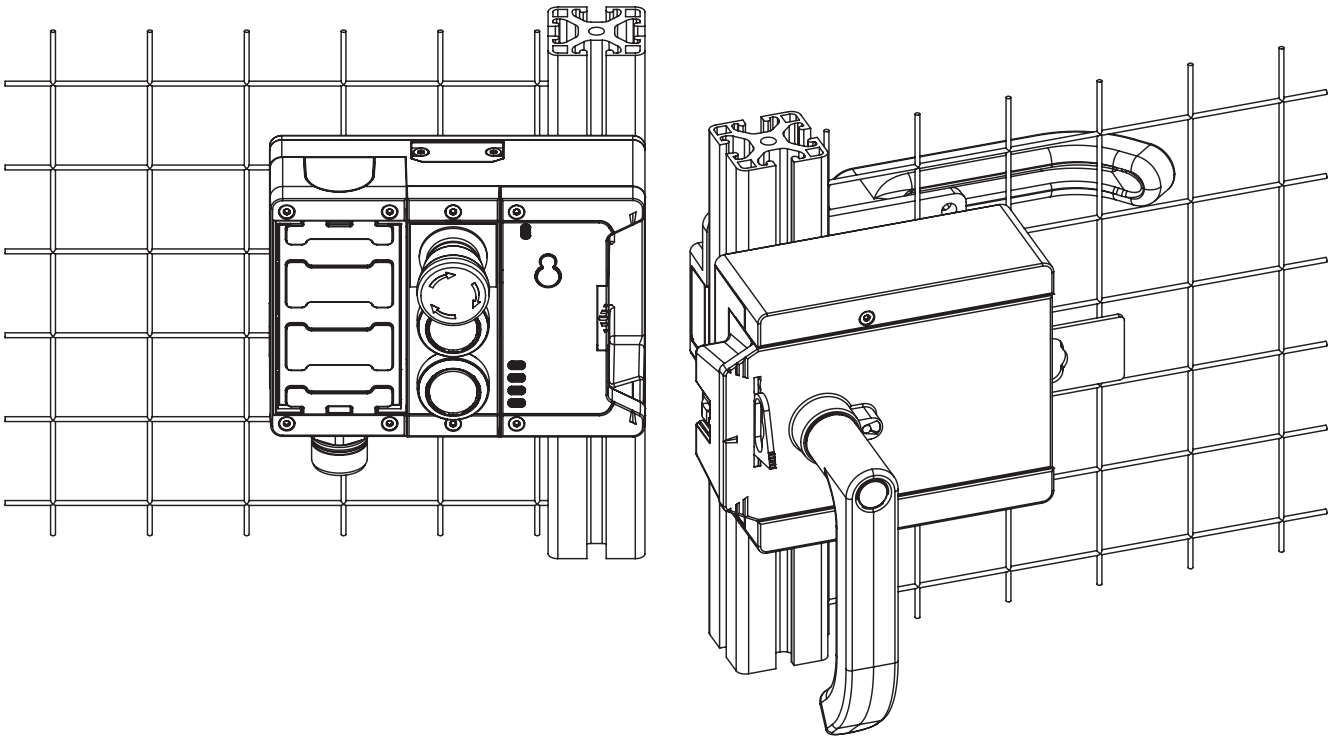
# EUCHNER

## Operating Instructions



Safety Systems

**MGB2-L1…-BR.-… / MGB2-L2…-BR.-…**
**MGB2-L1…-BP.-… / MGB2-L2…-BP.-…**
**from V1.0.0**

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# Contents

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# 1. About this document

## 1.1. Scope

These operating instructions are valid for all MGB2-L1…-BR.-… / MGB2-L2…-BR.-… and MGB2-L1…-BP.-… / MGB2-L2…-BP.-…. These operating instructions, the document “Safety information and maintenance” and any enclosed data sheet form the complete user information for your device.

| Series | Guard locking types | System families | Product versions |
|---|---|---|---|
| MGB2 | L1 (guard locking by spring force) | …-BP… | from V1.0.0 |
| | | …-BR… | |
| | L2 (guard locking by solenoid force) | …-BP… | |
| | | …-BR… | |

### 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 (PLC).

## 1.3. Key to symbols

| Symbol/depiction | Meaning |
|---|---|
|   | This section applies on operation as MGB2-BP |
|   | This section applies on 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 |
|  | Document on CD |
|  **DANGER WARNING CAUTION** | Safety precautions<br>**Danger** of death or severe injuries<br>**Warning** about possible injuries<br>**Caution** Slight injuries possible |
|  **NOTICE Important!** | **Notice** about possible device damage<br>**Important** information |
| **Tip** | Useful information |

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## 1.4. Supplementary documents

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

| Document title (document number) | Contents | |
|---|---|---|
| Safety Information and Maintenance Safety System MGB2-BR/MGB2-BP from V1.0.0 | Basic information for safe setup and service | |
| Operating Instructions (2500233) | (this document) | |
| Possibly enclosed 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. in the search box.

