User Manual

09/10 MN05013014Z-EN
replaces 05/08 AWB2528-1611en

Display/Operator System for CANopen MFD-CP4-CO, MFD-80

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Original Operating Instructions
The German-language edition of this document is the original operating manual.

Translation of the original operating manual
All editions of this document other than those in German language are translations of the original German manual.

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2nd edition 2010, edition date 09/10
See revision protocol in the "About this manual" chapter

Production: Thomas Kracht
Translation: Terence Osborn

Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.

- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).

Contents

About This Manual

This manual describes the installation, commissioning and operation of the display/operating system.

List of revisions

The following significant amendments have been introduced since the previous issue:

Publication date	page/ chapter	Key word	New	Change
09/10	All	Changeover to Eaton document numbers	✓	

Target group

This display/operator device must only be mounted and connected by qualified electrical personnel or a person familiar with the electrical installation. A specialist knowledge of electrical engineering is needed for commissioning. Plant sections may be damaged if the display/operator system is incorrectly connected or incorrectly programmed.

Other manuals

The description of the devices that have a terminal for the display/operator system is provided in separate manuals (MN, previous description manual):

- EC4P (MN05003003Z-EN; previous description AWB2724-1584GB)
- XC100 (MN05003004Z-EN; previous description AWB2724-1453GB)
- XC121 (MN05003002Z-EN; previous description AWB2724-1578GB)
- XC200 (MN05003001Z-EN; previous description AWB2724-1491GB).

All manuals are available on the Internet for download as PDF files. Go to http://www.eaton.com → **Support** and enter the document number in the Quick Search field, e.g. "1491"

Writing Conventions

Symbols used in this manual have the following meanings:

▶ indicates actions to be taken.

Caution!
Warns of a hazardous situation that could result in damage to the product or components.

Warning!
Warns of the possibility of serious damage and slight injury.

Danger!
Indicates the risk of major damage to property, or serious or fatal injury.

Draws your attention to interesting tips and supplementary information.

For greater clarity, the name of the current chapter is shown in the header of the left-hand page and the name of the current section in the header of the right-hand page. This does not apply to pages at the start of a chapter and empty pages at the end of a chapter.

1 About the Display/Operator System

Overview

The display/operator **system** consists of the following individual components:

- MFD-80... display/operating **unit**
- Communication module MFD-CP4-CO
- CANopen connection cable for connecting an Eaton PLC (such as EU4A-RJ45-CAB2 for connecting an EC4P).

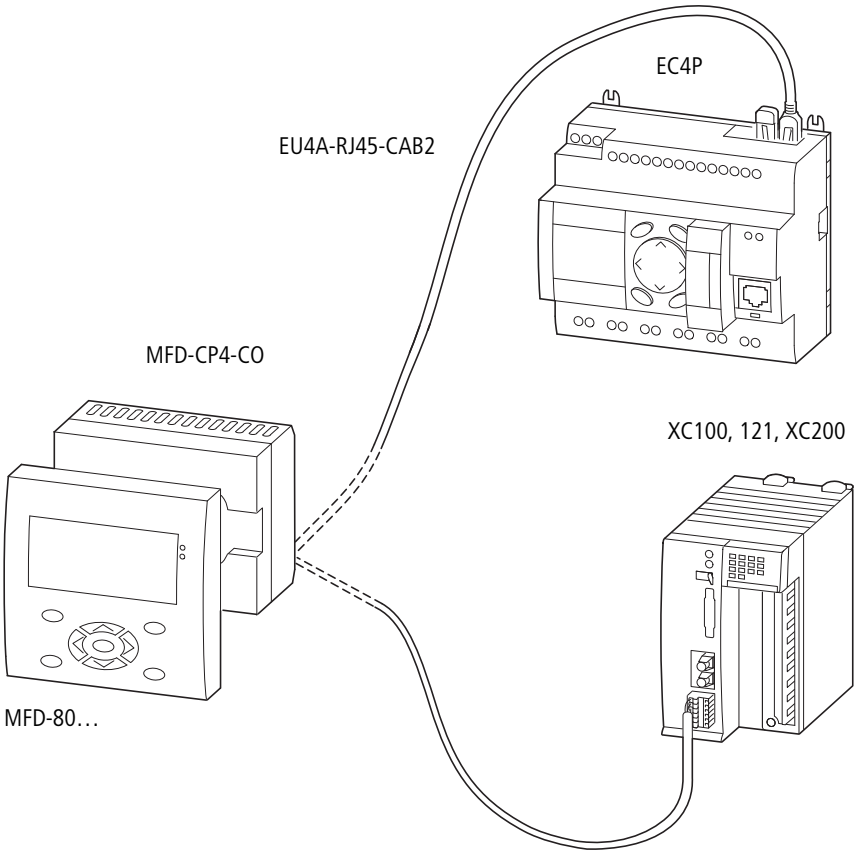


Figure 1: Display/operator system with connected Eaton PLC

Danger!
The display/operator system must only be run if it is properly mounted and installed:

- The installation must comply with regulations for electromagnetic compatibility (EMC).
- MFD-CP4-CO is designed to be installed in an enclosure, switch cabinet or distribution board.
- If the display/operator system is switched on, the controlled devices should not respond in an uncontrolled manner, e.g. uncontrolled motor startups.

