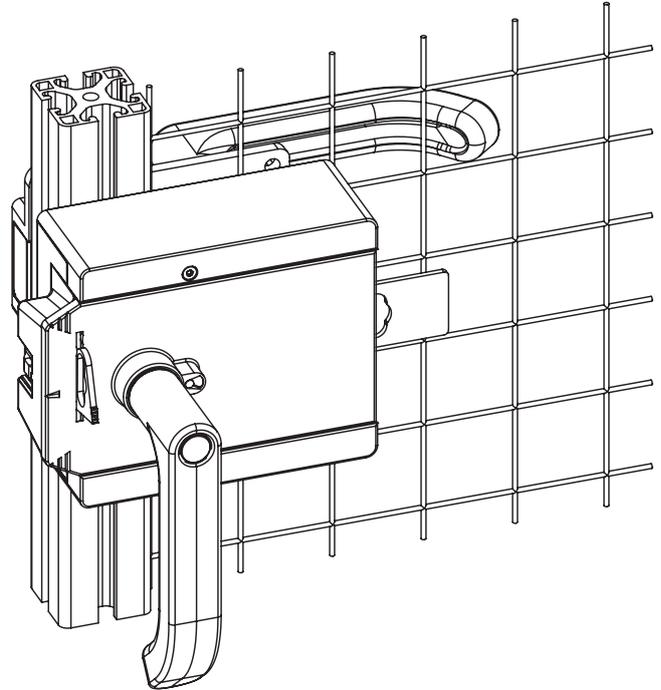
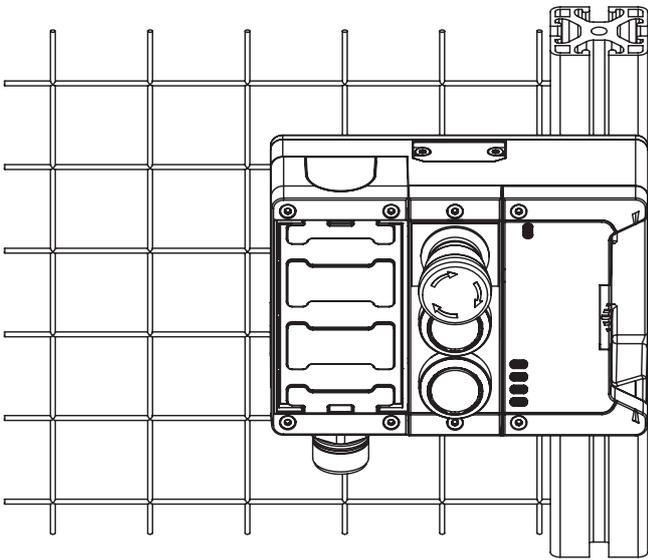


EUCHNER

Operating Instructions



Safety Systems
MGB2-I-BP-.../MGB2-I-BR-...

EN

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1. About this document

1.1. Scope

These operating instructions are valid for all interlocking modules MGB2-I-BP-.../MGB2-I-BR-.... These operating instructions, the document *Safety information* any associated data sheet form the complete user information for your device.

Series	Version	System families	Product versions
MGB2	I (without guard locking)	...-BP... ...-BR...	V1.1.X

1.1.1. Notes on older product versions

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

1.2. Target group

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

1.3. Key to symbols

Symbol/depiction	Meaning
	This section applies to operation as MGB2-BP
	This section applies to operation as MGB2-BR
	In this section, attention must be paid to the DIP switch settings
	Printed document
	Document is available for download at www.euchner.com
 DANGER WARNING CAUTION	Safety precautions Danger of death or severe injuries Warning about possible injuries Caution Slight injuries possible
 NOTICE Important!	Notice about possible device damage Important information
Tip	Useful information

1.4. Supplementary documents

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

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	
Operating instructions (2530674)	(this document)	
Declaration of conformity	Declaration of conformity	
Any associated data sheets	Item-specific information about deviations or additions	



Important!

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

2. Correct use

The following applies to MGB2-I...:

The system comprises at least one interlocking module MGB2-I... and one handle module MGB2-H...

The safety system MGB2-I... 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.

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
- EN IEC 62061

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

- EN ISO 13849-1
- EN ISO 14119
- EN IEC 60204-1

The safety system MGB2 may be combined only with the intended modules in the MGB2 system family.

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



Interlocking modules with the configuration MGB2-BR can be integrated into a BR switch chain.

Connection of several devices in a BR switch chain is permitted only using devices intended for series connection in a BR 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 15. *Technical data on page 41*).
- If a data sheet is included with the product, the information on the data sheet applies.

Table 1: Possible combinations for MGB2 components

Evaluation unit	Handle module	Submodules	Submodules
	MGB2-H... from V1.0.0	MSM-P-... MSM-N-... MSM-K-...	MSM-R-...
MGB2...BR/BP V1.1.X	●	●	-
Key to symbols	●	Combination possible	
	-	Combination not possible	

2.1. Main differences, MGB2-BP and MGB2-BR

System family	Symbol	Use
MGB2-BP		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.
MGB2-BR		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, PFHD (see chapter 15. *Technical data on page 41*).

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 15. *Technical data on page 41*)

4. Exclusion of liability and warranty

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

5. General safety precautions

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

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

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

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 MGB2-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. 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

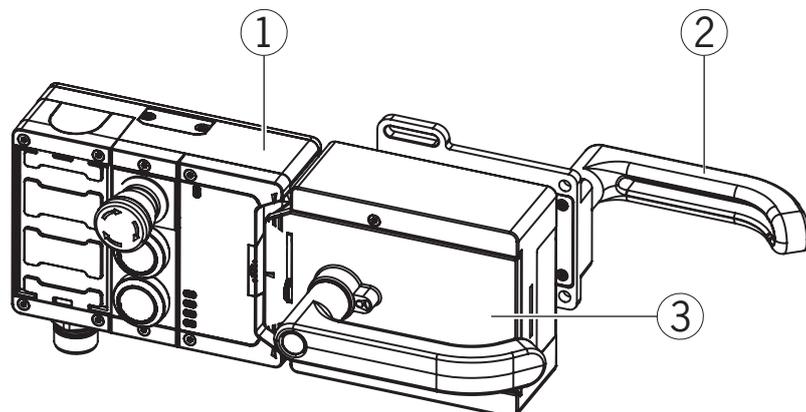
Together with a handle module, the interlocking module makes it possible to interlock movable guards. The combination also serves as a mechanical door stop at the same time.

The following switch-on condition applies to the safety outputs FO1A and FO1B (also see chapters 14.2. System status table MGB2-BR on page 36 and 14.3. System status table MGB2-BP on page 38):

- Guard closed
- Bolt tongue inserted into the interlocking module

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

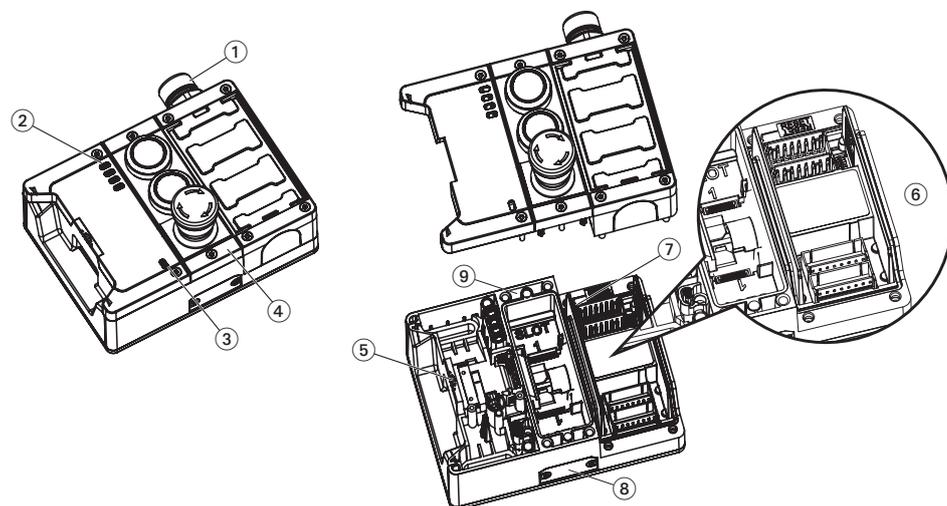


Key:

- ① Interlocking module (MGB2-I...)
- ② Escape release, optional (MGB-E-...)
- ③ Handle module (MGB2-H...)

Fig. 1: Overall system

7.1. Interlocking module MGB2-I...



Key:

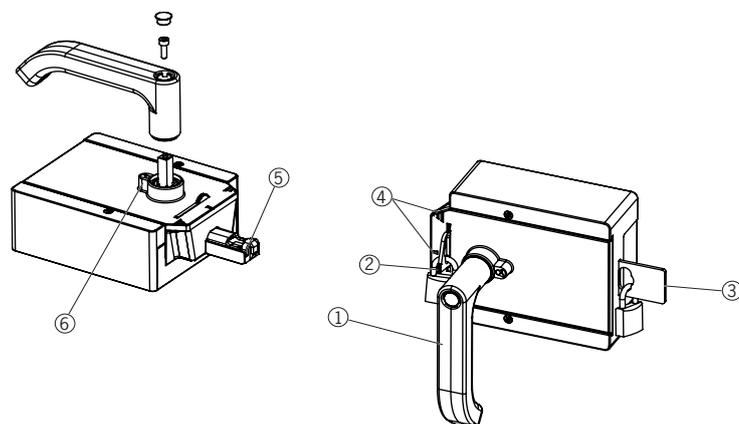
- ① Depending on version: cable entry M20x1.5 or plug connector X7
- ② Module function LED indicators
- ③ LED indicator for submodule in SLOT 1
- ④ Submodule in SLOT 1 (configuration example)
- ⑤ Auxiliary marking for correct alignment in relation to the handle module
- ⑥ Terminals (X1 - X4)
- ⑦ Internal reset
- ⑧ Cover, terminals X5 and X6

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.

