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1. About this document

1.1. Scope

This document is valid for all bus modules MBM-EI-...-MLI-... (EtherNet/IP). It serves as a system and configuration manual for all module combinations that can be operated with this bus module.

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	Output family	Module connection type	Product version (hardware version)	Firmware version
MBM-...	...EI-...	...MLI-...	V1.0.X	V1.1.X



Important!

A firmware update might have been performed on your device. Make sure that the device documentation corresponding to the update is available and is observed.

1.1.1. Notes on other product versions

Make sure to use the operating instructions valid for your product version. Please contact our service team if you have any questions.

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
	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 (MAN20001832)	(this document)	
Operating instructions for the connected modules and their submodules	Device-specific information for the related module and the installed submodules	
Information_EU-DA_110 (EC020001824)	Information on data usage in accordance with the EU Data Act	
Declaration of conformity	Declaration of conformity	
Release notes	Any firmware update report	
Any supplementary 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 bus module MBM-EI-...MLI-... (EtherNet/IP) is operated as an IO device under EtherNet/IP (CIP Safety). The bus module MBM communicates with the modules/submodules connected and evaluates all relevant information. It processes these data and then transmits them on the connected bus to a control system.

Before the device is used, 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 ISO 13849-1
- EN ISO 14119
- EN IEC 60204-1

The bus module MBM is allowed to 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*. A maximum of 18 modules or submodules can be operated on one bus module MBM.

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 CIP Safety® 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 50*).
- 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

Bus module	Basic modules	Handle module	Submodules	Submodules
		MGB2-H... from V1.0.0	MSM-P-... MSM-R-... MSM-N-...	MSM-K-...
MBM-...-MLI from V1.0.X	Interlocking/locking module MGB2-I-...-MLI/MGB2-L-...-MLI from V1.6.X	●	●	-
	Expansion module MCM-...-MLI from V1.3.X	-	●	-

Key to symbols	●	Combination possible
	-	Combination not possible

2.1. Notes on cybersecurity

EUCHNER components and systems must not be integrated into public networks. EUCHNER components are approved only for use in private networks. Use a VPN for remote access.

2.2. Notes on the EU Data Act

In accordance with EU Data Act 2023/2854, it is stated that data are generated during operation of the product. These instructions describe the type of data generated and access to the data. You will find further information in the document *Information on data usage in accordance with the EU Data Act*.

3. Description of the safety function

The safety function of the bus module MBM comprises evaluating the safety data transmitted from the overall system (e.g. from installed guard locking devices, emergency stop devices, enabling switches, etc.) and forwarding these data on a bus system connected. The number of safe devices in an overall system is limited to 12. Depending on the modules and submodules connected, the overall system can include the following safety functions:

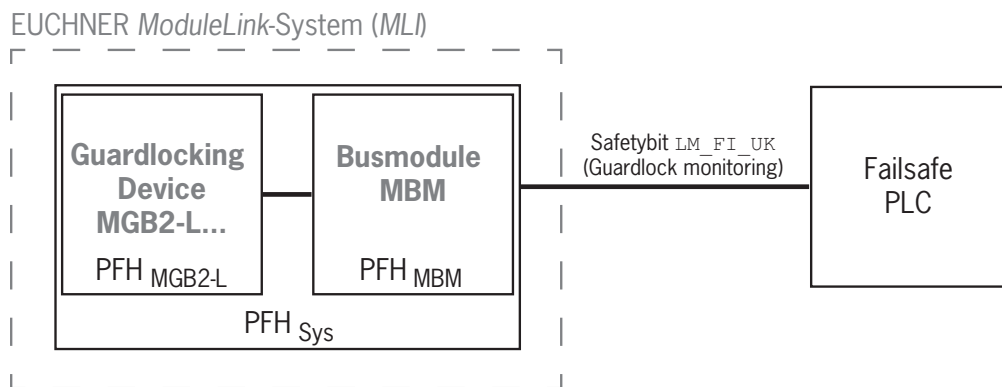
3.1. Safety functions in combination with an interlocking or locking module MGB2-I or MGB2-L

The following applies to MGB2-L...:

Monitoring of guard locking and the position of the guard (interlocking device with guard locking according to EN ISO 14119)

› Safety function:

- When guard locking is released, safety bit $LM_FI_ÜK$ (ÜK) = 0 (monitoring of the locking element).
- When the guard is open, safety bit LM_FI_SK (SK) = 0 (monitoring of the position of the guard).
- Guard locking can be activated only when the bolt tongue is located in the locking module (prevention of inadvertent locking position (faulty closure protection)).



› Safety characteristics:

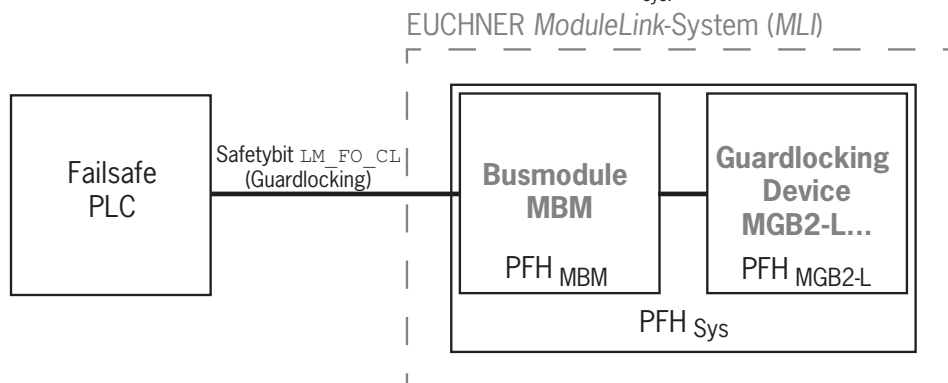
Category, Performance Level, PFH

Control of guard locking (safety bit LM_FO_CL ; applies only to guard locking devices according to the closed-circuit current principle)

› Safety function:

- If the device is used as guard locking for personnel protection, control of guard locking must be regarded as a safety function.

The safety level of guard locking control is determined by the system PFH_{sys} and by the external control (e.g. safe PLC).



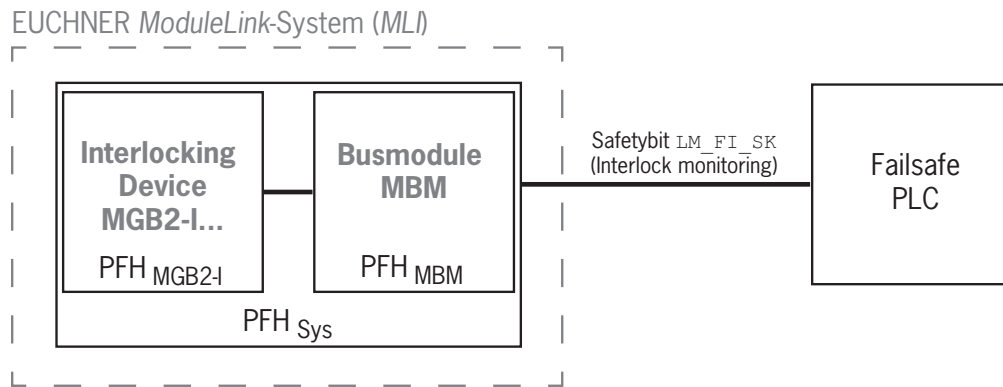
› Safety characteristics of the bus module and the locking module:

Category, Performance Level, PFH

The following applies to MGB2-I... (or a correspondingly configured MGB2-L2):

Monitoring of the guard position (interlocking device according to EN ISO 14119)

- › Safety function: When the guard is open, safety bit LM_FI_SK (SK) = 0. (see chapter 12.2. Data blocks for interlocking/locking module MGB2-I / MGB2-L).

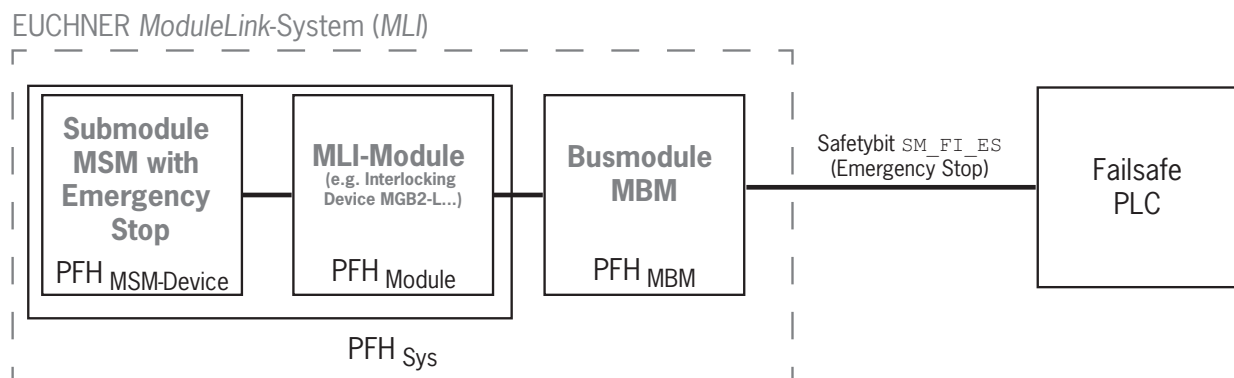


- › Safety characteristics:
Category, Performance Level, PFH
(you will find the reliability values according to EN 13849-1 in the technical data).

3.2. Safety functions on submodules with emergency stop

Emergency stop (emergency stop device according to EN ISO 13850)

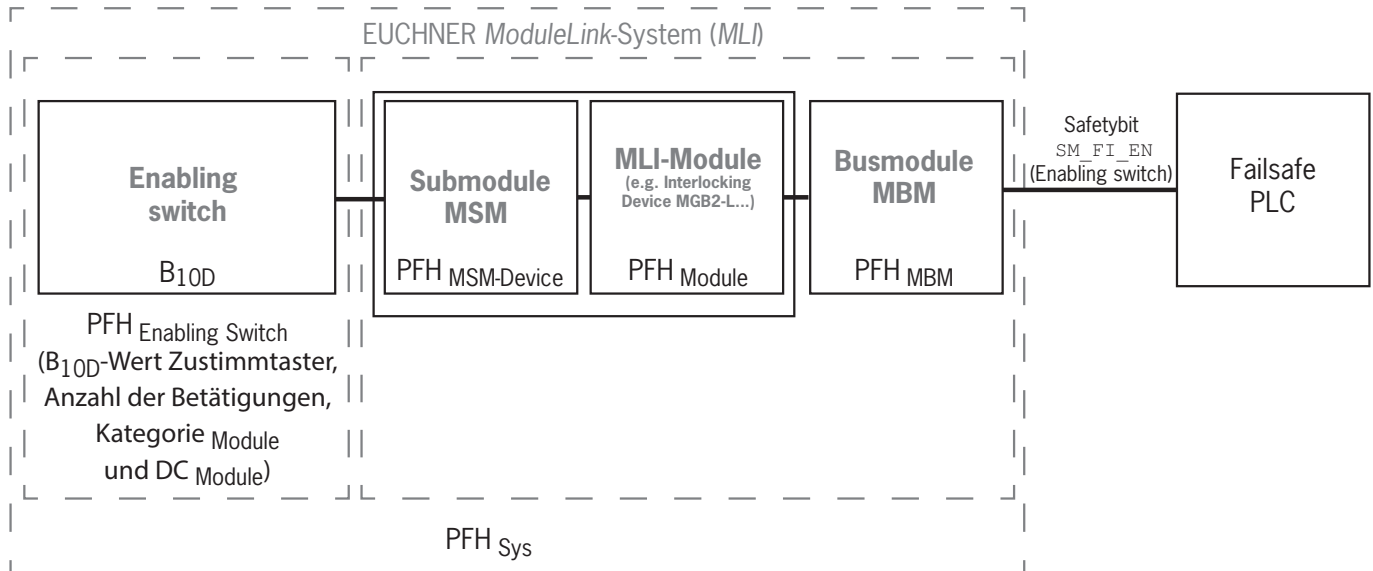
- › Safety function: evaluation of emergency stop
- › Safety characteristics: B_{10D} value of the emergency stop in the submodule (MSM) and PL, PFH, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



3.3. Safety functions on submodules with enabling switch

Enabling function

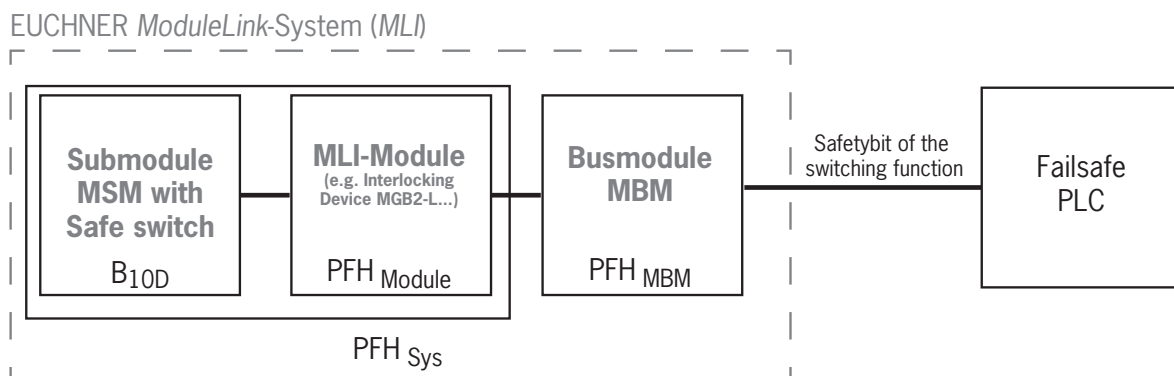
- › Safety function: evaluation of a connected enabling switch or other external electromechanical safety switches
- › Safety characteristics: B_{10D} value of the enabling switch (see operating instructions for the enabling switch) and PL, PFH, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



