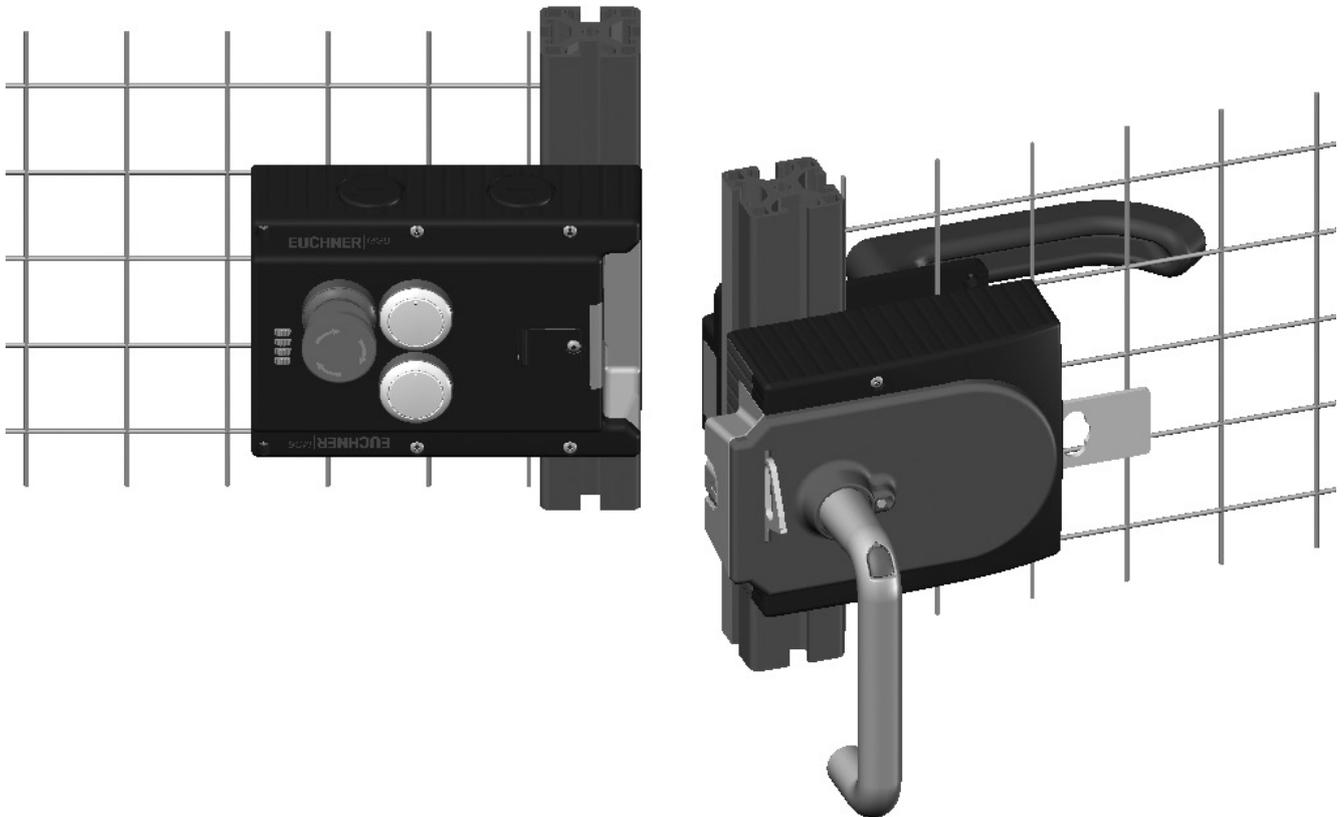


# EUCHNER

## Operating Instructions



Safety Systems  
MGB-LO...-AR.-...  
MGB-LO...-AP.-...

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 any associated data sheet form the complete user information for your device.

Series	Version	System families	Product versions
MGB	LO (without guard locking)	...-AP... ...-AR...	Up to V4.0.X

#### 1.1.1. Notes on other 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

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

### 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 <a href="http://www.euchner.com">www.euchner.com</a>
	Safety precautions <b>Danger</b> of death or severe injuries <b>Warning</b> about possible injuries <b>Caution</b> Slight injuries possible
	<b>Notice</b> about possible device damage <b>Important</b> information
	Useful information

### 1.4. Supplementary documents

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

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	
Operating instructions (2112657)	(this document)	
Declaration of conformity	Declaration of conformity	
Any associated 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](http://www.euchner.com). For this purpose, enter the doc. no. or the order number for the device in the search box.

## 2. Correct use

The 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 6*). More detailed information about the possible settings is available in chapter 11.6. *Changing device configuration (using DIP switches) on page 21*.

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
- › 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 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 29*).
- › 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-H... from V2.0.0
MGB...AR/AP from V3.0.0	●	
<b>Key to symbols</b>	●	Combination possible

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

System family	Symbol	Use
MGB-AP		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.
MGB-AR		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.

## 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 8*).
- › Safety characteristics: category, Performance Level, PFH<sub>D</sub> (see chapter 13. *Technical data on page 29*).

### 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<sub>10D</sub> value (see chapter 13. *Technical data on page 29*)

## 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 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 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 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 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. 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](http://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 F01A and F01B (also see chapters 14.2. *System status table MGB-AR on page 33* and 14.3. *System status table MGB-AP on page 34*):

Configuration	System family	MGB-AR	MGB-AP
<b>Condition</b> No fault in the device Guard closed Bolt tongue inserted in interlocking module <b>In case of series connection:</b> Signal available from the upstream switch on the safety inputs F1A and F1B <b>In case of separate operation:</b> DC 24 V present at the safety inputs F1A and F1B		TRUE	TRUE
		TRUE	TRUE
		TRUE	TRUE
		TRUE	irrelevant
		 F01A and F01B are <b>ON</b>	

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-...

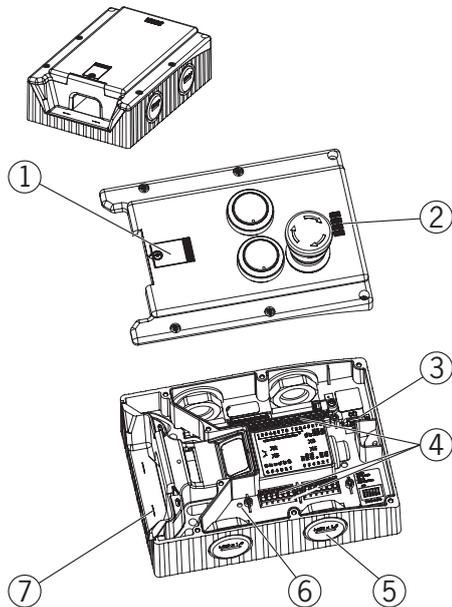


Fig. 1: Interlocking module MGB-L-...

**Key:**

- ① Cover for auxiliary release
- ② LED indicator
- ③ DIP switch
- 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 version, additional controls and indicators may be integrated into the cover and a mounting plate can be included. See associated data sheet.

#### 7.2. Handle module MGB-H-...

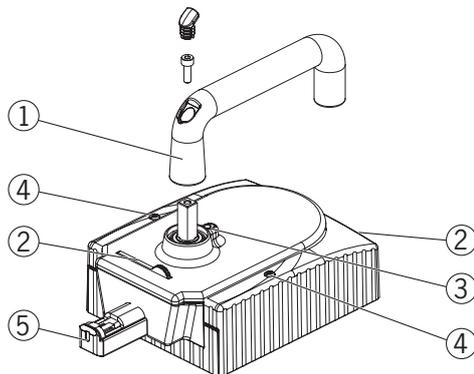


Fig. 2: Handle module MGB-H-...

