EUCHNER

Operating Instructions

Safety Systems

MGB2-L..B-PN.-... (PROFINET)

EN

Contents

EN

1. About this document

1.1. Scope

These operating instructions are valid for the following devices: 165504, 165505, 165506, 165508.

These consist of the following components, among others:

- MBM-PN... 169764 V2.0.X
- MGB2-L2-MLI-... 158711 V1.5.X
- MGB2-L2-MLI-... 156392 V1.5.X
- MSM-1-S-CA-P0R0P0-G2-164758 V1.1.X
- MSM-1-S-CA-B000SL-F6-164620 V1.1.X

These operating instructions, the document *Safety information* and any enclosed data sheet form the complete user information for your device.

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 devices on machines, as well as setup and servicing staff possessing special expertise in handling safety components.

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

EN

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 (2540773)	(this document)	
Declaration of conformity	Declaration of conformity	
Possibly enclosed data sheet	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. in the search box.

2. Correct use

The system may be operated only in the combination as purchased.

The safety system MGB2 is an interlocking device with guard locking (type 4). Devices with unicode evaluation possess a high coding level, devices with multicode evaluation possess a low coding level.

In combination with a movable guard and the machine control, this safety component prevents the guard from being opened while a dangerous machine function is being performed.

This means:

- Starting commands that cause a dangerous machine function must become active only when the guard is closed and locked.
- The guard locking must not be released until the dangerous machine function has ended.
- Closing and locking a guard must not cause automatic starting of a dangerous machine function. A separate start command must be issued. For exceptions, refer to EN ISO 12100 or relevant C-standards.

The system MGB2-L2B-PN... is operated as an IO device in the PROFINET (PROFIsafe).

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
- 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 60204-1

The safety system MGB2 may be combined only with the intended modules in the MGB2 system family. Only the enabling switch designated for this purpose (ZSB122338) may be connected.

On the 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. Comprehensive information about proper configuration, mounting and setup for PROFINET installations can be found at http://www.profibus.com/.

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 13849-2.
- Correct use requires observing the permissible operating parameters (see chapter *16. Technical data on page 58*).
- If a data sheet is included with the product, the information on the data sheet applies.

Table 1: Possible combinations for MGB2 components

Evaluation unit	Handle module
	MGB2-H from V1.0.0
MGB2-L2B-...PN (165506, 165508)	●

Key to symbols	●	Combination possible

EN

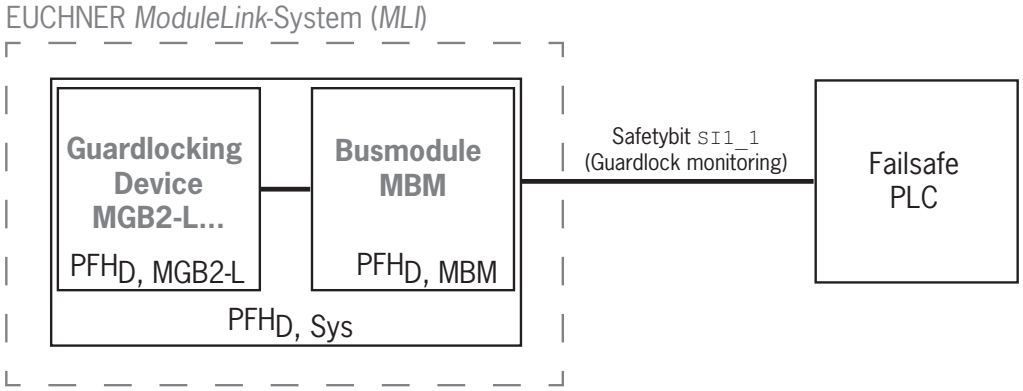
3. Description of the safety function

Devices from this series feature the following safety functions:

3.1. Safety functions in combination with a locking module 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 `SI1_1` (ÜK) = 0 (monitoring of the locking element).
  - When the guard is open, safety bit `SI1_0` (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)).

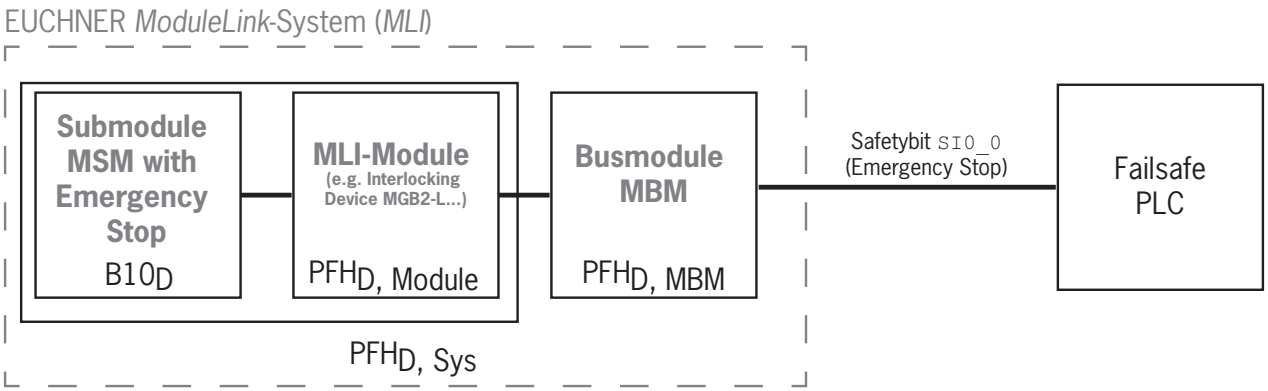


- Safety characteristics:
  category, Performance Level, PFH_D

3.2. Safety functions on submodules with emergency stop

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

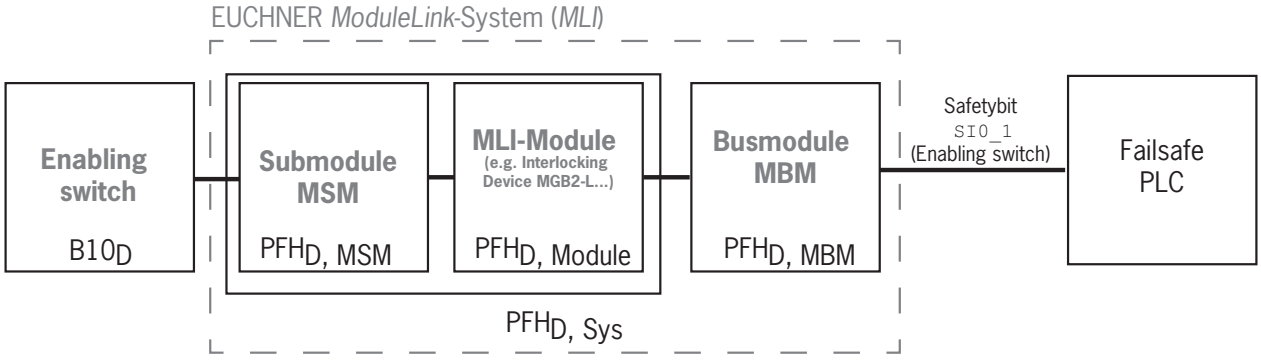
- Safety function: evaluation of emergency stop
- Safety characteristics: B_{10D} value of the emergency stop in the submodule (MSM) and PL, PFH_D, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



3.3. Safety functions on submodules with enabling switch

Enabling function

- Safety function: evaluation of a connected enabling switch
- Safety characteristics: B_{10D} value for the enabling switch (see operating instructions for the enabling switch) and PL, PFH_D, category and DC for the evaluation electronics (MLI modules) and the bus module (MBM)



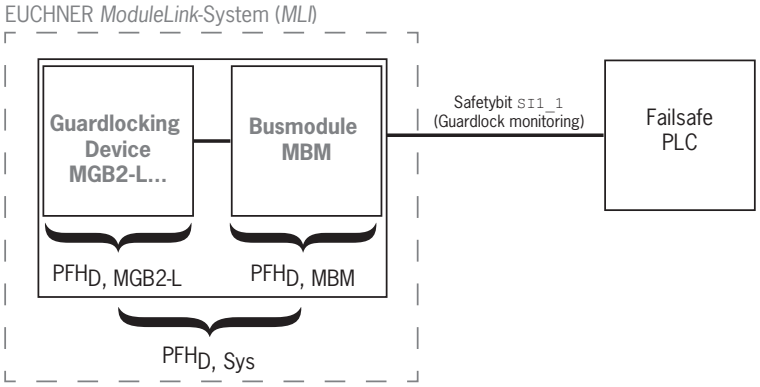
3.4. Determining safety characteristics of the overall system

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 $PFH_{D,\ Sys}$

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

$PFH_{D,\ Sys} = PFH_{D,\ MGB2\text{-}L} + PFH_{D,\ MBM}$



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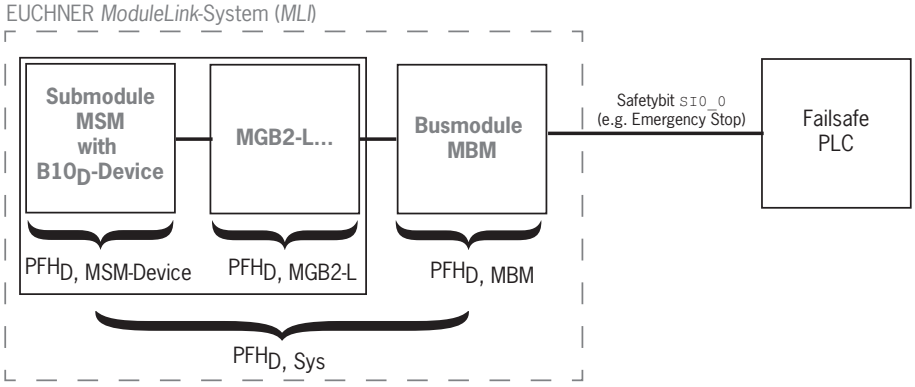
3.4.2. Calculation example for the “emergency stop” safety function

$PFH_{D,\ Sys} = PFH_{D,\ MSM\ device} + PFH_{D,\ MGB2\text{-}L} + PFH_{D,\ MBM}$

To calculate the $PFH_{D,\ MSM\ device}$ from the $B10_D$ value, use the method in Annex C 4.2 of EN ISO 13849-1:2016.

The following applies: $PFH_{D,\ Sys} = f\ (category_{MBM};\ DC_{MBM};\ B10_D;\ n_{op})$



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 particularly

- after any setup work
- after the replacement of a system component relevant for safety
- after an extended period without use
- after every fault
- after any change to the DIP switch settings
- after every factory reset

Independent of these checks, the safe function of the safeguard 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 perform 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 14119:2013, section 7.
- The switching operation is allowed to be triggered only by the intended handle module MGB2-H… that is positively fastened to the guard.
- 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.

EN

6. Function

6.1. Locking module MGB2-L...

Together with a handle module, the locking module makes it possible to lock movable guards. The combination also serves as a mechanical door stop at the same time. There are various configurations for the control of the guard locking (see section *6.2. Control of guard locking*). The following descriptions in chapter *6.1.1* describe the function of the guard locking with the factory setting.

Important!

To operate the device as guard locking for personnel protection according to EN ISO 14119, the safety bit SI1_1 (ÜK) must be evaluated.

The following switch-on conditions apply to the safety bit SI1_1 (ÜK):

- Guard closed
- Bolt tongue inserted into the locking module
- Guard locking in locking position (guard lock monitoring)

See also chapter *15. Diagnostics, troubleshooting and aids on page 45*.

The locking module detects the position of the guard and the position of the bolt tongue. The position of the guard locking is also monitored. The bolt tongue in the handle module is moved into and out of the locking module by actuating the door handle.

If the bolt tongue is fully inserted into the locking module, the guard locking can lock the bolt tongue in this position. This is performed by solenoid force.

6.1.1. Guard locking for version MGB2-L2

(guard locking actuated by power-ON and released by spring force)

Important!

- Use as guard locking for personnel protection is possible only in special cases, after strict assessment of the accident risk (see EN ISO 14119:2013, section 5.7.1)!
- Guard locking will be released during power-up or if communication is lost.

Guard locking: Apply voltage to the solenoid (with factory setting: safety bit SO0_0 = 1 and/or O0_0 = 1 in slot 3).

Releasing guard locking: Disconnect voltage from the solenoid (with factory setting: safety bit SO0_0 = 0 and O0_0 = 0 in slot 3).

The magnetically actuated guard locking operates in accordance with the open-circuit current principle. If the voltage is interrupted at the solenoid, the guard locking is released and the guard can be opened directly!

The guard can be opened as long as no voltage is applied to the guard locking solenoid.

If voltage is present at the guard locking solenoid, the guard locking is held in the closed position and the guard is locked.

Guard locking is controlled via safety bit SO0_0 and non-safe bit O0_0. Refer to the table in chapter *6.2. Control of guard locking* for the exact configuration.

Truth table:

PROFINET bit O0_0 in slot 3	PROFIsafe bit SO0_0	Guard locking with MGB-L2...
0	0	Inactive
0	1	Active
1	0	Active
1	1	Active

6.2. Control of guard locking

By changing the parameters in the configuration tool for your control system, you can set which bit combinations are to be used to control the guard locking. You will find an overview of the parameters in the operating instructions for the bus module MBM.

On the use of the guard locking for personnel protection, as standard the guard locking must be controlled from the safe control area.

On use as guard locking for process protection, the guard locking can also be controlled exclusively using a non-safe bit.

The following table shows the possible configurations.

