EN

Safety Switches with Metal Housing

EUCHNER
More than safety.

EUCHNER

More than safety.

Headquarters in Leinfelden-Echterdingen

Logistics center in Leinfelden-Echterdingen

Production location in Unterböhringen

Internationally successful – the EUCHNER company

EUCHNER GmbH + Co. KG is a world-leading company in the area of industrial safety technology. EUCHNER has been developing and producing high-quality switching systems for mechanical and systems engineering for more than 60 years.
The medium-sized family-operated company based in Leinfelden, Germany, employs around 750 people around the world.

18 subsidiaries and other sales partners in Germany and abroad work for our international success on the market.

Quality and innovation – the EUCHNER products

A look into the past shows EUCHNER to be a company with a great inventive spirit. We take the technological and ecological challenges of the future as an incentive for extraordinary product developments.

EUCHNER safety switches monitor safety doors on machines and installations, help to minimize dangers and risks and thereby reliably protect people and processes. Today, our products range from electromechanical and electronic components to intelligent integrated safety solutions. Safety for people, machines and products is one of our dominant themes.

We define future safety technology with the highest quality standards and reliable technology. Extraordinary solutions ensure the great satisfaction of our customers. The product ranges are subdivided as follows:

- Transponder-coded Safety Switches
- Transponder-coded Safety Switches with guard locking
- Multifunctional Gate Box MGB
- Access management systems (Electronic-Key-System EKS)
- Electromechanical Safety Switches
- Magnetically coded Safety Switches
- Enabling Switches
- Safety Relays
- Emergency Stop Devices
- Hand-Held Pendant Stations and Handwheels
- Safety Switches with AS-Interface
- Joystick Switches
- Position Switches

made in Germany

Contents

Safety Switches with Metal Housing

About this catalog

The *Safety Switches with Metal Housing* catalog gives you an overview of our safety switches with metal housing. For numerous applications these switches are the right choice due to their robustness and long service life. You will find the technical data after the product overview. There is a reference to the page with the related technical data on the pages listing the products.

At the front of the catalog you will find useful information on the topic of safety switches.
We have prepared an overview of the standards and a glossary on this topic in the appendix.

You will find the following series and accessories in this catalog:

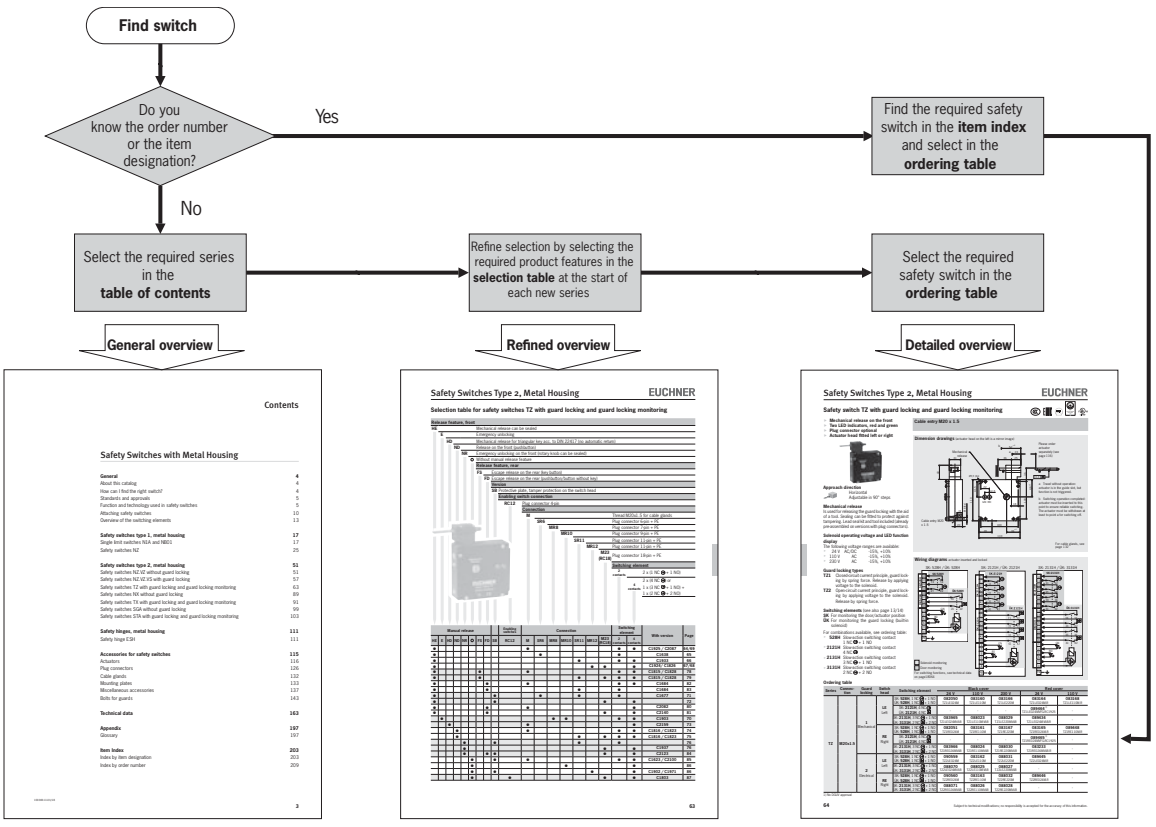
Safety switch in metal housing

Type 1			Type 2							Safety hinge ESH	Accessories
Single limit switches		Safety Switch	Without guard locking			With guard locking	With guard locking and guard locking monitoring				
N1A	NB01	NZ	NZ.VZ	NX	SGA	NZ.VZ.VS	TZ	TX	STA		
											
See page 17	See page 17	See page 25	See page 51	See page 89	See page 99	See page 57	See page 63	See page 91	See page 103	See page 111	See page 115

How can I find the right switch?

There are two ways you can find the right switch:

1. If you know the order number or the product designation, look for the switch directly in the item index (see page 203 or page 209).
2. If you have specific requirements, refine the selection step-by-step with the aid of the table of contents and the selection tables.



Standards and approvals

Standards

Safety switches must meet the requirements for safety components as per the Machinery Directive. The Machinery Directive has been implemented in national law in the EU member states and, as a result, is binding for all manufacturers.
Detailed requirements for the switches are defined in EN 60947 Part 5-1 (Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements. Electromechanical control circuit devices).
If the requirements of this standard are met, conformity with the applicable laws and therefore with the Machinery Directive is assumed. EUCHNER safety switches comply with the relevant standards for safety switchgear and therefore help you to comply with safety requirements during the design of your machinery.

Approvals

To demonstrate conformity, the Machinery Directive also includes the possibility of type examination. Although all relevant standards are taken into account during development, we have all our safety switches subjected to additional type examinations by a notified body.
Many of the safety switches listed in this catalog have been tested by the German Social Accident Insurance association (DGUV), formerly the employers' liability insurance association (BG), and are given in the lists from the DGUV.
Furthermore, numerous switches are listed by Underwriters Laboratories (UL) or other organizations. These switches can be used in countries in which this listing is required. The approval symbols on the individual pages of the catalog indicate which body tested the switches.
With the aid of the approval symbols listed below you can quickly see which approvals are available for the related switches:

DGUV Test ET Sicherheit geprüft tested safety	Switches with this symbol have the approval of the German Social Accident Insurance association (DGUV) – formerly the employers' liability insurance association (BG)
c UL us LISTED	Switches with this symbol are approved by Underwriters Laboratories (UL, Canada and USA)
TYPE APPROVED PRODUCT DNV·GL DNVGL.COM/AF	Switches with this symbol are approved by DNV GL, formerly Germanischer Lloyd
EAC	Switches with this symbol are approved by the Eurasian Economic Union (EEU)
CCC	Switches with this symbol have CCC certification for the Chinese market.

Function and technology used in safety switches

The task of safety switches

Safety switches have the task of preventing the operation of a machine in the case of a potential hazard. This task is defined in EN ISO 14119 (Safety of machinery. Interlocking devices associated with guards. Principles for design and selection). For this purpose the safety circuit must be opened by the safety switch. Safety switches are therefore key elements of an interlocking device.
In this context an interlocking device is, for example, the interruption of machine operation if the safety door is open – the stop state of the machine is "interlocked" so to speak and unintentional starting is therefore prevented. In relation to movable guards this means that if safety doors or safety flaps are open, the machine or system cannot be operated if the machine or system can produce a hazard. For this reason the safety switch for a guard must be attached such that a malfunction is excluded. Safety switches must also not be tampered with or bypassed.
The most important feature of a safety switch is at least one NC contact which is operated positively. The switching contacts are separated positively when the guard is opened.

Safety switch types according to EN ISO 14119

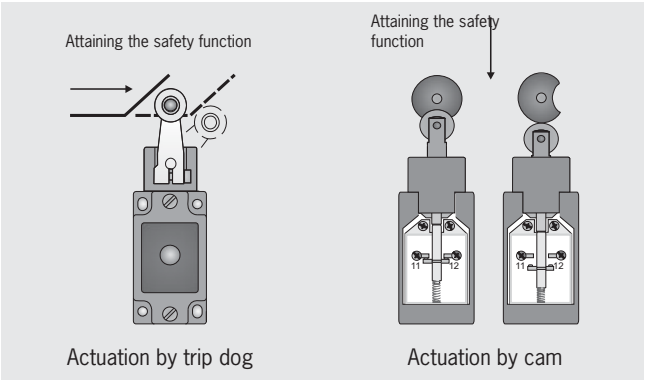
Safety switches in this catalog are divided into two different functional types. Switches type 1 are actuated by an actuator (e.g. a dog or some type of end stop).
For safety switches type 2 a special, coded actuator is required. The actuator therefore has a specific form (similar to a key). Other types are defined in EN ISO 14119.

Type 1

Type 2

Safety switches type 1

Safety switches type 1 are safety switches on which the actuating element for the switch is coded. The actuating elements are available in various versions (e.g. in the form of a plunger or a lever arm). The switches N1A, NB01 and NZ listed in this catalog are safety switches type 1.
To actuate a switch type 1, trip dogs or cams are often used (see figure on the next page).
The switch must be attached such that the switch is actuated if the guard is opened. The positively driven contact in the switching element is opened and the machine is shut down. A built-in spring returns the switch to the free position when the guard is closed and the positively driven contact is closed. In this way the safety circuit is enabled again.
A safety trip dog with a defined slope should be used to approach the switch. Linear trip dogs are generally used for travel limiting or for shutting down in final positions. A cam with cut-out (negative dog) is particularly suitable for protecting safety doors. An alternative is the safety hinge ESH. On the safety hinge ESH the cam is already integrated into the switch in a very small space envelope. It is therefore possible to protect movable guards with very little mounting effort.



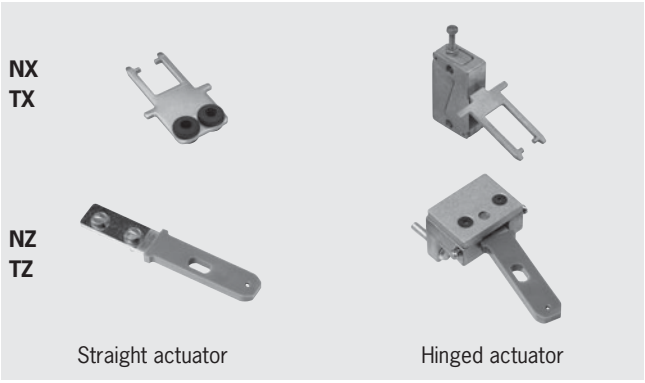
Actuation by trip dog Actuation by cam

Safety switches type 2

On safety switches type 2, the actuating element for the switch is coded. The actuating elements are available in various versions to suit the guard that is to be monitored.
This catalog contains series NZ.VZ, NZ.VZ.VS, TZ, NX, TX and STA switches that are used in combination with separate coded actuating elements. The function of these switches is, apart from the type of actuation, identical to the switches type 1.

Actuating elements for switches type 2

The safety switches NZ.VZ, NZ.VZ.VS, TZ, NX and TX can only be actuated using a special actuating element with multiple coding. The coding is a type of lock and key principle. The safety switch can only be actuated using an actuating element of a specific shape. Unlike a conventional key, the actuating elements for a switch series are always the same shape.



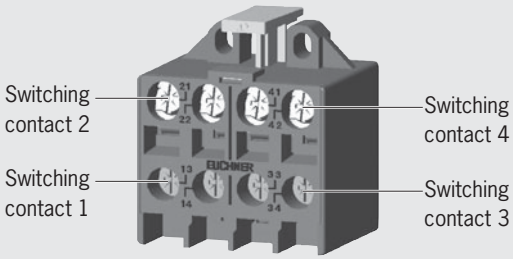
Straight actuator Hinged actuator

The positively driven contact in the switching element is closed by inserting the actuating element in the switch head. The positively driven contact is reliably opened by the positive application of force when the actuating element is removed – even if the contacts are welded together. In the open state, the machinery or systems are then safely interlocked against starting.
The actuators for the series NZ.VZ and TZ comprise a laminated spring steel core encapsulated in an abrasion-resistant plastic. As the spring steel core comprises three layers, complete fracture on overloading is unlikely. Straight actuators and hinged actuators are available for a wide range of applications in which, e.g. hinged and sliding doors are used. Hinged actuators are spring-mounted actuators that adjust to the inner contours of the switch on insertion in the actuating head. They are suitable for small hinged doors with a radius from 165 mm. For sliding doors and hinged doors with an adequately large pivoting radius (> 1,000 mm) a straight actuator can be used.
If increased play is required when the door is closed, an actuator with overtravel is available. With this actuator the door can move slightly in the actuating direction when closed. This is important, for example, if safety doors have a rubber end stop. Using an actuator with overtravel, the continuous pressure from the compressed rubber can be reduced. In this way the load is reduced on the switch head and the door mechanism.

Switching elements

Different switching elements are available for the switches offered in the catalog:

- Single switching element
- Double switching element with two independent switching contacts
- Quadruple switching element with four independent switching contacts



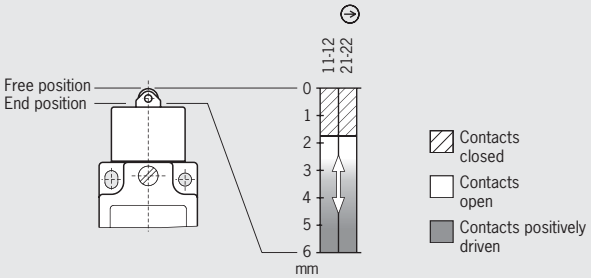
Quadruple switching element

Only one switching element is fitted in each case in switches of the series N1A, NB, NZ, NX, TX and STA. Two switching elements are fitted to all series TZ safety switches. In this case one of the switching elements is used to monitor the door position (SK) and the other is used to monitor the position of the guard locking solenoid (ÜK). Switching elements are divided into two types as a function of their switching characteristics:

- Slow-action switching elements and
- Snap-action switching elements

Slow-action switching element

Slow-action switching elements are mostly used in safety switches. The opening of the switching element is directly dependent on the position of the actuator. The further the actuator is moved, the further the switching element is opened.

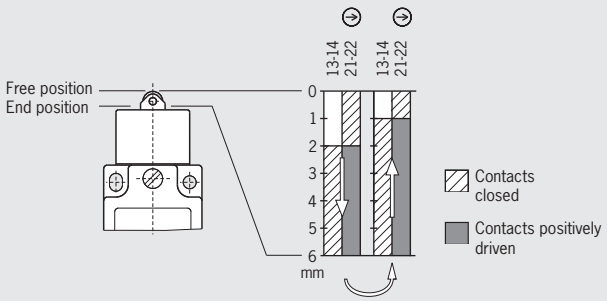


Travel diagram
Slow-action switching element

The actuator travel is therefore directly proportional to the travel covered by the switching contact in the switching element. From the travel diagrams it can be seen at which point the switching element changes from the closed state to the open state.

Snap-action switching element

On snap-action switching elements, the change from the completely closed state to the completely open state is made at a defined point. As a result the operating point is at a defined position, unlike on slow-action contact elements. Snap-action switching elements typically have a switching hysteresis.



Travel diagram
Snap-action switching element

Positively driven contacts ⊖

Positively driven contacts are used in the switching elements. These are special switching contacts that are designed to ensure the switching contacts are always reliably separated. Even if contacts are welded together, the connection is opened by the actuating force.
It is a common feature of all safety switching elements that at least one switching contact is designed as a positively driven contact. Often two positively driven contacts are employed to increase safety using the principle of duplicated design (redundancy). This dual-channel design ensures that on the failure of one channel or on a fault in the control circuit (e.g. in the machine wiring), the interlocking can still be provided with the aid of the second channel.
Switches must also meet the requirements of EN 60947-5-1 Annex K.

