

EUCHNER


Operating Instructions

**Transponder-Coded Safety Switch With Guard Locking
CTP/CTA-L1/2-BR Unicode/Multicode**

EN

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1. About this document





1.1. Scope

These operating instructions are valid for all CTP-L1/2-BR and CTA-L1/2-BR... from version V1.0.0. These operating instructions, the document *Safety information* and any enclosed data sheet form the complete user information for your device.

1.2. Target group




Design engineers and installation planners for safety devices on machines as well as setup and servicing staff possessing special expertise in handling safety components.


1.3. Key to symbols

Symbol/depiction	Meaning
	Printed document
	Document is available for download at www.euchner.com
 DANGER WARNING CAUTION	Safety precautions Danger of death or severe injuries Warning about possible injuries Caution slight injuries possible
 NOTICE Important!	Notice about possible device damage Important information
Tip	Useful information

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 (2537376)	(this document)	
Possibly enclosed data sheet	Item-specific information about deviations or additions	

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

Safety switches series CTP-L1/2-... and CTA-L1/2-... are interlocking devices with guard locking solenoid (type 4). The device meets the requirements according to EN IEC 60947-5-3. Devices with unicode evaluation possess a high coding level, devices with multicode evaluation possess a low coding level.

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

This means:

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

Devices from this series are also suitable for process protection.

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 switch is allowed to be operated only in conjunction with the intended EUCHNER actuator and the related connection components from EUCHNER. On the use of different actuators or other connection components, EUCHNER provides no warranty for safe function.

Connection of several devices in a BR switch chain is permitted only using devices intended for series connection in a BR switch chain. Check this in the instructions of the device in question.



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.
- › It is only allowed to use components that are permissible in accordance with the table below.

Table 1: Possible combinations for CTP/CTA components

Safety switch	Actuator	
	A-C-H...	A-C-H...-165497
CTP-L1/2-BR Unicode/Multicode	●	
CTA-L1/2-BR Unicode/Multicode	●	●
Key to symbols	●	Combination possible

3. Description of the safety function

Devices from this series feature the following safety functions:

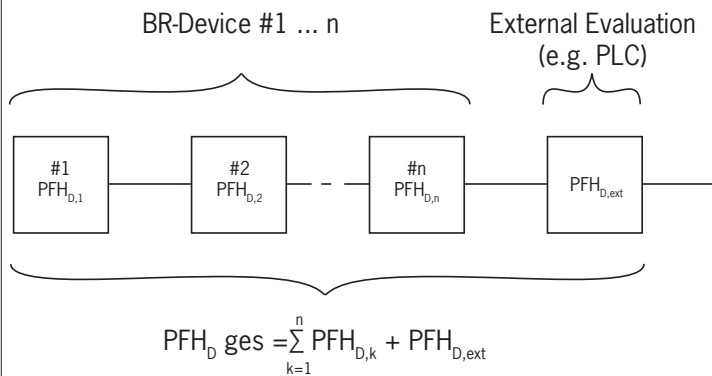
Monitoring of guard locking and the position of the guard (interlocking device with guard locking according to EN ISO 14119)

- Safety function (see chapter 6.5. *Switching states on page 11*):
 - The safety outputs are switched off when guard locking is released (monitoring of the locking element).
 - The safety outputs are switched off when the guard is open (monitoring of the door position).
 - Guard locking can be activated only when the actuator is located in the switch head (prevention of inadvertent locking position (faulty closure protection)).
 - The following additionally applies in a BR series connection: the safety outputs are switched on only when the device receives a corresponding signal from its predecessor in the chain.
- Safety characteristics: category, Performance Level, PFH_D (see chapter 14. *Technical data on page 38*).



NOTICE

You can regard the complete BR device chain as one subsystem during calculation. The following calculation method applies to the PFH_D value:



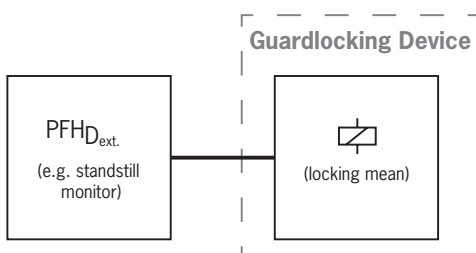
Alternatively, the simplified method according to section 6.3 of EN 13849-1:2015 can be used for calculation.

Control of guard locking for variants with IMP/IMM connection

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

The device does not feature a safety characteristic for the control of the guard locking, because the guard locking solenoid is completely disconnected from outside the device (no control function within the device). It therefore does not contribute to the failure probability.

The safety level for the control of the guard locking is defined only by the external control (e.g. PFH_{D, ext.} for the standstill monitor).



Control of guard locking via IO-Link communication

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

The device does not feature a safety characteristic for the control of the guard locking.

4. Exclusion of liability and warranty

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

5. General safety precautions

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

Check the safe function of the safeguard particularly

- › after any setup work
- › after the replacement of a system component
- › after an extended period without use
- › after every fault

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 must be triggered only by actuators designated for this purpose.
- › 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

The device permits the locking of movable guards.

The system consists of the following components: coded actuator (transponder) and switch.

Whether the device learns the complete actuator code (unicode) or not (multicode) depends on the respective version.

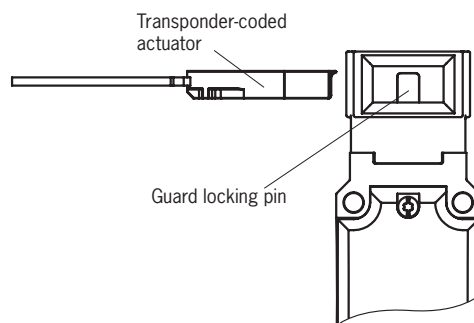
- ▶ **Devices with unicode evaluation:** The actuator must be assigned to the safety switch by a teach-in operation so that it is detected by the system. This unambiguous assignment ensures a particularly high level of protection against tampering. The system thus possesses a high coding level.
- ▶ **Devices with multicode evaluation:** Unlike systems with unicode evaluation, on multicode devices a specific code is not requested but instead it is only checked whether the actuator is of a type that can be detected by the system (multicode evaluation). There is no exact comparison of the actuator code with the taught-in code in the safety switch (unicode evaluation). The system possesses a low coding level.

When the guard is closed, the actuator is moved into the safety switch. When the operating distances are reached, power is supplied to the actuator by the switch and data are transferred.

If a permissible code is detected, the safety outputs are switched on.

The safety outputs are switched off when the guard is released.

In the event of a fault in the safety switch, the safety outputs are switched off and the DIA LED illuminates red. The occurrence of faults is detected at the latest on the next demand to close the safety outputs (e.g. on starting).



6.1. Guard lock monitoring

All versions feature two safe outputs for monitoring guard locking. The safety outputs FO1A and FO1B are switched off when guard locking is released.

6.2. Monitoring outputs/status bits

Depending on version, the signals listed in the following are available as a status bit or on the monitoring output. The status bits are evaluated via the BR/IO-Link Gateway. Please refer to the enclosed data sheet for further information.

6.2.1. Guard locking signal OL

The guard locking signal is present if the guard locking is active.

6.2.2. Door position signal OD

The door position signal is sent as soon as the actuator is inserted into the switch head (state: guard closed and not locked). The signal is also present if the guard locking is active.

6.2.3. Diagnostic signal OI

The diagnostic signal is present if there is an error (switch-on condition as for DIA LED).

6.2.4. Escape release signal OER

The escape release signal is present if the device has been released manually (see chapter 7. *Manual release on page 13*). The signal is reset if the guard locking is re-activated or the reset function has been activated.

6.2.5. Status signal OM

The status signal is present if the device's safety outputs are switched.

6.2.6. Locking element signal OLS

The locking element signal is present if the locking element is stuck and it is therefore not possible to activate/deactivate guard locking. The signal is reset as soon as the actuator is no longer under tensile stress.

6.2.7. Communication connection C

A monitoring output with the suffix C has the additional function of providing a communication connection to a BR/IO-Link Gateway. The switch delivers cyclical and acyclical data. You will find an overview of the communication data in chapter 11. *Using communication data on page 32.*

If no BR/IO-Link Gateway is connected, this output behaves like a monitoring output.

6.3. Version CTP/CTA Extended

Devices in the Extended version contain additional controls/indicators in the housing cover. Please refer to the enclosed data sheet for further information.

6.4. Guard locking

6.4.1. Guard locking on version CTP/CTA-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!

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.

The actuator cannot be pulled out of the switch and the guard is locked as long as the guard locking pin is extended.

If a voltage is applied to the guard locking solenoid, the guard locking pin is retracted and the actuator is released. The guard can be opened.

6.4.2. Guard locking on version CTP/CTA-L2

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



Important!

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

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 a voltage is applied to the guard locking solenoid, the guard locking pin is held in the extended position and the guard is locked.

6.4.3. Guard locking on version CTP/CTA-L1 and control via IO-Link communication

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

Activating guard locking: close guard; no auxiliary voltage at the solenoid and set bit CL.

Releasing guard locking: apply auxiliary voltage to the solenoid and clear bit CL.

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



Important!

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.

The actuator cannot be pulled out of the switch and the guard is locked as long as the guard locking pin is extended.

If the auxiliary voltage is applied to the guard locking solenoid, the guard locking pin is retracted and the actuator is released. The guard can be opened.

6.4.4. Guard locking on version CTP/CTA-L2 and control via IO-Link communication

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



Important!

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

Activating guard locking: apply auxiliary voltage to the solenoid and set bit CL.

Releasing guard locking: disconnect auxiliary voltage from the solenoid and clear bit CL.

The magnetically actuated guard locking operates in accordance with the open-circuit current principle. If the auxiliary 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 auxiliary voltage is applied to the guard locking solenoid.

If the auxiliary voltage is applied to the guard locking solenoid, the guard locking pin is held in the extended position and the guard is locked.

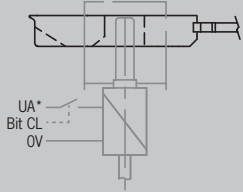
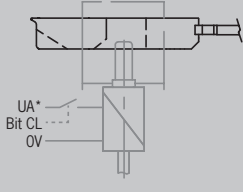
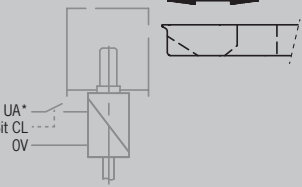

6.5. Switching states

The detailed switching states for your switch can be found in the system status table (see chapter 13. *System status table CTP/CTA-L1/2-BR on page 37*). All safety outputs, signals and display LEDs are described there.

6.5.1. Switching states on version CTP/CTA-L1/L2

	Guard closed and locked	Guard closed and not locked	Guard open
Voltage at guard locking solenoid CTP/CTA-L1	off	on	(irrelevant)
Voltage at guard locking solenoid CTP/CTA-L2	on	off	(irrelevant)
Safety outputs F01A and F01B	on	off	off
Guard locking signal OL	on	off	off
Door position signal OD	on	on	off

6.5.2. Switching states on version CTP/CTA-L1/L2 with control via IO-Link communication

	Guard closed and locked		Guard closed and not locked		Guard open
					
(Auxiliary) voltage* at guard locking solenoid CTP/CTA-L1	on	off*	on		irrelevant
Bit CL	0	irrelevant	1		
(Auxiliary) voltage* at guard locking solenoid CTP/CTA-L2	on		on	off*	irrelevant
Bit CL	1		0	irrelevant	
Safety outputs F01A and F01B 	on		off		off
Guard locking signal OL	on		off		off
Door position signal OD	on		on		off

* In some product variants the auxiliary voltage UA is connected internally to the operating voltage UB.

7. Manual release



Important!

No further release functions can be retrofitted on Extended variants with control elements in position 1 (S1) and position 2 (S2).

Some situations require the guard locking to be released manually (e.g. malfunctions or an emergency). A function test must 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:

7.1. Auxiliary release and auxiliary key release

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

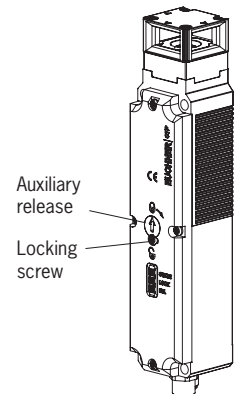
The safety outputs are switched off when the auxiliary release or the auxiliary key release is actuated. Use the safety outputs to generate a stop command.

The guard locking signal OL is switched off; the door position signal OD can assume an undefined state. Open the guard and close it again after resetting the auxiliary release or auxiliary key release. The device will then operate normally again.




