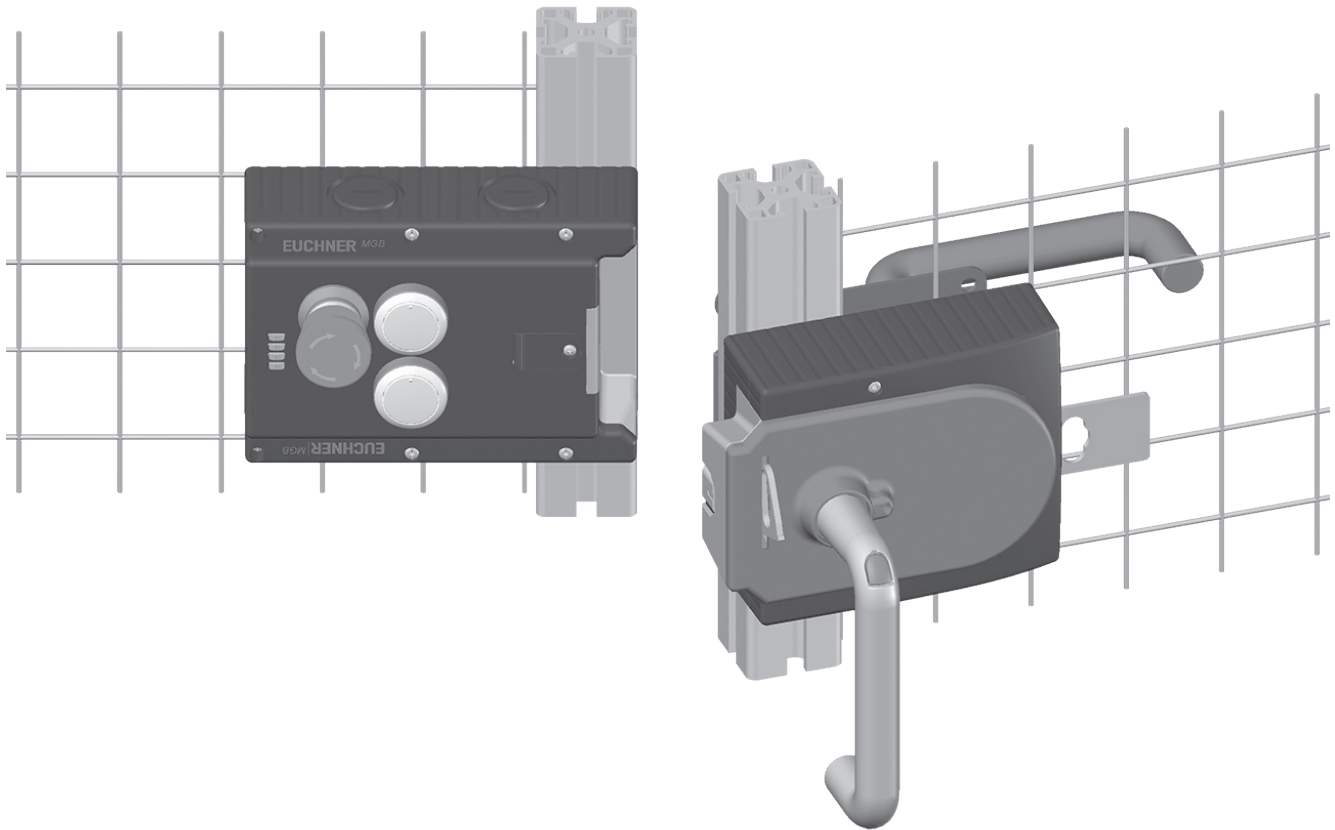


EUCHNER

Operating Instructions



Safety Systems
MGB-LO...-AR.-...
MGB-LO...-AP.-...
from V3.0.0

EN

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1. About this document

1.1. Scope

These operating instructions are valid for all MGB-LO...-AR-... and MGB-LO...-AP-... These operating instructions, the document "Safety information and maintenance" and any enclosed data sheet form the complete user information for your device.

Series	Version	System families	Product versions
MGB	LO (without guard locking)	...AP... ...AR...	from V3.0.0









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
	This section applies on operation as MGB-AP
	This section applies on operation as MGB-AR
	In this section attention must be paid to the DIP switch settings
	Printed document
	Document is available for download at www.euchner.com
	Document on CD
 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 and maintenance for safety system MGB-AR/MGB-AP from V3.0.0 (2123151)	Basic information for safe setup and service	
Operating Instructions (2112657)	(this document)	
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 comprises at least one interlocking module MGB-LO... and one handle module MGB-H...

The safety system MGB is an interlocking device without guard locking (type 4). Devices with unicode evaluation possess a high coding level, devices with multicode evaluation possess a low coding level.

The interlocking module can be configured with the aid of DIP switches. Depending on the setting, the interlocking module behaves like an AP or AR device (see chapter 2.1. *Main differences between MGB-AP and MGB-AR on page 7*). More detailed information about the possible settings is available in the chapter 11.6. *Changing device configuration (using DIP switches) on page 24*.

In combination with a movable guard and the machine control, this safety component prevents dangerous machine functions from occurring while the guard is open. A stop command is triggered if the guard is opened during the dangerous machine function.

This means:

- › Starting commands that cause a dangerous machine function must become active only when the guard is closed.
- › Opening the guard triggers a stop command.
- › Closing 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.

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, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- › EN ISO 12100, Safety of machinery – General principles for design – Risk assessment and risk reduction
- › IEC 62061, Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.

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

- › EN ISO 13849-1, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- › EN ISO 14119 (supersedes EN 1088), Safety of machinery – Interlocking devices associated with guards – Principles for design and selection
- › EN 60204-1, Safety of machinery – Electrical equipment of machines.

The safety system MGB can be combined only with the intended modules in the MGB system family.

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



Interlocking modules with the configuration MGB-AR can be integrated into an AR switch chain.

Connection of several devices in an AR switch chain is permitted only using devices intended for series connection in an AR switch chain. Check the operating instructions for the related device.





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 13. *Technical data on page 32*).
- › If a data sheet is included with the product, the information on the data sheet applies.

Table 1: Possible combinations for MGB components

Evaluation unit	Handle module
MGB...AR/AP from V3.0.0	<p style="text-align: center;">MGB-H... from V2.0.0</p> <p style="text-align: center;">●</p>
Key to symbols	<p style="text-align: center;">●</p> <p>Combination possible</p>

2.1. Main differences between MGB-AP and MGB-AR

System family	Symbol	Use
MGB-AP		<p>Optimized for operation in safe control systems. If series connection is not necessary, the number of terminals required can be reduced using this system family.</p>
MGB-AR		<p>Linking of several guards on one shutdown path. As a consequence several safety doors can be very simply polled using one evaluation unit or two control system inputs.</p>

3. Description of the safety function

Devices from this series feature the following safety functions:

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

- › Safety function: the safety outputs are switched off when the guard is open (see chapter 6. *Function on page 10*).
- › Safety characteristics: category, Performance Level, PFH_D (see chapter 13. *Technical data on page 32*).

The following applies to devices with emergency stop:

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

- › Safety function: emergency stop function
- › Safety characteristics: B_{10D} value (see chapter 13. *Technical data on page 32*)

4. Exclusion of liability and warranty

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

5. General safety precautions

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

Check the safe function of the guard particularly

- › after any setup work
- › after the replacement of an MGB component
- › after an extended period without use
- › after every fault
- › after any change to the DIP switch settings

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 14119:2013, section 7.
- › The switching operation is allowed to be triggered only by the intended handle module MGB-H... that is positively fastened to the guard.
- › Prevent bypassing by means of replacement actuators (only for multicode evaluation). For this purpose, restrict access to actuators and to keys for releases, for example.
- › 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 occupational 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. EUCHNER cannot provide any warranty in relation to the readability of the CD for the storage period required. For this reason you should archive a printed copy of the operating instructions. You can download the operating instructions from www.euchner.com.

6. Function

Together with a handle module, the interlocking module makes it possible to monitor the position of moving guards. The combination also serves as a mechanical door stop at the same time.



The following switch-on condition applies to the safety outputs FO1A and FO1B (also see chapters 14.2. *System status table MGB-AR on page 34* and 14.3. *System status table MGB-AP on page 35*):

Configuration	System family	MGB-AR	MGB-AP
Condition	No fault in the device	TRUE	TRUE
	Guard closed	TRUE	TRUE
	Bolt tongue inserted in interlocking module	TRUE	TRUE
	In case of series connection: Signal available from the upstream switch on the safety inputs F11A and F11B In case of separate operation: DC 24 V present at the safety inputs F11A and F11B	TRUE	Not relevant
		 FO1A and FO1B are ON	

The interlocking module detects the position of the guard and the position of the bolt tongue.

The bolt tongue in the handle module is moved into and out of the interlocking module by actuating the door handle.

7. System overview

7.1. Interlocking module MGB-LO-...

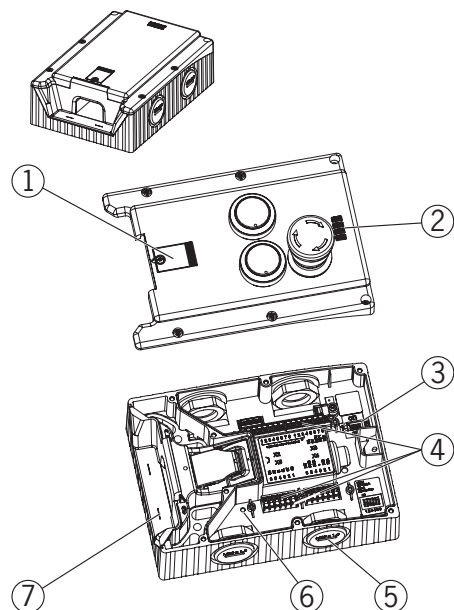


Figure 1: Interlocking module MGB-L-...