**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 version, a mounting plate can be included. See associated data sheet.

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

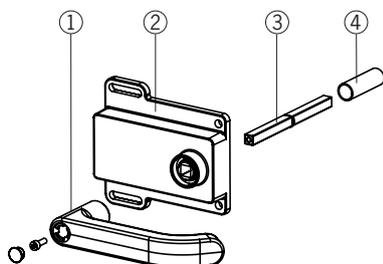


Fig. 3: Escape release MGB-E-...

**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 associated data sheet.

**7.4. Dimension drawing**

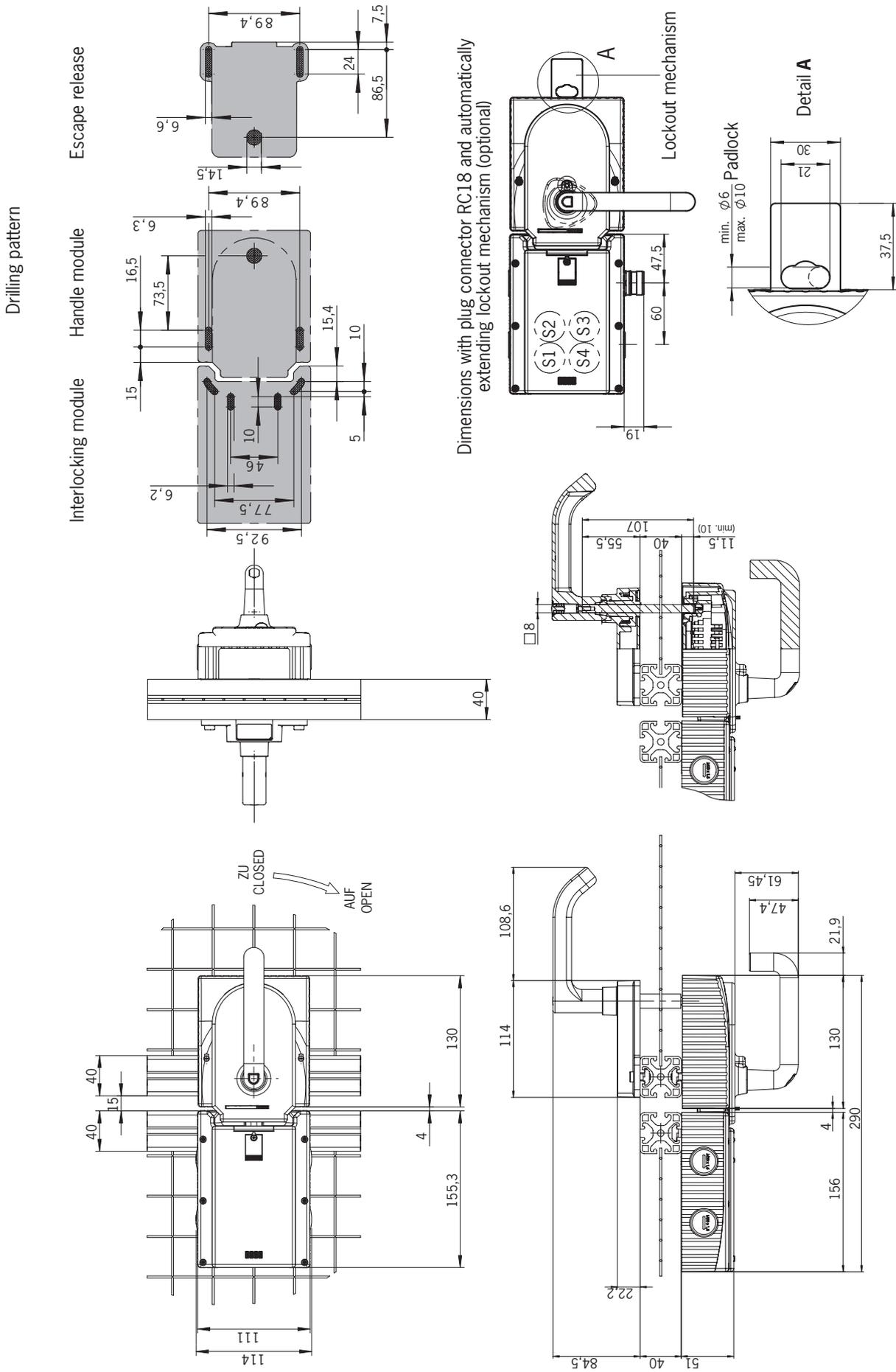


Fig. 4: Dimension drawing MGB fitted, without optional mounting plates

### 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 Fig. 5).

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

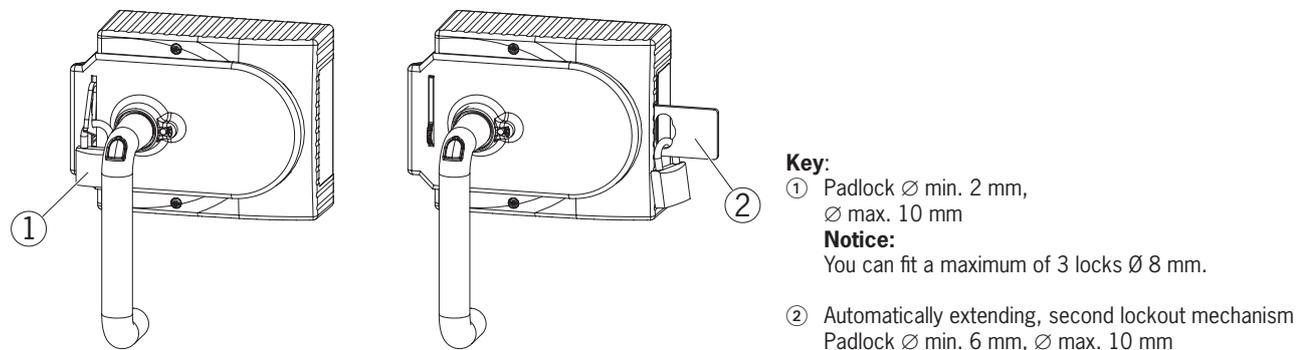


Fig. 5: Lockout mechanism secured with padlock

### 7.6. Escape release (optional)

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



#### Important!

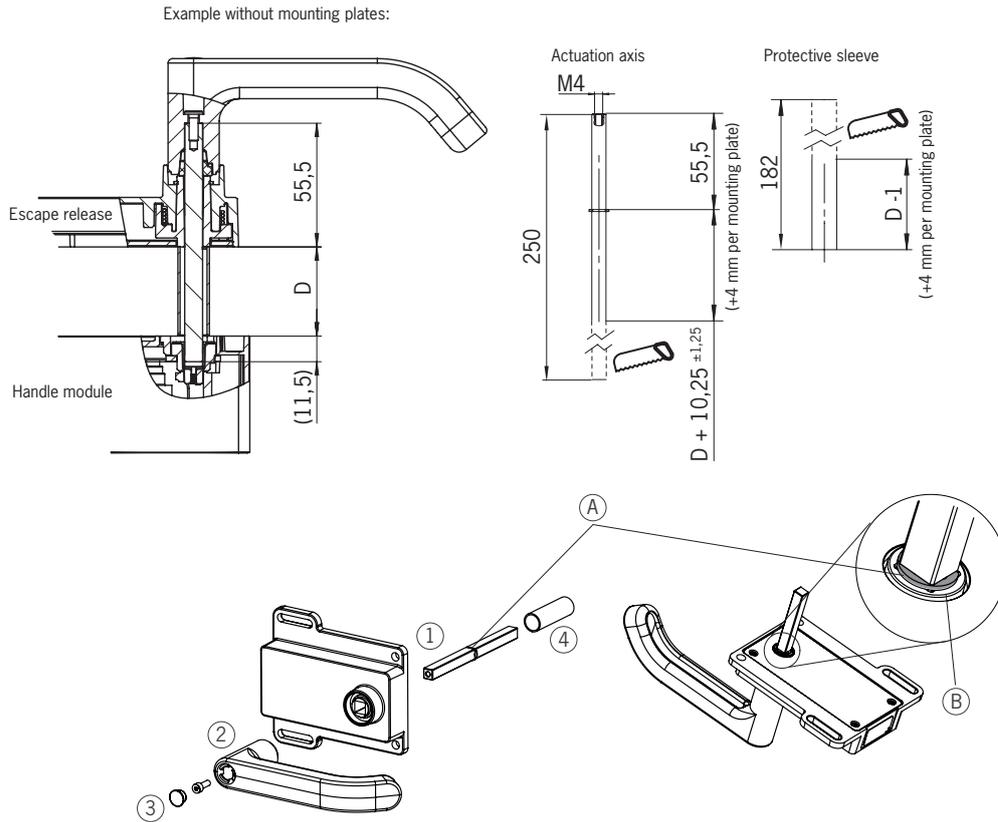
- It must be possible to actuate the escape release manually from inside the protected area without tools.
- It must not be possible to reach the escape release from the outside.
- The actuator must not be under tensile stress during manual release.
- The escape release meets the requirements of Category B according to EN ISO 13849-1:2008.

- Fit escape release such that operation, inspection and service 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.