Type of locking module	Use of the control bits for guard locking		Application
	Configuration 1	Configuration 2 (factory setting)	
MGB2-L2	SO0_0	SO0_0 (ZH) and O0_0 (S) in slot 3	Guard locking for personnel protection. Important: pay attention to section *6.1.1.*

EN

7. System overview

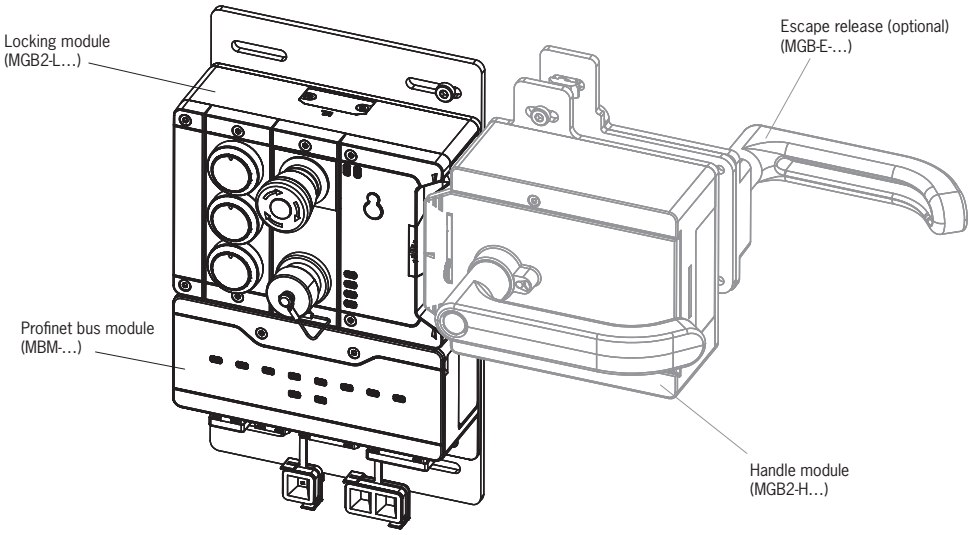
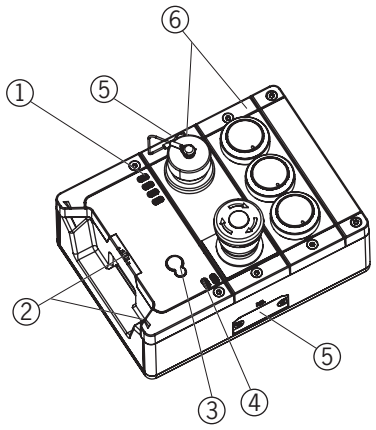
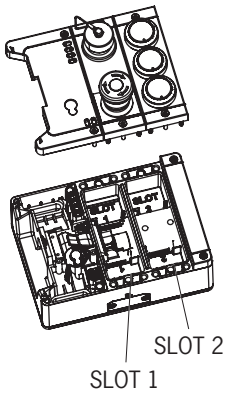


Fig. 1: Components at a glance

7.1. Locking module MGB2-L..



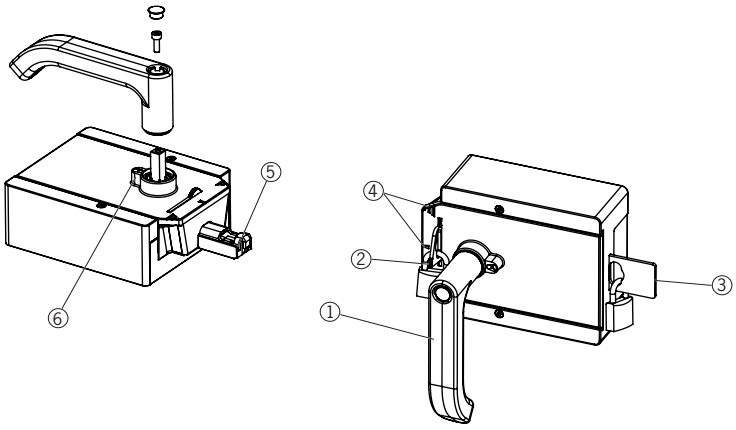


Key:
① Module function LED indicators
② Auxiliary marking for correct alignment in relation to the handle module
③ Auxiliary release (optional, only on version with guard locking)
④ LED indicator for submodule in SLOT 1 and SLOT 2
⑤ Top and bottom connections for the connection between modules
⑥ Submodules in SLOT 1 and SLOT 2 (configuration example)

Notice:
Depending on version, no submodules or different submodules may be inserted. See enclosed data sheet.

Fig. 2: Locking module MGB2-L..

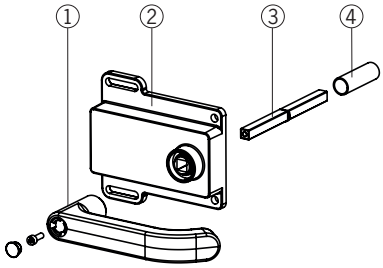
7.2. Handle module MGB2-H-...



Key:
① Door handle
② Fold-out lockout mechanism
③ Automatically extending lockout mechanism (optional)
④ Auxiliary markings for max. permissible mounting distance
⑤ Bolt tongue
⑥ Locking bolt for handle adjustment

Fig. 3: Handle module MGB2-H-...

7.3. Escape release MGB-E-... (optional)



Key:
① Door handle
② Housing
③ Actuation axis 8 x 8 mm
(different lengths available)
④ Protective sleeve

Notice:
Depending on version, a mounting plate can be included.
See enclosed data sheet.

Fig. 4: Escape release MGB-E-...

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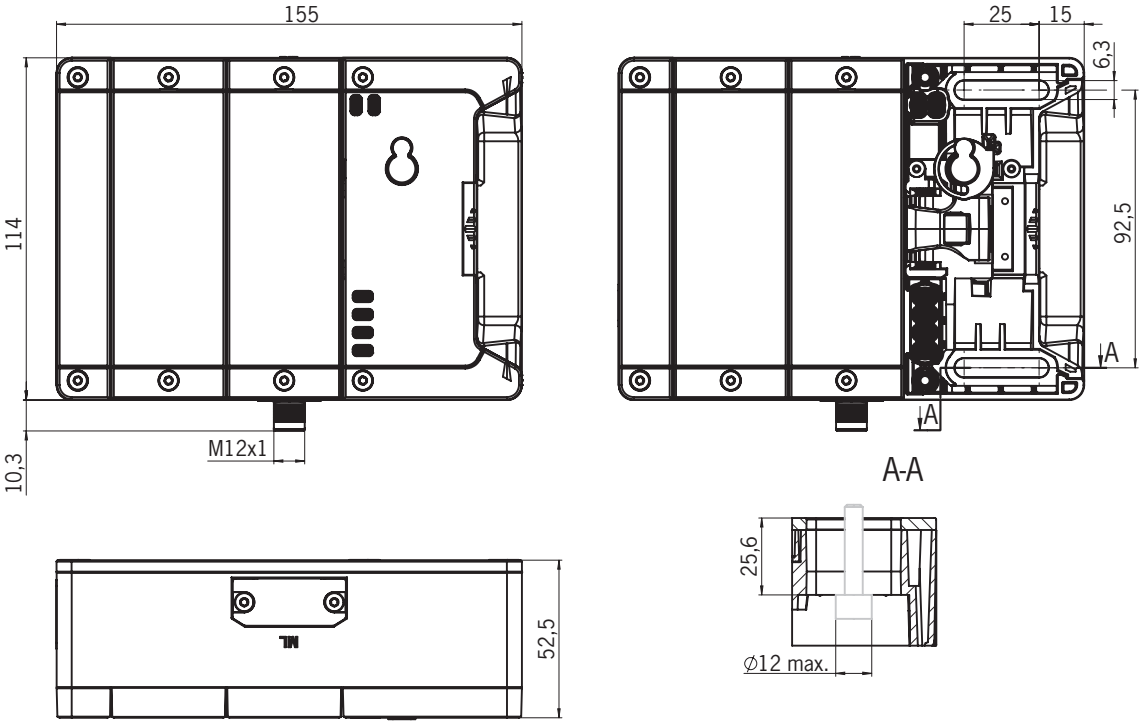
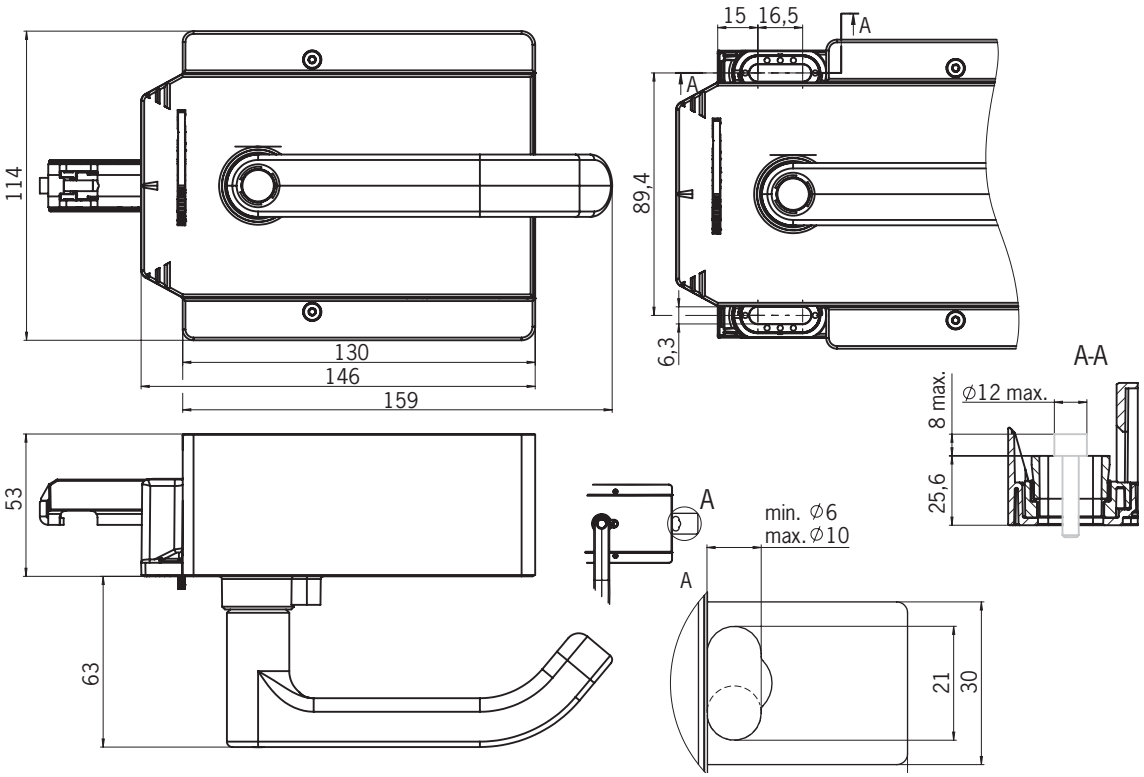
7.4. Dimension drawings

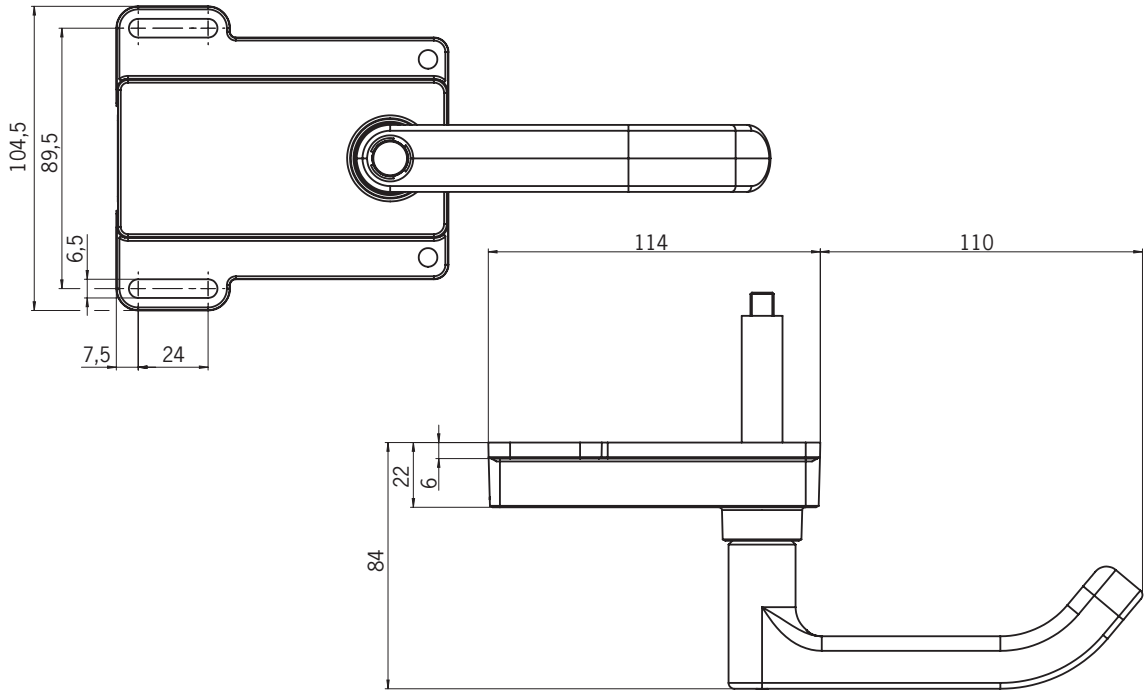
7.4.1. Locking module MGB2-L...



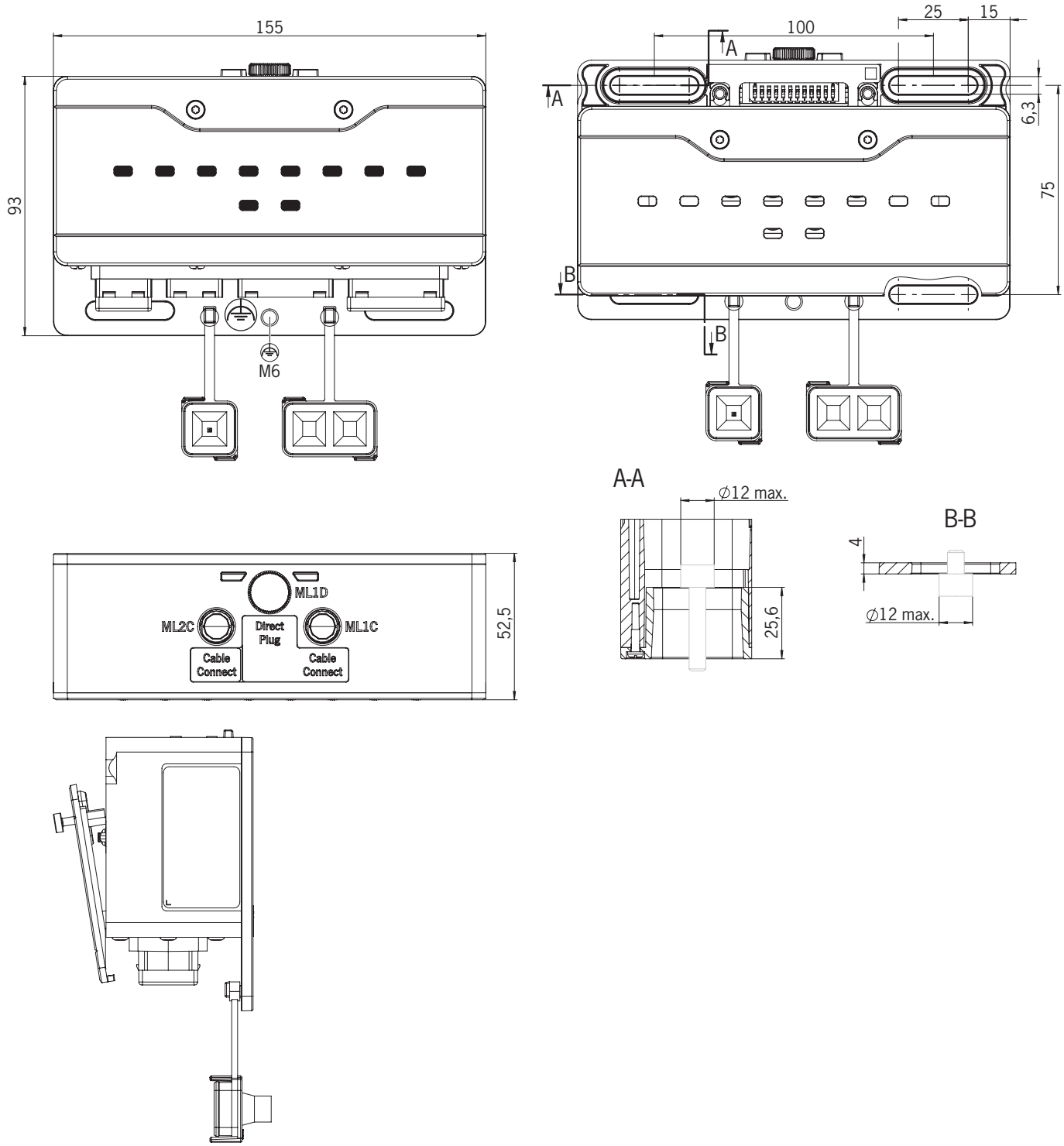
7.4.2. Handle module MGB2-H...