Task

The display/operator system enables you to externally implement display and operator functions for a connected PLC. If the PLC is mounted in a control cabinet, for example, the display/operator unit can be installed in the control cabinet door to provide the following display and operator functions.

View functions

- Basic screens (preconfigured display screens)

During initialization, the display can be loaded with up to 64 basic pages (preconfigured display pages/screens). These basic pages are selected during operation. Each basic page provides space for up to 4 variables. The variables can be displayed and edited.

Instead of embedding variables, the basic page can also be run in scrolling mode. In this mode you can add lines to any position in the basic page. Existing lines are overwritten or moved up or down, depending on the setting.

The basic pages 1 to 62 are stored retentively on the display.

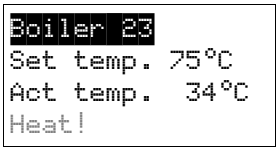


Figure 2: Example of a basic page

- Start page

A user-defined 4-line start page can also be loaded in addition to the basic pages. This is stored retentively on the display device. The start page is then always displayed if there is no current data from the PLC. This is the case, for example, during the startup phase or when a monitoring error occurs. The display background is shown on the last line of the start page.

Figure 3: Example of a start page:

Operator functions

- Baud rate and Node ID setting

The baud rate and node ID are set via a configuration menu which you can call up irrespective of the display's fieldbus status. The device is factory set for automatic baud rate detection and node ID = 2. More information on the device settings is provided on Unbekannte Quelle des Querverweises.

The CP4 display is provided with a keypad with 9 buttons. You can also control 2 LEDs.

Further information on the creation of basic and start pages and how to use these during operation is provided in the application note AN2700I10.

This is available for download at:
https://es-assets.eaton.com/AUTOMATION/DOWNLOAD/APPLICATION-EXAMPLES-NOTES-MODULES/EASY_HMI/MFD-CP4-CO/AN27I10.zip.

Surface mounting

Display/keypad

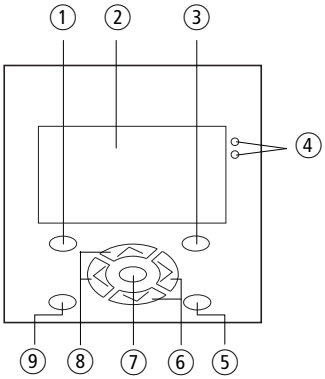
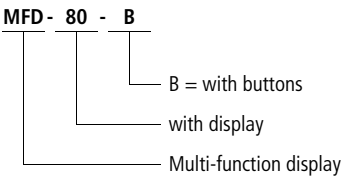


Figure 4: Display/keypad

1. DEL pushbutton
2. Graphic display
3. ALT button
4. LEDs for signalling
5. Mode pushbutton
6. Right, down cursor buttons
7. OK button
8. Left, up cursor buttons
9. ESC button

Key to part numbers



Communication module

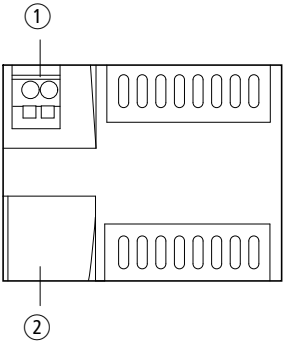
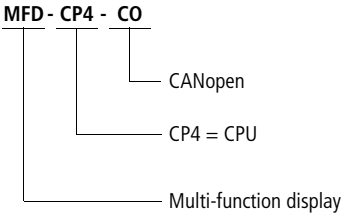


Figure 5: Communication module

① Supply voltage

② CANopen interface

Key to part numbers



2 Installation

The MFD-CP4-CO must only be installed and connected up by trained electricians or a person familiar with the installation of electrical equipment. The MFD-CP4-CO is installed in the following order:

- Mounting,
- Connecting the serial interface,
- Connecting the power supply.

Mounting

Install the display/operating unit in the front of a control cabinet, a service distribution board, operator panel or in an enclosure. You can protect the display/operating unit with a protective diaphragm or cover, depending on the environment in which it is to be used. This must be fitted before the MFD-CP4-CO is mounted and is therefore described in the next section.