Guard locking monitoring

The monitoring by the control system must be marked with the symbol shown on the illustration. This switching contact is a positively driven contact. The contacts are opened when guard locking is released.

Explanation of symbols and notation

Symbols and specific notation related to the switches or the switching contact are used time and again in the catalog.
The following example is intended to explain these aspects:

Notation
1 NC ⊖ + 1 NO

Explanation
Normally closed contacts are represented by NC, normally open contacts by NO. The number defines how many contacts are available. The symbol ⊖ behind the NC defines that the NC contact is a positively driven contact. This switch therefore has one normally closed contact and one normally open contact; the normally closed contact is a positively driven contact.

Safety contacts

If contacts fulfill safety tasks, positively driven contacts must be used. These contacts are referred to as safety contacts.

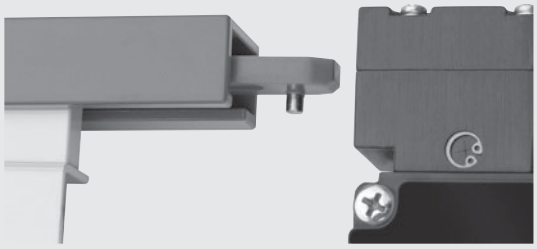
Monitoring contacts

Door monitoring contact and interlocking solenoid monitoring contact
In addition to the safety contacts, monitoring contacts are also required, for example, to indicate the position of the guard locking solenoid to the control system, or to indicate whether the guard is open. If these contacts do not have any safety function, either NC or NO contacts can be used.

Door unlock request contact
A special feature of the STA series is the door unlock request contact. When the actuator is in the locked state, positively driven contact 21-22 is opened by pulling the guard and a signal sent to the higher level PLC. Depending on the control concept, the guard can be unlocked automatically – when machine components that were still running have stopped.

Protection against tampering

A safety switch can only ensure that operation is free of hazards if it is not bypassed. To prevent tampering type 2, the actuator must be positively mounted on the guard. All actuating elements are supplied with safety screws that can be fastened using commonly available tools, but that can only be undone with extreme difficulty. It should be ensured that the screws cannot be undone with simple tools.
Increased protection against bypassing safety switches can be achieved by using a covered installation. In this way it can be made more difficult to insert replacement actuators, or this action can be prevented. Suitable for this purpose, for instance, are rear wall mounting or guiding the actuator in a C rail.
Switches type 1 can be installed covered so that the uncoded actuating element cannot be reached.



Guiding the actuator in a C rail

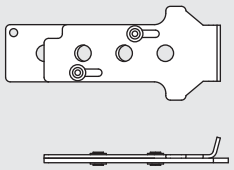
Protective plate

On the switches NZ.VZ, increased protection against bypassing can be achieved by using a protective plate over the switch head. The switch head's rearward opening is then rendered almost inaccessible.

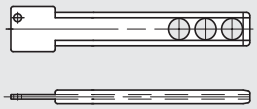
Safety switch type 2 with protective plate

Lockout bar

To prevent the unintentional closing of a guard, lockout bars are available for switches type 2. The lockout bar is inserted in the safety switch instead of the actuator when the guard is open. The lockout bar can then be secured with commercially available padlocks (up to five locks) to protect against removal.



Lockout bar for three padlocks (here for NX/TX)

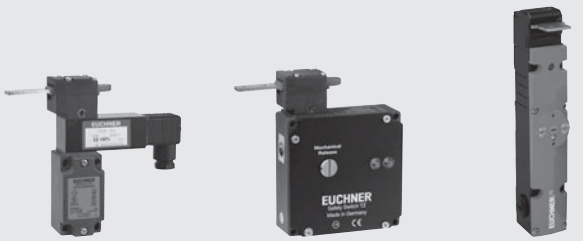


Lockout bar for three padlocks (here for NZ/TZ)

This feature guarantees protection for anyone (e.g. maintenance or service personnel, or cleaning staff) who needs to enter potentially hazardous areas. The switches cannot signal a safe (closed) state with a lockout bar fitted. As a result unintentional starting of the machine is not possible.

Guard locking

Safety switches type 2 are available both with and without guard locking. Guard locking is a feature that prevents the unintentional opening of a door as long as there is a hazard. The door is locked by preventing the removal of the actuator from the safety switch.
The series N1A, NB, NZ, NX, TX and STA listed in this catalog are safety switches type 2 with guard locking.



Safety Switch NZ.VZ.VS | Safety Switch TZ | Safety Switch TX

Personnel protection

Guard locking is required if a hazard cannot be removed immediately by shutting down a machine (e.g. due to machine movements with overtravel). In this case fail-safe control of the guard locking solenoid is required. This requirement can, for instance, be achieved by a safe standstill monitor or a safe delay. The safety switch must also provide a facility for monitoring the position of the solenoid.
The series TZ, TX and STA feature the guard locking monitoring required for this function and can therefore be used for protection of personnel.

Process protection

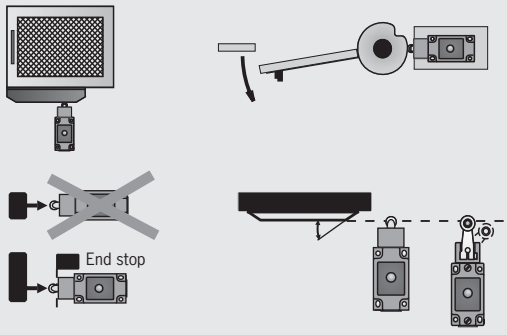
Often a guard is only to be locked to prevent interruption to the process due to unintentional opening of the guard. In this case the position of the guard locking solenoid does not need to be integrated in the safety circuit. In this situation the series NZ.VZ.VS, TZ, TX and STA safety switches are suitable.

Housing material

The series N1A, NB, NZ and TZ safety switches have a die-cast alloy housing with an anodized surface. Due to the durable housing material and the high degree of protection (up to IP 67), these switches can be used even under the harshest conditions. The degree of protection only applies to the space for the electrical wiring and not to the actuating head.

Attaching safety switches type 1, type 2 and the actuators

Certain requirements must be met with respect to attaching the safety switches, e.g. EN ISO 14119 *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection*.
Any installation position can be used, but safety switches must be attached such that their position cannot be changed in operation. However, it must be possible to replace the switches at any time, if necessary, without renewed adjustment.
These requirements are achieved by using reliable fixings that can only be undone using tools. To prevent a change to the position, there must also be no movement in the joint (e.g. by using dowel pins).

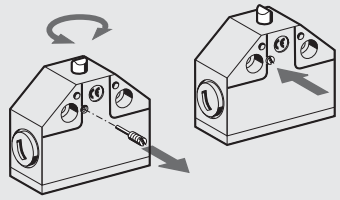


Attaching safety switches and actuators

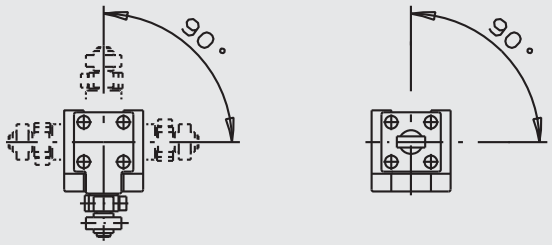
The same applies to the actuators for switches type 2 and trip dogs for switches type 1. A joint without movement is also required here. Above all else, loosening must be prevented. In addition, it must be ensured that cams and trip dogs can only be mounted in the correct position.
To prevent tampering, safety screws can also be used for the attachment of safety switches and trip dogs.
Mounting plates are available to ease the attachment of switches type 2 and also actuators. Bolts attached to the safety door are extremely helpful. All requirements, e.g. the mechanical end stop for the door and the exact guidance of the actuator, are optimally met by using bolts.

Changing the approach direction

Often the actuator approach direction does not match the standard alignment of the actuating head as delivered. For this reason, the actuating heads on the safety switches NZ, TZ, NX, TX and STA can be very straightforwardly adjusted to the required direction.

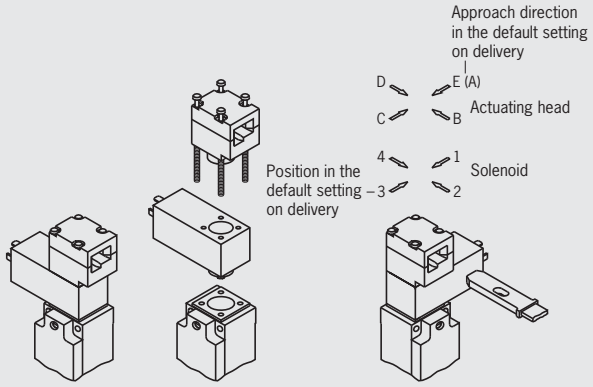


Changing the approach direction single limit switch N1A/NB01

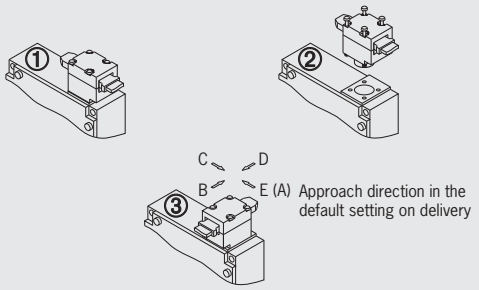


Lever arm Plunger

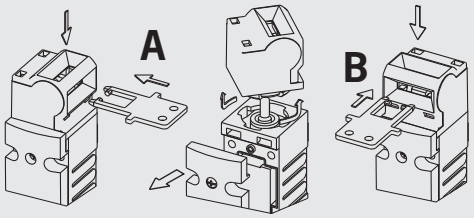
Changing the approach direction safety switch NZ (4 x 90°)



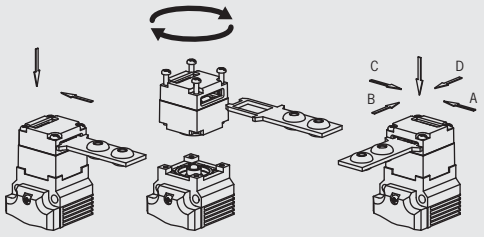
Changing the approach direction safety switch NZ.VZ.VS (4 x 90°)



Changing the approach direction safety switch TZ



Changing the approach direction safety switch NX/TX



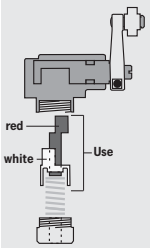
Changing the approach direction safety switch STA

After undoing the four fixing screws, the actuating head can be rotated in 90° steps. If for reasons of protection against tampering, renewed removal of the actuating head is to be prevented, the actuating head can be fastened to the basic housing using safety screws. You will find appropriate fixing material in the accessories section of this catalog.

Changing the switching direction

In addition, the actuating direction can be adjusted such that the actuator only switches in one direction.

Position Use	Actuation / Active	Left	Not activated	Right	
white / red	Both sides left + right				
red / white	State				
	Pos.driven contacts	⊖	closed	⊖	
	NO contacts	closed	open	closed	
white / red	One side left				
	State				
	Pos.driven contacts	closed	closed	⊖	
	NO contacts	open	open	closed	
red / white	One side right				
	State				
	Pos.driven contacts	⊖	closed	closed	
	NO contacts	closed	open	open	

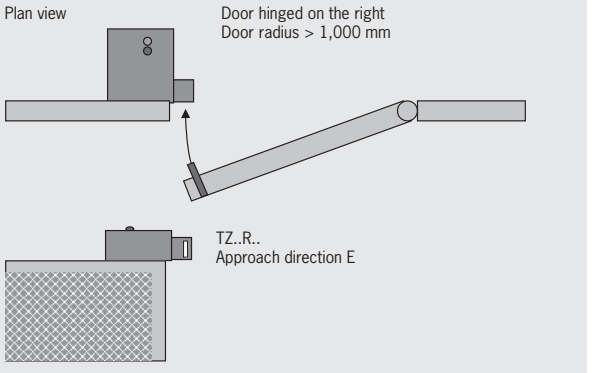


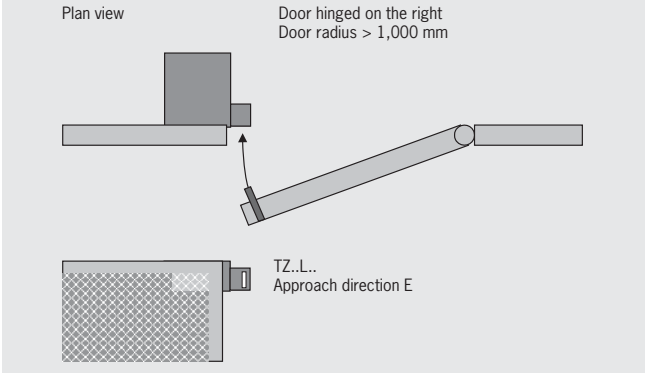
Changing the switching direction position switch NZ.H...

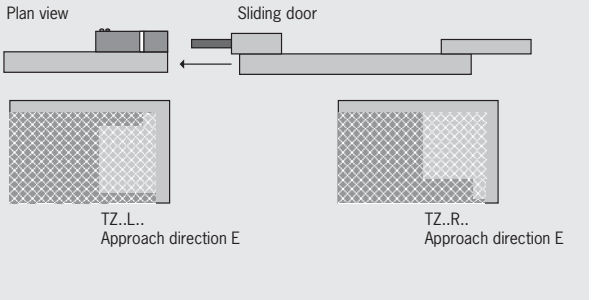
Attaching the safety switch TZ with actuating head fitted on left or right

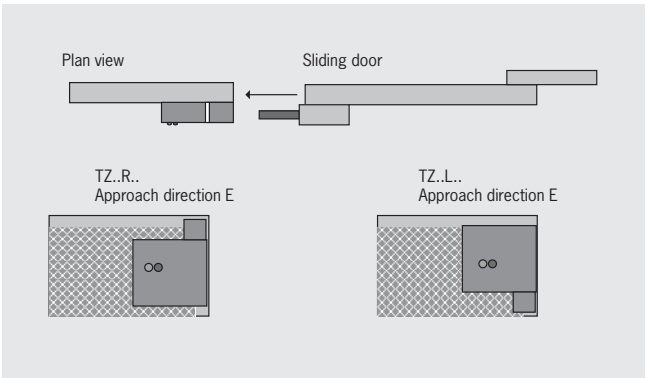
The safety switch TZ can be mounted in a large number of different installation positions. Often the switch is mounted horizontally on the roof of a machine or with a suspended actuator head. The method of attachment depends on whether the switch is to be attached in a protected installation position, for instance to make tampering more difficult, or whether the switch is to be mounted so that it is easily accessible as the escape release must be within reach from inside the system.

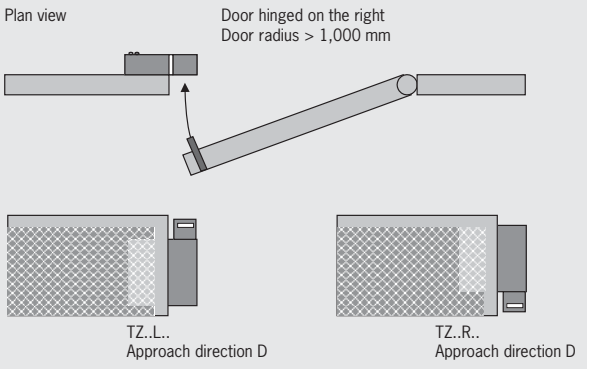
The drawings show that the attachment of the actuator head is very heavily dependent on how the switch is mounted. It is not possible to list all methods of attachment here, as the actuator head can be rotated in 90° steps. As a result there are a very large number of different methods of attachment. There is a suitable way of mounting the switch for every application.