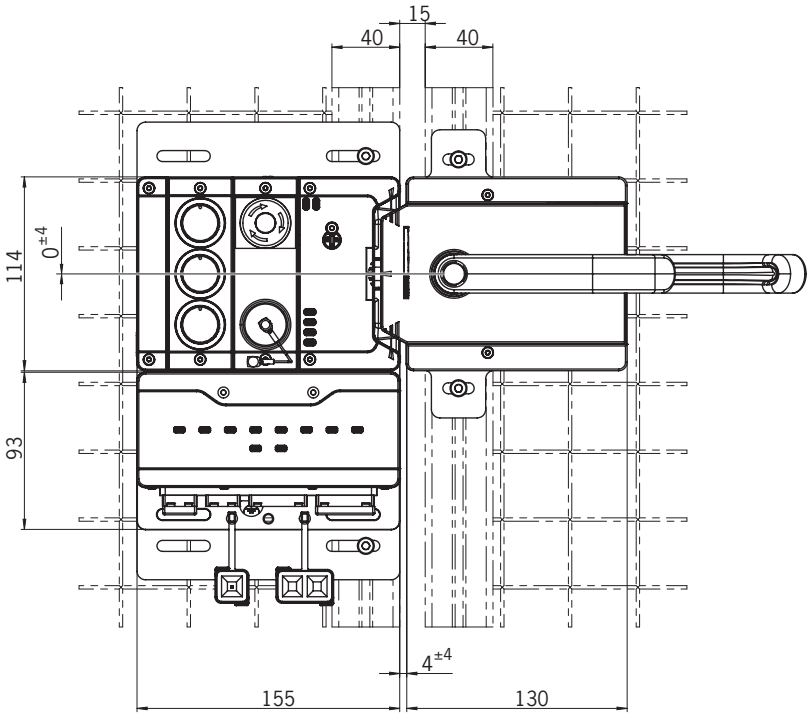
7.4.3. Escape release MGB-E-...

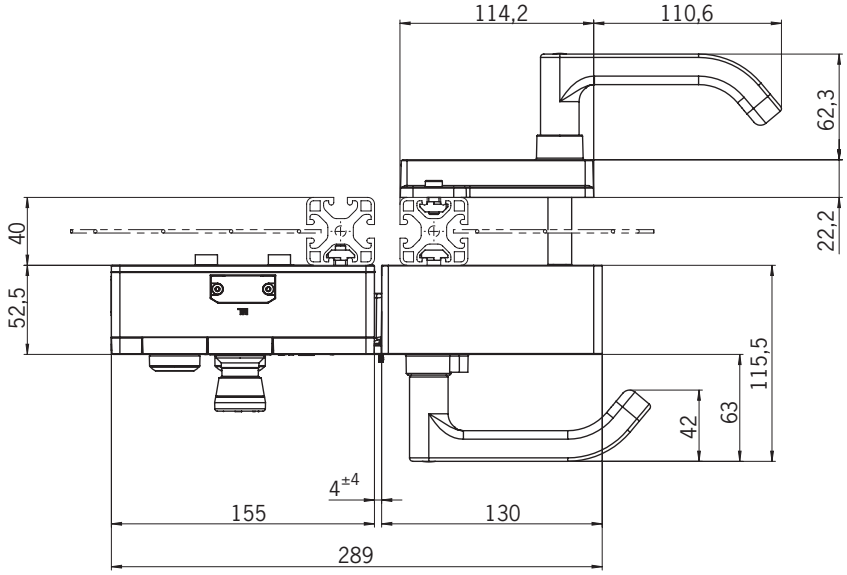


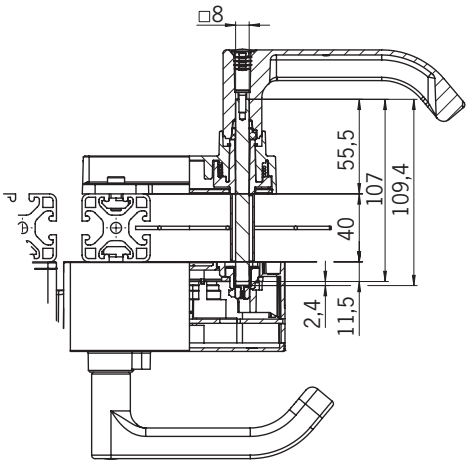
7.4.4. Dimension drawing for bus module MBM



7.4.5. Assembly of MGB2-L, MGB2-H and MGB-E (example on profile 40x40)







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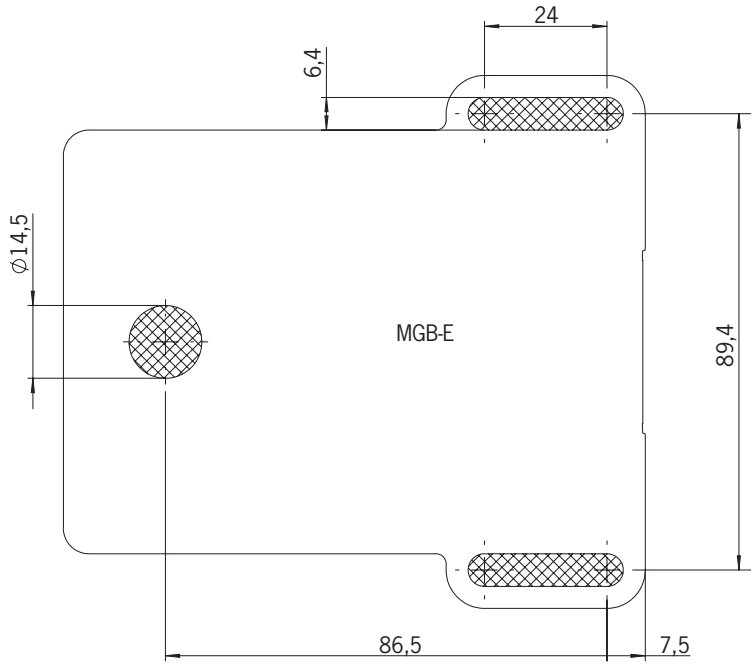
7.4.6. Drilling pattern, escape release MGB-E



8. Manual release

Some situations require the guard locking to be released manually (e.g. malfunctions or an emergency). A function test should be performed after release.

More information on this topic can be found in the standard EN ISO 14119:2013, section 5.7.5.1. The device can feature the following release functions:

8.1. Auxiliary release

In the event of servicing, the guard locking can be released with the auxiliary release irrespective of the state of the solenoid (see *Fig. 5*).

Important!

- Given corresponding parameter configuration, the system enters into a latching fault if the auxiliary release is actuated. See *System status table*, *signal sequence incorrect* status (DIA red, Lock flashes 1 time). For information on setting the related parameter, see section *17.1. Fault on actuating the escape release on page 60*.

Important!

- The auxiliary release is not a safety function.
- The machine manufacturer must select and use a suitable release (escape release, emergency release, etc.) for a specific application. A hazard assessment is required for this purpose. It may be necessary to take specifications from a product standard into account.
- The correct function must be checked at regular intervals.
- Loss of the release function due to mounting errors or damage during mounting. Check the release function every time after mounting.
- Observe the notes on any enclosed data sheets.

The locking screw must be screwed in and sealed again after every use of the auxiliary release (original set of seal labels, order no. 155853). Tightening torque 0.5 Nm.

1. Remove seal label or make a hole.
2. Undo locking screw.
3. Using a screwdriver, turn the auxiliary release to 🔓 in the direction of the arrow.

➡ Guard locking is released.

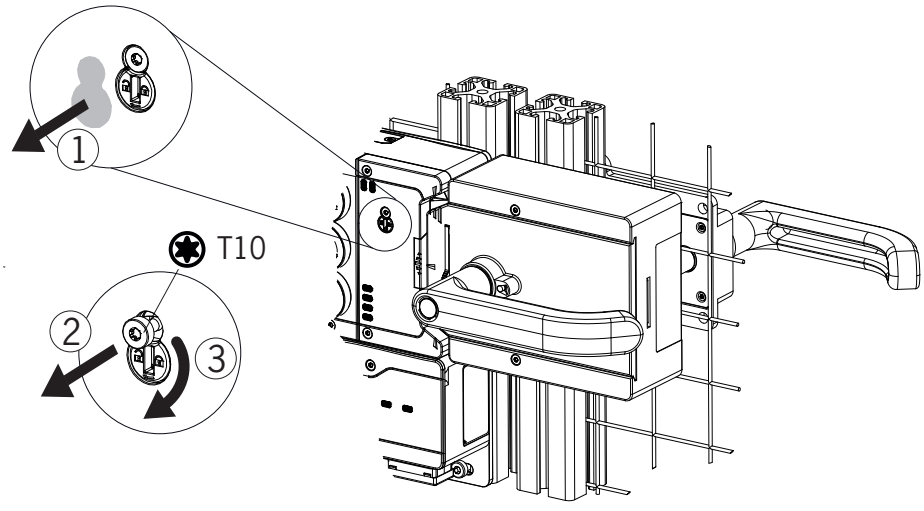


Fig. 5: Auxiliary release

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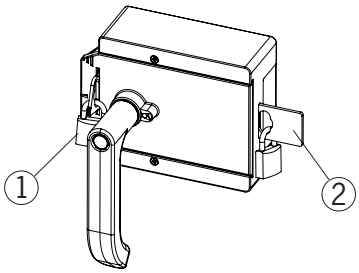
8.2. Lockout mechanism

If the lockout mechanism is pivoted out, the bolt tongue cannot be extended. The lockout mechanism can be secured with padlocks (see *Fig. 6*). This is intended to prevent people from being locked in unintentionally. The lockout mechanism does not fulfill any safety function.

➡ To pivot out, press the grooved part (possible only with bolt tongue retracted).



Key:
① Fold-out lockout mechanism
Padlock ∅ min. 2 mm, ∅ max. 10 mm

② Automatically extending lockout mechanism (optional)
Padlock ∅ min. 6 mm, ∅ max. 10 mm

Notice:
You can fit up to 3 locks Ø 8 mm per lockout mechanism.

Fig. 6: Lockout mechanism secured with padlock

8.3. Escape release (optional)

The escape release is used to open a guard from the inside without tools.

Depending on the parameters set in your configuration environment, the system may enter into a latching fault if the escape release is actuated (see *17.1. Fault on actuating the escape release on page 60*).

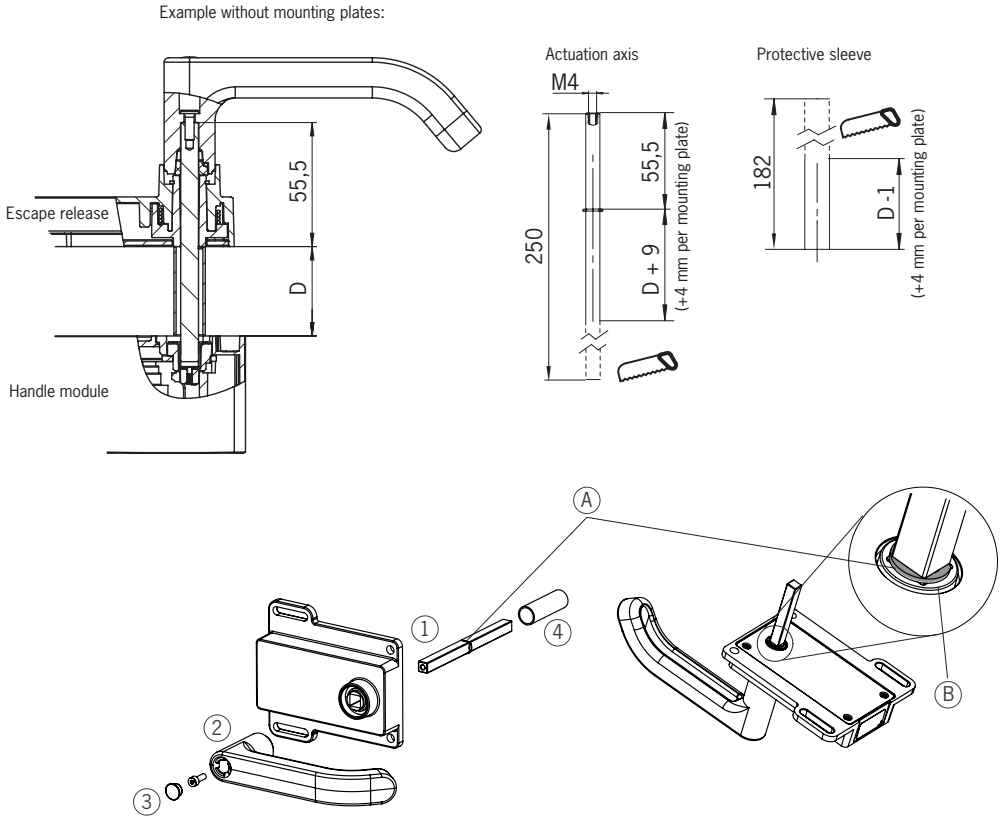
Important!