The MFD-CP4-CO communication module must be mounted in such a way that all the terminals are protected against direct contact, liquids and dust during operation.

For sufficient heat circulation around the device, the rear of the MFD-CP4-CO and the terminals must have a clearance of at least 3 cm from the wall or adjacent devices.

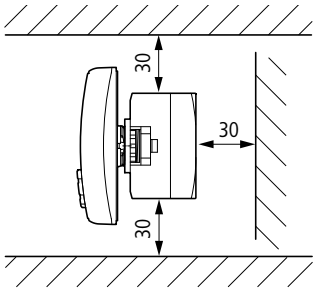


Figure 6: Minimum clearance for mounting

Fitting the protective diaphragm

For special applications such as in the food industry, the keypad must be protected against the ingress of dust, liquids etc. In this case fit the protective diaphragm over the display/ operating unit.

→ Fit the protective diaphragm before mounting the display/ operating unit.

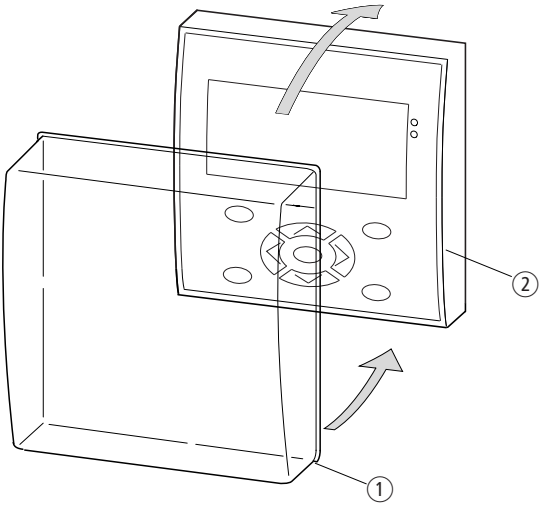


Figure 7: Fitting the protective diaphragm

① Protective diaphragm
② Display and operating unit

Danger!
Ensure that the membrane fits snugly in the groove of the display/operator unit. Otherwise a proper seal cannot be guaranteed and particles may enter underneath the membrane. This may cause malfunctions in the keypad.

In food industry applications, there is the risk of bacteria building up underneath the membrane.

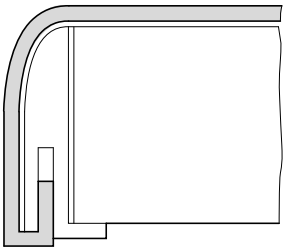


Figure 8: Correct location of the protective diaphragm

→ If the protective diaphragm has to be replaced, the display/operating unit has to be removed. Replace the diaphragm and refit the device.

Mounting the protective cover

The protective cover is provided for using the device in aggressive environments. This protects the display and the operating unit against mechanical damage or destruction. Protection type to IP 65 is maintained.

The protective cover can be opened so that the operating unit can be used.

The protective cover can be closed with a sealing facility to provide protection against unauthorized operation.

→ Fit the protective cover before mounting the display/operator unit.

▶ First remove the front frame before mounting.

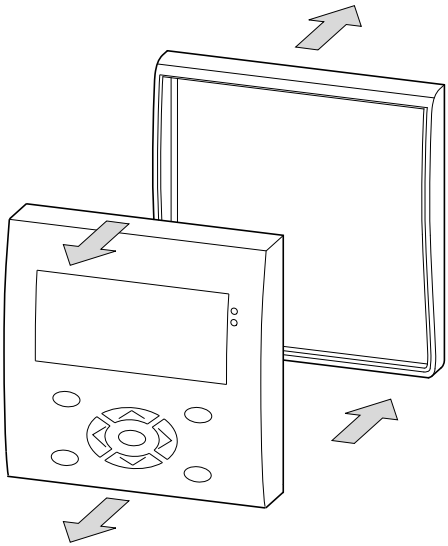


Figure 9: Removing the front frame

The protective cover can be mounted in two different positions.

▶ Choose the position that is most suitable for the application at hand and your requirements.

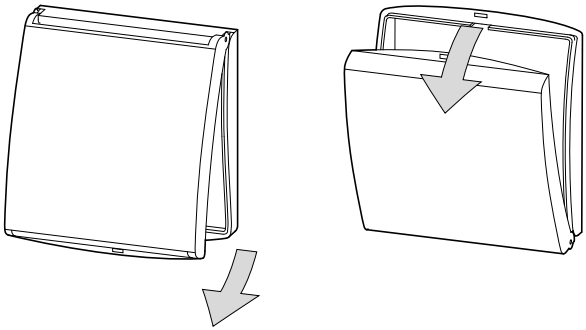


Figure 10: Position of the protective cover

▶ Mount the protective cover as shown in the figure.