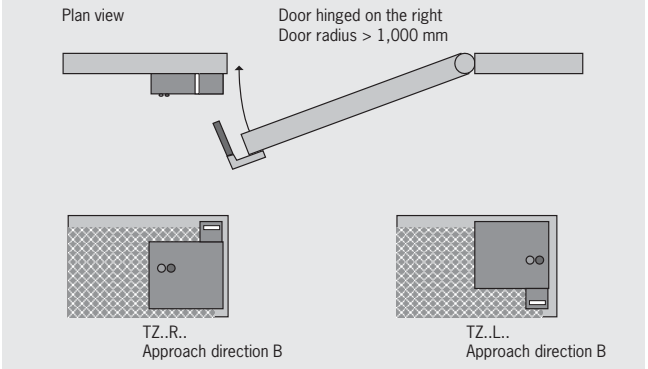


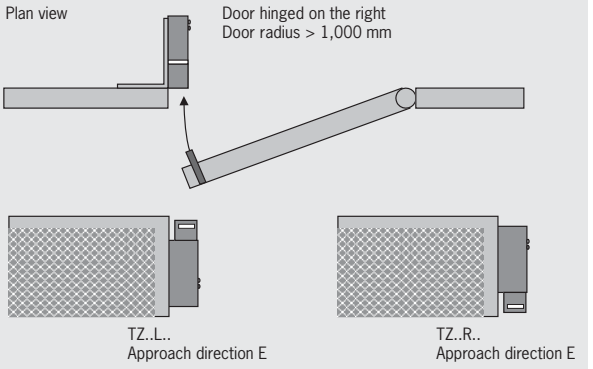


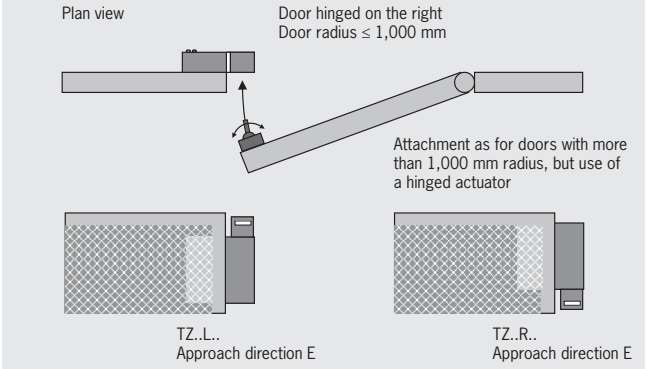












Electrical connection

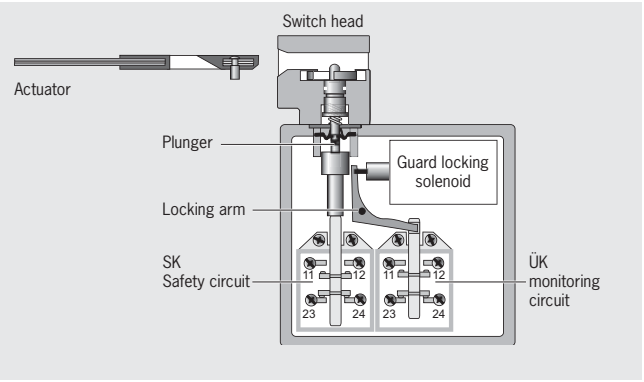
On switches with cable entry there is a large space envelope for making the electrical connection.
Modern wiring concepts increasingly utilize plug-in connections. A switch with plug connectors can be easily replaced during servicing work. This configuration results in short downtimes.
The safety switches NZ and TZ are available with various plug connectors. The corresponding mating connectors are also available as accessories with permanently connected cables of different lengths.

Switch layout for design TZ

▸ Locking arm
The locking arm ensures that the switch is guard locked by the solenoid. It acts directly on the switching element ÜK; the positively driven contacts can only be closed in the locked state (see ⁎*Failsafe locking mechanism*).

▸ SK
The position of the SK switching element is dependent on the position of the actuator or the guard. This situation means that the positively driven contacts on the SK switching element are only closed if the actuator is in the switch head.

▸ ÜK
The position of the ÜK switching element is dependent on the position of the actuator or the guard and the position of the solenoid or the guard locking. I.e., both guard locking and positively driven contact on the ÜK switching element can only be closed if the actuator is in the switch head and the guard locking solenoid is controlled correspondingly.



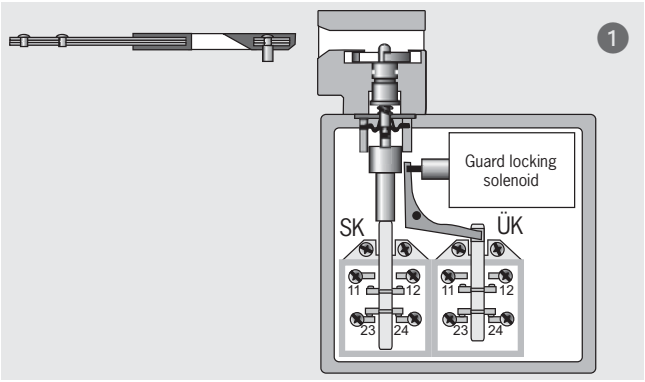
LED indicator TZ

As standard the TZ series is equipped with a red and a green LED. Depending on the switch design, the assignment is pre-wired or can be chosen as required (see also page 179).

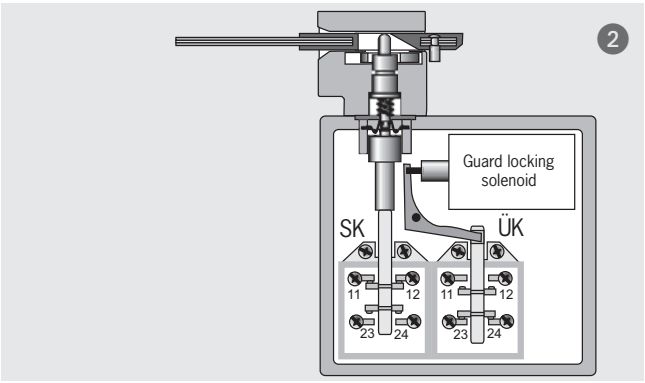
Principle of operation of TZ

The sectional drawings show the safety switch TZ in its three switch states:

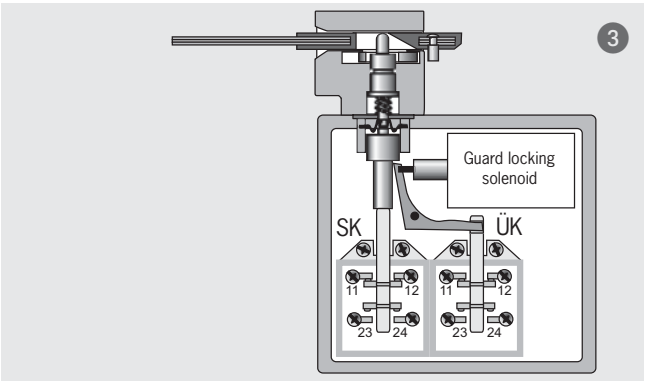
1 Door open and not locked
In the initial state (actuator removed/guard open) all positively driven contacts (SK and ÜK) are open. The related NO contacts 23-24 are closed and signal the state *open and unlocked*. Unintentional closing of the contacts on switching element ÜK is impossible due to the switch mechanism (see ⁎*Failsafe locking mechanism*).



2 Door closed and not locked
The plunger is released by inserting the actuator into the switch head. The contacts 11-12 on switching element SK are closed, the contacts 23-24 are opened. The contacts 11-12 on the switching element ÜK remain open as before, the door monitoring contacts 23-24 for switching element ÜK remain closed.



3 Door closed and locked
After the actuator has been inserted, it is possible to activate the switch's guard locking. If the guard locking solenoid is activated, the locking arm locks the plunger and actuates the switching element ÜK. The contacts 11-12 are closed on this switching element. The contacts 11-12 on the switching element SK continue to remain closed. In this position the positively driven contacts 11-12 on the two switching elements SK and ÜK are safely locked, both door monitoring contacts 23-24 are opened. The actuator and the guard are locked. This means that the machine connected to the safety circuit can be started.



LED indicator TX

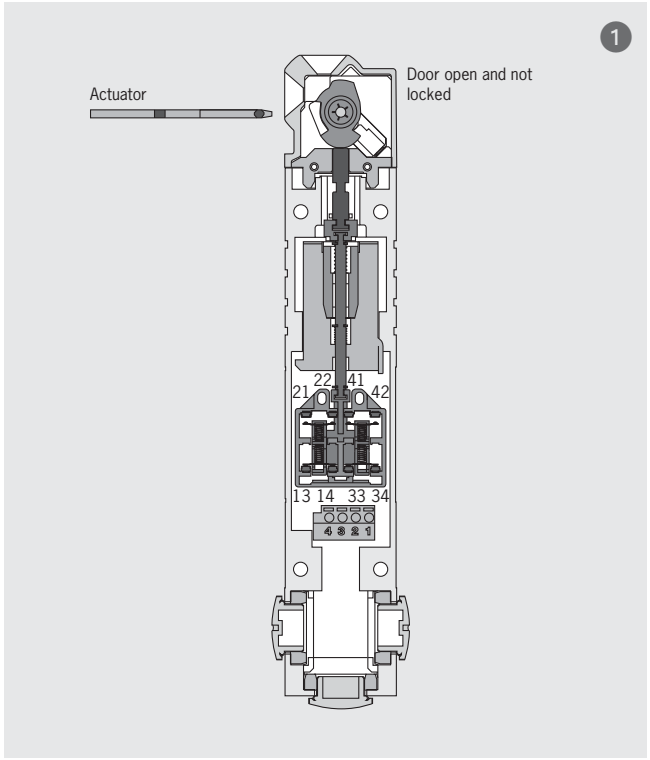
As standard the TX series is equipped with a red and a green LED. Depending on the switch design, the assignment is pre-wired or can be chosen as required.

Principle of operation of TX/STA

The sectional drawings show the safety switch TX in its three switch states. The same principle of operation applies to the STA.

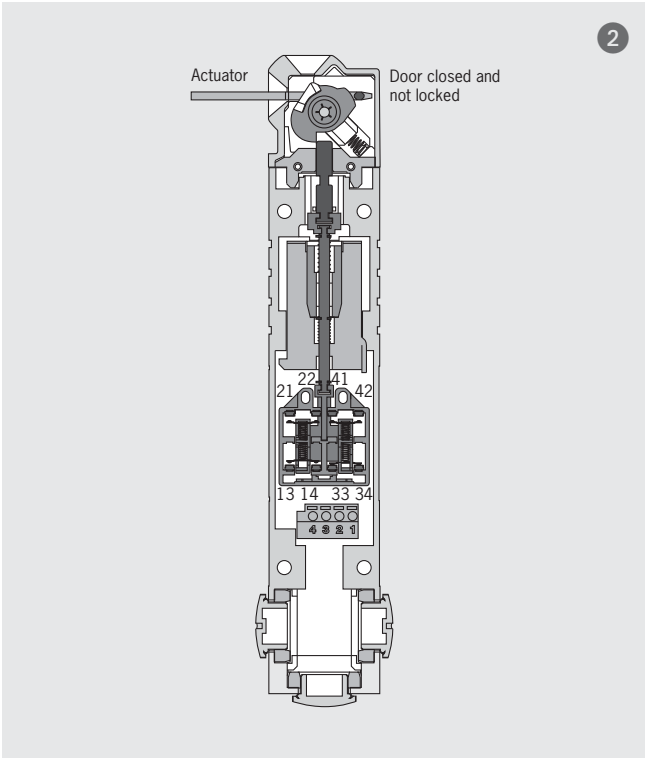
1 Door open and not locked

In the initial state (actuator removed/guard open) all positively driven contacts (here: 21-22 and 41-42) are open. The NO contact 13-14 is closed and signals the condition *Door open*. The NO contact 33-34 is also closed and signals the condition *Not locked*. Unintentional closing of the contacts 21-22 and 41-42 is impossible due to the switch mechanism (see ➧*Failsafe locking mechanism*).



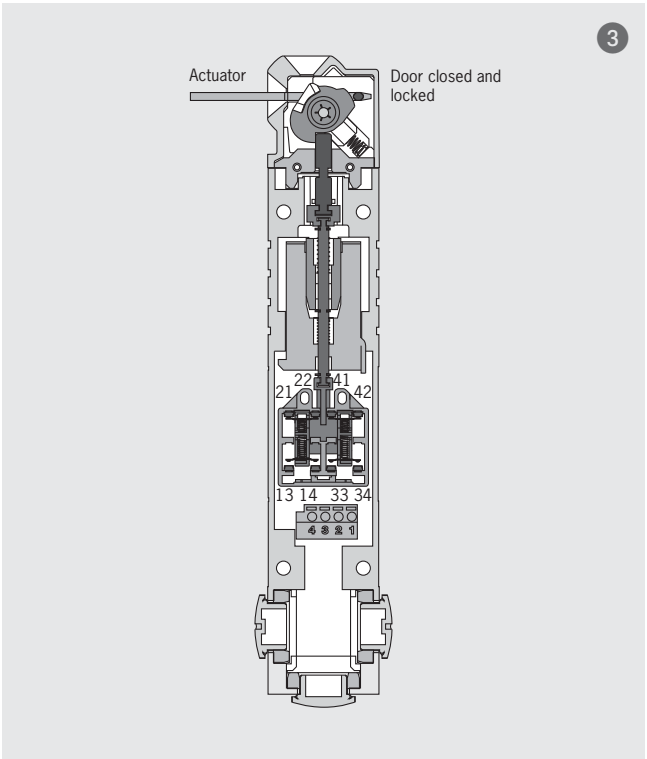
2 Door closed and not locked

The plunger is released by inserting the actuator into the switch head. The NO contact 13-14 is now open and signals the condition *Door closed*. The NO contact 33-34 remains closed and signals the condition *Not locked* as before. The positively driven contacts 21-22 and 41-42 remain open as before.



3 Door closed and locked

After the actuator has been inserted, it is possible to activate the switch's guard locking. When the guard locking solenoid is activated, NO contact 33-34 is opened and signals the condition *Locked*. The NO contact 13-14 signals the condition *Door closed* as before. The positively driven contacts 21-22 and 41-42 were closed when the guard locking solenoid was activated. The actuator and the guard are locked. This means that the machine connected to the safety circuit can be started.



Failsafe locking mechanism

The design feature of a guard locking which ensures that the locking mechanism (solenoid plunger) cannot go into the locking position if the guard is open is also referred to in DGUV Information 203-079 as failsafe locking mechanism.
The failsafe locking mechanism on an interlocking device with guard locking mechanically prevents the safety switch changing to the locked position with the guard open and therefore signaling a safe state.

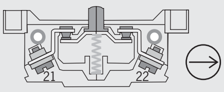
Switching elements

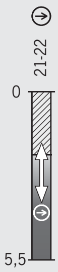
The switching elements used in our safety switches have a dedicated numbering system. A selection of switching elements is available depending on the switch type. In the following overview you can see which switching element is covered by the related number.
Some switching elements are marked with an *H* (e.g. 528H). The switching elements have an H-shaped contact bridge. They have a lower contact resistance and can therefore also safely switch small currents from 1 mA.

Please note: safety switching elements are not available as replacement switching elements.

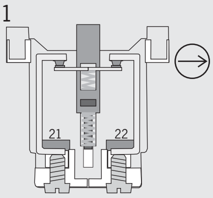
Switching elements with 1 switching contact

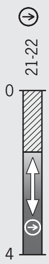
Switching element 508
- Slow-action switching contact
- 1 positively driven contact
- for series N1A





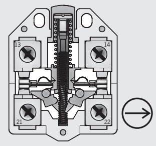
Switching element 588
- Slow-action switching contact
- 1 positively driven contact
- for series NB01

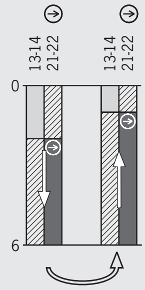




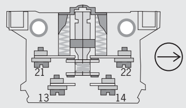
Switching elements with 2 switching contacts

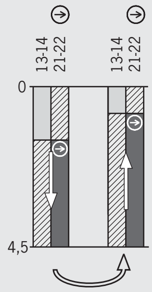
Switching element 511
- Snap-action switching element
- 1 positively driven contact + 1 NO contact
- for series NZ



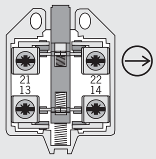


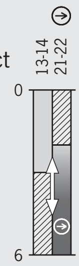
Switching element 514
- Snap-action switching element
- 1 positively driven contact + 1 NO contact
- for series N1A



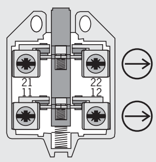


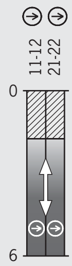
Switching element 528H
- Slow-action switching element
- 1 positively driven contact + 1 NO contact
- for series NZ / TZ





Switching element 538H
- Slow-action switching element
- 2 positively driven contacts
- for series NZ / TZ



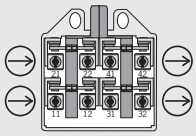


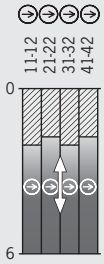
Contact
- closed
- open
- positively driven

Switching elements with 4 switching contacts

Switching element 2121H

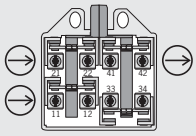
- Slow-action switching element
- 4 positively driven contacts

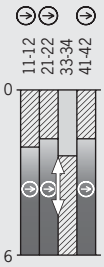




Switching element 2131H

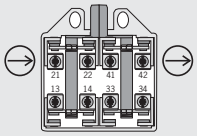
- Slow-action switching element
- 3 positively driven contacts + 1 NO contact (door monitoring contact on STA)
- for series NZ / TZ / NX / STA