- It must be possible to actuate the escape release manually from inside the protected area without tools.
- It must not be possible to reach the escape release from the outside.
- The bolt tongue must not be under tensile stress during manual release.
- The escape release meets the requirements of Category B according to EN ISO 13849-1:2015.
- The correct function must be checked at regular intervals.
- Observe the notes on any enclosed data sheets.

- Fit escape release such that operation, inspection and service are possible.
- The actuation axis for the escape release must be inserted min. 9 mm into the handle module. Note the information on the different profile widths in chapter *8.3.1. Preparing escape release on page 23*.
- Adjust escape release axis at right angles to the handle module. See *Fig. 7*.

8.3.1. Preparing escape release

Profile width	Length required for actuation axis		Which EUCHNER parts are required?	Necessary work steps
	Without mounting plates	With mounting plates (4 mm each)		
D	D+9	D+17		
30 mm	39 mm	47 mm	Standard escape release with 107 mm axis (order no. 100465)	Shorten to required length
40 mm	49 mm	57 mm	Standard escape release with 107 mm axis (order no. 100465) If necessary, extended actuation axis (order no. 106761)	*Without mounting plates:* none *With mounting plates:* Use extended actuation axis and protective sleeve and shorten to required length
45 mm	54 mm	62 mm	Standard escape release with 107 mm axis (order no. 100465) **and** extended actuation axis (order no. 106761)	Use extended actuation axis and protective sleeve and shorten to required length
50 mm	59 mm	67 mm	Standard escape release with 107 mm axis (order no. 100465) **and** extended actuation axis (order no. 106761)	Use extended actuation axis and protective sleeve and shorten to required length



① Insert actuation axis. The snap ring **A** must be in contact with the escape release **B**.
② Fit door handle
③ Tighten fixing screw with 2 Nm and push in cap.
④ Fit protective sleeve

Fig. 7: Preparing escape release

EN

9. Mounting

IMPORTANT

- Mounting must be performed only by authorized personnel.
- Depending on the substrate material, the detection range for the acquisition of the door position may vary.
- During mounting, pay attention to correct alignment. Use the alignment aids on the housing for the locking module and on the housing for the handle module (see *Fig. 8)*.

With two-leaf hinged doors, one of the two door leaves must also be latched mechanically.

Use a rod latch (Item) or a double-door lock (Bosch Rexroth) for this purpose, for example.

For mounting steps, see *Fig. 8* and *Fig. 10* to *Fig. 15*.

Attach system such that operation of the auxiliary release as well as inspection and service are possible.

The locking screw must be screwed in and sealed again after mounting and after every use of the auxiliary release (original set of seal labels, order no. 155853). Tightening torque 0.5 Nm.

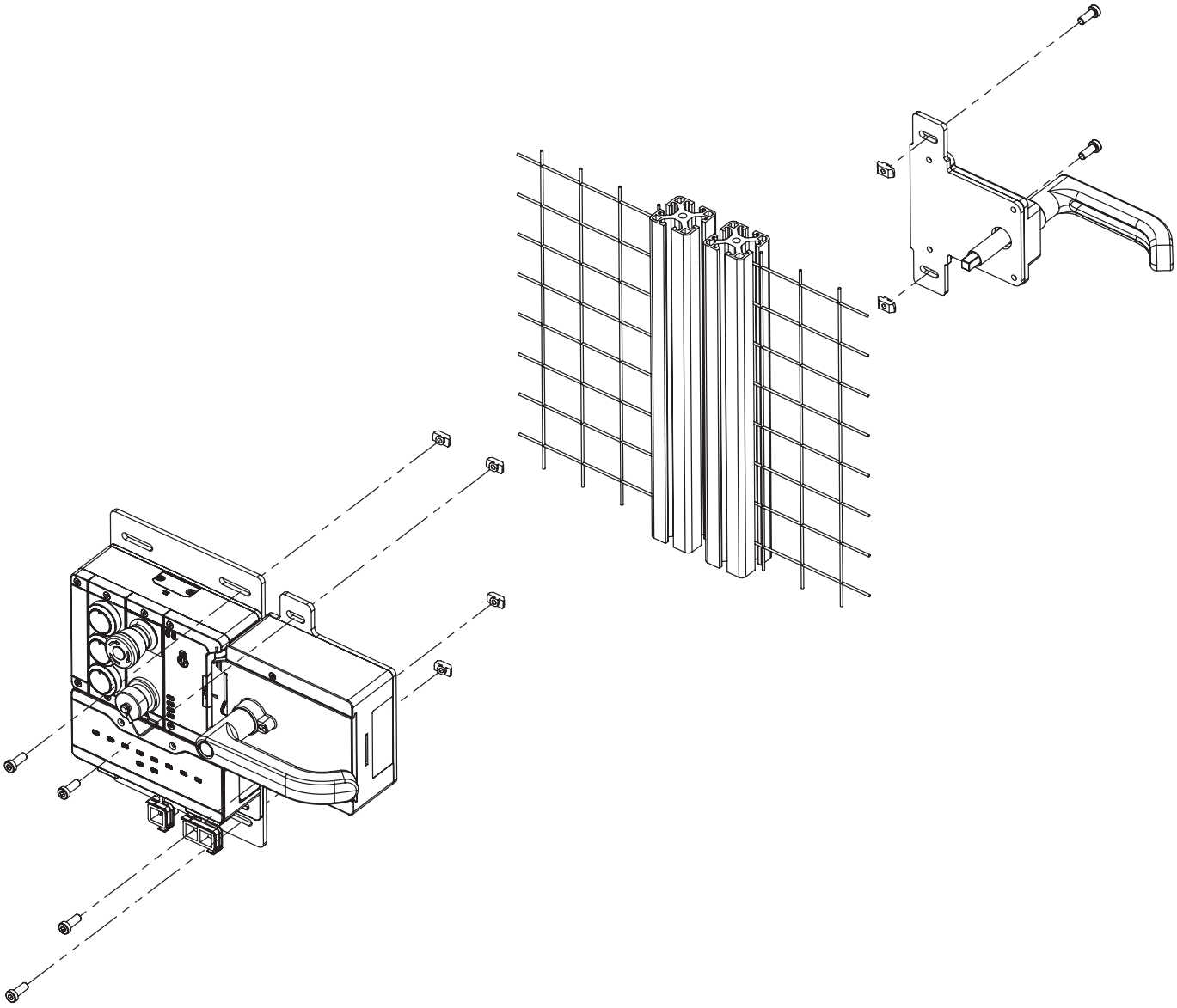


Fig. 8: Installation example for door hinged on the right (general view)

9.1. Line swap

During the first starting process, the current MLI topology will be saved if the control system configuration matches the MLI topology.

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 maintenance work 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 *15.3. Resetting system to factory settings (factory reset) on page 45*). The MLI topology will be saved the next time the system is started.

9.2. 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 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).

9.3. Mounting submodules

CAUTION

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

- Only submodules described in these instructions 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 of the submodule or the data sheet for the related submodule. This is included with each submodule.
- Pay attention to the alignment of the submodule. See marking (a) in *9.1. Line swap*. Submodules can also be installed rotated by 180°. The marking (a) always indicates the first position to be equipped. This is the emergency stop S1 position 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 submodule slots. 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 (order number 126372).

EN

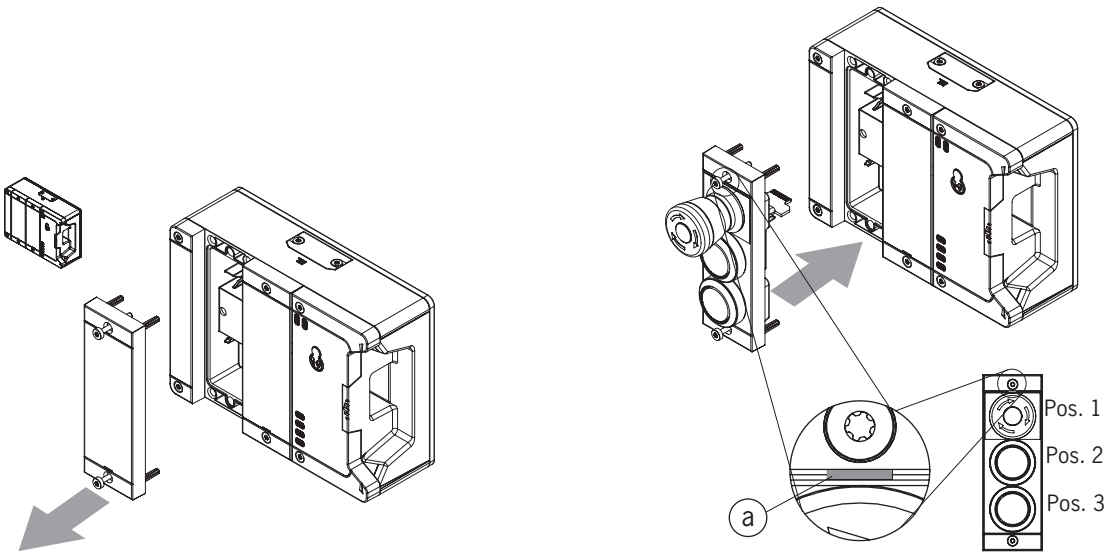


Fig. 9: Mounting submodule

9.4. 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 with the same function during 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.

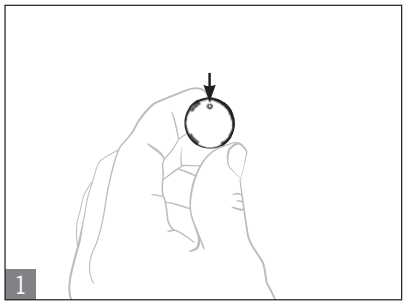
3. If an identical submodule is inserted with the same alignment, the fault display goes out and the bit is transmitted on the bus again to suit the actual situation.

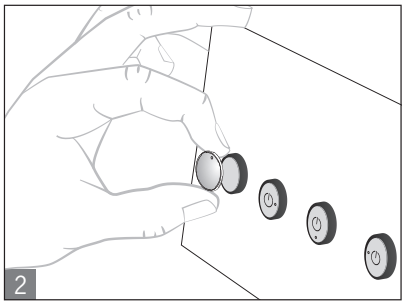
9.4.1. Replacing faulty submodule

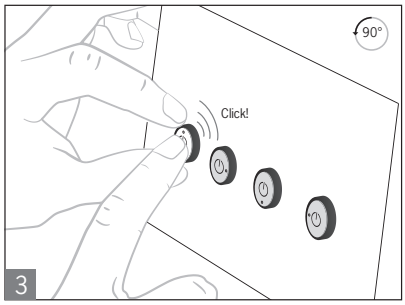
ⓘ	**Important!** If alignment detection is active, the system checks the alignment of the newly inserted submodule and compares it to the submodule inserted last. The alignment of the previous submodule must be retained in this situation because otherwise the configuration of the device will change.

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

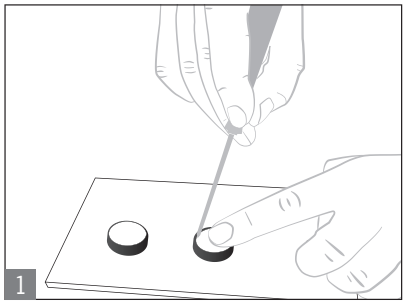
Fitting

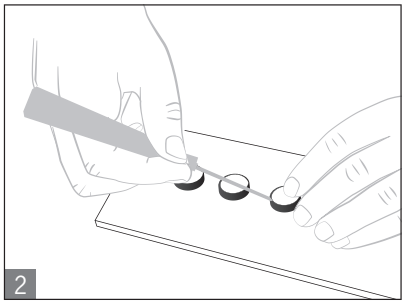






Removing





Lens

EN

10. Changing the door hinge position

10.1. Changing the locking module to a different door hinge position

To change the locking module for doors with a different door hinge position, the module only needs to be rotated by 180°. Submodules installed in the module can also be rotated by 180° (see section *9.1. Line swap on page 25*).

10.2. Changing the actuating direction of the handle module

(here: from right to left)

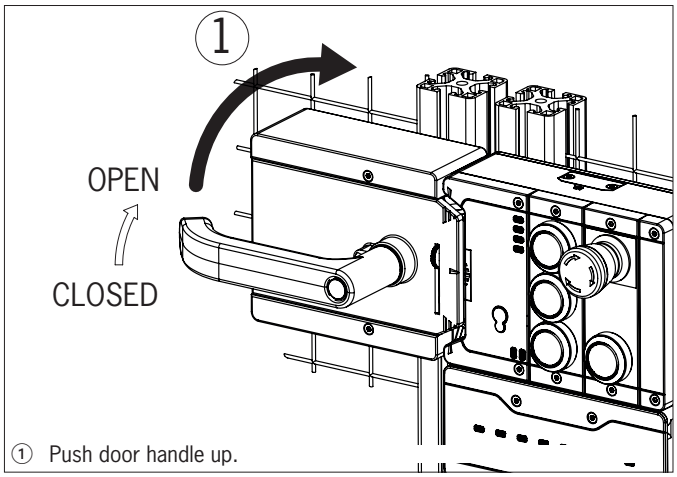
	**Important!** It is possible to make this change only when the bolt tongue is not extended and an escape release is not yet mounted.

In the delivery state, the handle module is set either for doors hinged on the right or for doors hinged on the left.

Based on the example of a handle module for doors hinged on the right this means:

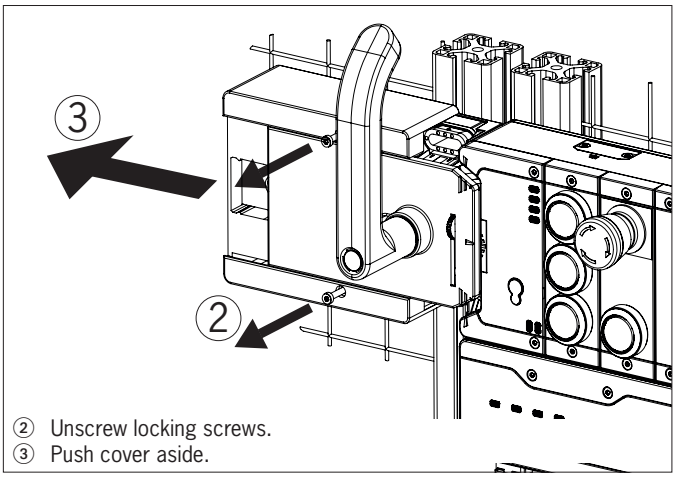
- The guard opens by pressing down the door handle.
- The system is mounted the other way up for doors hinged on the left. In other words, the guard opens by pressing up the door handle (see *Fig. 10*). For this reason the actuating direction of the door handle must be changed (see *Fig. 10* to *Fig. 15*).