- Adjust escape release axis at right angles to the handle module. See Fig. 4 and Fig. 7.

#### 7.6.1. Preparing escape release

(also see Fig. 6: Preparing escape release on page 12)

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) <b>and</b> 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) <b>and</b> extended actuation axis (order no. 106761)	Use long 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. 6: Preparing escape release

### 8. Mounting



#### WARNING

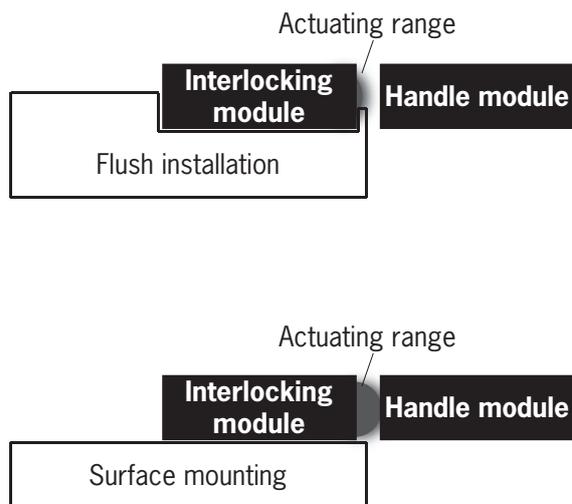
Mounting must be performed only by authorized personnel.

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!

› In case of flush installation, the operating distances change as a function of the installation depth and the guard material.



#### Tip!

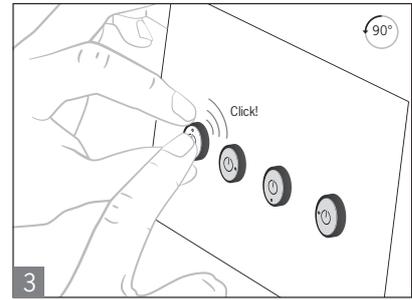
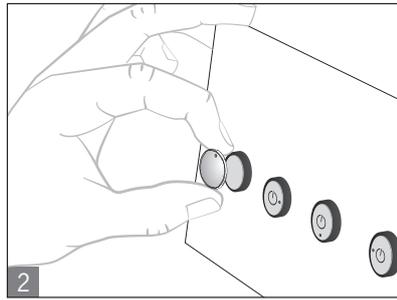
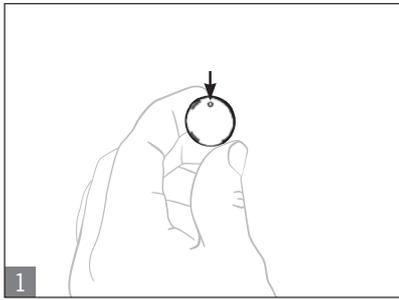
- › You will find an animation on the mounting process at [www.euchner.com](http://www.euchner.com).
- › The color and labeling of pushbuttons and indicators can be modified.

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

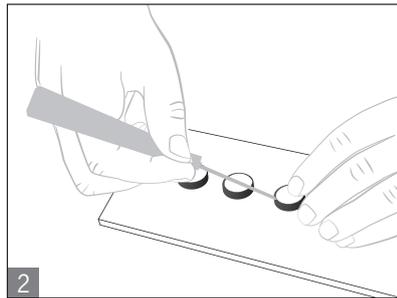
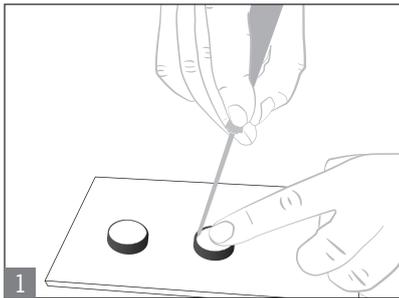
Install system so that inspection and service are possible.