## 2. Correct use

The system consists of at least one locking module MGB2-L1-…/MGB2-L2–… and one handle module MGB2-H…

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

The locking module can be configured with the aid of DIP switches. Depending on the setting, the locking module behaves like a BP or BR device (see chapter *2.1. Main differences, MGB2-BP and MGB2-BR on page 8*). In addition the guard locking monitoring can be switched on or off. More detailed information about the possible settings is available in the chapter *13.7. Changing device configuration (using DIP switches) on page 32*.


**With active guard locking monitoring the following applies:**

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

This means:

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

**With inactive guard locking monitoring the following applies:**

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. With inactive guard locking monitoring, guard locking must be used only for process protection.

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 can be combined only with the intended modules in the MGB2 system family.

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


Locking 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 *16. Technical data on page 48*).
- 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-...<br>from V1.0.0 | MSM-.-P-...<br>MSM-.-N-...<br>MSM-.-K-... | MSM-.-R-... |
| **MGB2...BR/BP from V1.0.0** | ● | ● | – |

| 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.<br>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:

**With active guard locking monitoring the following applies:**

DIP

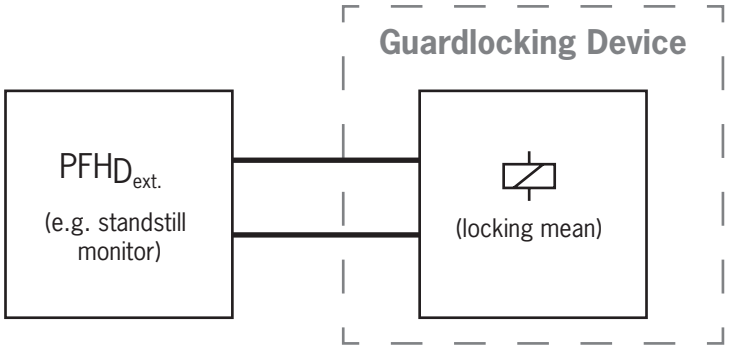
**Monitoring of guard locking and the position of the guard (interlocking device with guard locking according to EN ISO 14119)**

- Safety function (see chapter *6. Function on page 11*):
  - The safety outputs are switched off when guard locking is released (monitoring of the locking element). **Important:** This applies only if guard locking monitoring is active!
  - The safety outputs are switched off when the guard is open.
  - Guard locking can be activated only when the bolt tongue is located in the locking module (failsafe locking mechanism).
- Safety characteristics: category, Performance Level, $PFH_D$ (see chapter *16. Technical data on page 48*).

**Activation of guard locking**

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

  The safety level of guard locking control is determined by the device $PFH_{D\ int.}$ and by the external control (e.g. $PFH_{D\ ext.}$ of the standstill monitor).




- Safety characteristics: category, Performance Level, $PFH_D$ (see chapter *16. Technical data on page 48*).

**With inactive guard locking monitoring the following applies:**

DIP

**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 11*).
- Safety characteristics: category, Performance Level, $PFH_D$ (see chapter *16. Technical data on page 48*).

**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 *16. Technical data on page 48*)

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## 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 guard and, if necessary, other safety functions particularly

- after any setup work
- each time after replacement of a component relevant to 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 guard should be checked at suitable intervals as part of the maintenance schedule.

**WARNING**

Danger to life due to improper installation or due to bypassing (tampering). Safety components fulfill a personnel protection function.