3.4. Safety functions on submodules with safe pushbuttons and switches (general)

Detection of the switch position

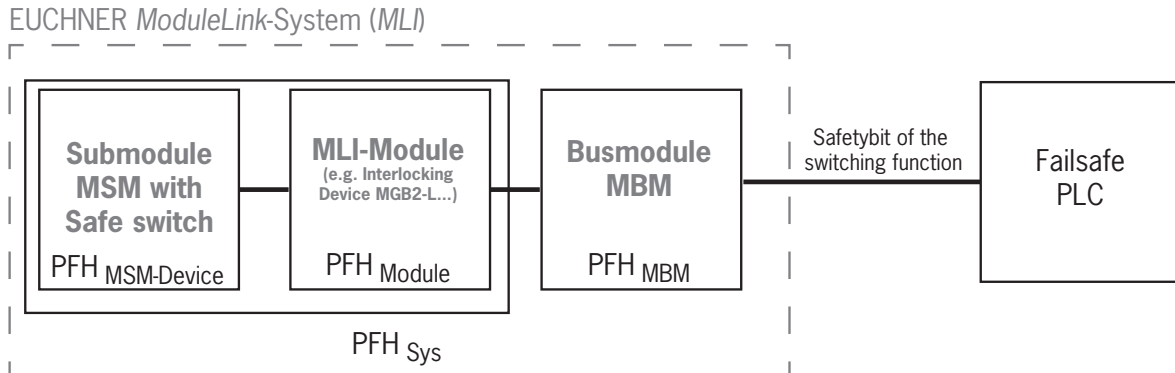
- › Safety function: evaluation of the switch position
- › Safety characteristics: B_{10D} value of the safe pushbutton or switch in the submodule (MSM) and PL, PFH, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



3.5. Safety functions on submodules without B_{10D} (e.g. MSM-CKS2)

Detection of the switch position

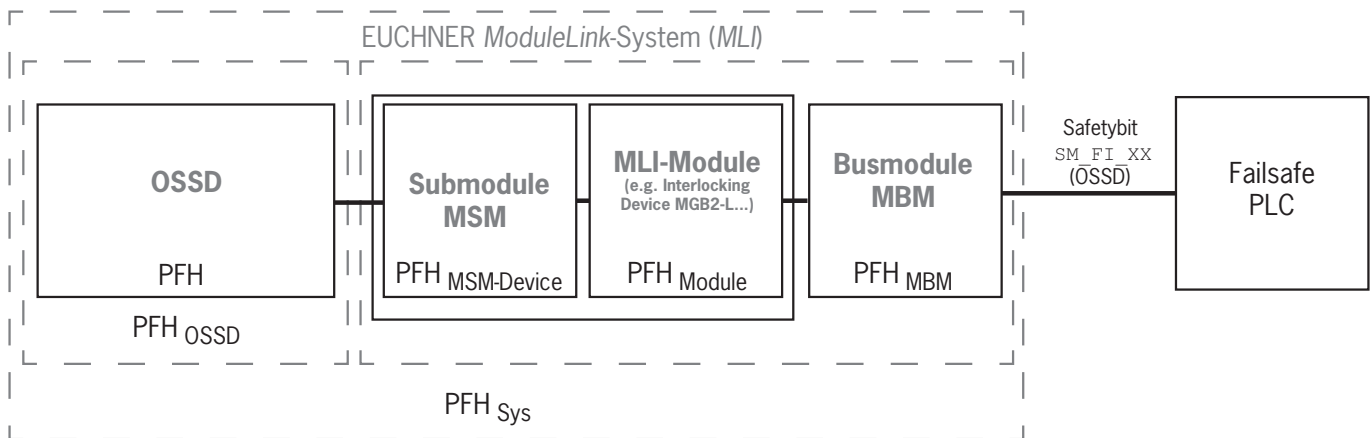
- › Safety function: evaluation of the switch position
- › Safety characteristics: PFH_{MSM-Device} value of the safe pushbutton or switch in the submodule (MSM) and PL, PFH, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



3.6. Safety functions on submodules with connection for OSSD safety switches

Detection of the switch position

- › Safety function: evaluation of the switch position
- › Safety characteristics: PFH_{MSM-Device} value of the safe pushbutton or switch in the submodule (MSM) and PL, PFH, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



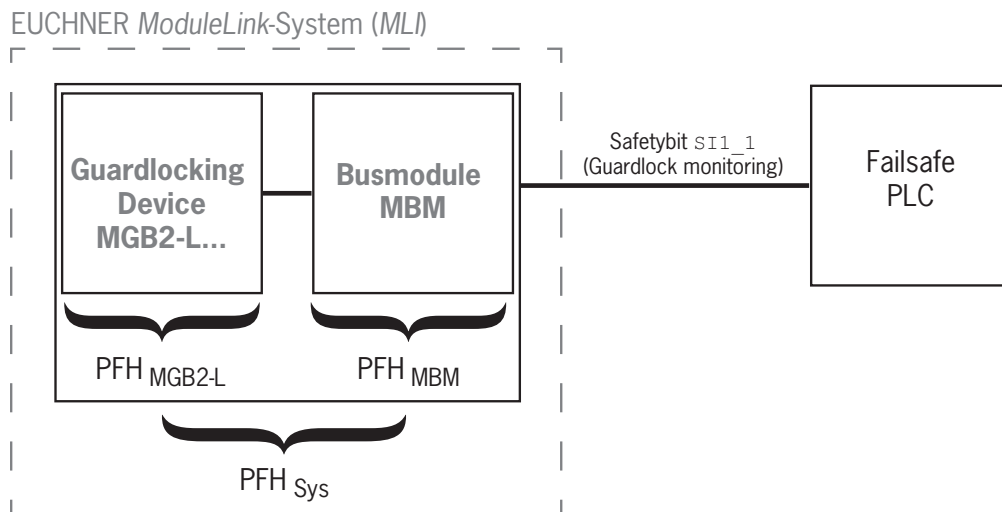
3.7. Determining safety characteristics of the overall system

The corresponding reliability values must be determined for each safety function in the overall system. Proceed as follows:

1. Refer to the data sheets or operating instructions for the system components containing the function for information on the reliability values for the related safety function.
2. Refer to the reliability value of the bus module MBM for the evaluation and forwarding of safety data.
3. Add together the values to a resulting reliability value PFH_{Sys} .

3.7.1. Calculation example for the “monitoring of guard locking” safety function

$$PFH_{Sys} = PFH_{MGB2-L} + PFH_{MBM}$$

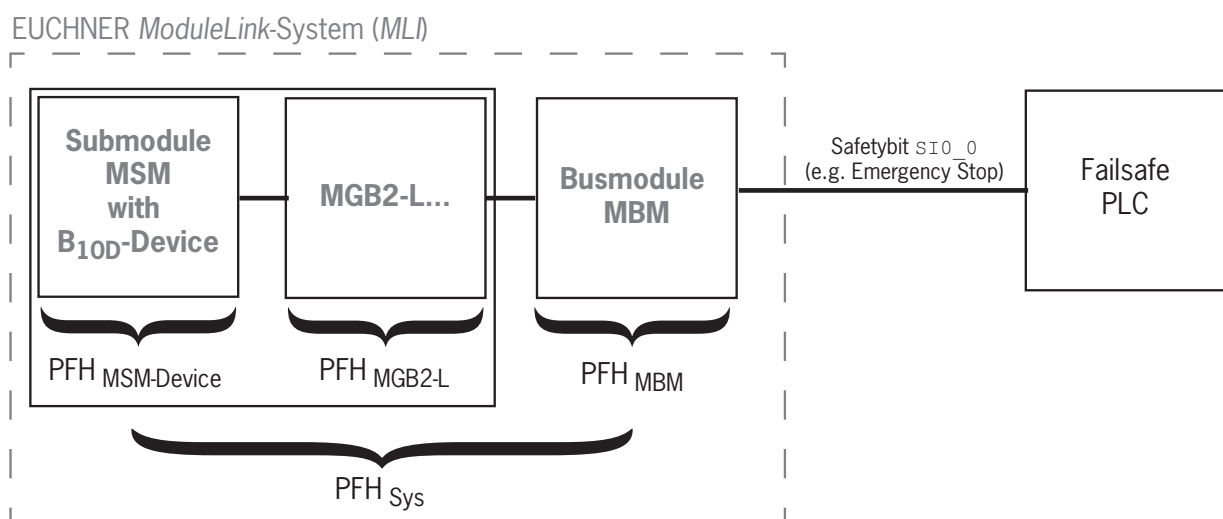


3.7.2. Calculation example for the “emergency stop” safety function

$$PFH_{Sys} = PFH_{MSM-Device} + PFH_{MGB2-L} + PFH_{MBM}$$

To calculate the $PFH_{MSM-Device}$ from the B_{10D} value, use the method in Annex C 4.2 of EN ISO 13849-1:2023.

The following applies: $PFH_{MSM-Device} = f(\text{category}_{MGB2}; DC_{MGB2}; B_{10D}; n_{op})$



4. Exclusion of liability and warranty

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

5. General safety precautions

Safety switches fulfill personnel protection functions. Incorrect installation or tampering can lead to fatal injuries to personnel.

Check the safe function of the safeguard and, if necessary, other safety functions particularly

- › after any setup work
- › after every replacement of a component relevant to safety (also after rotating a submodule)
- › after an extended period without use
- › after every fault
- › after any change to the DIP switch position
- › after every factory reset
- › after every firmware update.

Independent of these checks, the safe function of the guard should be checked at suitable intervals as part of the maintenance schedule.

	WARNING Danger to life due to improper installation or due to bypassing (tampering). Safety components fulfill a personnel protection function. › 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. You can download the operating instructions from www.euchner.com.

6. Function and system overview

An MLI system comprises at least the following components:

- One bus module MBM
- One module with MLI connection (e.g. interlocking or locking modules MGB2 or expansion modules MCM)

Modules can in turn contain submodules. *Fig. 1* shows a typical system layout with one bus module MBM (1), one locking module MGB2-L... (2) and the submodules MSM (3) installed in it. A full system can comprise up to 18 modules or submodules.

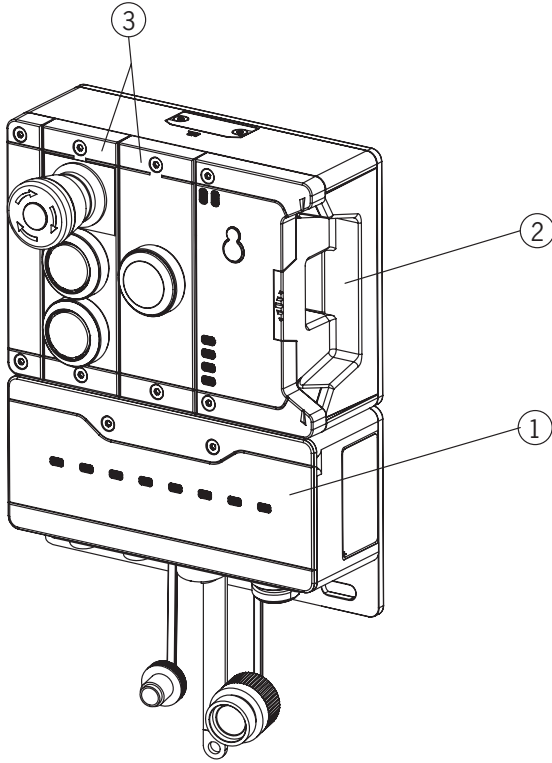


Fig. 1: Example system MGB2 Modular

6.1. Bus module MBM

Bus modules MBM have the following tasks:

- Gateway to the bus connected
- Central unit for control, evaluation and communication for the MLI modules connected
- Central power supply for the MLI modules connected
- Device web interface

6.2. Interlocking/locking module MGB2-I/MGB2-L

Together with a handle module, the interlocking module makes it possible to interlock movable guards. Together with a handle module, the locking module makes it possible to lock movable guards.

Interlocking/locking modules contain slots for submodules that provide additional functions.

For the exact functional description, refer to the operating instructions for your interlocking/locking module and the supplementary data sheets.