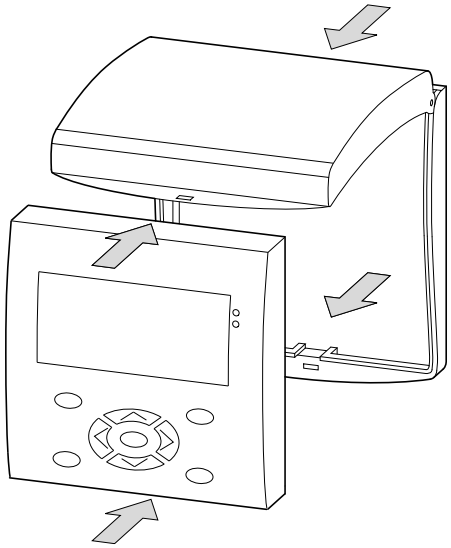


Figure 11: Mounting the protective cover

Sealing the protective cover

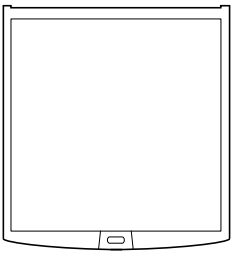


Figure 12: Sealing the protective cover

The grip handle of the protective cover is provided with holes that can be used in any mounting position. You can fit a wire or similar material through these holes in order to seal the cover. If the wire is provided with a lead seal, the cover is sealed. The cover can then only be opened by breaking the seal or the wire.

Mounting the display/operating unit (front mounting)

→ The protective diaphragm or the protective cover must be fitted beforehand.

▶ Drill and punch out two 22.5 mm diameter holes in the front plate. The diameter is the same as is normally required for control circuit devices.

→ Observe the following technical requirements:

- The hole spacing is 30 mm.
- The maximum thickness of the front plate must not be more than 6 mm.
- Ensure minimum clearances (→ page 11).
- In order to ensure protection to IP65, the surface of the mounting front must be even and smooth.

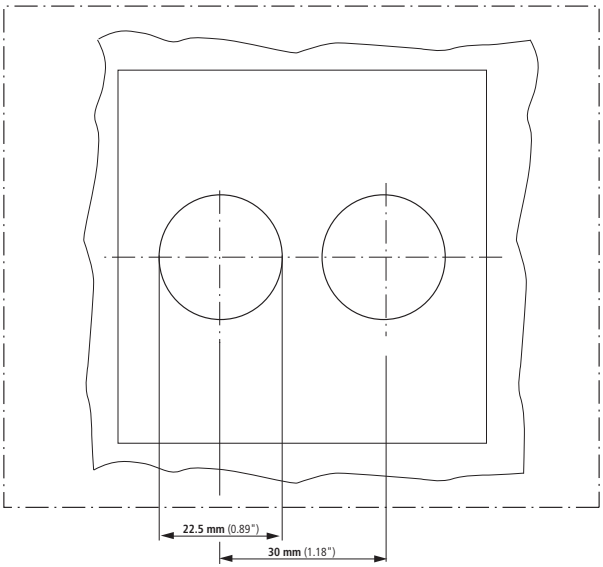


Figure 13: Drill holes for the MFD

▶ Fit the display/operator unit in the punched fixing holes.

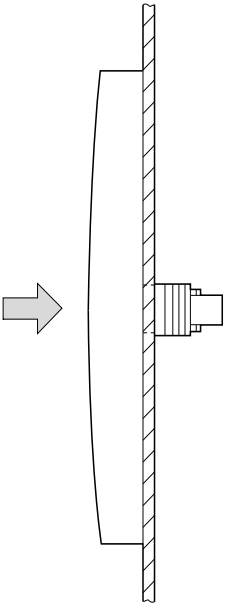


Figure 14: Mounting the display/operator unit

▶ Tighten the display/operating unit with the M22-MS mounting ring tool (→ figure 15).

The tightening torque must be between 1.2 and 2 Nm

→ Ensure that the correct torque is used. If the tightening torque is too low or high, this may impair the seal.

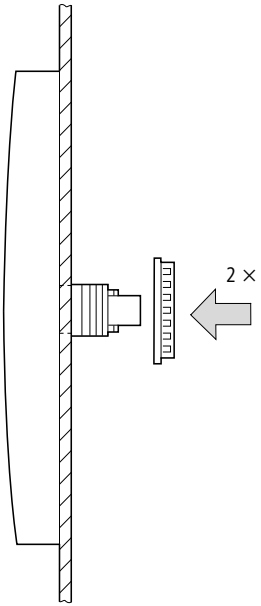


Figure 15: Screw fastening the display/operating unit

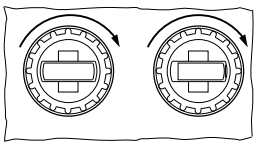


Figure 16: Rear of the mounted display/operator unit

Removing the display/operating unit (front mounting)

▶ Unscrew the fixing element and remove the display/operator unit.