Key:

- ① Cover for auxiliary release
- ② LED indicator
- ③ DIP switches
- ④ Terminals X2 -X5
- ⑤ Depending on version:
Cable entry M20x1.5 or plug connector
- ⑥ Internal reset
- ⑦ Auxiliary marking for maximum permitted mounting distance

Notice:

Depending on the version, additional controls and indicators may be integrated into the cover and a mounting plate can be included. See enclosed data sheet.

7.2. Handle module MGB-H-...

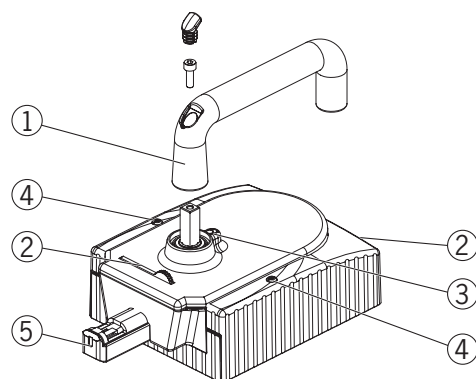


Figure 2: Handle module MGB-H-...

Key:

- ① Door handle
- ② Fold-out lockout mechanism
(optional: second, automatically extending lockout mechanism)
- ③ Locking pin for handle adjustment
- ④ Locking screws T10 for housing cover
- ⑤ Bolt tongue

Notice:

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

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

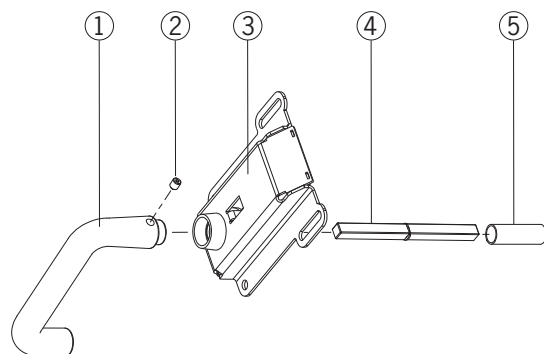


Figure 3: Escape release MGB-E-...

Key:

- ① Door handle
- ② Setscrew
- ③ Cover
- ④ Actuation axis 8 x 8 mm
(different lengths available)
- ⑤ Protective sleeve

Notice:

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

7.4. Dimension drawing

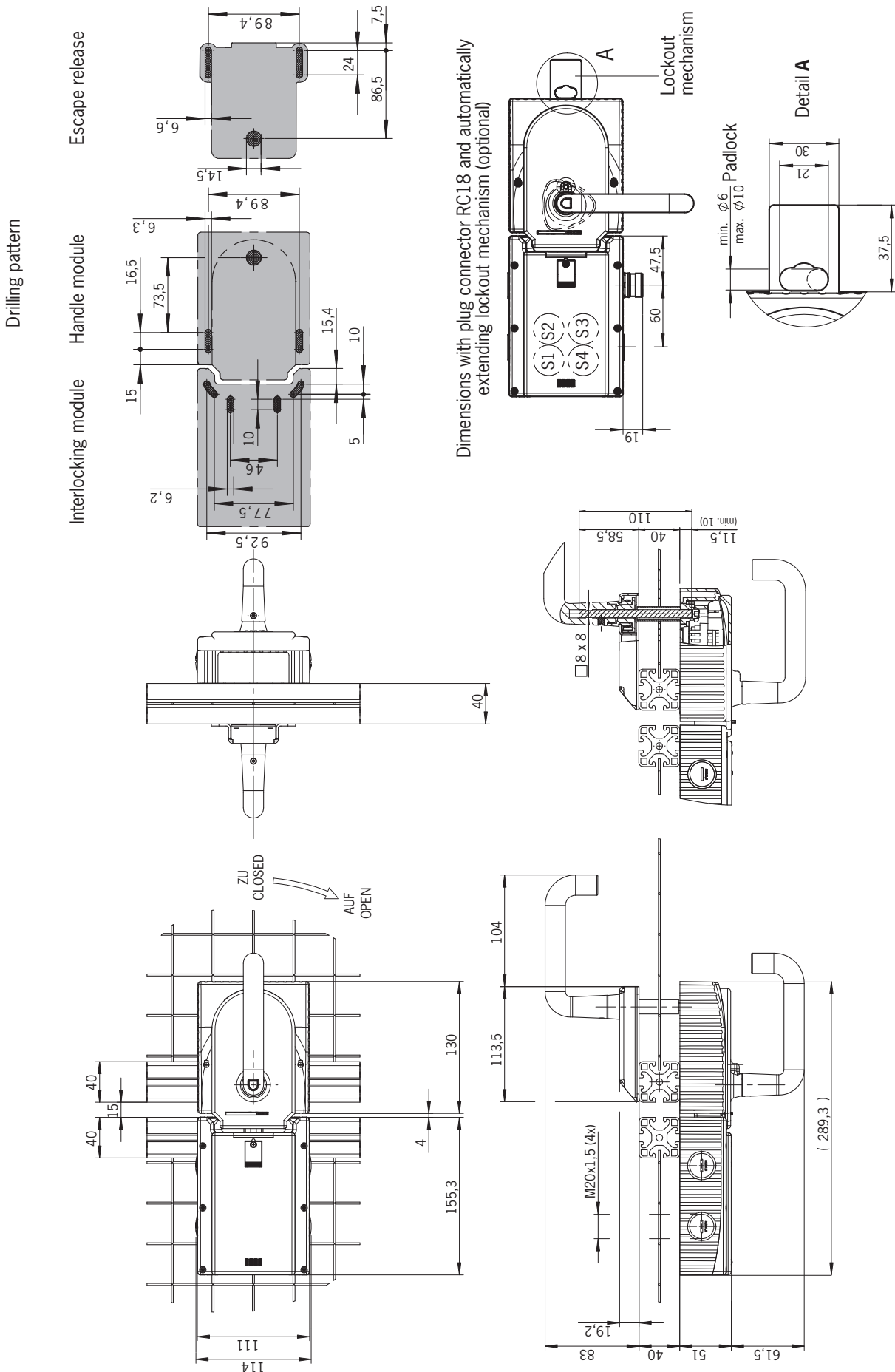


Figure 4: Dimension drawing MGB fitted, without optional mounting plates

7.5. Lockout mechanism

If the lockout mechanism is pivoted out/extended, the bolt tongue cannot be extended. The lockout mechanism can be secured with padlocks (see *Figure 5*).

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

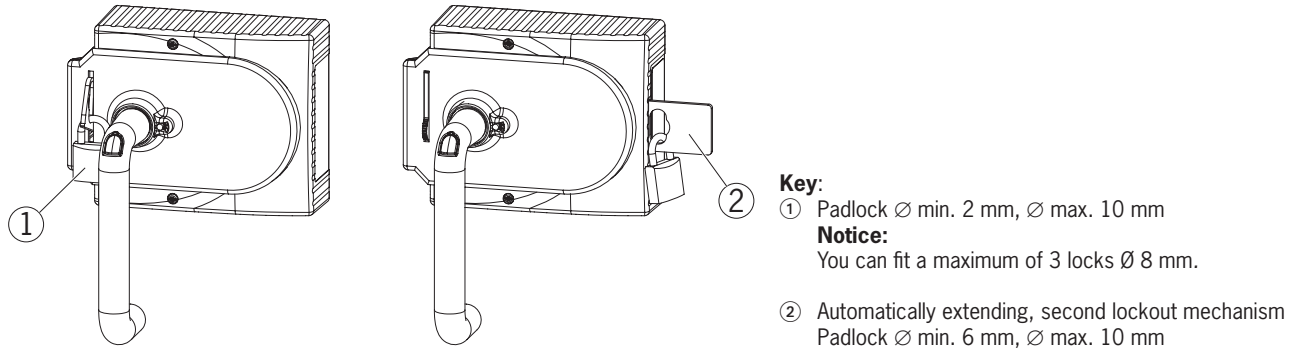


Figure 5: Lockout mechanism secured with padlock

7.6. Escape release (optional)

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



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 actuator must not be under tensile stress during manual release.
- The escape release meets the requirements of Category B according to EN ISO 13849-1:2008.

- Fit escape release such that operation, inspection and maintenance are possible.
- The actuation axis for the escape release must be inserted min. 10 mm into the handle module. Note the information on the different profile widths in the next chapter.
- Align escape release axis at right angles to the handle module. See *Figure 4* and *Figure 7*.

