EUCHNER

Operating Instructions

Contents

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1. About this document

1.1. Scope

This document is valid for expansion modules MCM-MLI…-172876/172795/172879/172882 and submodules with operating mode selector.

These operating instructions, the document *Safety information*, the operating instructions for the modules connected and any associated data sheets form the complete user information for your system.

Series	Module connection type	Product versions
MCM-…	…-MLI-…	V1.2.X

1.1.1. Notes on older product versions

Products with lower product versions or without a version number are not described by these operating instructions. Please contact our support team in this case.

1.2. Target group

Design engineers and installation planners for safety systems on machines, as well as setup and servicing staff possessing special expertise in handling safety components as well as expertise in the installation, setup, programming and diagnostics of programmable logic controllers (PLCs) and bus systems.

1.3. Key to symbols

Symbol/depiction	Meaning
📖	Printed document
(www)	Document is available for download at www.euchner.com
⚠️ DANGER WARNING CAUTION	Safety precautions **Danger** of death or severe injuries **Warning** about possible injuries **Caution** Slight injuries possible
ⓘ NOTICE Important!	**Notice** about possible device damage **Important** information
Tip	Useful information

1.4. Supplementary documents

The overall documentation for this device consists of the following documents:

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	📖
Operating instructions (MAN20001782)	(this document)	(www)
Declaration of conformity	Declaration of conformity	(www)
Operating instructions for the connected modules and their submodules	Device-specific information for the related module and the installed submodules	(www)
Any associated data sheets	Item-specific information about deviations or additions	📖

> ⓘ **Important!**
>
> Always read all documents to gain a complete overview of safe installation, setup and use of the device. The documents can be downloaded from www.euchner.com. For this purpose, enter the doc. no. or the order number for the device in the search box.

2. Correct use

The expansion module MCM offers space for additional submodules MSM and is used to expand MGB2 systems with MLI interface.

Before the device is used in combination with a safety function, a risk assessment must be performed on the machine, e.g. in accordance with the following standards:

‣ EN ISO 13849-1
‣ EN ISO 12100
‣ EN IEC 62061

Correct use includes observing the relevant requirements for installation and operation, particularly based on the following standards:

‣ EN 60204-1
‣ Possibly additional standards (depending on the submodules MSM used)

The expansion module MCM-MLI may be combined only with suitable modules that have an MLI interface. You will find more detailed information on compatibility in the operating instructions for the related MLI device. See also *Table 1: Combination options for modules with MLI technology*.

On the unauthorized modification of system components, EUCHNER provides no warranty for function.

The customer is responsible for the safe overall function, especially for the safe integration into the PROFIsafe environment.

> ⓘ **Important!**
>
> ‣ The user is responsible for the proper integration of the device into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-1.
> ‣ Correct use requires observing the permissible operating parameters (see chapter *14. Technical data on page 20*).
> ‣ If a data sheet is included with the product, the information on the data sheet applies.

Table 1: Combination options for modules with MLI technology

Base units	Submodules MSM-1-P-… MSM-1-R-… MSM-1-N-…	Submodules MSM-2-R-…	Submodules MSM-.-K-…
Expansion modules MCM-MLI-Y000X00-JJ-172795 MCM-MLI-Y0X0000-JJ-172876 MCM-MLI-Y00000X-JJ-172879	●	○ *	-
MCM-MLI-Y0X-JJ-172882	-	●	-

* Submodules MSM-2-R-… are allowed to be mounted only in Slot 0X intended for this purpose.

Key to symbols		
	●	Combination possible
	○	Limited combination possible
	-	Combination not possible

3. Description of the safety function

The expansion module MCM has the safety function of *evaluating submodules with safety function and forwarding the data to the bus module MBM*. If you use submodules MSM with safety function in the expansion module, please observe the description of the safety functions in the operating instructions for your bus module MBM and in any data sheet for your submodule MSM.

The submodule MSM-2-R-FA-M... has the safety function of safe switching and monitoring of the selected operating mode.

4. Exclusion of liability and warranty

In case of failure to comply with the conditions for correct use stated above, or if the safety instructions are not followed, or if any servicing is not performed as required, liability will be excluded and the warranty void.

5. General safety precautions

Additionally observe the safety regulations in the operating instructions for your bus module MBM.

⚠	**WARNING**
	
	Danger to life due to improper installation or due to bypassing (tampering). Any contained safety components fulfill a personnel protection function.
	‣ Contained safety components must not be bypassed, turned away, removed or otherwise rendered ineffective. On this topic pay attention in particular to the measures for reducing the possibility of bypassing according to EN ISO 14119:2025, section 8.
	‣ Mounting, electrical connection and setup only by authorized personnel possessing the following knowledge:
	  - specialist knowledge in handling safety components
	  - knowledge about the applicable EMC regulations
	  - knowledge about the applicable regulations on operational safety and accident prevention.

ⓘ	**Important!** Prior to use, read the operating instructions and keep these in a safe place. Ensure the operating instructions are always available during mounting, setup and servicing. For this reason you should archive a printed copy of the operating instructions. You can download the operating instructions from www.euchner.com.