Mount communication module

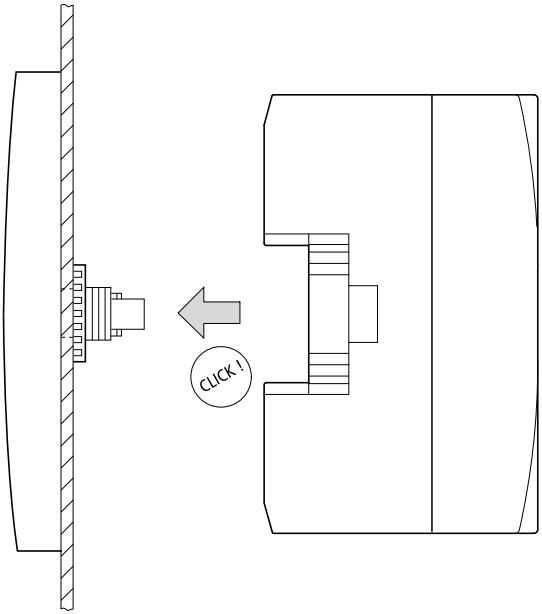


Figure 17: Mount communication module

Removing the communication module

Use a screwdriver with a 100 x 3.5 mm slot width.

- ▶ Insert the screwdriver into the lug of the fixing shaft catch. [1]
- ▶ Lever out the slide catch. [2]
- ▶ Pull out the communication module from the fixing shafts [3] .

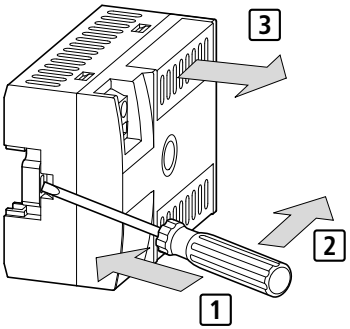


Figure 18: Releasing the fixing shaft

Connections

Terminations

The MFD-CP4-CO is fitted with cage clamp terminals for connecting the power supply and the connection cable to the CANopen interface.

Tool for cage clamp terminals
Slot-head screwdriver, width 3.5 mm x 0.6 mm.

Connection cross-sections of the MFD cage clamp terminal cables

- Power supply terminal: 0.08 - 2.5 mm^2 (AWG 28 –12)
- Interface terminal
  0.14 to 0.5 mm^2 (AWG 26 – 20)

Connecting the power supply

→ The required connection data for the MFD-CP4-CO is provided in the Section "Technical data", page 29.

DC power supply MFD-CP4-CO

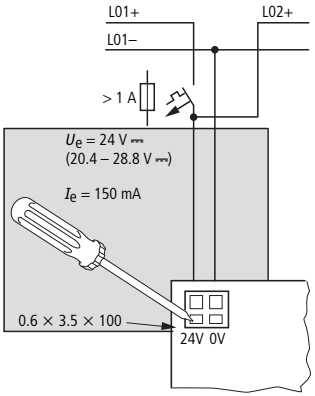


Figure 19: Power supply on the MFD

→ The MFD-CP4-CO is protected against polarity reversal. Ensure the correct polarity of the terminals to ensure that the MFD-CP4-CO functions correctly.

Cable protection

Provide cable protection (F1) of at least 1 A (slow) on the MFD-CP4-CO.

Connecting the connection cable

→ figure 20 and 21 or 22

- ▶ Remove the interface cover carefully [1] .
- ▶ Use a screwdriver to press down the recess next to the terminal [2] and connect the wires of the connection cable to the terminals in the order stated [3] . Proceed accordingly in the reverse order to remove the connection cable [4] .
- ▶ Refit the interface cover. [5]

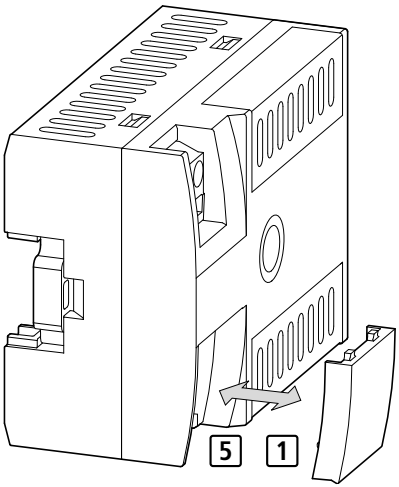


Figure 20: Fitting/removing the interface cover.

