientation of the unit.



RAM® mount set EC0405

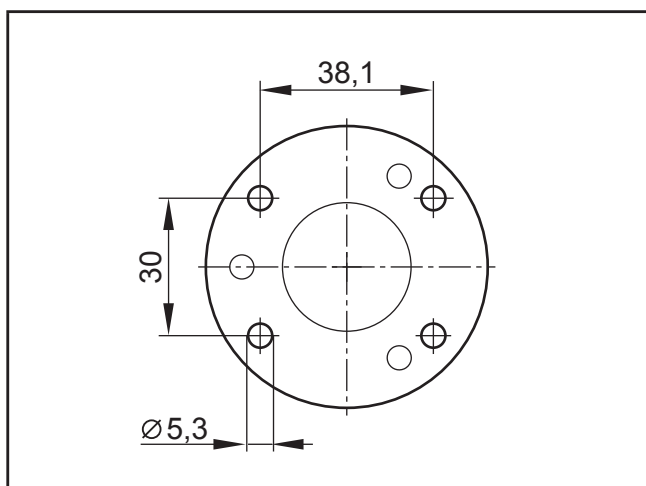
- 1: Display carrier
- 2: Mounting arm with fastening screw
- 3: Mounting plate with ball (2 pcs)



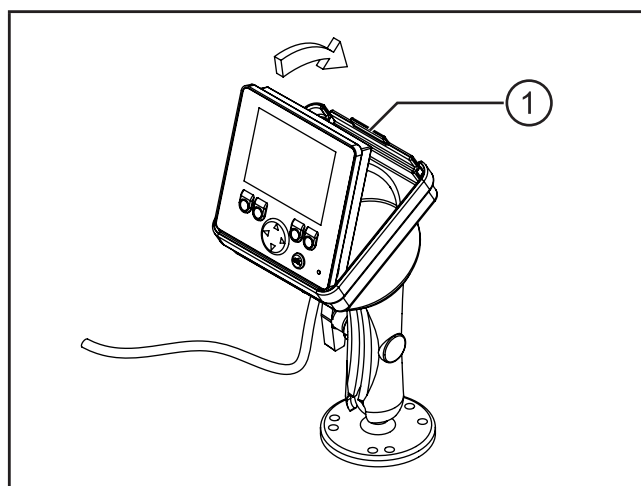
Mounting plate with ball

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- ▶ Screw the mounting plate onto an even surface.
Tightening torque: 5 ± 0.5 Nm
- ▶ Screw second mounting plate to the display carrier.
- ▶ Slightly loosen the fastening screw of the mounting arm.
- ▶ Place the mounting arm onto the balls and tighten the fastening screw.



Hole dimensions for mounting plate



Display carrier

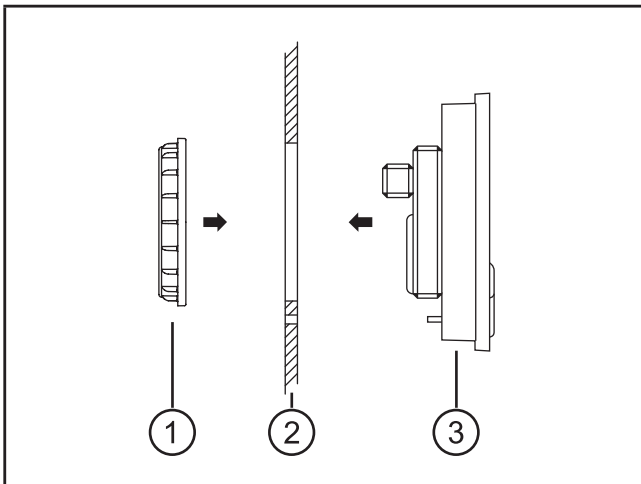
1: Snap-in

- ▶ Insert the device in the display carrier and clip it in place.
In the lower area the display carrier has a hole for the plug and cable pass-through.