7.6.1. Preparing escape release

(also see *Figure 6: Preparing escape release on page 15*)

Profile width	Length required for actuation axis		Which EUCHNER parts are required?	Necessary work steps
	Without plates	With mounting plates (4 mm each)		
D	D+13	D+21		
30 mm	43 mm	51 mm	Standard escape release with 110 mm axis (order no. 100465)	Shorten to required length
40 mm	53 mm	61 mm	Standard escape release with 110 mm axis (order no. 100465) If necessary, extended actuation axis (order no. 106761)	<i>Without mounting plates:</i> None <i>With mounting plates:</i> Use long actuation axis and protective sleeve and shorten to required length
45 mm	58 mm	66 mm	Standard escape release with 110 mm axis (order no. 100465) and extended actuation axis (order no. 106761)	Use long actuation axis and protective sleeve and shorten to required length
50 mm	63 mm	71 mm	Standard escape release with 110 mm axis (order no. 100465) and extended actuation axis (order no. 106761)	Use long actuation axis and protective sleeve and shorten to required length

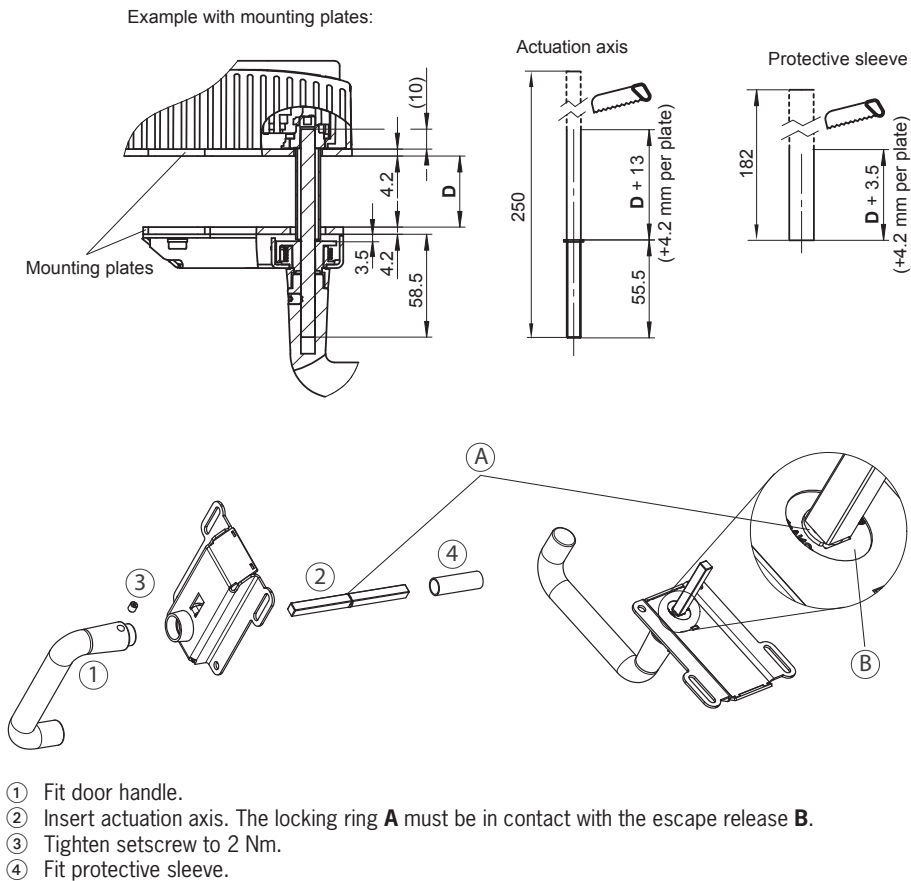


Figure 6: Preparing escape release

8. Installation



WARNING

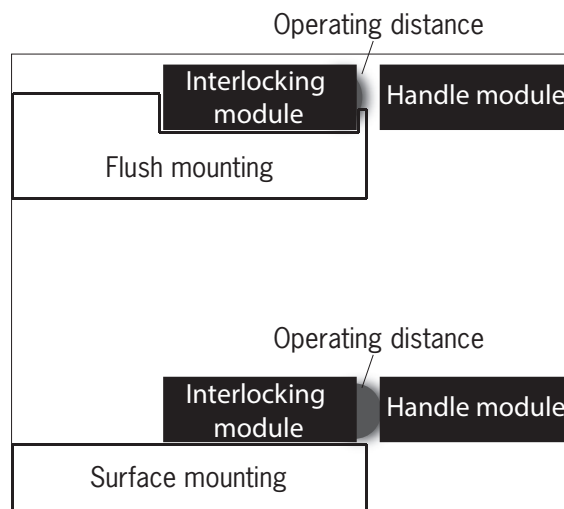
Mounting must be performed only by authorized personnel.

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.



Important!

› If installed flush, the switching distance changes as a function of the installation depth and the guard material.



Tip!

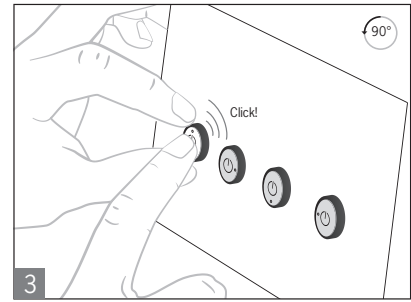
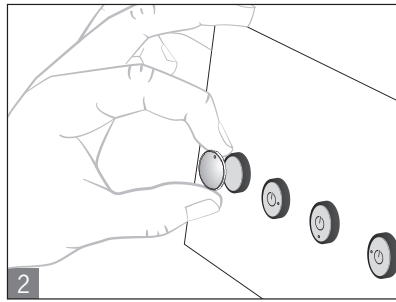
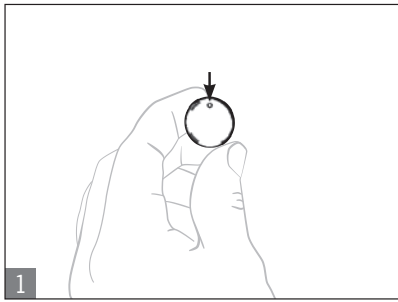
› You will find an animation on the mounting process at www.euchner.com.
› The color and labeling of pushbuttons and indicators can be modified.

For mounting steps, see *Figure 7* and *Figure 8* to *Figure 13*.

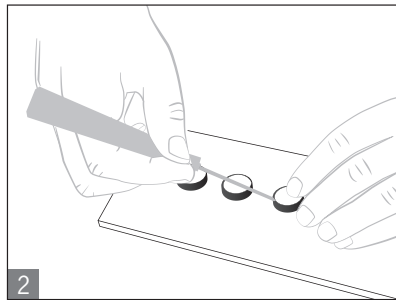
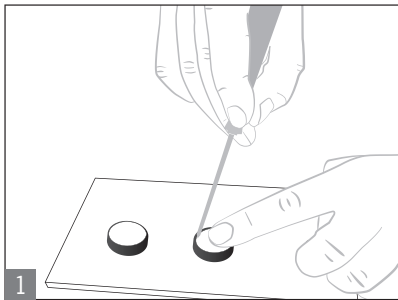
Install system so that inspection and maintenance are possible.

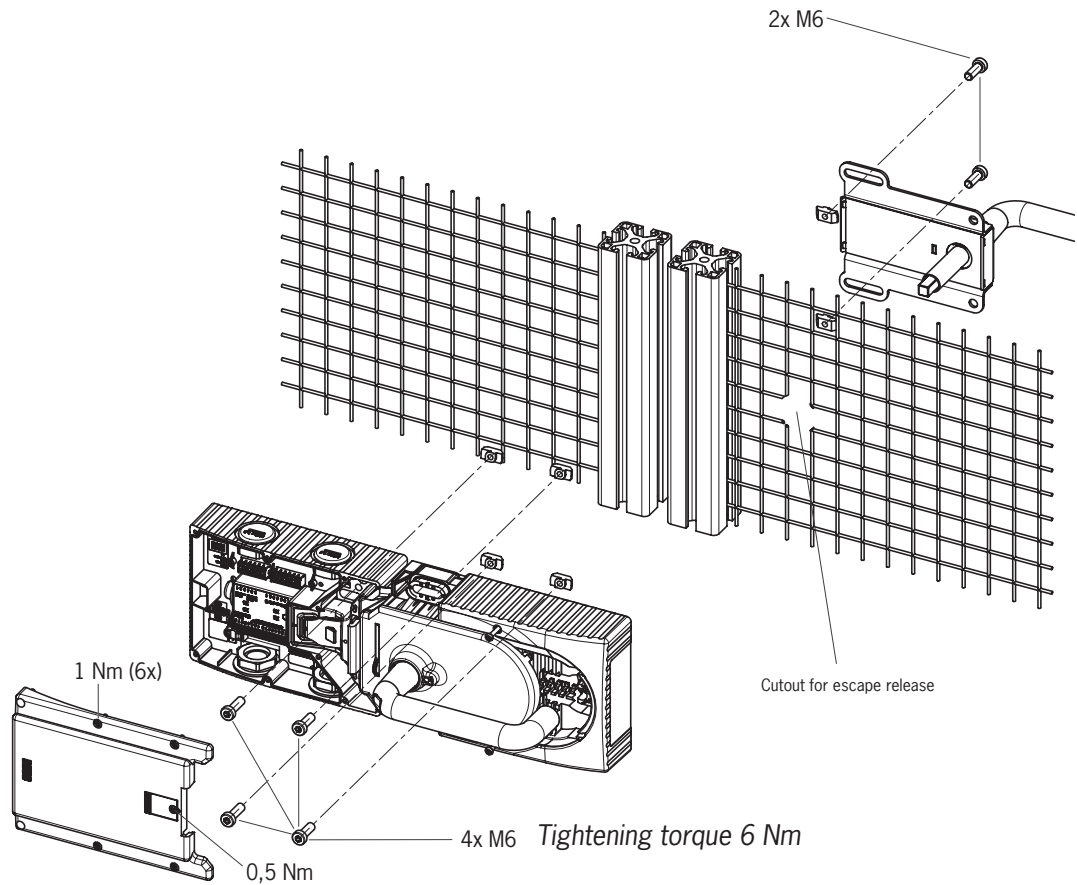
8.1. Mounting lens

Installation



Removal





Recommended fixing material:
For mounting on the mounting plate:
DIN 912-M6X25-8.8 ZN CYLINDER HEAD SCREW

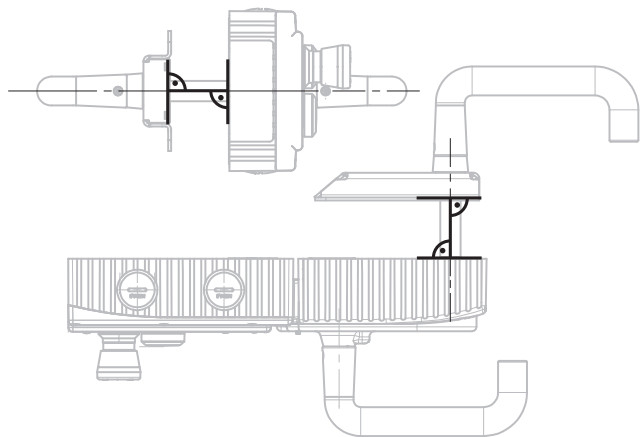


Figure 7: Installation example for door hinged on the right (general view)

9. Changing actuating direction (here: from right to left)



Important!