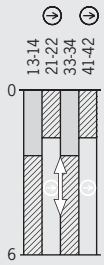




Switching element 3131H

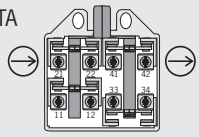
- Slow-action switching element
- 2 positively driven contacts + 2 NO contacts
- for series NZ / TZ / NX

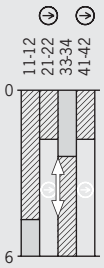




Switching element 4121H

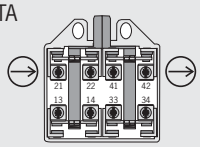
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NC contact (door monitoring contact)
- for series STA

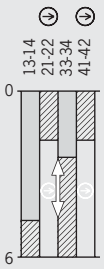




Switching element 4131H (without door monitoring contact)

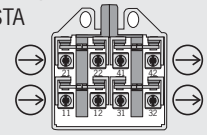
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NO contact
- for series STA

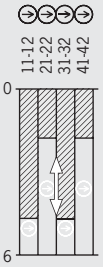




Switching element 4141H

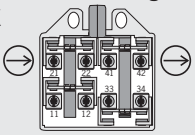
- Slow-action switching element
- 2 positively driven contacts + 2 positively driven contacts (door monitoring contacts)
- for series STA

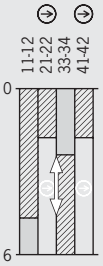




Switching element ETX B

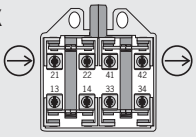
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NC contact (door monitoring contact)
- for series TX

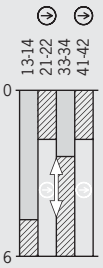




Switching element ETX C

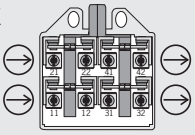
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NO contact (door monitoring contact)
- for series TX

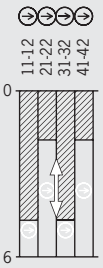




Switching element ETX D

- Slow-action switching element
- 2 positively driven contacts + 2 positively driven contacts (door monitoring contacts)
- for series TX





Contact

closed

open

positively driven

Selection table for single limit switches N1A and NB01

Actuating element

- **N1AD** – Chisel plunger
- **N1AR/N1AB** – Roller plunger with steel roller ∅ 8 mm
- **N1ARL** – Roller plunger with steel roller ∅ 18 mm
- **N1AW** – Rounded plunger
- **NB01D** – Chisel plunger
- **NB01R** – Roller plunger with steel roller ∅ 5 mm

Connection

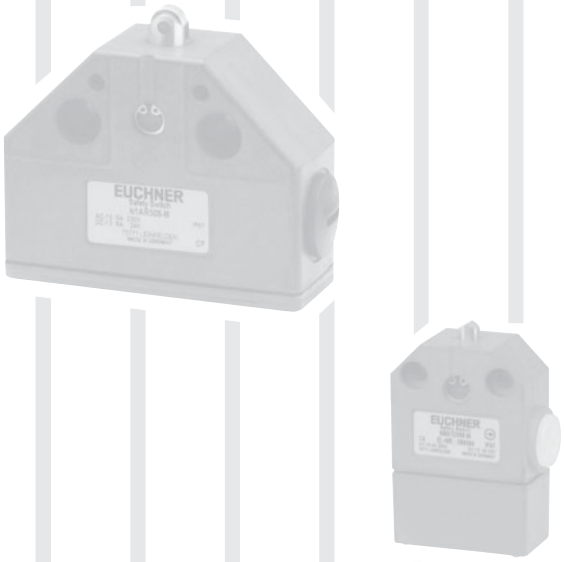
- **M** – Thread M16x1.5 or M12x1.5 for cable glands
- **SVM5** – M12 plug connector 5-pin, male socket adjustable (270°) for elbow connector

Exterior diaphragm

- **AM** – Protection against heavy soiling (dust) and aggressive coolants.

Switching element

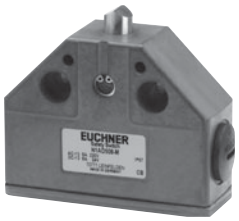
- **1 contact** – 1 NC ⊖
- **2 contacts** – 1 NC ⊖ + 1 NO



Actuating element						Connection		Dia-phragm AM	Switching element		With version	Page
N1AD	N1AR N1AB	N1ARL	N1AW	NB01D	NB01R	M	SVM5		1 contact	2 contacts		
●						●			●	●	C2222	18
●						●		●	●	●		19
●							●			●		19
	●					●			●	●	C2222	20
	●					●		●		●		21
	●						●			●		21
		●				●			●	●		22
			●			●	●		●	●	C2222	23
				●		●			●			24
					●	●			●			24

Single limit switch N1AD with chisel plunger

- **Housing according to DIN 43693**
- **LED optional**
- **Plug connector optional**
- **Exterior diaphragm optional**
- **Low temperature down to -40 °C optional**



Approach direction

Horizontal
Adjustable in 90° steps

Exterior diaphragm (optional)
Protection against heavy soiling (dust) and aggressive coolants.

Low temperature
Version C2222 with silicone membrane and low temperature grease.

LED function display (optional)
A function display is available for the following voltage ranges:

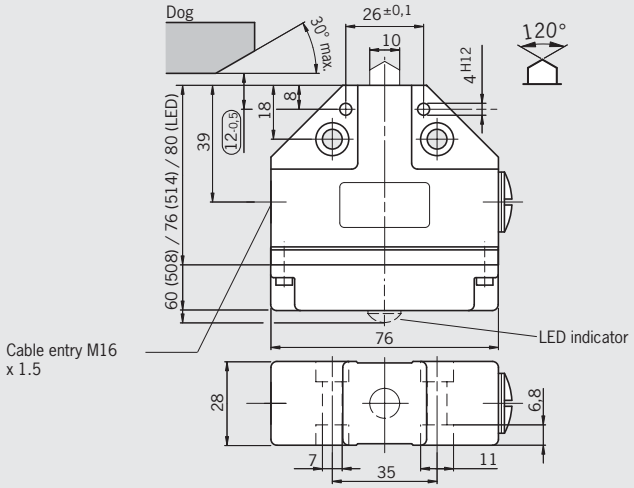
- AC 230 V ±15% red

Switching elements (see also page 13)

- **514** Snap-action switching contact 1 NC ⊖ + 1 NO
- **508** Slow-action switching contact 1 NC ⊖

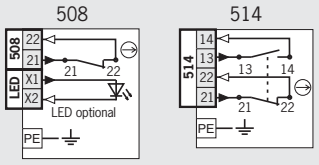
Cable entry M16 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams



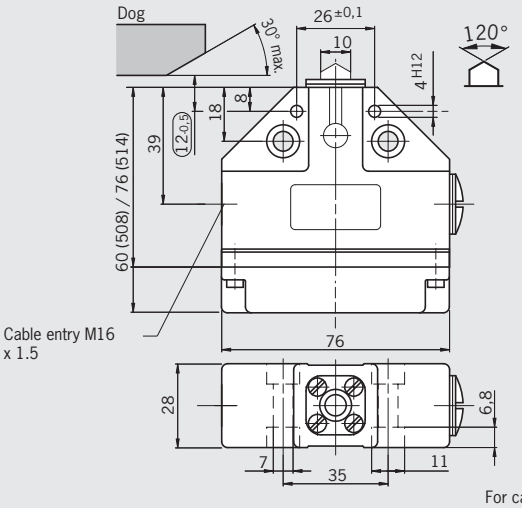
Ordering table

Series	Actuator	Connection	Switching element	Version	Function display	
					Without LED	230 V red LED
N1A	D Chisel plunger	Cable entry **M16 x 1.5**	**508** 1 NC ⊖		**083886** N1AD508-M	-
				C2222 Low temperature	**103237** N1AD508-MC2222	-
			514 1 NC ⊖ + 1 NO		**083849** [1] N1AD514-M	-

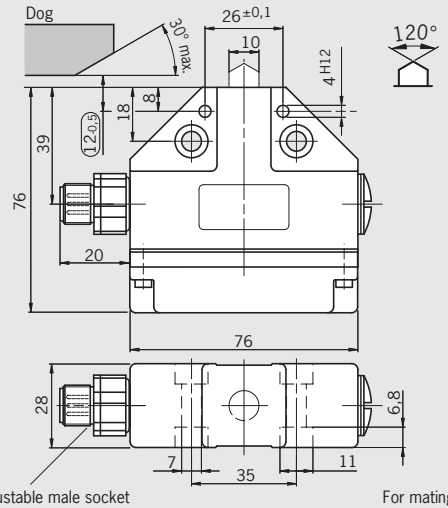
Cable entry M16 x 1.5
Exterior diaphragm

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

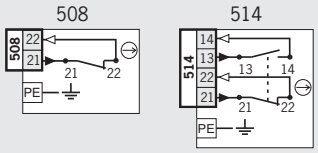


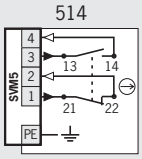
For cable glands, see page 132



For mating connectors, see page 126

Wiring diagrams





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					Without LED
N1A	D Chisel plunger	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	Exterior diaphragm	**090546** N1AD508AM-M
			514 1 NC ⊖ + 1 NO	Exterior diaphragm	**091261** N1AD514AM-M
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO		**087603** [1] N1AD514SVM5-M

For technical data, see page 163

Single limit switch N1AR/N1AB with roller plunger

- **Housing according to DIN 43693**
- **Steel roller ∅ 8 mm**
- **LED optional**
- **Plug connector optional**
- **Exterior diaphragm optional**
- **Ball bearing optional**
- **Low temperature down to -40 °C optional**

Approach direction

Horizontal
Adjustable in 90° steps

Exterior diaphragm (optional)
Protection against heavy soiling (dust) and aggressive coolants.

Low temperature
Version C2222 with silicone membrane and low temperature grease.

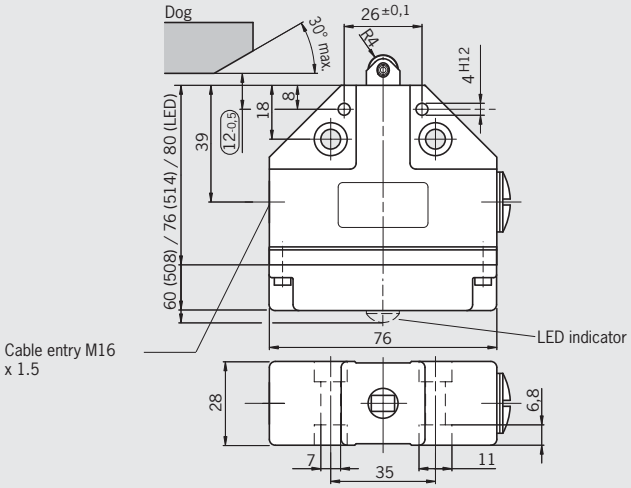
Ball bearing
For high approach speeds and long travel distances.

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V red

Switching elements (see also page 13)
- **514** Snap-action switching contact 1 NC ⊖ + 1 NO
- **508** Slow-action switching contact 1 NC ⊖

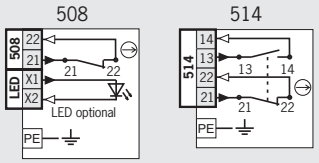
Cable entry M16 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams



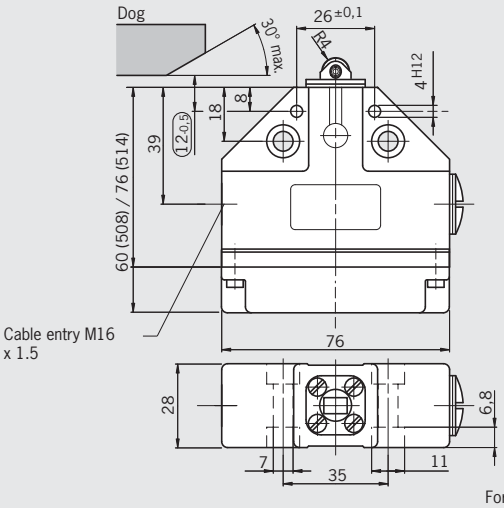
Ordering table

Series	Actuator	Connection	Switching element	Version	Function display	
					Without LED	12-60 V red LED
N1A	**R** Roller plunger ∅ 8 mm	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	Slide bearing	**083887** N1AR508-M	**087219** N1AR508LE060-M
				C2222 Low temperature	**103221** N1AR508-MC2222	-
			514 1 NC ⊖ + 1 NO	Slide bearing	**078487** [1] N1AR514-M	-
	B Roller plunger ∅ 8 mm	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	Ball bearing	**087245** N1AB508-M	-
			514 1 NC ⊖ + 1 NO	Ball bearing	**087247** [1] N1AB514-M	-

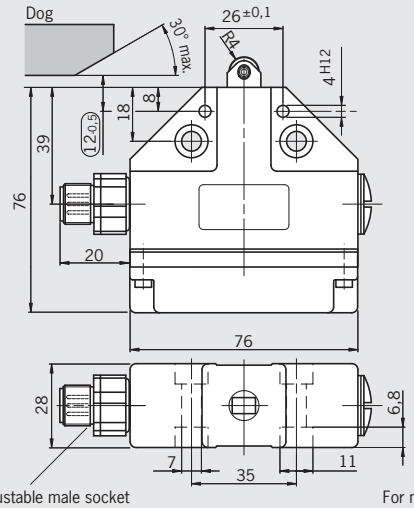
Cable entry M16 x 1.5
Exterior diaphragm

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

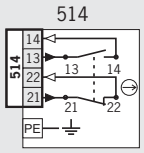


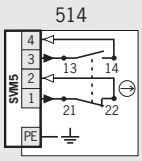
For cable glands, see page 132



For mating connectors, see page 126

Wiring diagrams





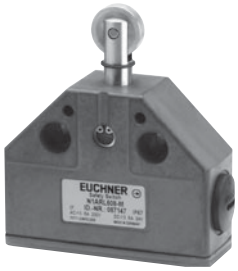
Ordering table

Series	Actuator	Connection	Switching element	Version	Function display Without LED
N1A	**R** Roller plunger ∅ 8 mm	Cable entry **M16 x 1.5**	**514** 1 NC ⊖ + 1 NO	Exterior diaphragm	**087158** N1AR514AM-M
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO		**087604** N1AR514SVM5-M

For technical data, see page 163

Single limit switch N1ARL with extended roller plunger

- **Housing according to DIN 43693**
- **Steel roller ∅ 18 mm**



Approach direction

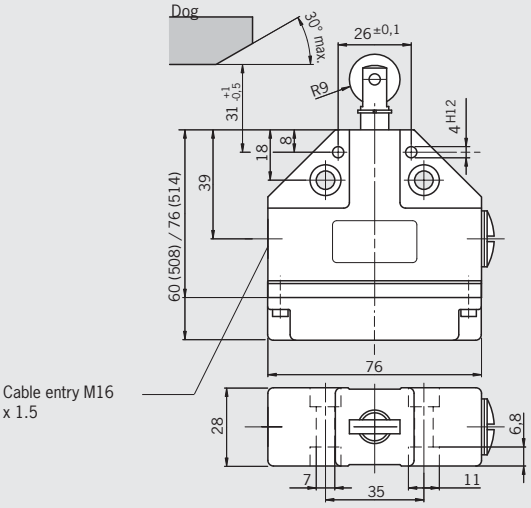
Horizontal
Adjustable in 90° steps

Switching elements (see also page 13)

- **514** Snap-action switching contact 1 NC ⊖ + 1 NO
- **508** Slow-action switching contact 1 NC ⊖

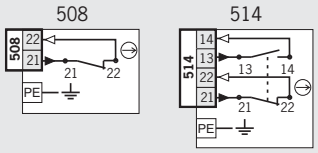
Cable entry M16 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams



Ordering table

Series	Actuator	Connection	Switching element	Function display
				Without LED
N1A	**RL** Roller plunger ∅ 18 mm	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	**087147** N1ARL508-M
			514 1 NC ⊖ + 1 NO	**087204** N1ARL514-M

Single limit switch N1AW with rounded plunger

- **Housing according to DIN 43693**
- **LED optional**
- **Plug connector optional**
- **Low temperature down to -40 °C optional**

Approach direction

Horizontal and vertical

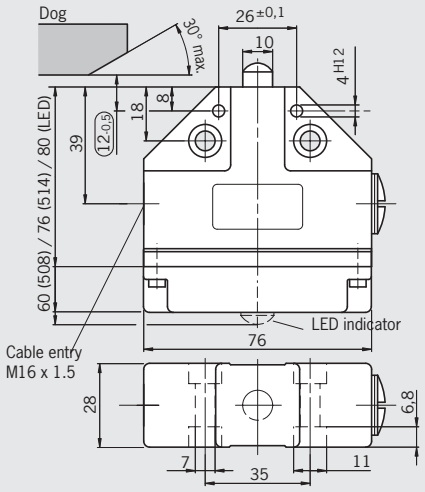
Low temperature
Version C2222 with silicone membrane and low temperature grease.