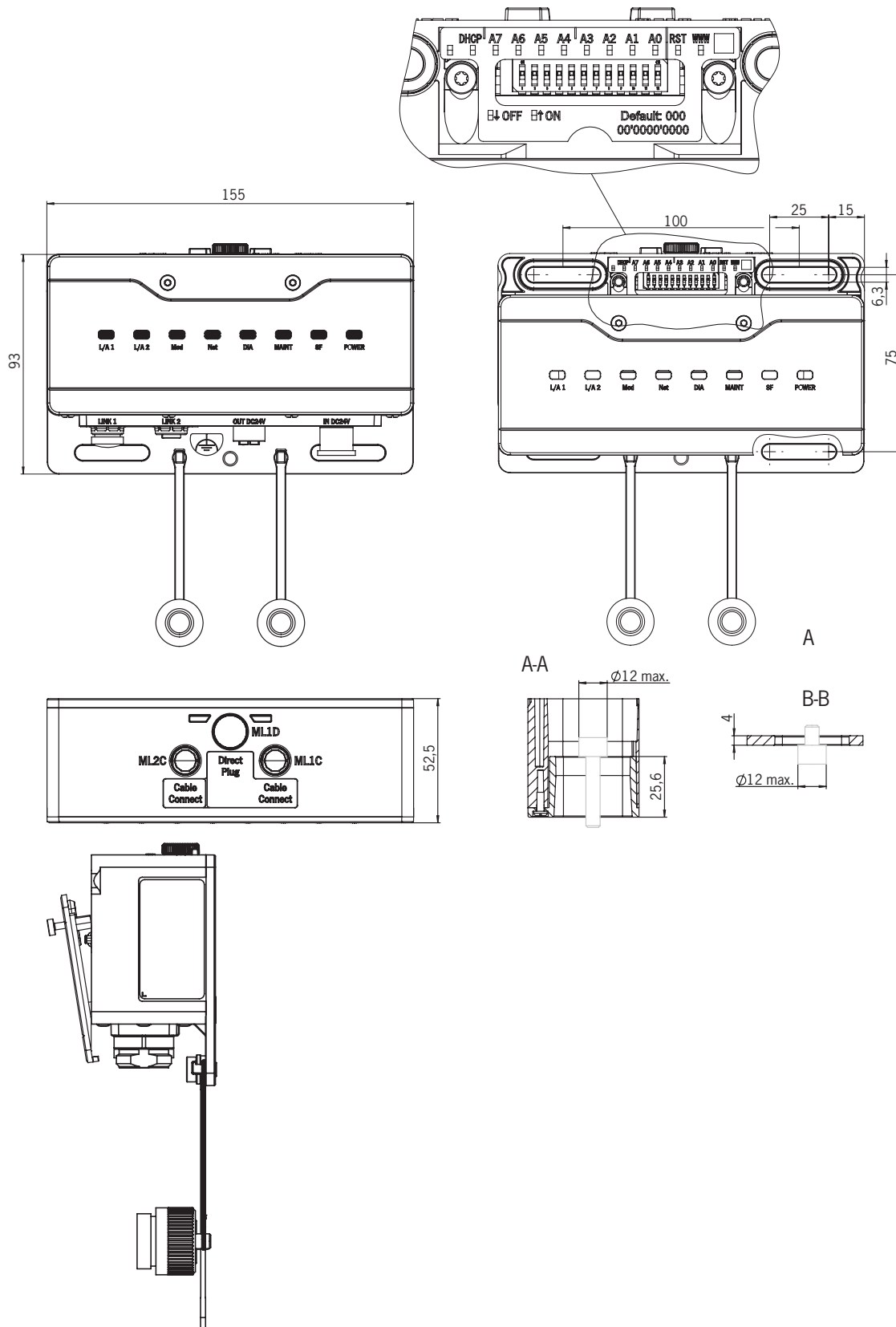
6.3. Expansion modules MCM

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

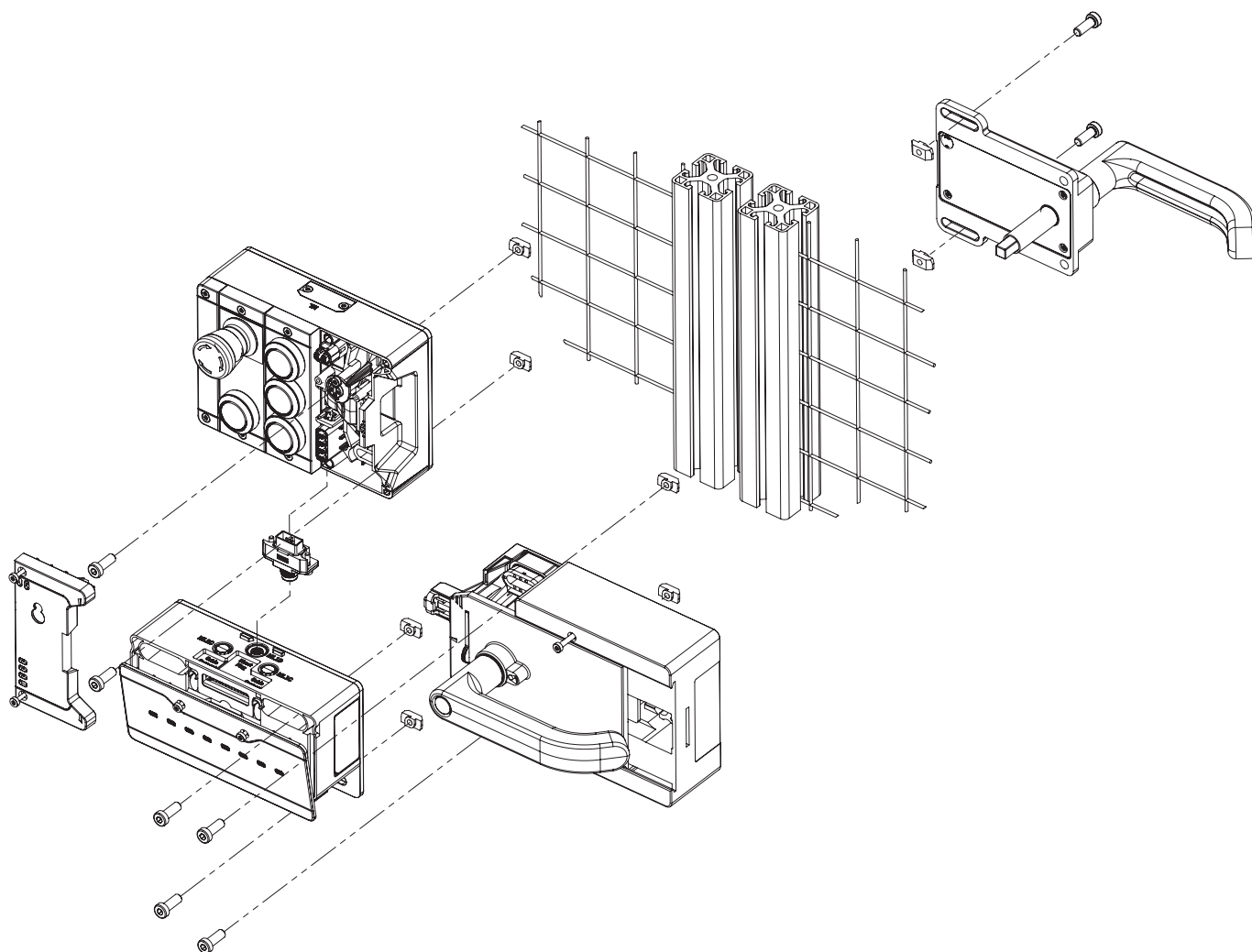
6.4. Submodules MSM

Submodules MSM can be installed in modules that have one or more submodule slots. Using the submodules, it is possible to install additional functions in the modules. Typical function expansions include emergency stop, pushbuttons, selector switches and indicators. For a detailed functional description, refer to the data sheet of the respective submodule.

6.5. Dimension drawing for bus module MBM



7. Mounting



8. 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.

9. Controls and indicators

9.1. DIP switches

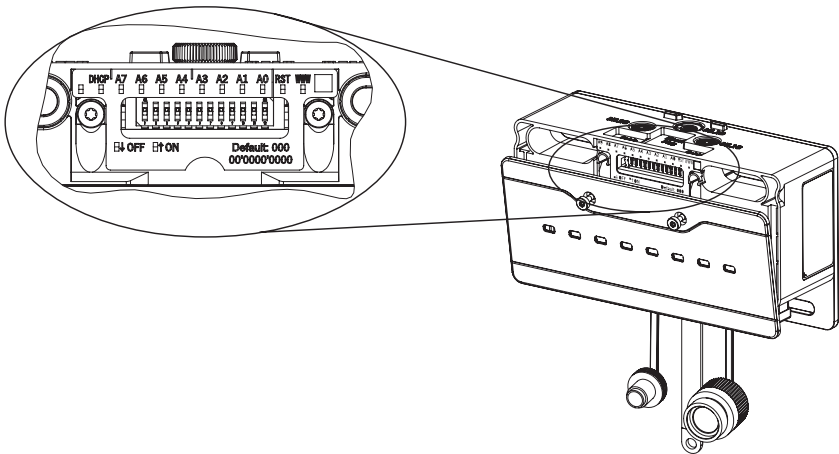
The DIP switches have the following functions:

- › Setting the device’s IP address
- › Hardware reset to restore the device to the factory settings
- › Activating the device web interface.



NOTICE

If the IP address is assigned using DIP switches, the subnet mask cannot be changed and the gateway cannot be used.



Switch	Description
DHCP	ON position = IP address via DIP switches A0 - A7 OFF position = IP address via DHCP
A0 ... A7	Address switch bits zero to seven For binary setting of the IP address (factory setting: 00000000)
RST	Factory reset (factory setting: off) For information on the factory reset, see chapter 13.3 on page 38.
WWW	Activate device web interface with extended diagnostic options. (factory setting: off) For information on the device web interface, see chapter 13.4 on page 39.

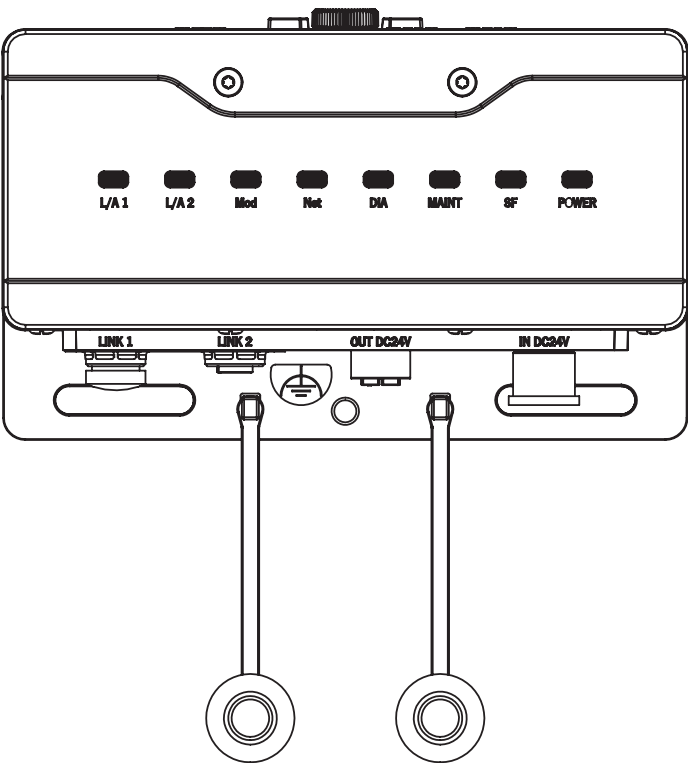
9.2. LED displays

The LEDs indicate the device status and the communication status.



NOTICE

- LEDs are not reliable indicators. It is therefore not possible to ensure the correct output of information.
- › For this reason, use the LEDs only for general device diagnostics during setup or fault analysis.
 - › Do not use the LEDs for the indication of the operating mode during operation.



LED	Description
Bus module MBM	
L/A 1	Connection correct: statically on Data transfer: flashes Color: green Error (NIC error): statically on Color: red
Mod	Normal state: statically on Color: green No connection: flashes Color: green Timeout: flashes Color: green IP address already available: flashes Color: red Self-test: flashes Color: red/green
L/A 2	Connection correct: statically on Data transfer: flashes Color: green Error (NIC error): statically on Color: red
Net	Normal state: statically on Color: green No connection: flashes Color: green Timeout: flashes Color: red IP address already available: statically on Color: red Self-test: flashes Color: red/green
DIA	Indicates errors Color: red
MAINT	Indicates the error flashing code Color: red/green/yellow
SF	System fault: statically on (see chapter 13. <i>Diagnostics, troubleshooting and aids on page 38</i>) Color: red
Power	Power Up: flashes Normal state: statically on Color: green

10. Electrical connection

	WARNING In the event of a fault, loss of the safety function due to incorrect connection. › Mounting must be performed only by authorized personnel. › Lay the connecting cables with protection to prevent the risk of short circuits.
	CAUTION Risk of damage to equipment or malfunctions as a result of incorrect connection. › All electrical connections must either be isolated from the mains supply by a safety transformer according to EN IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent insulation measures. › Power devices which are a powerful source of interference must be installed in a separate location away from the input and output circuits for signal processing. The cable routing for safety circuits should be as far away as possible from the cables of the power circuits. › In order to avoid EMC interference, follow the EMC notes on devices in the immediate vicinity of the system and its cables. › To avoid EMC interference, the physical environmental and operating conditions at the installation site of the device must comply with the requirements according to the standard DIN EN 60204-1:2006, section 4.4.2/EMC. › The functional earth must be connected. A bore hole with M6 thread is provided on the mounting plate for this purpose.
	Important! › The supply for further devices on the bus may be forwarded via the bus module MBM. The total supply current through the system must not be higher than specified in the technical data. › The total current consumption of all connected modules and submodules (including MBM) must not exceed the value specified in the technical data. Refer to the technical data of the respective device for information about the current consumption of the individual modules and submodules. › If the bus module MBM does not appear to function after the application of the operating voltage (e.g. Power LED does not illuminate), the device must be returned unopened to the manufacturer. › To ensure the stated degree of protection is achieved, the cover screws must be tightened to a tightening torque of 1 Nm. Unused connections must be fitted with the covers provided.

10.1. Notes on

	Important! › This device is intended to be used with a Class 2 power source in accordance with UL1310 ¹⁾. As an alternative an LV/C (Limited Voltage/Current) power source with the following properties can be used: - This device shall be used with a suitable isolating source in conjunction with a fuse in accordance with UL248. The fuse shall be rated max. 3.3 A and be installed in the max. 30 V DC power supply to the device in order to limit the available current to comply with the UL requirements. Please note possibly lower connection ratings for your device (refer to the technical data). 1) Note on the scope of the UL approval: only for applications as per NFPA 79 (Industrial Machinery). The devices have been tested as per the requirements of UL508 and CSA/ C22.2 no. 14 (protection against electric shock and fire).
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10.2. Bus connections

The bus module MBM includes the EtherNet/IP connections (X1 and X2) and the power supply connections (XD1 and XD2).

Depending on version, connection is via

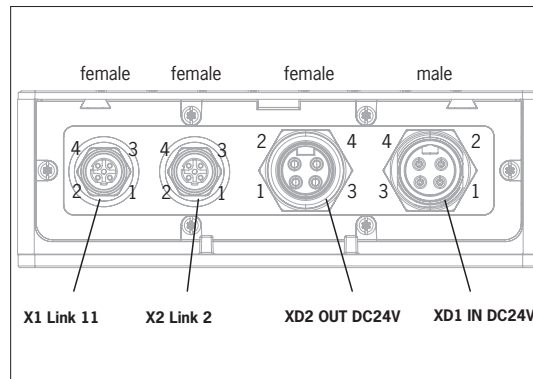
- 7/8" plugs and M12 plugs (D-coded) according to IEC 61076-2-101
- M12 plugs (L-coded), 4-pin, and M12 plugs (D-coded)
- M12 plugs (A-coded), 4-pin, and M12 plugs (D-coded)

The bus module MBM includes an EtherNet/IP switch for EtherNet connection.