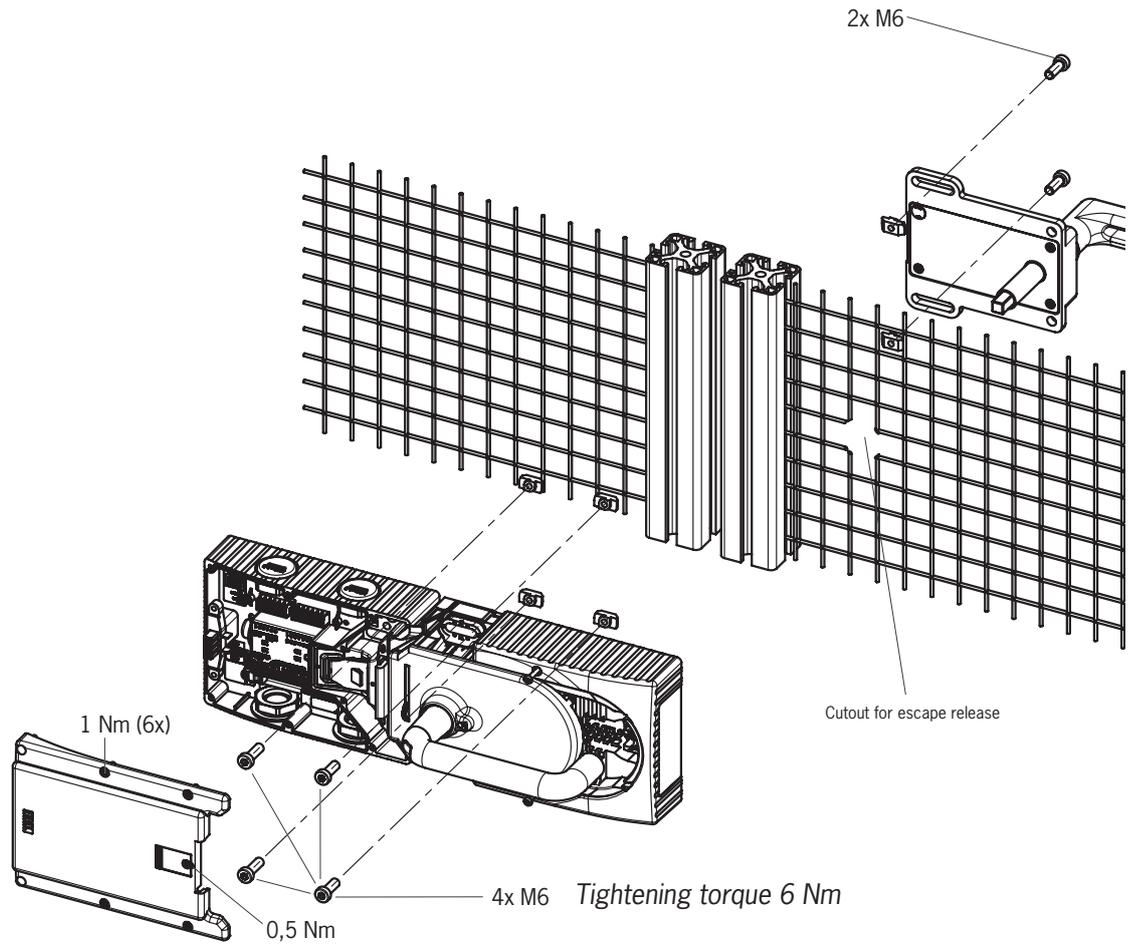
### 8.1. Mounting lens

#### Mounting



#### Removal





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

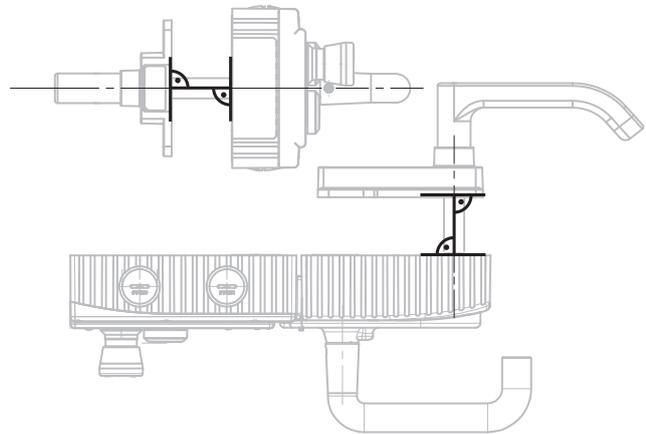


Fig. 7: Installation example for door hinged on the right (general view)

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



**Important!**

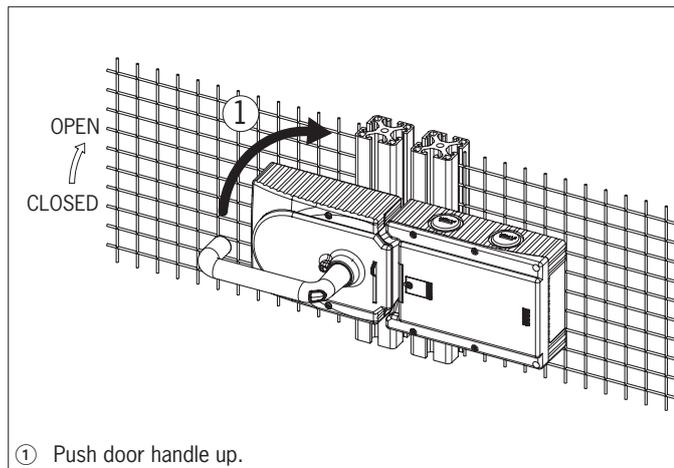
It is possible to make this change only when the bolt tongue is not extended and an escape release is not yet mounted.

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:

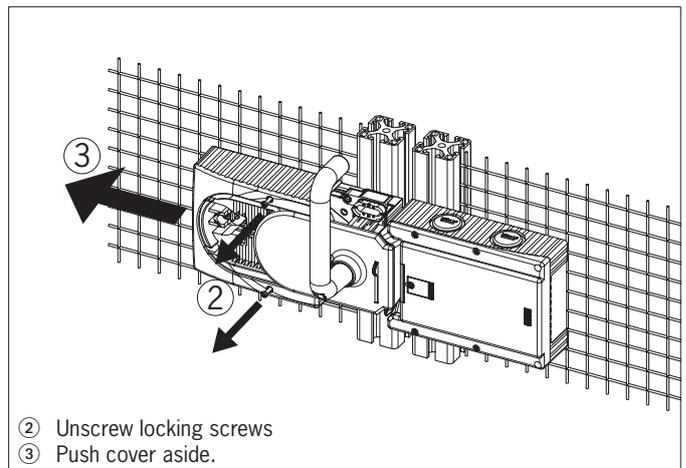
- › The guard opens by pressing down the door handle.
- › The system is mounted the other way around for doors hinged on the left. In other words, the guard opens by pressing up the door handle (see Fig. 8). For this reason the actuating direction of the door handle must be changed (see Fig. 8 to Fig.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

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



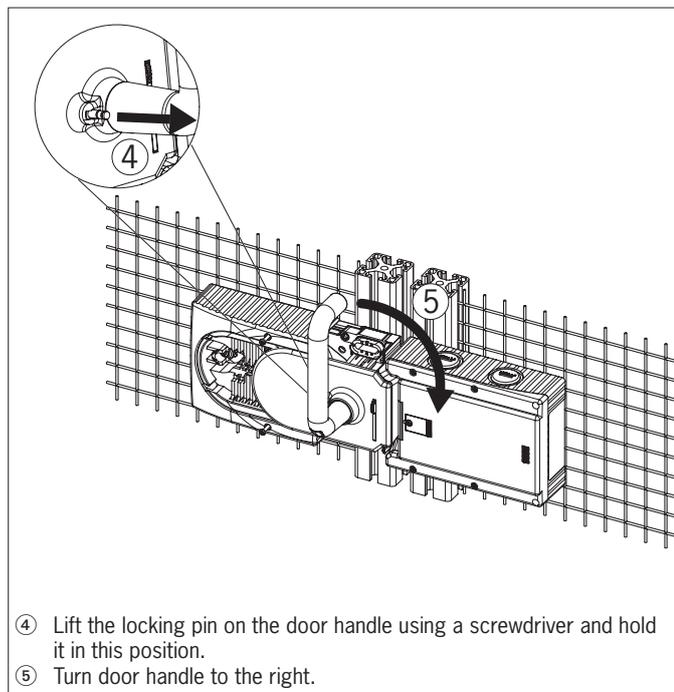
① Push door handle up.