4.4 Surface mounting

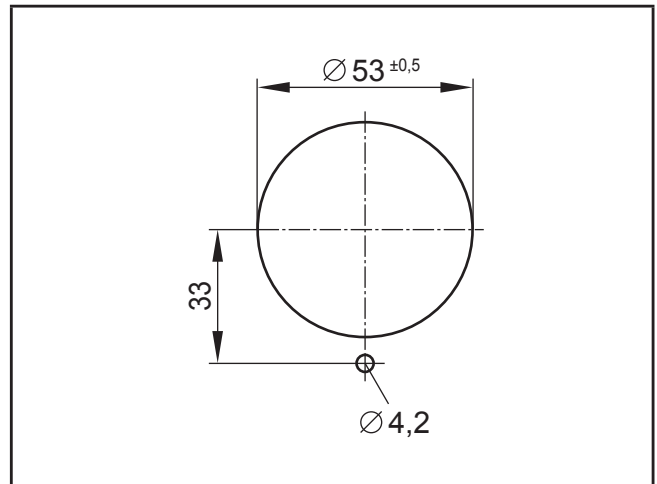
Suitable for material thicknesses up to 3 mm.

- ▶ Make a round cutout and hole for the locating pins.
Cutout for surface mounting (→ 8 Technical data)
- ▶ Remove the M52 nut from the device.
- ▶ Insert the device into the cutout.
- ▶ Screw the M52 nut onto the device and tighten by hand.



Mounting principle

- 1: M52 nut
- 2: control panel
- 3: BasicDisplay

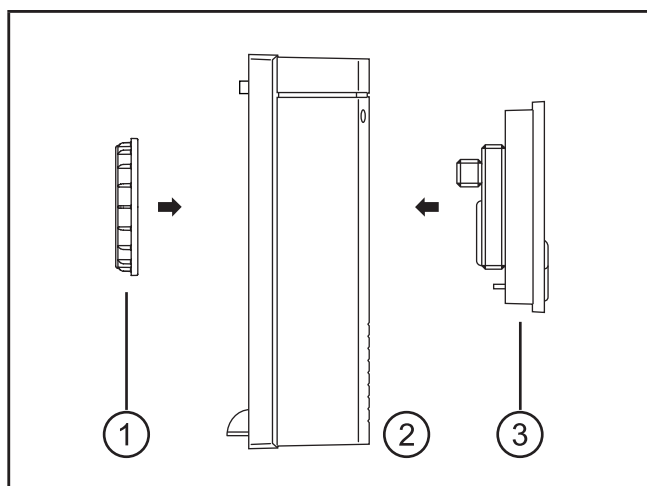


Cutout and hole for locating pins

4.5 Combination with BasicController

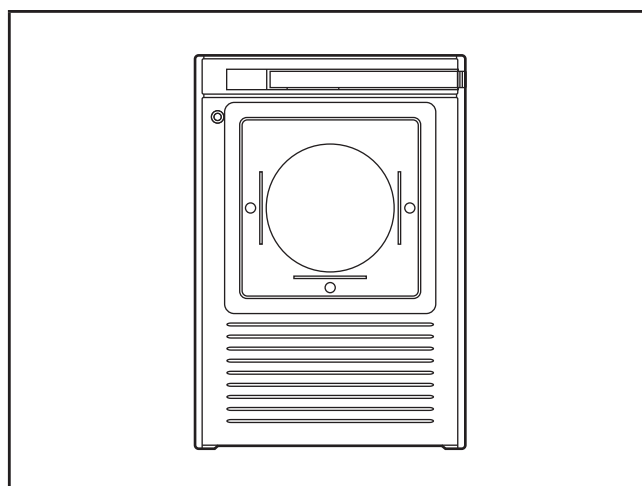
4.5.1 Installation of the display with cover

- ▶ Remove the M52 nut from the device.
- ▶ Place the device into the cover with built-in display recess.
- ▶ Screw the M52 nut onto the device and tighten by hand.