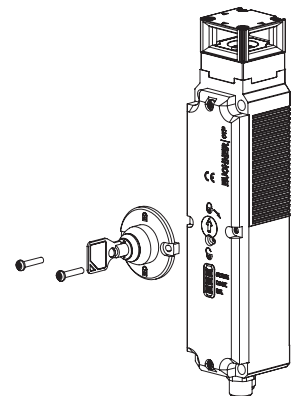
Important!

- ▶ The actuator must not be under tensile stress during manual release.
- ▶ To prevent tampering, the auxiliary release must be sealed (with sealing lacquer, for example) before the switch is set up.
- ▶ After use, reset the auxiliary release and screw in and seal the locking screw (with sealing lacquer, for example).
- ▶ The auxiliary key release must not be used to lock the switch during servicing to prevent activation of guard locking, for example.
- ▶ Loss of the release function due to mounting errors or damage during mounting.
- ▶ Check the release function every time after mounting.
- ▶ Observe the notes on any enclosed data sheets.



7.1.1. Actuating auxiliary release

1. Unscrew locking screw.
 2. Using a screwdriver, turn the auxiliary release to  in the direction of the arrow.
- ➔ Guard locking is released.



7.1.2. 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.

7.2. Emergency release

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 release manually from outside the protected area without tools.
- › The emergency release 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 emergency release must be sealed or the misuse of the release function must be prevented in the control system.
- › The release function meets all other requirements from EN ISO 14119.
- › The emergency release 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.
- › Observe the notes on any enclosed data sheets.

7.2.1. Actuating emergency release

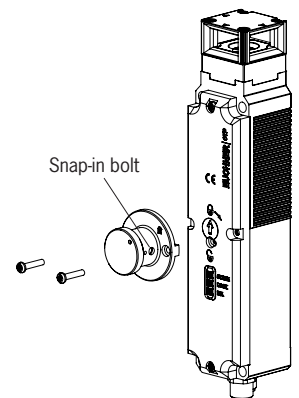
› Turn the emergency release clockwise until it clicks into place.

➔ Guard locking is released.

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

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

The guard locking signal OL is switched off; the door position signal OD can assume an undefined state. Open the guard and close it again after resetting the emergency release. The device will then operate normally again.



7.3. Escape release

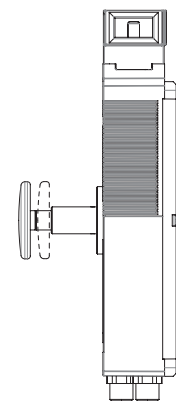
The escape release is optional on CTP devices; on CTA devices it is optional or can be retrofitted.

Permits opening of a locked guard from the danger zone without tools (see chapter 14.5.1. *Dimension drawing for safety switch CTP... on page 42*).



Important!

- › It must be possible to operate 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 13849-1:2015.



7.3.1. Actuating escape release

- › Press the red release knob to the end stop.
- ➔ Guard locking is released.

Pull the knob out again to reset.

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

The guard locking signal OL is switched off; the door position signal OD can assume an undefined state. Open the guard and close it again after resetting the escape release. The device will then operate normally again.

7.4. Wire front release (bowden)

Release via a pull wire. Depending on the type of attachment, the wire front release can be used as an emergency release or escape release.

The following applies to non-latching wire front releases.

If the release is to be used as an emergency release, one of the following measures must be taken (see EN ISO 14119:2013, section 5.7.5.3):

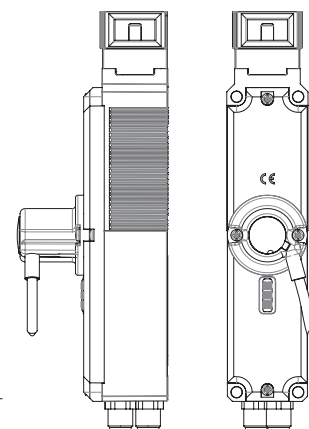
- › Install the release so that it can be reset only with the aid of a tool.
- › Alternatively, resetting can be realized at the control-system level by means of a plausibility check (status of the safety outputs does not match the guard locking control signal), for example.

The emergency-release specifications in chapter 7.2 on Page 14 apply irrespective of this information.



Important!

- › The wire front release meets the requirements of Category B according to EN ISO 13849-1:2015.
- › The correct function depends on the laying of the pull wire and the attachment of the pull handle. The plant manufacturer is responsible for proper installation; the notes from chapter 7.4.1 on Page 16 must be observed.
- › The actuator must not be under tensile stress during manual release.



7.4.1. Laying wire front release



Important!

- › Loss of the release function due to mounting errors, damage or wear.
- › Check the release function every time after mounting.
- › When routing the wire front release, ensure that it operates smoothly.
- › Observe the min. bending radius (100 mm) and minimize the number of bends.
- › The switch is not allowed to be opened.
- › Please observe the notes on the enclosed data sheets.

8. Changing the approach direction

The approach direction needs to be changed only if the switch is to be approached from the rear.

Proceed as follows:

1. Remove the screws from the safety switch.
2. Set the required direction.
3. Tighten the screws with a torque of 1.2 Nm.

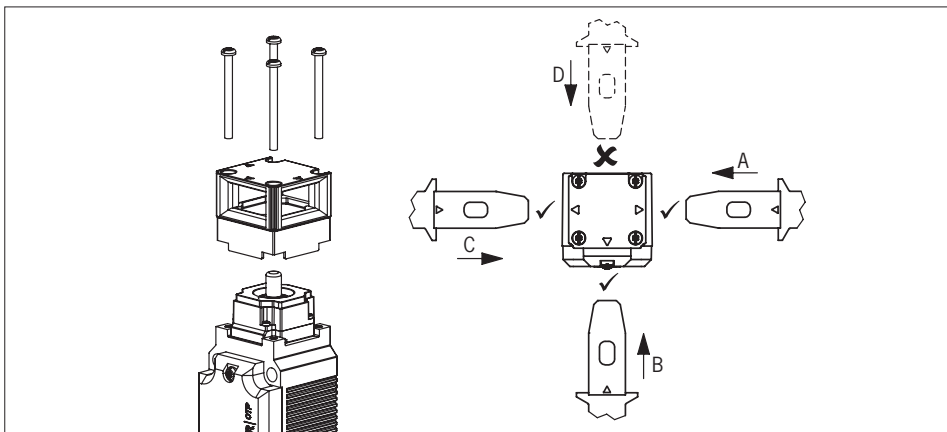


Figure 1: Changing the approach direction

9. Mounting



CAUTION

Safety switches must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

- › Observe EN ISO 14119:2013, section 7, for information about reducing the possibilities for bypassing an interlocking device.



CAUTION

Risk of damage to equipment and malfunctions as a result of incorrect installation.

- › Safety switches and actuators must not be used as an end stop.
- › Observe EN ISO 14119:2014, sections 5.2 and 5.3, for information about mounting the safety switch and the actuator. The following specifications must be observed:
 - Mounting with screws of property class 8.8 or higher.
 - The minimum screw diameter for CTP devices is 4 mm, for CTA devices 5 mm.
 - Secure the fixing material against loosening (e.g. by means of medium-strength positive screw locking).
- › Protect the switch head against damage, as well as penetrating foreign objects such as swarf, sand and blasting shot, etc.
- › Observe the min. door radii (see chapter 14.6.1. *Dimension drawing for actuator CTP/CTA... on page 46*).
- › Observe the tightening torque for mounting the switch:
 - For CTP devices: max. 1.4 Nm
 - For CTA devices: max. 6 Nm



CAUTION

Device damage or malfunctions caused by material changes due to the environment.

- › In accordance with section 6.3 of EN ISO 14119:2014, the environmental influences (e.g. direct UV radiation or corrosion) must be checked before a guard locking device is used.
- › Contact the manufacturer if you have any questions about environmental influences or about use in aggressive environments.

A clearance of 12 mm must be maintained around the actuator head (see *Figure 2*).

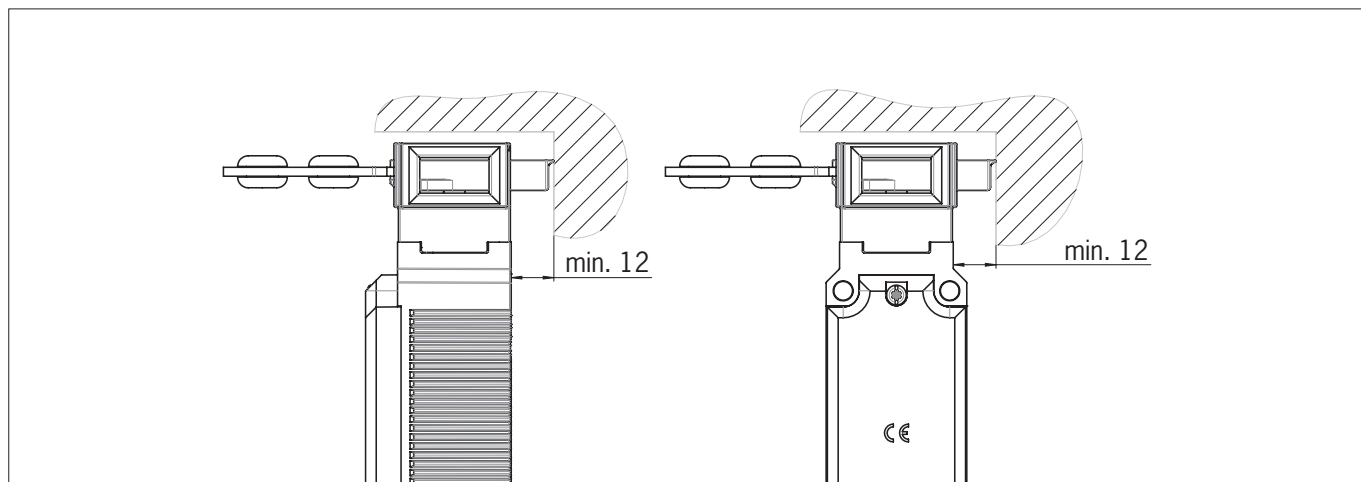


Figure 2: Actuator head clearance

10. Electrical connection

The following connection options are available:

- › Separate operation
- › Series connection with Y-distributors or passive distribution modules
- › Series connection, e.g. with wiring in the control cabinet
- › Connection to a BR/IO-Link Gateway GWY-CB-1-BR-IO
- › Connection to a safety relay ESM-CB with integrated BR/IO-Link Gateway



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.
- › 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.

- › In devices with IMP/IMM inputs, the power supply for the evaluation electronics is electrically isolated from the power supply for the guard locking solenoid.
- › Do not use a control system with pulsing or switch off the pulsing function in your control system. The device generates its own test pulses on the safety outputs. A downstream control system must tolerate these test pulses, which may have a length of up to 300 µs. The test pulses are output only with the safety outputs switched off during device start. Depending on the inertia of the downstream device (control system, relay, etc.), this can lead to short switching processes.
- › The inputs on an evaluation unit connected must be positive-switching, as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.
- › All the electrical connections must either be isolated from the mains supply by a safety transformer according to IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures (PELV).
- › 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 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 EN 60204-1:2006, section 4.4.2 (EMC).
- › Pay attention to any interference fields from devices such as frequency converters or induction heating systems. Observe the EMC instructions in the manuals from the respective manufacturer.




Important!

If the device does not appear to function when operating voltage is applied (e.g. green STATE LED does not flash), the safety switch must be returned unopened to the manufacturer.

10.1. 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 30 V DC power supply to the device as per the  requirements. Please note possibly lower connection ratings for your device (refer to the technical data).
- For use and application as per the requirements of UL ¹⁾ a connecting cable listed under the UL category code CYJV/7, min. 24 AWG, min. 80 °C, must be used.

1) Note on the scope of the UL approval: the devices have been tested as per the requirements of UL508 and CSA/ C22.2 no. 14 (protection against electric shock and fire).

10.2. Safety in case of faults

- The operating voltage U_B and the solenoid operating voltage U_{IMP} are reverse polarity protected.
- The safety outputs FO1A/FO1B are short circuit-proof.
- A short circuit between FO1A and FO1B is detected by the switch.
- A short circuit in the cable can be excluded by laying the cable with protection.

10.3. Fuse protection for power supply

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

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

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

$$I_{UB} = \text{Switch operating current (40 mA)}$$

$$I_{OX} = \text{Load current of monitoring output (max. 50 mA per monitoring output)}$$

$$I_{FO1A+FO1B} = \text{Load current of safety outputs FO1A + FO1B (2 x max. 150 mA)}$$



Important!

If there are further monitoring outputs, their load current must be taken into account.