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V red

Switching elements (see also page 13)
- **514** Snap-action switching contact 1 NC ⊖ + 1 NO
- **508** Slow-action switching contact 1 NC ⊖

Cable entry M16 x 1.5

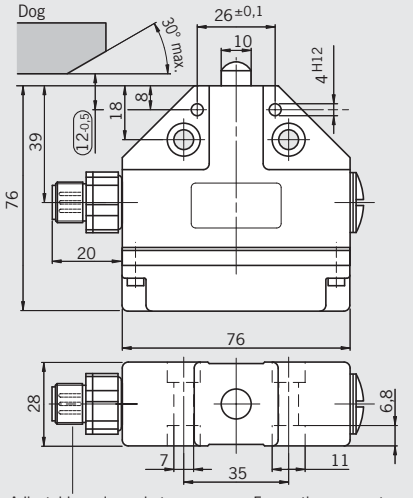
Dimension drawings



For cable glands, see page 132

Plug connector SVM5
M12 plug, 5-pin

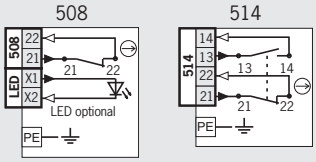
Dimension drawings

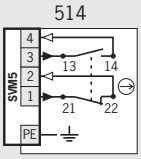


Adjustable male socket (max. 270°)

For mating connectors, see page 126

Wiring diagrams





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display	
					Without LED	12-60 V red LED
N1A	W Rounded plunger	Cable entry **M16 x 1.5**	**508** 1 NC ⊖		**087205** N1AW508-M	**087220** N1AW508LE060-M
				C2222 Low temperature	**103222** N1AW508-MC2222	-
			514 1 NC ⊖ + 1 NO		**083850** N1AW514-M	-
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO		**090743** [1] N1AW514SVM5-M	-

For technical data, see page 163

Single limit switch NB01

- **With chisel plunger**
- **With roller plunger, steel roller ∅ 5 mm**

Approach direction

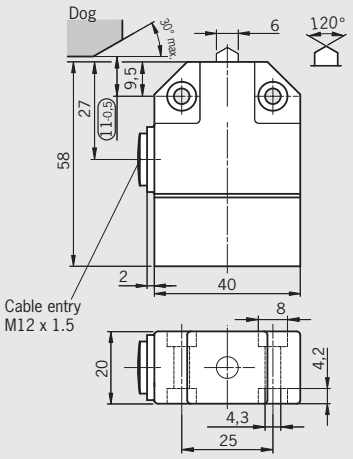
Horizontal
Adjustable in 90° steps

Switching elements (see also page 13)

- **588** Slow-action switching contact
  1 NC ⊖

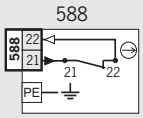
Cable entry M12 x 1.5
Chisel plunger

Dimension drawings

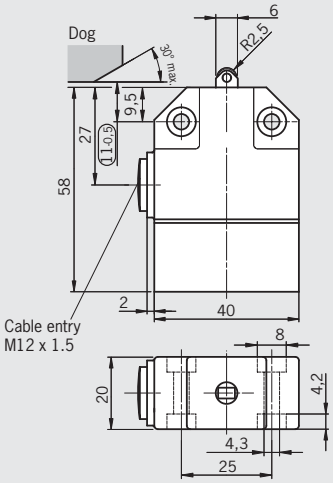


For cable glands, see page 132

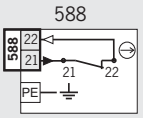
Wiring diagrams



Cable entry M12 x 1.5
Roller plunger



For cable glands, see page 132



Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
NB01	**D** Chisel plunger	Cable entry **M12 x 1.5**	**588** 1 NC ⊖	**088584** NB01D588-M
	R Roller plunger ∅ 5 mm	Cable entry **M12 x 1.5**	**588** 1 NC ⊖	**088583** NB01R588-M

Selection table for safety switches NZ

Actuating element

- **WO** Rounded plunger
- **RK** Roller plunger with steel roller ∅ 8 mm
- **RS** Roller plunger with steel roller ∅ 12 mm
- **RG** Roller plunger with plastic roller ∅ 12 mm
- **RL** Extended roller plunger with steel roller ∅ 18 mm
- **HS** Lever arm with steel roller ∅ 18 mm; 19 mm for ball bearing (C1833)
- **HB** Lever arm with plastic roller ∅ 18 mm; 30 mm (version C569); roller on inside of lever (C1779)
- **PS** Adjustable lever arm with steel roller ∅ 18 mm
- **PB** Adjustable lever arm with plastic roller ∅ 18 mm

Connection

- **M** Thread M20x1.5 for cable glands
- **SVM5** M12 plug connector 5-pin, male socket adjustable (270°) for elbow connector
- **MDC-5** M12 plug connector 5-pin, without PE
- **SEM5** M12 plug connector 5-pin, without PE
- **SM8** M12 plug connector 8-pin
- **SR6** Plug connector 6-pin + PE
- **MR8** Plug connector 7-pin + PE
- **MR9** Plug connector 8-pin + PE
- **SR11** Plug connector 11-pin + PE

Switching element

- **2 contacts** 1 NC ⊖ + 1 NO or 2 NC ⊖
- **4 contacts** 2 NC ⊖ + 2 NO, 3 NC ⊖ + 1 NO or 4 NC ⊖

Actuating element									Connection									Switching element		With version	Page
WO	RK	RS	RG	RL	HS	HB	PS	PB	M	SVM5	MDC-5	SEM5	SM8	SR6	MR8	MR9	SR11	2 contacts	4 contacts		
●									●	●								●	●	C2273	26
●														●			●	●	●	C1630/C1631	27
	●								●	●								●	●	C1912	28
	●													●			●	●	●		29
		●							●									●		C1588	46
		●							●	●								●	●	C2273	30
		●											●	●		●	●	●	●	C1630/C1631/C2300	31
		●															●		●		32
			●						●	●								●	●		33
			●										●	●			●	●	●	C1631/C2300	34
				●					●	●								●	●		35
				●							●			●			●	●	●	C1831	36
					●				●	●								●	●		37
					●								●	●			●	●	●	C1630/C2300	38
					●										●	●			●		39
					●				●										●	C1779	48
					●				●									●		C1833	49
						●			●									●		C569	47
						●			●	●								●	●	C2273	40
						●								●		●	●	●	●	C1630/C1631	41
							●		●									●	●		42
							●					●		●			●	●	●	C2376/C2334	43
								●	●									●	●		44
								●				●							●	C2376/C2334	45

Safety switch NZ.WO with rounded plunger

- **Version B according to EN 50041** (hardened)
- **LED optional**
- **Plug connector optional**

Approach direction

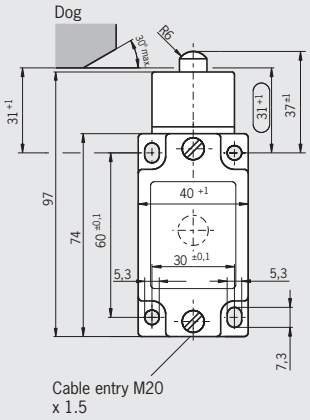
Horizontal and vertical

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V red or yellow

Switching elements (see also page 13/14)
- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

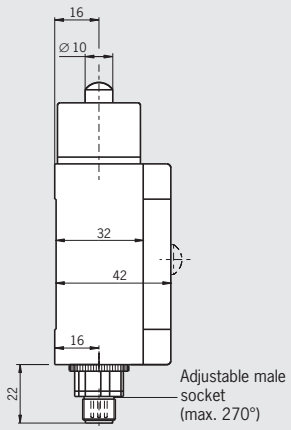
Cable entry M20 x 1.5

Dimension drawings



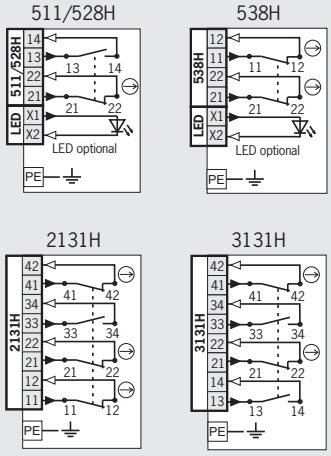
For cable glands, see page 132

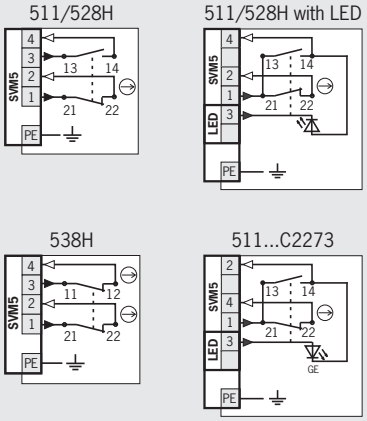
Plug connector SVM5
M12 plug, 5-pin



For mating connectors, see page 126

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	Function display: 12-60 V red LED	Function display: 12-60 V yellow LED
NZ	WO rounded plunger	1 Cable entry M20 x 1.5	511 [1] 1 NC ⊖ + 1 NO		088611 [1] NZ1WO-511-M	089057 [1] NZ1WO-511L060-M	089058 [1] NZ1WO-511L060GE-M
			528H 1 NC ⊖ + 1 NO		089624 NZ1WO-528-M	089078 NZ1WO-528L060-M	-
			538H 2 NC ⊖		090878 NZ1WO-538-M	089076 NZ1WO-538L060-M	-
			2131H 3 NC ⊖ + 1 NO		089629 NZ1WO-2131-M	-	-
			3131H 2 NC ⊖ + 2 NO		089626 NZ1WO-3131-M	-	-
		2 Plug connector SVM5 (M12 plug)	511 1 NC ⊖ + 1 NO		089014 NZ2WO-511SVM5	-	098652 NZ2WO-511SVM5L060GE
			511 1 NC ⊖ + 1 NO	C2273 Alternative wiring	-	-	105851 NZ2WO-511SVM5L060GEC2273
			528H 1 NC ⊖ + 1 NO		090923 NZ2WO-528SVM5	-	-
			538H 2 NC ⊖		090924 NZ2WO-538SVM5	-	-

1) No DGUV approval for switching element 511

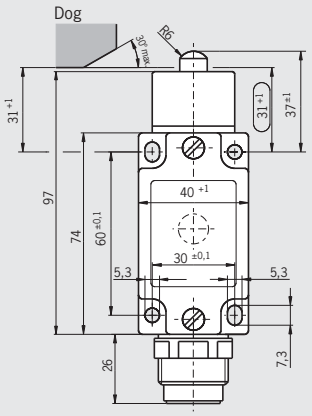
1)

Plug connector SR6
6-pin + PE

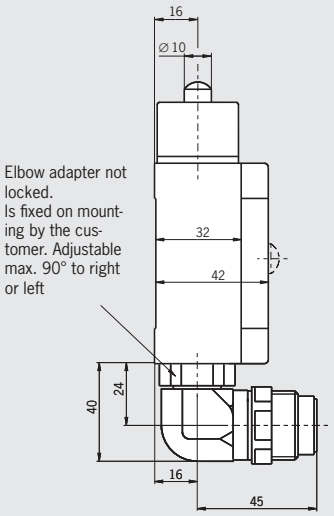
Plug connector SR6 angled
6-pin + PE

Plug connector SR11
11-pin + PE

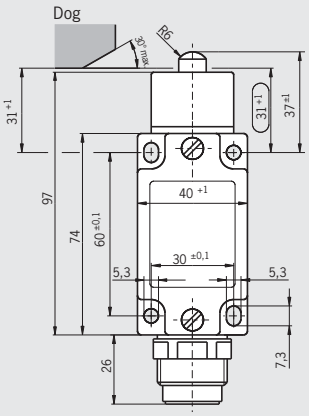
Dimension drawings



For mating connectors, see page 128

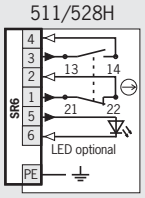


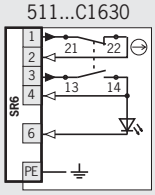
For mating connectors, see page 128

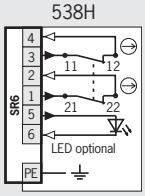


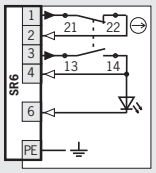
For mating connectors, see page 128

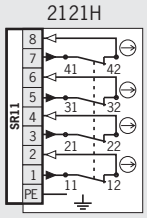
Wiring diagrams Switch not actuated

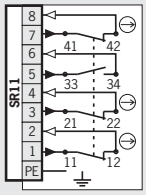


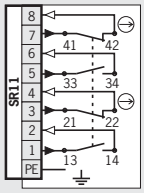












Ordering table

Series	Actuator	Connection	Switching element	Version	Function display		
					Without LED	12-60 V red LED	12-60 V yellow LED
NZ	WO rounded plunger	2 Plug connector SR6	**511** 1) 1 NC ⊖ + 1 NO		**090909** 1) NZ2WO-511	**091280** 1) NZ2WO-511L060	-
			511 1) 1 NC ⊖ + 1 NO	**C1630** Alternative wiring	-	-	**059481** 1) NZ2WO-511L060C1630
			528H 1 NC ⊖ + 1 NO		**090910** NZ2WO-528	**091279** NZ2WO-528L060	-
			538H 2 NC ⊖		**090911** NZ2WO-538	**087558** NZ2WO-538L060	-
		2 Plug connector SR6 Angled	**511** 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	-	-	**059482** NZ2WO-511L060C1631
		2 Plug connector SR11	**2121H** 4 NC ⊖		**090976** NZ2WO-2121	-	-
			2131H 3 NC ⊖ + 1 NO		**090912** NZ2WO-2131	-	-
			3131H 2 NC ⊖ + 2 NO		**090913** NZ2WO-3131	-	-

1) No DGUV approval for switching element 511

For technical data, see page 163

Safety switch NZ.RK with roller plunger

1)

Cable entry M20 x 1.5

Plug connector SVM5
M12 plug, 5-pin

- **Steel roller ∅ 8 mm**
- **LED optional**
- **Plug connector optional**
- **Ball bearing optional**

Approach direction

Horizontal
Adjustable in 90° steps

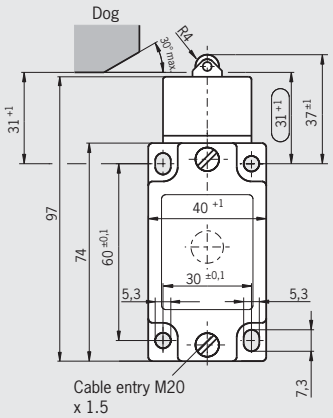
LED function display (optional)
A function display is available for the following voltage ranges:

- AC/DC 12-60 V red or yellow
- AC 230 V ±15% red

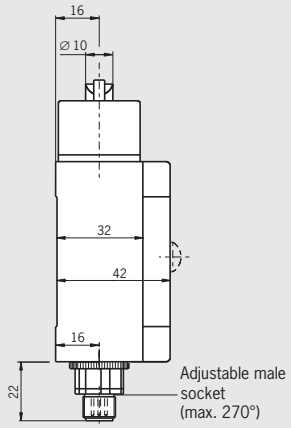
Switching elements (see also page 13/14)

- **511** Snap-action switching contact
  1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact
  1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact
  2 NC ⊖
- **2131H** Slow-action switching contact
  3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact
  2 NC ⊖ + 2 NO