6. Function

Expansion modules MCM have space for up to three submodules. In this way, even more extensive control tasks can be implemented.
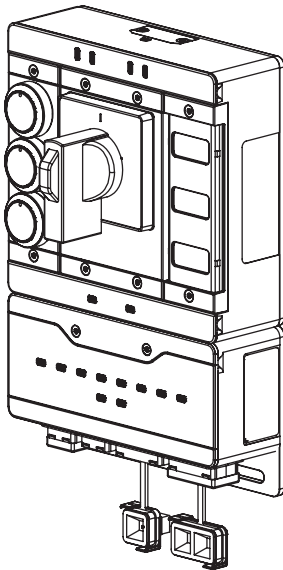

Fig. 1:	4-slot expansion module MCM with submodule with operating mode selector on a bus module MBM (direct plug)
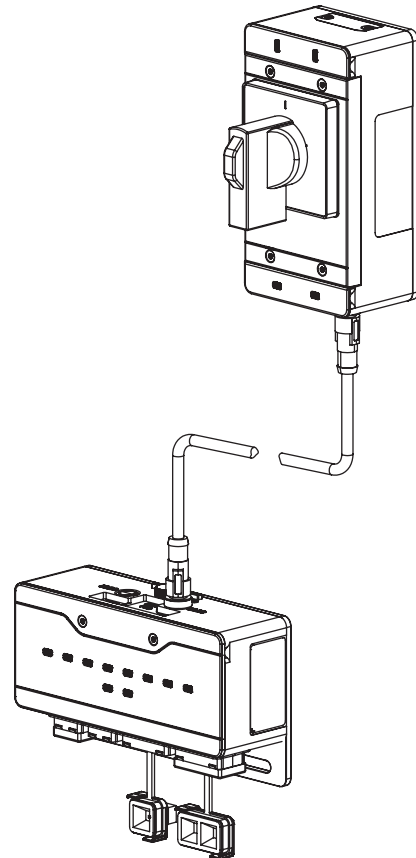
Fig. 2:	2-slot expansion module MCM with submodule with operating mode selector on a bus module MBM (cable connect)

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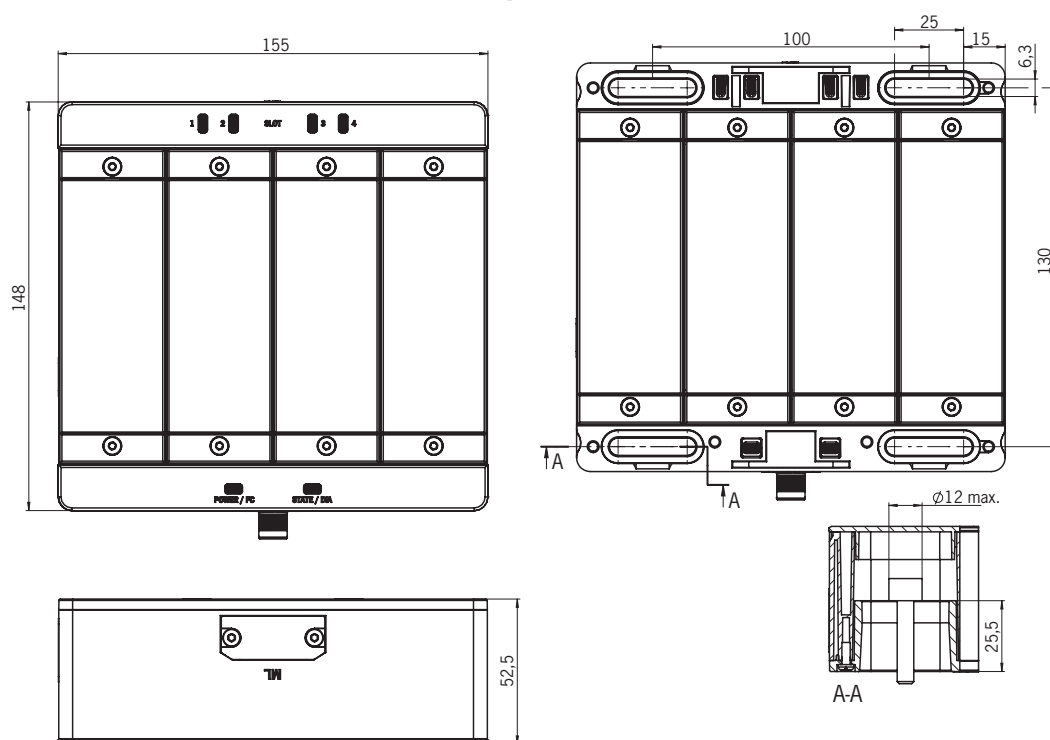## 6.1.   Dimension drawing for expansion module MCM

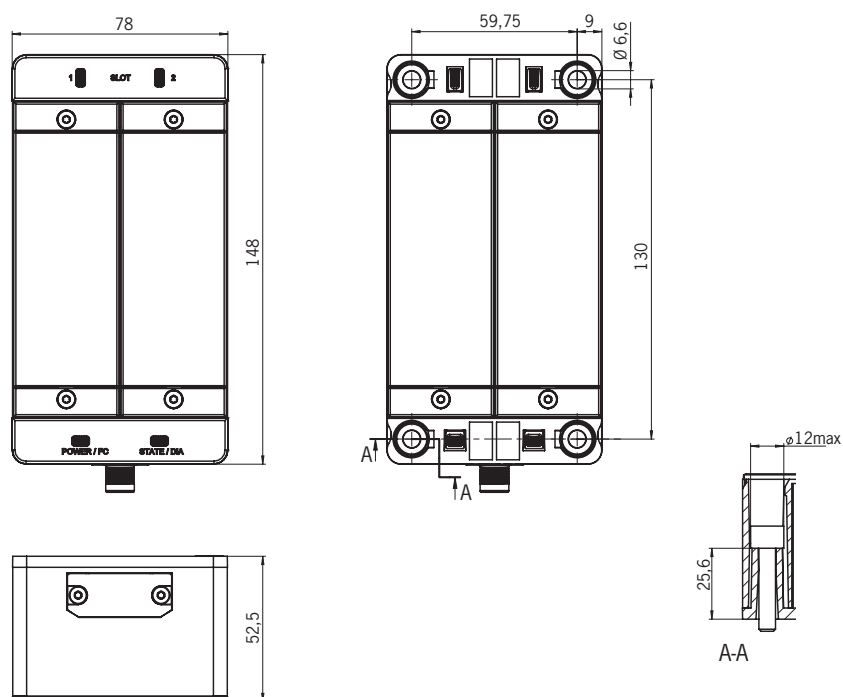Fig. 3:   Dimension drawing for 4-slot expansion module MCM