10.2.1. Terminal assignment for version with 7/8" and M12 plugs, D-coded

Pin	Description
X1.1	Transmit Data TxD+
X1.2	Receive Data RxD+
X1.3	Transmit Data TxD-
X1.4	Receive Data RxD-
Functional earth on plug housing	

Pin	Description
X2.1	Transmit Data TxD+
X2.2	Receive Data RxD+
X2.3	Transmit Data TxD-
X2.4	Receive Data RxD-
Functional earth on plug housing	
EtherNet/IP connector assignment	
Plug connectors X1 and X2	



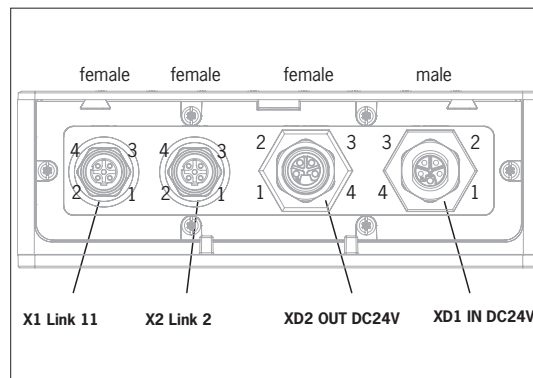
Pin	Description
XD1.1	(looped through)
XD1.2	24 V DC
XD1.3	0 V DC
XD1.4	(looped through)

Pin	Description
XD2.1	(looped through)
XD2.2	24 V DC
XD2.3	0 V DC
XD2.4	(looped through)
Power supply connector assignment	
Plug connectors XD1 and XD2	

10.2.2. Terminal assignment for version with Power M12 plugs (L-coded), 4-pin, and bus M12 plugs (D-coded)

Pin	Description
X1.1	Transmit Data TxD+
X1.2	Receive Data RxD+
X1.3	Transmit Data TxD-
X1.4	Receive Data RxD-
Functional earth on plug housing	

Pin	Description
X2.1	Transmit Data TxD+
X2.2	Receive Data RxD+
X2.3	Transmit Data TxD-
X2.4	Receive Data RxD-
Functional earth on plug housing	
EtherNet/IP connector assignment	
Plug connectors X1 and X2	



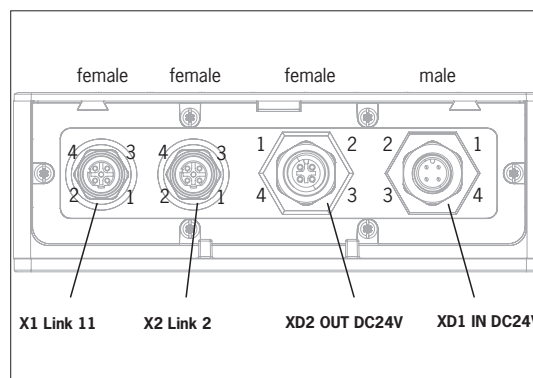
Pin	Description
XD1.1	24 V DC
XD1.2	(looped through)
XD1.3	0 V DC
XD1.4	(looped through)

Pin	Description
XD2.1	24 V DC
XD2.2	(looped through)
XD2.3	0 V DC
XD2.4	(looped through)
Power supply connector assignment	
Plug connectors XD1 and XD2	

10.2.3. Terminal assignment for version with Power M12 plugs (A-coded), 4-pin, and bus M12 plugs (D-coded)

Pin	Description
X1.1	Transmit Data TxD+
X1.2	Receive Data RxD+
X1.3	Transmit Data TxD-
X1.4	Receive Data RxD-
Functional earth on plug housing	

Pin	Description
X2.1	Transmit Data TxD+
X2.2	Receive Data RxD+
X2.3	Transmit Data TxD-
X2.4	Receive Data RxD-
Functional earth on plug housing	
EtherNet/IP connector assignment	
Plug connectors X1 and X2	

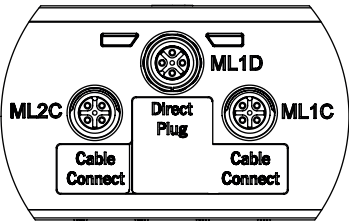


Pin	Description
XD1.1	24 V DC
XD1.2	(looped through)
XD1.3	0 V DC
XD1.4	(looped through)

Pin	Description
XD2.1	24 V DC
XD2.2	(looped through)
XD2.3	0 V DC
XD2.4	(looped through)
Power supply connector assignment	
Plug connectors XD1 and XD2	

10.3. MLI connections

The MLI connections are used to connect modules to the bus module MBM. The sealing caps can be reordered (complete set AC-SET-BP-M12, order no. 156739).



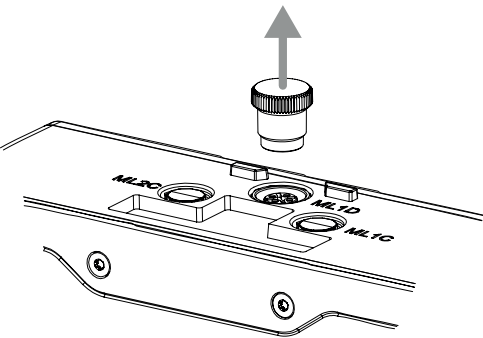
Connection	Description
ML1D (direct plug)	Module plug connector for direct mounting in a block. Important! Use only for direct mounting.
ML1C (cable connect)	Module plug connector for remote mounting (line 1).
ML2C (cable connect)	Module plug connector for remote mounting (line 2).

10.3.1. Direct mounting

Pay attention to the following points on direct mounting:

- › Ensure the modules are flush with each other. Excessively large distances will reduce the degree of protection achievable. Caution: The modules are only loosely connected together.
- › Make sure a sealing cap is fitted to unused connections.
- › Mount each module on the mounting surface as stipulated.

Before direct mounting, the sealing cap must be removed from connection ML1D (see figure below).

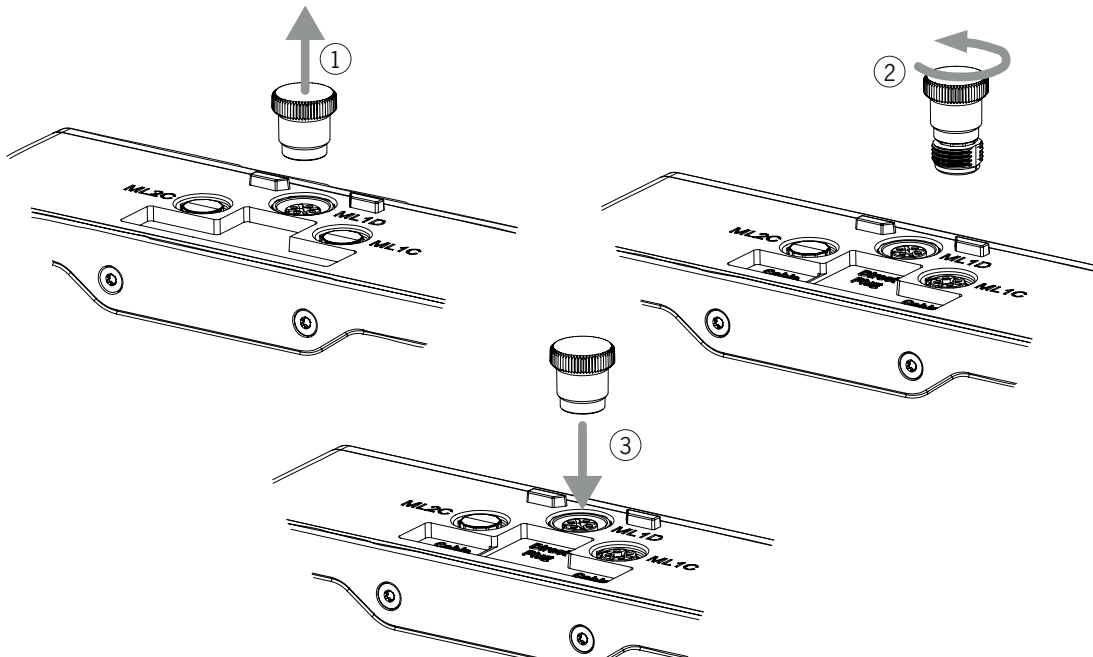


10.3.2. Remote mounting

Pay attention to the following points on remote mounting:

- › The maximum cable length for a line must not exceed 40 m.
- › Up to 3 basic modules can be operated per line. If you require a different configuration, contact our support team.
- › A maximum of 18 modules or submodules can be operated on one bus module MBM. Submodules count as one module here. Attention is to be paid to the maximum permissible total current consumption (see 14. *Technical data*).
- › The number of safe devices in an overall system is limited to 12.
- › Always use the module plug connector ML1C, ML2C or both for remote mounting.
- › Lay the cable so that it is protected against damage as far as possible.
- › Make sure a sealing cap is fitted to unused connections.
- › Make sure the connecting cables are correctly screwed into place to achieve the stated degree of protection.

Before remote mounting, the sealing cap must be unscrewed from connection ML1C. The sealing cap for connection ML1D is used as a tool for this purpose (see figure below). On the use of a second line, the sealing cap for ML2C must also be unscrewed. Then the sealing cap for connection ML1D must be re-fitted.



10.4. Connecting modules

Modules can either be connected together directly or using cables (see Fig. 2: *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.

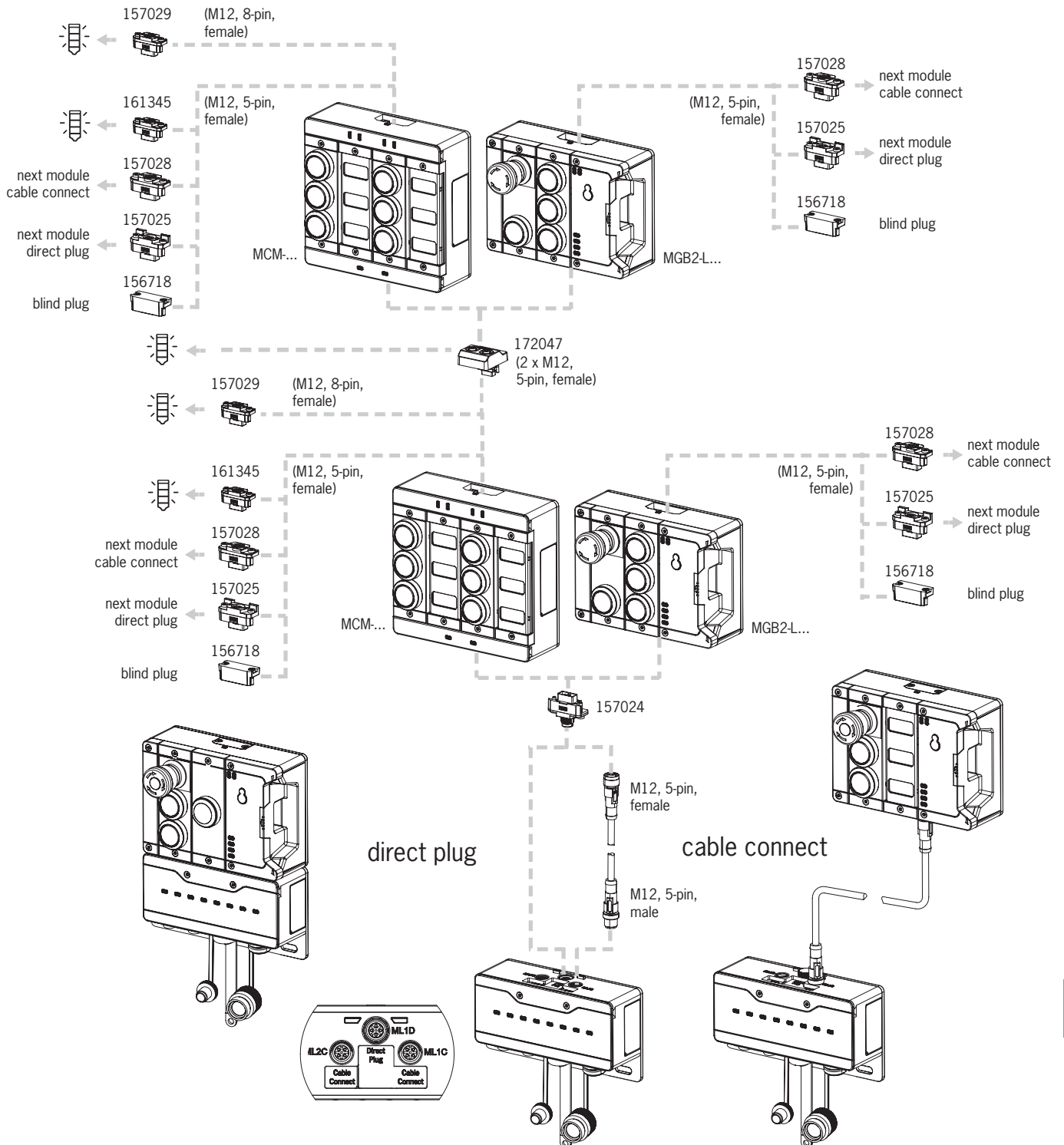


Fig. 2: Connecting modules

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-...
** Only for MCM-MLI-...JJ-..

11. Setup

11.1. Integrating into EtherNet/IP and CIP Safety



NOTICE

- The parameters *Input RPI*, *Safety Task Period*, *Network Delay Multiplier* and *Time Multiplier* have a decisive effect on the reaction time of the safety function. The safety function could be lost if the reaction times are too long.
- With the setting *SCID = 0*, the function of the safety program must be safeguarded in the PLC.
- It is recommended to assign to all safe networks and safe subnetworks an SNN that is unique across the entire system.
- Before the MBM can be integrated into a safe network, an IP address must be assigned.
- The device can be operated on Rockwell control systems from firmware version 36.