- Safety components must not be bypassed, turned away, removed or otherwise rendered ineffective. On this topic pay attention in particular to the measures for reducing the possibility of bypassing according to EN ISO 14119:2013, section 7.
- The switching operation is allowed to be triggered only by the intended handle module 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

## 6.1. Locking module MGB2-L1/L2

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

DIP

The following switch-on condition applies to the safety outputs FO1A and FO1B (also see chapters *15.2. System status table MGB2-BR on page 43* and *15.3. System status table MGB2-BP on page 45*):

| DIP switch Configuration → | System family | | MGB2-BR | | MGB2-BP | |
|---|---|---|---|---|---|---|
| | Guard locking monitoring | | active | inactive | active | inactive |
| Condition | No fault in the device | & | TRUE | TRUE | TRUE | TRUE |
| | Guard closed | | TRUE | TRUE | TRUE | TRUE |
| | Bolt tongue inserted in locking module | | TRUE | TRUE | TRUE | TRUE |
| | Guard locking active | | TRUE | Not relevant | TRUE | Not relevant |
| | **In case of series connection:** Signal available from the upstream switch on the safety inputs FI1A and FI1B **In case of separate operation:** DC 24 V present at the safety inputs FI1A and FI1B | | TRUE | TRUE | Not relevant | Not relevant |
| | | | FO1A and FO1B are **ON** | | | |

The locking module detects the position of the guard and the position of the bolt tongue. The position of the guard locking is also monitored.

Guard locking monitoring can be deactivated using DIP switches (see chapter *13.7. Changing device configuration (using DIP switches) on page 32*).

**Important!**

For use as guard locking for personnel protection in accordance with EN ISO 14119, guard locking monitoring must be active.

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

When the bolt tongue is fully inserted into the locking module, the locking arm locks the bolt tongue in this position. Depending on the version, this locking is by spring force or solenoid force.

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## 6.2. Guard locking for version MGB2-L1

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

**Activating guard locking:** close guard; no voltage at the solenoid.

**Releasing guard locking:** apply voltage to the solenoid.

The spring-operated guard locking functions in accordance with the closed-circuit current principle. If the voltage is interrupted at the solenoid, the guard locking remains active and the guard cannot be opened directly.

| | |
|---|---|
|  | **Important!**<br>If the guard is open when the power supply is interrupted and is then closed, guard locking is activated. This can lead to persons being locked in unintentionally. |

As long as the guard locking is closed, the bolt tongue cannot be pulled out of the locking module and the guard is locked.

If voltage is applied to the guard locking solenoid, the guard locking is opened and bolt tongue is released. The guard can be opened.

## 6.3. Guard locking for version MGB2-L2

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

| | |
|---|---|
|  | **Important!**<br>Use as guard locking for personnel protection is possible only in special cases, after strict assessment of the accident risk (see EN ISO 14119:2013, section 5.7.1)! |

**Activating guard locking:** apply voltage to the solenoid.

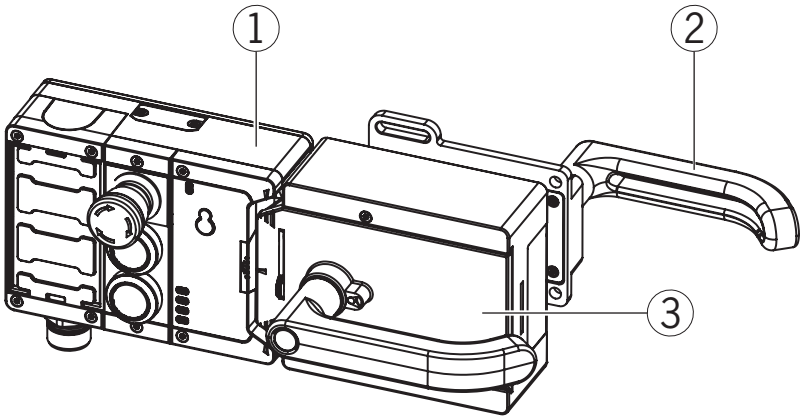
**Releasing guard locking:** disconnect voltage from the solenoid.