Fig. 8: Changing actuating direction, step ①



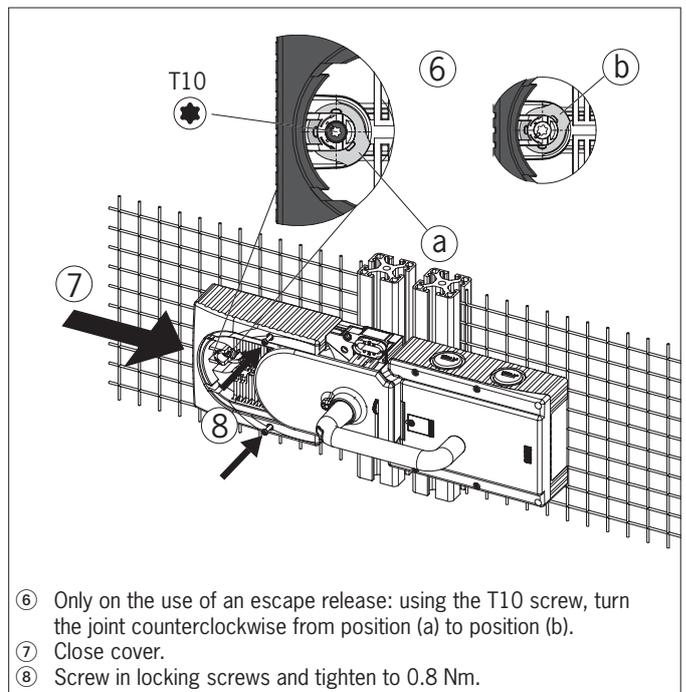
② Unscrew locking screws  
③ Push cover aside.

Fig. 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.

Fig. 10: Changing actuating direction, steps ④ and ⑤



⑥ Only on the use of an escape release: using the T10 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.

Fig. 11: Changing actuating direction, steps ⑥ to ⑧

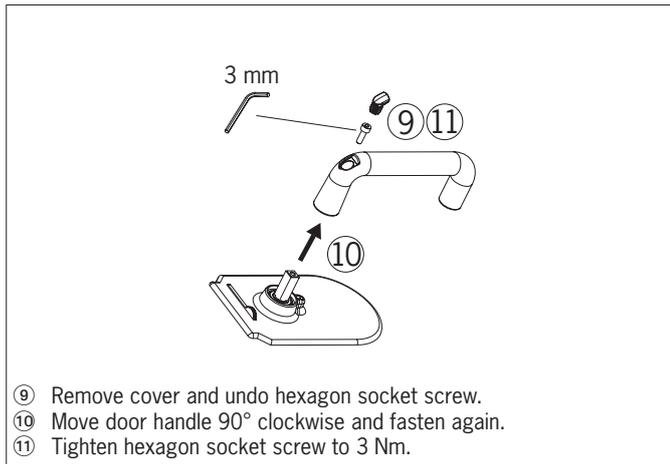


Fig. 12: Changing actuating direction, steps ⑨ to ⑪

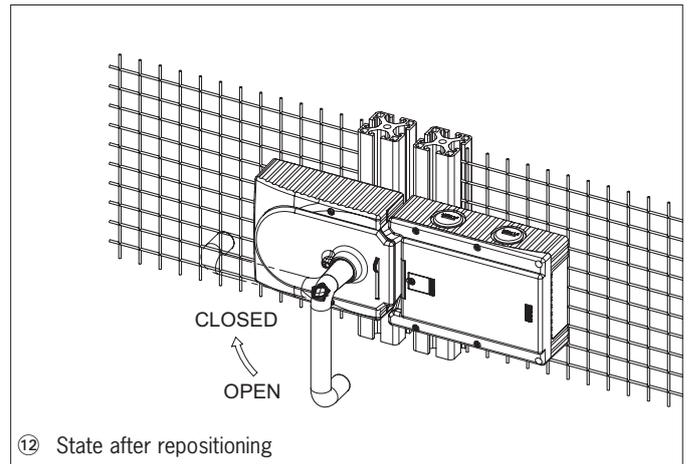


Fig. 13: Changing actuating direction, final state

## 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

In the event of a fault, 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 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.

- › The inputs on a connected evaluation unit 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 to EN IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent insulation 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 20*. 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!

- › This device is intended to be used with a Class 2 power source in accordance with UL1310 <sup>1)</sup>. 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 (protection against electric shock and fire).

### 11.2. Safety in case of faults

- › The operating voltage  $U_B$  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 the current required for the outputs. The following rules apply:

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

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

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

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

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



#### Max. current consumption of a switch chain $\Sigma I_{max}$

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

$$n = \text{Number of connected devices}$$

#### Assignment of the currents to the fuse circuits

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

## 11.4. Requirements for connecting cables



### CAUTION

Risk of damage to equipment or malfunctions as a result of incorrect connecting cables.

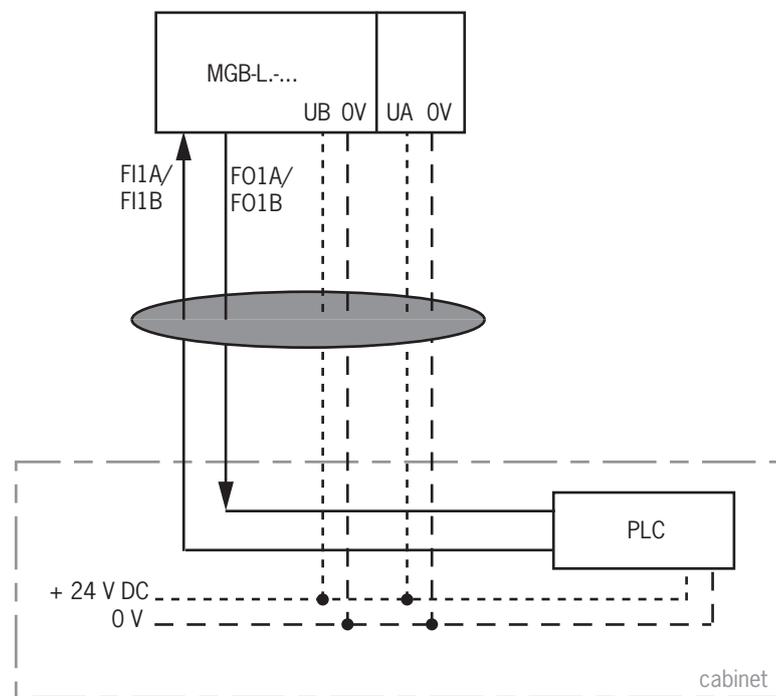
› On the use of other connection components, the requirements in the following table apply. EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.

Observe the following requirements with respect to the connecting cables:

Parameter	Value	Unit
Conductor cross-section, min.	0.13	mm <sup>2</sup>
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 connecting cables in a common cable harness.



**Important:** lay cables in a common harness

Fig. 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](http://www.euchner.com).

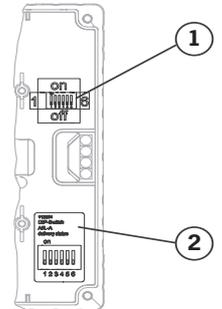
#### DIP switches

The device 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 switch
2	Sticker with factory setting

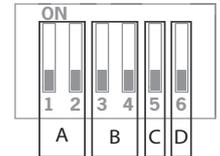


#### Function of the switches



#### Important!

DIP switches 3, 4 and 6 must be set to the *off* position.



