

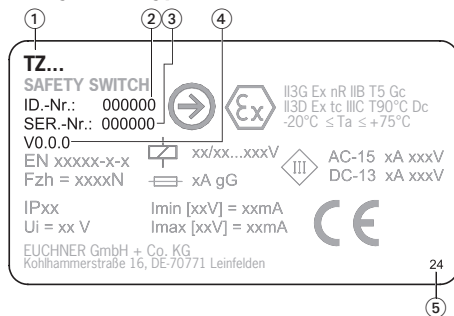
Scope

These operating instructions are valid for all TZ...AS1 of version V1.0.X. These operating instructions, the document *Safety information* and any available data sheet form the complete user information for your device.

Important!

Make sure to use the operating instructions valid for your product version. The version numbers can be found on the type label of your product. Please contact the EUCHNER service team if you have any questions.

Safety switch type label



- ① Item designation
- ② Item number
- ③ Serial number
- ④ Product version
- ⑤ Year of manufacture

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 (2086963)	(this document)	
Declaration of conformity	Declaration of conformity	
Any additions to the operating instructions	Take any associated additions to the operating instructions or data sheets into account.	

Important!

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

Correct use

EUCHNER safety switches series TZ...AS1 are operated as slaves on the safety bus AS-Interface Safety at Work and function as interlocking devices with guard locking solenoid (type 2). The actuator has 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.
- ▶ 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
- ▶ 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

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 13849-1.
- ▶ If the simplified method according to section 6.2.3 of EN ISO 13849-1:2023 is used for determining the Performance Level (PL), the PL might be reduced if several devices are connected in series.
- ▶ If a data sheet is included with the product, the information on the data sheet applies in case of discrepancies with the operating instructions.

Safety precautions

⚠ 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 14119:2025, section 8.
- ▶ The switching operation must be triggered only by actuators designated for this purpose.
- ▶ Prevent bypassing by means of replacement actuators. For this purpose, restrict access to actuators and to keys for releases, for example.
- ▶ A complete safety-oriented system generally consists of several signaling devices, sensors, evaluation units and concepts for safe shutdown. The manufacturer of a machine or installation is responsible for correct and safe overall function.
- ▶ All safety regulations and requirements stated in the operating instructions of the AS-Interface safety monitor used must be observed.
- ▶ Mounting, electrical connection and setup only by authorized personnel possessing special knowledge about handling safety components.

⚠ CAUTION

Danger due to high housing temperature at ambient temperatures above 40 °C.

- ▶ Protect switch against touching by personnel or contact with flammable material.

Function

The safety switch permits the locking of movable guards.

In the switch head, there is a rotating cam that is blocked/released by the guard locking pin.

The guard locking pin is moved on the insertion/removal of the actuator and on the activation/release of the guard locking. During this process, the switching contacts are actuated.

If the cam is blocked (guard locking active), the actuator cannot be pulled out of the switch head. For design reasons, guard locking can be activated only when the guard is closed (prevention of inadvertent locking position (faulty closure protection)).

Position monitoring of the guard and monitoring of interlocking are performed via two separate switching elements (door monitoring contact SK and solenoid monitoring contact ÜK).

When the guard is closed and guard locking effective, each TZ...AS1 transmits a switch-specific, unique safety code sequence with 8 x 4 bits via the AS-Interface bus. This code sequence is evaluated by an AS-Interface safety monitor. The positively driven contact SK for door monitoring is represented by the AS-Interface input bits D0 and D1. The solenoid monitoring contact ÜK is represented by the AS-Interface input bits D2 and D3.

The safety switch must be correspondingly configured in the AS-Interface safety monitor (refer to the operating instructions of the AS-Interface safety monitor used and the status table).

The safety switch is designed so that fault exclusions for internal faults in accordance with EN ISO 13849-2:2013, Table A4, can be assumed.

Version TZ1...AS1

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

Important!

For the purpose of personnel protection against dangerous overtraveling movements, the black AS-Interface cable (auxiliary power) leading to the AS-Interface distribution box to which the switch is connected can additionally be switched via a standstill monitor or via the safe switch-on delay feature of a dual-channel AS-Interface safety monitor (e.g. door locking for duration of the time delay).