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

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

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

10.4. Requirements for connecting cables



CAUTION

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

- › Use connection components and connecting cables from EUCHNER.
- › 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:

For safety switches CTP/CTA-...-BR-...-SAB-... with plug connectors 2 x M12

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
Recommended cable type	LIYY 8 x 0.25 mm ² or 5 x 0.34 mm ²	

For safety switches CTP/CTA-...-BR-...-SA-... with plug connector M12, 8-pin

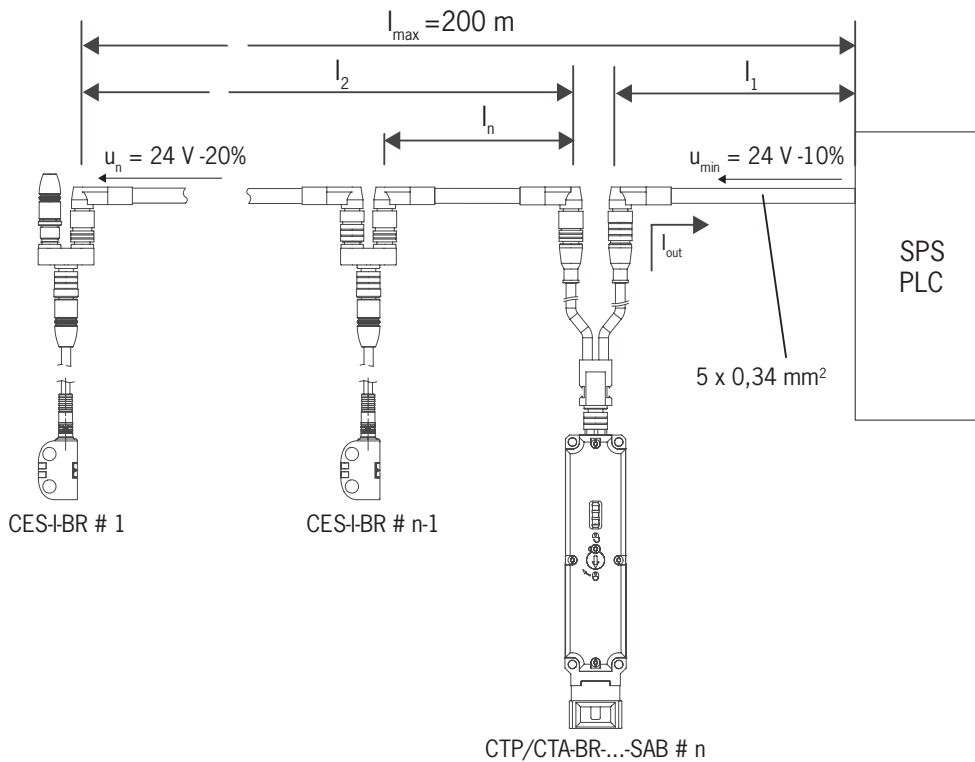
Parameter	Value	Unit
Conductor cross-section, min.	0.25	mm ²
R max.	60	Ω/km
C max.	120	nF/km
L max.	0.65	mH/km
Recommended cable type	LIYY 8 x 0.25 mm ²	

For safety switches CTP/CTA-...-BR-...-SH-... with plug connector M23 (RC18)

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
Recommended cable type	LIYY 8 x 0.25 mm ²	

10.5. Maximum cable lengths

For devices with IMP/IMM inputs, switch chains are permitted up to a maximum overall cable length of 200 m taking into account the voltage drop as a result of the cable resistance (see table below with example data and case example).



n Max. number of switches	$I_{FO1A/FO1B}$ (mA) Possible output current per channel FO1A/FO1B	l_1 (m) Max. cable length from the last switch to the control system
5	10	150
	25	100
	50	80
	100	50
	150	25
6	10	120
	25	90
	50	70
	100	50
	150	25
10	10	70
	25	60
	50	50
	100	40
	150	25

10.5.1. Determining cable lengths using the example table

Example: 6 switches are to be used in series. Cabling with a length of 40 m is routed from a safety relay in the control cabinet to the last switch (#6). Cables with a length of 20 m each are connected between the individual safety switches.

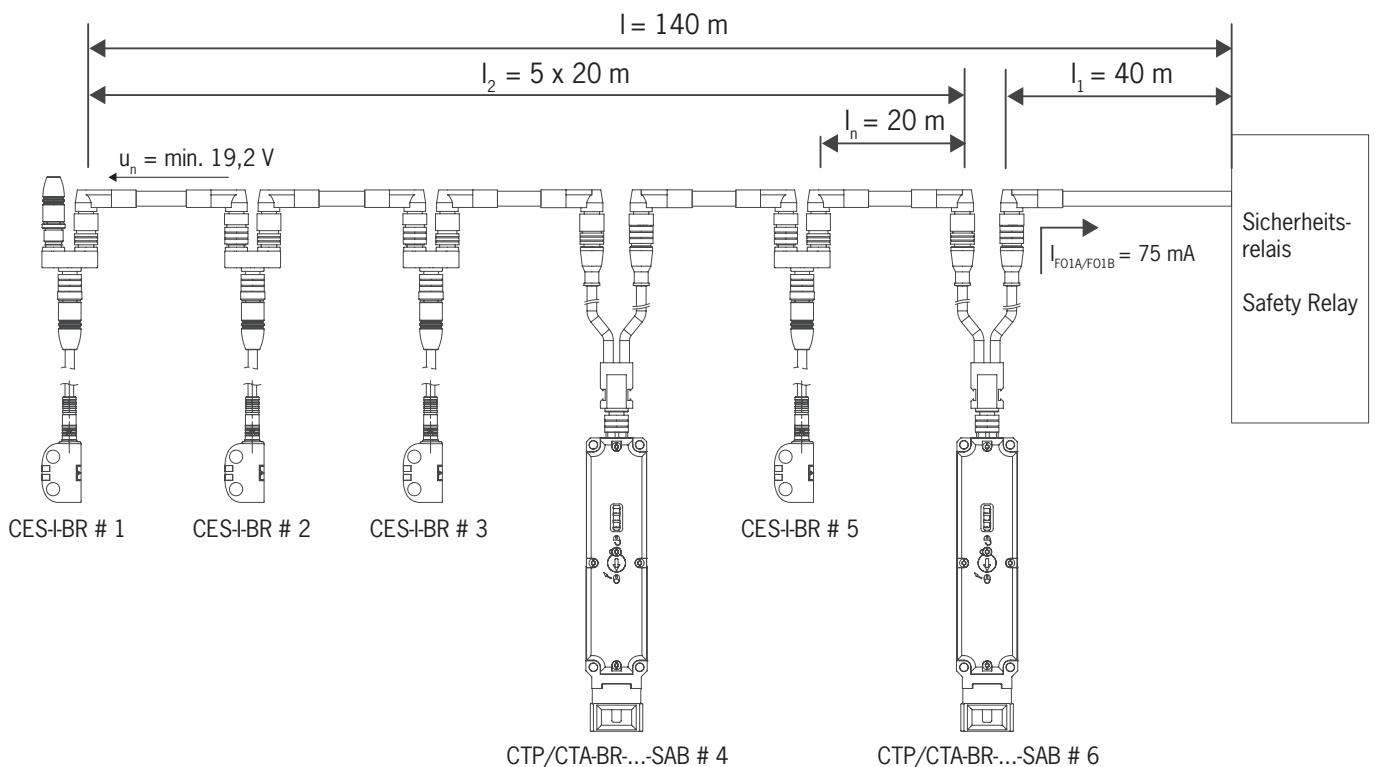


Figure 3: Circuit example with six CES-C07/CTP/CTA-BR...-SAB

A safety relay is connected downstream that consumes 75 mA at each of the two safety inputs. This operates over the whole temperature range with a voltage of 19.2 V (corresponds to 24 V -20%).

All the relevant values can now be determined using the example table:

1. Select the corresponding section in the column n (max. number of switches). In this case: 6 switches.
 2. In the column $I_{F01A/F01B}$ (possible output current per channel F01A/F01B), find a current greater than or equal to 75 mA. In this case: 100 mA.
- ➔ It is then possible to determine the maximum cable length from the last switch (#6) to the control system from column l_1 . In this case, a length of 50 m is permitted.

Result: The desired cable length l_1 of 40 m is below the permitted value from the table. The overall length of the switch chain l_{max} of 140 m is less than the maximum value of 200 m.

- ➔ The planned application is therefore functional in this form.

10.6. Connector assignment of safety switches CTP/CTA-...-BR-...-SAB-... with plug connectors 2 x M12

Plug connector (view of connection side)	Pin	Designation	Function	Conductor coloring of connecting cable ¹⁾
<p>2 x M12</p>	X 1.1	F11B	Enable input, channel B	WH
	X 1.2	UB	Electronics operating voltage, 24 V DC	BN
	X 1.3	FO1A	Safety output, channel A	GN
	X 1.4	FO1B	Safety output, channel B	YE
	X 1.5	OL/C	Guard lock monitoring output/communication	GY
	X 1.6	F11A	Enable input, channel A	PK
	X 1.7	OVUB	Electronics operating voltage, 0 V DC	BU
	X 1.8	RST	Reset input	RD
	X 2.1	IMM	Solenoid operating voltage, 0 V DC	BN
	X 2.2	OD	Door position monitoring output	WH
	X 2.3	OI	Diagnostic monitoring output	BU
	X 2.4	IMP	Solenoid operating voltage, 24 V DC	BK
	X 2.5	-	n.c.	GY

1) Only for standard EUCHNER connecting cable.

10.7. Connector assignment of safety switches CTP/CTA-...-BR-...-AZDE-SAB-... with plug connectors 2 x M12

Plug connector (view of connection side)	Pin	Designation	Function	Conductor coloring of connecting cable ¹⁾
<p>2 x M12</p>	X 1.1	F11B	Enable input, channel B	WH
	X 1.2	UB	Electronics operating voltage, 24 V DC	BN
	X 1.3	FO1A	Safety output, channel A	GN
	X 1.4	FO1B	Safety output, channel B	YE
	X 1.5	OD/C	Door position monitoring output/communication	GY
	X 1.6	F11A	Enable input, channel A	PK
	X 1.7	OV	Electronics and solenoid operating voltage, 0 V DC	BU
	X 1.8	UA	Solenoid (auxiliary) voltage, 24 V DC (connected internally to UB)	RD
	X 2.1	S1.A1	Emergency stop (channel A contact 1)	BN
	X 2.2	S1.B1	Emergency stop (channel B contact 1)	WH
	X 2.3	-	n.c.	BU
	X 2.4	S1.A2	Emergency stop (channel A contact 2)	BK
	X 2.5	S1.B2	Emergency stop (channel B contact 2)	GY

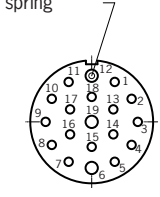


1) Only for standard EUCHNER connecting cable.

10.8. Connector assignment of safety switches CTP/CTA-...-BR-...-SA-... with plug connector M12, 8-pin

Plug connector (view of connection side)	Pin	Designation	Function	Conductor coloring of connecting cable ¹⁾
<p>1 x M12</p>	1	F11B	Enable input, channel B	WH
	2	UB	Electronics operating voltage, 24 V DC	BN
	3	FO1A	Safety output, channel A	GN
	4	FO1B	Safety output, channel B	YE
	5	OD/C	Door position monitoring output/communication	GY
	6	F11A	Enable input, channel A	PK
	7	OV	Electronics and solenoid operating voltage, 0 V DC	BU
	8	IMP	Solenoid operating voltage, 24 V DC	RD

1) Only for standard EUCHNER connecting cable.

10.9. Connector assignment of safety switches CTP/CTA-...-BR-...-SH-... with plug connector M23 (RC18)

Plug connector (view of connection side)	Pin	Designation	Function	Conductor coloring of connecting cable ¹⁾
<p>M23 (RC18)</p> <p>With shield spring</p> 	1	IMP	Solenoid operating voltage, 24 V DC	VT
	2	FI1A	Enable input, channel A	RD
	3	FI1B	Enable input, channel B	GY
	4	FO1A	Safety output, channel A 	RD/BU
	5	FO1B	Safety output, channel B 	GN
	6	UB	Electronics operating voltage, 24 V DC	BU
	7	RST	Reset input	GY/PK
	8	OD/C	Door position monitoring output/communication	GN/WH
	9	OI	Diagnostic monitoring output	YE/WH
	10	OL	Guard lock monitoring output	GY/WH
	11	-	n.c.	BK
	12	FE	Functional earth (must be connected to meet the EMC requirements)	GN/YE
	13	-	n.c.	PK
	14	-	n.c.	BN/GY
	15	-	n.c.	BN/YE
	16	-	n.c.	BN/GN
	17	-	n.c.	WH
	18	IMM	Solenoid operating voltage, 0 V DC	YE
	19	OVUB	Electronics operating voltage, 0 V DC	BN

1) Only for standard EUCHNER connecting cable.