(Similarly on handle modules for doors hinged on the left)



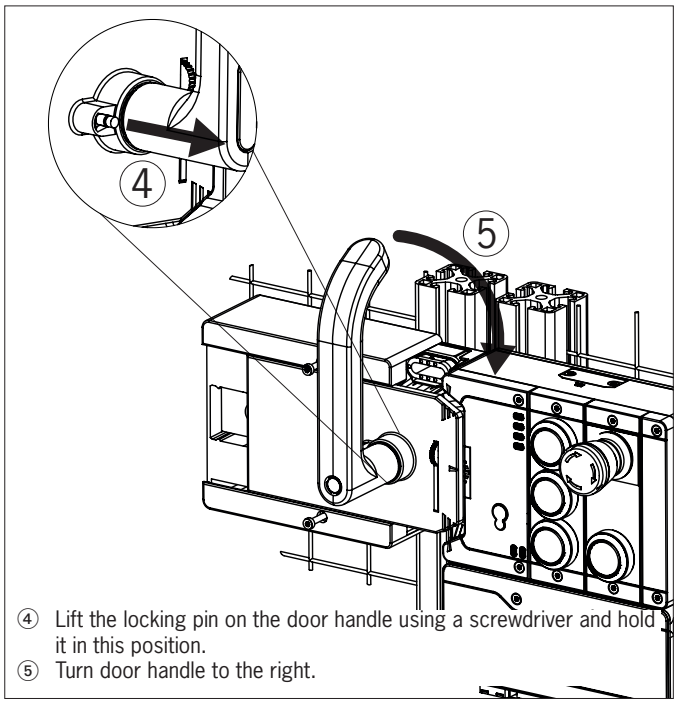
① Push door handle up.

Fig. 10: Changing actuating direction, step ①



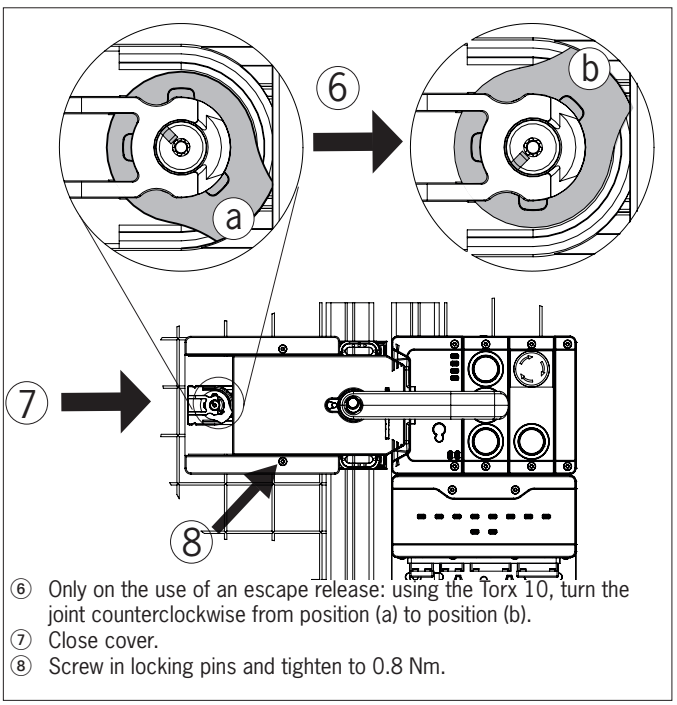
② Unscrew locking screws.
③ Push cover aside.

Fig. 11: Changing actuating direction, steps ② and ③



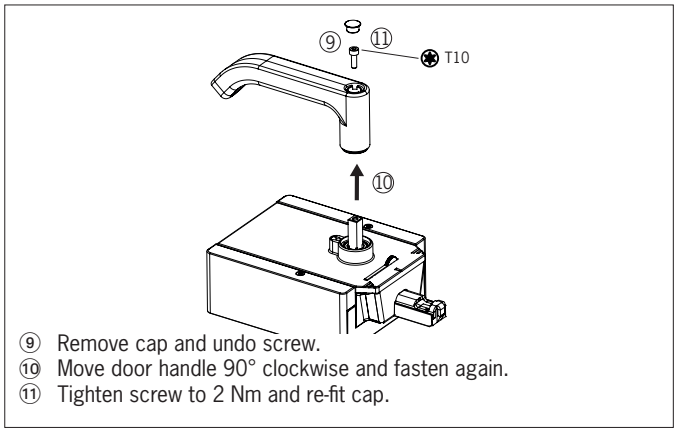
④ Lift the locking pin on the door handle using a screwdriver and hold it in this position.
⑤ Turn door handle to the right.

Fig. 12: Changing actuating direction, steps ④ and ⑤



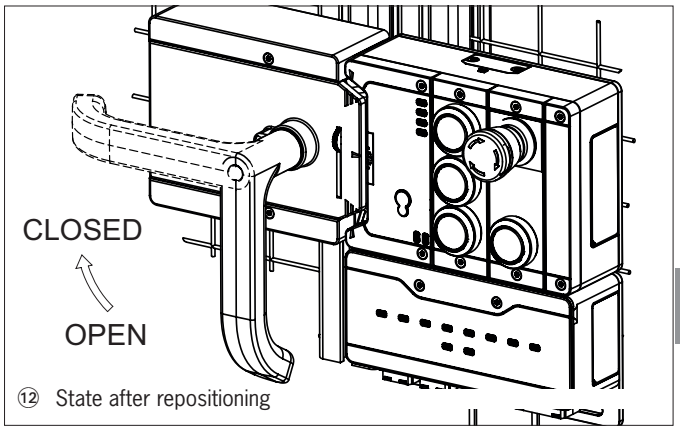
⑥ Only on the use of an escape release: using the Torx 10, turn the joint counterclockwise from position (a) to position (b).
⑦ Close cover.
⑧ Screw in locking pins and tighten to 0.8 Nm.

Fig. 13: Changing actuating direction, steps ⑥ to ⑧



⑨ Remove cap and undo screw.
⑩ Move door handle 90° clockwise and fasten again.
⑪ Tighten screw to 2 Nm and re-fit cap.

Fig. 14: Changing actuating direction, steps ⑨ and ⑪



⑫ State after repositioning

Fig. 15: Changing actuating direction, final state

EN

11. Protection against environmental effects

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 locking and handle modules. For this purpose a suitable installation position should be selected.

Cover device during painting work!

12. Controls and indicators

12.1. Locking module MGB2-L..

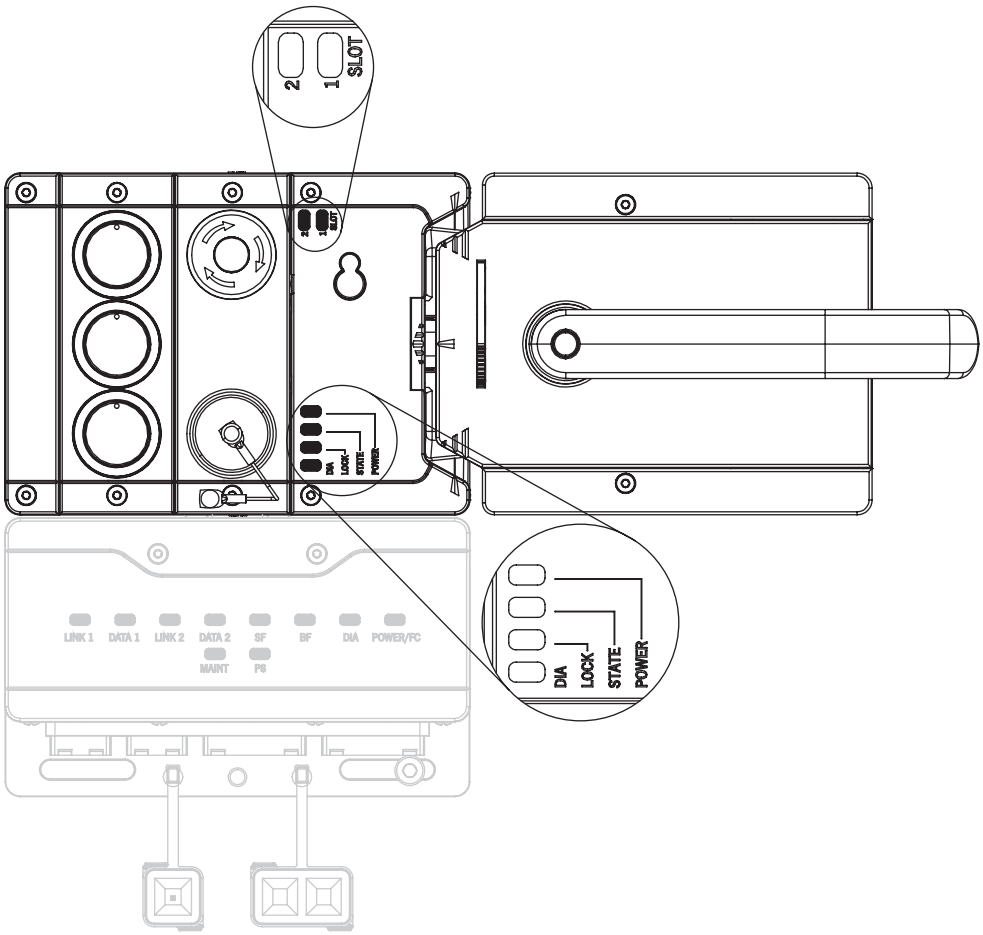


Fig. 16: Indicators and control elements

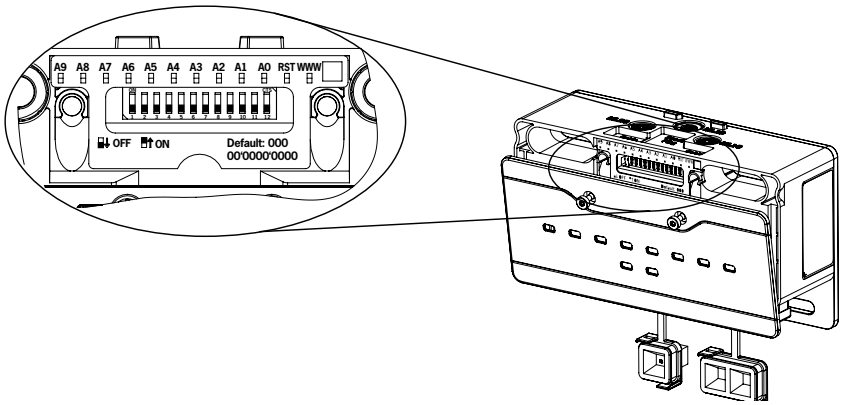
LED	Description
POWER	Illuminates if power supply correct Color: green
STATE	Indicates the device state Color: green
LOCK	Indicates the state of the guard locking Color: yellow
DIA	Indicates errors Color: red
SLOT 1	Indicates the status of the submodule Color: red/green
SLOT 2	Indicates the status of the submodule Color: red/green

12.2. Bus module MBM

12.2.1. DIP switches

The DIP switches have the following functions:

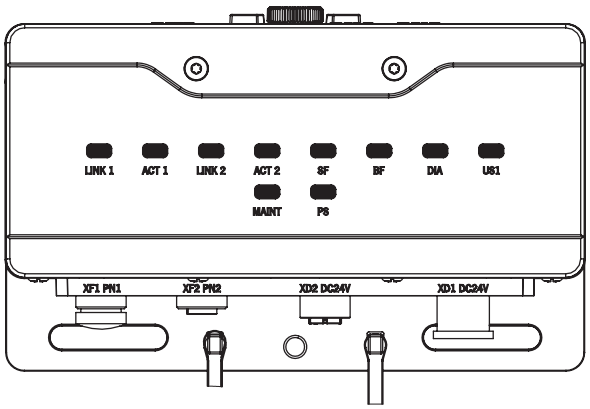
- Setting the device's PROFIsafe address
- Hardware reset to restore the device to the factory settings
- Activating the device web interface



Switch	Description
A0 ... A9	Address switch, bits zero to nine For binary setting of the PROFIsafe address (factory setting: 0000000000)
RST	Factory reset (factory setting: off) For information on the factory reset, see chapter *15.3 on page 45*.
WWW	Activate device web interface with extended diagnostic options (factory setting: off) For information on the device web interface, see chapter *15.4 on page 46*.

12.2.2. LED displays

The LEDs indicate the device status and the communication status.



LED	Description
Bus module MBM	
LINK 1	Connection correct: statically On PROFINET device localization: flashing Color: green
ACT 1	Connection setup: flashing Color: yellow Connection setup complete, cyclical data traffic: statically On Color: yellow
LINK 2	Connection correct: statically On PROFINET device localization: flashing Color: green
ACT 2	Connection setup: flashing Color: yellow Connection setup complete, cyclical data traffic: statically On Color: yellow
SF	System fault: statically On (see chapter *15. Diagnostics, troubleshooting and aids*) Color: red
BF	Bus fault: statically On (see chapter *15. Diagnostics, troubleshooting and aids*) Color: red
DIA	Indicates errors Color: red
US1	Power Up: flashing Normal state: statically On Color: green
MAINT	Indicates the error flashing code Color: red/green/yellow
PS	Normal state: statically On Device passivated: flashing Control system communication error: flashing Color: green

EN

13. 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 the 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.
- Metal plugs must be used for the power supply via push-pull plugs.
- 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. Alternatively, the functional earth can also be connected via plugs XD1 and XD2 (5-pin). We recommending connecting the functional earth to the mounting plate.

Important!

- The power supply for additional PROFINET devices 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.
- If the bus module MBM does not appear to function after the application of the operating voltage (e.g. US1 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.

13.1. Notes about c UL us

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).

13.2. Bus connections

The bus module MBM includes the PROFINET connections (XF1 and XF2) and the power supply connections (XD1 and XD2).