Fig. 2: Interlocking module MGB2-I...

7.2. Handle module MGB2-H...

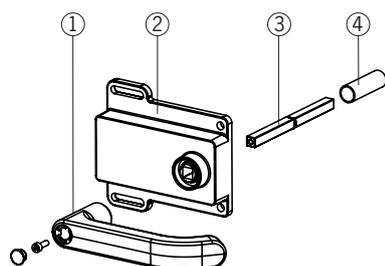


Key:

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

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

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



Key:

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

Notice:

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

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

7.4. Dimension drawing

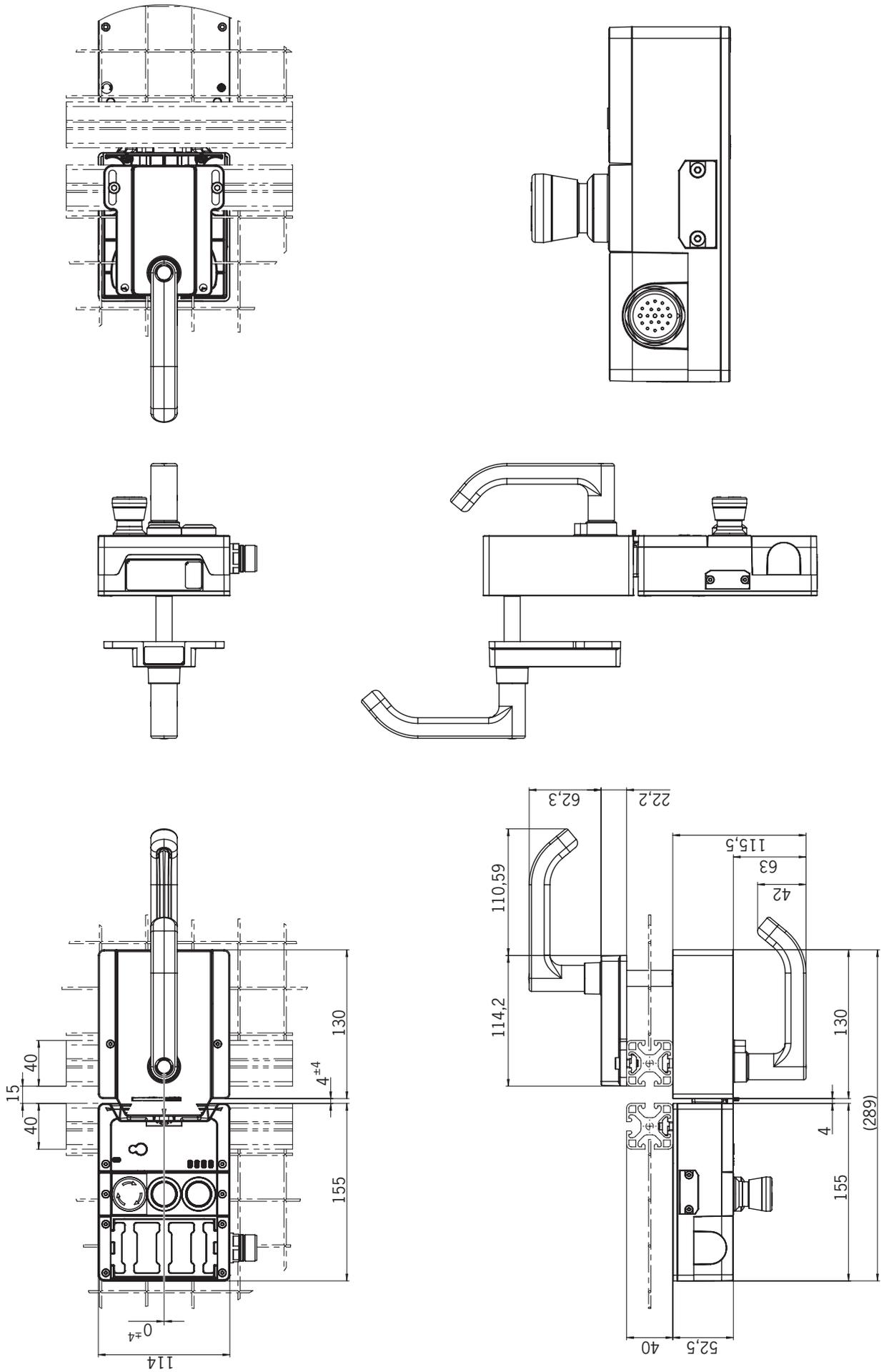


Fig. 5: Dimension drawing for MGB2 mounted, without optional mounting plates

7.4.1. Drilling pattern, overall system

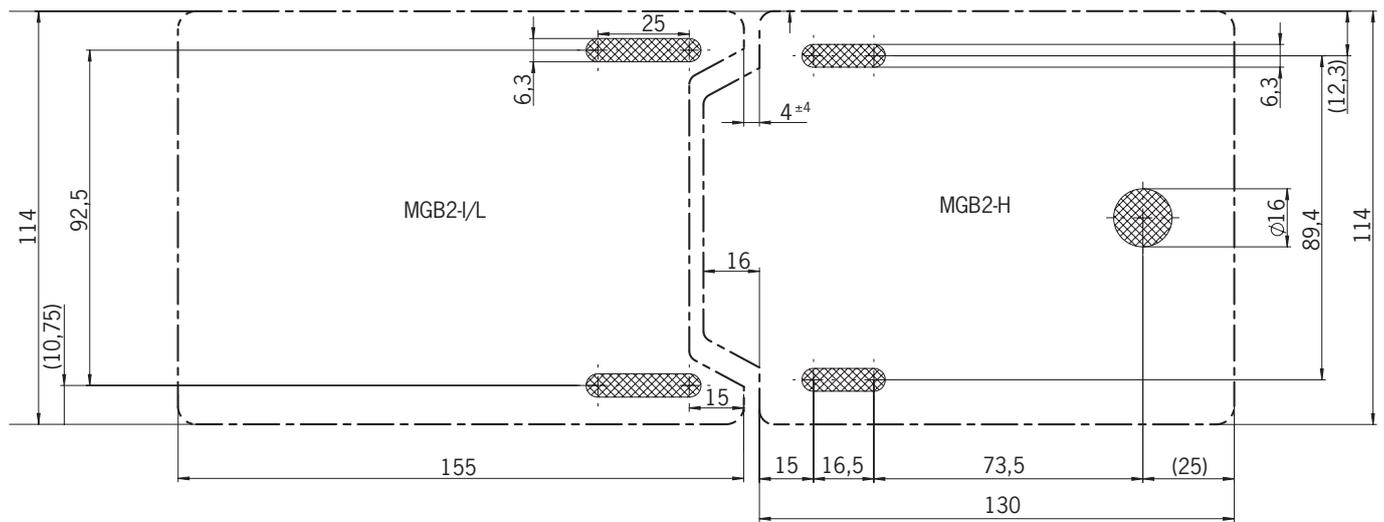
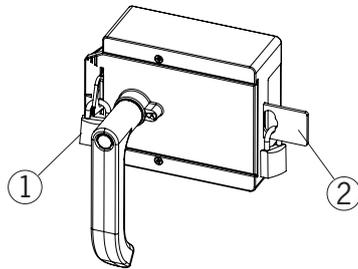


Fig. 6: Drilling pattern, overall system

7.5. Lockout mechanism

If the lockout mechanism is pivoted out, the bolt tongue cannot be extended. The lockout mechanism can be secured with padlocks (see Fig. 7). This is intended to prevent people from being locked in unintentionally. The lockout mechanism does not fulfill any safety function.

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



Key:

- ① Fold-out lockout mechanism
Padlock \varnothing min. 2 mm, \varnothing max. 10 mm
- ② Automatically extending lockout mechanism (optional)
Padlock \varnothing min. 6 mm, \varnothing max. 10 mm

Notice:

You can fit up to 3 locks \varnothing 8 mm per lockout mechanism.

Fig. 7: Lockout mechanism secured with padlock

7.6. Escape release (optional)

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



When release monitoring is active, the system enters into a latching fault when the escape release is actuated. See *System status table, signal sequence incorrect* status (DIA red, Lock flashes 1 time).
The system might not enter into a latching fault if the escape release is actuated very slowly.



Important!

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

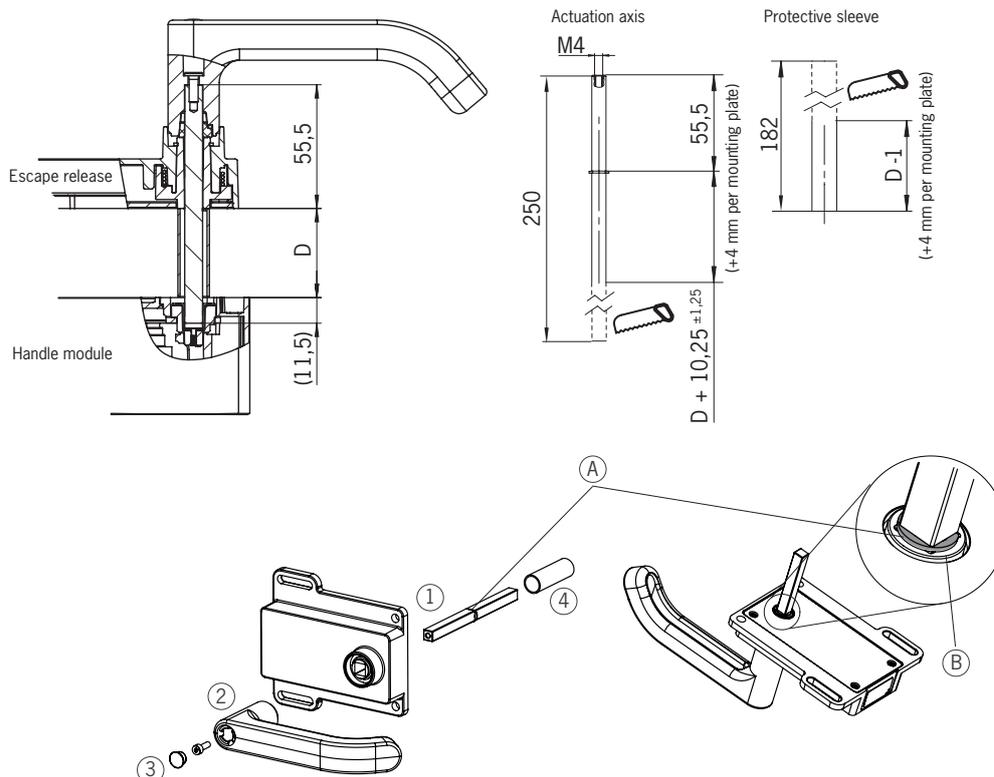
- › Fit escape release such that operation, inspection and service are possible.
- › The actuation axis for the escape release must be inserted min. 9 mm into the handle module. Note the information on the different profile widths in chapter 7.6.1. *Preparing escape release on page 14.*
- › Adjust escape release axis at right angles to the handle module. See Fig. 9.