MFD-CP4-CO to EC4P

You can use the EU4A-RJ45-CAB2 cable to connect the MFD-CP4-CO to an EC4P.

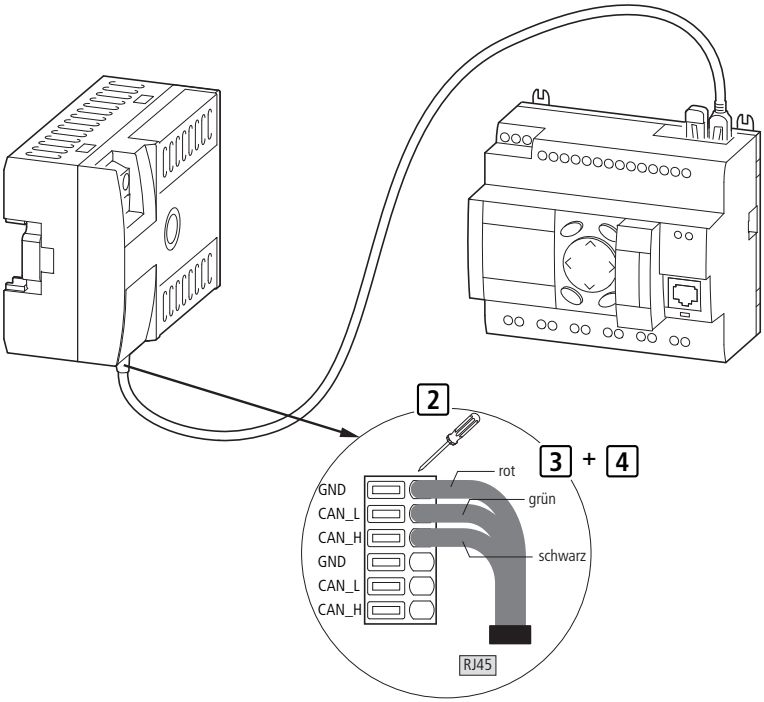


Figure 21: Connecting the MFD-CP4-CO to EC4P
Connector type: 6-pole cage clamp terminal block, cable connections: up to 0.5 mm^2

MFD-CP4-CO to XC200, XC121

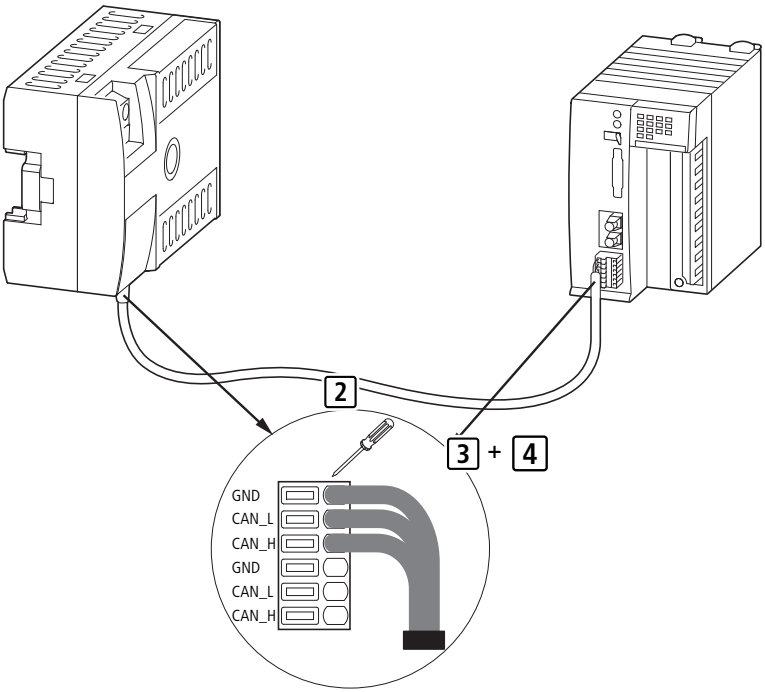


Figure 22: Connecting MFD-CP4-CO to XC121 or XC200
Connector type: 6-pole cage clamp terminal block, cable connections: up to 0.5 mm^2

Bus Terminating Resistors

120 Ω bus terminating resistors must be used at the ends of the network:

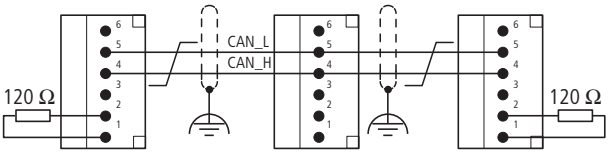


Figure 23: Possible configuration of a CANopen bus with bus termination resistors

3 Setting and commissioning the device

Settings

You can display and modify the station address (node ID), baud rate, backlight and contrast via the MFD80 display.