For detailed information about setup, contact the EUCHNER support team (support@euchner.de). The suitable EDS and AOI files for your system are also available there.

11.2. Product Code

Each bus module MBM has a Default Product Code on delivery. Each EDS file contains exactly one configuration and a suitable Product Code.

As soon as the bus module MBM receives an EDS from the control system, it compares the topology in the EDS with the topology of the connected modules and submodules. If these match, the bus module accepts the new Product Code from the EDS file.

A bus module MBM that has already accepted a Product Code from an EDS file must be reset to the factory setting in order to change the configuration, see chapter 13.3. *Resetting system to factory settings (factory reset) on page 38*.

11.3. Teach-in operation

The modules and submodules must be assigned to each other using a teach-in function before the system forms a functional unit.

During the teach-in operation, the module is in the safe state (all safe bits are not set).



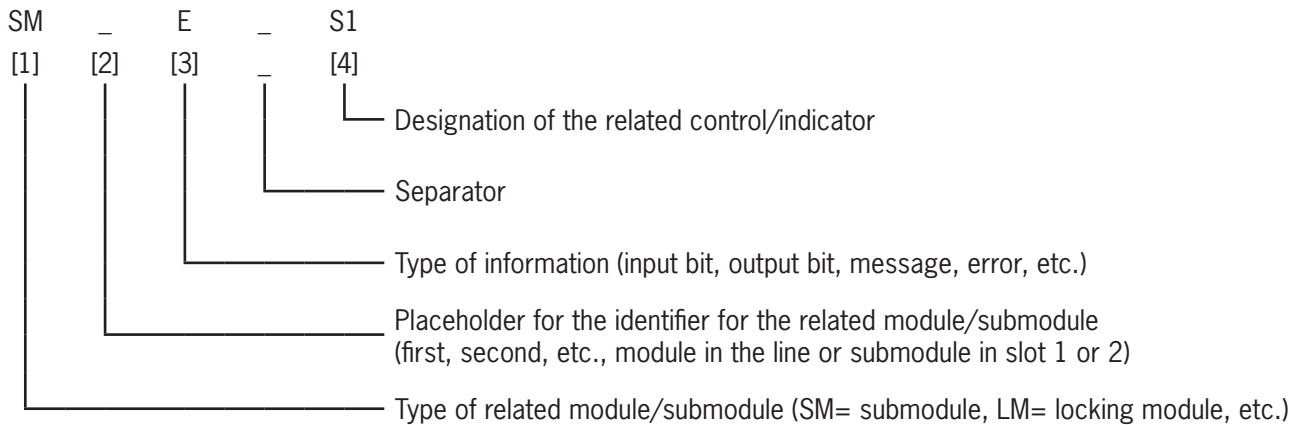
Important!

- A system that has not yet been taught-in remains in teach-in standby until all modules have been taught-in during a power-up process. Systems that have already been taught-in must be reset to the factory setting in order to restore teach-in standby.
- Faulty modules or submodules can be replaced with identical modules or submodules without a teach-in operation.

11.4. Overview of the communication data

The associated input and output bits are listed on the data sheet for the respective module/submodule (see chapter 11.5. *Information on the related data sheets*). The identifiers for the bits always have the same structure (see below).

The following example shows an error status bit [E] in a submodule [SM] for the switch position S1 [S1].



The individual abbreviations are explained in the following tables. You will find a detailed explanation of the individual bits on the supplementary data sheet (see item 1 in *Fig. 3 on page 27*).

Bit identifiers for position [1]	Description
BM	Data from bus modules MBM
LM	Data from interlocking/locking modules MGB2-I.../MGB2-L...
SM	Data from submodules MSM
EM	Data from expansion modules MCM

Bit identifiers for position [3]	Description
I	Input. Bit in the input area of the control system
O	Output. Bit in the output area of the control system
FI	Failsafe input. Safe bit in the input area of the control system (CIP Safety bit)
FO	Failsafe output. Safe bit in the output area of the control system (CIP Safety bit)
D	Diagnostics. Status bit for diagnostics messages
E	Error. Status bit for error messages
ACK	Acknowledge. Acknowledgment bit for confirmation of messages

Bit identifiers for position [4]	Description
S	Switch 1, 2, ...
H	Lamp 1, 2, ...
ES	EMERGENCY STOP
SK	Safe signal "Position of the bolt tongue" (guard closed and bolt tongue inserted)
UK	Safe signal "Position of guard locking"
CL	Guard locking control
EN	Enabling switch
SYS	System
ER	Escape release
ML	Module connection (MLI)
SM	Submodule

11.5. Information on the related data sheets

In addition to the operating instructions, you will find all item-specific information on the data sheets. This information includes, along with the modules and submodules installed, information on compatibility (connection type) and on the communication data that the related module exchanges with the bus module MBM. The following example data sheets show where this information is given.

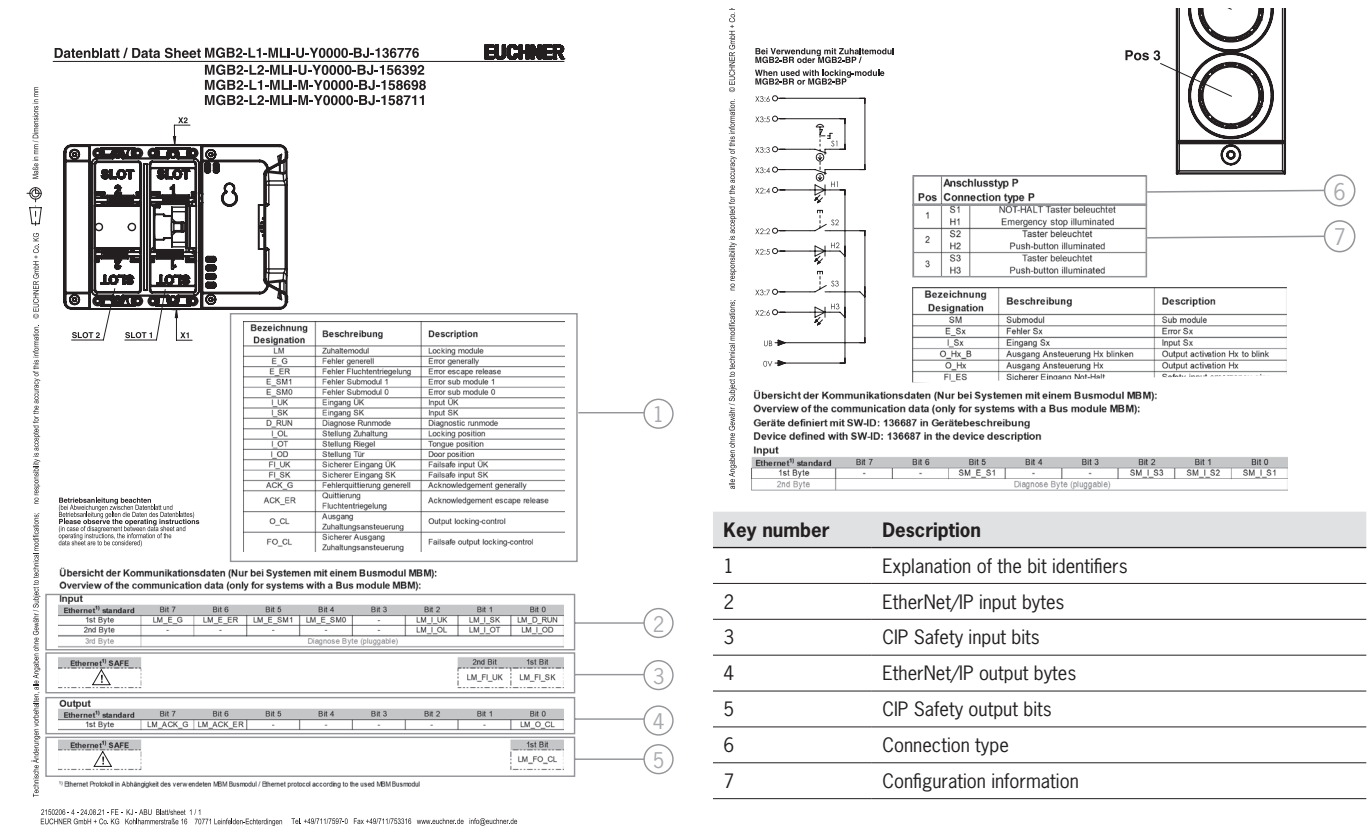


Fig. 3: Example data sheets, locking module (left) and submodule (extract, right)

With the MBM-EI, the diagnostic bytes (pluggable) are always transmitted as well.

11.6. System layout and layout of the data areas in the control system

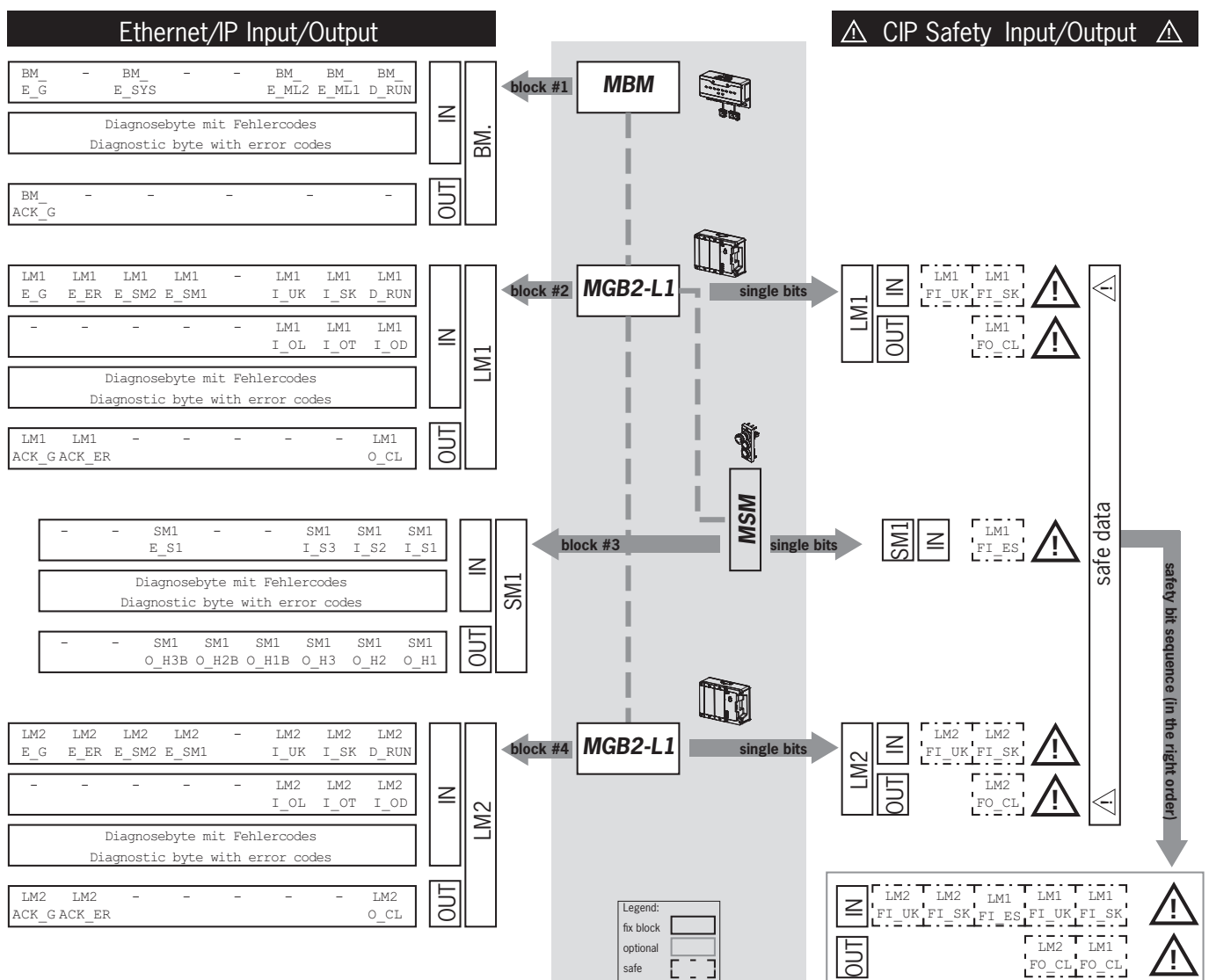
Due to its modular layout, the MLI system offers you a very large degree of flexibility. This flexibility also applies to the use of the communication data. The data areas that the system occupies in your control system are dependent on your system layout.

Each module has fixed communication data that are permanently assigned in the EDS file when the modules are combined.

The following graphic is intended to make it clear which rules must be used to combine the data blocks of the individual modules and submodules. A distinction is made between non-safe EtherNet/IP data and safe CIP Safety data.

While EtherNet/IP data are always incorporated by bytes ("block #1 ... #4"), the data are always incorporated by individual bits for CIP Safety data ("single bits" in the figure below). This means you must make sure you provide enough safe memory for CIP Safety data.

The following example shows a typical system layout with the bus module (BM1) to which two locking modules (LM1 and LM2) are connected on one line. The first locking module (LM1) also contains a submodule (SM1) with one emergency stop and two pushbuttons. Based on this example, you can see the composition of the communication data.



The individual data blocks or bits are always combined in the same sequence as the system layout. Here the counting is always started at the bus module (1) and then continued from the first to the last modules on a line. If there are two lines, the complete first line on ML1C (2...4 in the figure below) is counted first and then the complete second line on ML2C (5...7 in the figure below). Submodules in a module are counted immediately after the module in which they are inserted before the count continues with the next module. For submodules, the SLOT number defines the sequence.

The following figure is intended to clarify the counting sequence.