Mounting principle

- 1: M52 nut
- 2: cover
- 3: BasicDisplay

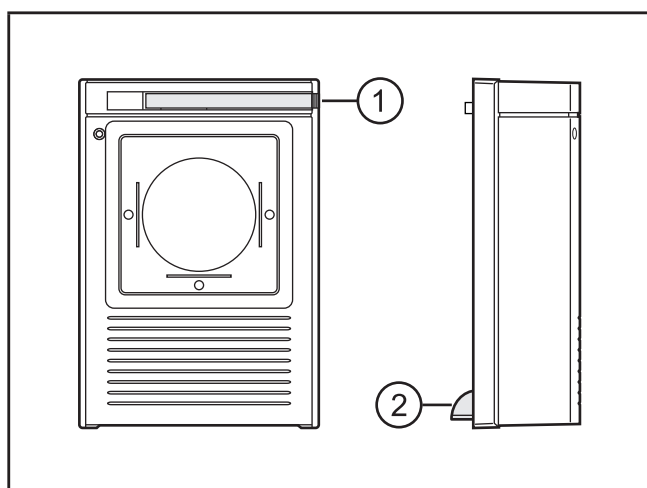


Cover with built-in display recess

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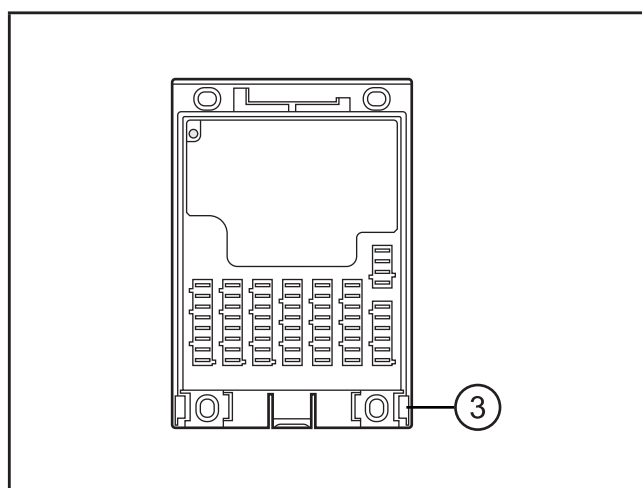
4.5.2 Installation of the cover

The covers of the Basic series feature a single-lever locking. Installation is done without tools.



Cover with built-in display recess

- 1: locking lever
- 2: cover guides

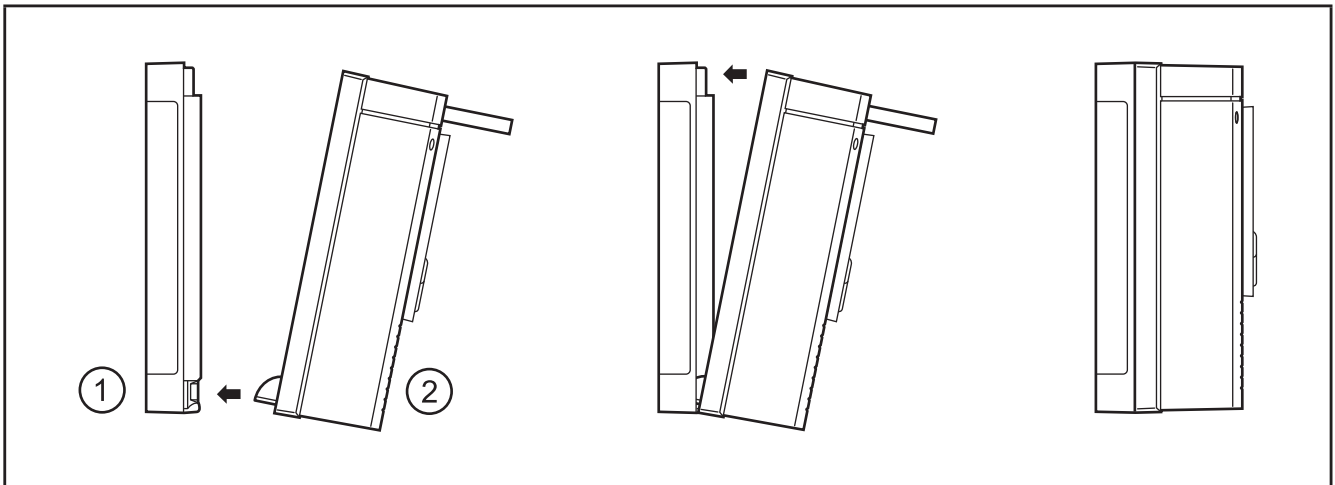


BasicController

- 3: insertion slots for cover guides

- ▶ Pull out the locking lever and rotate it towards you.
- ▶ Place the cover diagonally onto the device.
Insert the 2 cover guides, found at the bottom of the cover, into the slots.

- ▶ Close the cover onto the lower part.
The 2 guides and slots provide a pivot point.
- ▶ Move the locking lever back into its initial position.
- > The cover is locked.