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

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

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

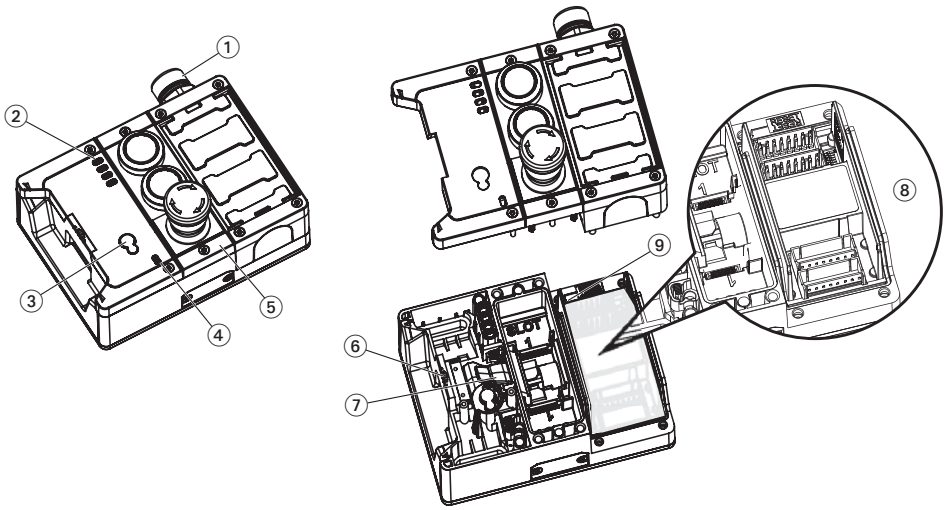
# 7. System overview




**Key**:
① Interlocking modul/Locking module (MGB2-I…/ MGB2-L…)
② Escape release, optional (MGB-E-…)
③ Handle module (MGB2-H…)

Figure 1: Overall system

## 7.1. Locking module MGB2-L.-…

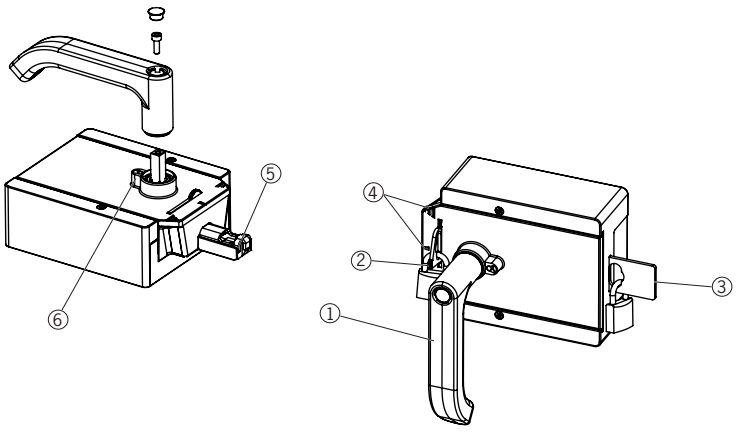



**Key**:
① Depending on version: Cable gland M20x1,5 or plug connector
② Module function LED indicators
③ Auxiliary release (optional, only on version with guard locking)
④ LED indicator for submodule in SLOT 1
⑤ Submodule in SLOT 1 (configuration example)
⑥ Auxiliary marking for correct alignment in relation to the handle module
⑦ Locking arm
⑧ Terminals (X1 - X4)
⑨ Internal reset

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

Figure 2: Locking module MGB2-L.–…

## 7.2. Handle module MGB2-H-…




**Key**:
① Door handle
② Hinged lockout mechanism
③ Automatically extending lockout mechanism (optional)
④ Auxiliary markings for max. permissible mounting distance
⑤ Bolt tongue
⑥ Latching pin for handle adjustment

Figure 3: Handle module MGB2-H-…

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

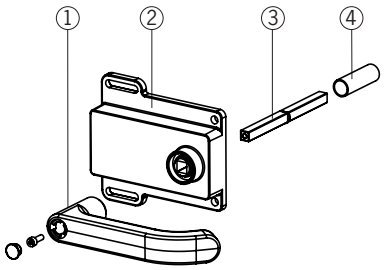


Figure 4: Escape release MGB-E-...