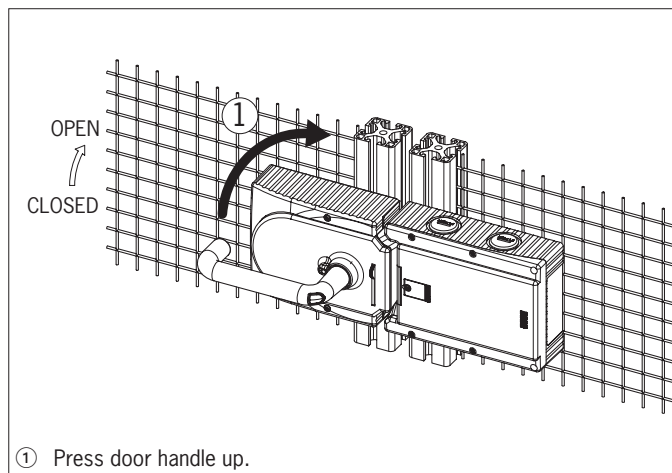
It is possible to make this change only when the bolt tongue is not extended and an escape release is not yet mounted.

As supplied, 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:

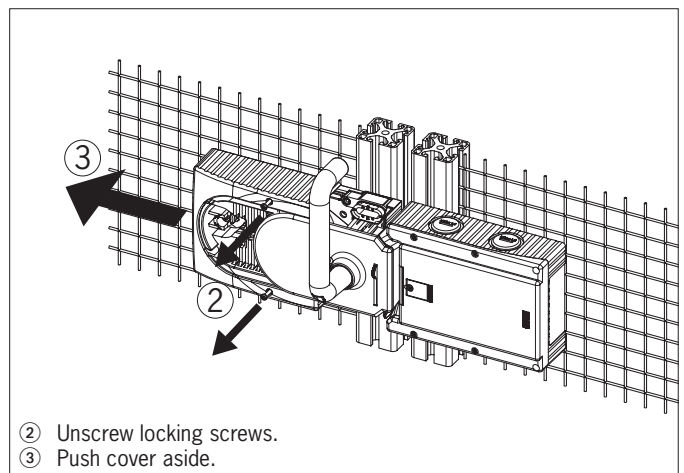
- The guard opens by pressing down the door handle.
- The system is mounted the other way around for doors hinged on the left. In other words, the guard opens by pressing up the door handle (see *Figure 8*). For this reason the actuating direction of the door handle must be changed (see *Figure 8* to *Figure 13*).

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



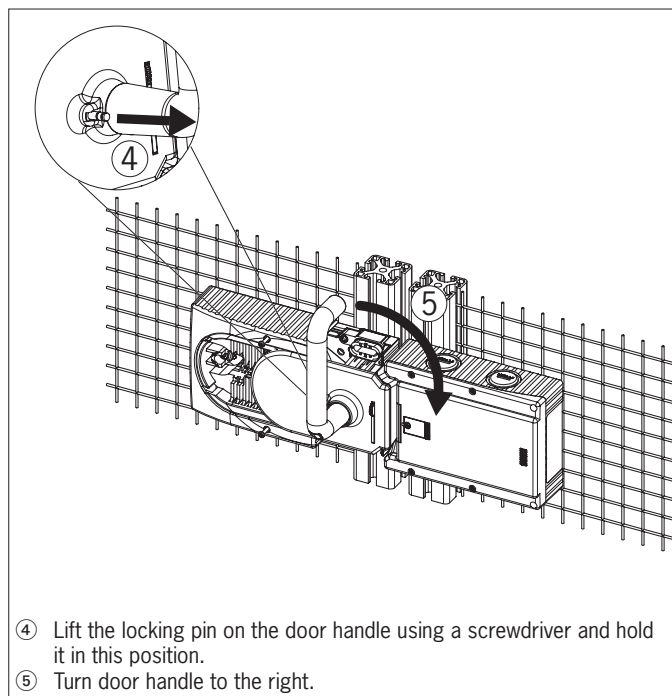
① Press door handle up.

Figure 8: Changing actuating direction, step ①



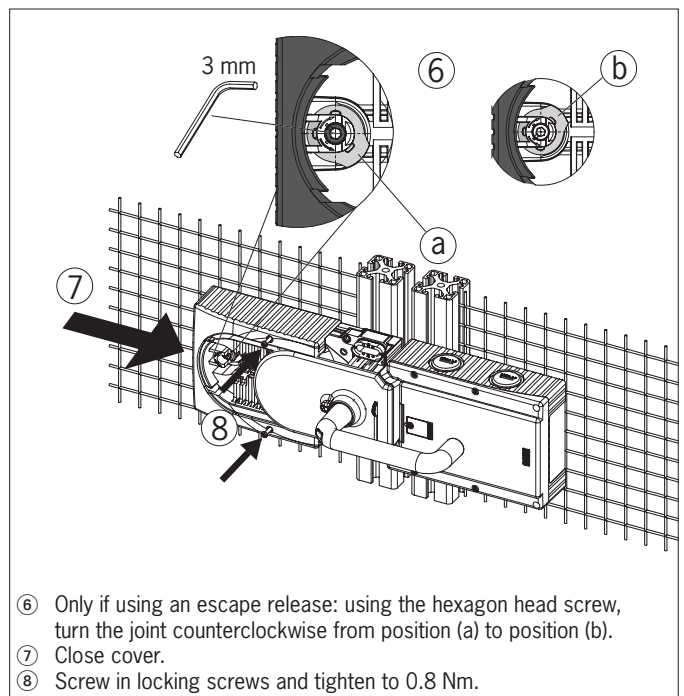
② Unscrew locking screws.
③ Push cover aside.

Figure 9: 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.

Figure 10: Changing actuating direction, steps ④ and ⑤



⑥ Only if using an escape release: using the hexagon head screw, turn the joint counterclockwise from position (a) to position (b).
⑦ Close cover.
⑧ Screw in locking screws and tighten to 0.8 Nm.

Figure 11: Changing actuating direction, steps ⑥ to ⑧

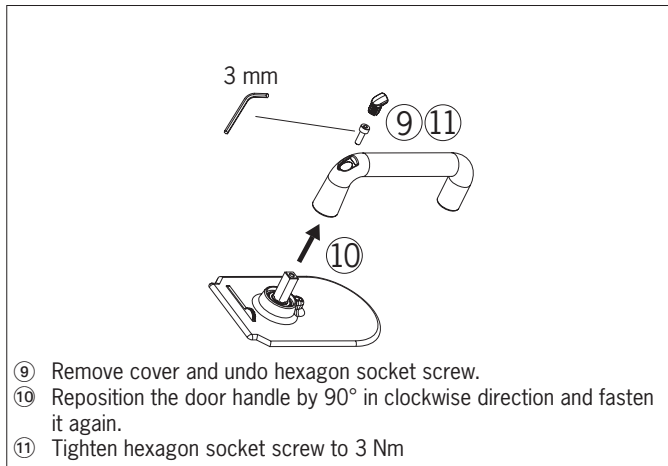


Figure 12: Changing actuating direction, steps ⑨ and ⑪

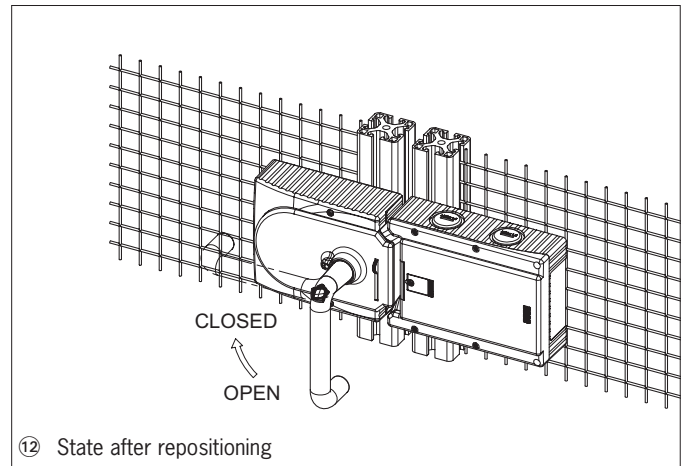


Figure 13: Changing actuating direction, final state

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

Cover device during painting work!

11. Electrical connection



WARNING

- If there is a mistake, loss of the safety function due to incorrect connection.
- › To ensure safety, both safety outputs (FO1A and FO1B) must always be evaluated.
 - › The monitoring outputs must not be used as safety outputs.
 - › Lay the connection cables with protection to prevent the risk of short circuits.