- 1: BasicController
- 2: cover with premounted BasicDisplay

4.5.3 Removing the cover

- ▶ Pull out the locking lever and rotate it towards you.
- > The cover is unlocked and can be removed.

5 Electrical connection

5.1 General electrical connection

Wiring (→ 8 Technical data)

- ▶ If the device is used as a stand-alone display, provide the connected cable with a strain relief.



M12 connector: Max. tightening torque 1,5 Nm.

5.2 Fuse

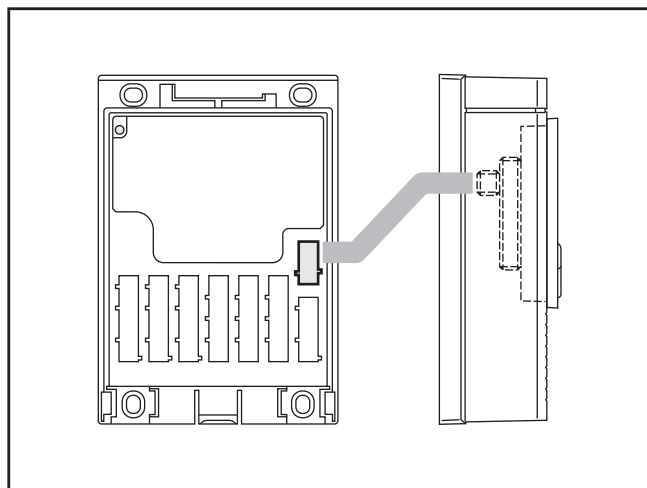
- ▶ Protect supply voltage.

Potential	Description	Pin no.	Fuse
VBB _s	Supply voltage	2	≤ 2 A time-lag

5.3 Connection accessories

You can find more information about the available accessories at:
www.ifm.com → data sheet search → e.g. CR0451 → Accessories

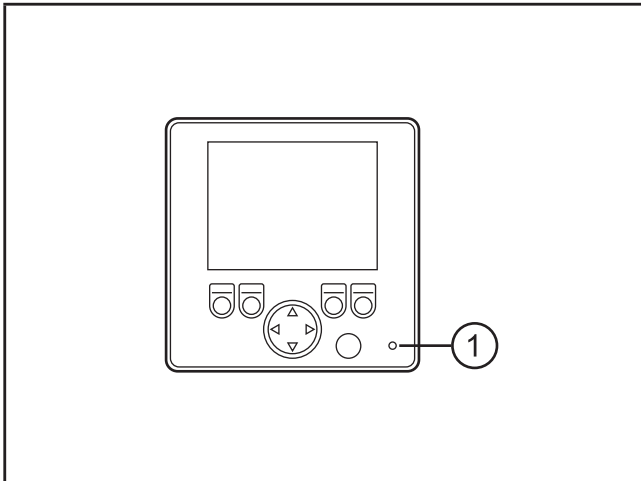
5.3.1 Example accessories



CR040x BasicController
 cover with EC0402 built-in display recess
 EC0452 connection cable

Accessories and example connection

6 Display elements



1: status LED

Operating states (→ 8 Technical data)

7 Set-up

7.1 Programming

The user can easily create the application software by means of the IEC 61131-3 compliant programming system CODESYS 2.3.

⚠ 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.

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7.2 Required documentation

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

- CODESYS V2.3 programming manual
(alternatively as online help)
- BasicDisplay system manual
(alternatively as online help)

The manuals can be downloaded from the internet:

www.ifm.com → data sheet search → CR0451 → Additional data

CODESYS and BasicDisplay online help:

www.ifm.com → Service → Download → Control systems*

*) Download area with registration

7.3 Required hardware

A CAN interface for the connection to a PC or a notebook is required to load the application program to the device.

Example:

- CAN/RS232 USB interface CANfox (art. no.: EC2112)
- Adapter cable for CANfox (art. no.: EC2113)