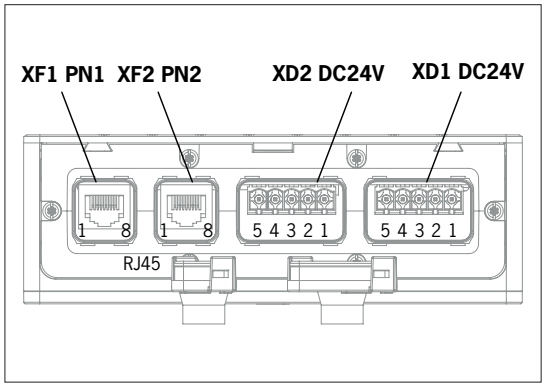
Connection is performed via push-pull plugs according to IEC 61076-3-117, variant 14.

The bus module MBM includes a PROFINET IRT switch for Ethernet connection.

13.2.1. Terminal assignment for version with push-pull plugs

Pin	Description
XF1.1	Receive Data RD+
XF1.2	Receive Data RD-
XF1.3	Transmit Data TD+
XF1.4	n.c.
XF1.5	n.c.
XF1.6	Transmit Data TD-
XF1.7	n.c.
XF1.8	n.c.
Functional earth on plug housing	

Pin	Description
XF2.1	Receive Data RD+
XF2.2	Receive Data RD-
XF2.3	Transmit Data TD+
XF2.4	n.c.
XF2.5	n.c.
XF2.6	Transmit Data TD-
XF2.7	n.c.
XF2.8	n.c.
Functional earth on plug housing	



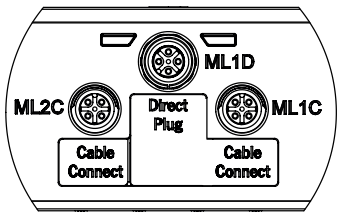
Pin	Description
XD1.1	L1 operating voltage DC 24 V
XD1.2	N1 operating voltage 0 V
XD1.3	L2 auxiliary voltage 1) DC 24 V
XD1.4	N2 auxiliary voltage 1) 0 V
XD1.5	Functional earth 2)

Pin	Description
XD2.1	L1 operating voltage DC 24 V
XD2.2	N1 operating voltage 0 V
XD2.3	L2 auxiliary voltage 1) DC 24 V
XD2.4	N2 auxiliary voltage 1) 0 V
XD2.5	Functional earth 2)

1) The auxiliary voltage is not required for the MGB2 system.
2) Optional; we recommend using the FE connection on the mounting plate.

13.3. 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).



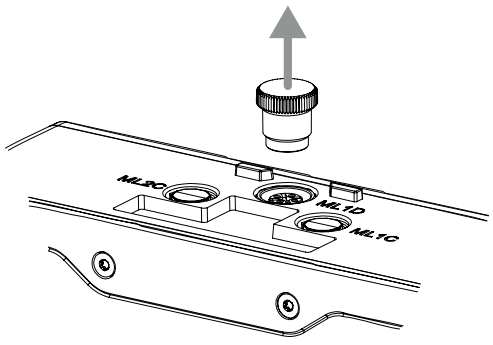
Connection	Description
ML1D (direct plug)	Module plug connector for direct mounting in a block. **Important!** Use only for direct mounting.
ML1C (cable connect)	Module plug connector for remote mounting (line 1).
ML2C (cable connect)	Module plug connector for remote mounting (line 2).

13.3.1. 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).



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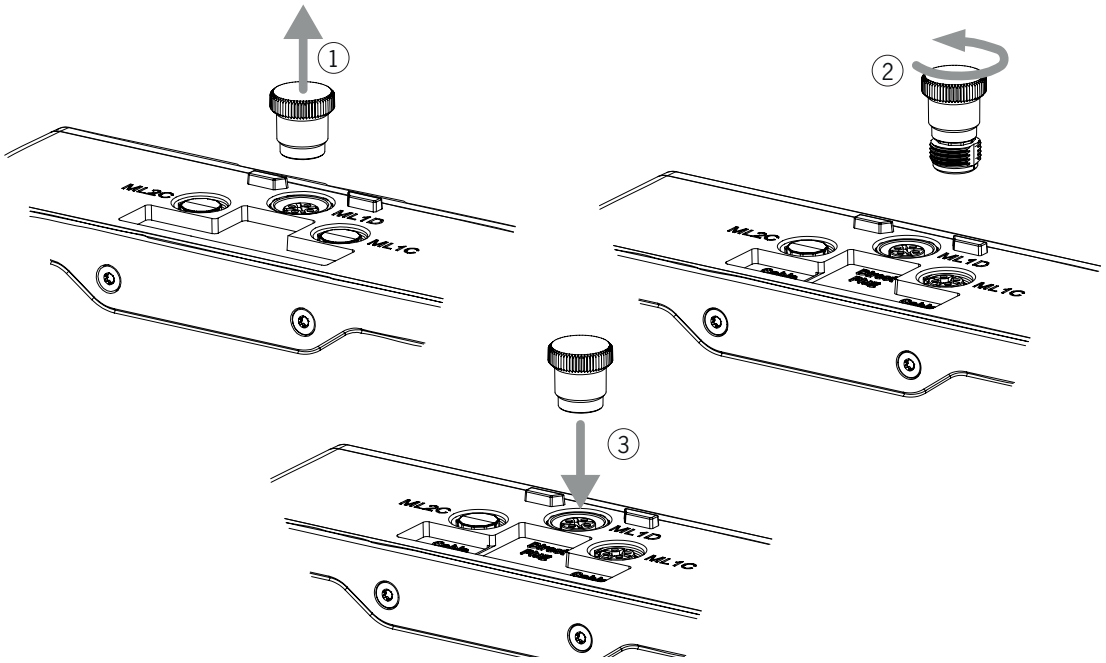
13.3.2. Remote mounting

Pay attention to the following points on remote mounting:

- The maximum cable length for a line must not exceed 40 m.
- Up to 3 modules can be operated per line. If you require a different configuration, contact our technical 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 *16. Technical data*).
- The number of safe devices in an overall system is limited to 12.
- Always use the module plug connector ML1C or ML2C or both for a line.
- 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 ML2C must also be unscrewed. Then the sealing cap for connection ML1D must be re-fitted.



14. Setup

14.1. Teach-in operation (only for MGB2 unicode)

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.

During a teach-in operation, the module is in the safe state (no safe bits are set).

Important!

- A system that has not yet been taught-in remains in the teach-in standby state until a handle module has been taught-in. Locking modules already taught-in remain in the teach-in standby state for 3 min. after system start.
- The locking module disables the code for the previous handle module if teach-in is carried out for a new handle module. Teach-in is not possible again immediately for this device if a new teach-in operation is carried out. The disabled code is deleted in the locking module only after a third code has been taught-in.
- If the locking module detects a disabled or unsuitable handle module while the module is in the teach-in standby state, a teach-in error is indicated after 30 s.
- The locking module can be operated only with the last handle module taught-in.
- If, in the teach-in standby state, the locking module detects the taught-in handle module, the teach-in standby state is ended immediately and the locking module changes to normal operation.
- If the bolt tongue is in the actuating range for less than 30 s, the handle module is not taught-in and the device indicates a teach-in error.

Teaching-in handle module

1. Fit handle module.
2. Close safety device. Check for correct alignment and distance using the markings on the locking module and re-adjust if necessary.
3. Insert bolt tongue into the locking module.
4. Connect locking module to the bus module MBM. The bus module must be in operation for this purpose.

➡ Teach-in operation starts, green LED (State) flashes slowly (approx. 1 Hz). During the teach-in operation, the locking module checks whether the handle module is a disabled handle module. Provided this is not the case, the teach-in operation is completed after approx. 30 seconds, and the green LED (State) goes out. The new code has now been stored, and the old code is disabled. The STATE and DIA LEDs on the locking module flash alternately if the teach-in operation was successful.

5. Restart overall system via the bus module MBM. For this purpose, disconnect the bus module from the power supply for a few seconds.

EN

14.2. Integrating into PROFINET and PROFIsafe

NOTICE

The parameters *Update time* and *F-WD-Time* 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 *14.2.1 on page 37*.

Important!

You will require the corresponding GSD file in GSDML format in order to integrate the MGB2 system:
› GSDML-Vx.x-EUCHNER-MBM-IRT_D_2558628-YYYYMMDD.xml
Alternatively, the following GSD file in GSDML format can also be used:
› GSDML-Vx.x-Euchner-MGB-PN_D_YYYYMMDD.xml
You will find the GSD file in the Download area at www.euchner.com.
Prior to setup, the GSD file must be imported into the configuration software for the control system (see control system manual).
› The bus module supports PROFIsafe version 2.6.1 as standard. If your control system does not support this version, the respective modules for version 2.4 are also available from us under *Legacy* in the GSD.

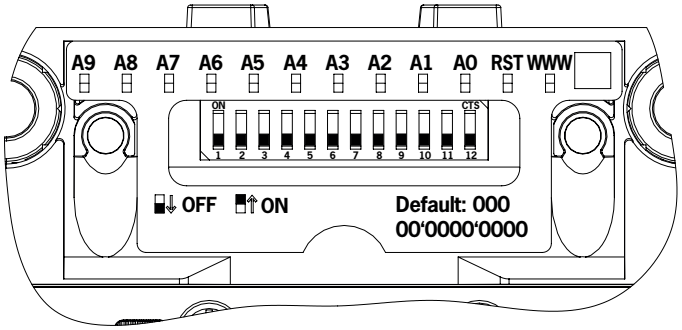
You must perform the following steps to integrate the MGB2 system into PROFINET:

1. Configure the MGB2 system with the configuration software of the control system and assign parameters.

The following PROFINET parameters must be set:
› Device name (factory setting from GSD file): [EUCHNER-MBM].
› IP address: optionally fixed or dynamic
› Update time: recommendation [automatic]

The following PROFIsafe parameters must be set:
› F_dest_adr (PROFIsafe address): this is generally assigned automatically by the control system.
› F_WD_Time (time during which the control system expects a response from the PROFIsafe device): [xxx ms]. Factory setting from GSD file: [600 ms].

2. Set the PROFIsafe address (F_dest_adr) on the bus module MBM using the DIP switches.



Important: Identical addresses must be set in the control system and on the device.

3. If necessary, set additional parameters for the individual modules. You will find an overview of the possible parameters in chapter *14.2.1. List of the parameters that can be set per module/submodule on page 37*.
4. Save the configuration and transfer it to the MGB2 system.

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

Module/submodule	PROFINET, PROFIsafe	Parameter	Setting range / [factory setting]	Description
Bus module MBM	PROFINET	Device name	Arbitrary designation	The device name can be assigned as required. Important: It must match the name in the configuration software. Tip: On replacing a faulty device, it is recommended to delete the name in the device (factory setting). If there is no name in the device, the existing name in the system for the previous device is entered automatically on starting. Prerequisite: Your PROFINET topology must be correctly configured.
		IP address		If a dynamic IP address is not assigned by your control system, a static IP address can be entered here.
		Update time	250 µs ... 512 ms [automatic]	Interval until the inputs/outputs are updated.
	PROFIsafe	F_dest_adr	1 ... 1022	Address of the PROFIsafe device. This address must match the DIP switch setting on the device.
		F_source_adr	1 ... 65534	Address of the control system connected to the device
		F_WD_Time	150 ... 65,535 ms [600]	Time within which the device must react to a control system request. Error if time exceeded.
Locking module MGB2	PROFIsafe	Deselection of non-safe guard locking control **Important:** Setting has an effect on the safety function	Yes/No [No]	Here you can set whether control from the non-safe area is to take place in addition to control from the safe area.

14.3. Replacing an MGB2 system without programming device

If servicing is required, the MGB2 system is easy to replace with a new one. For this purpose, the following prerequisites must be met:

- The DIP switch settings (PROFIsafe address) on the new device must match those on the old device.
- Your Profinet master must support the automatic replacement of Profinet devices.
- Your Profinet topology must be correctly configured.
- The replacement device must be connected to the same port as its predecessor.
- There must be no device name in the MGB2 system.
  This field is empty in the delivery state. Systems that already contain a name must first be reset to the factory settings.

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

The Profinet bus does not need to be switched off for this purpose.

14.4. Mechanical function test

It must be possible to insert the bolt tongue easily into the locking module. To check, close guard several times and actuate door handle.

If available, check function of the escape release. With active guard locking it must be possible to operate the escape release from the inside without excessive effort (approx. 40 N).

14.5. Electrical function test

1. Close all guards and insert the bolt tongue into the locking module.
2. Activate guard locking.
- The machine must not start automatically.
- It must not be possible to open the guard.
- The green LED (State) and the yellow LED (Lock) are illuminated.
3. Enable operation in the control system.
- It must not be possible to deactivate guard locking as long as operation is enabled.
4. Disable operation in the control system and deactivate guard locking.
- The guard must remain locked until there is no longer any risk of injury.
- It must not be possible to start the machine as long as guard locking is deactivated.
- It must be possible to open the guard.

Repeat steps 2-4 for each guard.

14.6. PROFINET data bytes for data structure (data blocks for non-safe functions)

ⓘ	**Important!** Select one of the configurations by bringing together the corresponding modules via drag & drop in the configuration software of your control system. The modules are easy to distinguish by means of the commentary block. The modules must be selected prior to the first Power On process. Another Power On is required if modules are to be exchanged.

The following modules can be present in various combinations in an MGB2 system:

- Bus module, MGB2-B-…PN (contains everything required for the PROFINET connection)
- Locking module, MGB2-L. (forms the door locking mechanism together with the handle module)

Each MGB2 module occupies a certain number of PROFINET data bytes in the input and output areas of the control system.

The PROFINET data bytes for every MGB2 module or also individual functions are combined in data blocks (see tables below).

A distinction is made between the following data block types:

- Data blocks for MGB2 modules
- Data blocks for individual functions

These data blocks are automatically assigned to the designated slots in the configuration software of the control system when your MGB2 system is placed. This assignment changes according to MGB2 system. The exact assignment of the slots and the exact bit allocation for your device can be seen in the data sheet. The data sheet is included with every MGB2 system.

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14.7. Data blocks for MGB2 modules

All standard functions of an MGB2 module are combined in these data blocks. Additional functions, e.g. an optional enabling switch or a stack light, have separate data areas.