- ▶ Activating guard locking: close guard; no voltage at the solenoid and/or clear AS-Interface output bit D0
- ▶ Releasing guard locking: apply voltage to the solenoid and set AS-Interface output bit D0

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

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.

Version TZ2...AS1

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

Important!

- ▶ Guard locking devices according to the open-circuit current principle are not intended for protecting personnel.
- ▶ Use as guard locking for personnel protection is possible only in special cases, after strict assessment of the accident risk (see EN ISO 14119:2025, section 6.6.1!)

- ▶ Activating guard locking: apply voltage to the solenoid and set AS-Interface output bit D0
- ▶ Releasing guard locking: disconnect voltage from the solenoid or clear AS-Interface output bit D0

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.

Switching states

The detailed switching states and code sequences for your switch can be found in the status table.

Selection of the actuator

NOTICE

- Damage to the device due to unsuitable actuator. Make sure to select the correct actuator.
- Additionally pay attention to the door radius and the mounting options (see Fig. 5).

Manual release

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


Further information on this topic can be found in the standard EN ISO 14119:2025, section 7.2.3. The device can feature the following release functions:

Auxiliary release

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

The half-sequence is sent when the auxiliary release is actuated.

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.

Important!

- The actuator must not be under tensile stress during manual release.
- To prevent tampering, the auxiliary release must be sealed before the switch is set up.
- Reset the auxiliary release after use and screw in the screw plug (tightening torque 0.5 Nm).
- Restore the sealing with a new seal.

Auxiliary key release/auxiliary release with triangular wedge

Function as for auxiliary release.

Important!

- The actuator must not be under tensile stress during manual release.

Escape release

This permits opening of a locked guard from the danger area without tools.

Important!

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

The half-sequence is sent when the escape release is actuated.

Emergency release

This permits opening of a locked guard from outside the danger area without tools.

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 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.

The half-sequence is sent when the emergency release is actuated.

Mounting

NOTICE

Device damage due to improper mounting and unsuitable ambient conditions.

- Safety switches and actuators must not be used as an end stop.
- Observe EN ISO 14119:2025, sections 6.2 and 6.3, for information about mounting the safety switch and the actuator.
- Observe EN ISO 14119:2025, section 8, for information about reducing the possibilities for bypassing an interlocking device.
- Protect the switch head against damage, as well as penetrating foreign objects such as swarf, sand and blasting shot, etc.
- The specified IP degree of protection is applicable only if the housing screws, cable entries and plug connectors are properly tightened. Observe the tightening torques.
- The screw plug of the auxiliary release must be sealed prior to setup.

Changing the actuating direction

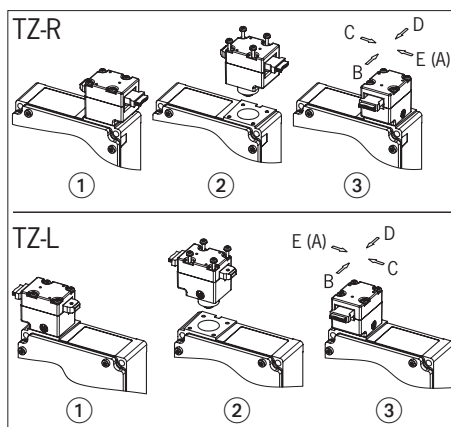


Fig. 1: Changing the actuating direction

1. Insert the actuator into the actuating head.
2. Remove the screws from the actuating head.
3. Set the required direction.
4. Tighten the screws with a torque of 1.2 Nm.

Electrical connection

The safety switch is connected to the bus system with a 4-pin connecting cable with M12 plug connector via a passive AS-Interface distribution box with a yellow and black AS-Interface cable.

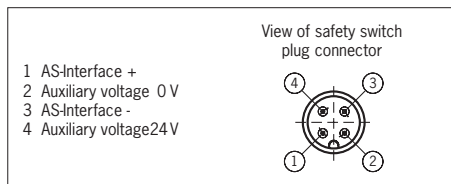


Fig. 2: Terminal assignment of M12 plug connector

The following information applies to devices with plug connector:

- Check that the plug connector is sealed.