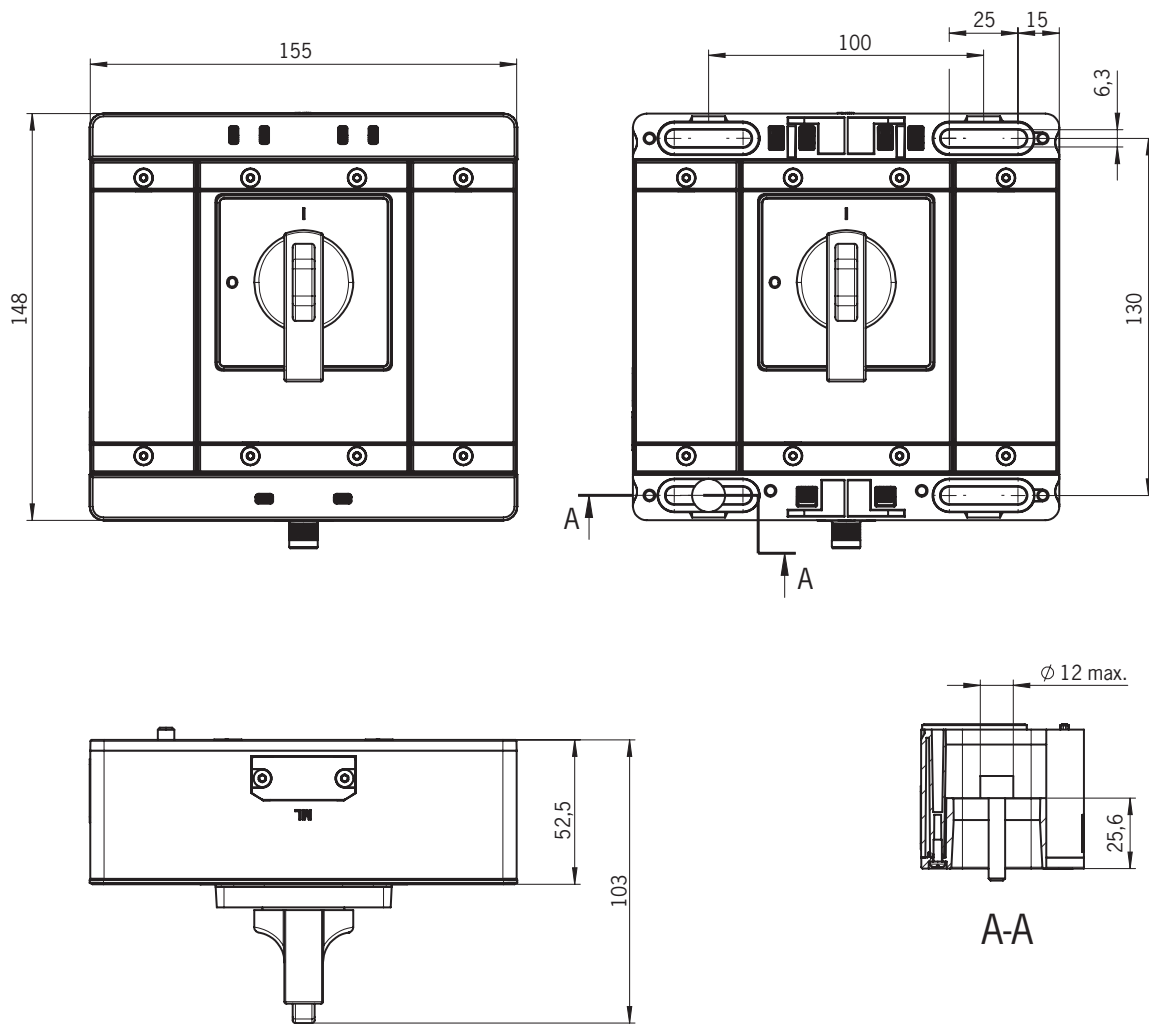Fig. 4:   Dimension drawing for 2-slot expansion module MCM
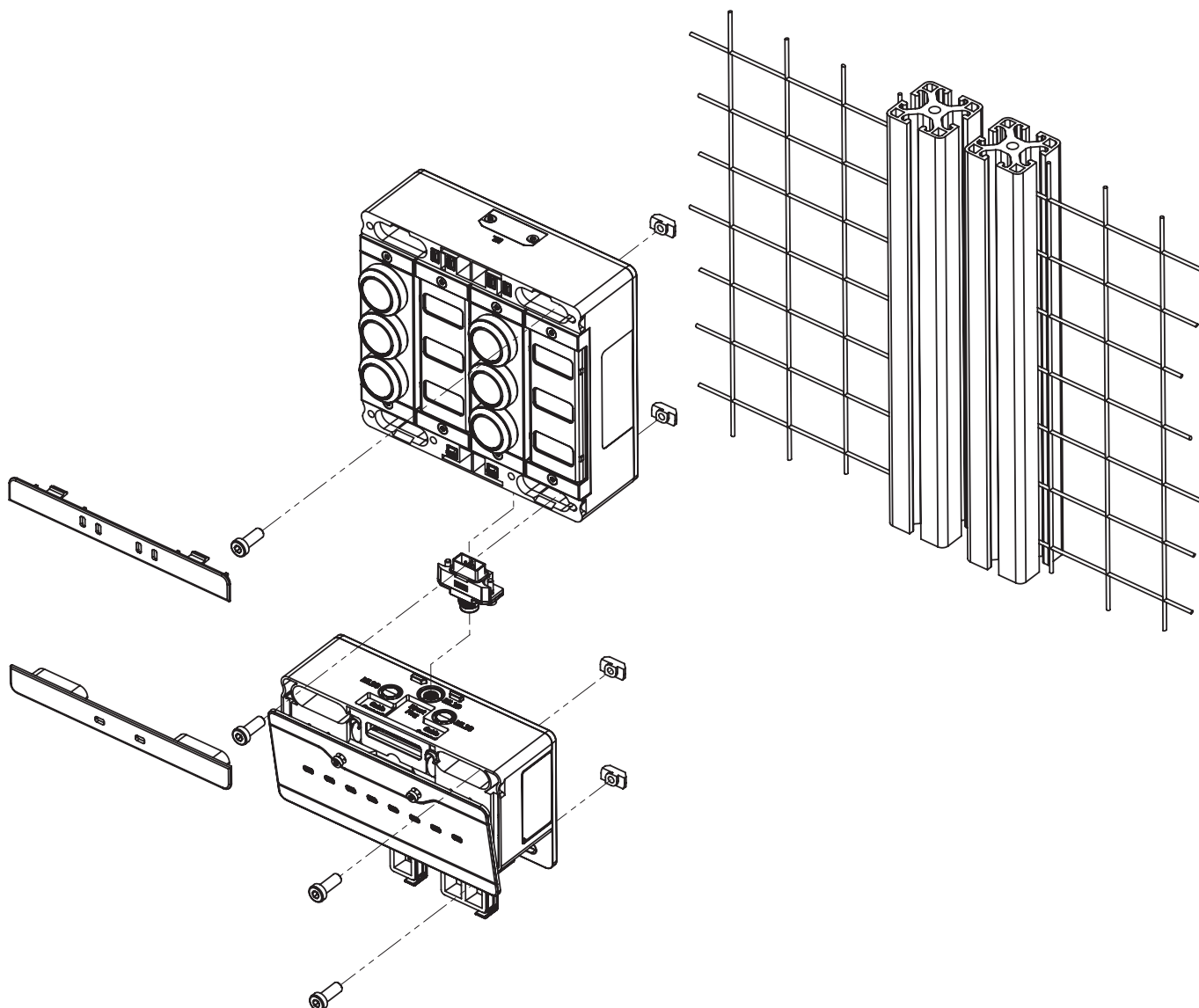
Fig. 5:   Dimension drawing for 4-slot MCM with submodule MSM-2-R-FA-M… with operating mode selector