Dimension drawings

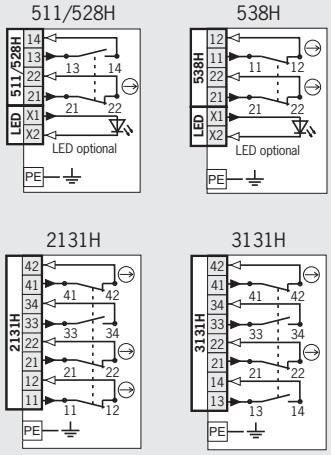


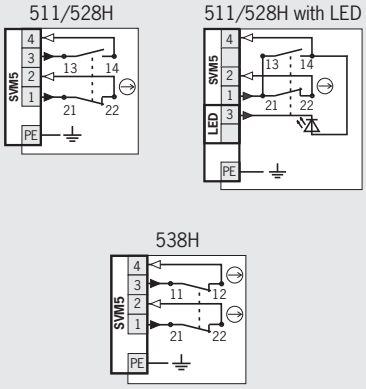
For cable glands, see page 132



For mating connectors, see page 126

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	230 V red LED	12-60 V yellow LED
NZ	RK Roller plunger	1 Cable entry **M20 x 1.5**	**511** 1) 1 NC ⊖ + 1 NO		**088608** 1) NZ1RK-511-M	**090354** 1) NZ1RK-511L060-M	**090355** 1) NZ1RK-511L220-M	-
			528H 1 NC ⊖ + 1 NO		**090905** NZ1RK-528-M	**090358** NZ1RK-528L060-M	-	-
			528H 1 NC ⊖ + 1 NO	**C1912** With bearing	**090572** NZ1RK-528-MC1912	-	-	**086408** NZ1RK-528L060GE-MC1912
			538H 2 NC ⊖		**090906** NZ1RK-538-M	-	-	-
			2131H 3 NC ⊖ + 1 NO		**090907** NZ1RK-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO		**090908** NZ1RK-3131-M	-	-	-
		2 Plug connector **SVM5** (M12 plug)	**511** 1 NC ⊖ + 1 NO		**089007** NZ2RK-511SVM5	-	-	**128141** NZ2RK-511SVM5L060GE
			528H 1 NC ⊖ + 1 NO		**090930** NZ2RK-528SVM5	-	-	-
			538H 2 NC ⊖		**089018** NZ2RK-538SVM5	-	-	-

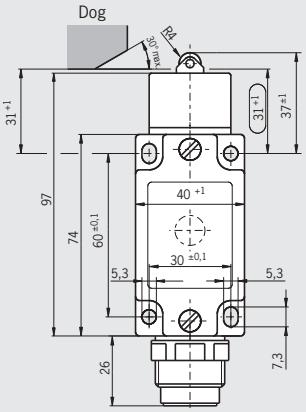
1) No DGUV approval for switching element 511

1)

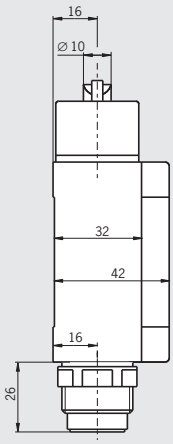
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

Dimension drawings



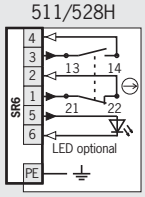
For mating connectors, see page 128



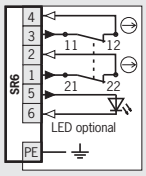
For mating connectors, see page 128

Wiring diagrams Switch not actuated

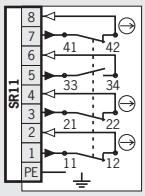
511/528H



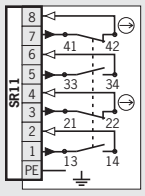
538H



2131H



3131H



Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	RK Roller plunger	2 Plug connector SR6	**511** 1) 1 NC ⊖ + 1 NO	**090016** 1) NZ2RK-511	**099273** 1) NZ2RK-511L060
			528H 1 NC ⊖ + 1 NO	**090919** NZ2RK-528	-
			538H 2 NC ⊖	**090920** NZ2RK-538	-
		2 Plug connector SR11	**2131H** 3 NC ⊖ + 1 NO	**090921** NZ2RK-2131	-
			3131H 2 NC ⊖ + 2 NO	**090922** NZ2RK-3131	-

1) No DGUV approval for switching element 511

For technical data, see page 163

Safety switch NZ.RS with roller plunger

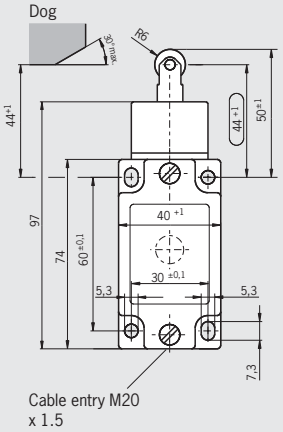
1)

Cable entry M20 x 1.5

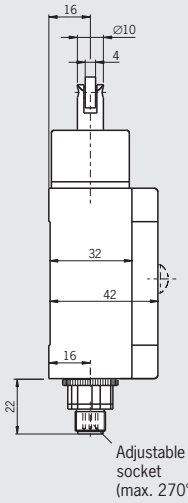
Plug connector SVM5
M12 plug, 5-pin

- **Version C acc. to EN 50041 NZ.RS** (steel roller ∅ 12 mm)
- **LED optional**
- **Plug connector optional**

Dimension drawings



For cable glands, see page 132



For mating connectors, see page 126

Approach direction

Horizontal
Adjustable in 90° steps

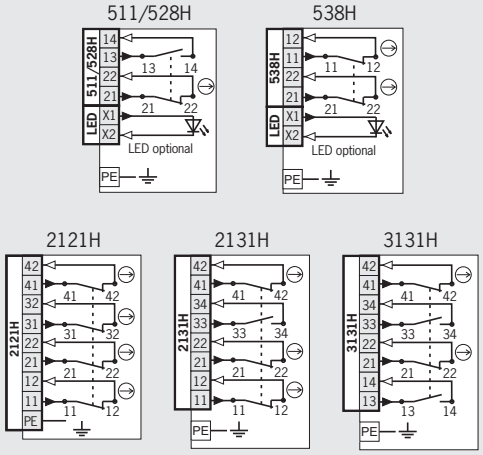
LED function display (optional)
A function display is available for the following voltage ranges:

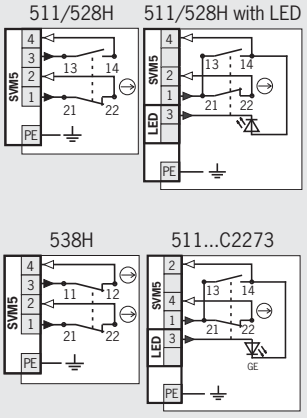
DC	24 V	±10%	yellow
AC/DC	12-60 V		red or yellow
AC	110 V	±15%	red
AC	230 V	±15%	red

Switching elements (see also page 13/14)

- **511** Snap-action switching contact
  1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact
  1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact
  2 NC ⊖
- **2121H** Slow-action switching contact
  4 NC ⊖
- **2131H** Slow-action switching contact
  3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact
  2 NC ⊖ + 2 NO

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	Function display: 12-60 V red LED	Function display: 12-60 V yellow LED
NZ	RS Roller plunger	1 Cable entry **M20 x 1.5**	**511** [1] 1 NC ⊖ + 1 NO		**079960** [1] NZ1RS-511-M	**089053** [1] NZ1RS-511L060-M	**086528** [1] NZ1RS-511L060GE-M
			528H 1 NC ⊖ + 1 NO		**089627** NZ1RS-528-M	**086413** NZ1RS-528L060-M	-
			538H 2 NC ⊖		**090936** NZ1RS-538-M	**090555** NZ1RS-538L060-M	**090424** NZ1RS-538L060GE-M
			2121H 4 NC ⊖		**087595** NZ1RS-2121-M	-	-
			2131H 3 NC ⊖ + 1 NO		**089633** NZ1RS-2131-M	-	-
			3131H 2 NC ⊖ + 2 NO		**089631** NZ1RS-3131-M	-	-
		2 Plug connector **SVM5** (M12 plug)	**511** 1 NC ⊖ + 1 NO		**090027** NZ2RS-511SVM5	-	**098651** NZ2RS-511SVM5L060GE
			511 1 NC ⊖ + 1 NO	**C2273** Alternative wiring	-	-	**105856** NZ2RS-511SVM5L060GEC2273
			528H 1 NC ⊖ + 1 NO		**090963** NZ2RS-528SVM5	-	-
			538H 2 NC ⊖		**090964** NZ2RS-538SVM5	-	-

1) No DGUV approval for switching element 511

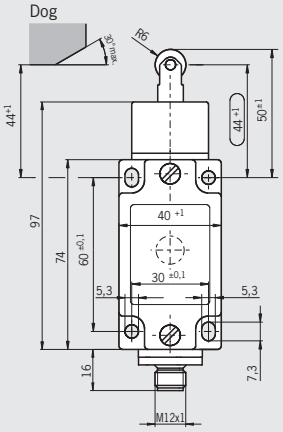
Plug connector SM8
M12 plug, 8-pin

Plug connector SR6
6-pin + PE

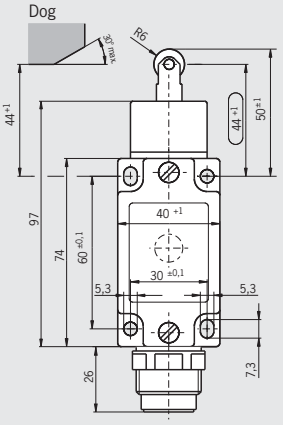
Plug connector SR6 angled
6-pin + PE

Plug connector MR9
8-pin + PE

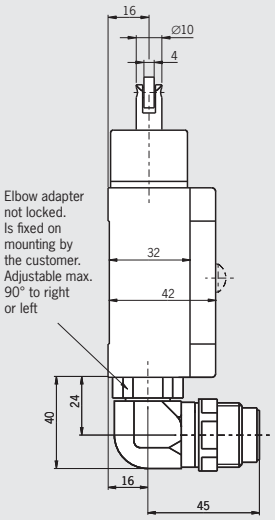
Dimension drawings



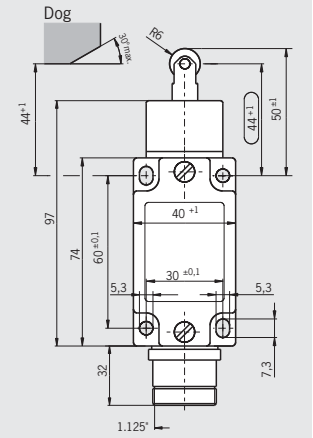
For mating connectors, see page 126



For mating connectors, see page 128

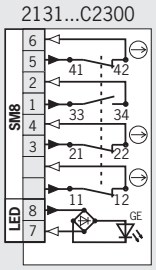


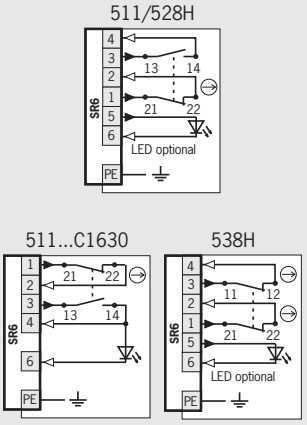
For mating connectors, see page 128

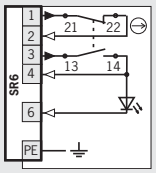


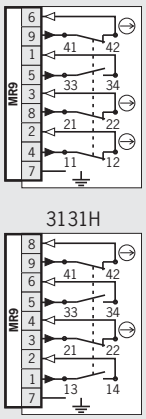
For mating connectors, see page 131

Wiring diagrams Switch not actuated









Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	24 V LED yellow	12-60 V red LED	12-60 V yellow LED
NZ	RS Roller plunger	2 Plug connector SM8 (M12 plug)	2131H 3 NC ⊖ + 1 NO	C2300 Alternative wiring	-	106478 NZ2RS-2131L024GEC2300	-	-
		2 Plug connector SR6	511 [1] 1 NC ⊖ + 1 NO		090024 [1] NZ2RS-511	-	090147 [1] NZ2RS-511L060	089622 [1] NZ2RS-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	C1630 Alternative wiring	-	-	-	082400 [1] NZ2RS-511L060C1630
			528H 1 NC ⊖ + 1 NO		090950 NZ2RS-528	-	088197 NZ2RS-528L060	-
			538H 2 NC ⊖		090951 NZ2RS-538	-	090952 NZ2RS-538L060	-
		2 Plug connector SR6 Angled	511 1 NC ⊖ + 1 NO	C1631 Alternative wiring	-	-	-	079350 NZ2RS-511L060C1631
		1...9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO		077362 [2] NZ1RS-2131-9C-GMMF	-	-	-
			3131H 2 NC ⊖ + 2 NO		087074 NZ2RS-3131-9C-GMMF	-	-	-

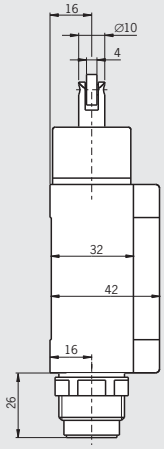
1) DGUV approval not for switching element 511 2) UL approval only for safety switch 077362

Please turn over

For technical data, see page 163

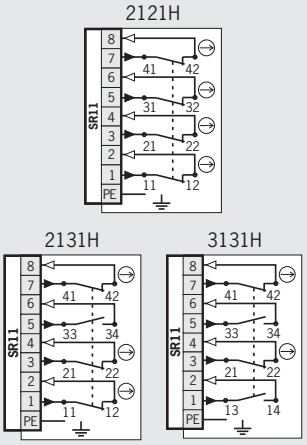
Plug connector SR11
11-pin + PE

Dimension drawings



For mating connectors, see page 128

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					Without LED
NZ	RS Roller plunger	2 Plug connector SR11	**2121H** 4 NC ⊖		**090974** NZ2RS-2121
			2131H 3 NC ⊖ + 1 NO		**090149** NZ2RS-2131
			3131H 2 NC ⊖ + 2 NO		**090954** NZ2RS-3131

Safety switch NZ.RG with roller plunger

- **Version C acc. to EN 50041 NZ.RS** (plastic roller ∅ 12 mm)
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal
Adjustable in 90° steps

LED function display (optional)
A function display is available for the following voltage ranges:

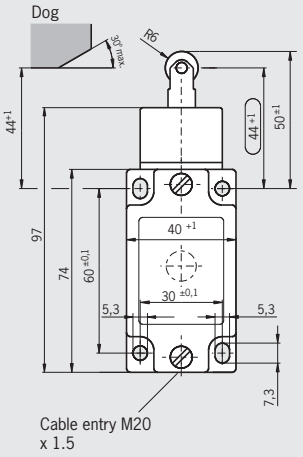
DC	24 V	±10%	yellow
AC/DC	12-60 V		red or yellow
AC	230 V	±15%	red

Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

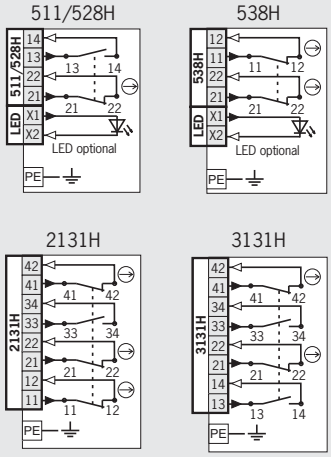
Cable entry M20 x 1.5

Dimension drawings

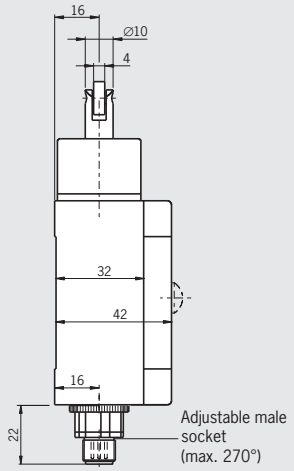


For cable glands, see page 132

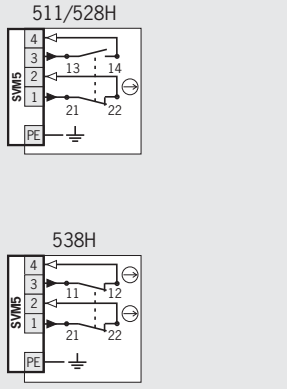
Wiring diagrams Switch not actuated



Plug connector SVM5
M12 plug, 5-pin



For mating connectors, see page 126



Ordering table

Series	Actuator	Connection	Switching element	Function display: Without LED	Function display: 12-60 V red LED
NZ	RG Roller plunger	1 Cable entry M20 x 1.5	511 [1] 1 NC ⊖ + 1 NO	088605 [1] NZ1RG-511-M	089052 [1] NZ1RG-511L060-M
			528H 1 NC ⊖ + 1 NO	090932 NZ1RG-528-M	090008 NZ1RG-528L060-M
			538H 2 NC ⊖	090933 NZ1RG-538-M	090009 NZ1RG-538L060-M
			2131H 3 NC ⊖ + 1 NO	090934 NZ1RG-2131-M	-
			3131H 2 NC ⊖ + 2 NO	090935 NZ1RG-3131-M	-
		2 Plug connector SVM5 (M12 plug)	511 [1] 1 NC ⊖ + 1 NO	090026 [1] NZ2RG-511SVM5	-
			528H 1 NC ⊖ + 1 NO	090961 NZ2RG-528SVM5	-
			538H 2 NC ⊖	090962 NZ2RG-538SVM5	-