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

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

## 7.4. Dimension drawing

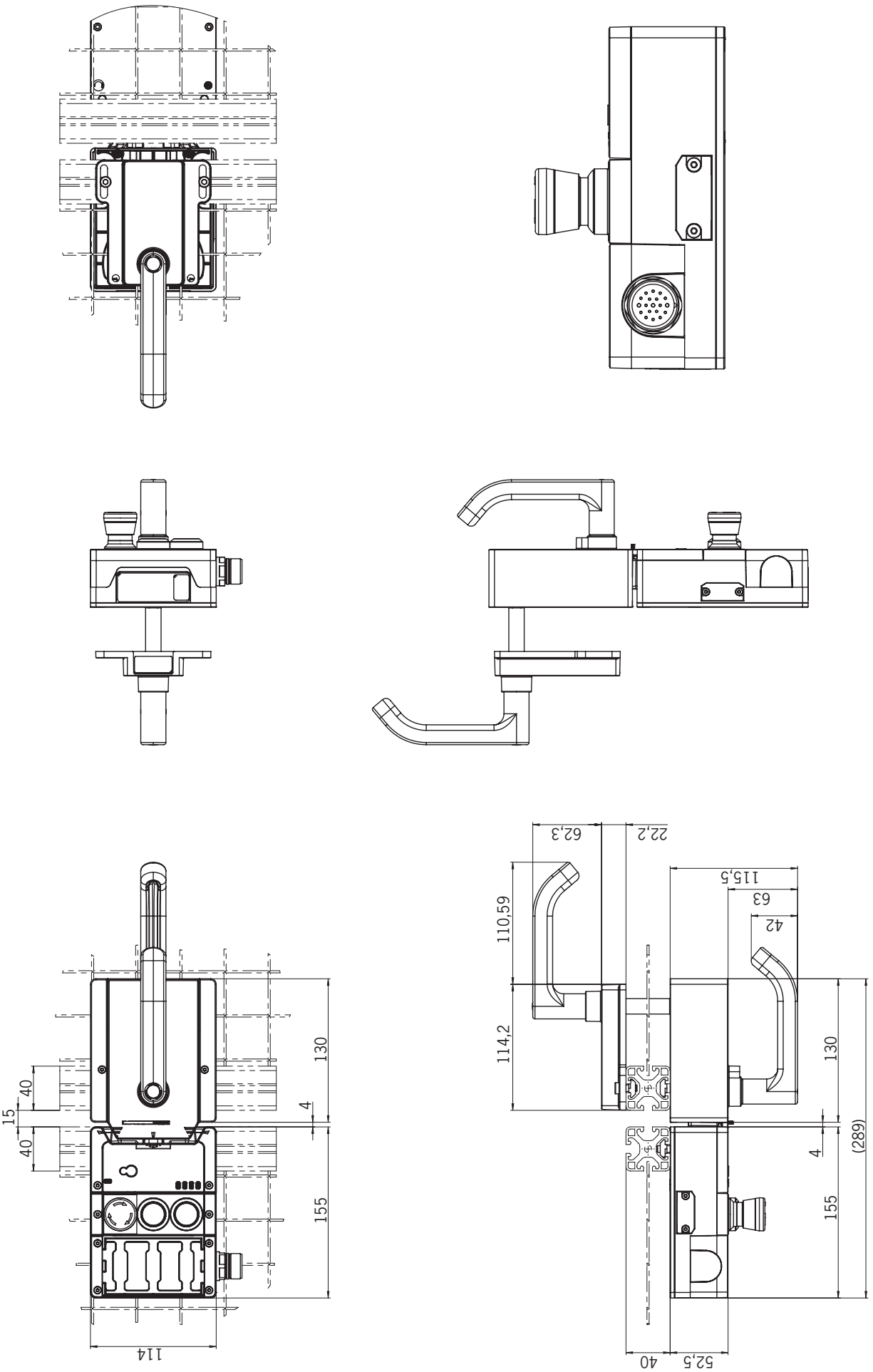


Figure 5: Dimension drawing MGB2 fitted, without optional mounting plates

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# 8. Manual release

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

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

## 8.1. Auxiliary release and auxiliary key release (can be retrofitted)

In the event of malfunctions, the guard locking can be released with the auxiliary release irrespective of the state of the solenoid.

The safety outputs ⊣ are switched off when the auxiliary release is actuated. Use the safety outputs ⊣ to generate a stop command.

The monitoring output OL is switched off; OD indicates the current state of the guard. Open the guard and close it again after resetting the auxiliary release. The device will then operate normally again.

### 8.1.1. Actuating auxiliary release

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

➡ Guard locking is released.

DIP

- When release monitoring is active, the system enters into a latching fault when the auxiliary 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 auxiliary release is actuated very slowly.

**Important!**

- The auxiliary release must be reset at the control system level, e.g. by means of a plausibility check (status of the safety outputs does not match the guard locking activation signal). See EN ISO 14119:2013, sec. 5.7.5.4.
- The auxiliary release is not a safety function.
- The machine manufacturer must select and use a suitable release (escape release, emergency unlocking, etc.) for a specific application. A hazard assessment is required for this purpose. It may be necessary to take specifications from a product standard into account.
- The correct function must be checked at regular intervals.
- Loss of the release function due to mounting errors or damage during mounting. Check the release function every time after mounting.
- Please observe the notes on any enclosed data sheets.

### 8.1.2. Actuating auxiliary key release

On devices with auxiliary key release (can be retrofitted), simply turn the key to release. Function as for auxiliary release. For mounting, see the auxiliary key release supplement.