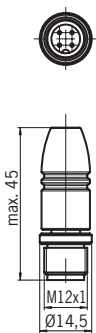
10.10. Connector assignment, Y-distributor for series connection without IO-Link communication

(Only for version with plug connectors 2 x M12)

Connector assignment for safety switch CTP/CTA-L1/2-BR (plug X1, 8-pin plug) and Y-distributor (8-pin socket)

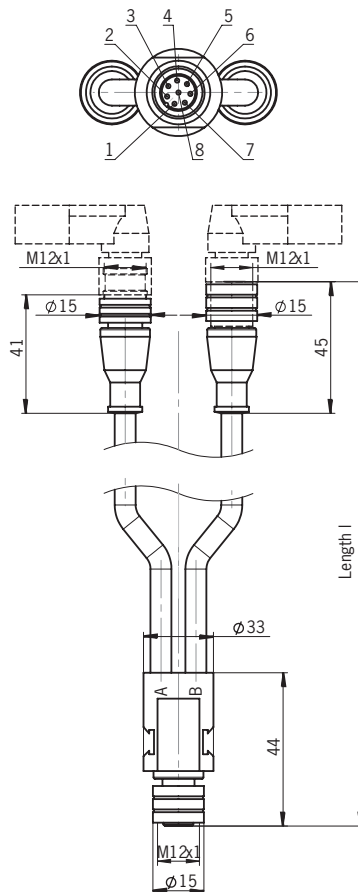
Pin	Function
X1.1	F11B
X1.2	UB
X1.3	F01A
X1.4	F01B
X1.5	n.c.
X1.6	F11A
X1.7	OVUB
X1.8	*

Strapping plug 097645
4-pin, plug
(figure similar)



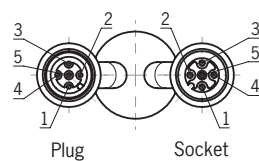
Y-distributor with connecting cable 111696 or 112395

Socket



Order no.	Length l [mm]
111696	200
112395	1,000

Pin	Function
X2.1	UB
X2.2	F01A
X2.3	OVUB
X2.4	F01B
X2.5	*



Pin	Function
X3.1	UB
X3.2	F11A
X3.3	OVUB
X3.4	F11B
X3.5	*

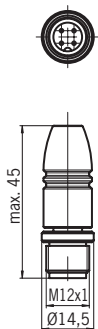
* Function and compatibility are dependent on the pin assignment of the device connected.

10.11. Connector assignment, Y-distributor for series connection with IO-Link communication

Connector assignment of safety switch CTP/CTA-L1/2-BR (8-pin plug) and Y-distributor (8-pin socket)

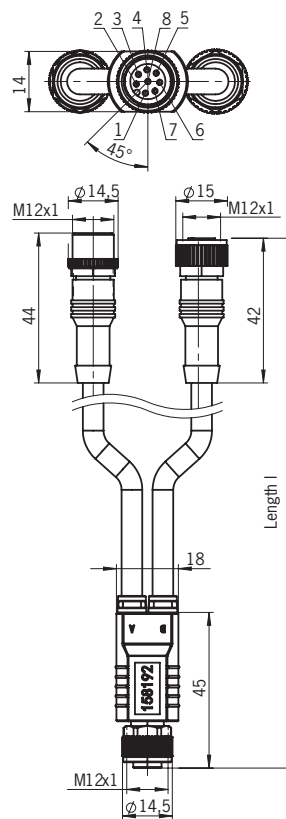
Pin	Function
X1.1	F1B
X1.2	UB
X1.3	F01A
X1.4	F01B
X1.5	C
X1.6	F1A
X1.7	OVUB
X1.8	n.c.

Strapping plug 097645
4-pin, plug
(figure similar)



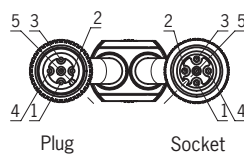
Y-distributor with connecting cable 158192 or 158193

Socket



Order no.	Length l [mm]
158192	200
158193	1,000

Pin	Function
X2.1	UB
X2.2	F01A
X2.3	OVUB
X2.4	F01B
X2.5	C



Pin	Function
X3.1	UB
X3.2	F1A
X3.3	OVUB
X3.4	F1B
X3.5	C

10.12. Connection of a single CTP/CTA-BR (separate operation)

If a single CTP/CTA-BR is used, connect the device as shown in *Figure 4*. The monitoring outputs can be routed to a control system.

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 s. The RST input must be connected to 0 V if it is not used.

If there is an internal error (see chapter 13. *System status table CTP/CTA-L1/2-BR on page 37*), the reset does not work.



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.



Important!

▸ The example shows only an excerpt that is relevant for connection of the CTP/CTA system. The example illustrated here does not show complete system planning. The user is responsible for safe integration into the overall system. Detailed application examples can be found at www.euchner.com. Simply enter the order number of your switch in the search box. You will find all available connection examples for the device in *Downloads*.

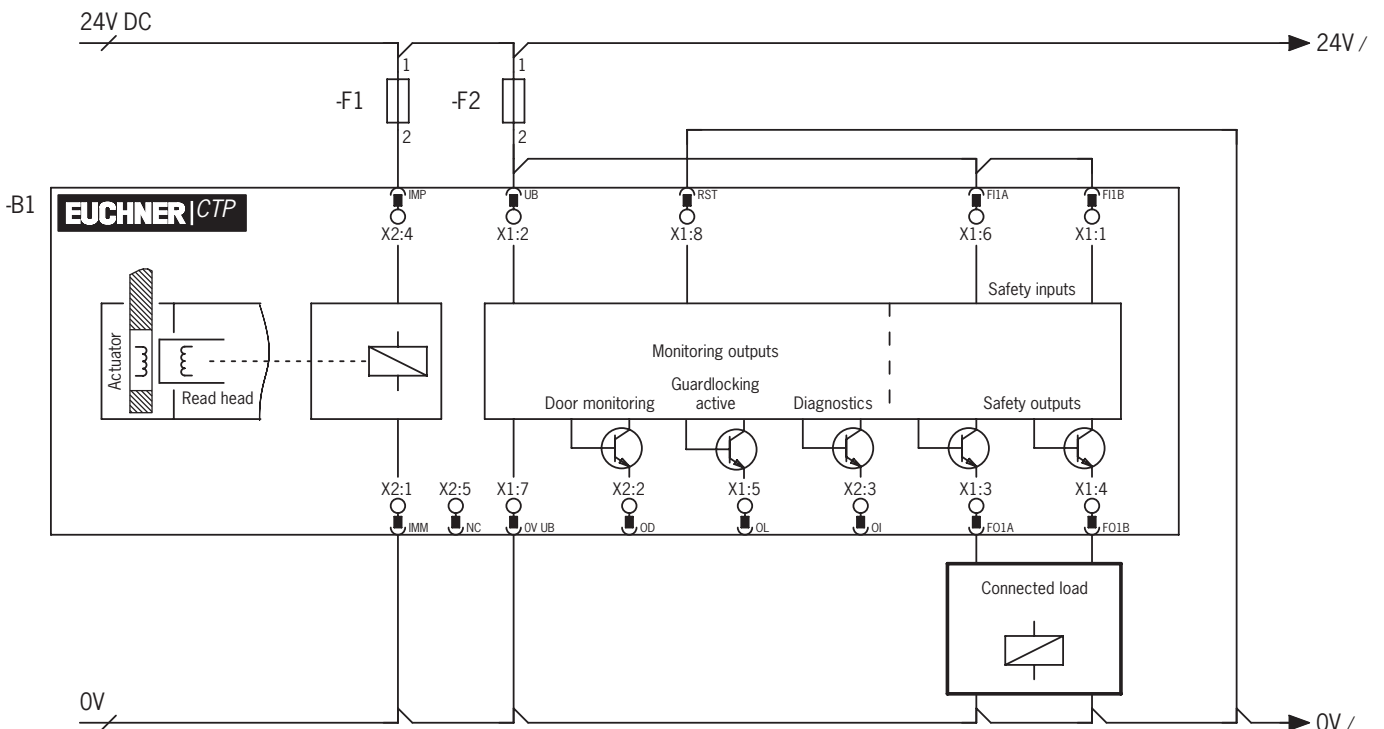


Figure 4: Connection example for separate operation, version with plug connectors 2xM12

10.13. Connection of several devices in a switch chain (series connection)



Important!

- › A BR switch chain may contain a maximum of 20 safety switches.
- › The example shows only an excerpt that is relevant for connection of the CTP/CTA system. The example illustrated here does not show complete system planning. The user is responsible for safe integration into the overall system. Detailed application examples can be found at www.euchner.com. Simply enter the order number of your switch in the search box. You will find all available connection examples for the device in *Downloads*.
- › Make sure you use the correct Y-distributors. See chapter 10.10. *Connector assignment, Y-distributor for series connection without IO-Link communication on page 25*

The series connection is shown (see *Figure 5* to *Figure 7*) based on the example of the version with plug connector M12. The switches are connected one behind the other with the aid of pre-assembled connecting cables and Y-distributors. If a safety door is opened or if a fault occurs on one of the switches, the system shuts down the machine.

The series connection can also be realized via additional terminals in a control cabinet.

The safety outputs are permanently assigned to the respective safety inputs of the downstream switch. FO1A must be routed to F11A and FO1B to F11B. If the connections are interchanged (e.g. FO1A to F11B), the device will switch to the fault state.

10.13.1. Series connection without IO-Link communication

With this connection method, only the safety signals are passed from device to device.

10.13.2. Series connection with IO-Link communication

If, in addition to the safety function, detailed monitoring and diagnostic data are to be processed, a BR/IO-Link Gateway and the corresponding Y-distributors are required (see chapter 10.11. *Connector assignment, Y-distributor for series connection with IO-Link communication on page 26*).

To poll the communication data from the devices connected, the communication connection C on each device is routed via the Y-distributor to the BR/IO-Link Gateway.

You will find further information in the operating instructions for your BR/IO-Link Gateway.

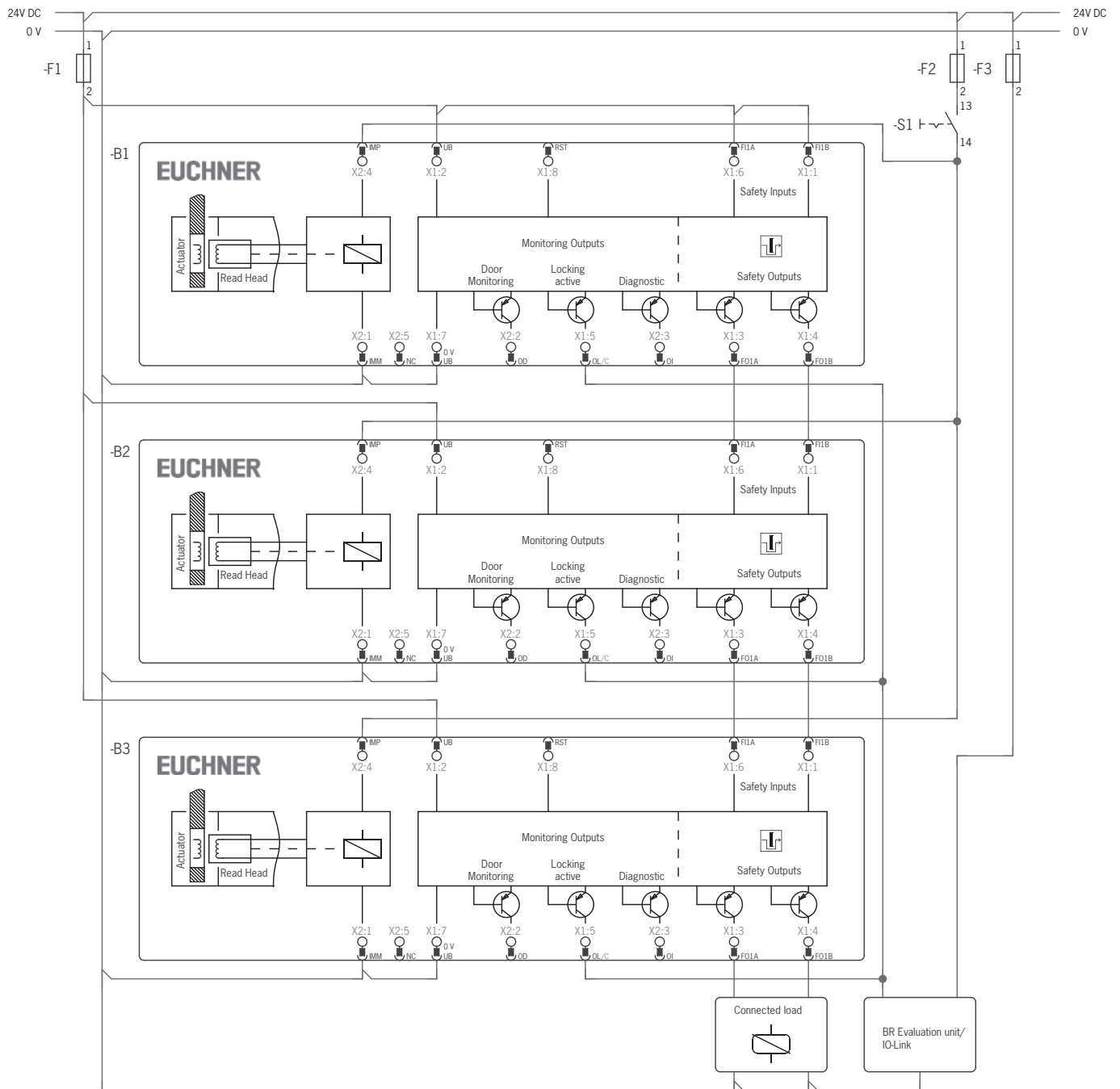


Figure 5: Connection example for series connection with wiring in the control cabinet