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7. Mounting

7.1. Mounting modules

7.2. Replacing modules

⚠	**CAUTION**
	Risk of damage to equipment or malfunction as a result of uncontrolled machine stop.
	The communication within the system is interrupted by the replacement of a module, and the safe bits are reset. If a process is running, this situation can result in an uncontrolled stop and damage to the installation or the product.
	‣ Before replacement, make sure the installation is in a suitable operating mode.

Modules (e.g. locking modules or expansion modules) can be replaced only in combination with a restart of the overall system. On the disconnection of the module connection, the system enters into a fault state. The affected module and all downstream modules remain inactive (fault state) until the overall system is restarted.

8. Submodules

8.1. Mounting submodules

⚠️ | **CAUTION**

Risk of damage to equipment or malfunction as a result of incorrect connection or a configuration change.

‣ Only submodules of connection types P, R, E and N can be used. Check the compatibility before installation. For information on the related connection type of a submodule, refer to the sticker on the rear side of the submodule or the associated data sheet for the related submodule.

‣ Submodules MSM-2-R-…- with double slot width are allowed to be mounted only in the slot intended for this purpose.

‣ Pay attention to the alignment of the submodule. See marking (a) in *Fig. 6: Mounting submodule*. Submodules can also be installed rotated by 180°. The marking (a) always indicates the first position to be equipped. This means the position of pushbutton S1 in the example below.

‣ Make sure the pins on the submodule slide straight into the guide. Tighten the cover screws to 0.5 Nm.

‣ On using a submodule with labeling fields, pay attention to the correct alignment of the modules in relation to the labeling fields. Incorrect assignments can cause serious malfunctions in your installation.

‣ Make sure no foreign bodies, e.g. swarf or wires, enter the open slots on the submodule. These can cause short circuits or contact problems.

‣ Avoid touching the contacts on the underside of the submodule. Risk of ESD damage and contact problems due to soiling.