7.6.1. Preparing escape release

Notice: Various escape releases with different axis lengths are available, as well as mounting plates and door handles/door knobs. You will find further information at www.euchner.com.

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

Example without mounting plates:



- 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. 8: Preparing escape release

8. Mounting



WARNING

Mounting must be performed only by authorized personnel.



NOTICE

Risk of damage to equipment and malfunctions as a result of incorrect installation. Observe EN ISO 14119:2013, sections 5.2 and 5.3, for information about mounting the safety switch and the actuator.

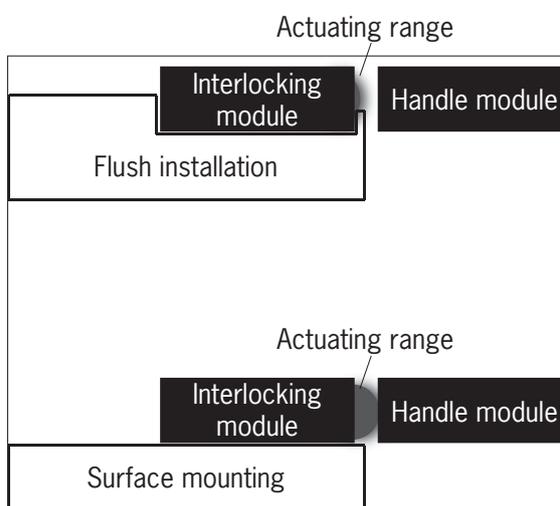
With two-leaf hinged doors, one of the two door leaves must also be latched mechanically.

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.
› The pushbuttons and indicators can be customized using replaceable color covers and labels.

For mounting steps, see *Fig. 9* and *Fig. 12* to *Fig. 21*.

Install system so that inspection and service are possible.

8.1. Replacing modules



CAUTION

Risk of damage to equipment or malfunction as a result of uncontrolled machine stop.

- › The communication within the system is interrupted by the replacement of a module. If a process is running, this situation can result in an uncontrolled stop and damage to the installation or the product. Before replacement, make sure the installation is in a suitable operating status.

An interlocking module with the BP configuration can be replaced only in combination with an overall system restart. On the disconnection of the module connection, the system enters into a fault state. The related module and all downstream modules remain inactive until the overall system is restarted (fault state).

Interlocking modules with the configuration BR are hot pluggable. It is therefore not necessary to restart the overall system.

8.2. Mounting submodules



CAUTION

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

- › Only submodules of connection types P, K and N can be used. Check the compatibility before installation. For information on the related connection type of a submodule, refer to the associated data sheet for the related submodule.
- › Pay attention to the alignment of the submodule. See marking (a) in *Fig. 10: Mounting submodule*. Submodules can also be installed rotated by 180°. The marking (a) always indicates the first position to be equipped. This is the emergency stop S1 position in the example below.
- › Make sure the pins on the submodule slide straight into the guide. Tighten the cover screws to 0.5 Nm.
- › If you use a submodule, pay attention to the correct alignment of the modules in relation to the labeling fields on the connection module. Incorrect assignments can cause serious malfunctions in your installation.
- › Make sure no foreign bodies, e.g. swarf or wires, enter the open submodule slots. These can cause short circuits or contact problems.
- › Avoid touching the contacts on the underside of the submodule. Risk of ESD damage and contact problems due to soiling.
- › Unused submodule slots must be fitted with a cover (e.g. order number 126372).

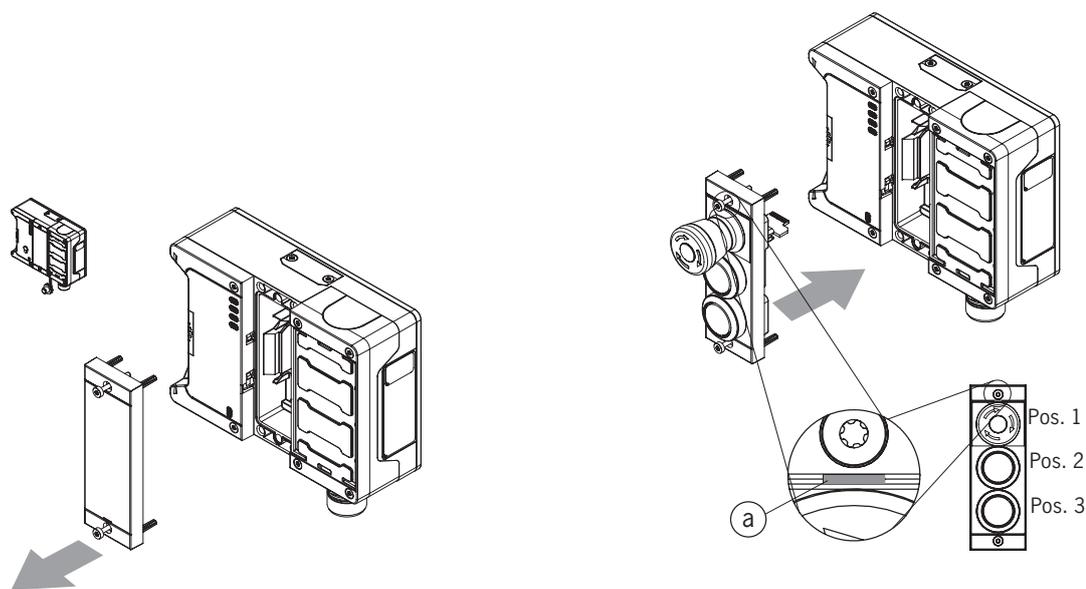


Fig. 10: Mounting submodule

8.3. Replacing submodules



CAUTION

▶ The communication between submodule and interlocking module is interrupted by the replacement of a submodule. The submodule ceases to function. The function of the interlocking module, e.g. the safety outputs F01A/F01B, is not affected. If a process is running, the removal/replacement of a submodule can result in an uncontrolled stop and damage to the installation or the product. Before replacement, make sure the installation is in a suitable operating status.



NOTICE

Pay attention to the information on the replacement of a submodule in the operating instructions for the related module. Correct function must be tested after replacement before the system enters normal operation again.

The replacement of submodules MSM while in operation is also possible (pay attention to safety note above). As soon as the system detects a compatible submodule, the submodule is ready for operation.

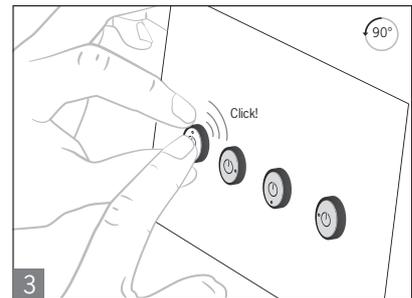
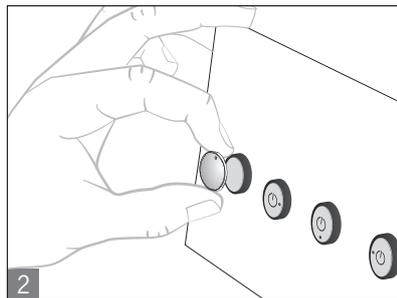
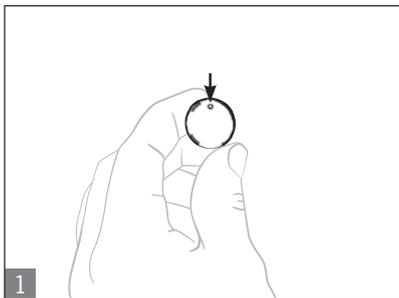
If an incompatible submodule is installed, the Slot 1 LED illuminates red.

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

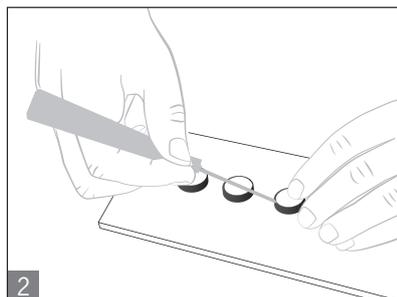
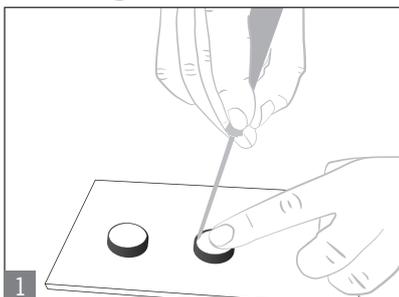
The use of a different submodule will change the function and as a result the terminal assignment (see data sheet for the submodule). Take into account the changes in your wiring and control system.

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

Fitting



Removing



8.4. Changing direction of connection



CAUTION

Risk of damage to equipment or malfunction as a result of uncontrolled machine stop.