Setup

Setting the AS-Interface address

The address can be set prior to or after mounting. The AS-Interface address of the safety switch is set using an AS-Interface programming device. Addresses 1 to 31 are valid.

The unit is programmed by connecting the programming device to the M12 plug connector of the safety switch with a programming cable.

Address 0 is the default setting on delivery (the AS-Interface Fault LED is lit during operation).

Configuration in the AS-Interface safety monitor

(see operating instructions for the AS-Interface safety monitor and status table)

The safety switch is configured in the AS-Interface safety monitor with the AS-Interface address set as follows, for example:

- Dual-channel dependent
- Synchronization time = infinite ∞

In this operating mode, after the guard locking is released, the guard must be opened each time prior to restarting.

- Dual-channel independent

The guard locking is opened and closed using the output D0. When the guard locking is open, the safety circuit shuts down. It is not necessary to open the door. Safety is provided again when the guard locking is closed.

The dual-channel feature and the door contact are not tested in this configuration. Additional measures outside the monitor must be provided for testing.

- Dual-channel conditionally dependent
- Independent: In-1

The guard locking is opened and closed using the output D0. When the guard locking is open, the safety circuit shuts down. It is not necessary to open the door. Safety is provided again when the guard locking is closed.

The switch is monitored for a malfunction.

Observe the following if the guard locking solenoid on a TZ1..AS1 spring interlock safety switch in the operating mode *door locking for duration of the time-delay* is switched on (unlocked) via the second release contact of a dual-channel safety monitor and a PLC:

- It is not possible to switch off the guard locking solenoid by means of the monitor alone.

The control system (PLC) must therefore switch off the guard locking solenoid in the locked position via AS-Interface output D0 = 0 in order to re-establish the switch-on conditions for the first OSSD.

- The AS-Interface output must be switched on with D0 = 1 so that the guard locking solenoid can be released by the second safety output of the monitor.

Status signals (not relevant to safety)

The state of the AS-Interface input bits D0 and D1 for door monitoring and the AS-Interface input bits D2 and D3 for solenoid monitoring can also be polled by the control system (PLC) (refer to the operating instructions for the AS-Interface safety monitor).

LED displays

The AS-Interface bus status is indicated by two LEDs (Power, Fault).

Two additional LEDs can be connected via the AS-Interface bus, e.g. to indicate the status signals (see status signals and technical data).

Function test

⚠ WARNING

Fatal injury due to faults during the function test.

- ▶ Before carrying out the function test, make sure that there are no persons in the danger area.
- ▶ Observe the valid accident prevention regulations.

Check the device for correct function after installation and after every fault.

Proceed as follows:

Mechanical function test

The actuator must slide easily into the actuating head. Close the guard several times to check the function. The function of any manual releases (except for the auxiliary release) must also be tested.

Electrical function test

1. Switch on operating voltage.
2. Close all guards and activate guard locking.
 - ➔ The machine must not start automatically.
 - ➔ It must not be possible to open the guard.
3. Start the machine function.
 - ➔ It must not be possible to release guard locking as long as the dangerous machine function is active.
4. Stop the machine function and release guard locking.
 - ➔ The guard must remain locked until there is no longer any risk of injury (e.g. due to movements with overtravel).
 - ➔ It must not be possible to start the machine function as long as guard locking is released.

Repeat steps 2 - 4 for each guard.

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 14119:2025, section 9.2.1.

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

- ▶ Correct switching function
- ▶ Secure mounting of all components
- ▶ Damage, heavy contamination, dirt and wear
- ▶ Sealing of cable entry
- ▶ Loose cable connections or plug connectors.

Info: The year of manufacture can be seen in the bottom right corner of the type label.

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.

Notes on UL requirements

- ▶ 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 A and be installed in the max. 33.3 V DC power supply to the device in order to limit the available current to comply with the UL requirements. Please note possibly lower connection ratings for your device (refer to the technical data).

- ▶ For use and application in accordance with UL requirements¹⁾, a connecting cable listed under the UL category code CYJV/7 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).