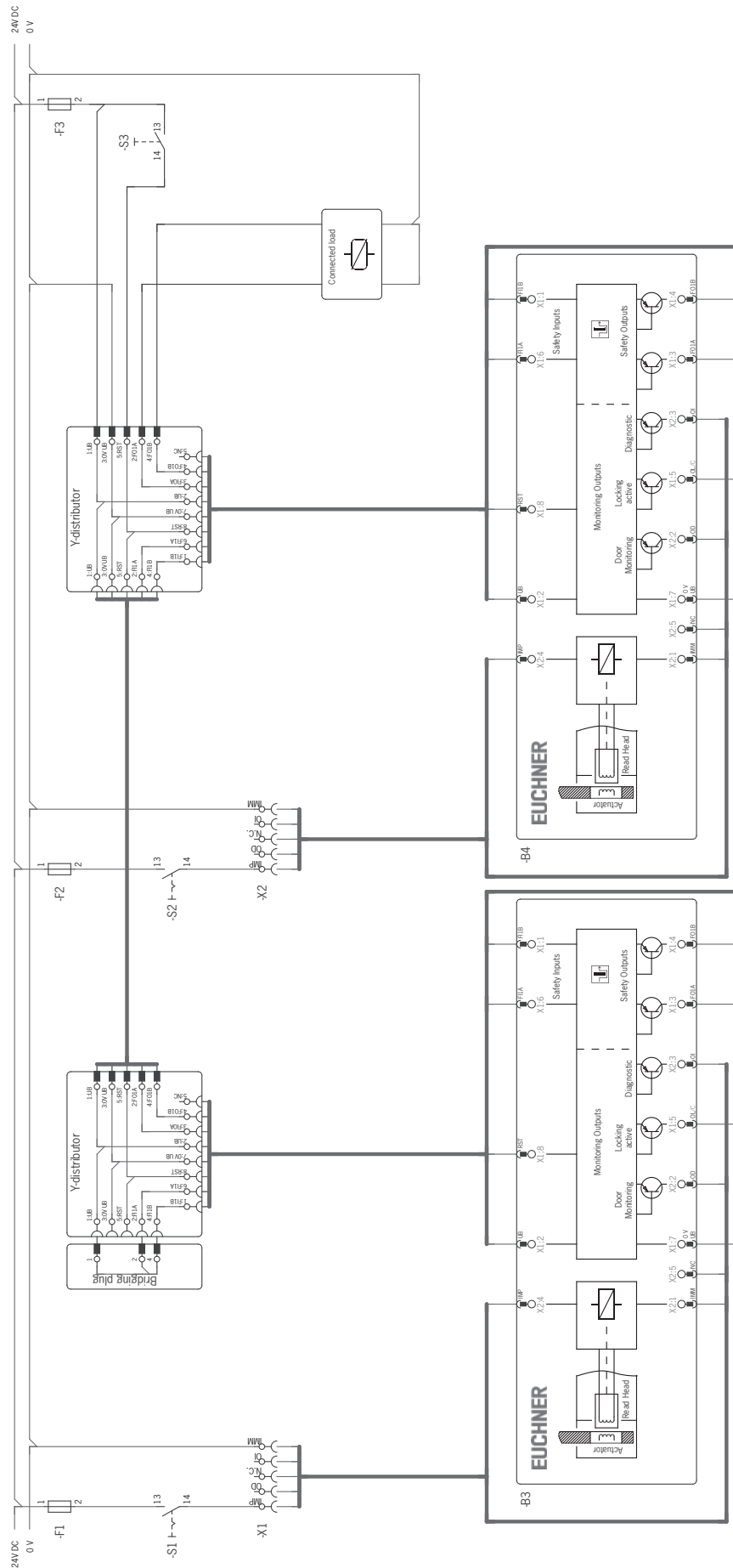


Figure 6: Connection example for series connection without IO-Link communication

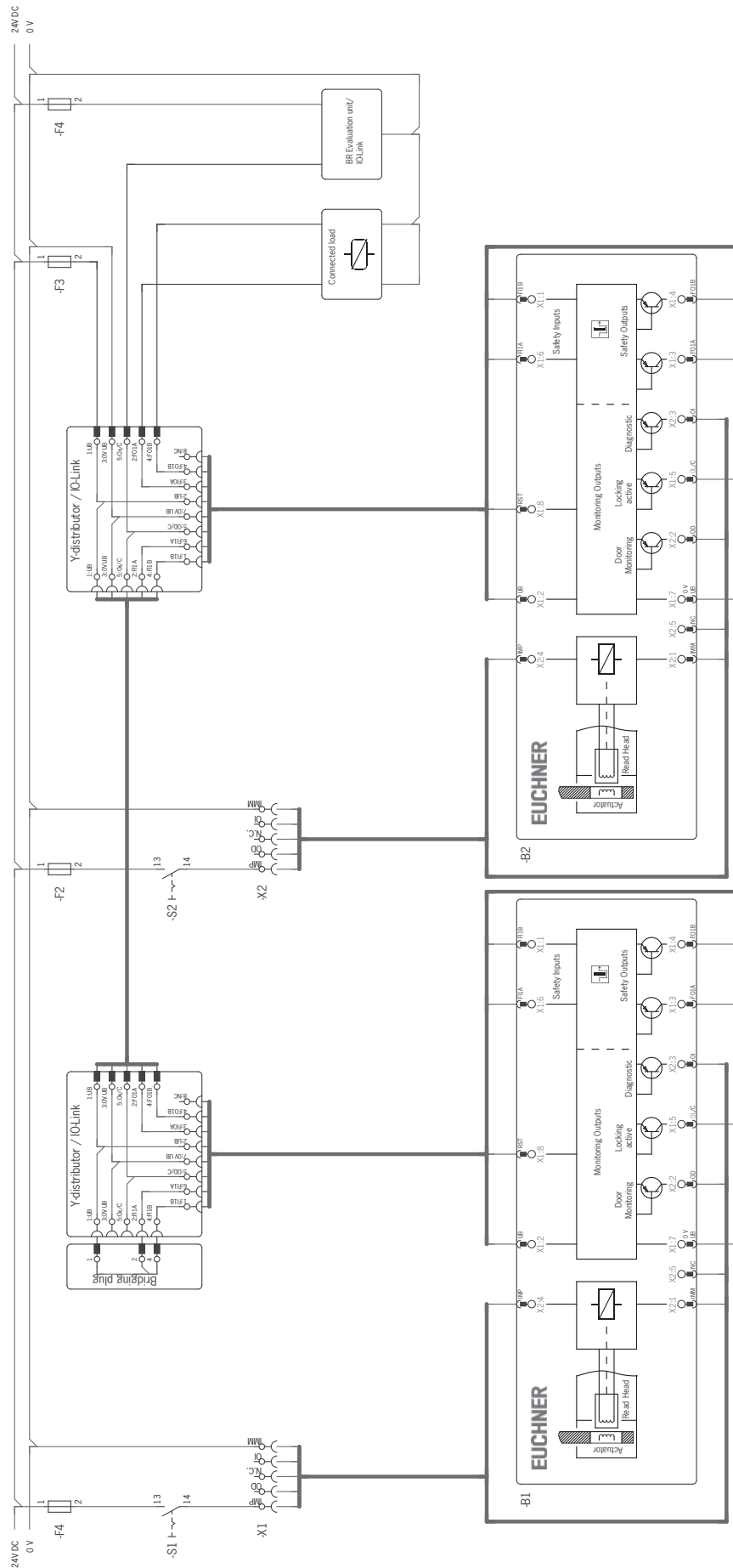


Figure 7: Connection example for series connection with IO-Link communication

11. Using communication data

A BR/IO-Link Gateway is required to use the device's communication data and forward them to a higher-level bus system. The following devices are suitable:

- GWY-CB-1-BR-IO (BR/IO-Link Gateway)
- ESM-CB (safety relay with integrated BR/IO-Link Gateway)

11.1. Connection to a BR/IO-Link Gateway GWY-CB

The Gateway is an IO-Link device. Communication via IO-Link offers cyclical (process data) and acyclical (device data and events) data exchange (see chapter 11.3. *Overview of the communication data on page 32*).

The communication connection C on the device allows the diagnostic line to be connected to the Gateway. The Ox/C connection represents a non-safety-related communication channel between the Gateway and the connected devices.

IO-Link communication can be used for the following functions as well:

- Chain reset: performing a reset of the BR safety chain

You will find further information in the operating instructions for your BR/IO-Link Gateway.

11.2. Connection to a safety relay ESM-CB

The safety relay ESM-CB features an integrated BR/IO-Link Gateway. In addition to functioning as an IO-Link device (see chapter 11.1. *Connection to a BR/IO-Link Gateway GWY-CB on page 32*), the device can be used for connecting two monitored single- or dual-channel sensor circuits. The sensor circuits evaluate various signaling devices:

- Sensor circuit S1 with short circuit detection; suitable for single- or dual-channel safety sensors
- Sensor circuit S2, suitable for OSSD signals; short circuit detection by signaling device

When at least one sensor circuit is interrupted, the safety relay initiates the safe state. Different relay starting behavior and various monitoring functions are possible.

The device's safety outputs FO1A and FO1B are routed to the OSSD inputs of the safety relay. The OD/C connection of the device allows the diagnostic line to be connected to the Gateway.

You will find further information in the operating instructions for your safety relay with integrated BR/IO-Link Gateway.

11.3. Overview of the communication data

The switch transmits both process data that are continuously transmitted to the evaluation unit (cyclical data) and data that can be polled specifically as needed (acyclical data). For further information on connection and on the communication data, refer to the operating instructions for your BR/IO-Link Gateway.

11.3.1. Cyclical data (process data)

Table 2: Cyclical data (process data)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	OI		OER		OM	OQ		OD
Byte 2	S1	S2	S3		OLS		OL	

Table 3: Status and control data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	H1	H2	H3	H1_B	H2_B	H3_B	-	CL

 Extended version

 Version with control by BR

11.3.2. Acyclical data (device data and events)

Table 4: Acyclical data (examples)

Dez	Command		Meaning	Answer (number of bytes)	Category	Use in device classes
	Bin	Hex				
General information						
1	1	1				
2	10	2	Send device ID-number/ serial number	6	PWR-UP	All
3	11	3	Send device Versions number	5	PWR-UP	All
4	100	4				
5	101	5	Complete number of participants	2	PWR-UP	All
6	110	6				
7	111	7				
8	1000	8				
9	1001	9				
10	1010	A	Blinking frequency and LED position	1	Control data	Only EXTENDED
11	1011	B				
12	1100	C				
13	1101	D				
14	1110	E				
15	1111	F				
16	10000	10				
17	10001	11	Number of switching cycles (Solenoid)	3	Additional	All
18	10010	12	Send current error code	1	Error	All
19	10011	13	Send last error code	1	Error	All
20	10100	14	Request of size of error log	1	Error	All
21	10101	15	Send error with number	1	Error	All
22	10110	16	Send detected tag code	5	Transponder	All
23	010111	17	Send taught tag code	5	Transponder	All
24	011000	18	Send blocked tag code 1	5	Transponder	All
25	011001	19	Voltage (Power supply)	2	Additional	All
26	011010	1A	Temperature	1	Additional	All
27	011011	1B	Number of switching cycles (Door position)	3	Additional	All
28	011100	1C				
29	011101	1D	Reset device (Soft- Reset) ¹⁾	1	Reset	All
30	011110	1E	Factory reset	1	Reset	All
31	011111	1F				
32	100000	20				
⋮	⋮	⋮				
63	111111	3F				

1) In a switch chain there is a chain reset.

For more information on these and other acyclical data, refer to the operating instructions for your BR-/IO-Link Gateway.