You can find more information about the available accessories at:

www.ifm.com → data sheet search → CR0451 → Accessories

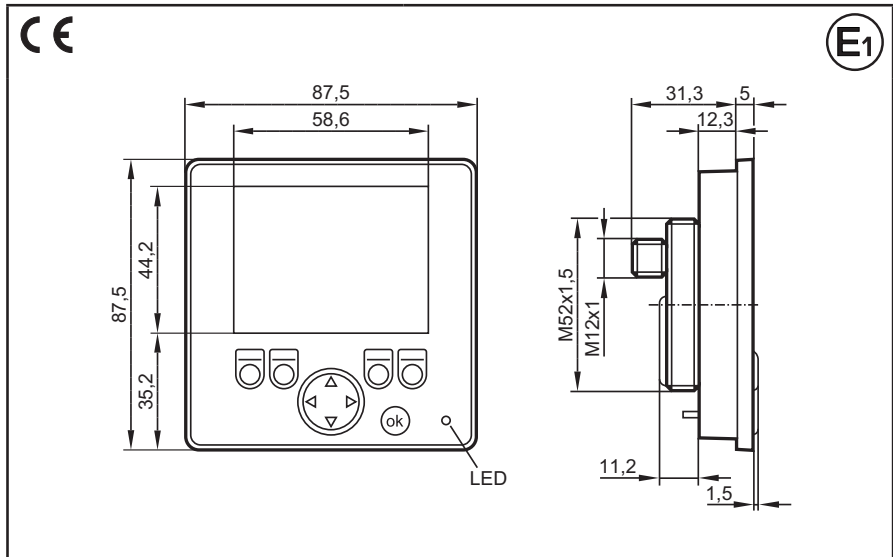
or directly

www.ifm.com → data sheet search → EC2112

8 Technical data

CR0451

BasicDisplay
 2.8" colour display
 5 freely programmable
 backlit
 function keys
 Rocker switch
 for cursor function
 8...32 V DC



Technical data

Display

Display

Format

Resolution

Aspect ratio

Surface

Colours

Background illumination

Brightness

Contrast ratio

Character sets

Mechanical data

Dimensions (W x H x D)

Cutout for panel mounting (W x H)

Cutout for surface mounting (Ø)

Hole for locating pins (Ø)

Housing material

Pushbuttons

Rocker switch

Background illumination operating elements

Protection rating

Operating/storage temperature

Weight

Programmable display with graphic capabilities,
 can be used with BasicController or as stand-alone display

TFT LCD colour display, transmissive

57.6 x 43.2 mm (active area), 2.8" diagonal

320 x 240 pixels

4 : 3

polyester film

256 (8 bits)

LED (lifetime \geq 50.000 h; at 25°C) \geq 300 cd/m², typically 350 cd/m² (adjustable 0...100%, increments 1%) \geq 400:1, typically 500:1

preinstalled: Arial, Lucida Console (fixed font sizes)

For further information see the BasicDisplay manual

www.ifm.com → data sheet search → CR0451 → Additional data

87.5 x 87.5 x 37.7 mm

81.5 ± 0.5 x 81.5 ± 0.5 mm

53 ± 0.5 mm

4.2 mm (33 mm distance to the centre of the cutout)

plastic (black)

5 function keys (silicone keyboard) with tactile feedback
 freely programmable (softkey function)
 Lifetime \geq 750,000 activations

cursor function (up, down, left, right) with tactile feedback
 Lifetime \geq 750,000 activations

LED (brightness adjustable 0...100%, global control)

IP 67

(on the front panel when mounted, otherwise IP 65)