‣ Unused submodule slots must be fitted with a cover (e.g. order number 126372).
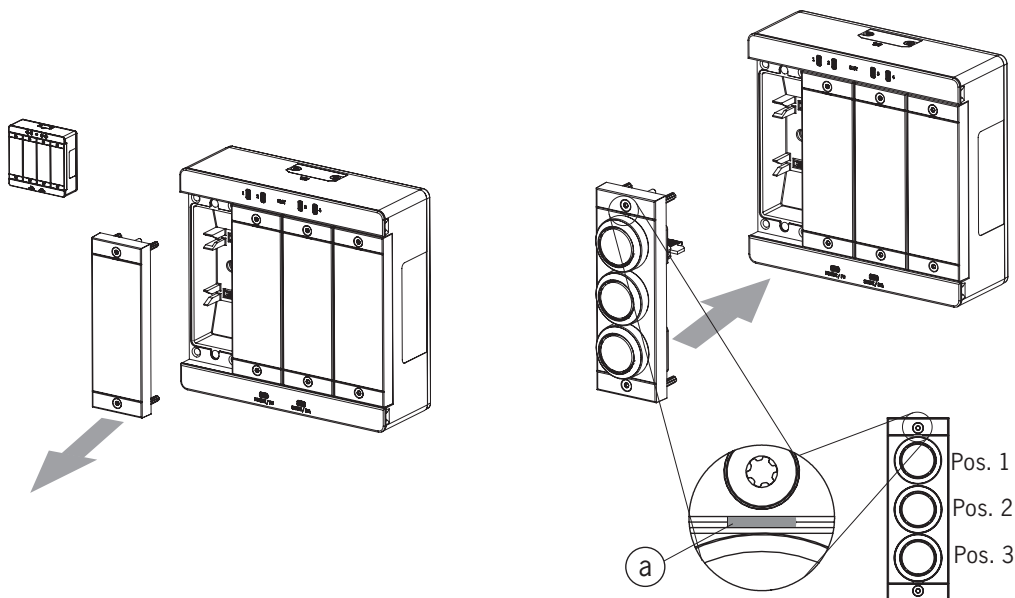

Pos. 1
Pos. 2
Pos. 3

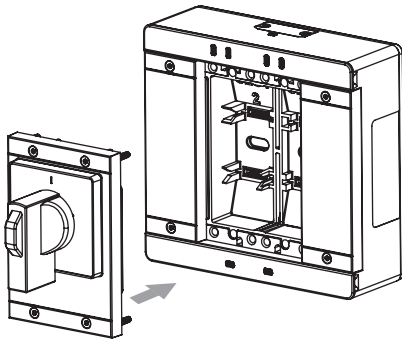Fig. 6:   Mounting submodule

Fig. 7:   Mounting submodule MSM-2-R-FA-M… with an operating mode selector

8.2.   Replacing submodules

⚠	**CAUTION**
	Risk of damage to equipment or malfunction as a result of uncontrolled machine stop.
	The communication within the system is interrupted by the replacement of a submodule, and the safe bits are reset. If a process is running, this situation can result in an uncontrolled stop and damage to the installation or the product.
	‣ Before replacement, make sure the installation is in a suitable operating mode.

ⓘ	**NOTICE**
	Pay attention to the information on the replacement of a submodule in the operating instructions for the related module. On submodules with a safety function, the correct function must be tested after replacement before the system enters normal operation again.

Submodules MSM can be replaced during operation as well (pay attention to safety note above). As soon as the system detects a correct submodule, the submodule is ready for operation. The system reacts as follows on a replacement:

1. If the submodule MSM is removed, the SLOT LED illuminates red, interrupted by 1x green flash. In addition, the SF LED on the bus module MBM illuminates red.

2. If the submodule MSM contains a safety function, the related bit on the bus is cleared as soon as the submodule has been removed.

3. If an identical submodule is inserted with the same alignment, the fault display goes out and the bit is transmitted on the bus again to suit the actual situation.

8.2.1. Replacing faulty submodule

A submodule should be replaced during operation.

ⓘ	**Important!**
	If alignment detection is active, the system checks the alignment of the newly inserted submodule and compares it to the submodule inserted last. The alignment of the previous submodule must be retained in this situation because otherwise the configuration of the device will change. If a configuration change is required, pay attention to the sequence in *8.2.2. Replacing submodule with a submodule with a different function (changing configuration)*. You will find information on switching on and off the alignment detection in the operating instructions for your bus module MBM.

8.2.2. Replacing submodule with a submodule with a different function (changing configuration)

The system saves the last configuration of your system.

The configuration changes if
‣ You replace a submodule with a submodule with a different function or
‣ You install the same submodule rotated by 180°.

Adapt the configuration in the configuration software for your control system.
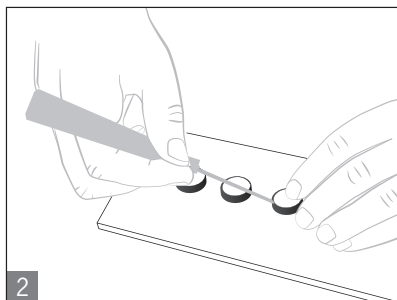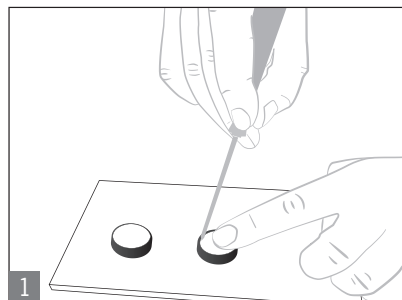
Then the new configuration must be taught-in by restarting the bus module MBM. You will find further information in the operating instructions for your bus module MBM.

8.3. Fitting and removing lenses and labels for controls and indicators

Fitting

Removing

Lens

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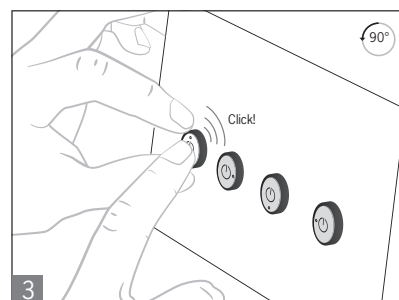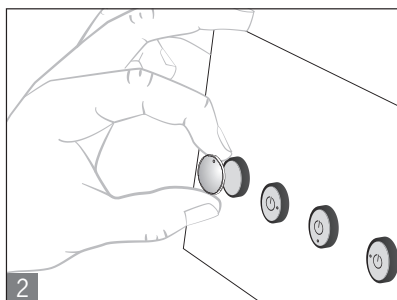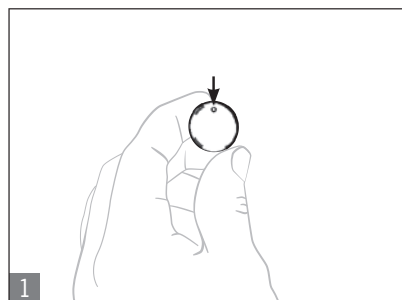
8.4. Submodules with operating mode selector

8.4.1. Function

Depending on version, operating mode selectors have 2 or 3 positions.

