Installation instructions
BasicDisplay
ecomotion
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

<table>
<thead>
<tr>
<th>Mounting type</th>
<th>Required accessories</th>
<th>Art. no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>e.g. in a panel</td>
<td>mounting frame</td>
</tr>
<tr>
<td>RAM® mount</td>
<td>e.g. as desktop unit that can be aligned in various directions</td>
<td>RAM® mount set</td>
</tr>
<tr>
<td>Structure</td>
<td>e.g. on a control panel</td>
<td>–</td>
</tr>
<tr>
<td>Combination</td>
<td>with CR040x BasicController</td>
<td>cover with built-in display recess</td>
</tr>
</tbody>
</table>

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.
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)

► Screw the mounting plate onto an even surface.  
  Tightening torque: 5 ±0.5 Nm
► Srew 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

► 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.
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.

4.5.2 Installation of the cover

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

► 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.

<table>
<thead>
<tr>
<th>Potential</th>
<th>Description</th>
<th>Pin no.</th>
<th>Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>VBB⁺</td>
<td>Supply voltage</td>
<td>2</td>
<td>≤ 2 A time-lag</td>
</tr>
</tbody>
</table>

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

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.

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

<table>
<thead>
<tr>
<th>Display data</th>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Programmable display with graphic capabilities, can be used with BasicController or as stand-alone display</td>
</tr>
<tr>
<td>Format</td>
<td>TFT LCD colour display, transmissive</td>
</tr>
<tr>
<td>Resolution</td>
<td>57.6 x 43.2 mm (active area), 2.8” diagonal</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>320 x 240 pixels</td>
</tr>
<tr>
<td>Surface</td>
<td>4 : 3</td>
</tr>
<tr>
<td>Colours</td>
<td>polyester film</td>
</tr>
<tr>
<td>Background illumination</td>
<td>256 (8 bits)</td>
</tr>
<tr>
<td>Brightness</td>
<td>≥ 300 cd/m², typically 350 cd/m² (adjustable 0...100%, increments 1%)</td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>≥ 400:1, typically 500:1</td>
</tr>
<tr>
<td>Character sets</td>
<td>preinstalled: Arial, Lucida Console (fixed font sizes)</td>
</tr>
</tbody>
</table>

For further information see the BasicDisplay manual www.ifm.com → data sheet search → CR0451 → Additional data

<table>
<thead>
<tr>
<th>Mechanical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x D)</td>
</tr>
<tr>
<td>Cutout for panel mounting (W x H)</td>
</tr>
<tr>
<td>Cutout for surface mounting (Ø)</td>
</tr>
<tr>
<td>Hole for locating pins (Ø)</td>
</tr>
<tr>
<td>Housing material</td>
</tr>
<tr>
<td>Pushbuttons</td>
</tr>
<tr>
<td>Rocker switch</td>
</tr>
<tr>
<td>Background illumination operating elements</td>
</tr>
<tr>
<td>Protection rating</td>
</tr>
<tr>
<td>Operating/storage temperature</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

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We reserve the right to make technical alterations without prior notice!
### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>8...32 V DC</td>
</tr>
<tr>
<td>Current consumption</td>
<td>70 mA (at 24 V DC; 100% background illumination)</td>
</tr>
<tr>
<td>Overvoltage</td>
<td>36 V for t ≤ 10 s</td>
</tr>
<tr>
<td></td>
<td>at U_b ≤ 7.8 V</td>
</tr>
<tr>
<td></td>
<td>at U_b ≤ 7.0 V</td>
</tr>
<tr>
<td>Processor</td>
<td>Freescale PowerPC 5517E, 50 MHz</td>
</tr>
<tr>
<td>Memory (total)</td>
<td>592 Kbytes RAM / 1536 Kbytes Flash / 1 Kbyte FRAM</td>
</tr>
<tr>
<td>CAN Baud rate</td>
<td>20 Kbits/s...1 Mbit/s (default 250 Kbits/s)</td>
</tr>
<tr>
<td>CANopen, CiA DS 301 version 4, CiA DS 401 version 1.4 or SAE J 1939 or free protocol</td>
<td></td>
</tr>
<tr>
<td>Software/programming</td>
<td>CODESYS version 2.3 (IEC 61131-3)</td>
</tr>
<tr>
<td></td>
<td>via integrated target visualisation</td>
</tr>
<tr>
<td>Status LED</td>
<td>two-colour LED (red/green)</td>
</tr>
</tbody>
</table>

#### Operating states (LED)

<table>
<thead>
<tr>
<th>Colour</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>–</td>
<td>permanently off no operating voltage</td>
</tr>
<tr>
<td>orange</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></td>
<td>2 Hz</td>
<td>application is running (RUN)</td>
</tr>
<tr>
<td></td>
<td>permanently on</td>
<td>application stopped (STOP)</td>
</tr>
<tr>
<td>red</td>
<td>5 Hz</td>
<td>application stopped due to undervoltage</td>
</tr>
<tr>
<td></td>
<td>permanently on</td>
<td>system fault (fatal error)</td>
</tr>
</tbody>
</table>

### Test standards and regulations

- **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
- **UN/ECE-R10** Emission standard Immunity with 100 V/m
- **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)
### Technical data

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Standards/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climatic tests</strong></td>
<td></td>
</tr>
<tr>
<td>- Damp heat, cyclic</td>
<td>EN 60068-2-30: 2006</td>
</tr>
<tr>
<td>upper temperature 55°C, number of cycles: 6</td>
<td></td>
</tr>
<tr>
<td>- Damp heat, steady state</td>
<td>EN 60068-2-78: 2002</td>
</tr>
<tr>
<td>test temperature 40°C / 93% RH, Test duration: 21 days</td>
<td></td>
</tr>
<tr>
<td>- Salt spray test</td>
<td>EN 60068-2-52: 1996</td>
</tr>
<tr>
<td>severity level 3 (motor vehicle)</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical tests</strong></td>
<td></td>
</tr>
<tr>
<td>- Test VII; Vibration, random</td>
<td>ISO 16750-3: 2007</td>
</tr>
<tr>
<td>mounting location: vehicle body</td>
<td></td>
</tr>
<tr>
<td>- Vibration, sinusoidal</td>
<td>EN 60068-2-6: 2008</td>
</tr>
<tr>
<td>10...500 Hz; 0.72 mm/10 g; 10 cycles/axis</td>
<td></td>
</tr>
<tr>
<td>- Bumps</td>
<td>ISO 16750-3: 2007</td>
</tr>
<tr>
<td>30 g/6 ms; 24,000 shocks</td>
<td></td>
</tr>
<tr>
<td><strong>Tests for railway applications</strong></td>
<td></td>
</tr>
<tr>
<td>- Electronic equipment used on rolling stock</td>
<td>EN 50155 clause 12-2: 2008</td>
</tr>
<tr>
<td>- Electromagnetic compatibility (EMC)</td>
<td>EN 50121: 2006</td>
</tr>
</tbody>
</table>

### Back of the unit

1. M12 connector
2. M52 thread for fixing nut
3. Locating pins

### Connection

**M12 connector, A-coded, 5 poles**

### Wiring

<table>
<thead>
<tr>
<th>Supply, CAN</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n.c.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8...32 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CAN_H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAN_L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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