CAUTION

- Risk of damage to equipment or malfunctions as a result of incorrect connection.
- › The inputs on an evaluation unit connected must be positive-switching, as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.
 - › All the electrical connections must either be isolated from the mains supply by a safety transformer according EN IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures.
 - › All electrical outputs must have an adequate protective circuit for inductive loads. The outputs must be protected with a free-wheeling diode for this purpose. RC interference suppression units must not be used.
 - › 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.
 - › To prevent EMC problems, it is imperative you follow the chapter 11.5. *Notes on cable laying on page 23*. Follow EMC notes on devices in the immediate vicinity of the MGB system and their cables.
 - › In order 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.




Important!

- › If the device does not appear to function when the operating voltage is applied (e.g. green Power LED does not illuminate), the safety switch must be returned 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.
- › Tighten screw for the cover for the auxiliary release to 0.5 Nm.

11.1. Notes about 



Important!

- ▶ For use and operation as per the  requirements ¹⁾, a power supply with the feature “for use in class 2 circuits” must be used. The same requirement applies to the safety outputs. Alternative solutions must comply with the following requirements:
 - a) Electrically isolated power supply unit with a max. open-circuit voltage of 30 V/DC and a limited current of max. 8 A.
 - b) Electrically isolated power supply unit in combination with fuse as per UL248. This fuse should be designed for max. 3.3 A and should be integrated into the 30 V DC voltage section.
- ▶ The mounting of conduits directly on the MGB is not allowed. Cables are allowed to be connected only via suitable cable glands. For this purpose use EUCHNER cable gland of type EKPM20/06U. Equivalent cable glands can be used if they are UL-listed (QCRV) and are suitable for the related cable diameter (22 AWG – 17 AWG).

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 (protection against electric shock and fire).

11.2. Safety in case of faults

- ▶ The operating voltage UB is reverse polarity protected.
- ▶ The safety outputs FO1A/FO1B are short circuit-proof.
- ▶ A short circuit between FI1A and FI1B or FO1A and FO1B is detected by the device.
- ▶ A short circuit in the cable can be excluded by laying the cable with protection.

11.3. Fuse protection for power supply

The power supply must be provided with fuse protection depending on the number of devices and current required for the outputs. The following rules apply:

Max. current consumption of an individual device I_{max}

$I_{max} = I_{UB} + I_{UA} + I_{FO1A+FO1B}$

$I_{UB} =$ Device operating current (80 mA)

$I_{UA} =$ Load current of monitoring outputs OD, OT and OI (3 x max. 50 mA) + switches

$I_{FO1A+FO1B} =$ Load current of safety outputs FO1A + FO1B (2 x max. 50 mA)



Max. current consumption of a switch chain ΣI_{max}

$\Sigma I_{max} = I_{FO1A+FO1B} + n \times (I_{UB} + I_{UA})$

$n =$ Number of connected devices

Current assignment to the fuses

Current	Fuse circuit F1	Fuse circuit F2
I_{UB}	80 mA	
$I_{FO1A+FO1B}$	(2 x max. 200 mA)	
I_{UA}		$I_{OD,OT,OI} = (3 \times \text{max. } 50 \text{ mA})$ $I_{switches} = \text{max. } 100 \text{ mA}$ (per switch) $I_{indicators} = \text{max. } 5 \text{ mA}$ (per indicator)

11.4. Requirements for connection cables



CAUTION

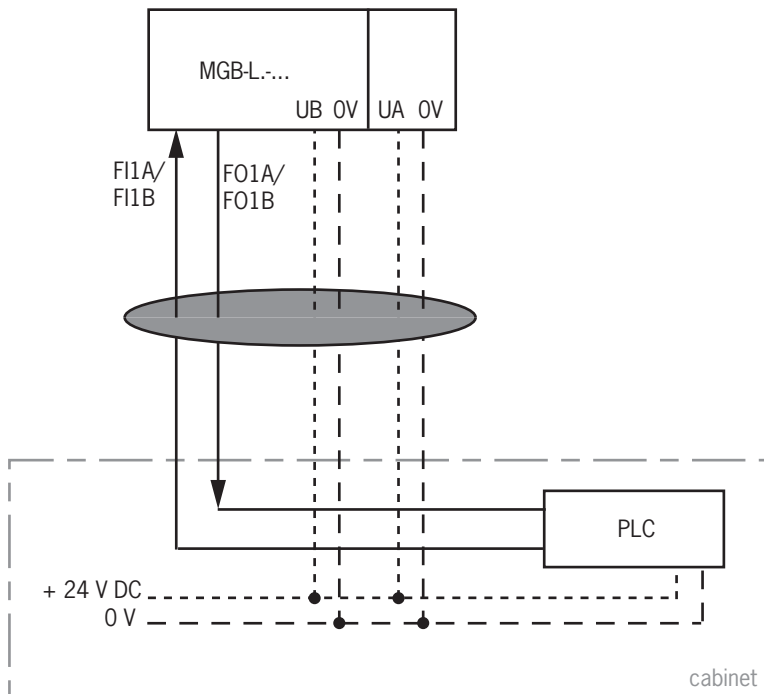
Risk of damage to equipment or malfunctions as a result of incorrect connection cables.
 ▶ On the usage of other connection components, the requirements in the following table apply. EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.

Observe the following requirements with respect to the connection cables:

Parameter	Value	Unit
Conductor cross-section, min.	0.13	mm ²
R max.	60	Ω/km
C max.	120	nF/km
L max.	0.65	mH/km

11.5. Notes on cable laying

Lay all MGB connection cables in a common cable harness.



Important: lay cables in a common harness

Figure 14: Stipulated cable laying

11.6. Changing device configuration (using DIP switches)



Tip!

You will find an animation on device configuration at www.euchner.com.

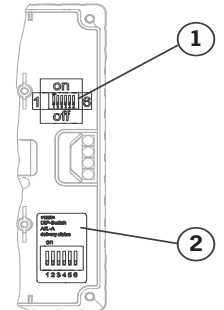
DIP switches

The devices can be configured using the DIP switches. The following settings are possible:

- › Changing system family (AR/AP switching)

Position of the switches

Item	Description
1	DIP switches
2	Sticker with factory setting

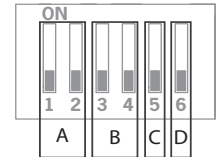


Function of the switches



Important!

DIP switches 3, 4 and 6 must be set to “off” position.



Detail	Switch	Function
A	1+2	On: Device is operated as AP system
		Off: Device is operated as AR system
B	3+4	No function
C	5	On: Configuration possible
		Off: Configuration inhibited (factory setting)
D	6	No function

11.6.1. Changing system family (AR/AP switching)



CAUTION

Malfunction due to incorrect configuration or incorrect connection.

- › Note that the terminal assignment also changes on changing the configuration (see chapter 11.8. *Terminal assignment and contact description on page 26*).

1. Switch off power supply.
2. Set DIP switches 1, 2 and 5 as shown.

For changing from AR => AP	For changing from AP => AR

3. Switch on power supply for 5 s.
 - ➔ The change is confirmed by the illumination of the Power LED. All other LEDs are off.
4. Switch off power supply and set DIP switch 5 to OFF.
 - ➔ The next time the device is started, it operates in the operating mode set.

11.7. Notes on operation with control systems

Please observe the following requirements for connection to safe control systems:

General notes

- Use a common power supply for the control system and the connected safety switches.
- A pulsed power supply must not be used for UB/UA. Tap the supply voltage directly from the power supply unit. If the supply voltage is connected to a terminal of a safe control system, this output must provide sufficient electrical current.
- The safety outputs (FO1A and FO1B) can be connected to the safe inputs of a control system. Prerequisite: the input must be suitable for pulsed safety signals (OSSD signals, e.g. from light grids). The control system must tolerate test pulses on the input signals. This normally can be set up by parameter assignment in the control system. Observe the notes of the control system manufacturer. For the pulse duration of your safety switch, please refer to chapter 13. *Technical data on page 32.*
- The inputs on an evaluation unit connected must be positive-switching, as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.



- Always connect inputs FI1A and FI1B directly to a power supply unit or to outputs FO1A and FO1B of another EUCHNER AR device (series connection). Pulsed signals must not be present at inputs FI1A and FI1B. The test pulses are also present when the safety outputs are switched off (only on FO1A). Depending on the inertia of the downstream device (control system, relay, etc.), this can lead to short switching processes.

The inputs on an evaluation unit connected must be positive-switching, as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.



NOTICE

Due to the fact that short circuit monitoring of the safety outputs FO1A/FO1B is performed by the device itself, the Performance Level in accordance with EN 13849 is not reduced if the control system pulsing is switched off.



Tip!

A detailed example of connecting and setting the parameters of the control system is available for many devices at www.euchner.com in the area Download ▶ Applications ▶ MGB. The features of the respective device are dealt with there in greater detail.