- ▶ The direction of connection can be changed by removing the covers and mounting rotated by 180°.
- ▶ The communication within the system is interrupted if the internal wiring is changed. If a process is running, this situation can result in an uncontrolled stop and damage to the installation or the product. Before replacement, make sure the installation is in a suitable operating status.

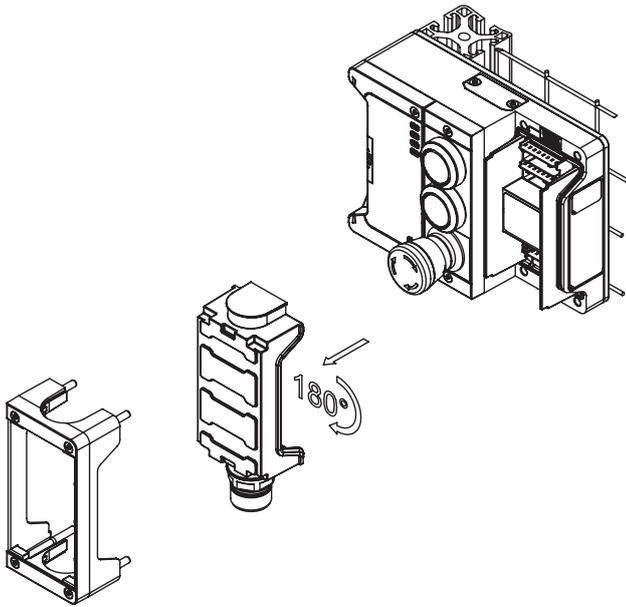


Fig. 11: Changing direction of connection

9. Changing the door hinge position

9.1. Changing the interlocking module to a different door hinge position

To change the interlocking module for doors with a different door hinge position, the module only needs to be rotated by 180°. Submodules installed in the module can also be rotated by 180° (see section 8.1. *Replacing modules on page 17*).

9.2. Changing the actuating direction of the handle module

(here: from right to left)



Important!

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

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

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

- The guard opens by pressing down the door handle.
- The system is mounted the other way up for doors hinged on the left. In other words, the guard opens by pressing up the door handle (see Fig. 12). For this reason the actuating direction of the door handle must be changed (see Fig. 12 to Fig. 21).