1) No DGUV approval for switching element 511

Please turn over

For technical data, see page 163

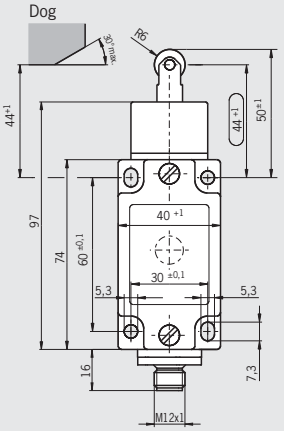
Plug connector SM8
M12 plug, 8-pin

Plug connector SR6
6-pin + PE

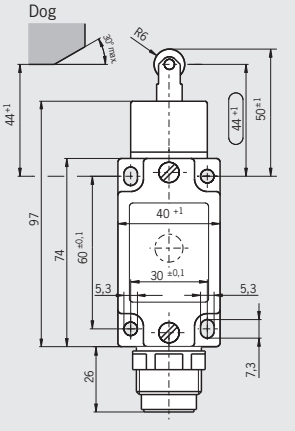
Plug connector SR6
Angled 6-pin + PE

Plug connector SR11
11-pin + PE

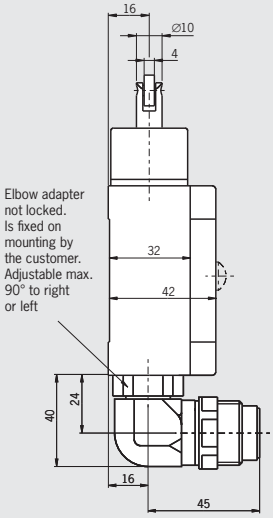
Dimension drawings



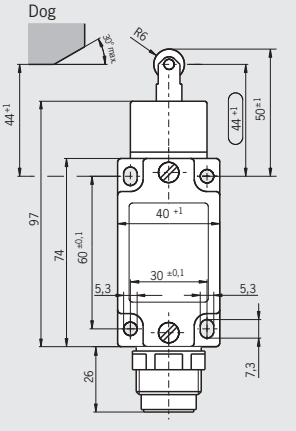
For mating connectors, see page 126



For mating connectors, see page 128

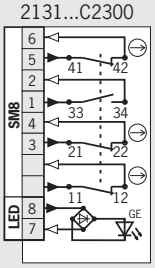


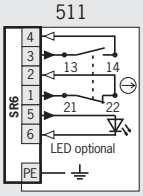
For mating connectors, see page 128

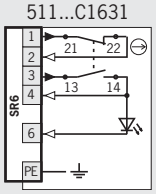


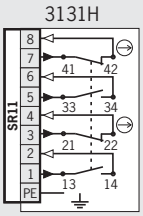
For mating connectors, see page 128

Wiring diagrams Switch not actuated









Ordering table

Series	Actuator	Connection	Switching element	Version	Function display			
					Without LED	24 V LED yellow	12-60 V red LED	12-60 V yellow LED
NZ	RG Roller plunger	**2** Plug connector **SM8** (M12 plug)	**2131H** 3 NC ⊖ + 1 NO	**C2300** Alternative wiring	-	**109016** NZ2RG-2131L024GEC2300	-	-
		2 Plug connector **SR6**	**511** 1 NC ⊖ + 1 NO		**090032** NZ2RG-511	-	**091284** NZ2RG-511L060	-
		2 Plug connector **SR6** Angled	**511** 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	-	-	-	**091348** NZ2RG-511L060C1631
		2 Plug connector **SR11**	**3131H** 2 NC ⊖ + 2 NO		**090948** NZ2RG-3131	-	-	-

1) No DGUV approval for switching element 511

Safety switch NZ.RL with extended roller plunger

- **Steel roller ∅ 18 mm**
- **With grooved ball bearing ∅ 16 mm optional**
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal
Adjustable in 90° steps

LED function display (optional)
A function display is available for the following voltage ranges:

- AC/DC 12-60 V red

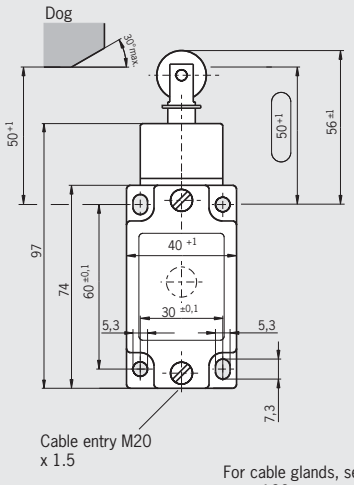
Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

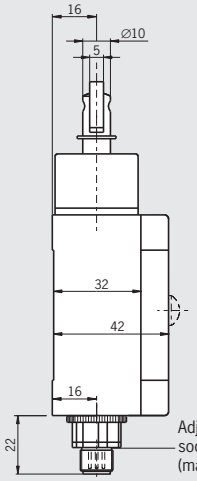
Cable entry M20 x 1.5

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

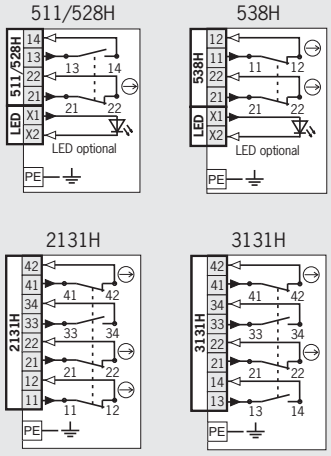


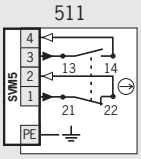
For cable glands, see page 132



For mating connectors, see page 126

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	RL Roller plunger	1 Cable entry **M20 x 1.5**	**511** [1] 1 NC ⊖ + 1 NO	**088614** [1] NZ1RL-511-M	**088996** [1] NZ1RL-511L060-M
			528H 1 NC ⊖ + 1 NO	**090937** NZ1RL-528-M	**090938** NZ1RL-528L060-M
			538H 2 NC ⊖	**090939** NZ1RL-538-M	**090940** NZ1RL-538L060-M
			2131H 3 NC ⊖ + 1 NO	**090941** NZ1RL-2131-M	-
			3131H 2 NC ⊖ + 2 NO	**090942** NZ1RL-3131-M	-
		2 Plug connector **SVM5** (M12 plug)	**511** [1] 1 NC ⊖ + 1 NO	**090028** [1] NZ2RL-511SVM5	-

1) No DGUV approval for switching element 511

Please turn over

For technical data, see page 163

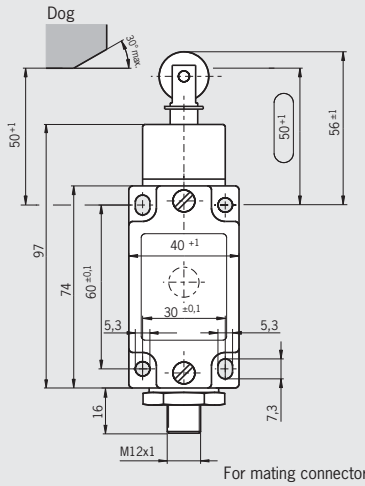
1)

Plug connector MDC-5
M12 plug, 5-pin

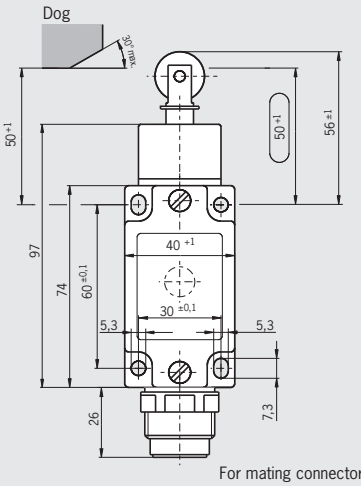
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

Dimension drawings

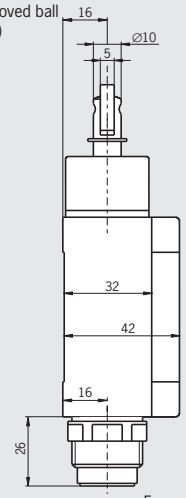


For mating connectors, see page 126



For mating connectors, see page 128

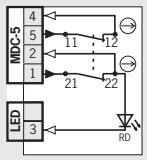
Notice:
Roller diameter 16 mm on version with grooved ball bearing (C1831)



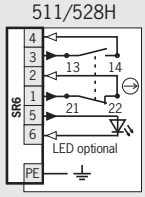
For mating connectors, see page 128

Wiring diagrams Switch not actuated

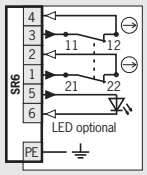
538H with LED



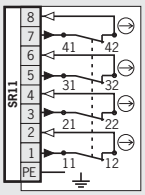
511/528H



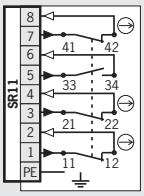
538H



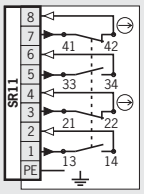
2121H



2131H



3131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	Function display: 12-60 V red LED
NZ	RL Roller plunger	2 Plug connector **MDC-5** (M12 plug)	**538H** 2 NC ⊖	Without PE	-	**105989** NZ2RL-538L0605MDC
		2 Plug connector **SR6**	**511** 1) 1 NC ⊖ + 1 NO		**090025** 1) NZ2RL-511	-
			528H 1 NC ⊖ + 1 NO		-	**091282** NZ2RL-528L060
			538H 2 NC ⊖		-	**091278** NZ2RL-538L060
		2 Plug connector **SR11**	**2121H** 4 NC ⊖		**090975** NZ2RL-2121	-
			2121H 4 NC ⊖	**C1831** Grooved ball bearing	**095806** 2) NZ2RL-2121C1831	-
			2131H 3 NC ⊖ + 1 NO		**090958** NZ2RL-2131	-
			3131H 2 NC ⊖ + 2 NO		**090959** NZ2RL-3131	-

1) DGUV approval not for switching element 511 2) No DGUV approval

Safety switch NZ.HS with roller lever arm

- **Version A acc. to EN 50041** (steel roller ∅ 18)
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

Switching direction
Right, left or both sides (see page 9).

LED function display (optional)
A function display is available for the following voltage ranges:

- DC 24 V ±10% yellow
- AC/DC 12-60 V red or yellow

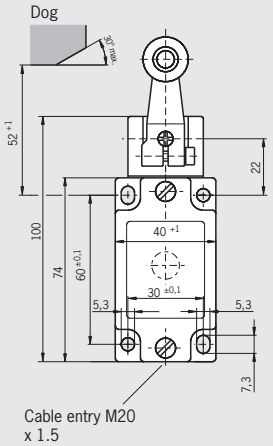
Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

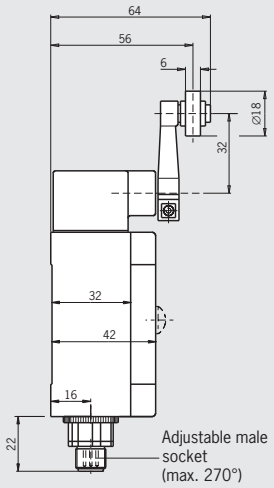
Cable entry M20 x 1.5

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

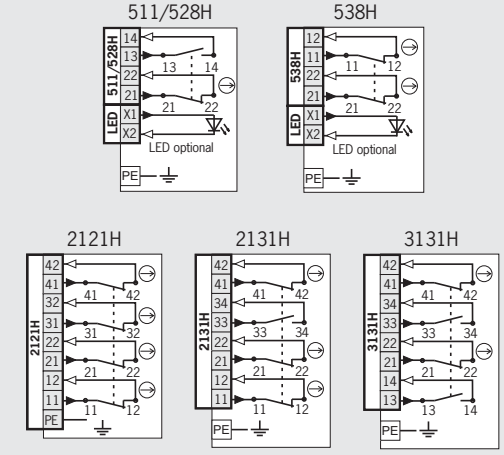


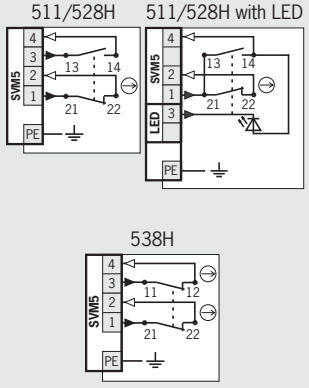
For cable glands, see page 132



For mating connectors, see page 126

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	Function display: 12-60 V red LED	Function display: 12-60 V yellow LED
NZ	HS Lever arm	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO		**079953** [1] NZ1HS-511-M	**090035** [1] NZ1HS-511L060-M	**090038** [1] NZ1HS-511L060GE-M
			528H 1 NC ⊖ + 1 NO		**090970** NZ1HS-528-M	**090971** NZ1HS-528L060-M	**090049** NZ1HS-528L060GE-M
			538H 2 NC ⊖		**090972** NZ1HS-538-M	**090760** NZ1HS-538L060-M	-
			2121H 4 NC ⊖		**090254** NZ1HS-2121-M	-	-
			2131H 3 NC ⊖ + 1 NO		**090973** NZ1HS-2131-M	-	-
			3131H 2 NC ⊖ + 2 NO		**090747** NZ1HS-3131-M	-	-
		2 Plug connector SVM5 (M12 plug)	**511** [1] 1 NC ⊖ + 1 NO		**090867** [1] NZ2HS-511SVM5	-	**098648** [1] NZ2HS-511SVM5L060GE
			528H 1 NC ⊖ + 1 NO		**090868** NZ2HS-528SVM5	-	-
			538H 2 NC ⊖		**090869** NZ2HS-538SVM5	-	-

1) No DGUV approval for switching element 511

Please turn over

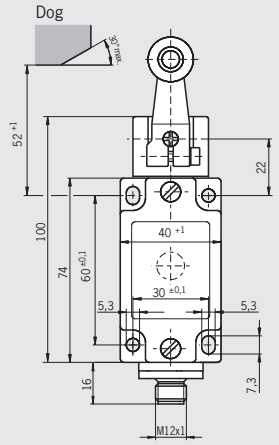
For technical data, see page 163

Plug connector SM8
M12 plug, 8-pin

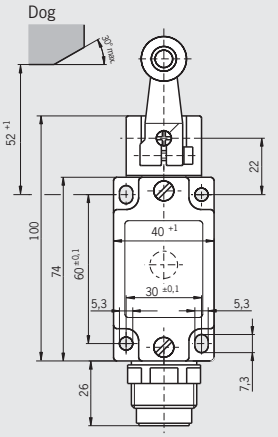
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

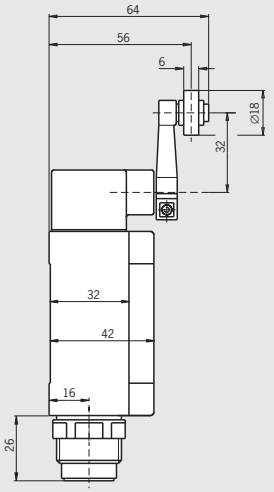
Dimension drawings



For mating connectors, see page 126

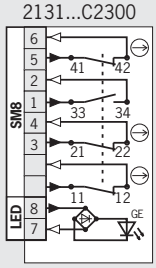


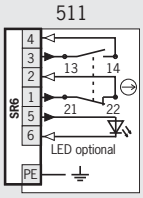
For mating connectors, see page 128

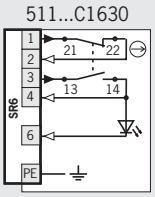


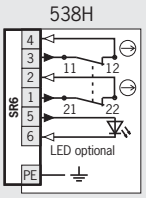
For mating connectors, see page 128

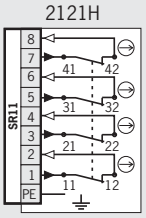
Wiring diagrams Switch not actuated

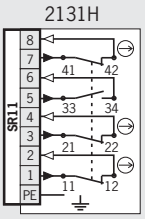


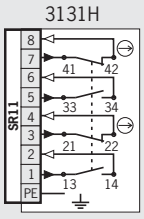












Ordering table

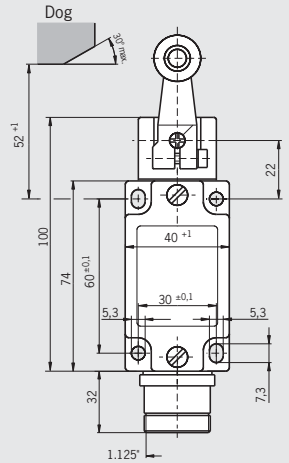
Series	Actuator	Connection	Switching element	Version	Function display: Without LED	24 V LED yellow	12-60 V red LED	12-60 V yellow LED
NZ	HS Lever arm	2 Plug connector SM8 (M12 plug)	**2131H** 3 NC ⊖ + 1 NO	**C2300** Alternative wiring	-	**122405** NZ2HS-2131L024GEC23000	-	-
		2 Plug connector SR6	**511** [1] 1 NC ⊖ + 1 NO		**089093** [1] NZ2HS-511	-	**089094** [1] NZ2HS-511L060	**090697** [1] NZ2HS-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	-	-	-	**078473** [1] NZ2HS-511L060C1630
			528H 1 NC ⊖ + 1 NO		**090852** NZ2HS-528	-	**088196** NZ2HS-528L060	-
			538H 2 NC ⊖		**090853** NZ2HS-538	-	**090854** NZ2HS-538L060	-
		2 Plug connector SR11	**2121H** 4 NC ⊖		**091264** NZ2HS-2121	-	-	-
			2131H 3 NC ⊖ + 1 NO		**090146** NZ2HS-2131	-	-	-
			3131H 2 NC ⊖ + 2 NO		**090856** NZ2HS-3131	-	-	-