Press the DEL and ALT buttons simultaneously to call up the Setup menu.

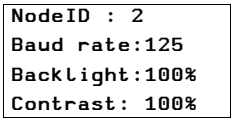


Figure 24: Setup menu

Use the ∧ and ∨ buttons to select the required parameters. Press OK to then switch to Entry mode. Entry mode enables you to change the setting using the < and > buttons. Pressing the OK button again stores the actual value.

Pressing the ∨ button in the last line causes the current software version of the device to be displayed.

→ The device is provided with an automatic baud rate detection feature. A setting for this is therefore not normally required. If the MFD4-CO is the only station on the bus, and if the master does not support automatic baud rate detection, the baud rate can be set via the display.

Initial Commissioning

Danger!
The display/operator system must only be run if it is properly mounted and installed:

- The installation must comply with regulations for electromagnetic compatibility (EMC).
- MFD-CP4-CO is designed to be installed in an enclosure, switch cabinet or distribution board.
- If the display/operator system is switched on, the controlled devices should not respond in an uncontrolled manner, e.g. uncontrolled motor startups.

Prior to initial commissioning, the station number (NodeID) of the MFD-CP4-CO is set as follows via the display:

▶ Connect the supply voltage.

▶ Press the DEL and ALT buttons simultaneously. The Setup menu is displayed. The cursor is in the first line on the NodeID parameter.

▶ Press the OK button and select the required addresses with the < and > buttons.

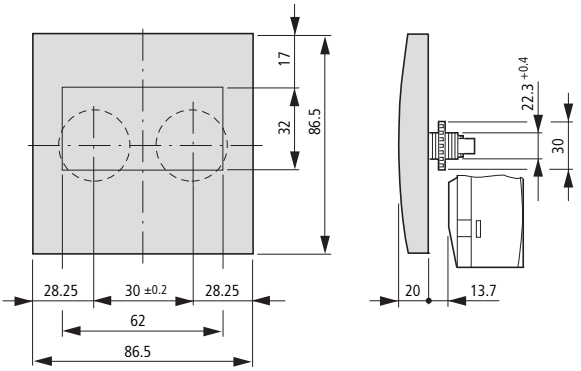
▶ Press the OK button again to save the value.

The next time the power supply is switched off and on the device will try to connect to the new address.

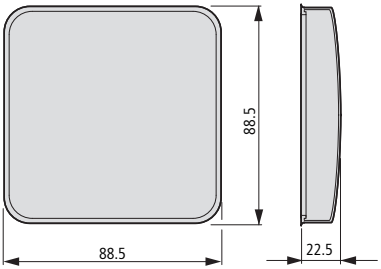
Appendix

Dimensions

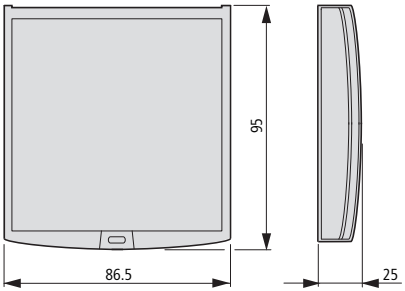
MFD-80.. display/operating unit



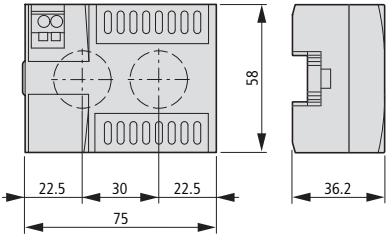
MFD-80-XM protective diaphragm



MFD-80-XS protective cover



Communication module MFD-CP4-CO



Technical data General ambient conditions

Climatic conditions (damp heat constant to IEC 60068-2-78; cyclical to IEC 60068-2-30) (cold to IEC 60068-2-1, heat to IEC 60068-2-2)			
Operating ambient temperature Installed horizontally/vertically		°C, (°F)	–25 to 55, (–13 to 131)
Condensation			Prevent condensation by means of suitable measures
Display legibility		°C, (°F)	–5 to 50, (23 to 122)
Storage/transport temperature		°C, (°F)	–40 to 70, (–40 to 158)
Relative humidity (IEC 60068-2-30), non-condensing		%	5 to 95
Air pressure (in operation)		hPa	795 up to 1080
Ambient mechanical conditions			
Pollution degree			
Power supply unit/CPU			2
Display/operating unit			3
Degree of protection (EN 50178, IEC 60529, VBG4)			
Power supply unit/CPU			IP20
Display/operating unit			IP65
Display/operating unit with protective cover			IP65
Display/operating unit with protective diaphragm			IP65
Vibration (IEC 60068-2-6)			
Constant amplitude 0.15 mm		Hz	10 up to 57
Constant acceleration, 2 g		Hz	57 up to 150
Shocks (IEC 60068-2-27) semi-sinusoidal 15 g/11 ms		Shocks	18
Drop (IEC 60068-2-31)	Drop height	mm	50
Free fall, when packed (IEC 60068-2-32)		m	1