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

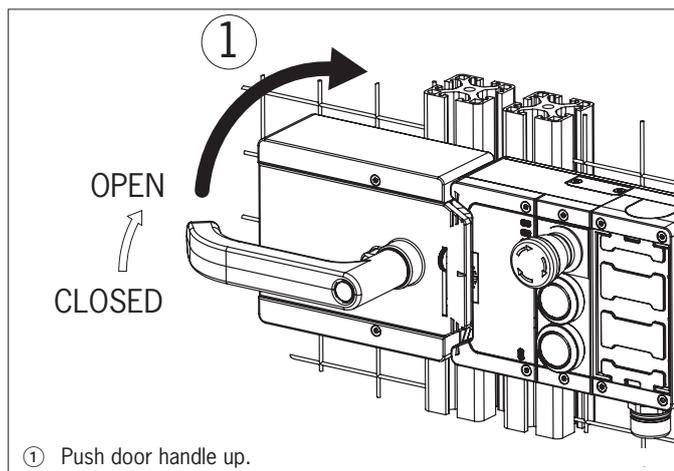


Fig. 12: Changing actuating direction, step ①

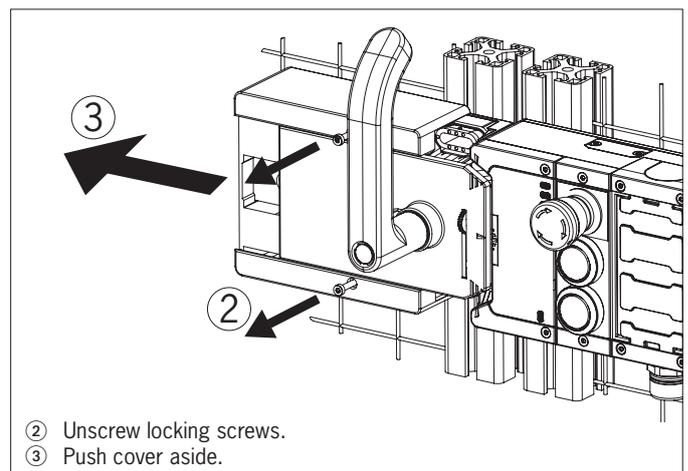


Fig. 13: Changing actuating direction, steps ② and ③

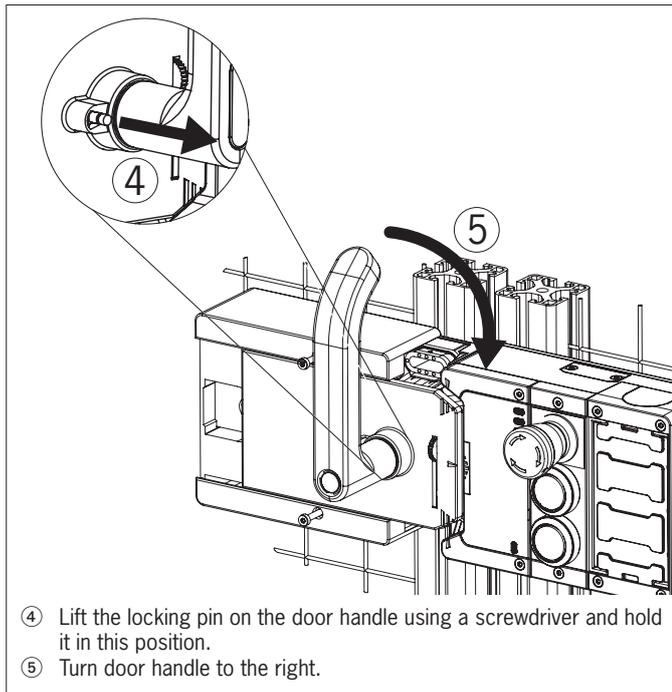


Fig. 14: Changing actuating direction, steps ④ and ⑤

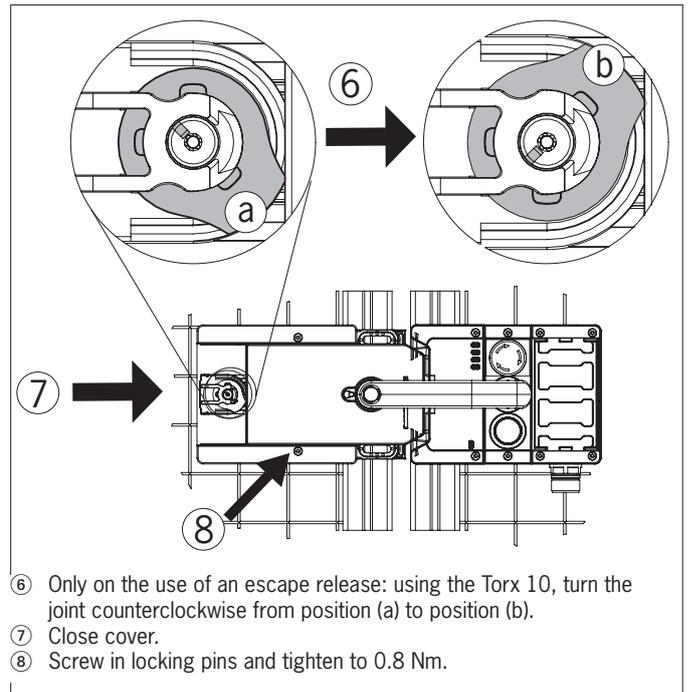


Fig. 15: Changing actuating direction, steps ⑥ to ⑧

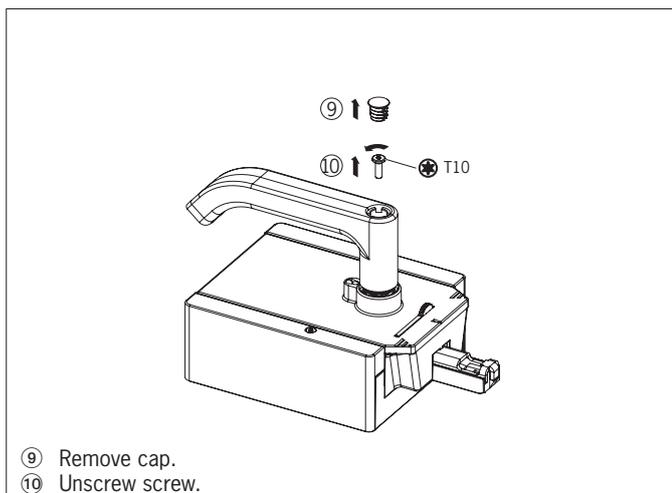


Fig. 16: Changing actuating duration, steps ⑨ and ⑩

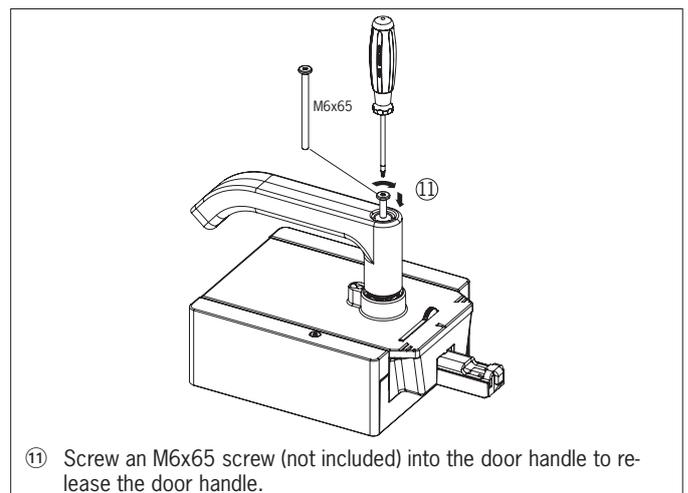
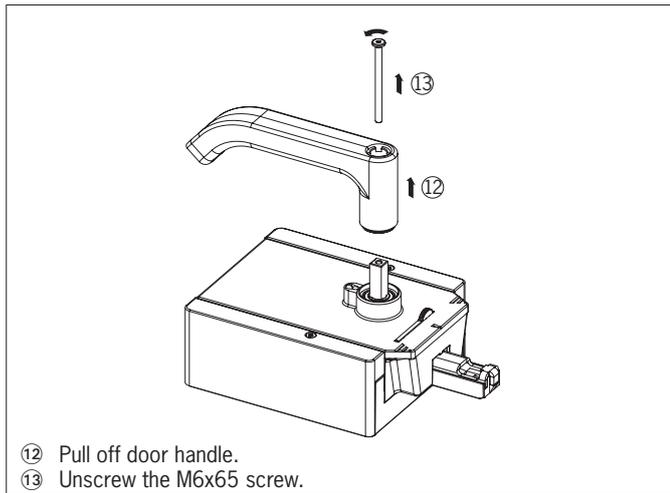
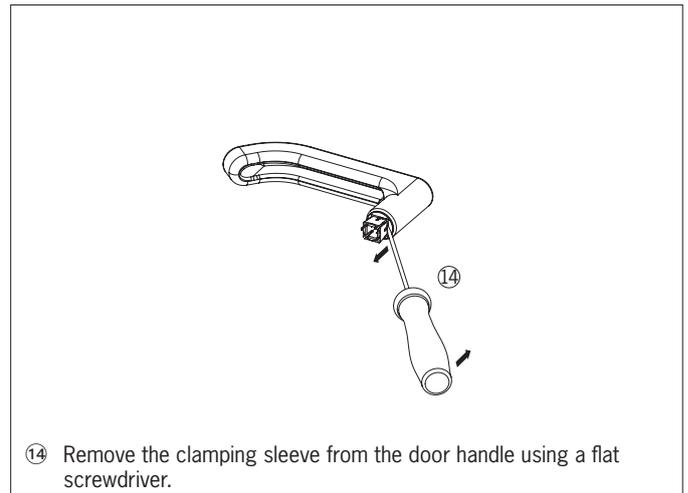


Fig. 17: Changing actuating duration, step ⑪



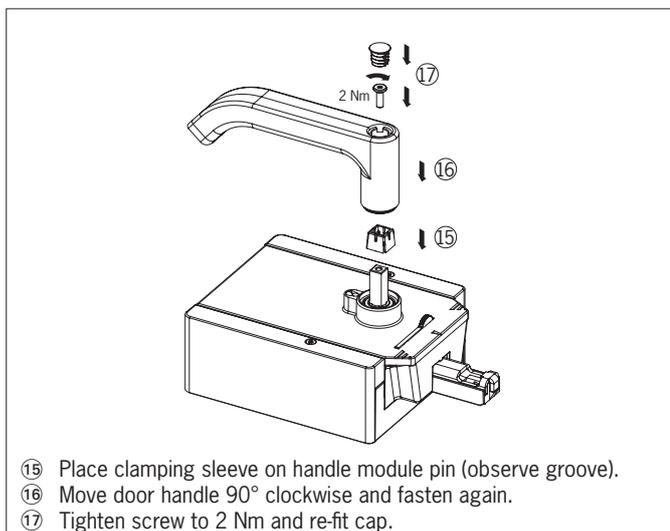
- ⑫ Pull off door handle.
- ⑬ Unscrew the M6x65 screw.

Fig. 18: Changing actuating duration, steps ⑫ and ⑬



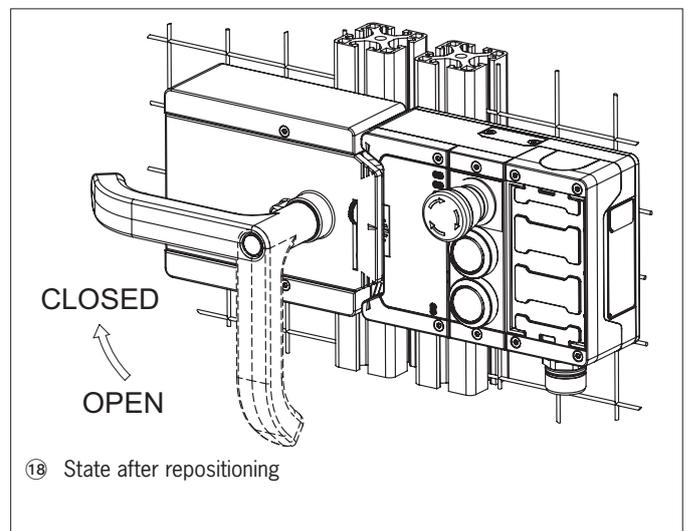
- ⑭ Remove the clamping sleeve from the door handle using a flat screwdriver.

Fig. 19: Changing actuating duration, step ⑭



- ⑮ Place clamping sleeve on handle module pin (observe groove).
- ⑯ Move door handle 90° clockwise and fasten again.
- ⑰ Tighten screw to 2 Nm and re-fit cap.

Fig. 20: Changing actuating duration, steps ⑮ to ⑰



- ⑱ State after repositioning

Fig. 21: Changing actuating direction, final state

10. Protection against environmental effects

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

Pay attention to the following measures:

- Seal unused connections using the covers provided.
- Make sure the housing covers are correctly sealed and the cover screws are tightened to the necessary tightening torque.
- Cover the device during painting work.

11. Controls and indicators

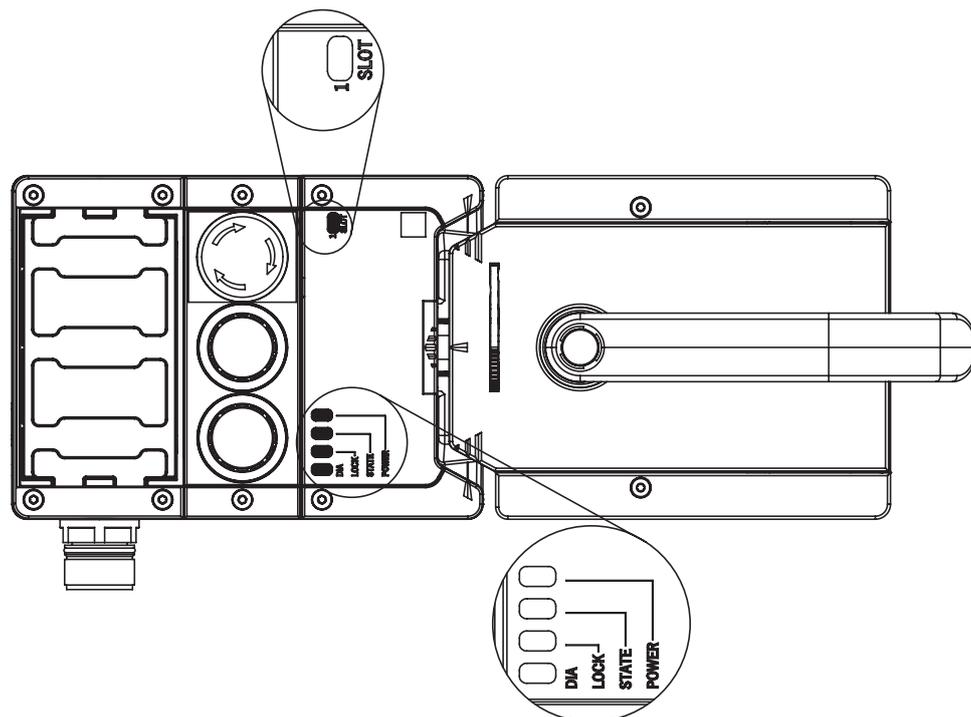


Fig. 22: Indicators and control elements

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

12. 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 12.6. *Notes on cable laying on page 27*. Follow EMC notes on devices in the immediate vicinity of the MGB2 system and its 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.

12.1. Using submodules

Each interlocking module can contain one submodule. For an exact description of the individual submodules as well as information on compatibility, refer to the associated data sheet for the related submodule.



Important!

- Only submodules of connection types P, K and N may be installed in the modules described here. For information on the related connection type of a submodule, refer to the associated data sheet for the related submodule.
- On using a submodule, pay attention to the correct alignment of the module in relation to the labeling fields on the connection submodule. Incorrect assignments can cause serious malfunctions in your installation.
- Unused submodule slots must be fitted with a cover (e.g. order number 126372).
- Avoid touching the contacts on the underside of the submodule. Risk of ESD damage and contact problems due to soiling.

12.2. Notes about



Important!

- This device is intended to be used with a Class 2 power source in accordance with UL1310. 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).

12.3. 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.