14.7.1. Data block for MGB2 bus module for MGB2 locking module L2

PROFINET	Input area	Bit		7	6	5	4	3	2	1	0
Expanded modules	**MGB-B**	Slot 1	Byte 0	-	-	-	-	-	S92	S91	S90
	Emergency stop	Slot 2	Byte 0	-	-	-	-	-	-	-	S94
	MGB-L	Slot 3	Byte 0	ÜK	SK	-	-	-	Z	R	T
Data bytes (data blocks for safe function)	**Enabling switch**	Slot 4	Byte 0	-	-	ES (S1)	-	-	-	-	ES
	Diagnostics	Slot 5	Byte 0	-	-	-	-	E	E	E	E
			Byte 1	-	-	-	-	-	-	-	-
	Output area	Bit		7	6	5	4	3	2	1	0
	MGB-B	Slot 1	Byte 0	-	-	-	-	-	H92	-	H90
	Emergency stop	Slot 2	Byte 0	-	-	-	-	-	-	-	-
	MGB-L	Slot 3	Byte 0	-	-	-	-	-	-	-	S
	Enabling switch	Slot 4	Byte 0	-	-	-	-	-	-	-	-
	Diagnostics	Slot 5	Byte 0	-	-	-	-	-	-	Reset	Q
			Byte 1	-	-	-	-	-	-	-	-

ÜK = T and R and Z
SK = T and R

Z = Guard locking
R = Bolt position
T = Door position

E = Device diagnostics
Q = Acknowledgment
S = Guard locking solenoid
ES = Enabling switch

14.7.2. Non-safe bits

Input	Bit identifier			Meaning	Condition for setting	Condition for resetting
Input	R			Non-safe input Bolt position	Door closed and bolt tongue inserted into locking module	Bolt tongue not in locking module OR error
	T			Non-safe input Door position	Door closed	Door open OR error
	Z			Non-safe input Guard lock monitoring	Door closed, bolt tongue inserted into locking module and locked	Guard locking open OR error
	SK			Non-safe input Door position	Door closed and bolt tongue inserted into locking module	Door open OR error
	ÜK			Non-safe input Guard lock monitoring	Door closed, bolt tongue inserted into locking module and locked	Guard locking open OR error
	ES			Non-safe input Enabling switch (ES)	Enabling switch pressed	Enabling switch is not pressed OR error
	E	Slot 5 Byte 0	IO_0	Device diagnostics: Message present. Diagnostic code: see chapter *15.6* ff.		
			IO_1	Device diagnostics: Plausibility check detected an error (escape release actuated). Diagnostic code: see chapter *15.6* ff.		
			IO_2	Device diagnostics: Error in emergency stop. Diagnostic code: see chapter *15.6* ff.		
			IO_3	Device diagnostics: Error in enabling switch. Diagnostic code: see chapter *15.6* ff.		

Output	Bit identifier	Meaning	Description
Output	S	Guard locking solenoid	
	Reset	Reset	Device diagnostics: Acknowledge message, acknowledgment of IO_2 or IO_3. IO_0 is also acknowledged if only one message is present.
	Q	Acknowledgment	Device diagnostics: Acknowledge message, acknowledgment of IO_1. IO_0 is also acknowledged if only one message is present

14.7.3. Additional button functions

Lamp control with MGB2-PN

Lamp	Color	ON	OFF	Flashing
H90	White	Bit H90 = 1	Bit H90 = 0	-
H91	White	Door closed and acknowledged	Door open	Door closed and not acknowledged or escape release actuated
	Blue	Door closed and locked via bit from standard area and acknowledged	All other states	-
	Yellow	Door closed and locked via bit from safe area and acknowledged	All other states	-
	Green	Door closed and locked via bit from safe area and from standard area and acknowledged	All other states	-
H92	Blue	Bit H92 = 1	Bit H92 = 0	-
H94	Red	Bit ANH = 1 and emergency stop not pressed and acknowledged	Bit ANH = 0 and emergency stop not pressed and acknowledged	Emergency stop pressed

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14.7.4. Additional button functions

Lamp control in enabling switch with MGB2-PN

Lamp	Color	ON	OFF	Flashing
ES+	Red	Enabling switch inserted	Enabling switch not inserted	-
ES-	Yellow	Enabling switch inserted and pressed and acknowledged	Enabling switch not pressed or enabling switch not inserted	Enabling switch inserted and pressed and not acknowledged

14.8. PROFIsafe data bytes (data block for safe functions)

Safe PROFIsafe data are transmitted in addition to the non-safe PROFINET data. These data include all information about the door position and guard locking, emergency stop and enabling switch, for example.

Important!

Select one of the configurations by bringing together the corresponding modules via drag & drop in the configuration software of your control system.

The modules are easy to distinguish by means of the commentary block. The modules must be selected prior to the first Power On process. Another Power On is required if modules are to be exchanged.

14.8.1. PROFIsafe data bytes

The PROFIsafe data block includes all safe functions. It is subdivided as follows:

- 2 input bytes of data for the functions (e.g. emergency stop switch position)
- 2 additional input bytes (empty)
- 4 input bytes used within PROFIsafe
- 1 output byte for the functions (e.g. safe control of guard locking)
- 1 additional output byte (empty)
- 4 output bytes used within PROFIsafe

All data bits are present in parallel in the non-safe PROFINET data area and can be used as a status bit there.

Important!

Never use the status bits for safety functions!

14.8.2. Data block for PROFIsafe

PROFIsafe	Input area	Bit		7	6	5	4	3	2	1	0
Expanded modules Data bytes (data blocks for safe function)	SAFETY	Slot 6	Byte 0	-	-	-	Z	R	-	ES	NH
			Byte 1	-	-	-	-	-	-	ÜK	SK
			Byte 2	PSÜK	-	-	ZSIN	ZSQ	ÜKQ	SKQ	NHQ
			Byte 3	-	-	-	-	-	-	-	-
			Bytes 4 - 7	Used within PROFIsafe (control byte, CRC, etc.)							
	Output area	Bit		7	6	5	4	3	2	1	0
	SAFETY	Slot 6	Byte 0	ETR	ENR	ANH	-	-	-	NE	ZH
			Byte 1	-	-	-	-	-	-	-	-
			Bytes 2 - 5	PROFIsafe used internally (status byte, CRC, etc.)							

ÜK = T and R and Z
SK = T and R

Z = Guard locking
R = Bolt position
T = Door position
ZH = Guard locking

ES = Enabling switch
NH = Emergency stop
ZSIN = Enabling switch inserted
ZSQ = Enabling switch acknowledged
ÜKQ = ÜK acknowledged
SKQ = SK acknowledged
NHQ = Emergency stop acknowledged
NE = Emergency release

ETR = Enhanced functionality
ENR = Enhanced functionality
ANH = Enhanced functionality
PSÜK = Enhanced functionality

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14.8.3. Safe bits

Input/output	Bit identifier	Meaning	Condition for setting	Condition for resetting
Input	R	Safe input Door position	Door closed and bolt tongue inserted into locking module	Door open OR error
	Z	Safe input Guard lock monitoring	Door closed, bolt tongue inserted into locking module and locked	Guard locking open OR error
	SK	Safe input Door position	Door closed and bolt tongue inserted into locking module	Door open OR error
	ÜK	Safe input Guard lock monitoring	Door closed, bolt tongue inserted into locking module and locked	Guard locking open OR error
	ES	Safe input Enabling switch (ES)	Enabling switch pressed	Enabling switch is not pressed OR error
	NH	Safe input Emergency stop	Emergency stop not pressed	Emergency stop is pressed OR error
	NHQ	Safe input Emergency stop acknowledgment	Emergency stop is not pressed AND acknowledgment was detected on S91 or via the ETR bit	Emergency stop is pressed OR error
	SKQ	Safe input SK acknowledgment	SK is set AND acknowledgment was detected on S91 or via the ENR bit	SK deleted OR error
	ÜKQ	Safe input ÜK acknowledgment	ÜK is set AND acknowledgment was detected on S91 or via the ETR bit	ÜK deleted OR error
	ZSQ	Safe input ZS acknowledgment	ES is set AND acknowledgment was detected on ES(S1)	ES deleted OR error
	ZSIN	Safe input Insertion detection	The enabling switch plug is inserted into the MSM	The enabling switch is not inserted into the MSM OR error
	PSÜK	Non-safe input PSÜK	ÜK is set AND control of guard locking is only from the non-safe area	ÜK deleted OR control from the safe area OR error
Output	ZH	"Control of guard locking from the safe area 1: Guard locking is activated 0: Guard locking is deactivated"	Remark: Observe setting via GSD for control of guard locking	
	NE	"Emergency release: 1: Guard locking is to be opened 0: No function change"		
	ANH	"1: LED on emergency stop (S94) On 0: LED on emergency stop (S94) Off"	Remark: As long as emergency stop is not pressed	
	ENR	Reset bit for use for SKQ and ÜKQ		
	ETR	Reset bit for use for NHQ		

15. 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 PROFINET or the control system to the error codes stated. For PROFINET, the offset to be taken into account is 0x100.

Most messages are also displayed on the devices.

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

15.1. Reset and restart

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

15.2. Acknowledging errors

To acknowledge errors, set the respective acknowledgment bit for 100…1,000 ms. You will find an overview of the error messages and reset conditions from chapter *15.6. General errors*.

15.3. Resetting system to factory settings (factory reset)

You can reset the device using one of the following methods:

- With the aid of the configuration software for your control system (this resets only the PROFINET portion). Example for Siemens TIA-Portal: in the “Online & Diagnostics” dialog box
- 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 *12.2.1. DIP switches on page 31*.
- Check the safe function of the safeguard and, if necessary, other safety functions after every factory reset.

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15.4. 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 and device name of the bus module MBM
- PROFIsafe address
- Error list for each module and submodule
- Error list for the overall system

The error numbers indicated correspond to those in the error tables below from chapter *15.6 on page 49*.

15.4.1. Using device web interface

Proceed as follows:

1. Set “WWW” DIP switch to “on” position. See also chapter *12.2.1 on page 31*.
   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.

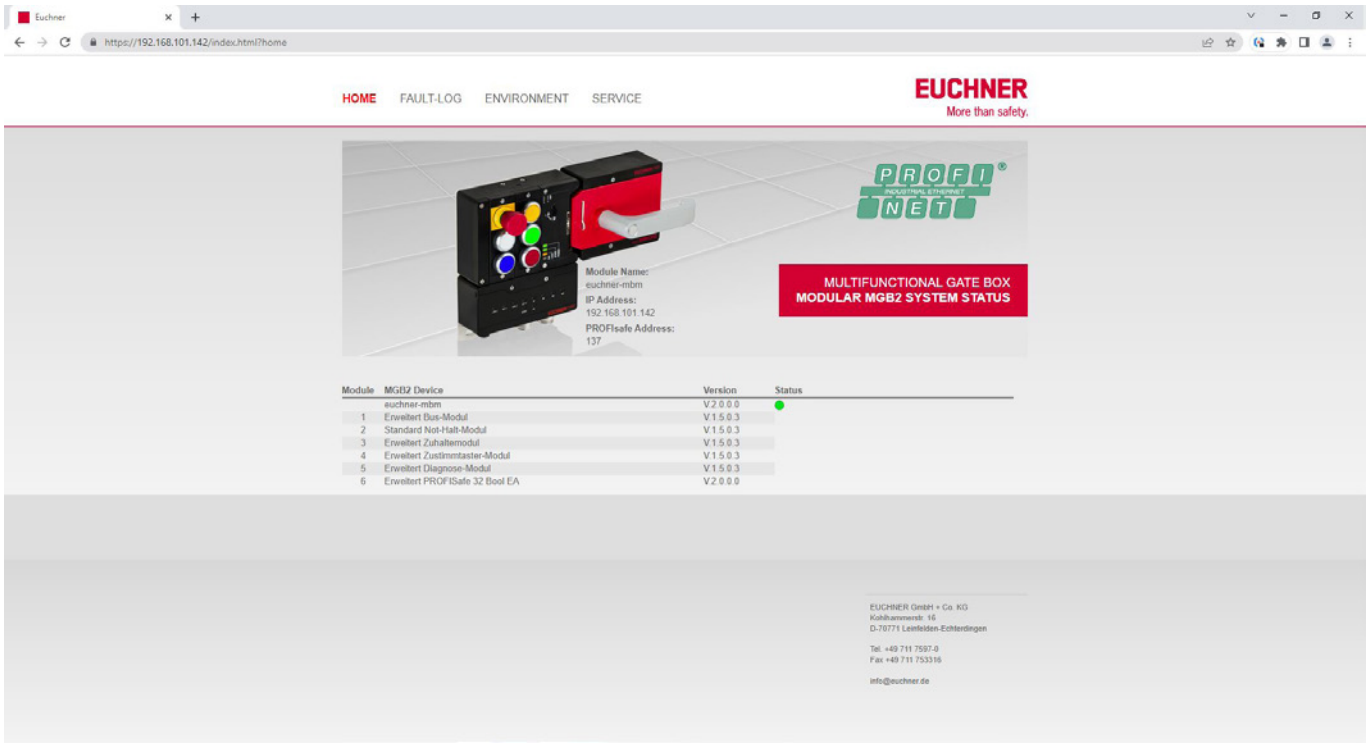

Fig. 17: HOME page on the device web interface in the bus module MBM

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.
- The password-protected SERVICE page can be accessed only for on-site support by EUCHNER.