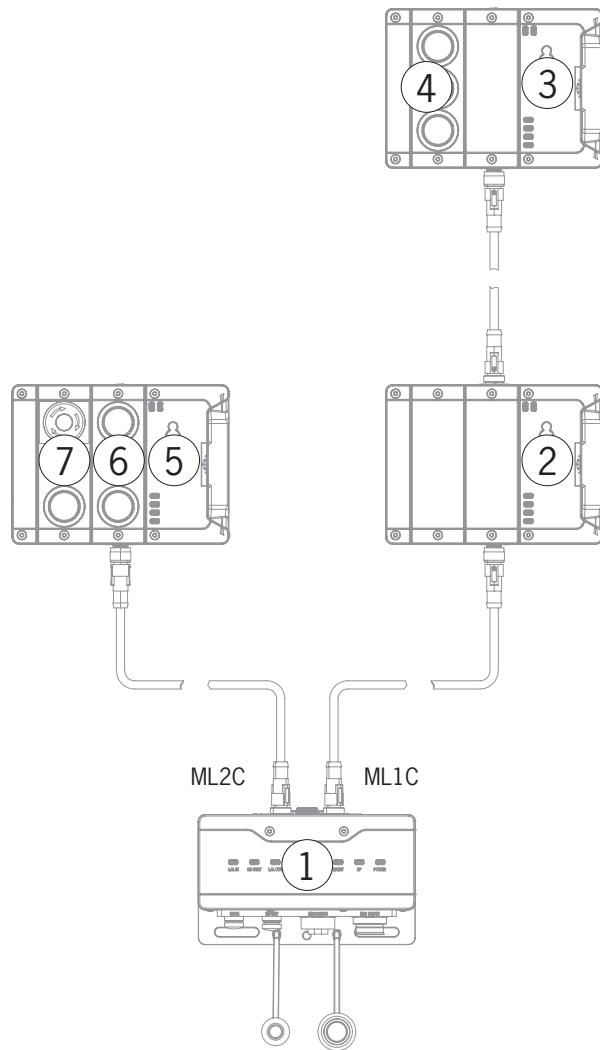


Fig. 4: Counting sequence

11.7. EtherNet/IP data bytes

Each module or submodule sends specific, non-safe communication data. The following chapters provide an overview of the most important module types and their data. You can find item-specific information on which data blocks your modules or submodules contain on the supplementary data sheet (see chapter 11.5. *Information on the related data sheets*).

The following modules can be present in various combinations in an MLI system:

- A bus module MBM (contains everything necessary for a bus connection).
- Several interlocking/locking modules, MGB2-I or MGB2-L (together with the handle module, they form an interlocking device with or without guard locking).
- Several expansion modules MCM
- Several submodules MSM.
- Additional connected devices such as enabling switches, etc.

Each module or submodule occupies a certain number of EtherNet/IP data bytes in the input and output areas of the control system.

11.8. CIP Safety data bytes

Safe CIP Safety data are possibly also transmitted in addition to the non-safe EtherNet/IP data. These data include all information on the position of the bolt tongue and guard locking on an interlocking or locking module MGB2, emergency stop and enabling switch, for example.

While EtherNet/IP data are always incorporated by bytes, the data are always incorporated by individual bits for CIP Safety data.

The following CIP Safety data blocks are provided:

- 4 input bytes and 4 output bytes

All device-specific data bits are present in parallel in the non-safe EtherNet/IP data area and can be used as status bits there.



Important!

Never use the status bits for safety functions!

11.8.1. Data block for CIP Safety



Important!

For the scope of the safe bits, refer to the associated data sheet for your device or set. Use only bits that are specified according to the data sheet. Safe bits are marked there with a warning symbol and bounded with a dotted line.

11.9. Integrating into EtherNet/IP and CIP Safety



NOTICE

The parameters *Input RPI*, *Safety Task Period*, *Network Delay Multiplier* and *Time Multiplier* have a decisive effect on the reaction time of the safety function. The safety function could be lost if the reaction times are too long.

You will find a list of all parameters that can be set in chapter 11.9.1 on page 32.



Important!

You will require the corresponding EDS and possibly the AOI file to integrate the system. Contact the EUCHNER support team for this purpose.

The following parameters are required for setting the file correctly:

- safe or non-safe control of guard locking
- Escape Release Alarm
- Topology (see Fig. 4: Counting sequence on page 29)

Prior to setup, the files must be imported into the configuration software for the control system (see chapter 11.9. Integrating into EtherNet/IP and CIP Safety on page 31 and the control system manual).

You must perform the following steps to integrate the system into EtherNet/IP:

1. Configure the system with the configuration software for the control system and set the parameters.

The following EtherNet/IP parameters must be set in the bus module parameters:

- IP address (via DIP switches or DHCP; additional settings such as Subnet Mask, Gateway, DNS and Hostname are then required here)
- RPI Time for standard data
- SNN
- RPI Time for Safety input data

2. Save the configuration and transfer it to the system.

11.9.1. List of the parameters that can be set per module/submodule

Module/submodule	EtherNet/IP, CIP Safety	Parameter	Setting range / [default value]	Description
Bus module MBM	EtherNet/IP	IP address		The IP address can be assigned as required. Important: it must match the one in the configuration software.
		RPI Time	20 ... 3200 ms	Requested Packet Interval: interval at which the data are retrieved from the MBM.
	CIP Safety	RPI Time (input data)	20 ... 3200 ms	Requested Packet Interval: interval at which the safe data are retrieved from the MBM.
		Network Delay Multiplier	350 ... 600%	Network delay Multiplier: permissible jitter of the RPI. The value must increase with the network load.
		Safety Network Number		The "Safety Network Number (SNN)" can be assigned as required. Length 6 bytes Hexadecimal notation
Submodules	EtherNet/IP	Submodule alignment	Do not check/top/bottom [Do not check]	For submodules on which installation rotated by 180° cannot result in incorrect operation or functional problems, the alignment check can be disabled here. With "top" or "bottom", it is checked whether the position marking for S1 is at the "top" or "bottom" of the submodule (for marking, see data sheet for the submodule). Parameterization is performed by setting the corresponding bytes in the configuration of bus module MBM.
Submodules with illuminated control elements or submodules with indicators or stacklight for expansion module MCM	EtherNet/IP	Flashing frequency H1	1 ... 255 (corresponds to 0.1 ... 25.5 Hz)	Here you can set the frequency at which the indicator is to flash. Prerequisite: the corresponding output bit for the flashing function must be set. Parameterization is performed by setting the corresponding bytes in the configuration of bus module MBM.
		Flashing frequency H2	1 ... 255 (corresponds to 0.1 ... 25.5 Hz)	
		Flashing frequency H3	1 ... 255 (corresponds to 0.1 ... 25.5 Hz)	
		Flashing frequency H4 (only for stacklight)	1 ... 255 (corresponds to 0.1 ... 25.5 Hz)	

11.10. Line swap

The current MLI topology will be saved during the first starting process.

When the system is restarted, the bus module detects if the position of an MLI device has changed or the device is being operated on a different MLI line.

The bus module additionally reports an error if devices were removed or added.

This is intended to prevent devices that were incorrectly connected after servicing from entering safe mode, for example.

If the system reports a line swap error, the MLI topology must be checked and corrected if necessary. Once the MLI topology matches the stored topology again, the system enters normal operation again after the restart.

Replacement devices are not recognized as errors if there are no major changes in the safe data of the MLI devices. In this case, the user is responsible for testing the safe function.

An intentional change of the MLI topology must be reset via factory reset using the DIP switches (see chapter 13.3. *Resetting system to factory settings (factory reset) on page 38*). The MLI topology will be saved the next time the system is started.

11.11. 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 status.



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.

The replacement of submodules MSM while in operation is also possible (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.

11.12. 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 status.

Modules (e.g. locking module or expansion module) 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 related module and all downstream modules remain inactive until the overall system is restarted (fault state).

11.13. Changing the configuration

Changes to the configuration of the overall system must always be made in the configuration software for your control system (see chapter 11.9. *Integrating into EtherNet/IP and CIP Safety on page 31*). Depending on the change, a factory reset or possibly a new ESD file and AOI file can also be required.

12. Overview of data blocks for modules and submodules



Important!

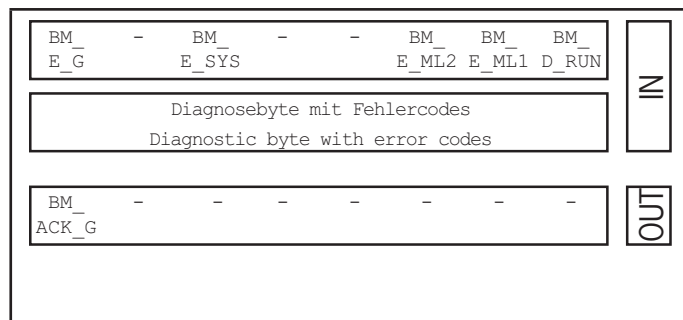
- › You will find the exact data structure for your device on the supplementary data sheet.
- › The safe output data (OUT) evaluated internally in the bus module MBM are set to 0x00 (cleared) on:
 1. Power on (application of the power supply)
 2. EtherNet/IP connection interruption (e.g. disconnection of terminal plug)
 3. Inhibit Module (PLC STOP)

12.1. Data blocks for bus module MBM

12.1.1. Safe bits

Bus modules do not have any dedicated safe bits.

12.1.2. Non-safe bits



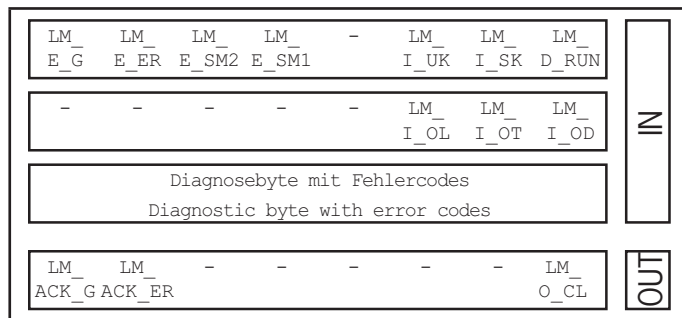
Input/output	Bit identifier	Meaning	Condition for setting	Condition for resetting
Input	BM_D_RUN	Diagnostics run mode	Device in operation	Device is not supplying any data
	BM_E_ML1	Error status bit Line 1	Fault on a module OR submodule OR EMC problem OR max. cable length exceeded	Automatic if error rectified OR acknowledgment bit BM_ACK_G is set for 500 ms (min. 350 ms and max. 750 ms)
	BM_E_ML2	Error status bit Line 2	Fault on a module OR submodule OR EMC problem OR max. cable length exceeded	Automatic if error rectified OR acknowledgment bit BM_ACK_G is set for 500 ms (min. 350 ms and max. 750 ms)
	BM_E_SYS	Error status bit Overall system	Any error in the overall system	Automatic if error rectified OR acknowledgment bit BM_ACK_G is set for 500 ms (min. 350 ms and max. 750 ms)
	BM_E_G	Error status bit General module error	Error in the module	Automatic if error rectified OR acknowledgment bit BM_ACK_G is set for 500 ms (min. 350 ms and max. 750 ms)
Output	BM_ACK_G	Acknowledgment bit for general errors	Control via PLC Resets error bit BM_E_G. Acknowledgment bit must be set for 500 ms (min. 350 ms and max. 750 ms).	

12.2. Data blocks for interlocking/locking module MGB2-I / MGB2-L

12.2.1. Safe bits

Input/output	Bit identifier	Meaning	Condition for setting	Condition for resetting
Input	LM_FI_SK	Safe input Door position	Door closed and bolt tongue inserted into interlocking/locking module	Door open OR error in transponder
	LM_FI_UK	Safe input Guard lock monitoring (only for MGB2-L)	Door closed AND locked	Guard locking open OR error in guard locking
Output	LM_FO_CL	Safe control of guard locking (only for MGB2-L)	Control via PLC Set = guard locking released Not set = guard locking active	

12.2.2. Non-safe bits



Input/output	Bit identifier	Meaning	Condition for setting	Condition for resetting
Input	LM_D_RUN	Diagnostics run mode	Device in operation	Device is not supplying any data
	LM_I_SK	Non-safe input Door and bolt position	Door closed and bolt tongue inserted into interlocking/locking module	Door open OR error in transponder
	LM_I_UK	Non-safe input Guard lock monitoring	Door closed AND locked	Guard locking open OR error in guard locking
	LM_E_SM1	Error status bit for submodule 1	Error in submodule	Automatic if error rectified
	LM_E_SM2	Error status bit for submodule 2	Error in submodule	Automatic if error rectified
	LM_E_ER	Error status bit for escape release	Actuation of the escape release. This behavior must be set in the parameters.	Acknowledgment bit LM_ACK_ER is set for min. 50 ms
	LM_E_G	Error status bit General module error	Error in module OR a submodule installed	Automatic if error rectified OR acknowledgment bit LM_ACK_G is set for min. 50 ms
	LM_I_OD	Non-safe input Door position	Door closed	Door open
	LM_I_OT	Non-safe input Bolt tongue	Bolt tongue inserted into interlocking/locking module	Bolt tongue not inserted into interlocking/locking module
	LM_I_OL	Non-safe input Guard locking	Guard locking active	Guard locking released
Output	LM_O_CL	Non-safe control of guard locking	Can be used as additional, non-safe control bit for guard locking. The behavior is already defined in the EDS file. Control via PLC Bits LM_FO_CL AND LM_O_CL set = guard locking released Bit LM_FO_CL OR LM_O_CL not set = guard locking active	
	LM_ACK_ER	Acknowledgment bit for escape release error	Control via PLC Resets error bit LM_E_ER. Acknowledgment bit must be set for 500 ms (min. 350 ms and max. 750 ms).	
	LM_ACK_G	Acknowledgment bit for general errors	Control via PLC Resets error bit LM_E_G. Acknowledgment bit must be set for 500 ms (min. 350 ms and max. 750 ms).	