12.4. 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}

$$I_{max} = I_{UB} + I_{F01A+F01B}$$

I_{UB} = Device operating current (80 mA) + monitoring outputs (4 x max. 50 mA) + control elements

$I_{F01A+F01B}$ = Load current of safety outputs F01A + F01B (2 x max. 150 mA)



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

$$\Sigma I_{max} = I_{F01A+F01B} + n \times I_{UB} + n \times \text{monitoring outputs}$$

n = Number of connected devices

Assignment of the currents to the fuse circuits

Current	Fuse circuit F1	Fuse circuit F2
I_{UB}	80 mA $I_{OD,OT,OL,OI} = (4 \times \text{max. } 50 \text{ mA})$ $I_{\text{control elements}} = \text{max. } 10 \text{ mA}$ (per control element) $I_{\text{indicators}} = \text{max. } 5 \text{ mA}$ (per indicator)	
$I_{F01A+F01B}$	(2 x max. 150 mA)	

12.5. Requirements for connecting cables



CAUTION

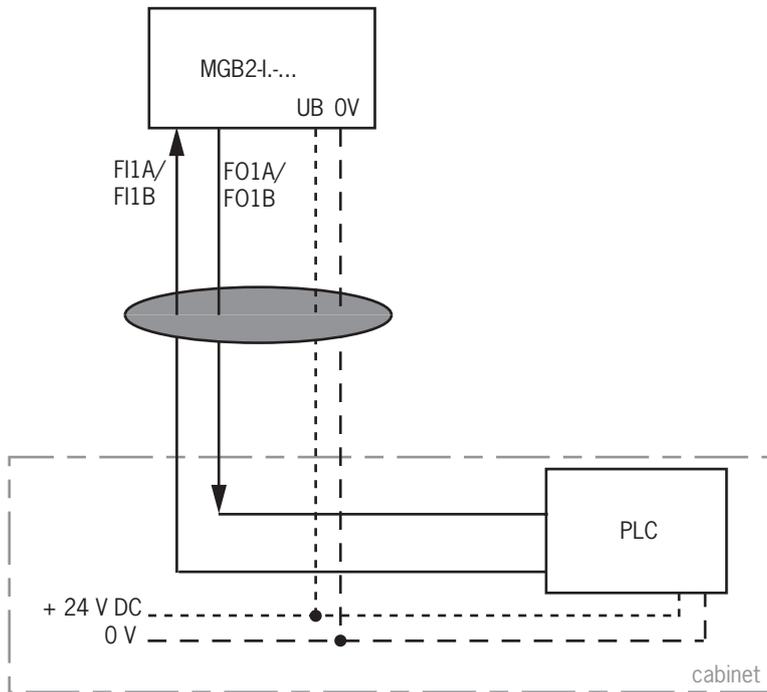
Risk of damage to equipment or malfunctions as a result of incorrect connecting cables.
 ▶ On the use of other connection components, the requirements in the following table apply.
 EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.

Observe the following requirements with respect to the connecting cables:

Parameter	Value	Unit
Conductor cross-section, min.	0.25	mm ²
R max.	60	Ω/km
C max.	120	nF/km
L max.	0.65	mH/km

12.6. Notes on cable laying

Lay all MGB2 connecting cables in a common cable harness.



Important: lay cables in a common harness

Fig. 23: Stipulated cable laying

12.7. Changing device configuration (using DIP switches)



Tip!

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

DIP switches

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

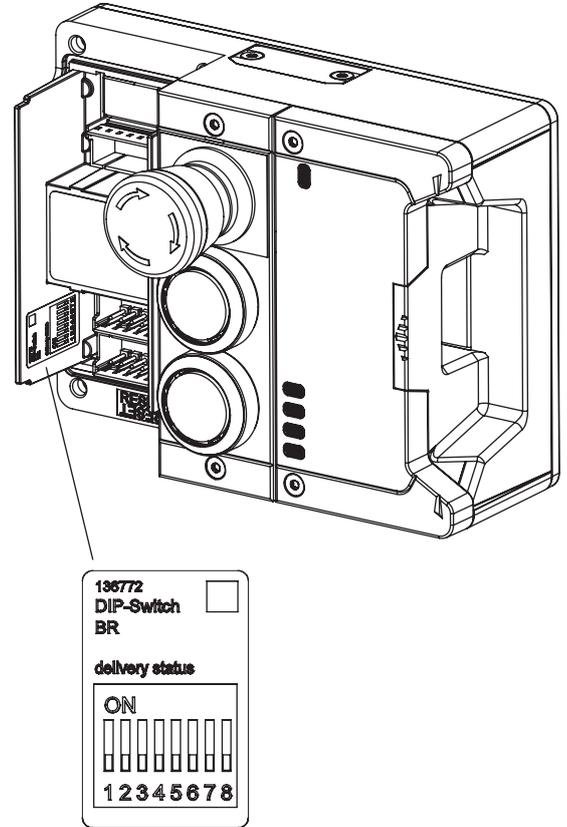
- › Changing system family (BR/BP switching)

Position of the switches

Item	Description
1	DIP switch
2	Sticker with factory setting

Function of the switches

Switch	Function
1+4	on: device is operated as a BP system off: device is operated as a BR system
2+5	n.c.
3	n.c.
6	n.c.
7	on: factory reset on off: factory reset off
8	on: configuration possible off: configuration inhibited (factory setting)



12.7.1. Changing system family (BR/BP switching)



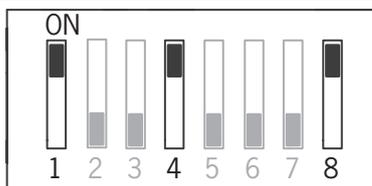
CAUTION

Malfunction due to incorrect configuration or incorrect connection.

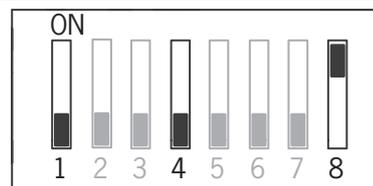
- › Note that the terminal assignment also changes on changing the configuration (see chapter 12.9. Terminal assignment and contact description on page 30).

1. Switch off power supply.
2. Set DIP switches 1, 4 and 8 as shown.

For change from BR => BP



For change from BP => BR



3. Switch on power supply for 5 s.
 - ➔ The change is confirmed by positive acknowledgment.
4. Switch off power supply and set DIP switch 8 to OFF.
 - ➔ The next time the device is started, it operates in the operating mode set.

12.8. 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. 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, refer to chapter 15. *Technical data on page 41.*
- › 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 FI1A and FI1B directly to a power supply unit or to outputs FO1A and FO1B of another EUCHNER BR device (series connection). Pulsed signals must not be present at inputs FI1A and FI1B.



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 *Downloads/Applications/MGB2*. The features of the respective device are dealt with there in greater detail.

12.9. Terminal assignment and contact description

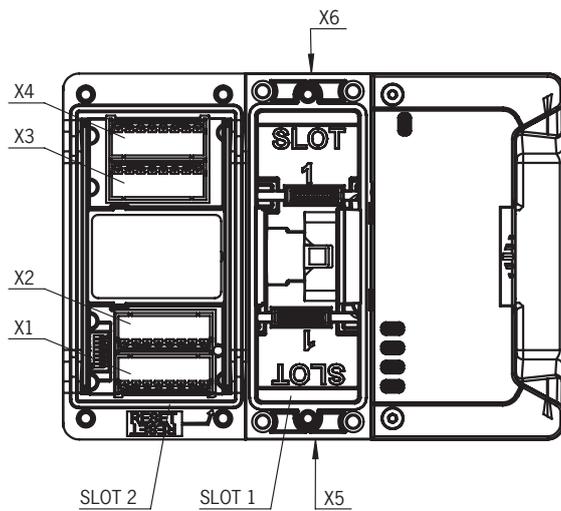


Fig. 24: Connections and LEDs

Terminal	Designation	Description
X1.1	UB	BR electronics operating voltage, 24 V DC
X1.2	F11A	Enable input for channel A If operated separately (BP), set DIP switch as per operating instructions.
X1.3	F11B	Enable input for channel B If operated separately (BP), set DIP switch as per operating instructions.
X1.4	OT/C	Bolt tongue monitoring output ON when the door is closed and the bolt tongue is inserted into the interlocking module. Optional: BR diagnostic output
X1.5	OD	Door monitoring output ON when the door is closed.
X1.6	n.c.	
X1.7	OI	Monitoring output DIA ON when the device is in the fault state.
X1.8	F01A	Safety output, channel A ON when door is closed and interlocked. Attention: Pay attention to the DIP switch position.
X2.1	0 V UB	BR electronics operating voltage, 0 V
X2.2	S2 1.2	
X2.3	S2 2.2	
X2.4	S1 LED	See the associated data sheet for the submodule
X2.5	S2 LED	
X2.6	S3 LED	
X2.7	RST	Reset input, device is reset if 24 V DC is applied to RST for min. 3 s.
X2.8	F01B	Safety output, channel B ON when door is closed. Attention: Pay attention to the DIP switch position.
X3.1	n.c.	
X3.2	n.c.	
X3.3 - X3.8		See the associated data sheet for the submodule
X4.1 - X4.8		See the enclosed data sheet for the submodule
X5		Connection for optional accessories; see associated data sheet
X6		Connection for optional accessories; see associated data sheet

Table 2: Terminal assignment and contact description

12.10. Terminal assignment, submodule with plug connector M23 (X7)



NOTICE

The following table applies to the submodule MSM-C-K-BA-SH0-S1-160849.
Various assembly options are possible. Refer to the data sheet of the submodule for the correct wiring for your device.

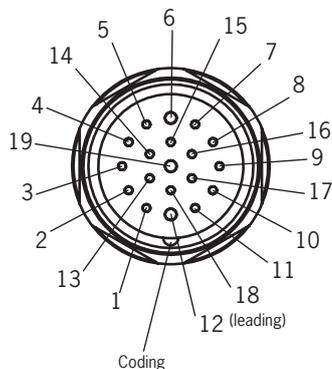


Fig. 25: View of connection side, plug connector M23 (X7)

Pin	Terminal	Designation	Description
1	X3.1	n.c.	
2	X1.2	F11A	Enable input for channel A If operated separately (BP), set DIP switch as per operating instructions.
3	X1.3	F11B	Enable input for channel B If operated separately (BP), set DIP switch as per operating instructions.
4	X1.8	F01A	Safety output, channel A ON when door is closed and interlocked. Attention: Pay attention to the DIP switch position.
5	X2.8	F01B	Safety output, channel B ON when door is closed and interlocked. Attention: Pay attention to the DIP switch position.
6	X1.1	UB	BR electronics operating voltage, 24 V DC
7	X2.7	RST	Reset input, device is reset if 24 V DC is applied to RST for min. 3 s.
8	X1.4	OT/C	Bolt tongue monitoring output ON when the door is closed and the bolt tongue is inserted into the interlocking module. Optional: BR diagnostic output
9	X1.7	OI	Monitoring output DIA ON when the device is in the fault state.
10	X3.3		See the associated data sheet for the submodule
11	X3.5		See the associated data sheet for the submodule
12	-	n.c.	Not used
13	X3.4		
14	X3.6		
15	X2.2		See the associated data sheet for the submodule
16	X2.5		
17	X3.7		
18	X2.6		
19	X2.1	0 V UB	BR electronics operating voltage, 0 V
	X3.2	n.c.	