11.8. Terminal assignment and contact description

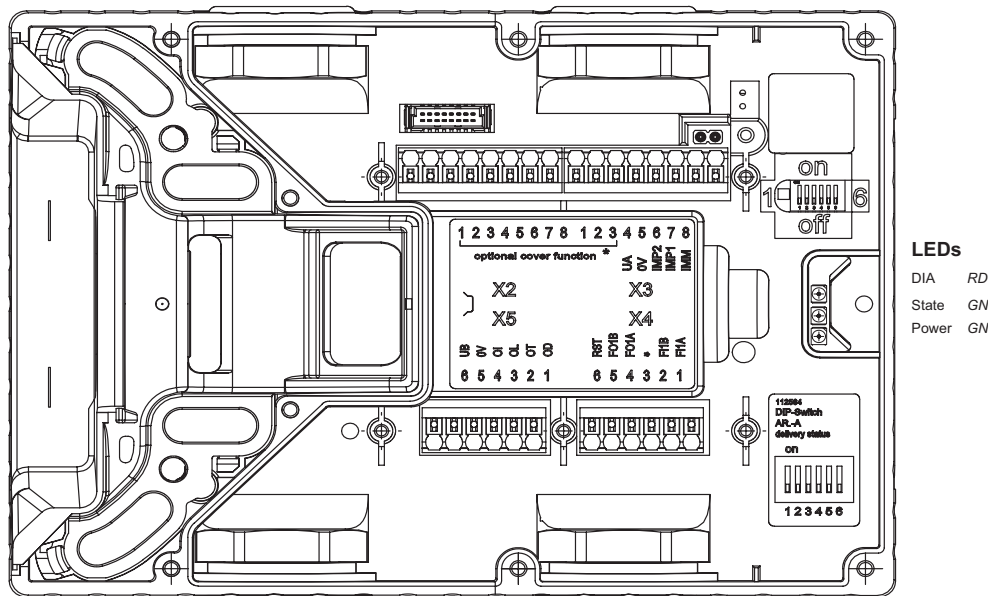


Figure 15: Connections and LEDs

Terminal	Designation	Description
X3.1 to X3.3	-	See the enclosed data sheet
X3.4	UA	Power supply for monitoring outputs and cover assembly, DC 24 V, must be permanently present.
X3.5	0V	Ground, DC 0 V (connected internally to X5.5).
X3.6	-	Not used
X3.7	-	Not used
X3.8	-	Not used
X4.1	F11A	In case of AR configuration: Enable input for channel A, connect to DC 24 V in separate operation. In case of switch chains, connect output signal FO1A from previous device. In case of AP configuration: Input is not evaluated.
X4.2	F11B	In case of AR configuration: Enable input for channel B, connect to DC 24 V in separate operation. In case of switch chains, connect output signal FO1B from previous device. In case of AP configuration: Input is not evaluated.
X4.3	-	See the enclosed data sheet
X4.4	FO1A	Safety output channel A, ON when door is closed and bolt tongue is inserted.
X4.5	FO1B	Safety output channel B, ON when door is closed and bolt tongue is inserted.
X4.6	RST	Reset input, device is reset if DC 24 V is applied to RST for at least 3 s.
X5.1	OD	Door monitoring output, ON when the door is closed.
X5.2	OT	Bolt tongue monitoring output, ON when the door is closed and the bolt tongue is inserted in the interlocking module.
X5.3	-	Not used
X5.4	OI	Diagnostics monitoring output, ON when the device is in the fault state.
X5.5	0V	Ground, DC 0 V (connected internally to X3.5).
X5.6	UB	Power supply, DC 24 V
X2.1 to X2.8	-	See the enclosed data sheet
X1	-	Reserved for connection of the cover circuit board (only for populated covers)

Table 2: Terminal assignment and contact description

11.10. Operation in an AR switch chain

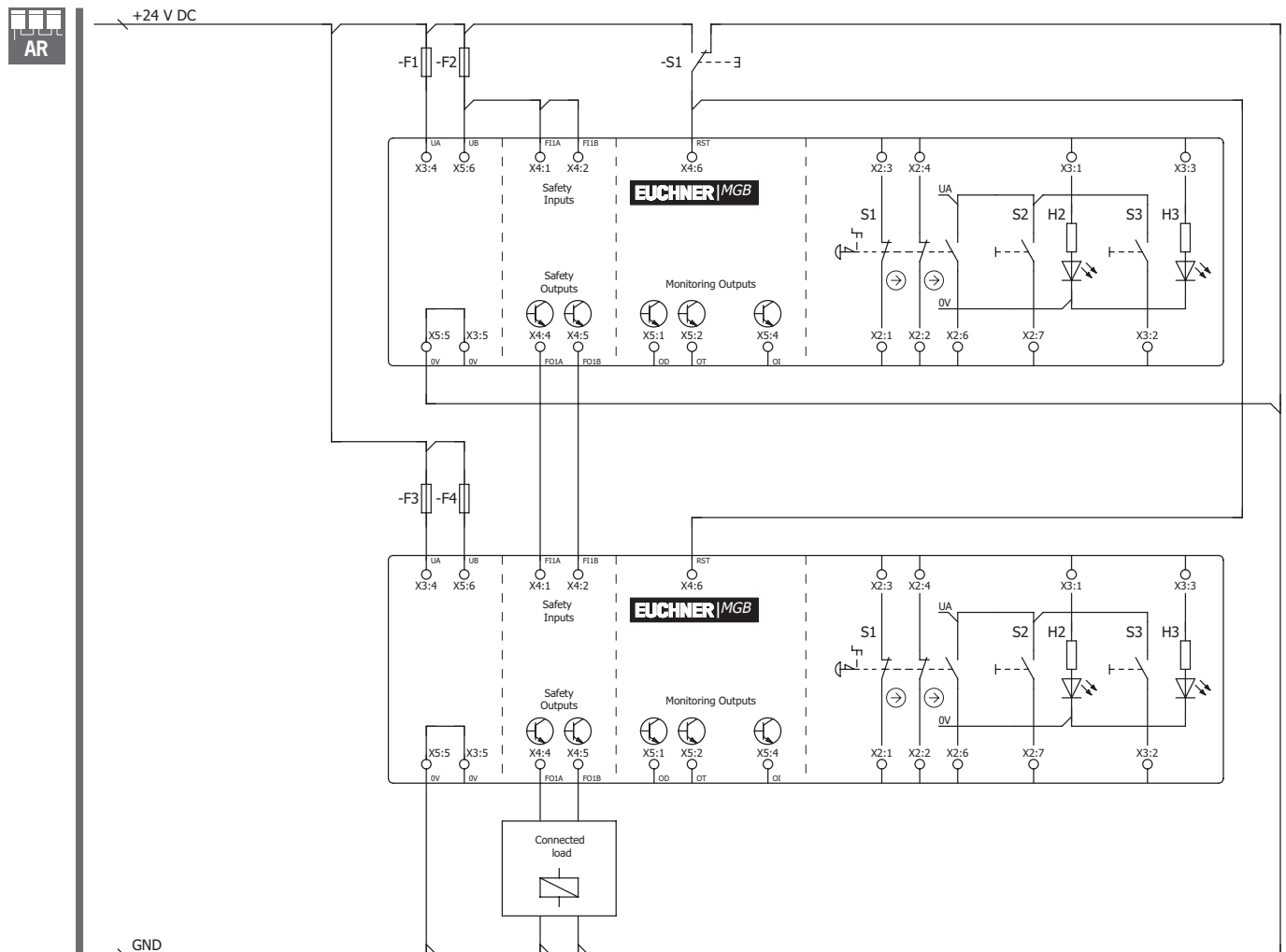


Figure 17: Connection examples for operation in a CES-AR switch chain

For detailed information on operation in an AR switch chain, see the related CES-AR operating instructions. The interlocking module MGB-LO-AR-... behaves in the switch chain in practice like a safety switch CES-AR. The differences to the CES-AR are described in the following.

11.11. Information on operation in an AR switch chain

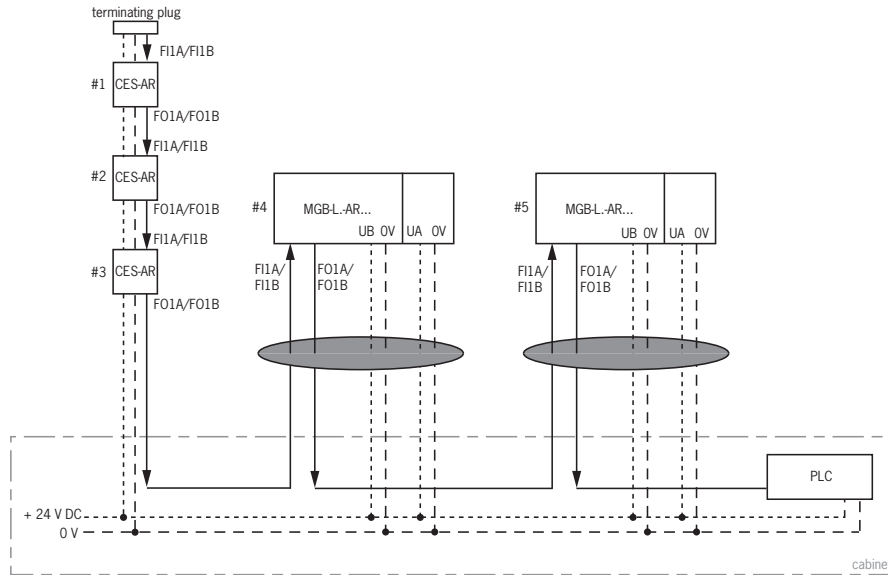


11.11.1. System times

The interlocking module has longer reaction times than a CES-AR switch (see chapters 13. *Technical data on page 32 and 13.1. Typical system times on page 33*).

11.11.2. Wiring an AR switch chain

To prevent earth loops, the wiring should be in a star configuration (see *Figure 18*).



Important: lay cables in a common harness

Figure 18: Central wiring of an AR switch chain in the control cabinet

11.11.3. Number of devices in switch chains

In a pure MGB switch chain a maximum of ten devices can be connected in series. In mixed switch chains (e.g. MGB together with CES-AR) the maximum number of devices is also ten.

11.11.4. Resetting in switch chains



Important!

Use the reset input (RST) for resetting in AR switch chains. All devices in the chain must be reset simultaneously. Resetting individual switches will result in faults.