A bit pattern is sent for each position. Only these bit patterns are correct; all others indicate an error.

Exception: The switch is in an intermediate position during the change from one position to the other one. In this case, all outputs have the value 0 until the next position is reached. This is not a fault state and must be tolerated by the control system. For this purpose, a sensible time by which the next position must be reached can be defined (e.g. 1 … 3 s). Then the output for the new operating mode is set.

Safe positions (and therefore bit sequences) are only those that are assigned to a position (1-0-0, 0-1-0 and 0-0-1).

Safe state

Position	Bit FI_S1.3	Bit FI_S1.2	Bit FI_S1.1
1	0	0	1
2	0	1	0
3	1	0	0
Intermediate position (permissible only briefly)	0	0	0

All other states indicate a faulty selector switch.
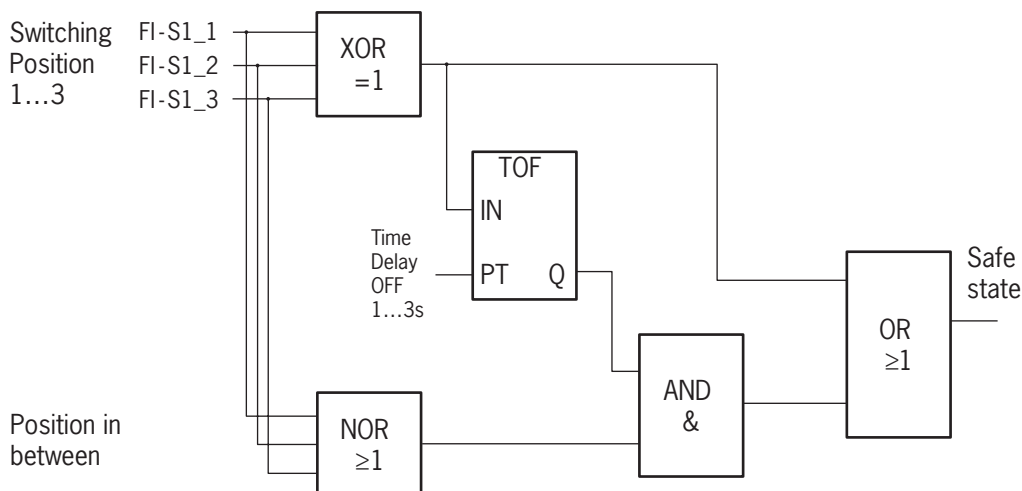
Safe state switching logic

Fig. 8: Example of implementing the switching logic with the aid an OFF time TOF as used in an S7 control system.

9. Protection against environmental effects

A lasting and correct safety function requires that the system must be protected against foreign bodies such as swarf, sand, blasting shot, etc., which can become lodged in the housing.

Pay attention to the following measures:

‣ Seal unused connections using the covers provided.

‣ Make sure the housing covers are correctly sealed and the cover screws are tightened to the necessary tightening torque.

‣ Cover the device during painting work.

10. Controls and indicators

10.1. LED displays

The LEDs indicate the device status and the communication status. An exact description of the indicators and faults can be found in section *12. Setup*.
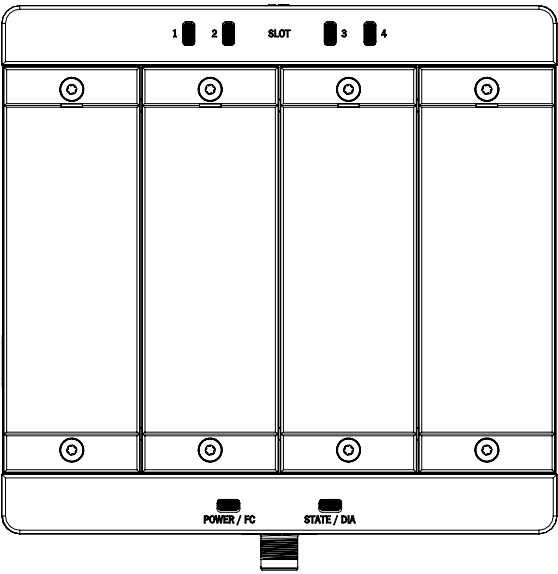
LED	Description
Expansion module MCM	
POWER/FC	Combined indication Power: illuminated with correct power supply FC (fault code): flashes 1 x to indicate MLI connection faults Color: green
STATE/DIA	Combined indication STATE: indicates the device state Color: green DIA: indicates faults Color: red
SLOT 1 … n	Indicates the status of the submodule Color: red/green

11. Electrical connection

ⓘ	**Important!** Pay attention to the instructions on electrical connection in the operating instructions for your bus module MBM.

11.1. Connecting modules

Modules can either be connected together directly or using cables (see *Fig. 9: Connecting modules*).

Each module has a top and a bottom connection. You can use either the bottom or the top connection or both if the module is between two other modules.