Declaration of conformity

The product complies with the requirements according to

- ▶ Machinery Directive 2006/42/EC (until January 19, 2027)
- ▶ Machinery Regulation (EU) 2023/1230 (from January 20, 2027)

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

Service

If servicing is required, please contact:

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Kohlhammerstraße 16
70771 Leinfelden-Echterdingen

Service telephone:

+49 711 7597-500

E-mail:

support@euchner.de

Internet:

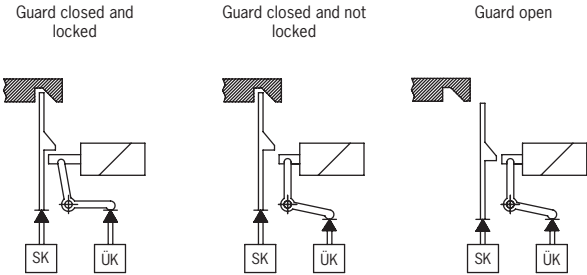
www.euchner.com

Technical data

Parameter	Value	
Housing material	Die-cast alloy	
Degree of protection	IP67, mating connector inserted	
Mechanical life	1 x 10 ⁶ operating cycles	
Ambient temperature	-25 ... +55 °C	
Degree of contamination	3 (industrial)	
Installation position	Any	
Approach speed, max.	20 m/min	
Extraction force (not locked)	30 N	
Retention force	10 N	
Actuating force, max.	35 N	
Actuation frequency	1,200/h	
Switching principle SK, UK	Positively driven, slow-action switching contact	
Contact material	Silver alloy, gold flashed	
Connection	Plug connector M12, 4-pin	
Weight	Approx. 0.5 kg	
Locking force	F _{max}	F _{Zh}
ACTUATOR Z-G.... HINGED ACTUATOR Z...	2,000 N	1,500 N
Guard locking solenoid		
Solenoid operating voltage (auxiliary voltage on black AS-Interface cable)	DC 24 V +10%/-15% 10 W Power supply unit with electrical isolation (EN IEC 60742, PELV)	
Solenoid operating current	350 mA	
Duty cycle	100%	
Connection	M12 plug connector	
AS-Interface data acc. to AS-Interface specification 2.1	EA code: 7 ID code: B	
Operating voltage, AS-Interface	DC 22.5 ... 31.6 V	
Total current consumption, max.	45 mA	
Valid AS-Interface addresses	1 - 31	
AS-Interface inputs	Acc. to AS-Interface Safety at Work	
Door monitoring contact SK	D0, D1	
Solenoid monitoring contact UK	D2, D3	
AS-Interface outputs		
D0	Guard locking solenoid, 1 = Solenoid energized	
D1	Red LED, 1 = LED on	
D2	Green LED, 1 = LED on	
AS-Interface Power LED	Green, AS-Interface Power on	
AS-Interface Fault LED	Red, offline phase or address "0"	
Characteristics acc. to EN ISO 13849-1		
Monitoring of guard locking and the guard position		
B _{10D}	3 x 10 ⁶	



Status table



Programming	State	D0, D1	D2, D3	Monitor diagnostics
2-channel conditionally dependent	Guard closed and locked	Code sequence		Green
	Guard closed and not locked	Half-sequence	00	Yellow flashing
	Invalid state (guard open, guard locking active)	00	Half-sequence	Red flashing (monitoring of the invalid state)
	Guard open	00	00	Red
	Address 0 or communication disrupted	–		Gray
2-channel independent	Guard closed and locked	Code sequence		Green
	Guard closed and not locked	Half-sequence	00	Red
	Invalid state (guard open, guard locking active)	00	Half-sequence	Red
	Guard open	00	00	Red
	Address 0 or communication disrupted	–		Gray
2-channel dependent Synchronization time infinite ∞	Guard closed and locked	Code sequence		Green if guard was previously open or yellow flashing after startup if only the guard locking was open.
	Guard closed and not locked	Half-sequence	00	Yellow flashing if guard was previously closed. Red if guard was previously open.
	Invalid state (guard open, guard locking active)	00	Half-sequence	Yellow flashing if guard was previously closed. Red if guard was previously open.
	Guard open	00	00	Red
	Address 0 or communication disrupted	–		Gray