12. Commissioning

12.1. Teach-in operation (only for MGB unicode)

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

During a teach-in operation the safety outputs are switched off.



Important!

- › The interlocking 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 actuator if a new teach-in operation is carried out. The disabled code is deleted again in the interlocking module only after a third code has been taught.
- › The interlocking module can only be operated with the last handle module taught.
- › If, in the teach-in standby state, the interlocking module detects the handle module taught-in or a disabled handle module, the teach-in standby state is ended immediately and the interlocking module changes to normal operation.
- › If the bolt tongue is in the operating distance for less than 60 s, the handle module is not taught.



Tip!

A teach-in adapter is available to make it easier to teach-in AR devices already mounted in series or for device replacement (order no. 122369). It is simply inserted between the connecting cable and the AR device. The device immediately enters teach-in operation on reconnection. After teach-in, the adapter is removed again and the MGB is connected normally.

Teaching in handle module

1. Fit handle module.
2. Close guard. Check for correct alignment and distance using the marking on the interlocking module and re-adjust if necessary.
3. Insert bolt tongue in the interlocking module.
4. Apply operating voltage to the interlocking module, optionally connect teach-in adapter.
 - ➔ The green LED (State) flashes quickly (approx. 5 Hz). A self-test is performed during this time (approx. 10 s in case of AR configuration). Teach-in operation starts, green LED (State) flashes slowly (approx. 1 Hz). During the teach-in operation, the interlocking 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. 60 seconds, and the green LED (State) goes out. The new code has now been stored, and the old code is disabled.
5. To activate the handle module's code from the teach-in operation in the interlocking module, the operating voltage must then be switched off at the interlocking module for min. 3 seconds. As an alternative, 24V can be applied to the input RST for at least 3 seconds.

Teach-in in a series connection works analogously. Here, the complete series connection must be restarted using the input RST.

12.2. Mechanical function test

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

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

12.3. Electrical function test



WARNING

On usage in a switch chain with different AR devices (e.g. CES-AR, CET-AR), also follow the procedure for the functional check in the related operating instructions.

1. Switch on operating voltage.
 - ➔ The interlocking module carries out a self-test. In case of AR configuration: The green State LED flashes for 10 s at 5 Hz. The green State LED then flashes at regular intervals.
 2. Close all guards and insert the bolt tongue in the interlocking module. As soon as the bolt tongue is inserted in the interlocking module, the safety outputs FO1A/FO1B are ON.
 - ➔ The machine must not start automatically.
 - ➔ The green State LED illuminates continuously.
 3. Enable operation in the control system.
 4. Open the guard.
 - ➔ The machine must switch off and it must not be possible to start it as long as the guard is open.
- Repeat steps 2-4 for each guard.

13. Technical data



NOTICE

If a product data sheet is included with the product, the information on the data sheet applies in case of discrepancies with the operating instructions.

Parameter	Value	Unit
Housing material	Fiber glass reinforced plastic die-cast zinc, nickel-plated stainless steel	
Dimensions	See chapter 7.4. Dimension drawing on page 12	
Weight		
Interlocking module	0.75	kg
Handle module	1.00	
Escape release	0.50	
Ambient temperature at $U_B = DC 24 V$	-20 ... +55	°C
Degree of protection		
Cover not populated/populated with buttons/indicators/selecter switches	IP 65	
Cover populated with key-operated switch	IP 54	
Cover populated with key-operated rotary switch FS22	IP 42	
Safety class	III	
Degree of contamination	3	
Installation position	Any	
Connection	4 cable entries M20x1.5 or plug connector	
Conductor cross-section (rigid/flexible)	0.13 ... 1.5 (AWG 24 ... AWG 16)	mm ²
- With ferrule according to DIN 46228/1	0.25 ... 1.5	
- With ferrule with collar according to DIN 46228/1	0.25 ... 0.75	
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5 %)	24 +10% / -15% (PELV)	V DC
Auxiliary voltage U_A (reverse polarity protected, regulated, residual ripple < 5 %)	24 +10% / -15% (PELV)	V DC
Current consumption I_{UB} (no load on any outputs)	80	mA
Current consumption I_{UA} - Pushbutton S (unloaded, per LED)	5	mA
External fuse	See chapter 11.3. Fuse protection for power supply on page 22	
Safety outputs F01A/F01B	Semiconductor outputs, p-switching, short circuit-proof	
Test pulses	AR < 1,000/AP < 300	µs
Test-pulse interval	Min. 100	ms
Output voltage U_{F01A} / U_{F01B} ¹⁾		
HIGH U_{F01A} / U_{F01B}	$U_B - 2V \dots U_B$	V DC
LOW U_{F01A} / U_{F01B}	0 ... 1	
Switching current per safety output	1 ... 200	mA
Utilization category according to EN IEC 60947-5-2	DC-13 24 V 200 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.	
Monitoring outputs - Output voltage ¹⁾ - Max. load	p-switching, short circuit-proof $U_A - 2V \dots U_A$ Max. 50	mA
Rated insulation voltage U_i	30	V
Rated impulse withstand voltage U_{imp}	1.5	kV
Resilience to vibration	Acc. to EN IEC 60947-5-3	
Switching frequency	0.25	Hz
EMC protection requirements	Acc. to EN IEC 60947-5-3	
Reliability values acc. to EN ISO 13849-1		
Category	4	
Performance Level	PL e	
PFH _D	$3.7 \times 10^{-9} / h$ ²⁾	
Mission time	20	years
Mechanical life - In case of use as door stop, and 1 Joule impact energy	1×10^6 0.1×10^6	
B_{10D} (emergency stop)	0.065×10^6	
Emergency stop		
Operating voltage	5 ... 24	V
Operating current	1 ... 100	mA
Breaking capacity max.	250	mW
Power supply LED	24	V DC
Controls and indicators		
Operating voltage	U_A	V
Operating current	1 ... 10	mA
Breaking capacity max.	250	mW
Power supply LED	24	V DC

1) Values at a switching current of 50 mA without taking into account the cable length.

2) Applying the limit value from EN ISO 13849-1:2008, section 4.5.2 (MTTFd = max. 100 years), the employers' liability insurance association certifies a PFHd of max. 2.47×10^{-8} .

13.1. Typical system times



Important!

The system times given are maximum values for one device.

Ready delay:



In case of AR configuration the following applies: After switching on, the unit carries out a self-test for 10 s. The system is ready for operation only after this time.



In case of AP configuration the following applies: After switching on, the unit carries out a self-test for 0.5 s. The system is ready for operation only after this time.

Switch-on time of safety outputs:



In case of AR configuration the following applies: The max. reaction time from the moment when the guard is locked to the moment when the safety outputs switch on T_{on} is 570 ms.



In case of AP configuration the following applies: The max. reaction time from the moment when the bolt tongue is inserted to the moment when the safety outputs switch on T_{on} is 570 ms.



Simultaneity monitoring, safety inputs FI1A/FI1B: If the safety inputs have different switching states for longer than 150 ms, the safety outputs FO1A/FO1B will be switched off. The device switches to fault state.

Risk time according to EN 60947-5-3:

If the bolt tongue is pulled out of the interlocking module, the safety outputs FO1A and FO1B are deactivated after a maximum of 350 ms.

This value applies to a single switch. For each additional switch in a chain the risk time increases by 5 ms.

Difference time: The safety outputs FO1A and FO1B switch with a slight delay in relation to each other. They both have the ON state at the latest after a difference time of 10 ms.

Time offset: The max. permissible time offset between switch-on of operating voltage U_B and auxiliary voltage U_A is 1 s.

14. System states

14.1. Key to symbols

○	LED not illuminated
☀	LED illuminated
☀ 10 Hz (8 s)	LED flashes for 8 seconds at 10 Hz
☀ 3 x	LED flashes three times
X	Any state

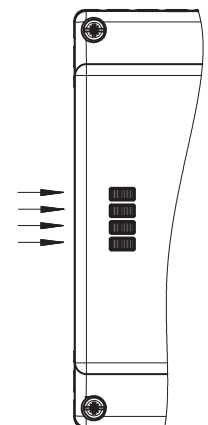
LED

Power gn

State gn

DIA rd

Lock ye



14.2. System status table MGB-AR

Operating mode	Safety outputs F1A and F1B	Door position	Position of the bolt tongue	Safety outputs FO1A and FO1B	Door monitoring output (OD)	Bolt tongue monitoring output (OT)	Diagnostics monitoring output (OI)	Power (green)	LED indicator		State
									STATE (green)	DIA (red)	
Self-test	X	X	X	OFF	OFF	OFF	OFF		5 Hz		Selftest after powerup
	X	open	not inserted	OFF	OFF	OFF	OFF		Long OFF short ON		Normal operation, door open
	X	closed	not inserted	OFF	ON	OFF	OFF		Long ON, short OFF		Normal operation, door closed
Normal operation	OFF	closed	inserted	OFF	ON	ON	OFF		Long ON, short OFF		Normal operation, door closed, bolt tongue inserted safety inputs F1A/F1B OFF
	ON	closed	inserted	ON	ON	ON	OFF			○	Normal operation, door closed, bolt tongue inserted. Safety inputs F1A/F1B are ON. Safety outputs FO1A and FO1B are ON
	OFF	closed	inserted	OFF	ON	ON	OFF		Long ON, short OFF		Operation in an AR chain: Normal operation, door closed and locked. Safety outputs on the previous device OFF
Teach-in standby (only for MGB unicode)	ON	closed	inserted	ON	ON	ON	OFF				Operation as separate device: Normal operation, door closed and locked.
	X	open	not inserted	OFF	OFF	OFF	OFF		3 x		Operation in an AR chain: Normal operation, door closed and locked. Safety outputs on the previous device ON
	X	closed	inserted	OFF	OFF	OFF	OFF		1 Hz		Door open; device is ready for teach-in of another handle module (only 3 min. after Power UP)
Commissioning (only for MGB unicode)	X	X	X	OFF	OFF	OFF	OFF				Teach-in operation, tip: To prevent the interruption of teach-in operations, close door and insert bolt tongue.
	X	X	X	OFF	OFF	OFF	OFF		○		Positive acknowledgment after completion of teach-in operation
	X	X	X	OFF	OFF	OFF	ON		1 x		Error during teach-in/configuration or invalid DIP switch setting
Diagnostics	errorneous	X	X	OFF	OFF	OFF	ON				F1A/F1B input error (e.g. missing test pulses, illogical switching state from previous switch)
	X	X	X	OFF	X	X	OFF			☀	Handle module read error (e.g. error in code)
	X	X	X	OFF	OFF	OFF	ON				Output fault (e.g. short circuit, loss of switching capability) or short circuit at the outputs
	X	X	X	X	OFF	OFF	ON			○	Internal fault (e.g. component faulty, data error)
	X	X	X	OFF	OFF	OFF	ON			○	Signal sequence erroneous (e.g. broken bolt tongue)