The bottom module connector is already integrated. To use the top connection, change its position. If you want to use both connections, you must order a corresponding module connector. Use only the module connectors intended to interconnect the modules (see *Table 2: Overview of module connectors*). The maximum cable length for a line must not exceed 40 m.
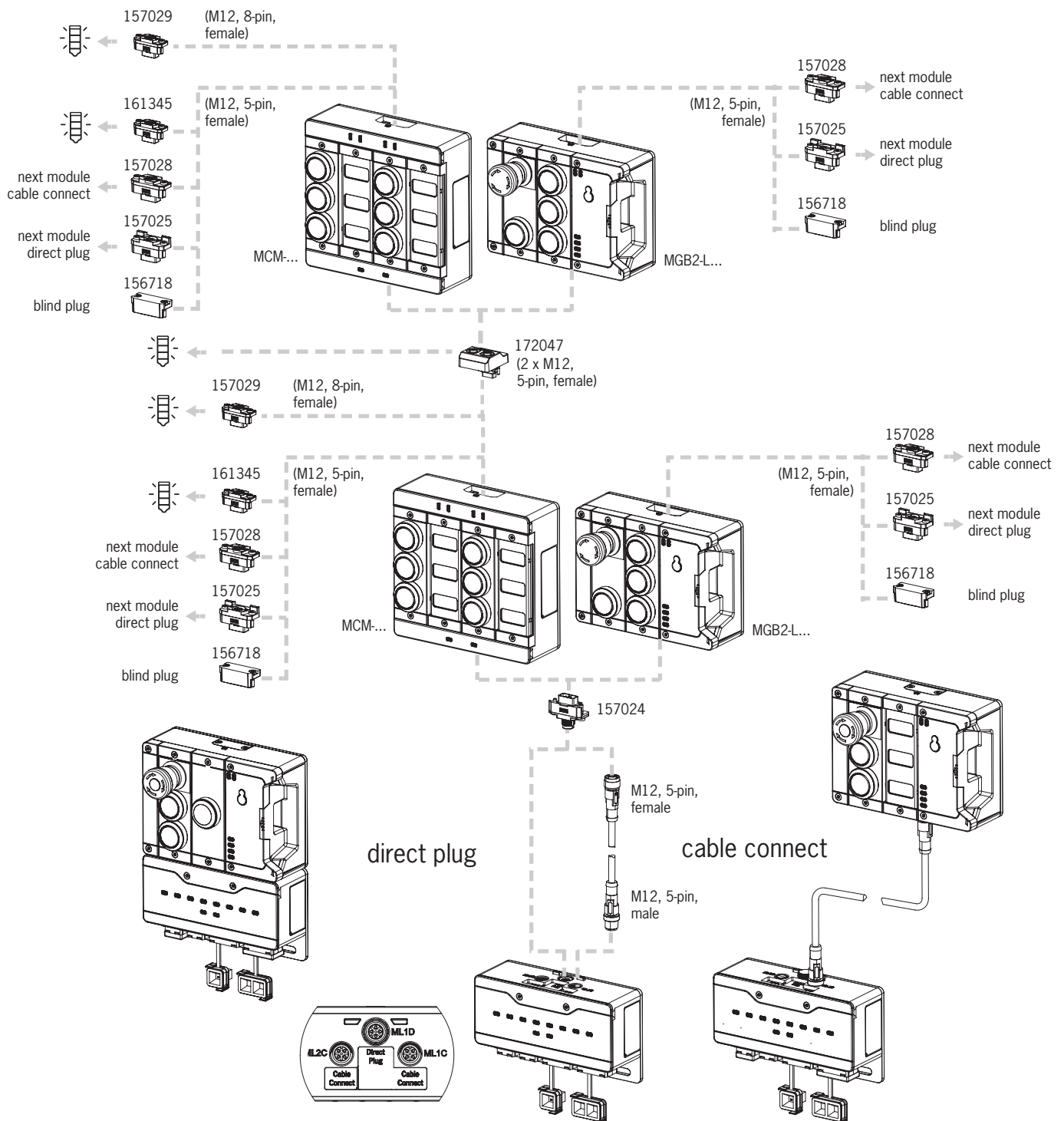

Fig. 9:   Connecting modules

Table 2:   Overview of module connectors

Function	Order no.	Included?
Module connector M12, 5-pin plug	157024	1x *
Blanking cover	156718	1x *
Set with sealing caps for unused connections	156739	Yes
Module connector, 5-pin socket, for the direct connection of a further module	157025	No, must be ordered separately
Module connector M12, 5-pin socket, for the connection of a further module via a connecting cable	157028	
Module connector 2 x M12, 5-pin socket, for the connection of a further module and a stacklight via connecting cables**	172047	
Module connector M12, 5-pin socket, for the connection of a stacklight**	161345	
Module connector M12, 8-pin socket, for the connection of a stacklight**	157029	
Connecting cable M12, 5-pin	See catalog or www.euchner.com	
Connecting cable M12, 8-pin		

* Not for MGB2-…-Y0000-… or for MCM-…-Y00..
** Only for MCM-MLI-..JJ-..

12. Setup

For information on setup, refer to the operating instructions for your bus module MBM.

12.1. System status table (module LEDs)

If there are faults, the bit EM_E_G is set. After the fault has been rectified, this can be acknowledged using the bit EM_ACK_G. The bit EM_E_G is reset during this process.