Table 3: Terminal assignment and contact description

12.11. Operation as separate device

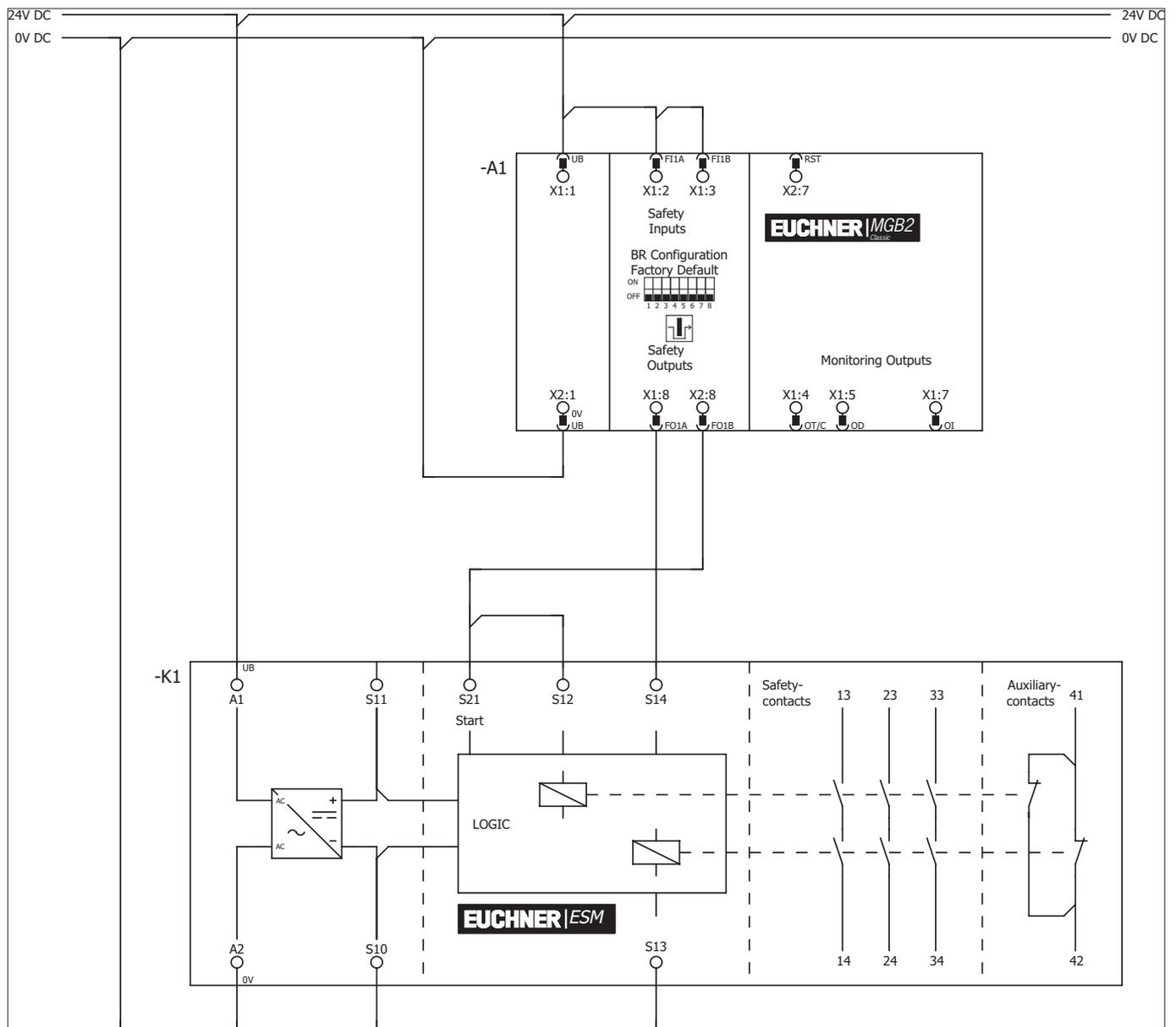


Fig. 26: Connection example for separate operation

The switches can be reset via the RST input. For this purpose, a voltage of 24 V (\pm permissible tolerances) must be applied to the input for $t > 3$ sec. During the time when this voltage is present on the input, all LEDs and outputs (monitoring and safety outputs) are switched off. The device restarts on the falling edge of the voltage.

12.12. Information on operation in a BR switch chain

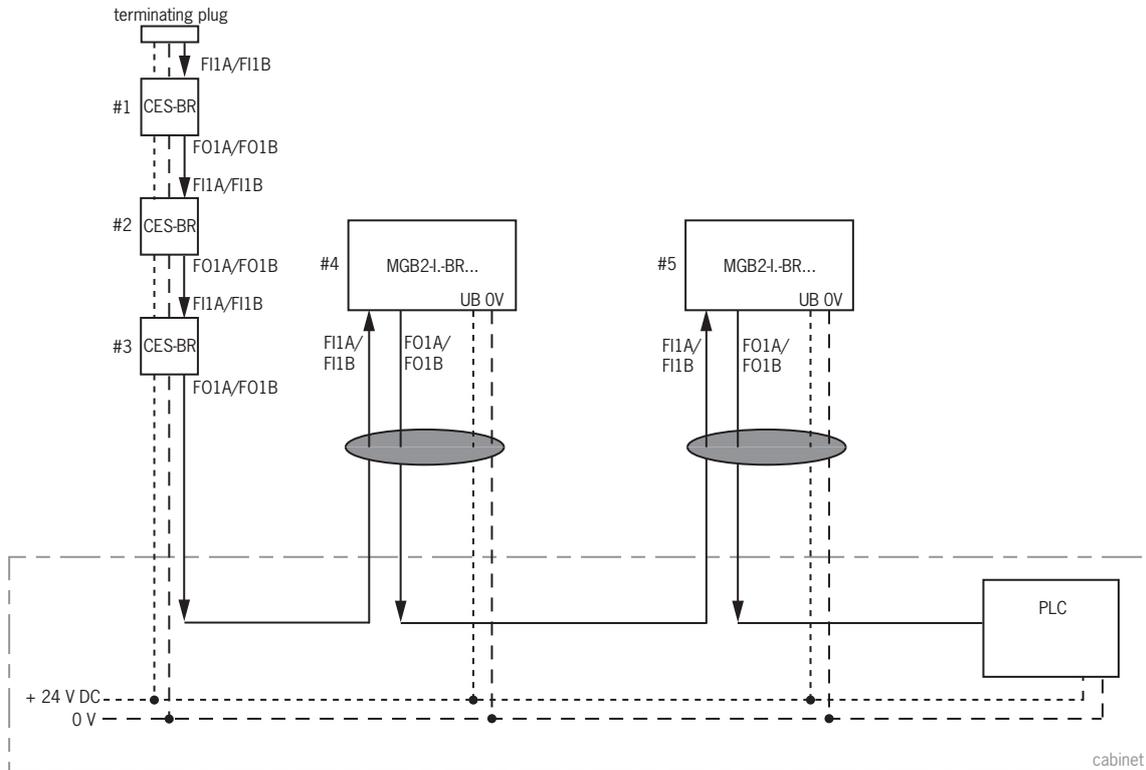


12.12.1. System times

The interlocking module has different reaction times compared to a CES-BR switch (see chapters 15. Technical data on page 41 and 15.2. Typical system times on page 43).

12.12.2. Wiring of a BR switch chain

To prevent earth loops, the wiring should be in a star configuration (see Fig. 27).



Important: lay cables in a common harness

Fig. 27: Central wiring of a BR switch chain in the control cabinet

12.12.3. Number of devices in switch chains

In a pure MGB2 switch chain a maximum of ten devices can be connected in series. In mixed switch chains (e.g. MGB2 together with CES-BR) the maximum number of devices is also ten.

12.12.4. Resetting in switch chains



Important!

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

13. Setup

13.1. Teach-in operation (only for MGB2 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 taught-in 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 30 s, the handle module is not taught-in.

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. 1 s in case of BP configuration and approx. 5 s in case of BR 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. If this is not the case, the teach-in operation is completed after approx. 30 seconds; the green LED (State) and the red LED (DIA) flash slowly (approx. 1 Hz). 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.

13.2. 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.

13.3. Electrical function test



WARNING

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

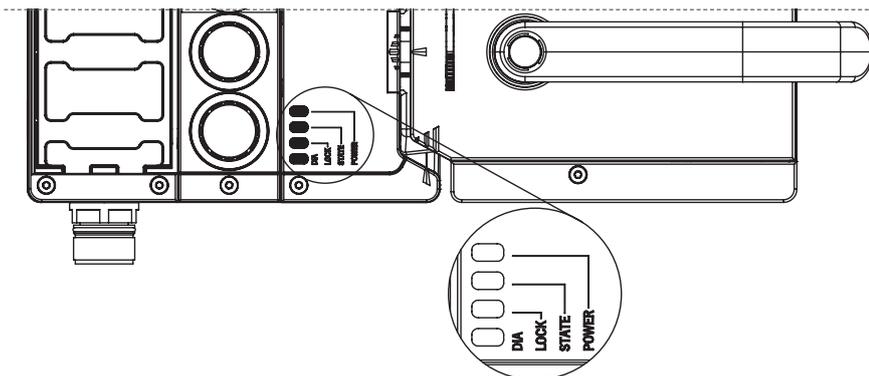


1. Switch on operating voltage.
 - ➔ The interlocking module carries out a self-test. In case of BR configuration: the green State LED flashes at 5 Hz for 5 s. The State LED then flashes at regular intervals.
 2. Close all guards and insert the bolt tongue into the interlocking module. As soon as the 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. The yellow Lock LED is ON for a long time with a short interruption.
 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.