-20...70° C / -30...80° C

0.17 kg

CR0451	Technical data																						
Electrical data																							
Operating voltage	8...32 V DC																						
Current consumption	70 mA (at 24 V DC; 100% background illumination)																						
Overvoltage	36 V for $t \leq 10$ s																						
Undervoltage detection	at $U_b \leq 7.8$ V																						
Switching-off in case of undervoltage	at $U_b \leq 7.0$ V																						
Processor	Freescale PowerPC 5517E, 50 MHz																						
Memory (total)	592 Kbytes RAM / 1536 Kbytes Flash / 1 Kbyte FRAM																						
Memory allocation	see BasicDisplay system manual www.ifm.com → Data sheet search → CR0451 → Additional data																						
CAN	CAN interface 2.0 A/B, ISO 11898																						
Baud rate	20 Kbits/s...1 Mbit/s (default 250 Kbits/s)																						
Communication profile	CANopen, CiA DS 301 version 4, CiA DS 401 version 1.4 or SAE J 1939 or free protocol																						
Software/programming																							
Programming system	CODESYS version 2.3 (IEC 61131-3)																						
Graphic functions	via integrated target visualisation																						
Other features																							
Status LED	two-colour LED (red/green)																						
Operating states (LED)	<table border="1"> <thead> <tr> <th>Colour</th> <th>Status</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>–</td> <td>permanently off</td> <td>no operating voltage</td> </tr> <tr> <td>orange</td> <td>1 x on</td> <td>initialisation or reset checks</td> </tr> <tr> <td rowspan="3">green</td> <td>5 Hz</td> <td>no operating system loaded</td> </tr> <tr> <td>2 Hz</td> <td>application is running (RUN)</td> </tr> <tr> <td>permanently on</td> <td>application stopped (STOP)</td> </tr> <tr> <td rowspan="2">red</td> <td>5 Hz</td> <td>application stopped due to undervoltage</td> </tr> <tr> <td>permanently on</td> <td>system fault (fatal error)</td> </tr> </tbody> </table>		Colour	Status	Description	–	permanently off	no operating voltage	orange	1 x on	initialisation or reset checks	green	5 Hz	no operating system loaded	2 Hz	application is running (RUN)	permanently on	application stopped (STOP)	red	5 Hz	application stopped due to undervoltage	permanently on	system fault (fatal error)
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	permanently on	system fault (fatal error)																					
Test standards and regulations																							
CE marking	EN 61000-6-2: 2005	Electromagnetic compatibility (EMC) Noise immunity																					
	EN 61000-6-4: 2007	Electromagnetic compatibility (EMC) Emission standard																					
	EN 61010-1: 2001	Safety requirements for electrical equipment for measurement, control and laboratory use																					
E1 marking	UN/ECE-R10	Emission standard Immunity with 100 V/m																					
Electrical tests	ISO 7637-2: 2004	Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state A Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state A Pulse 5, severity level: III; function state C (data valid for the 24 V system) Pulse 4, severity level: III; function state C (data valid for the 12 V system)																					

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Technical data

Climatic tests

EN 60068-2-30: 2006	Damp heat, cyclic upper temperature 55°C, number of cycles: 6
EN 60068-2-78: 2002	Damp heat, steady state test temperature 40°C / 93% RH, Test duration: 21 days
EN 60068-2-52: 1996	Salt spray test severity level 3 (motor vehicle)

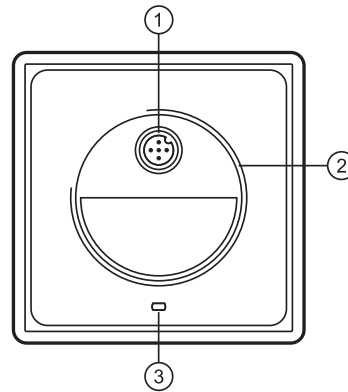
Mechanical tests

ISO 16750-3: 2007	Test VII; Vibration, random mounting location: vehicle body
EN 60068-2-6: 2008	Vibration, sinusoidal 10...500 Hz; 0.72 mm/10 g; 10 cycles/axis
ISO 16750-3: 2007	Bumps 30 g/6 ms; 24,000 shocks

Tests for railway applications

EN 50155 clause 12-2: 2008	Electronic equipment used on rolling stock
EN 50121: 2006	Electromagnetic compatibility (EMC)

Back of the unit



- 1: M12 connector
- 2: M52 thread for fixing nut
- 3: locating pins

Connection

M12 connector, A-coded, 5 poles

Wiring

Supply, CAN		
	1	n.c.
	2	8...32 V DC
	3	GND
	4	CAN_H
	5	CAN_L


9 Maintenance, repair and disposal


9.1 Maintenance

The device does not contain any components that need to be maintained by the user.

9.2 Cleaning the housing surface

- ▶ Disconnect the device.
- ▶ Clean the device from dust and light dirt using a soft, chemically untreated, dry cloth.
- ▶ In case of heavy dirt use a damp soft clean cloth.

 The following agents are not suited for cleaning the device: chemicals dissolving plastics such as methylated spirit, benzine, thinner, alcohol, acetone or ammonia.

 Micro-fibre cloths without chemical additives are recommended.

9.3 Repair

- ▶ The device must only be repaired by the manufacturer.
Observe the safety instructions (→ 2.4 Tampering with the device)

9.4 Disposal

- ▶ Dispose of the device in accordance with the national environmental regulations.

10 Approvals/standards

Test standards and regulations (→ 8 Technical data)

The EC declaration of conformity and approvals can be found at:
www.ifm.com → data sheet search → CR0451 → Approvals