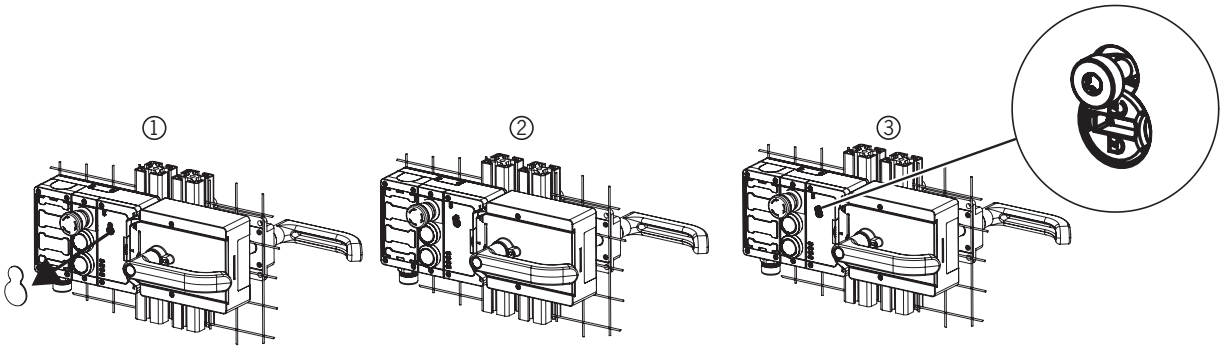



Figure 6: Auxiliary release

## 8.2. Emergency unlocking (can be retrofitted)

Permits opening of a locked guard from outside the danger zone without tools. For mounting, see the mounting supplement.

**Important!**

- It must be possible to operate the emergency unlocking manually from outside the protected area without tools.
- The emergency unlocking must possess a marking indicating that it may be used only in an emergency.
- The actuator must not be under tensile stress during manual release.
- The unlocking function meets all other requirements from EN ISO 14119.
- The emergency unlocking meets the requirements of Category B according to EN ISO 13849-1:2015.
- Loss of the release function due to mounting errors or damage during mounting.
- Check the release function every time after mounting.
- Please observe the notes on any enclosed data sheets.

### 8.2.1. Actuating emergency unlocking

- Turn emergency unlocking clockwise until it clicks into place.

➡ Guard locking is released.

To reset, press the snap-in bolt inward using a small screwdriver or similar tool and turn the emergency unlocking back.

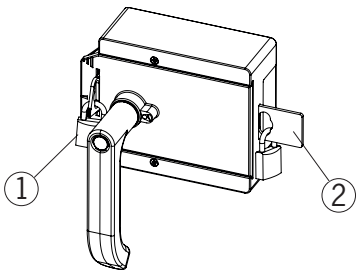
The safety outputs ⊣ are switched off when the emergency unlocking is actuated. Use the safety outputs ⊣ to generate a stop command.

The monitoring output OL is switched off; OD indicates the current state of the guard. Open the guard and close it again after resetting the emergency unlocking. The device will then operate normally again.

## 8.3. Lockout mechanism

If the lockout mechanism is pivoted out, the bolt tongue cannot be extended. The lockout mechanism can be secured with padlocks (see *Figure 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 Hinged lockout mechanism
Padlock ∅ min. 2 mm, ∅ max. 10 mm

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

**Notice:**
You can fit a maximum of 3 locks ∅ 8 mm per lockout mechanism.

Figure 7: Lockout mechanism secured with padlock

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## 8.4. Escape release (optional)

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

DIP

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.

Depending on the parameters set in your configuration environment, the system may enter into a latching fault if the escape release is actuated (see chapter *17. Troubleshooting and assistance on page 51*).