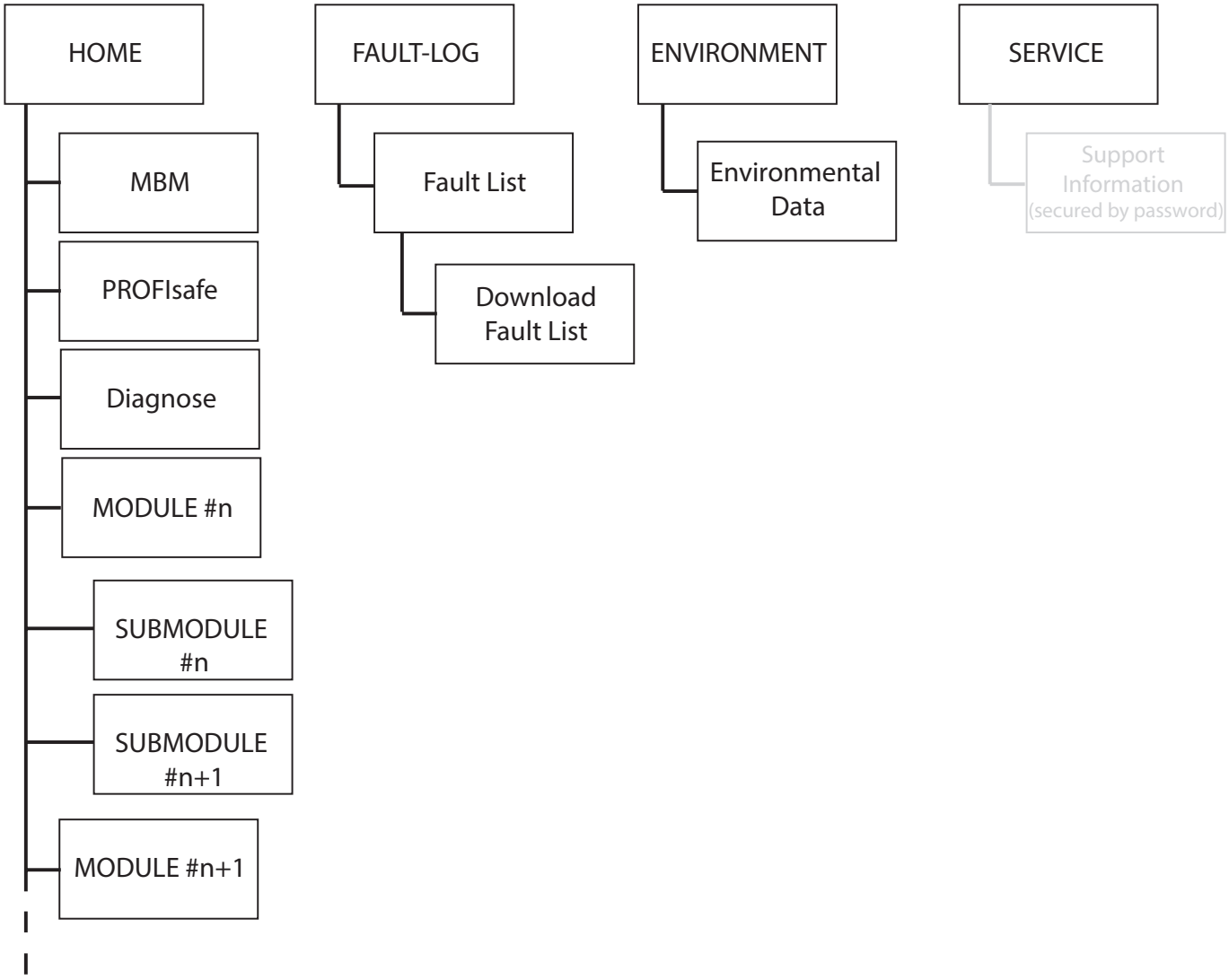

Fig. 18: Site map for the device web interface in the bus module MBM

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15.5. System indications during setup, teach-in and normal operation

Operating mode	LED indicator: POWER (gn)	LED indicator: STATE (gn)	LED indicator: Lock (ye), only MGB2-L1/-L2	LED indicator: DIA (rd)	Door position	Position of the bolt tongue	Guard locking control LM.FO_CL (depending on setting also LM.O.CL)	Device diagnostics Status bit LM.I_OD	Bolt position Status bit LM.I_OT	Bolt position (SK) Safe input bit LM.FI_SK Status bit LM.I_SK	Guard locking Status bit LM.I_OL	Guard locking status (ÜK) Safe input bit LM.FI_UK Status bit LM.I_UK	State
Normal operation	☼	long OFF short ON	○	○	open	not inserted	off	off	off	off	off	off	Normal operation, door open
		long ON short OFF	○	○	closed	not inserted	off	on	off	off	off	off	Normal operation, door closed
		☼	long ON short OFF	○	closed	inserted	off	on	on	on	off	off	Normal operation, door closed, bolt tongue inserted
		☼	☼	○	closed	inserted	on	on	on	on	on	on	Normal operation, door closed and locked
		X	☼ flashing quickly	○	X	not inserted	on	off	off	off	off	off	Ready for guard locking, guard locking is active, bolt tongue not inserted
Teach-in standby (only for MGB2 unicode)		3 x	○	○	open	not inserted	off	off	off	off	off	off	Door open; device is ready for teach-in of another handle module (only short time after power-UP)
Setup (only for MGB2 unicode)		1 Hz	○	○	closed	inserted	on	on	on	off	on	off	Teach-in operation
		☼	alternately flashing STATE /DIA	☼		X	X	off	off	off	off	off	Positive acknowledgment after completion of teach-in operation
Key to symbols								○					LED not illuminated
				☼									LED illuminated
					1 Hz								LED flashes at 1 Hz
					3 x								LED flashes three times
								X					Any state

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.

15.6. General errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x01 ... 0x06	Internal error	Internal device error. Device is no longer functional.	Internal error	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 error	Internal device error. Device is no longer functional.	Internal error	Latching	Restart system. If the error persists, contact our support team.	LM_E_G	☼	○	○	☼	○	○

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15.7. 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							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0xAE	Configuration error	Configuration in the control system does not match the actual configuration. Modules might be swapped or in the wrong location.	Config-uration error	Latching	Restore the correct configuration and restart the system. A factory reset may be necessary.	BM_E_G	☼		☼	○	☼	☼	☼ 3x rd	
0xEA	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			☼		☼	☼	☼ long on rd	
0xEB	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.									

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
0x1F	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	○	☼	○	○

15.8. 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	Repeat 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	○	☼		

15.9. Environment errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x60	Supply voltage too high	Overvoltage	Environment error	Resettable/ latching	Decrease supply voltage. Pay attention to technical data.	BM_E_G			○	○	☼ long on	☼	☼ 5x rd	
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.									

EN

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	☼	☼ 5x	○	☼		
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 housing too high	Environment error	Latching	Check whether the system is operating in specified temperature range. Technical data must be observed.							
0x63	Temperature too low	Temperature in housing too low	Environment error	Latching	Check whether the system is operating in specified temperature range. Technical data must be observed.							

15.10. Communication errors

MBM

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x74	MLI1 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.	BM_E_G			✳	○	✳	✳	✳ 4x rd	
0x75	MLI2 disrupted	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.									
0x78	Safety communication with devices lost	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.									
0x79	Non-safety communication with devices lost	Communication disrupted	Communication error	Resettable	Check cables and plug connectors for correct seating and damage.									
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; Ethernet cable is not connected	Communication error	Resettable	Check PROFINET connection	BM_E_G	○	○		✳ 1 Hz		✳	○	✳ 1x

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			✳		

EN

15.11. 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 was 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				

15.12. 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 error. 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	○

15.13. PROFINET errors

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x10C	Parameter setting error	The assembly has detected a parameter setting error. Parameter setting errors can be: - The assembly cannot evaluate any parameters (examples of possible causes: unknown parameters, invalid parameter combination). - No parameters have been assigned yet to the assembly.	Application error	Latching	Check parameters and correct these. Then load the parameters into the assembly again.				✳		✳	✳	✳ 2x rd	

EN

15.14. PROFIsafe errors

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x0150	F_DEST_ ADDR	Erroneous safety destination address	Parameter setting error	Latching	The PROFIsafe address set on the device does not match the address set in the configuration tool for your control system. Either modify the DIP switch setting or change the information in the parameter F_dest_adr.	BM_E_G	✳		○	○	✳	✳	○	✳ 1x
0x0151	F_DEST_ ADDR	Safety destination address invalid	Parameter setting error	Latching	The PROFIsafe address set in the configuration tool for your control system has an impermissible value. Check the parameter setting.									
0x0152	F_ SOURCE_ ADDR	Safety source address invalid	Parameter setting error	Latching	The PROFIsafe source address set in the configuration tool for your control system has an impermissible value. Check the parameter setting.									
0x0153	F_WD_ TIME	Watchdog timer value is 0 ms	Parameter setting error	Resettable	The value for the watchdog timer set in the configuration tool for your control system has an impermissible value. Check the parameter setting.									
0x0154	F_SIL	Parameter F_SIL exceeds SIL for the specific device application	Parameter setting error	Resettable	The value for F_SIL set in the configuration tool for your control system has an incorrect value. Check the parameter setting.									
0x0155	F_CRC_ Length	Parameter F_CRC_ LENGTH does not correspond to the values generated			The value for the length of the CRC set in the configuration tool for your control system has an incorrect value. Check the parameter setting.									
0x0156	F_Version	Version for F parameter set incorrectly	Parameter setting error	Resettable	An incorrect version or an invalid F_Version has been detected. Check the parameter setting.									
0x0157	F_CRC1	CRC1 error	Parameter setting error	Resettable	The CRC value calculated does not match the value in the GSDML file. There may be an incorrect value in the GSDML file or incorrect transmission due to interference (e.g. EMC problems).									
0x0158	Device specific diagnosis information	Device-specific error			Information that a device-specific error has occurred. See error codes from chapter 13.5. General errors on page 39ff.									
0x0159		Watchdog Time iParameter saving exceeded												

Error code	Error designation	Meaning	Error category	Error behavior	Troubleshooting	Corresponding error/status bit	LED displays Bus module							
							LINK 1 / LINK 2	ACT 1 / ACT 2	SF	BF	DIA	US1	MAINT	PS
0x0162		F_Block_ID not supported	Parameter setting error	Resettable	Check the parameters and correct them. Then load the parameters into the assembly again.	BM_E_G	✳		○	○	✳	✳	○	✳ 1x
0x0163	CRC2 error		Communication error	Resettable	Read the CRC2 error memory. Restart communication.									
0x0164	F_WD_Time or F_WD_Timer_2 elapsed	Transfer error: timeout	Communication error	Resettable	Restart communication.									

EN

16. 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, powder-coated sheet steel
Dimensions	See dimension drawing
Weight of MGB2-L.B (bus module, locking module and submodules with mounting plate)	3.1 kg
Weight of handle module with mounting plate	1.57 kg
Weight of escape release module with mounting plate	1.05 kg
Ambient temperature	-25 ... +55 °C
Degree of protection	IP65
Safety class	III
Degree of contamination	3
Installation orientation	Any
Locking force F_{zh} acc. to GS-ET-19	2,000 N
Connection options, power supply	2 x push-pull power [1]
Connection, bus	2 x RJ 45, push-pull, according to IEC 61076-3-117 variant 14, screened [1]
Connecting cable, bus	Profinet I/O cable, at least cat. 5e
Operating voltage U_B	DC 24 V -15% / +20% and 5% ripple (PELV – see chapter *13. Electrical connection on page 32*)
Current consumption, max.	610 mA
Max. feed-in current in the connection block (push-pull plug connector)	16 A
Fuse protection for power supply, external	Min. 1 A slow-blow
Safety outputs	PROFIsafe acc. to IEC 61784-3-3
Rated insulation voltage U_i	75 V
Rated impulse withstand voltage U_{imp}	0.5 kV
Resilience to vibration and shock	Acc. to EN 60947-5-3
EMC protection requirements	Acc. to EN 61000-4 and DIN EN 61000-6-7
Switching frequency, max.	1 Hz
Risk times, max. (turn-off times) [2]	
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.	262 ms
- Monitoring of the position of the guard T_{RiskSK}	317 ms
- Monitoring of guard locking T_{RiskUK}	297 ms
Reliability values acc. to EN ISO 13849-1	
Category	
- R, Z, SK, ÜK, NH, NHQ, SKQ, ÜKQ	4
- Bits ES, ZSQ, ZSIN	3
Performance Level	
- R, Z, SK, ÜK, NH, NHQ, SKQ, ÜKQ	PL e
- Bits ES, ZSQ, ZSIN	PL d
$MTTF_D$ [3]	
- MBM	430 years
- MGB2-L	820 years
- MSM for enabling switch [4]	3,316 years
DC	99%
- Enabling switch and included acknowledgment button	92.5%
Mission time	20 years

PFH_D [3]	
- MBM	5.38×10^{-9}
- Monitoring of guard locking and the position of the guard	2.62×10^{-9}
- Monitoring of the position of the guard	2.62×10^{-9}
- Evaluation of safety signals in submodules installed	2.62×10^{-9}
- MSM for enabling switch [4]	2.16×10^{-9}
B_{10D} [5]	
- Emergency stop	0.13×10^{6}
- Enabling switch	Acc. to manufacturer's specifications
- Acknowledgment button on enabling switch	Acc. to manufacturer's specifications
B_{10}	
- Acknowledgment button for bits NHQ, SKQ,ÜKQ	1.3×10^{6}

1) The document *PROFINET Cabling and Interconnection Technology* from the PNO aids in the correct selection of cables.
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.
3) Fixed failure rate without consideration of faults in wearing parts.
4) Applying the limit value for cat 3 from EN ISO 13849-1 ($MTTF_D$ = max. 100 years), a PFH_D of max. 4.29×10^{-8} can be assumed.
5) Information regarding wearing parts without consideration of fixed failure rates in electronic components.

16.1. Radio frequency approvals

FCC ID: 2AJ58-02
IC: 22052-02

FCC/IC-Requirements

This device complies with part 15 of the FCC Rules and with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1) This device may not cause harmful interference, and

2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority

to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

EN

17. Troubleshooting

17.1. Fault on actuating the escape release

To achieve monitoring of the locking element in category 4, PL e according to EN ISO 13849-1, internal monitoring logic is integrated into every locking module.

Result: Bit `I0_1` is set in the diagnostic block when the escape release is actuated (see *15. Diagnostics, troubleshooting and aids on page 45*).

The bit `O0_1` must be set in the diagnostic block for at least 100 ms to acknowledge the error.

Door position	Position of the bolt tongue	Guard locking	Bolt position Status bit `LM_I_OT`	Guard locking Status bit `LM_I_OL`	ÜK Input bit `LM_FI_UK`	Device diagnostics status bit `LM_I_OD`	LED indicator: Power (gn)	LED indicator: State (gn)	LED indicator: Lock (ye)	LED indicator: DIA (rd)	State
X	X	X	off	off	off	X	✳	○	✳	1 x ✳	Signal sequence incorrect (e.g. after actuation of the escape release)

○	LED not illuminated
✳	LED illuminated
3 x ✳	LED flashes three times
X	Any state

17.2. Resetting errors

Proceed as follows:

1. Acknowledge fault via the respective bit (in data block for diagnostics function).
2. Close guard if necessary and switch on guard locking.

➡ The system is in normal operation again.

Notice: Some errors can be acknowledged only via a voltage reset.

18. Service

If servicing is required, please contact:

Euchner GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
Germany

Service telephone:
+49 711 7597-500

E-mail:
support@euchner.de

Internet:
www.euchner.com

19. 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 switching function (see chapter *14.5. Electrical function test on page 38*)
- Check the secure mounting of the devices and the connections
- Check for contamination

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.

20. Declaration of conformity

The declaration of conformity is part of the operating instructions.

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

EN

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