After remedying the cause, use the reset function (see chapter 15, Troubleshooting and assistance on page 36) or briefly disconnect the power supply. Please contact the manufacturer if the fault could not be reset after restarting.
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.

14.3. System status table MGB-AP

Operating mode	Door position	Position of the bolt tongue	Safety outputs FO1A and FO1B	Door monitoring output (OD)	Bolt tongue monitoring output (OT)	Diagnostics monitoring output (OI)	LED indicator			State
							Power (green)	State (green)	DIA (red)	
Normal operation	open	not inserted	OFF	OFF	OFF	OFF		Long OFF, short ON		Normal operation, door open
	closed	not inserted	OFF	ON	OFF	OFF		Long ON, short OFF		Normal operation, door closed
	closed	inserted	ON	ON	ON	OFF				Normal operation, door closed, bolt tongue inserted. Safety outputs FO1A and FO1B are ON
	closed	inserted	ON	ON	ON	OFF			○	Normal operation, door closed and locked.
Teach-in standby (only for MGB unicode)	open	not inserted	OFF	OFF	OFF	OFF		3 x		Door open; device is ready for teach-in of another handle module (only 3 min. after Power UP)
	closed	inserted	OFF	OFF	OFF	OFF		1 Hz		Teach-in operation, tip: To prevent the interruption of teach-in operations, close door and insert bolt tongue.
Commissioning (only for MGB unicode)	X	X	OFF	OFF	OFF	OFF	○			Positive acknowledgment after completion of teach-in operation
	X	X	OFF	OFF	OFF	ON		1 x		Error during teach-in/configuration or invalid DIP switch setting
Diagnostics	X	X	OFF	X	OFF	OFF		3 x		Handle module read error (e.g. error in code)
	X	X	OFF	OFF	ON	ON		4 x		Output fault (e.g. short circuit, loss of switching capability) or short circuit at the outputs
	X	X	X	OFF	OFF	ON	○			Internal fault (e.g. component faulty, data error)
	X	X	OFF	OFF	OFF	ON	○			Signal sequence erroneous (e.g. broken bolt tongue)

After remedying the cause, use the reset function (see chapter 15. Troubleshooting and assistance on page 36) or briefly disconnect the power supply. Please contact the manufacturer if the fault could not be reset after restarting.
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. Troubleshooting and assistance

15.1. Fault reset

Proceed as follows:

1. Open the guard.
2. Switch off operating voltage at the interlocking module for min. 3 seconds or connect 24 V to the input RST for min. 3 seconds.
Alternatively, the internal reset (see 7. System overview on page 11) can be pressed for 3 seconds with a pointed object, e.g. ball-point pen.
 - ➔ The green LED (State) flashes quickly (approx. 5 Hz in case of AR configuration). A self-test is performed during this time (approx. 10 s in case of AR configuration). The LED then cyclically flashes three times.
3. Close the guard.
 - ➔ The system is in normal operation again.

15.2. Help on troubleshooting in the Internet

You will find a help file on troubleshooting under "Support" in the service area at www.euchner.com.

15.3. Help on mounting in the Internet

You will find an animation on the mounting process at www.euchner.com.

15.4. Application examples

You will find application examples on connecting the device to various control systems at www.euchner.com.

16. Service

If service support is required, please contact:

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

Service telephone:

+49 711 7597-500

E-mail:

support@euchner.de

Internet:

www.euchner.com

17. Inspection and service



WARNING

Loss of the safety function because of damage to the system.

- › In case of damage, the affected module must be replaced completely. Only accessories or spare parts that can be ordered from www.euchner.com may be replaced.
- › Check the device for proper function at regular intervals and after every fault. For information about possible time intervals, refer to EN ISO 14119:2013, section 8.2.

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

- › Check the switching function (see chapter 12.3. *Electrical function test on page 31*)
- › Check the secure fastening of the devices and the connections
- › Check for soiling

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.

18. Declaration of conformity



EUCHNER

More than safety.

EU-Konformitätserklärung
EU declaration of conformity
Déclaration UE de conformité
Dichiarazione di conformità UE
Declaración UE de conformidad

Original DE
Translation EN
Traduction FR
Traduzione IT
Traducción ES

2123150-08-01/17

Die nachfolgend aufgeführten Produkte sind konform mit den Anforderungen der folgenden Richtlinien (falls zutreffend):
The beneath listed products are in conformity with the requirements of the following directives (if applicable):
Les produits mentionnés ci-dessous sont conformes aux exigences imposées par les directives suivantes (si valable)
I prodotti sotto elencati sono conformi alle direttive sotto riportate (dove applicabili):
Los productos listados a continuación son conforme a los requisitos de las siguientes directivas (si fueran aplicables):

I:	Maschinenrichtlinie Machinery directive Directive Machines Direttiva Macchine Directiva de máquinas	2006/42/EG 2006/42/EC 2006/42/CE 2006/42/CE 2006/42/CE		
II:	Funkanlagen-Richtlinie (RTTE / RED) Radio equipment directive Directive équipement radioélectrique Direttiva apparecchiatura radio Directiva equipo radioeléctrico	1999/5/EC bis 2017-06-12 1999/5/EC until 2017-06-12 1999/5/CE 1999/5/CE 1999/5/CE	2014/53/EU ab 2017-06-13 2014/53/EU from 2017-06-13 2014/53/UE 2014/53/UE 2014/53/UE	
III:	RoHS Richtlinie RoHS directive Directive de RoHS Direttiva RoHS Directiva RoHS	2011/65/EU 2011/65/EU 2011/65/UE 2011/65/UE 2011/65/UE		

Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU und EMV Richtlinie 2014/30/EU werden gemäß Artikel 3.1 der Funkanlagen-Richtlinie eingehalten.
The safety objectives of the Low-voltage directive 2014/35/EU and EMC Directive 2014/30/EU comply with article 3.1 of the Radio equipment directive.
Les objectifs de sécurité de la Directive basse tension 2014/35/UE et Directive de CEM 2014/30/UE sont conformes à l'article 3.1 de la Directive équipement radioélectrique.
Gli obiettivi di sicurezza della Direttiva bassa tensione 2014/35/UE e Direttiva CEM 2014/30/UE sono conformi a quanto riportato nell'articolo 3.1 della Direttiva apparecchiatura radio.
Los objetivos de seguridad de la Directiva de bajo voltaje 2014/35/UE y Directiva CEM 2014/30/UE cumplen con el artículo 3.1 de la Directiva equipo radioeléctrico.

Folgende Normen sind angewandt:
Following standards are used:
Les normes suivantes sont appliquées:
Vengono applicate le seguenti norme:
Se utilizan los siguientes estándares:

a: EN 60947-5-3:2013
b: EN ISO 14119:2013
c: EN ISO 13849-1:2015
d: EN 60947-5-5:1997/A1:2005/A11:2013
e: EN 50364:2010
f: EN 300 330-2 V1.6.1
g: EN 50581:2012 (RoHS)

Bezeichnung der Bauteile Description of components Description des composants Descrizione dei componenti Descripción de componentes	Type Type Type Tipo Tipo	Richtlinie Directives Directive Direttiva Directivas	Normen Standards Normes Norme Estándares	Zertifikats-Nr. No. of certificate Número du certificat Numero del certificato Número del certificado
Sicherheitsschalter Safety Switches Interrupteurs de sécurité Fincorsa di sicurezza Interruptores de seguridad	MGB-L...-AR... MGB-L...-AP... MGB-H... MGB-E... MGB-C...	I, II	a, b, c, e, f, g	UQS 123125
Sicherheitsschalter mit Not-Halt-Einrichtungen Safety Switches with Emergency-Stop facilities Interrupteurs de sécurité avec appareillage arrêt d'urgence Fincorsa di sicurezza con dispositivi di arresto di emergenza Interruptores de seguridad con dispositivos de parada de emergencia	MGB-L...-AR... MGB-L...-AP... MGB-C...			

Genehmigung der umfassenden Qualitätssicherung (UQS) durch die benannte Stelle 0035
Approval of the full quality assurance system by the notified body 0035
Approbation du système d'assurance qualité complet par l'organisme notifié 0035
Approvazione del sistema di garanzia di qualità totale da parte dell'organismo notificato 0035
Aprobación del sistema de aseguramiento de calidad total por parte del organismo 0035 notificado

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