11.4. Notes on operation with safe control systems

Observe the following requirements for connection to safe control systems:

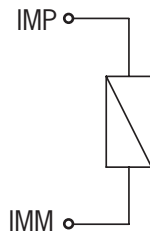
- › Use a common power supply for the control system and the connected safety switches.
- › A pulsed power supply must not be used for U_B . Tap the supply voltage directly from the power supply unit. If the power supply is connected to a terminal of a safe control system, this output must provide sufficient electrical current.
- › Always connect inputs F11A and F11B 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 F11A and F11B.
- › 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 14. *Technical data on page 38.*

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/CTP...* or *CTA...*. The features of the respective device are dealt with there in greater detail.

11.5. Connection of guard locking control

11.5.1. Guard locking control for variants with IMM connection

Solenoid operating voltage 24 V DC



Solenoid operating voltage 0 V DC

Figure 8: Connection example with IMM connection

11.5.2. Guard locking control for variants without IMM connection

Solenoid operating voltage 24 V DC

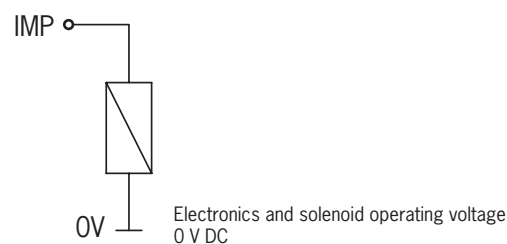
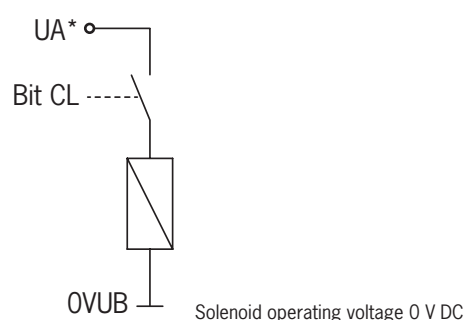


Figure 9: Connection example without IMM connection

11.5.3. Guard locking control for variants with UA connection

(Auxiliary) voltage* at guard locking solenoid



* In some product variants the auxiliary voltage UA is connected internally to the operating voltage UB.

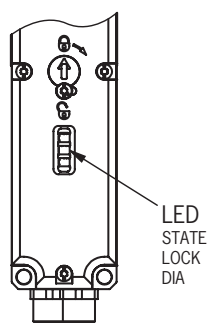
Figure 10: Connection example with UA connection

12. Setup

12.1. LED displays

You will find a detailed description of the signal functions in chapter 13. *System status table CTP/CTA-L1/2-BR on page 37.*

LED	Color
STATE	Green
LOCK	Yellow
DIA	Red



12.2. Teach-in function for actuator (only for unicode evaluation)

The actuator must be allocated to the safety switch using a teach-in function before the system forms a functional unit.

During a teach-in operation, the safety outputs are switched off, i.e. the system is in the safe state.

The teach-in operation is fully automatic. The number of possible teach-in operations is unlimited.



Tip!

Prior to switching on, close the guard on which the actuator to be taught-in is installed. The teach-in operation starts immediately after switching on. This feature simplifies above all teach-in with series connections and on large installations.



Important!

- › The teach-in operation can be performed only if the device does not have any internal fault.
- › Devices in the condition as supplied remain in teach-in standby state until they have successfully taught-in the first actuator. Once taught-in, switches remain in the teach-in standby state for approx. 3 min. after each switch-on.
- › The safety switch disables the code of the preceding device if teach-in is carried out for a new actuator. Teach-in is not possible again immediately for this device if a new teach-in operation is carried out. The disabled code is released again in the safety switch only after a third code has been taught-in.
- › The safety switch can be operated only with the last actuator taught-in.
- › If the switch detects the actuator that was most recently taught-in when in the teach-in standby state, this state is ended immediately and the switch changes to normal operation.
- › The actuator to be taught-in is not activated if it is within the actuating range for less than 30 s.

12.2.1. Actuator teach-in

1. Establish teach-in standby:
 - Devices in the condition as supplied: unlimited teach-in standby after switching on.
 - Switch already taught-in: teach-in standby is available for approx. 3 min after switching on.
- ➔ Teach-in standby indication, STATE LED flashes 3x repeatedly.
2. Insert the actuator during teach-in standby.
 - ➔ The automatic teach-in operation starts (duration approx. 30 s).
During the teach-in operation the STATE LED flashes (approx. 1 Hz).
Alternate flashing of the STATE and DIA LEDs acknowledges the successful teach-in operation.
Teach-in errors are indicated by the illumination of the red DIA LED and a flashing code on the green STATE LED (see chapter 13. *System status table CTP/CTA-L1/2-BR on page 37*).
3. Switch off operating voltage U_B (min. 3 s).
 - ➔ The code of the actuator that was just taught-in is activated in the safety switch.
4. Switch on operating voltage U_B .
 - ➔ The device operates normally.

12.3. Functional check



WARNING

- Danger of fatal injury as a result of faults in installation and functional check.
- › Before carrying out the functional check, make sure that there are no persons in the danger zone.
 - › Observe the valid accident prevention regulations.

12.3.1. Mechanical function test

The actuator must slide easily into the actuating head. Close the guard several times to check the function. For devices with mechanical release (emergency release or escape release), the correct function of the release must be checked as well.

12.3.2. Electrical function test

After installation and any fault, the safety function must be fully checked. Proceed as follows:

1. Switch on operating voltage.
 - ➔ The machine must not start automatically.
 - ➔ The safety switch carries out a self-test. The green STATE LED then flashes at regular intervals.
2. Close all guards. In case of guard locking by solenoid force: activate guard locking.
 - ➔ The machine must not start automatically. It must not be possible to open the guard.
 - ➔ The green STATE LED illuminates continuously.
3. Enable operation in the control system.
 - ➔ It must not be possible to deactivate guard locking as long as operation is enabled.
4. Disable operation in the control system and deactivate guard locking.
 - ➔ The guard must remain locked until there is no longer any risk of injury.
 - ➔ It must not be possible to start the machine as long as guard locking is deactivated.

Repeat steps 2 - 4 for each guard.

12.4. Factory reset

During switching on, connect the two outputs FO1A and FO1B to 0 V or set the bit 0x1E via the BR chain.

13. System status table CTP/CTA-L1/2-BR

Operating mode	Actuator/door position	Safety outputs F01A and F01B	Guard locking signal OL	Door position signal OD	LED indicator Output		LOCK (yellow)	State
					STATE (green)	DIA (red) and diagnostic signal OI		
Self-test	X	off	off	off	5 Hz	○	○	Self-test after power-up
	X	off	off	off	5 Hz	1 x	○	No communication with the BR/IO-Link Gateway
Normal operation	closed	on	on	on		○		Normal operation, door closed and locked
	closed	off	on	on	1 x inverse	○		Normal operation, door closed and locked, safety outputs not switched because: - Preceding device in the switch chain signals <i>door open</i> (only with series connection)
	open	off	off	off	1 x	○	1 x	Normal operation, door open, ready for guard locking
	closed	off	off	on	1 x inverse	○	○	Normal operation, door closed and not locked
	open	off	off	off	1 x	○	○	Normal operation, door open
Teach-in operation (only unicode)	open	off	off	off	3 x	○	○	Device in teach-in standby
	closed	off	X	on	1 Hz	○	○	Teach-in operation
	X	off	X	X	↔		○	Positive acknowledgment after completion of teach-in operation
Fault display	X	off	x	x	1 x		○	Error in the teach-in operation (only unicode) Actuator removed from the actuating range prior to the end of the teach-in operation or faulty actuator detected
	X	off	off	off	2 x			or 1 x inverse
	X	off	off	off	3 x	○	Read error (e.g. actuator faulty)	
	X	off	off	off	4 x	○	Output fault (e.g. short circuit, loss of switching ability)	
	X	off	X	X	5 x	○	Disabled actuator detected/environment error	
	X	off	off	off	○		○	Internal fault/plausibility error

Key to symbols	○	
	1 x inverse	
	5 Hz	
	3 x	
	↔	LEDs flash alternately
	X	Any state

When DIA flashes inversely once, the fault display can generally be reset by opening and closing the guard after remedying the cause. If the fault is still displayed afterward, as well as for all other fault displays, briefly interrupt the power supply. Contact the manufacturer if the fault display is not 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, contact the manufacturer.

14. Technical data



NOTICE

If a data sheet is included with the product, the information on the data sheet applies.

14.1. Technical data for safety switch CTP-L1/2-BR

Parameter	Value			Unit
	min.	typ.	max.	
General				
Material - Switch head - Switch housing	Die-cast zinc Reinforced thermoplastic			
Installation orientation	Any			
Degree of protection	IP65/IP67/IP69/IP69K			
	IP65/IP67 (screwed tight with the related mating connector)			
Safety class acc. to EN IEC 61558	III			
Degree of contamination	3			
Mechanical life	1 x 10 ⁶ operating cycles			
Ambient temperature at U _B = 24 V	-20	-	+55	°C
Actuator approach speed, max.	20			m/min
Actuating/extraction/retention force at 20 °C	10/20/20			N
Locking force F _{max} ¹⁾	3,900			N
Locking force F _{Zh} ¹⁾ acc. to EN ISO 14119	F _{Zh} = F _{max} /1.3 = 3,000			N
Weight	Approx. 0.42			kg
Connection (depending on version)	2 plug connectors M12, 5- and 8-pin / 1 plug connector RC18, 19-pin			
Operating voltage U _B (reverse polarity protected, regulated, residual ripple < 5%)	24 ± 15% (PELV)			V DC
Current consumption I _{UB}	40			mA
The following applies to the approval according to UL	Operation only with UL Class 2 power supply or equivalent measures			
Switching load acc. to UL	DC 24 V, class 2			
External fuse (operating voltage U _B) ²⁾	0.25	-	8	A
External fuse (solenoid operating voltage U _{IMP}) ²⁾	0.5	-	8	A
Rated insulation voltage U _i	-	-	50	V
Rated impulse withstand voltage U _{imp}	-	-	0.5	kV
Rated conditional short-circuit current	100			A
Resilience to vibration	Acc. to EN 60947-5-3			
EMC protection requirements	Acc. to EN 60947-5-3			
Ready delay	-	8	11	s
Risk time for single device	-	-	260	ms
Risk time delay per device	5			ms
Turn-on time	-	-	400	ms
Discrepancy time	-	-	10	ms
Test-pulse duration	300			µs
Frequency band	120 ... 130			kHz
Safety outputs FO1A/FO1B Semiconductor outputs, p-switching, short circuit-proof				
- Output voltage U _{FO1A} /U _{FO1B} ³⁾				V DC
HIGH U _{FO1A} /U _{FO1B}	U _B - 1.5	-	U _B	
LOW U _{FO1A} /U _{FO1B}	0	-	1	
Switching current per safety output	1	-	150	mA
Utilization category acc. to EN 60947-5-2	DC-13 24V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Switching frequency ⁴⁾	0.5			Hz
Monitoring outputs OL, OI, OD p-switching, short circuit-proof				
Output voltage	0.8 x U _B	-	U _B	V DC
Max. load	-	-	50	mA
Solenoid				
Solenoid operating voltage U _{IMP} (reverse polarity protected, regulated, residual ripple < 5%)	DC 24 V +10%/-15%			
Solenoid current consumption I _{IMP}	400			mA
Connection rating	6			W
Duty cycle	100			%

Parameter	Value			Unit
	min.	typ.	max.	
Reliability values acc. to EN ISO 13849-1				
Mission time		20		years
Monitoring of guard locking and the guard position				
Category		4		
Performance Level (PL)		e		
PFD _D		5.38 x 10 ⁻⁹ /h		
Control of guard locking				
Category	Depends on external control (with control of guard locking via IO-Link communication, not a safety characteristic)			
Performance Level (PL)				
PFD _D				

1) Dependent on the actuator used

2) Trip characteristic medium slow-blow

3) Values at a switching current of 50 mA without taking into account the cable lengths