Detail	Switch	Function
A	1+2	on: device is operated as an AP system
		off: device is operated as an 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)



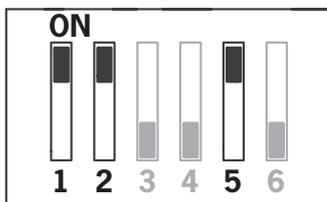
#### CAUTION

Malfunction due to incorrect configuration or incorrect connection.

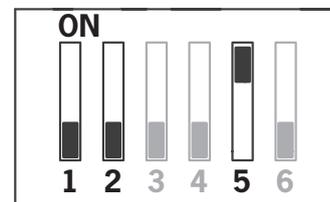
- › Note that the terminal assignment also changes on changing the configuration (see chapter 11.8. *Terminal assignment and contact description on page 23*).

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

Observe the following guidelines 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 power supply 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 29.*
- › The inputs on a connected evaluation unit 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 F11A and F11B 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 F11A and F11B. 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.



### NOTICE

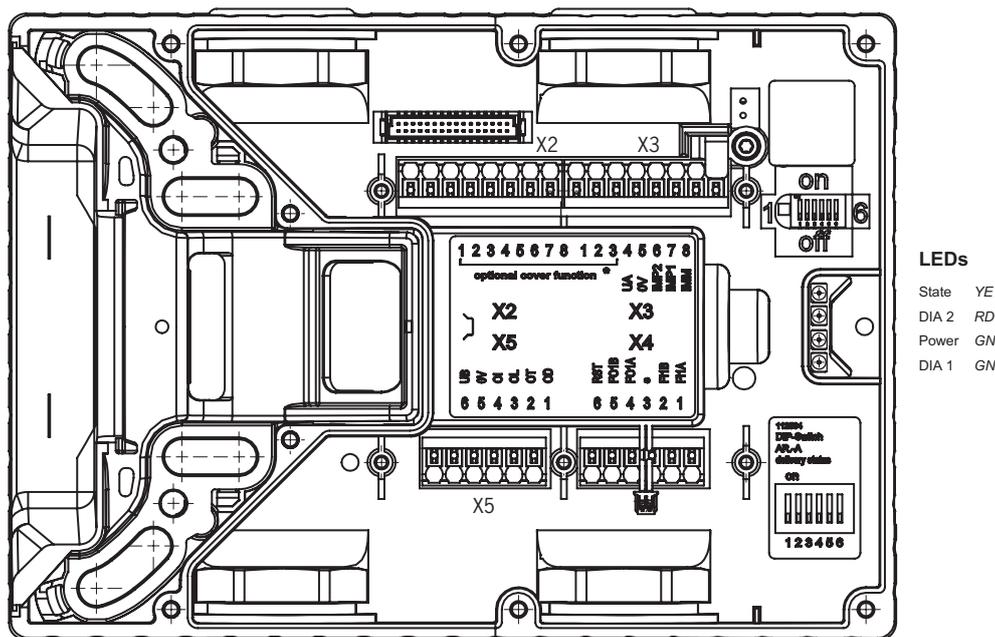
Due to the fact that short circuit monitoring of the safety outputs FO1A/FO1B is performed by the device itself, the Performance Level in accordance with EN 13849 is not reduced if the control system pulsing is switched off.



### Tip!

A detailed example of connecting and setting the parameters of the control system is available for many devices at [www.euchner.com](http://www.euchner.com), in the area *Service/Downloads/Applications*. The features of the respective device are dealt with there in greater detail.

### 11.8. Terminal assignment and contact description



**LEDs**

State YE  
DIA 2 RD  
Power GN  
DIA 1 GN

Fig. 15: Connections and display LEDs

Terminal	Designation	Description
X3.1 to X3.3	-	See associated data sheet
X3.4	UA	Power supply for monitoring outputs and cover assembly, DC 24 V, must be permanently present.
X3.5	0 V	Ground, DC 0 V (connected internally to X5.5).
X3.6	-	Not used
X3.7	-	Not used
X3.8	-	Not used
X4.1	F11A	<b>With AR configuration:</b> 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. <b>With AP configuration:</b> input is not evaluated.
X4.2	F11B	<b>With AR configuration:</b> 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. <b>With AP configuration:</b> input is not evaluated.
X4.3	-	See associated data sheet
X4.4	F01A	Safety output channel A, ON when door is closed and bolt tongue is inserted.
X4.5	F01B	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 into the interlocking module.
X5.3	-	Not used
X5.4	OI	Diagnostic monitoring output, ON when the device is in the fault state.
X5.5	0 V	Ground, DC 0 V (connected internally to X3.5).
X5.6	UB	Power supply, DC 24 V
X2.1 to X2.8	-	See associated data sheet
X1	-	Reserved for connection of the cover circuit board (only for populated covers)

Table 2: Terminal assignment and contact description

### 11.9. Operation as separate device

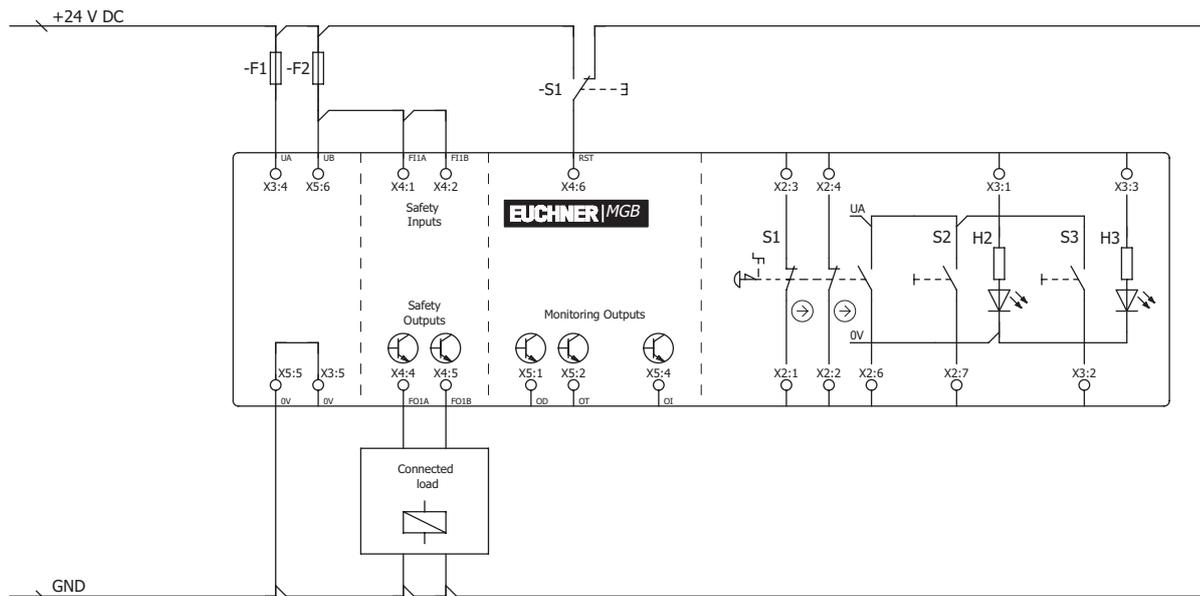


Fig. 16: Connection example for separate operation

The switches can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. The supply voltage to the switches is interrupted during this time. The RST input must be connected to 0 V if it is not used.