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



14.2. System status table MGB2-BR

State	Submodule LEDs		Lock (yellow)		LED indicator		Diagnostic monitoring output (OI)		Bolt tongue monitoring output (OT)		Door monitoring output (OD)		Safety outputs F01A and F01B		Position of the bolt tongue		Door position		Safety inputs F11A and F11B		Operating mode	
Self-test after power-up	○	○	○	○	5 Hz	○	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	X	X	X	X	X	X	Self-test	
Normal operation, door open	X	X	○	○	long OFF, short ON		OFF	OFF	OFF	not inserted	open	X	OFF	OFF	not inserted	open	X	X	X	Normal operation		
Normal operation, door closed	X	X	○	○	long ON, short OFF		OFF	OFF	OFF	not inserted	closed	ON	OFF	OFF	not inserted	closed	X	X	X			
Normal operation, door closed, bolt tongue inserted, safety inputs F11A/F11B OFF	X	X	○	○	long ON, short OFF	○	OFF	OFF	OFF	inserted	closed	ON	OFF	OFF	inserted	closed	X	X	X			
Normal operation, door closed, bolt tongue inserted. Safety inputs F11A/F11B are ON. Safety outputs F01A and F01B are ON	X	X	○	○			OFF	OFF	OFF	inserted	closed	ON	ON	ON	inserted	closed	X	X	X			
Door open; device is ready for teach-in of another handle module (only 3 min. after power-up). If a transponder is detected, jump to the teach-in operation state. Should the teach-in operation not be successful, this state is active again after a reset.	X	X	○	○	3 x	○	OFF	OFF	OFF	not inserted	X	X	OFF	OFF	not inserted	X	X	X	X	Teach-in standby (only for MGB2 unicode)		
Waiting for address assignment by master	○	○	○	○	5 Hz	1x	OFF	OFF	OFF	X	OFF	OFF	OFF	OFF	X	X	X	X	X			
Tip for teach-in operation: to prevent the interruption of teach-in operations, close the door. If teach-in operation is started, it is always continued to the end. After the teach-in time has elapsed, one of these states is assumed with latching: 1. User action acknowledgment 2. Teach-in error 3. Transponder error	X	X	○	○	1 Hz	○	OFF	OFF	OFF	inserted	closed	X	OFF	OFF	inserted	closed	X	X	X	Setup (only for MGB2 unicode)		
Positive acknowledgment after completion of teach-in operation	○	○	○	○	1 Hz	1 Hz	OFF	OFF	OFF	X	OFF	OFF	OFF	OFF	X	X	X	X	X			

Operating mode	Door position	Position of the bolt tongue	Safety outputs F01A and F01B	Door monitoring output (OD)	Bolt tongue monitoring output (OT)	Diagnostic monitoring output (OI)	Power (green)	STATE (green)		DIA (red)	Lock (yellow)	Submodule LEDs		State
								1 x	3 x			SLOT (green)	SLOT (red)	
Diagnostics	X	X	OFF	X	X	ON		1 x	3 x		○	○	○	Error during teach-in/configuration or invalid DIP switch setting
	X	X	OFF	X	OFF	ON		3 x	3 x	long ON	○	○	○	Faulty or disabled transponder. If a transponder error is detected during teach-in, the teach-in operation is continued and the transponder error is indicated afterward
	X	X	OFF	X	OFF	ON		3 x	3 x	long ON	○	○	○	Faulty or disabled transponder has been detected during normal operation
	X	X	OFF	X	X	ON		4 x	4 x		○	○	○	Output error (latching, e.g. short circuit, loss of switching capability) or short circuit at the outputs. Short circuits, external voltage, short circuit on the output or output current too high
	X	X	OFF	X	X	ON		4 x	4 x	long ON	○	○	○	Output error (resettable, e.g. short circuit, loss of switching capability) or short circuit at the outputs. Short circuits, external voltage, short circuit on the output or output current too high
	X	X	OFF	X	X	ON	☀				○	○	○	Internal fault (e.g. component fault, data error)
	X	X	OFF	X	X	ON				long ON	☀	1 x	○	Signal sequence erroneous: - Broken bolt tongue - With active release monitoring: escape release or auxiliary release was actuated - Faults due to contamination or damage
	X	X	OFF	X	X	ON				ON	☀		○	Environment error (latching), e.g. voltage or temperature too high/too low
	X	X	OFF	X	X	ON				long ON	☀		○	Environment error (resettable), e.g. voltage or temperature too high/too low
	X	X	OFF	X	X	ON					☀	2x	○	Voltage error on the solenoid: - Overvoltage/low voltage: Observe the values for the power supply in the technical data.
	X	X	X	X	X	X				X	○	☀	○	Internal fault in the submodule, e.g. CRC error

After remedying the cause, use the reset function (see chapter 16. Troubleshooting and assistance on page 44) or briefly disconnect the power supply. 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.

14.4. System status table (Slot LED)

A submodule error is reset automatically as soon as a compatible submodule is installed correctly.

Fault display SLOT1 LED	Meaning	Measures
OFF	A submodule is not used.	–
Red ON	An incompatible submodule has been installed.	Install compatible submodule to reset.

15. 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
	min.	typ.	max.	
Housing material	Fiber glass reinforced plastic Die-cast zinc, nickel-plated Stainless steel			
Dimensions	See chapter 7.4. Dimension drawing on page 11 (interlocking module, without submodules)			
Weight				kg
Interlocking module	1.00			
Handle module	1.10			
Escape release	0.55			
Ambient temperature at UB = DC 24 V	-25 ... +55			°C
Degree of protection				
Cover not populated/populated with buttons/ indicators/selector switches/key-operated rotary switches	IP65			
Safety class	III			
Degree of contamination	3			
Installation orientation	Any			
Connection	1 cable entry M20x1.5 with 4 socket connectors or plug connectors			
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	0.25 ... 1.5 (AWG 23 ... AWG 16) 0.25 ... 1.5 0.25 ... 0.75			mm ²
Operating voltage UB (reverse polarity protected, regulated, residual ripple < 5 %)	24 -15% / +20% (PELV)			V DC
Current consumption I _{UB} (at 20.4 V incl. FI1A/FI1B, no load on any outputs)	80			mA
External fuse	See chapter 12.4. Fuse protection for power supply on page 26			
Safety outputs FO1A/FO1B	Semiconductor outputs, p-switching, short circuit-proof			
Test pulses	< 300			µs
Test pulse interval	Min. 100			ms
Output voltage U _{FO1A} / U _{FO1B} ¹⁾				V DC
HIGH U _{FO1A} / U _{FO1B}	UB - 3.5 V ... UB			
LOW U _{FO1A} / U _{FO1B}	0 ... 1			
Switching current per safety output	1 ... 150			mA
Utilization category acc. to EN IEC 60947-5-2	DC-13 24 V 150 mA Caution: Outputs must be protected by a free-wheeling diode in the case of inductive loads.			
Monitoring outputs - Output voltage ¹⁾ - Max. load	p-switching, short circuit-proof UB - 3.5 V ... UB Max. 50			mA
Rated insulation voltage U _i	75			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			
Ready delay (BR)	-	5	-	s
Risk time for single device	-	-	50	ms
Risk time delay per device	10			ms
Turn-on time	-	-	80	ms
Discrepancy time	-	-	10	ms
Reliability values acc. to EN ISO 13849-1				
Category	4			
Performance Level	PL e			
MTTF _D ³⁾	750			years
Diagnostic Coverage DC	99			%
PFFH _D	2.95 x 10 ⁻⁹			
Mission time	20			years
Safety Integrity Level	SIL 3			
Mechanical life	1 x 10 ⁶			
- In case of use as door stop, and 1 Joule impact energy	0.1 x 10 ⁶			
Brp (emergency stop)	0.13 x 10 ⁶			

Emergency stop		
Operating voltage	5 ... 30	V
Operating current	1 ... 100	mA
Breaking capacity, max.	250	mW
Power supply LED	24	V DC
Controls and indicators		
Operating voltage	UB	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.
3) Fixed failure rate without consideration of faults in wearing parts.

15.1. Radio frequency approvals

Product description: Safety Switch

FCC ID: 2AJ58-03

IC: 22052-03

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.

15.2. Typical system times



Important!

The system times given are maximum values for one device.

Ready delay:



The following applies to BR configuration: After switching on, the device carries out a self-test for 5 s. The system is ready for operation only after this time.



The following applies to BP configuration: 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:



The following applies to BR configuration: The max. reaction time from the moment when the guard is closed to the moment when the safety outputs switch on T_{on} is 80 ms.



The following applies to BP configuration: 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 80 ms.



Simultaneity monitoring of safety inputs F11A/F11B: If the safety inputs have different switching states for longer than 50 ms, the safety outputs F01A/F01B 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 F01A and F01B will be switched off after a maximum of 50 ms.

This value applies to a single switch. The risk time increases by 10 ms for each additional switch in a chain.

Difference time: The safety outputs F01A and F01B switch with a slight time offset. They both have the ON state at the latest after a difference time of 10 ms.

16. Troubleshooting and assistance

Simple errors (DIA flashing) are reset by opening and closing the guard. If the error is not reset by this action, proceed as follows:

16.1. 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. small screwdriver.
 - ➔ The green LED (State) flashes quickly (approx. 5 Hz in case of BR configuration). A self-test is performed during this time (approx. 5 s in case of BR configuration). The LED then cyclically flashes three times.
3. Close the guard.
 - ➔ The system is in normal operation again.

16.2. Troubleshooting help on the Internet

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

16.3. Mounting help on the Internet

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

16.4. Application examples

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

17. 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:

info@euchner.de

Internet:

www.euchner.com

18. 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 13.3. *Electrical function test on page 35*)
- › 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.

19. Declaration of conformity

The declaration of conformity is part of the operating instructions.

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

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