Electromagnetic compatibility (EMC)		
Electrostatic discharge (ESD), (IEC/EN 61000-4-2, severity level 3)		
Air discharge	kV	8
Contact discharge	kV	6
Electromagnetic fields (RFI), (IEC/EN 61000-4-3)	V/m	10
Radio interference suppression (EN 55011, EN 55022), limit class		B
Fast transient burst (IEC/EN 61000-4-4, severity level 3)		
Supply cables	kV	2
Signal cables	kV	2
High energy pulses (Surge) MFD (IEC/EN 61000-4-5, severity level 2), power cable symmetrical	kV	1
Line-conducted interference (IEC/EN 61000-4-6)	V	10
Insulation resistance		
Overvoltage category		II
Clearance in air and creepage distances		EN 50178, UL 508, CSA C22.2, No 142
Insulation resistance		EN 50178
Tools and cable cross-sections		
Power supply terminal		
Solid and flexible with ferrule, minimum to maximum	mm^2	0.08 up to 2.5
	AWG	28 up to 12
Interface terminal		
Flexible, tin-coated, minimum to maximum	mm^2	0.14 up to 0.5
	AWG	26 up to 20
Slot-head screwdriver, width	mm	3.5 × 0.5
	inch	0.14 × 0.02

MFD-80.. display/operating unit

Front dimensions W × H × D		
With buttons	mm	86.5 × 86.5 × 21.5
	inches	3.41 × 3.41 × 0.85
Without buttons	mm	86.5 × 86.5 × 20
	inches	3.41 × 3.41 × 0.79
Overall dimensions with fixing shaft W × H × D		
With buttons	mm	86.5 × 86.5 × 43
	inches	3.41 × 3.41 × 1.69
Thickness of fixing wall (minimum; maximum)	mm	1; 6
	inches	0.04; 0.24
Weight	g	130
	lb	0.287
Mounting		2 22.5 mm (0.886 in) holes Display fastened with two fixing rings
Maximum tightening torque of the fixing rings [Nm]		1.2 up to 2
Power supply		via MFD-CP4-CO communication module
LCD display		
Type		Graphic/monochrome
Visible area W x H	mm	62 x 33
Size of pixels	mm	0.4 x 0.4
Number of pixels (W x H)		132 x 64
Spacing (pixel centre to pixel centre)	mm	0.42
LCD backlight		yes
Backlight color		Yellow/green
Backlight can be switched on and off in the visualization application via LE1.		yes
LEDs		
Number of LEDs		2

Operator buttons	
Number	9
Pushbutton illumination (LED)	
Number	5
Color	green

MFD-XM-80 protective diaphragm

Dimensions B × H × T	mm	88 × 88 × 25
	inches	3.46 × 3.46 × 0.98
Weight	g	25
	lb	0.055
Mounting		Is fitted over the display/keypad (with silver bezel)

MFD-XS-80 protective cover

Dimensions B × H × T	mm	86.5 × 94 × 25
	inches	3.41 × 3.41 × 0.98
Weight	g	36
	lb	0.079
Mounting		Is fitted over the display/keypad (without silver bezel)

Communication module MFD-CP4-CO

Dimensions W × H × D	mm	75 × 58 × 36.2
	inches	2.95 × 2.28 × 1.43
Weight	g	164
	lb	0.362
Mounting		Plug-fitted to the display fixing shaft
Current supply		
Rated voltage		
Nominal value	V DC, (%)	24, (+20, –15)
Permissible range	V DC	20.4 - 28.8
Ripple	%	≦ 5
Input current		
for 24 V DC, MFD-CP4-CO, MFD-80…	mA	part no. 150
Voltage dips, IEC/EN 61131-2	ms	10
Heat dissipation		
for 24 V DC, MFD-CP4-CO, MFD-80…	W	part no. 3.6
CANopen		
Device profile		to DS301 V4
PDO type		asynchronous (event controlled)
Address		1 to 63 can be set through display
Baud rate		10 KByte to 1 MByte, Automatic detection, manual setting via display possible.
Terminal type		6 pole spring-cage terminal
Terminal resistor	Ω	external 120

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