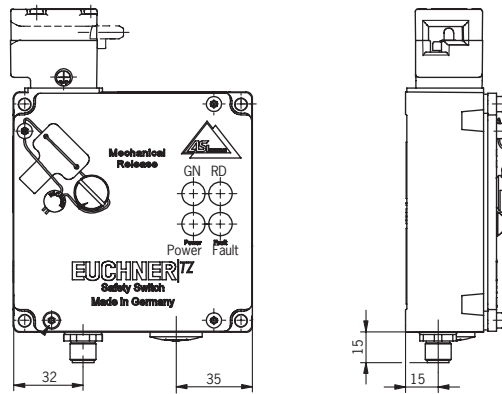
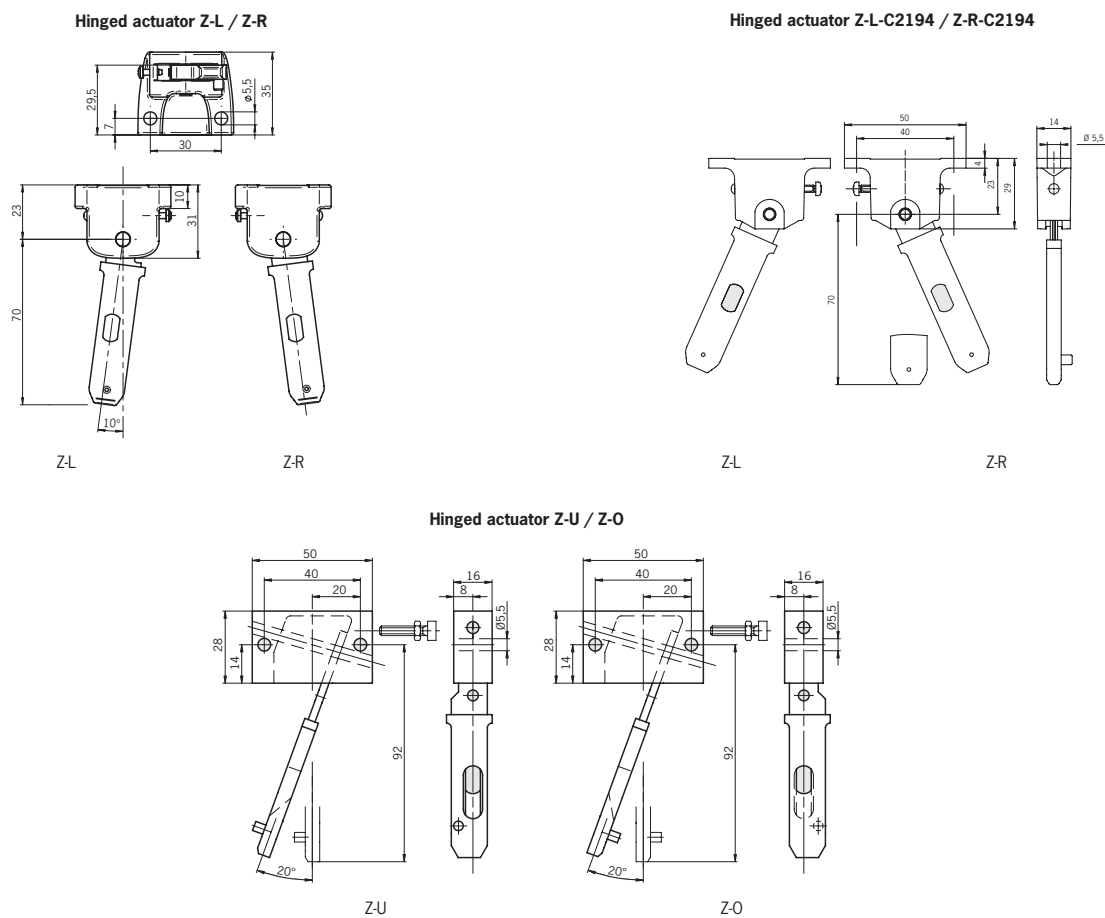


Fig. 4: Dimension drawing for TZ1LE024SEMAS1-C2175 with different plug connector position and screw plug



Actuator	Door radius, min. [mm]
Actuator Z-G...	1,000
Hinged actuator Z-R	200
Hinged actuator Z-L	200
Hinged actuator Z-C2194	200
Hinged actuator Z-U	165
Hinged actuator Z-O	165

Fig. 5: Minimum door radii