**Important!**

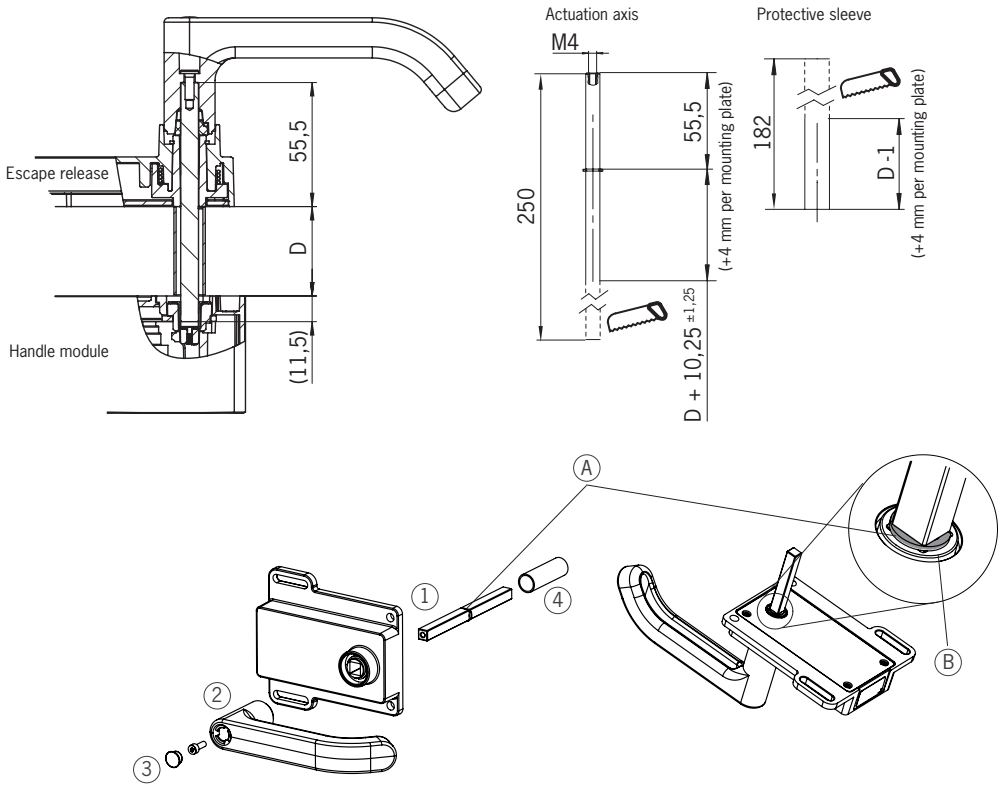
- It must be possible to actuate the escape release manually from inside the protected area without tools.
- It must not be possible to reach the escape release from the outside.
- The bolt tongue must not be under tensile stress during manual release.
- The escape release meets the requirements of Category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

- Fit escape release such that operation, inspection and maintenance 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 the chapter *8.4.1. Preparing escape release on page 19*.
- Align escape release axis at right angles to the handle module. See *Figure 9*.

### 8.4.1. Preparing escape release

| Profile width | Length required for Actuation axis | | Which EUCHNER parts are required? | Necessary work steps |
|---|---|---|---|---|
| | Without mounting plates | With mounting plates (4 mm each) | | |
| **D** | **D+9** | **D+17** | | |
| 30 mm | 39 mm | 47 mm | Standard escape release<br>with 107 mm axis<br>(order no. 100465) | Shorten to required length |
| 40 mm | 49 mm | 57 mm | Standard escape release<br>with 107 mm axis<br>(order no. 100465)<br>If necessary,<br>extended actuation axis (order no. 106761) | *Without mounting plates:*<br>None<br>*With mounting plates:*<br>Use extended actuation axis and protective sleeve and shorten to required length |
| 45 mm | 54 mm | 62 mm | Standard escape release<br>with 107 mm axis<br>(order no. 100465)<br>**and**<br>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<br>with 107 mm axis<br>(order no. 100465)<br>**and**<br>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 to 2 Nm and press in cap.
④ Fit protective sleeve.

Figure 8: Preparing escape release

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# 9. Mounting

**WARNING**

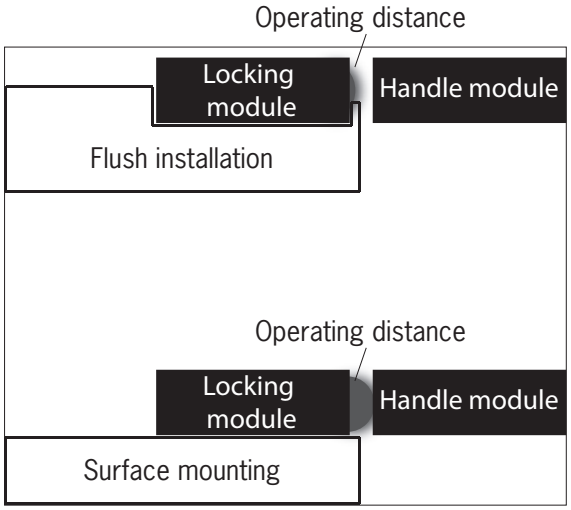
Mounting must be performed only by authorized personnel.