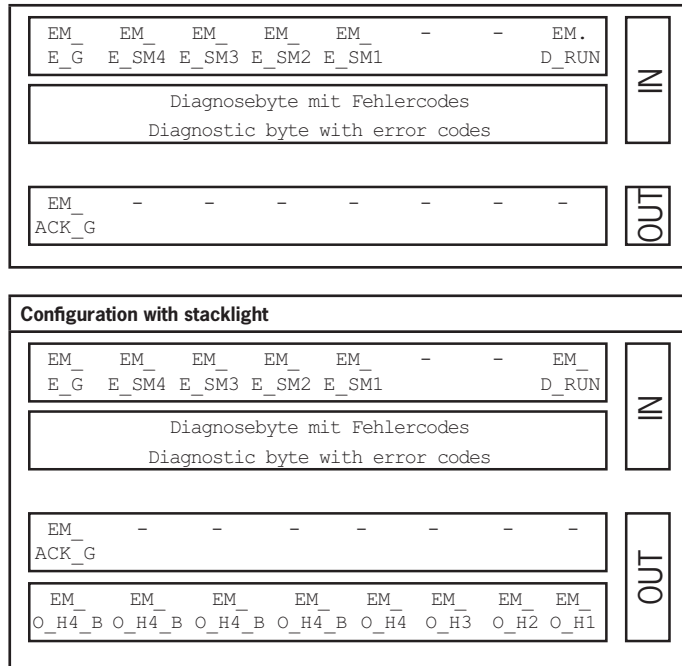
12.3. Data blocks for expansion module MCM

Expansion modules can contain up to four submodules and evaluate them.

12.3.1. Safe bits

Expansion modules do not have any dedicated safe bits.

12.3.2. Non-safe bits



Input/output	Bit identifier	Meaning	Condition for setting	Condition for resetting
Input	EM_D_RUN	Diagnostics run mode	Device in operation	Device is not supplying any data
	EM_E_SM1	Error status bit for submodule 1	Error in submodule	Automatic if error rectified
	EM_E_SM2	Error status bit for submodule 2	Error in submodule	Automatic if error rectified
	EM_E_SM3	Error status bit for submodule 3	Error in submodule	Automatic if error rectified
	EM_E_SM4	Error status bit for submodule 4	Error in submodule	Automatic if error rectified
	EM_E_G	Error status bit General module error	Error in module OR a submodule installed	Automatic if error rectified OR acknowledgment bit BM_ACK_G is set for 500 ms (min. 350 ms and max. 750 ms)
Output	EM_ACK_G	Acknowledgment bit for general errors	Control via PLC Resets error bit EM_E_G. Acknowledgment bit must be set for 500 ms (min. 350 ms and max. 750 ms).	
	EM_O_H1	Lamp H1	Control bit for lamp H1...H4. Control via PLC (HIGH = illuminated).	
	EM_O_H2	Lamp H2		
	EM_O_H3	Lamp H3		
	EM_O_H4	Lamp H4		
	EM_O_H1_B	Lamp H1 flashing function	Control bit for lamp H1...H4 flashing function. Control via PLC must be used in combination with the corresponding control bit for the lamp (EM_O_H.). Switching logic based on the example of H1: EM_O_H1 AND EM_O_H1_B = H1 flashes To set the flashing frequency, see chapter 11.9.1. List of the parameters that can be set per module/submodule on page 32.	
	EM_O_H2_B	Lamp H2 flashing function		
	EM_O_H3_B	Lamp H3 flashing function		
	EM_O_H4_B	Lamp H4 flashing function		

12.4. Data blocks for submodules

For the data blocks your submodule contains, refer to the associated data sheet. See also chapter 11.5. *Information on the related data sheets.*

12.5. Replacing a bus module MBM

If servicing is required, the bus module MBM is easy to replace with a new module. For this purpose, the following prerequisites must be met:

- › The DIP switch settings on the new device must match those on the old device. If you assign the IP address via DHCP, this must be reassigned after replacement.
- › The device must correspond to the factory setting. A Product Code from another EDS file must not have been applied. MBMs that have already applied a Product Code must be reset to the factory settings first.
- › If the old device had an SSN, this must be assigned again for the new device.

Once these conditions are met, simply replace the old MBM with the new MBM.

12.6. Handle module teach-in operation (only for systems with locking module MGB2 uni-code)

The handle module must be assigned to the locking module using a teach-in function before the system comprising locking module and handle module forms a functional unit.

You will find a detailed description of the teach-in operation in the operating instructions for your locking/interlocking module.

13. Diagnostics, troubleshooting and aids

All error codes are listed in the following. The error code is output in the corresponding byte.



Important!

The error code given in the tables below is sequential and starts with 0x01. You must add any upstream error codes from EtherNet/IP or the control system to the error codes stated. For EtherNet/IP, the offset to be taken into account is 0x200.

Most messages are also displayed on the devices.

Key to symbols			LED not illuminated
			LED illuminated
			LED flashes three times
			LED flashes at 1 Hz
			LED flashes with a long turn-on time
			Any state

13.1. Reset and restart

To acknowledge general errors and restart the system, disconnect the bus module MBM from the power supply for a few seconds.

13.2. Acknowledging errors

To acknowledge errors, set the respective acknowledgment bit for 500 ms (min. 350 ms and max. 750 ms). You will find an overview of the error messages and reset conditions from chapter 13.5. *General errors*.

13.3. Resetting system to factory settings (factory reset)

You can reset the device as follows:

- › With the aid of the DIP switches in the bus module MBM (this resets the overall system including the MLI topology). Procedure: Switch off system, set “RST” DIP switch to “ON” position and restart system. If DIA and MAINT flash alternately, switch the system off, set the “RST” DIP switch to “OFF” position and restart the system. See also chapter 9.1. *DIP switches on page 17*.
- › Check the safe function of the safeguard and, if necessary, other safety functions after every factory reset.

13.4. Diagnostics with the aid of the device web interface

The device has an internal device web interface. The device web interface can be used at any time in operation if the function is activated. It is not possible to make any settings on the device.

The following diagnostics information is provided:

- › Overview of all modules and submodules installed
- › Status and version of all modules and submodules installed
- › IP address of the bus module MBM
- › Error list for each module and submodule
- › SNN and Product Code of the bus module MBM
- › Error list for the overall system.

The error numbers indicated correspond to those in the error tables below from chapter 13.5 on page 41.

13.4.1. Using device web interface

Proceed as follows:

1. Set “WWW” DIP switch to “on” position. See also chapter 9.1 on page 17.
Notice: The change is effective only after a restart.
 2. Connect device to a PC or other suitable input/output device using a network cable.
 3. Open the device web interface in the browser (IP address: XXX.XXX.XXX.XXX).
- ➔ The HOME page appears.

HOME FAULT-LOG ENVIRONMENT SETTINGS



Module Name: mbm
IP Address: 192.168.1.50
Product Code: 4099
Safety Network Number:
4D57_0164_AA9C (2026/3/17 6h:29m:34s:492ms)

MULTIFUNCTIONAL GATE BOX
MODULAR MGB2 SYSTEM STATUS

Module	MGB2 Device	Slot	Firmware Version	Hardware Version	Status
	MBM-EI-S1-MLI-3B-173315		V 1.1.0	V 1.0.0	●
	CIPSafety_4Bytes_Norm		V 1.1.0	V 1.0.0	●
	Diagnose_EXT		V 1.1.0	V 1.0.0	●
1	MCM-MLI-Y00000000-JJ-157854			V 1.3.0	●
	MSM-1-P-CA-BPP-A1-136687	1		V 1.1.2	●
2	MCM-MLI-Y0000-JJ-164241			V 1.3.0	●
	MSM-1-R-CKS2-FLX-00Q0FS-J1-168595	1		V 1.0.1	●
	MSM-1-P-CA-RRR-C5-157218	2		V 1.1.0	●
3	MGB2-L1-MLI-U-Y0000-BJ-136776			V 1.6.0	●
	MSM-1-P-CA-BPP-A1-136687	2		V 1.1.2	●

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Fig. 5: HOME page on the device web interface in the bus module MBM

There you can see information on the bus module MBM and on the modules and submodules connected. Devices with errors have a red status.

On the HOME page, you can do the following:

- › Click the name of a module to open the diagnostics page for the module.
- › Click FAULT-LOG to display a fault log for the overall system. All current and previous errors since setup are listed there. The error list can also be downloaded from the device. With this file, our support team will be able to provide specific assistance if you have problems. The download link is at the end of the error list.
Click ENVIRONMENT to display available environment parameters.
- › Click SETTINGS to download the HTTPS certificate. The administrator area with firmware update option can also be found here. This can be protected by a user-assigned password.

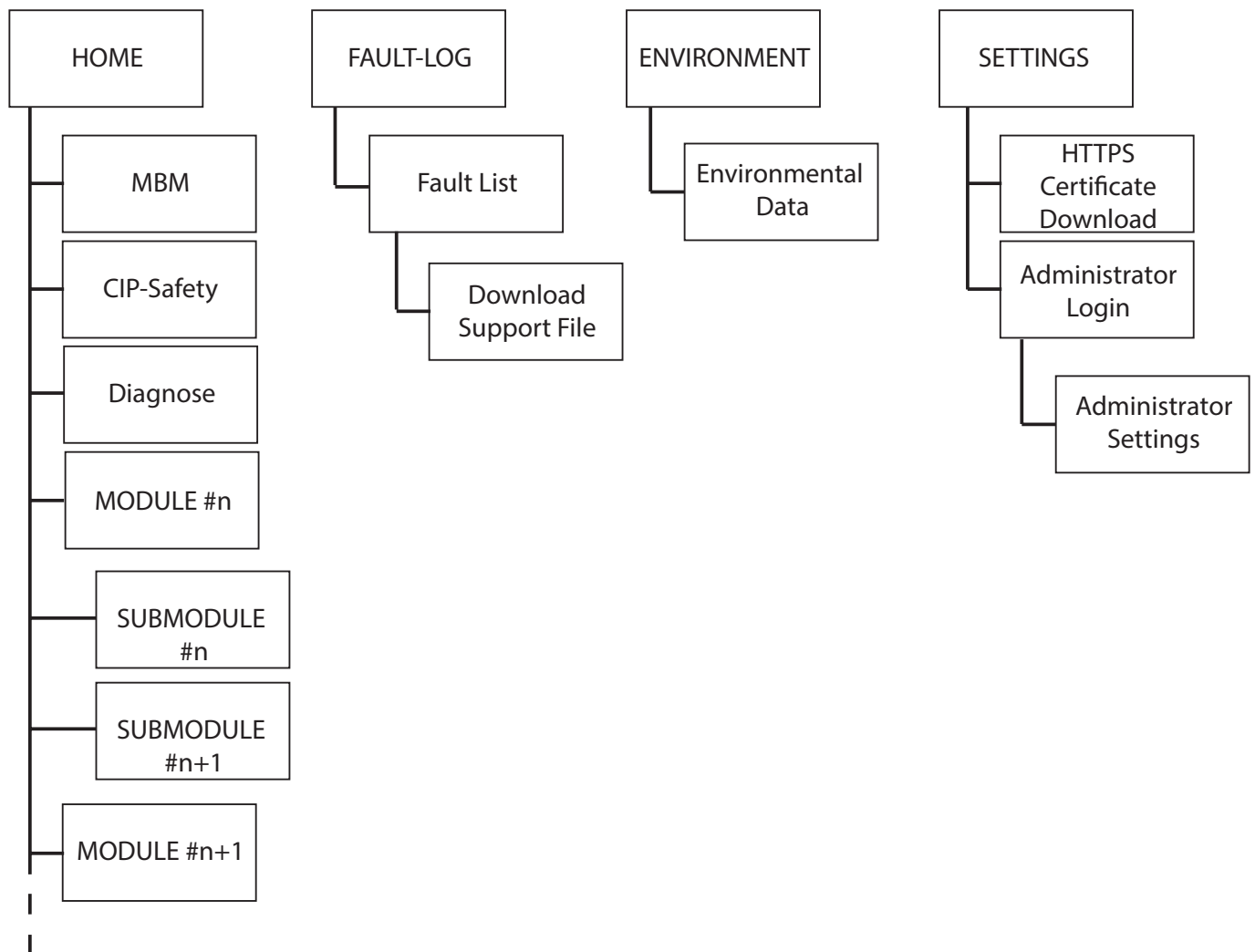


Fig. 6: Site map for the device web interface in the bus module MBM

13.4.2. Using password



Important!

- › EUCHNER recommends assigning an individual password for each device.
- › If a default password is used for different devices instead of individual passwords, it is essential to observe the following points:
 - The use of default passwords might facilitate unauthorized access to the network and the devices.
 - If a network error occurs during the firmware update process, devices not intended for a firmware update might be updated.

13.5. General errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays							
							Bus module							
							L/A 1	Mod	L/A 2	Net	D/A	MAINT	SF	POWER
0x01 ⋮ 0x06	Internal fault	Internal device fault. Device is no longer functional.	Internal fault	Latching	Restart system. If the error persists, contact our support team.	BM_E_G								

Interlocking/locking module

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays					
							Interlocking/locking module					
							POWER	STATE	LOCK	DIA	SLOT 1	SLOT 2
0x01 ... 0x06	Internal fault	Internal device fault. Device is no longer functional.	Internal fault	Latching	Restart system. If the error persists, contact our support team.	LM_E_G						

MCM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays				
							Interlocking/locking module				
							POWER/FC	STATE	DIA	SLOT RED	SLOT GREEN
0x01 ... 0x06	Internal fault	Internal device fault. Device is no longer functional.	Internal fault	Latching	Restart system. If the error persists, contact our support team.	EM_E_SM					

13.6. Teach-in errors and configuration errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays							
							Bus module							
							L/A 1	Mod	L/A 2	Net	DIA	MAINT	SF	POWER
OxAE	Configuration error	Configuration in the control system does not match the actual configuration. Modules might be swapped or in the wrong location.	Configuration error	Latching	Restore the correct configuration and restart the system.	BM_E_G						 3x rd		
OxEA	Topology error	Saved topology does not match the actual topology. Modules might be swapped or in the wrong location.	Topology error	Latching	Restore the correct topology and restart the system. An intentional change of the MLI topology must be reset via factory reset.	BM_E_G								
OxEB	Topology error	Saved topology does not match the actual topology. Modules might have been added or removed.	Topology error	Latching	Restore the correct topology and restart the system. An intentional change of the MLI topology must be reset via factory reset.							 long on		 long on

Interlocking/locking module

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays					
							Interlocking/locking module					
							POWER	STATE	LOCK	DIA	SLOT 1	SLOT 2
Ox1F	Actuator/handle module could not be taught-in	Actuator/handle module not detected often enough during teach-in operation or removed during teach-in operation.	Teach-in error	Latching	Restart teach-in operation. Make sure the handle module is not removed during the teach-in operation (door closed, bolt tongue inserted).	LM_E_G		 1x				
Ox22	Solenoid configuration error	Single-channel solenoid control	Configuration error	Latching	Set solenoid monitoring in the settings.							