4) Corresponds to the actuation frequency

14.2. Technical data for safety switch CTA-L1/2-BR

Parameter	Value			Unit
	min.	typ.	max.	
General				
Material				
- Switch head	Die-cast zinc			
- Switch housing	Die-cast zinc			
Installation orientation	Any			
Degree of protection	IP65/IP67/IP69/IP69K (screwed tight with the related mating connector)			
Safety class acc. to EN IEC 61558	III			
Degree of contamination (external, acc. to EN 60947-1)	3			
Mechanical life	1 x 10 ⁶ operating cycles			
Ambient temperature at U _B = 24 V	-20	-	+55	°C
Actuator approach speed, max.	20			m/min
Actuating/extraction/retention force at 20 °C	10/20/20			N
Locking force F _{max} ¹⁾	8,000			N
Locking force F _{Zh} ¹⁾ acc. TÜV Süd	F _{Zh} = F _{max} /2 = 4,000			N
Weight	Approx. 0.95			kg
Connection	2 plug connectors M12, 5- and 8-pin / 1 plug connector RC18, 19-pin			
Operating voltage U _B (reverse polarity protected, regulated, residual ripple < 5%)	24 ± 15% (PELV)			V DC
Current consumption I _{UB}	40			mA
The following applies to the approval according to UL	Operation only with UL Class 2 power supply or equivalent measures			
Switching load acc. to UL	DC 24 V, class 2			
External fuse (operating voltage U _B) ²⁾	0.25	-	8	A
External fuse (solenoid operating voltage U _{IMP}) ²⁾	0.5	-	8	A
Rated insulation voltage U _i	-	-	50	V
Rated impulse withstand voltage U _{imp}	-	-	0.5	kV
Rated conditional short-circuit current	100			A
Resilience to vibration	Acc. to EN 60947-5-3			
EMC protection requirements	Acc. to EN 60947-5-3			
Ready delay	-	5	-	s
Risk time for single device	-	-	270	ms
Risk time delay per device	5			ms
Turn-on time	-	-	150	ms
Discrepancy time	-	-	10	ms
Test pulse duration ⁵⁾	-	-	0.3	ms
Test-pulse interval	100	-	-	ms
Safety outputs F01A/F01B 2 semiconductor outputs, p-switching, short circuit-proof				
- Output voltage U _{F01A} /U _{F01B} ³⁾				
HIGH U _{F01A} /U _{F01B}	U _B - 1.5	-	U _B	V DC
LOW U _{F01A} /U _{F01B}	0	-	1	
Switching current per safety output	1	-	150	mA
Utilization category acc. to EN 60947-5-2	DC-13 24V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Switching frequency ⁴⁾	0.5			Hz

Parameter	Value			Unit
	min.	typ.	max.	
Monitoring outputs OL/C, OI, OD 3 semiconductor outputs, p-switching, short circuit-proof				
Output voltage	$0.8 \times U_B$	-	U_B	V DC
Max. load	1	-	50	mA
Solenoid				
Solenoid operating voltage U_{IMP} (reverse polarity protected, regulated, residual ripple < 5%)	DC 24 V +10%/-15%			
Solenoid current consumption I_{IMP}	400			mA
Connection rating	6			W
Duty cycle	100			%
Reliability values acc. to EN ISO 13849-1				
Mission time	20			years
Monitoring of guard locking and the guard position				
Category	4			
Performance Level (PL)	e			
PFH_D	$5.38 \times 10^{-9}/h$			
Control of guard locking				
Category	Depends on external control (with control of guard locking via IO-Link communication, not a safety characteristic)			
Performance Level (PL)				
PFH_D				

- 1) Dependent on the actuator used
- 2) Trip characteristic medium slow-blow
- 3) Values at a switching current of 50 mA without taking into account the cable lengths
- 4) Corresponds to the actuation frequency
- 5) Applies to a load with $C \leq 30$ nF and $R \leq 20$ k Ω

14.3. Typical system times

Refer to the technical data for the exact values.

Ready delay: After switch-on, the device carries out a self-test. The system is ready for operation only after this time.

Turn-on time of safety outputs: The max. reaction time t_{on} is the time from the moment when the guard is locked to the moment when the safety outputs switch on.

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

Risk time according to EN 60947-5-3: The risk time is the maximum time until at least one of the safety outputs FO1A or FO1B switches off safely when the actuator is removed from the actuating range. This also applies if an internal or external fault occurs at this moment.

If several devices are operated in a series connection, the risk time of the overall device chain will increase with each device added. Use the following calculation formula:

$$t_r = t_{r,e} + (n \times t_i)$$

t_r = Total risk time
 $t_{r,e}$ = Risk time, single device (see technical data)
 t_i = Risk time delay per device
 n = Number of additional devices (total number - 1)

Discrepancy time: The safety outputs FO1A and FO1B switch with a slight time offset. They have the same signal state no later than after the discrepancy time.

Test pulses at the safety outputs: The device generates its own test pulses on the safety outputs FO1A and FO1B. A downstream control system must tolerate these test pulses.

This can usually be set up in the control systems by parameter assignment. If parameter assignment is not possible for your control system or if shorter test pulses are required, contact our support organization.

The test pulses are also output when the safety outputs are switched off.

14.4. Radio frequency approvals

FCC ID: 2AJ58-13

IC: 22052-13



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.

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Unique Identifier:

CTP-I-AR SERIES
CTP-I1-AR SERIES
CTP-I2-AR SERIES
CTP-IBI-AR SERIES
CTP-L1-AR SERIES
CTP-L2-AR SERIES
CTP-LBI-AR SERIES
CTP-I-AP SERIES
CTP-I1-AP SERIES
CTP-I2-AP SERIES
CTP-IBI-AP SERIES
CTP-L1-AP SERIES
CTP-L2-AP SERIES
CTP-LBI-AP SERIES
CTA-BR SERIES
CTA-BP SERIES
CTP-BR SERIES
CTP-BP SERIES

Responsible Party – U.S. Contact Information

EUCHNER USA Inc.

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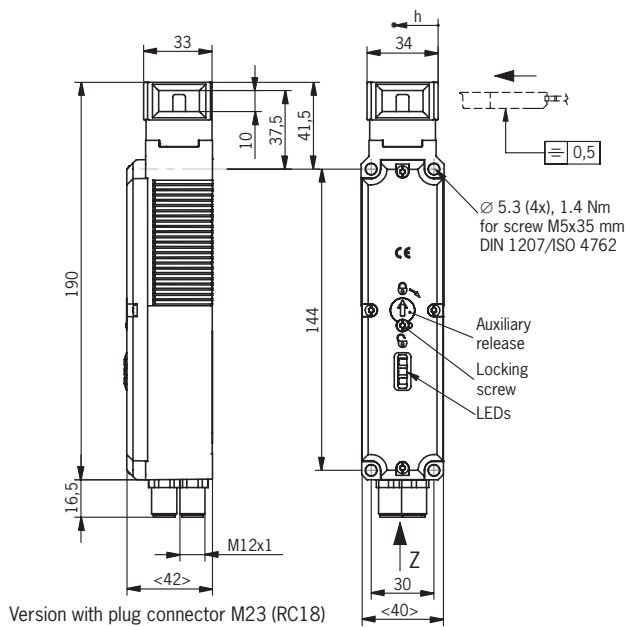
info(at)euchner-usa.com

<http://www.euchner-usa.com>

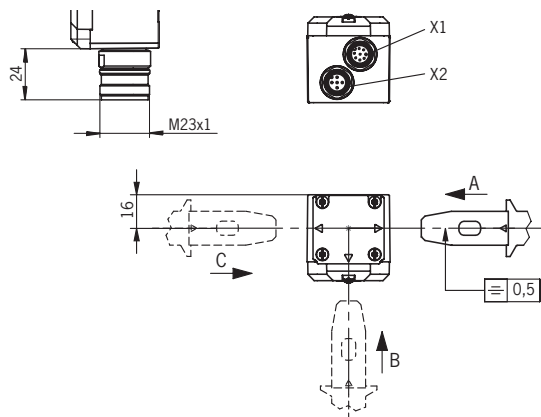
14.5. Dimension drawing for safety switch CTP/CTA...

14.5.1. Dimension drawing for safety switch CTP...

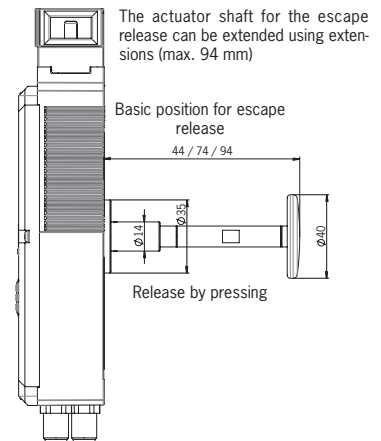
Version with plug connectors 2 x M12



Version with plug connector M23 (RC18)

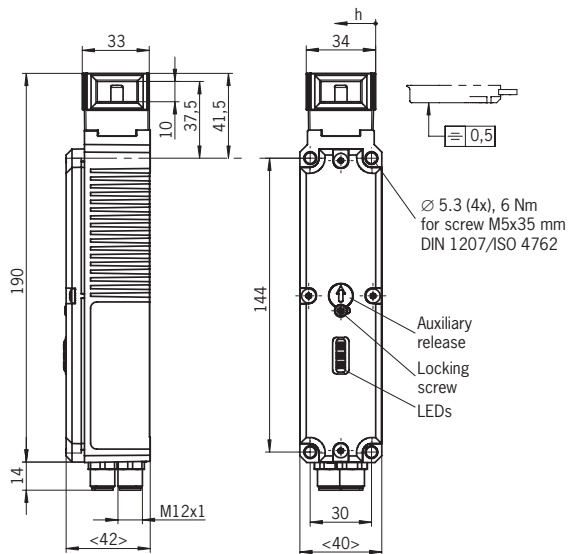


With escape release

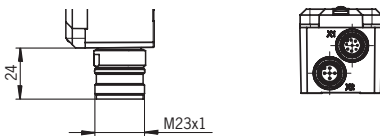


14.5.2. Dimension drawing for safety switch CTA...

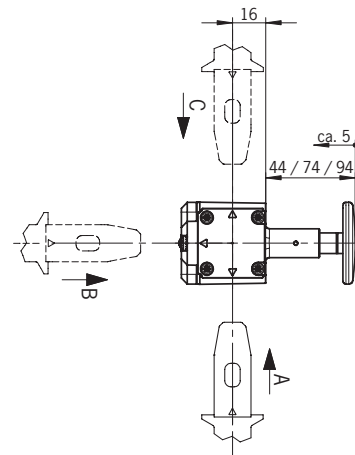
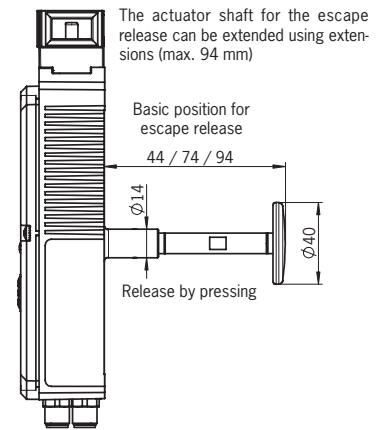
Version with plug connectors 2 x M12



Version with plug connector M23 (RC18)



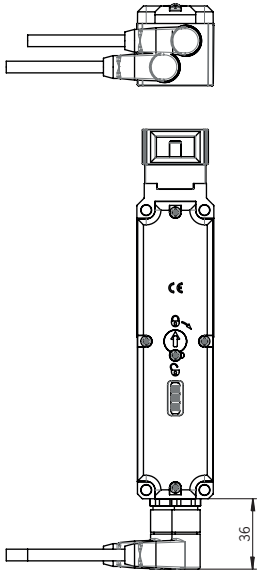
With escape release



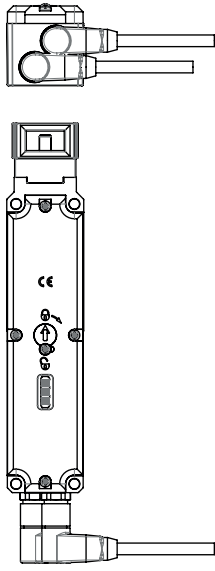
14.5.3. Dimension drawing for connections and variants CTP/CTA ...