### 11.10. Operation in an AR switch chain

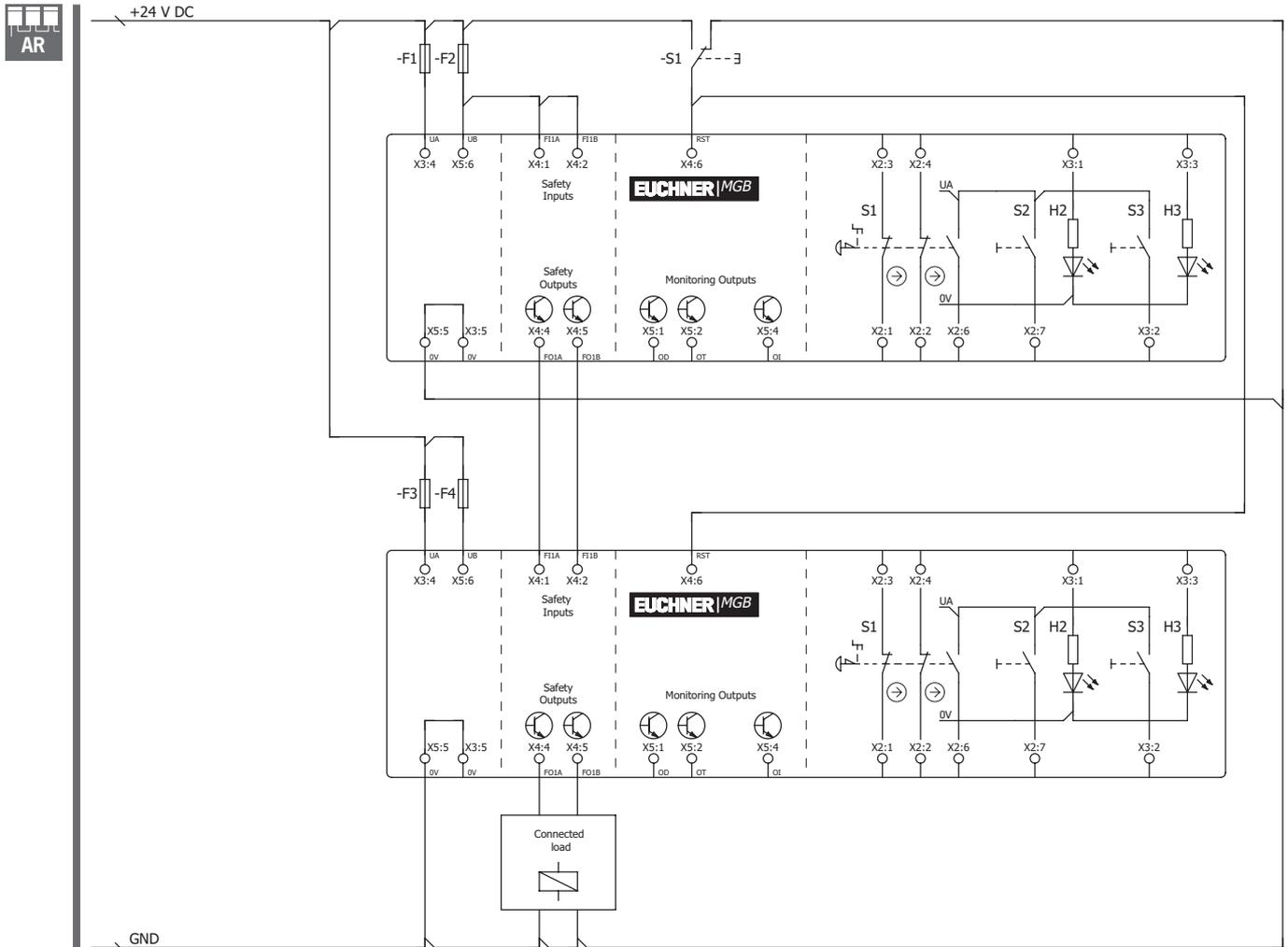


Fig. 17: Connection examples for operation in a CES-AR switch chain

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

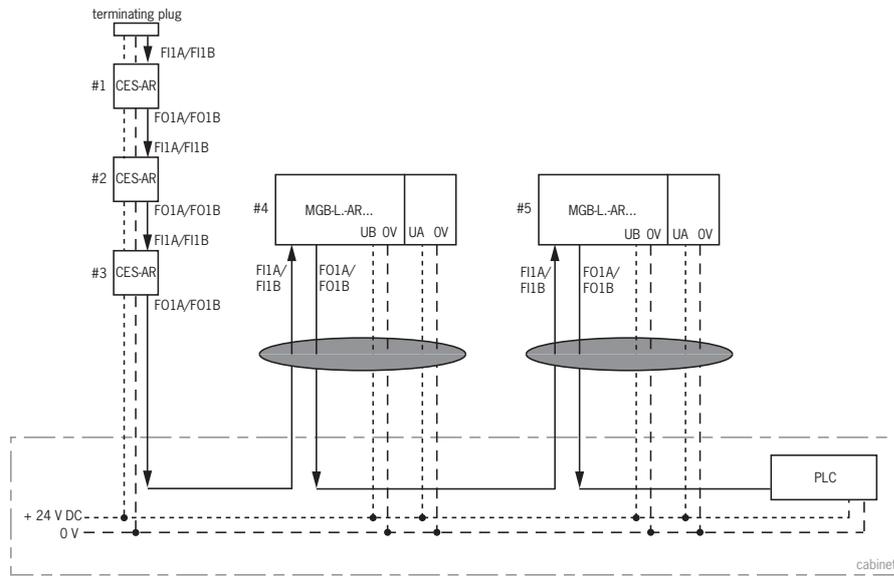


### 11.11.1. System times

The interlocking module has longer reaction times than a CES-AR switch (see chapters 13. *Technical data on page 29* and 13.2. *Typical system times on page 32*).

### 11.11.2. Wiring an AR switch chain

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



**Important:** lay cables in a common harness

Fig. 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. Setup

### 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 device 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-in.
- The interlocking module can be operated only with the last handle module taught-in.
- 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 actuating range for less than 60 s, the handle module is not taught-in.



#### Tip!

A teach-in adapter (order no. 122369) is available for easier teach-in of AR devices already mounted in a row or for device replacement. 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 safety device. Check for correct alignment and distance using the marking on the interlocking module and re-adjust if necessary.
3. Insert bolt tongue into 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, 24 V 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 into 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. With AR configuration: the green State LED flashes at 5 Hz for 10 s. The State LED then flashes at regular intervals.
  2. Close all guards and insert the bolt tongue into the interlocking module. As soon as the bolt tongue is inserted into 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 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. <i>Dimension drawing on page 10</i>	
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/selector switches	IP65	
Cover populated with key-operated rotary switch	IP54	
Cover populated with key-operated rotary switch FS22	IP42	
Safety class	III	
Degree of contamination	3	
Installation orientation	Any	
Connection	4 cable entries M20x1.5 or plug connector	
Conductor cross-section (rigid/flexible) - With cable end sleeve acc. to DIN 46228/1 - With cable end sleeve with collar acc. to DIN 46228/1	0.13 ... 1.5 (AWG 24 ... AWG 16) 0.25 ... 1.5 0.25 ... 0.75	mm <sup>2</sup>
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. <i>Fuse protection for power supply on page 19</i>	
<b>Safety outputs FO1A/FO1B</b>	<b>Semiconductor outputs, p-switching, short circuit-proof</b>	
Test pulses	AR < 1,000/AP < 300	µs
Test pulse interval	Min. 100	ms
Output voltage $U_{FO1A} / U_{FO1B}$ <sup>1)</sup>		V DC
HIGH $U_{FO1A} / U_{FO1B}$	$U_B - 2V \dots U_B$	
LOW $U_{FO1A} / U_{FO1B}$	0 ... 1	
Switching current per safety output	1 ... 200	mA
Utilization category acc. to EN IEC 60947-5-2	DC-13 24 V 200 mA Caution: Outputs must be protected by a free-wheeling diode in the case of inductive loads.	
Monitoring outputs - Output voltage <sup>1)</sup> - 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	