13.7. Transponder errors

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays					
							Interlocking/locking module					
							POWER	STATE	LOCK	DIA	SLOT 1	SLOT 2
0x42	Invalid handle module detected	Handle module is not valid or handle module is faulty.	Transponder error	Latching	Restart teach-in operation. If the error persists, contact our support team.	LM_E_G		 3x				
0x25	Disabled actuator detected	Already taught-in but disabled actuator has been detected.	Transponder error	Latching	Restart teach-in operation with a new handle module or use taught-in handle module if a teach-in operation was not intended.	LM_E_G		 3x				

13.8. Environment errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays							
							Bus module							
							L/A 1	Mod	L/A 2	Net	DIA	MAINT	SF	POWER
0x60	Supply voltage too high	Overvoltage	Environment error	Resettable	Decrease supply voltage. Pay attention to technical data.	BM_E_G								
0x61	Supply voltage too low	Low voltage	Environment error	Resettable	Increase supply voltage or check system topology. Pay attention to technical data and max. number of modules/submodules. Possibly excessively long cables.						 long on	 5x rd		

Interlocking/locking module

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays					
							Interlocking/locking module					
							POWER	STATE	LOCK	DIA	SLOT 1	SLOT 2
0x60	Supply voltage too high	Overvoltage	Environment error	Resettable	Decrease supply voltage. Pay attention to technical data.	LM_E_G						
0x61	Supply voltage too low	Low voltage	Environment error	Resettable	Increase supply voltage or check system topology. Pay attention to technical data and max. number of modules/sub-modules. Possibly excessively long cables.							
0x62	Temperature too high	Temperature in the housing too high	Environment error	Latching	Check whether the system is operating in the temperature range specified. Pay attention to technical data.							
0x63	Temperature too low	Temperature in the housing too low	Environment error	Latching	Check whether the system is operating in the temperature range specified. Pay attention to technical data.							

MCM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays				
							Interlocking/locking module				
							POWER/FC	STATE	DIA	SLOT RED	SLOT GREEN
0x60	Supply voltage too high	Overvoltage	Environment error	Resettable	Decrease supply voltage. Pay attention to technical data.	EM_E_SM					
0x61	Supply voltage too low	Low voltage	Environment error	Resettable	Increase supply voltage or check system topology. Pay attention to technical data and max. number of modules/submodules. Possibly excessively long cables.						
0x62	Temperature too high	Temperature in the housing too high	Environment error	Latching	Check whether the system is operating in the temperature range specified. Pay attention to technical data.						
0x63	Temperature too low	Temperature in the housing too low	Environment error	Latching	Check whether the system is operating in the temperature range specified. Pay attention to technical data.						

13.9. MLI communication errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays							
							Bus module							
							L/A 1	Mod	L/A 2	Net	DIA	MAINT	SF	POWER
0x74	MLI1 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.	BM_E_G								
0x75	MLI2 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.									
0x78	Safety communication with device lost	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.									
0x79	Non-safety communication with device lost	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.						✱	✱ 4x rd	✱	✱
0x7A	Maximum number of modules/submodules exceeded		Communication error	Latching	Reduce the number of modules/submodules in your system. Max. 18 devices.									
0x7B	Bus open circuit error	No Link signal	Communication error	Resettable	Check EtherNet/IP connection.									

Interlocking/locking module

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays					
							Interlocking/locking module					
							POWER	STATE	LOCK	DIA	SLOT 1	SLOT 2
0x74	MLI1 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.	LM_E_G	✱ 1x			✱		

MCM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays				
							Interlocking/locking module				
							POWER/FC	STATE	DIA	SLOT RED	SLOT GREEN
0x74	MLI1 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.	EM_E_SM	 1x				

13.10. Plausibility errors

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays			
							Interlocking/locking module			
							POWER	STATE	DIA	LOCK
0x88	Plausibility error: bolt fracture	Transponder for the bolt has been detected without the door closed.	Plausibility error	Resettable	Check function of the handle module. Pay attention to damage. Replace handle module if necessary. Acknowledge error with LM_ACK_G.	LM_E_G				 1x
0x8A	Plausibility error: signal sequence	Transponder has been detected or removed without the bolt handle having been moved. Door may have been slammed too fast.	Plausibility error	Resettable	Open door, acknowledge error with LM_ACK_G. Close door more slowly. On repeated occurrence, contact our support team.					
	Escape release	Message that the escape release has been actuated (only if set in the parameters).	Plausibility error	Resettable	Rectify error via general acknowledgment bit LM_ACK_G or via acknowledgment bit LM_ACK_ER for escape release error.	LM_E_G/ LM_E_ER				

13.11. Submodule errors

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting/acknowledgment	LED displays	
						Submodule	
						SLOT RED	SLOT GREEN
	Incorrect submodule	Submodule type detected does not correspond to the submodule type saved	Incorrect submodule	Submodule will be ignored; no effect on overall system	Replace submodule, modify system topology or restart system		 3x
	Submodule missing	Submodule missing, even though a submodule has been taught-in for the slot	Submodule missing	Missing submodule will be ignored; no effect on overall system	Install submodule or modify system topology		 1x
	Submodule rotated by 180°	Submodule is installed rotated by 180°	Submodule rotated by 180°	Submodule will be ignored; no effect on overall system	Rotate submodule by 180°		 2x
	Internal submodule error	Internal device fault. Submodule is no longer functional.	Internal submodule error	Submodule will be ignored; no effect on overall system	Replace submodule		
0xA0	Error in the safety equipment (can be reset automatically)	E.g.: discrepancy error (emergency stop, enabling switch, key-operated rotary switch, acknowledgment pushbutton)	Safety error in submodule	Latching	For submodules to which an external device is connected (e.g. enabling switch): check correct function of the external device. For errors in the submodule: replace faulty submodule and send to the manufacturer.	 1 Hz	

13.12. CIP Safety errors

CIP Safety errors are output as an internal error with error code 0x01 within the control system. You can read the specific error code via the internal device web interface.

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays							
							Bus module							
							L/A 1	Mod	L/A 2	Net	D/A	MAINT	SF	POWER
0x250	Error in CIP Safety state handling	Internal error in Net state handling	Internal fault	Latching	Restart system. If the error persists, contact our support team.									
0x251	Different stack track counters on both safety channels													
0x252	Error in hardware parameter	CIP Safety address 0 is invalid												
0x253	Error in parameters	Only 4-byte Safety input and output modules are allowed												
0x254	Error in stack	Internal stack error. Error could have been caused by CIP Safety stack.												
0x255	Error in internal CIP Safety stack variables	The internal CIP Safety stack variables differ on both channels, e.g. due to bit flips												
0x256	Incorrect CIP Safety SNN	The set CIP Safety address in the control system and the CIP Safety address in the device do not match												

13.13. Updating firmware

The device's firmware can be updated using the EUCHNER Device Update tool. You will find further information in the software manual.

	WARNING Loss of the safety function A firmware update can change or expand functions. Observe the following points to ensure the safety function: › Carefully observe the release notes for the respective firmware version prior to the update process. Ensure that the changes the firmware update triggers in the device continue to comply with the requirements of the overall system. - Perform a risk assessment on the overall system before the update if necessary, because the update could change functions or processes in the EUCHNER device. - Observe and follow the instructions in the software manual when updating the firmware.
---	--

13.14. Running EUCHNER Device Update

	NOTICE Damage to the device The device can be damaged when the firmware is updated. › Make sure to use only one instance of the EUCHNER Device Update tool. Sending several broadcasts simultaneously from different instances to search for devices can damage the device. › Ensure that a possible network connection loss does not result in losing data and damaging the device. While the network is being scanned, an overload might occur. › Ensure a stable power supply for the device. › Ensure that the automatic restart of the device after a successful update is not interrupted.
---	---

	Important! › After the update, check the update report to determine whether and on which devices the update process was successful. › Ensure that the firmware update is recorded in the machine documentation using the automatically generated update report. › Ensure that the device documentation corresponding to the update is available and is observed after the device update.
---	--

14. Technical data



NOTICE

If a data sheet is included with the product, the information on the data sheet applies.

Parameter	Value
Housing material	Fiber glass reinforced plastic Die-cast zinc, nickel-plated, stainless steel
Dimensions	See dimension drawing
Ambient temperature	-30 ... +55 °C at UB = 24 V
Degree of protection	IP65
Safety class	III
Degree of contamination	3
Installation position	Any
Connection options, power supply	2 x plug connectors 7/8" 2 x M12 plugs (L-coded) or 2 x M12 plugs (A-coded) or 2 x M12 (D-coded)
Connection, bus ¹⁾	EtherNet/IP cable, at least cat. 5e
Connecting cable, bus	CIP Safety
Safety outputs, protocol	DC 24 V +20%/-15% (PELV – see chapter 10. Electrical connection)
Operating voltage U _B	200 mA
Current consumption, max. (only bus module)	4 A
Current consumption, max. (bus module and all connected modules/submodules)	3.2 A
- Plug connector 7/8" acc. to ANSI/B93.55M-1981	4 A
- Plug connector M12 (L-coded) ¹⁾	3.2 A
- Plug connector M12 (A-coded)	4 A
Maximum feed-in current in the connection block	6 A
- Plug connector 7/8" acc. to ANSI/B93.55M-1981	12 A
- Plug connector M12 (L-coded) ¹⁾	4 A
- Plug connector M12 (A-coded)	Min. 4 A slow-blow
Fuse protection for power supply, external	75 V
Rated insulation voltage U _i	0.5 kV
Rated impulse withstand voltage U _{imp}	Acc. to EN 60947-5-3
Shock and vibration resistance	Acc. to EN 61000-4 and DIN EN 61000-6-7
EMC protection requirements	
Risk times, max. (turn-off times) ²⁾	200 ms
Overall system:	
Fixed value for the processing of safety functions such as	
- Evaluation of submodules with emergency stop, safe pushbuttons or switches, enabling switches, etc.	
- Monitoring of the position of the guard.	
- Monitoring of guard locking.	
Characteristics acc. to EN ISO 13849-1/EN IEC 62061	
Category	4
Safety Integrity Level	SIL 3
Performance Level	PL e
Mission time	20 years
PFH ³⁾	4.11 x 10 ⁻⁹

1) At temperatures < 40 °C, the max. current consumption (bus module including all connected modules/submodules) can be increased to 4 A and the max. feed-in current in the connection block to 16 A.

2) The risk time is the maximum time between the change in an input status and the clearing of the corresponding bit in the bus protocol. See chapter *Calculation example for determining the risk time for safe functions* on page 51.

3) Information regarding wearing parts without consideration of fixed failure rates in electronic components.

Calculation example for determining the risk time for safe functions



Important!

The values in this calculation are only examples. Please refer to the operating instructions of the respective device for the values.

Only modules and submodules that contain a safety function flow into the calculation of the risk time. Safe modules and submodules are apparent because they transmit safe bits (CIP Safety bits) via the bus module to the control system.

Modules with safety functions are, for example:

- › Interlocking and locking modules MGB2-I.../MGB2-L...
- › Submodules MSM with emergency stop, safe acknowledgment pushbutton, safe selector switch, enabling switch, etc.

The following formula applies to the calculation of the risk time for your system:

$$T_{Risk} = T_{RiskSystem} + T_{RiskFunction}$$
$$T_{RiskSystem} = T_P + n \times t_L$$

- T_{Risk} = Total risk time of a safety function
- T_P = Processing time for safety function (general figure 200 ms)
- t_L = Latency time for a safe module/submodule (general figure 27 ms)
- n = Number of safe modules/submodules installed in the system
- $T_{RiskFunctionSK}$ = 155 ms
- $T_{RiskFunctionUK}$ = 70 ms
- $T_{RiskFunctionElements}$ = 35 ms (valid for all safe functions except SK and UK)

The following example shows a system with three locking modules. In two of the locking modules, there is one submodule with a safety function installed. There is therefore a total of 5 safe modules/submodules.

System layout	Position	Module/submodule	Safety function?	Processing time T_P	Latency time t_L
	1	Bus module MBM	-	200 ms	-
	2	Locking module MGB2-L	yes	-	27 ms
	3	Locking module MGB2-L	yes	-	27 ms
	4	Submodule MSM with emergency stop safety function	yes	-	27 ms
	5	Interlocking module MGB2-I	yes	-	27 ms
	6	Submodule MSM	no	-	-
	7	Submodule MSM with emergency stop safety function	yes	-	27 ms

These data yield the following calculation:

$T_{RiskSystem} = 200 \text{ ms} + 5 \times 27 \text{ ms} = 335 \text{ ms}$

$T_{RiskSK} = 335 \text{ ms} + 155 \text{ ms} = 490 \text{ ms}$

$T_{RiskUK} = 335 \text{ ms} + 70 \text{ ms} = 405 \text{ ms}$

$T_{RiskElements} = 335 \text{ ms} + 35 \text{ ms} = 370 \text{ ms}$

15. Service

If servicing is required, please contact:

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Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
Germany

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 following requirements:

- › Machinery Directive 2006/42/EC (until January 19, 2027)

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*.

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