Plug connectors 2 x M12

Cable outlet C

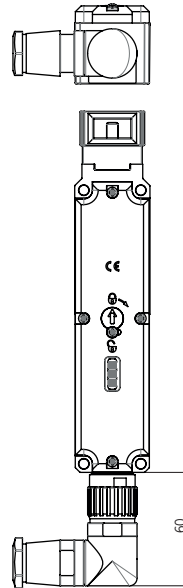


Cable outlet A

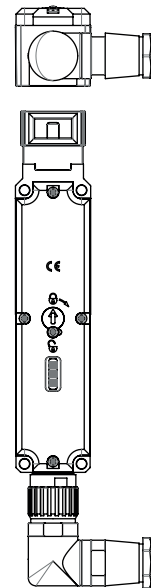


Plug connector M23

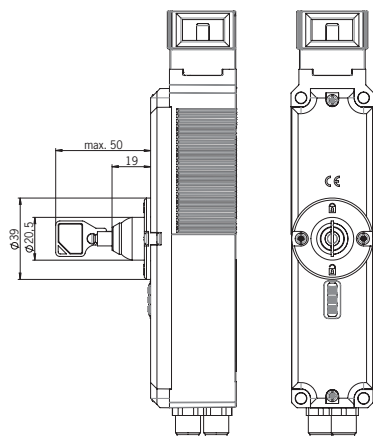
Cable outlet C



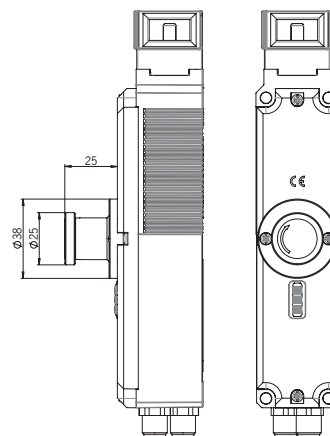
Cable outlet A



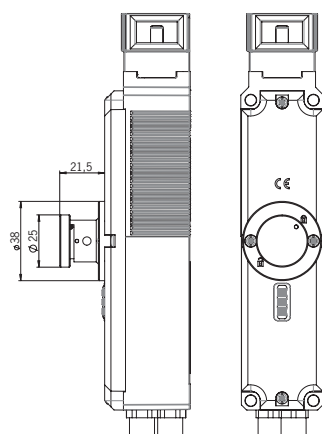
With auxiliary key release



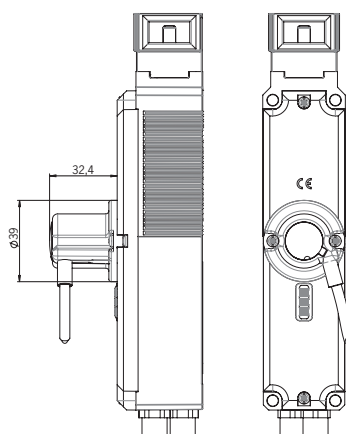
With release, automatic return



With emergency release



With wire front release

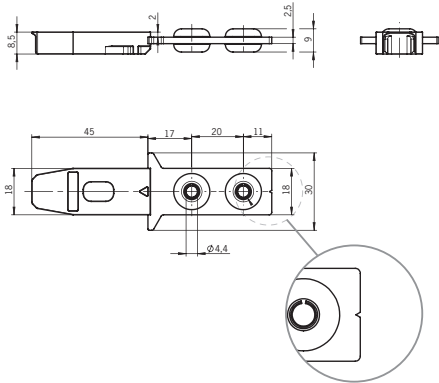
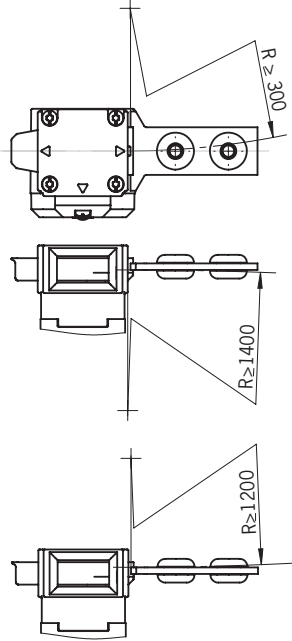
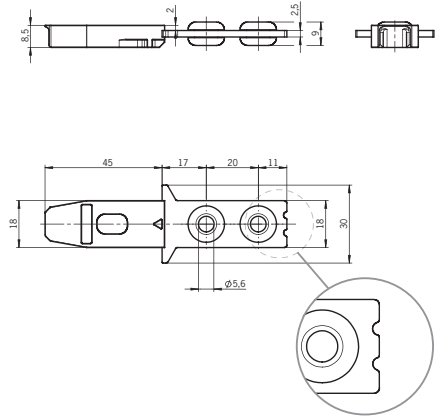
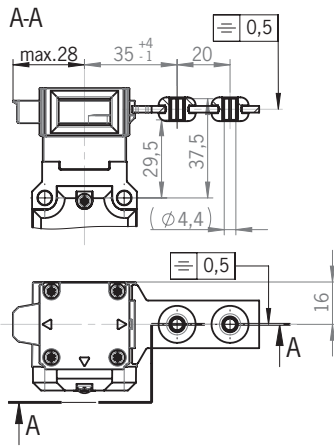


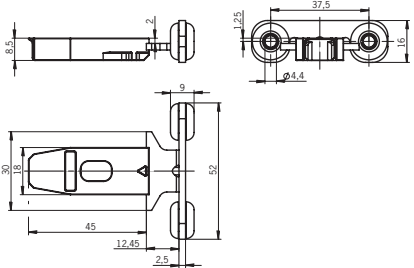
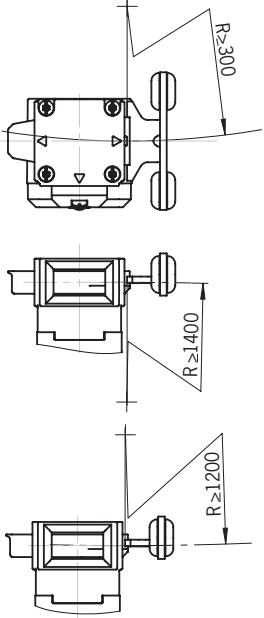
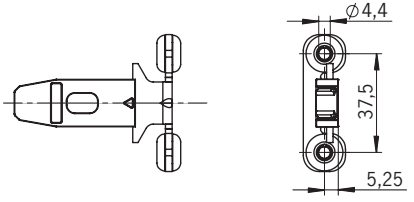
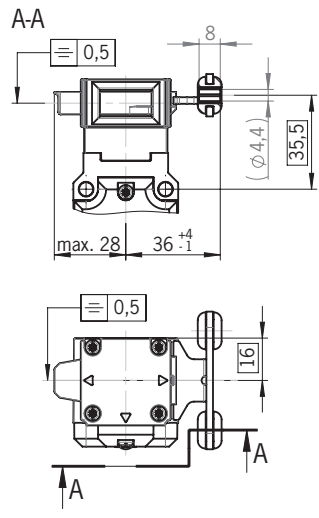
14.6. Technical data for actuator CTP/CTA-...

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Fiber reinforced plastic			
Weight	0.03 ... 0.06 (depending on version)			kg
Ambient temperature	-20	-	+55	°C
Degree of protection	IP65/IP67/IP69/IP69K			
Mechanical life	1 x 10 ⁶			
Locking force	F _{max}	F _{ZH} (ISO 14119)	F _{ZH} (TÜV Süd)	N
- Straight actuator 165497 (black) ¹⁾	8,000	-	4,000	
126015 (red)	3,900	3,000	-	
- Hinged actuator	2,600	2,000	-	
- Bent actuator	1,500	1,100	-	
Installation orientation	Any			
Power supply	Inductive via read head			

1) Possible only in combination with CTA-BR

14.6.1. Dimension drawing for actuator CTP/CTA-...

	Dimension drawing	Min. door radius [mm]	Order no./item
Straight actuators	 <p>Color: red</p>		<p>126015 A-CH-G-SST-126015</p>
	<p>Only for CTA</p>  <p>Color: black</p>		<p>165497 A-CH-G-SSS-165497</p>

Bent actuators	Dimension drawing	Min. door radius [mm]	Order no./item
	 <p>bent, upward</p>	 <p>$R \geq 300$</p> <p>$R \geq 1400$</p> <p>$R \geq 1200$</p>	<p>122667 A-CHW-SST-122667</p>
 <p>bent, downward</p>	 <p>A-A</p> <p>0,5</p> <p>8</p> <p>$\phi 4,4$</p> <p>35,5</p> <p>max. 28</p> <p>36^{+4}_{-1}</p> <p>A</p>	<p>122668 A-CHW-SST-122668</p>	

	Dimension drawing	Min. door radius [mm]	Order no./item
		<p>X = 53 mm (122671, 122672) X = 49 mm (122669, 122670)</p>	<p>122671 A-C-HRL-LS-122671</p>
			<p>122672 A-C-HRL-LS-122672</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Hinged actuators</p>		<p>X = 41 mm (122673, 122674) X = 45 mm (122675, 122676)</p>	<p>122675 A-C-HR0-LS-122675</p>
		<p>X = 41 mm (122673, 122674) X = 45 mm (122675, 122676)</p>	<p>122676 A-C-HRU-LS-122676</p>



Tip!

The actuator is supplied with screws that cannot easily be unscrewed with a tool.

15. Ordering information and accessories



Tip!

Suitable accessories, e.g. cables or assembly material, can be found at www.euchner.com. To order, enter the order number of your item in the search box and open the item view. Accessories that can be combined with the item are listed in *Accessories*.

16. Inspection and service



WARNING

Danger of severe injuries due to the loss of the safety function.

- › If damage or wear is found, the complete switch and actuator assembly must be replaced. Replacement of individual parts or assemblies is not permitted.
- › 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. *Functional check on page 36*)
- › Check all additional functions (e.g. escape release, lockout bar, etc.)
- › Check the secure mounting of the devices and the connections
- › Check for soiling

No servicing is required. Repairs to the device are only allowed to be made by the manufacturer.



NOTICE

The year of manufacture is given in the laser marking at the bottom right corner. The current version number in the format (V X.X.X) can also be found on the device.

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:

support@euchner.de

Internet:

www.euchner.com

18. Declaration of conformity



EUCHNER

More than safety.

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

Original DE
Translation EN
Traduction FR
Traduzione IT
Traducción ES

2123042-09-04/21

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

I:	Maschinenrichtlinie Machinery directive Directive Machines Direttiva Macchine Directiva de máquinas	2006/42/EG 2006/42/EC 2006/42/CE 2006/42/CE 2006/42/CE		
II:	Funkanlagen-Richtlinie (RED) Radio equipment directive Directive équipement radioélectrique Direttiva apparecchiatura radio Directiva equipo radioeléctrico	2014/53/EU 2014/53/EU 2014/53/UE 2014/53/UE 2014/53/UE		
III:	RoHS Richtlinie RoHS directive Directive de RoHS Direttiva RoHS Directiva RoHS	2011/65/EU 2011/65/EU 2011/65/UE 2011/65/UE 2011/65/UE	+	(EU) 2015/863 (RoHS 3) (EU) 2015/863 (RoHS 3) (EU) 2015/863 (RoHS 3) (UE) 2015/863 (RoHS 3) (UE) 2015/863 (RoHS 3)

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

Folgende Normen sind angewandt: a: EN 60947-5-3:2013 f: EN IEC 63000:2018 (RoHS)
Following standards are used: b: EN ISO 14119:2013 g: EN 50364:2018
Les normes suivantes sont appliquées: c: EN ISO 13849-1:2015 h: EN 300 330 V2.1.1
Vengono applicate le seguenti norme: d: EN 62026-2:2013 (ASi)
Se utilizan los siguientes estándares: e: EN 60947-5-5:1997/A2:2017

Bezeichnung der Bauteile Description of components Description des composants Descrizione dei componenti Descripción de componentes	Type Type Type Tipo Tipo	Richtlinie Directives Directive Direttiva Directivas	Normen Standards Normes Norme Estándares	Zertifikats-Nr. No. of certificate Número du certificat Numero del certificato Número del certificado
Sicherheitsschalter Safety Switches Interrupteurs de sécurité Fincorsa di sicurezza Interruptores de seguridad	CTA-... CTP-...AP... CTP-...AR... CTP-...AS... CTP-...BP... CTP-...BR... CTP-LBI...	I, II, III I, II, III I, II, III I, II, III I, II, III I, II, III	a, b, c, f, g, h a, b, c, f, g, h a, b, c, f, g, h a, b, c, d, f, g, h a, b, c, f, g, h a, b, c, f, g, h	UQS 2544633 UQS 123565, ET 18080* UQS 125542 UQS 2544632 UQS 127798
Sicherheitsschalter mit Not-Halt-Einrichtungen Safety Switches with Emergency-Stop facilities Interrupteurs de sécurité avec appareillage arrêt d'urgence Fincorsa di sicurezza con dispositivi di arresto di emergenza Interruptores de seguridad con dispositivos de parada de emergencia	CTP-...E...	I, II, III	a, b, c, e, f, g, h	UQS 123565
Betätiger Actuator Actionneur Azionatore Actuador	A-C-...	I, II, III	a, b, c, f, g, h	UQS 123565, ET 18080*



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* Benannte Stelle
Notified Body
Organisme notifié
Sede indicata
Entidad citada

0340
DGUV Test
Prüf- und Zertifizierungsstelle Elektrotechnik
Fachbereich ETEM
Gustav-Heinemann-Ufer 130
50968 Köln

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

TÜV Rheinland Industrie Service GmbH
Alboinstr. 56
12103 Berlin
Germany

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller:
This declaration of conformity is issued under the sole responsibility of the manufacturer:
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant:
La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante:
La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante:

EUCHNER GmbH + Co. KG
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70771 Leinfelden-Echterdingen
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Leinfelden, April 2021
EUCHNER GmbH + Co. KG
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CTP/CTA-L1/2-BR

(translation of the original operating instructions)

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