Operating mode	LED indicator POWER/FC (gn)	LED indicator STATE/DIA (gn/rd)	LED indicator SLOT 1 … n	Device diagnostics Corresponding error/status bit	State
Normal operation	☼	☼ gn (flashes, short ON, long OFF)			Normal operation
Fault display	☼	☼ rd	☼ 1 Hz	EM.E_G and EM.E_SM	Fault in the safety equipment of the submodule. See *12.2. System status table (slot LEDs)*
	☼ 1 x	☼ rd		EM.E_G	MLI communication fault (also refer to the operating instructions for your bus module MBM)
	☼	☼ gn/rd 5 x		EM.E_G	Environment error (e.g. temperature or power supply outside the permissible range)
	☼	☼	○	EM.E_G	Internal fault (e.g. component faulty, data error)*
	○	○	○		

Key to symbols		
	○	LED not illuminated
	☼ gn	LED illuminated (here: green)
	☼ 10 Hz, 8 s	LED flashes for 8 seconds at 10 Hz
	☼ 3 x	LED flashes three times
	☼ ⊓⊓	LED flashes, short ON, long OFF
	X	Any state

* Latching fault; use corresponding output bit EM_ACK_G to reset.

Important: If you do not find the displayed device status in the system status table, this indicates an internal device fault. In this case, you should contact the manufacturer.

12.2. System status table (slot LEDs)

If a fault occurs on the submodule, the bit EM.E_SM.. is set. As soon as the fault has been corrected, it is reset automatically (non-latching fault).

Fault display SLOT 1 … n LED	Meaning	Measures
OFF	A submodule is not used or Submodule functioning without faults	-
Red ON Green flashes 1 x	Submodule missing although a submodule was included in the last configuration	Insert suitable submodule or Change configuration
Red ON Green flashes 2 x	Submodule is installed rotated by 180°	Case 1: Submodule type is correct, but submodule must be installed rotated by 180°. Case 2: If it is intended to change the configuration, the system must be restarted so that the required configuration is taught-in. Case 3: Alignment is irrelevant for this submodule, but the parameter for alignment detection is active. Change parameter for alignment detection and restart system.
Red ON Green flashes 3 x	Submodule type does not correspond to the submodule type configured last	Insert submodule of appropriate type or Change configuration
Red ON	Internal fault in the submodule	Replace submodule. ‣ If the problem persists: replace the base unit.
Red flashing (1 Hz) The DIA LED also illuminates	Fault in the safety equipment, can be reset automatically ‣ Enabling switch discrepancy error ‣ Other input faults on the submodule	For enabling switch: Release enabling switch and press again. ‣ If the problem persists: check the cable and connection. ‣ If the problem persists: replace the submodule. ‣ If the problem persists: replace the base unit. For all other submodules: Replace submodule. ‣ If the problem persists: replace the base unit.

13. Diagnostics, troubleshooting and aids

For instructions on diagnostics and troubleshooting, refer to the operating instructions for your bus module MBM.

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14. Technical data

> ### (i) NOTICE
>
> If a data sheet is included with the product, the information on the data sheet applies.

14.1. Expansion modules MCM-MLI…

Parameter	Value
Housing material	Fiber glass reinforced plastic, die-cast zinc, nickel plated
Dimensions	See dimension drawing
Ambient temperature	-30 … +55 °C
Degree of protection	IP65
Safety class	III
Degree of contamination	3
Installation position	Any
Connection options, power supply	Supply via MLI connection on the bus module or a module connected in-between
Current consumption, max. (without submodules)	75 mA
Current consumption, max., per submodule	50 mA
Current consumption, max., for stacklight module	100 mA per output at 24 V DC
Rated insulation voltage U_i	75 V
Rated impulse withstand voltage U_{imp}	0.5 kV
Shock and vibration resistance	Acc. to EN 60947-5-3
EMC protection requirements	Acc. to EN 61000-4 and DIN EN 61326-3-1
Risk times, max. (turn-off times) [1] - Expansion module MCM - Submodules MSM	The expansion module MCM does not contribute to increasing the risk time See information in the operating instructions for your bus module
Characteristics acc. to EN ISO 13849-1 and EN IEC 62061	
Category	4
Safety Integrity Level	SIL 3
Performance Level	PL e
DC	99%
Mission time	20 years
PFH	2.82×10^{-9}

1) The risk time is the maximum time between the change in the input status and the clearing of the corresponding bit in the bus protocol.

14.2. Submodule MSM-2-R-FA-M...

Parameter	Value
Housing material	Fiber glass reinforced plastic
Dimensions	See dimension drawing
Ambient temperature at U_B = 24 V DC	-25 … +55 °C
Degree of protection	IP54
Installation position	Any
Current consumption, max.	36 mA
Shock and vibration resistance	Acc. to EN 60947-5-3
Characteristics acc. to EN ISO 13849-1 and EN IEC 62061	
Safe switching and monitoring of the selected operating mode	
Category	4
Safety Integrity Level	SIL 3
Performance Level	PL e
Mission time	20 years
PFH	9.06×10^{-10}

15. Service

If servicing is required, please contact:

EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen

Service telephone:
+49 711 7597-500

E-mail:
support@euchner.de

Internet:
www.euchner.com

16. Inspection and service

⚠	**WARNING**
	Loss of the safety function because of damage to the device.
	In case of damage, the affected module must be replaced completely. Only accessories or spare parts that can be ordered from EUCHNER may be replaced.

Regular inspection of the following is necessary to ensure trouble-free long-term operation:

‣ Check the secure mounting of the devices and the connections

Further inspection measures may be necessary for the modules connected and submodules installed. Refer to the related operating instructions.

No servicing is required. Repairs to the device are only allowed to be made by the manufacturer.

ⓘ	**NOTICE**
	The year of manufacture can be seen in the lower right corner of the type label.

17. Declaration of conformity

The product complies with the requirements according to

‣ Machinery Directive 2006/42/EC (until January 19, 2027)
‣ Machinery Regulation (EU) 2023/1230 (from January 20, 2027)
‣ Explosion Protection Directive (ATEX) 2014/34/EU

The EU declaration of conformity can be found at www.euchner.com. Enter the order number of your device in the search box. The document is available under *Downloads*.