Characteristics acc. to EN ISO 13849-1 <sup>2)</sup>		
Category	4	
Performance Level	PL e	
PFH <sub>D</sub>	$3.7 \times 10^{-9} / h$ <sup>3)</sup>	
Mission time	20	years
Mechanical life	$1 \times 10^6$	
- In case of use as door stop, and 1 Joule impact energy	$0.1 \times 10^6$	
B <sub>10D</sub> (emergency stop)	$0.065 \times 10^6$	
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	UA	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 lengths.

2) Refer to the declaration of conformity for the issue date.

3) 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.  $2.47 \times 10^{-8}$ .

## 13.1. Radio frequency approvals (for devices with FCC ID and IC on the type label)

**Product description: Safety Switch**

**FCC ID: 2AJ58-09**

**IC: 22052-09**



### 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.

This device complies with the Nerve Stimulation Exposure Limits (ISED SPR-002) for direct touch operations.

Cet appareil est conforme aux limites d'exposition relatives à la stimulation des nerfs (ISED CNR-102) pour les opérations tactiles directes.

### Supplier's Declaration of Conformity

#### 47 CFR § 2.1077 Compliance Information

#### Unique Identifier:

MGB-LO-AR Series  
MGB-L1-AR Series  
MGB-L2-AR Series  
MGB-LO-AP Series  
MGB-L1-AP Series  
MGB-L2-AP Series

#### Responsible Party – U.S. Contact Information

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## 13.2. 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 device 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 device carries out a self-test for 0.5 s. The system is ready for operation only after this time.

### Turn-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 of 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 enters the 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 will be switched off after a maximum of 350 ms.

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

**Difference time:** The safety outputs FO1A and FO1B switch with a slight time offset. 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.

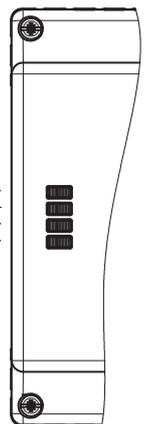
## 14. System states

### 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 inputs F11A and F11B	Door position	Door monitoring output (OD)	Safety outputs F01A and F01B	Diagnostic monitoring output (OI)	LED indicator			State
						Power (green)	STATE (green)	DIA (red)	
<b>Self-test</b>	X	X	OFF	OFF	OFF	5 Hz			Self-test after power-up
	X	open	OFF	OFF	OFF	long OFF, short ON			Normal operation, door open
	X	closed	ON	OFF	OFF	long ON, short OFF			Normal operation, door closed
<b>Normal operation</b>	OFF	closed	ON	OFF	OFF	long ON, short OFF			Normal operation, door closed, bolt tongue inserted, safety inputs F11A/F11B OFF
	ON	closed	ON	ON	OFF		○		Normal operation, door closed, bolt tongue inserted. Safety inputs F11A/F11B are ON. Safety outputs F01A and F01B are ON
	OFF	closed	ON	OFF	OFF	long ON, short OFF			<b>Operation in an AR chain:</b> normal operation, door closed and locked. Safety outputs on the previous device OFF
<b>Teach-in standby</b> (only for MGB unicode)	ON	closed	ON	ON	OFF				<b>Operation as separate device:</b> normal operation, door closed and locked.
	X	open	OFF	OFF	OFF	3 x			<b>Operation in an AR chain:</b> normal operation, door closed and locked. Safety outputs on the previous device ON
	X	closed	OFF	OFF	OFF	1 Hz			Door open; device is ready for teach-in of another handle module (only 3 min. after Power UP)
<b>Setup</b> (only for MGB unicode)	X	closed	OFF	OFF	OFF				Tip for teach-in operation: to prevent the interruption of teach-in operations, close the door and insert the bolt tongue.
	X	X	OFF	OFF	OFF	○			Positive acknowledgment after completion of teach-in operation
	X	X	OFF	ON	ON	1 x			Error during teach-in/configuration or invalid DIP switch setting
<b>Diagnostics</b>	error- ne- ous	X	OFF	OFF	ON	2 x			F11A/F11B input error (e.g. missing test pulses, illogical switching state from previous switch)
	X	X	OFF	OFF	OFF	3 x		☀	Handle module read error (e.g. error in code)
	X	X	OFF	OFF	ON	4 x			Output fault (e.g. short circuit, loss of switching capability) or short circuit at the outputs
	X	X	OFF	OFF	ON	○			Internal fault (e.g. component fault, data error)
	X	X	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 35) 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	Door monitoring output (OD)	Safety outputs F01A and F01B	Position of the bolt tongue	Diagnostic monitoring output (OI)	LED indicator			State
						Power (green)	State (green)	DIA (red)	
<b>Normal operation</b>	open	OFF	OFF	not inserted	OFF	●	long OFF, short ON	○	Normal operation, door open
	closed	ON	OFF	not inserted	OFF	●	long ON, short OFF	○	Normal operation, door closed
	closed	ON	ON	inserted	OFF	●		○	Normal operation, door closed, bolt tongue inserted. Safety outputs F01A and F01B are ON
	closed	ON	ON	inserted	OFF	●		○	Normal operation, door closed and locked.
<b>Teach-in standby</b> (only for MGB unicode)	open	OFF	OFF	not inserted	OFF	●	3 x		Door open, device is ready for teach-in of another handle module (only 3 min. after Power UP)
	closed	OFF	OFF	inserted	OFF	●	1 Hz		Tip for teach-in operation: to prevent the interruption of teach-in operations, close the door and insert the bolt tongue.
<b>Setup</b> (only for MGB unicode)	X	OFF	OFF	X	OFF	○			Positive acknowledgment after completion of teach-in operation
	X	OFF	OFF	X	ON	●	1 x		Error during teach-in/configuration or invalid DIP switch setting
<b>Diagnostics</b>	X	X	OFF	X	OFF	●	3 x		Handle module read error (e.g. error in code)
	X	OFF	OFF	X	ON	●	4 x		Output fault (e.g. short circuit, loss of switching capability) or short circuit at the outputs
	X	OFF	OFF	X	ON	○			Internal fault (e.g. component fault, data error)
	X	OFF	OFF	X	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 35) 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. Resetting errors

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 9) 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. Troubleshooting help on the Internet

You will find a help file on troubleshooting under *Downloads* in the service area at [www.euchner.com](http://www.euchner.com).

### 15.3. Mounting help on the Internet

You will find an animation on the mounting process at [www.euchner.com](http://www.euchner.com).

### 15.4. Application examples

You will find application examples on connecting the device to various control systems at [www.euchner.com](http://www.euchner.com).

## 16. 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](mailto:support@euchner.de)

**Internet:**

[www.euchner.com](http://www.euchner.com)

## 17. 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.
- › 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 28*)
- › 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.

## 18. Declaration of conformity

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



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