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!**

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




**Tip!**

- You will find an animation on the mounting process at www.euchner.com.
- The pushbuttons and indicators can be customized using replaceable color covers and labels.

For mounting steps , see *Figure 9* and *Figure 12* to *Figure 17*.

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

The locking screw must be screwed back in and sealed after assembly and after every use of the auxiliary release. (Seal labels order no. 155853). Tightening torque 0.5 Nm.

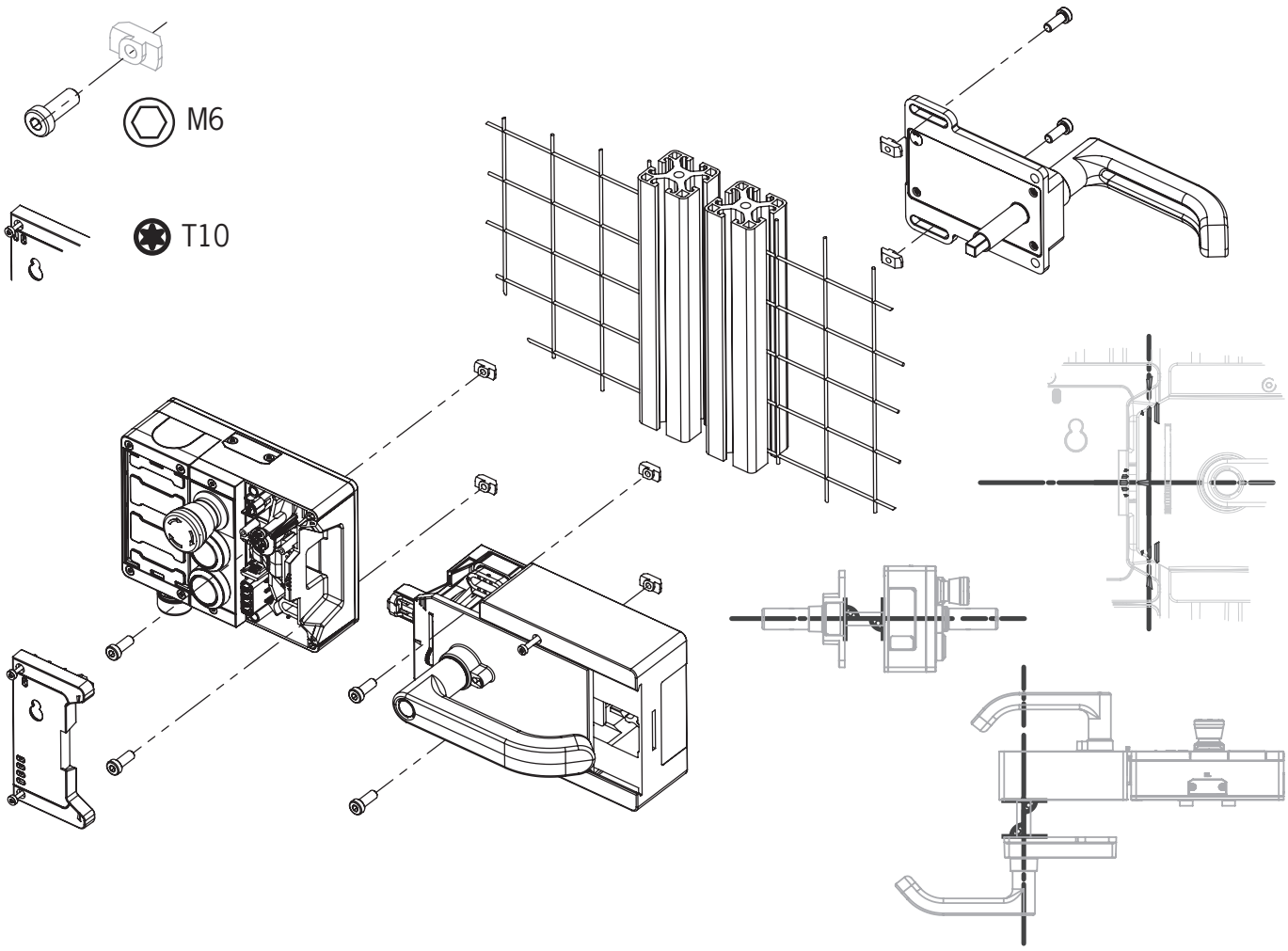



Figure 9: Installation example for door hinged on the right (general view)