1) No DGUV approval for switching element 511

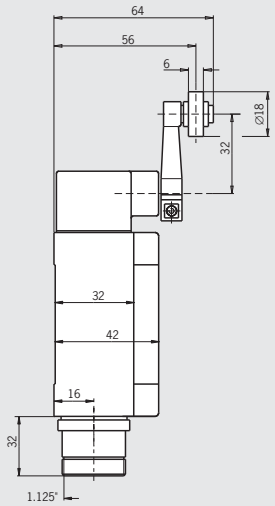
Plug connector MR8
7-pin + PE

Plug connector MR9
8-pin + PE

Dimension drawings

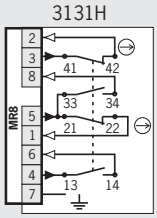


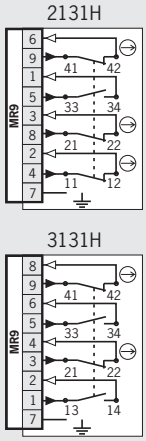
For mating connectors, see page 131



For mating connectors, see page 131

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
NZ	HS Lever arm	1...8C Plug connector MR8	3131H 2 NC ⊖ + 2 NO	086574 NZ1HS-3131-8C-Ford / PT60577-101K01
		1...9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO	077391 [2] NZ1HS-2131-9C-GMMF
			3131H 2 NC ⊖ + 2 NO	073508 NZ1HS-3131-9C-GMMF

2) UL approval only for safety switch 077391

For technical data, see page 163

Safety switch NZ.HB with roller lever arm

- **Version A acc. to EN 50041** (plastic roller ∅ 18)
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

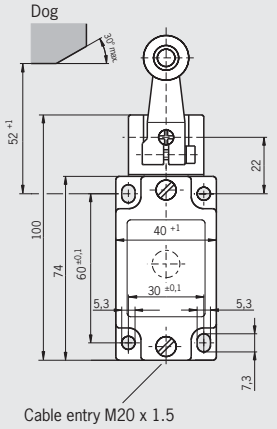
switching direction
Right, left or both sides (see page 9).

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V red or yellow

Switching elements (see also page 13/14)
- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

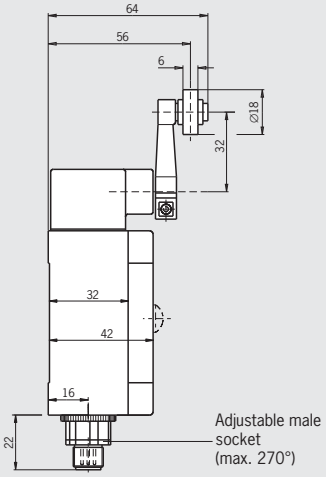
Cable entry M20 x 1.5

Dimension drawings



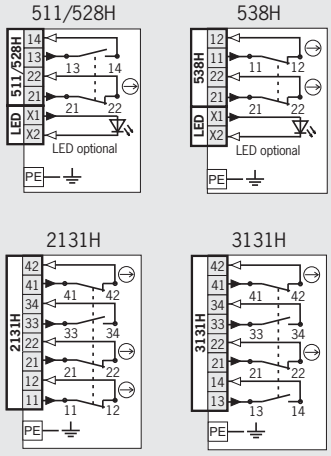
For cable glands, see page 132

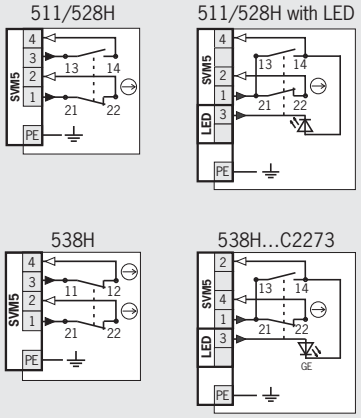
Plug connector SVM5
M12 plug, 5-pin



For mating connectors, see page 126

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Version	Function display		
					Without LED	12-60 V red LED	12-60 V yellow LED
NZ	HB Lever arm	1 Cable entry **M20 x 1.5**	**511** [1] 1 NC ⊖ + 1 NO		**079952** [1] NZ1HB-511-M	**090039** [1] NZ1HB-511L060-M	**086525** [1] NZ1HB-511L060GE-M
			528H 1 NC ⊖ + 1 NO		**088199** NZ1HB-528-M	**090965** NZ1HB-528L060-M	**086527** NZ1HB-528L060GE-M
			538H 2 NC ⊖		**090966** NZ1HB-538-M	**090967** NZ1HB-538L060-M	-
			2131H 3 NC ⊖ + 1 NO		**090968** NZ1HB-2131-M	-	-
			3131H 2 NC ⊖ + 2 NO		**090969** NZ1HB-3131-M	-	-
		2 Plug connector **SVM5** (M12 plug)	**511** [1] 1 NC ⊖ + 1 NO		**090861** [1] NZ2HB-511SVM5	-	**098649** [1] NZ2HB-511SVM5L060GE
			511 [1] 1 NC ⊖ + 1 NO	**C2273** Alternative wiring	-	-	**105839** [1] NZ2HB-511SVM5L060GEC2273
			528H 1 NC ⊖ + 1 NO		**090864** NZ2HB-528SVM5	-	-
			538H 2 NC ⊖		**090862** NZ2HB-538SVM5	-	-

1) No DGUV approval for switching element 511

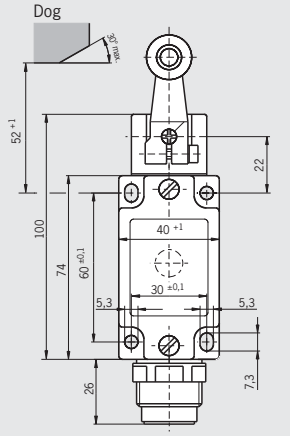
Plug connector SR6
6-pin + PE

Plug connector SR6 angled
6-pin + PE

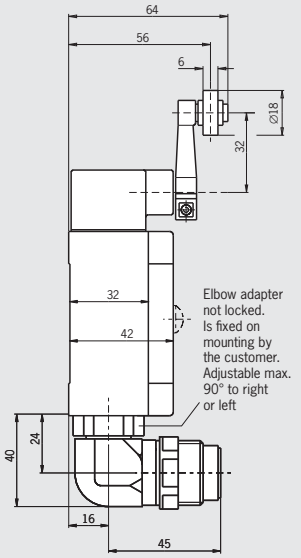
Plug connector SR11
11-pin + PE

Plug connector MR9
8-pin + PE

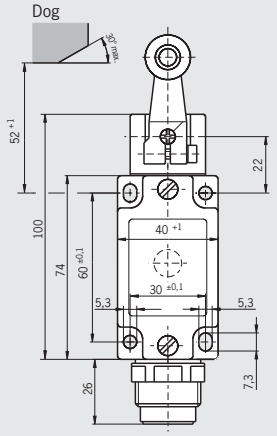
Dimension drawings



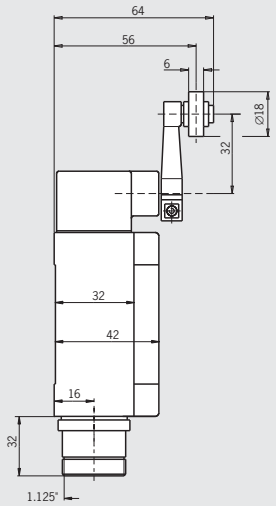
For mating connectors, see page 128



For mating connectors, see page 128



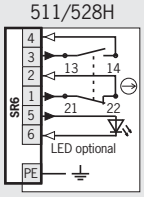
For mating connectors, see page 128



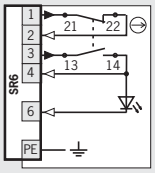
For mating connectors, see page 131

Wiring diagrams Switch not actuated

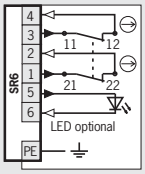
511/528H



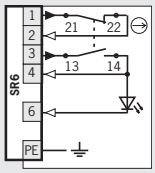
511...C1630
528H...C1630



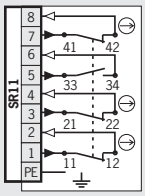
538H



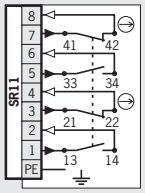
511...C1631
528H...C1631



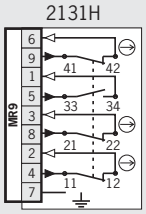
2131H



3131H



2131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display		
					Without LED	12-60 V red LED	12-60 V yellow LED
NZ	HB Lever arm	2 Plug connector SR6	511 [1] 1 NC ⊖ + 1 NO		089091 [1] NZ2HB-511	089092 [1] NZ2HB-511L060	090719 [1] NZ2HB-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	C1630 Alternative wiring	-	-	054121 [1] NZ2HB-511L060C1630
			528H 1 NC ⊖ + 1 NO		090845 NZ2HB-528	090846 [1] NZ2HB-528L060	-
			528H 1 NC ⊖ + 1 NO	C1630 Alternative wiring	-	-	091346 NZ2HB-528L060C1630
			538H 2 NC ⊖		090847 NZ2HB-538	090848 NZ2HB-538L060	-
		2 Plug connector SR6 Angled	511 [1] 1 NC ⊖ + 1 NO	C1631 Alternative wiring	-	-	054122 [1] NZ2HB-511L060C1631
			528H 1 NC ⊖ + 1 NO	C1631 Alternative wiring	-	-	091347 NZ2HB-528L060C1631
		2 Plug connector SR11	2131H 3 NC ⊖ + 1 NO		090136 NZ2HB-2131	-	-
			3131H 2 NC ⊖ + 2 NO		090137 NZ2HB-3131	-	-
		1...9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO		077390 NZ1HB-2131-9C-GMMF	-	-

1) No DGUV approval for switching element 511

For technical data, see page 163

Safety switch NZ.PS with adjustable lever arm

- **Steel roller ∅ 18**
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

switching direction
Right, left or both sides (see page 9).

Lever arm adjustment
Lever arm length can be adjusted from 28 mm to 78 mm in steps of 12.5 mm.

LED function display (optional)
A function display is available for the following voltage ranges:

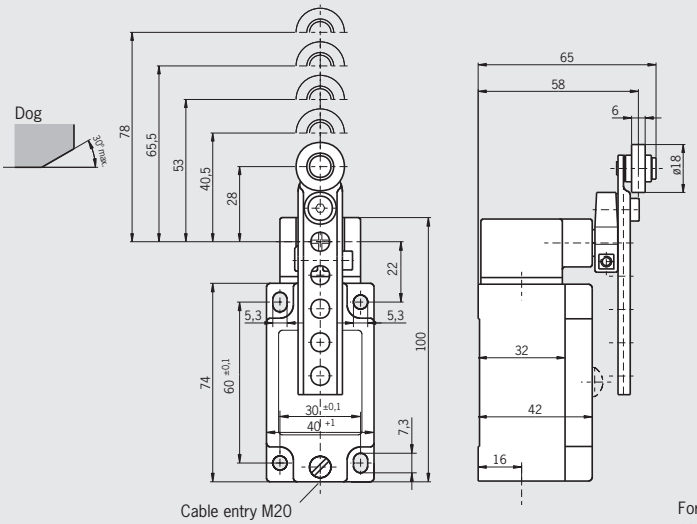
- AC/DC 12-60 V red or yellow
- AC 230 V ±15% red

Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

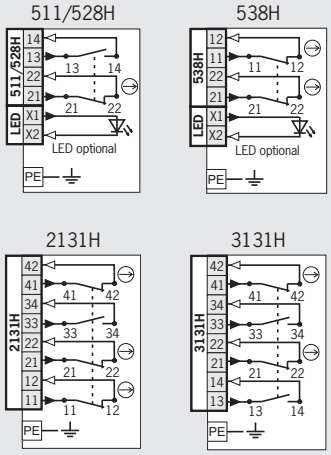
Cable entry M20 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	PS Adjustable lever arm	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO	**088613** [1] NZ1PS-511-M	**104102** [1] NZ1PS-511L060-M
			528H 1 NC ⊖ + 1 NO	**090874** NZ1PS-528-M	**090430** NZ1PS-528L060-M
			538H 2 NC ⊖	**090875** NZ1PS-538-M	**104364** NZ1PS-538L060-M
			2131H 3 NC ⊖ + 1 NO	**090876** NZ1PS-2131-M	-
			3131H 2 NC ⊖ + 2 NO	**090877** NZ1PS-3131-M	-

1) No DGUV approval for switching element 511

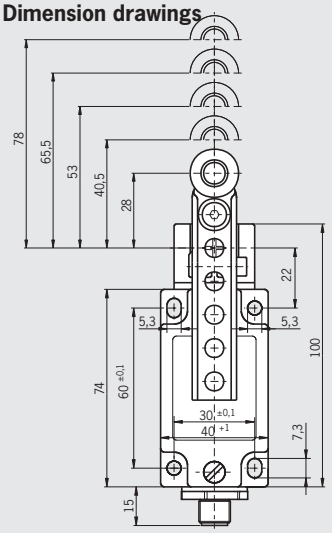
1)

Plug connector SEM5
M12 plug, 5-pin

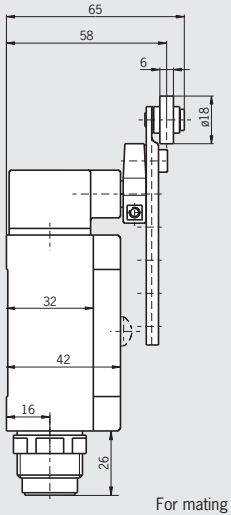
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

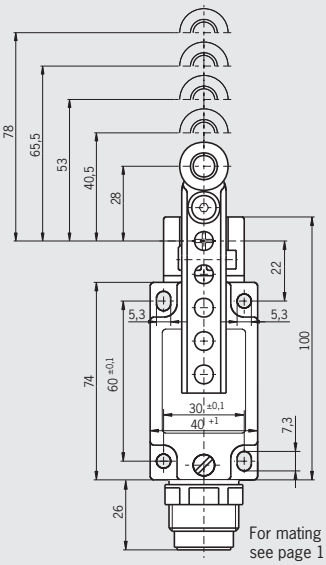
Dimension drawings



For mating connectors, see page 126



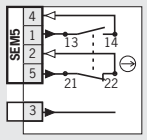
For mating connectors, see page 128



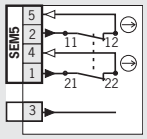
For mating connectors, see page 128

Wiring diagrams Switch not actuated

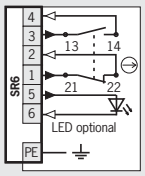
511...C2376



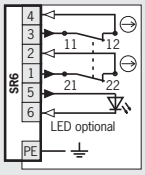
538H...C2334



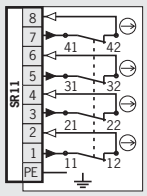
511



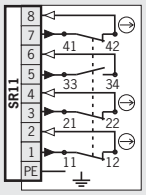
538H



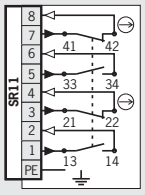
2121H



2131H



3131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display	
					Without LED	12-60 V red LED
NZ	PS Adjustable lever arm	2 Plug connector SEM5 (M12 plug)	511 1 NC ⊖ + 1 NO	C2376 Alternative wiring	128059 1) NZ2PS-511SEM5C2376	
			538H 2 NC ⊖	C2334 Alternative wiring	136864 NZ2PS-538SEM5C2334	
		2 Plug connector SR6	511 1) 1 NC ⊖ + 1 NO		093112 1) NZ2PS-511	090152 1) NZ2PS-511L060
			538H 2 NC ⊖		-	091632 NZ2PS-538L060
		2 Plug connector SR11	2121H 4 NC ⊖		091268 NZ2PS-2121	-
			2131H 3 NC ⊖ + 1 NO		090151 NZ2PS-2131	-
			3131H 2 NC ⊖ + 2 NO		090150 NZ2PS-3131	-

1) No DGUV approval for switching element 511

For technical data, see page 163

Safety switch NZ.PB with adjustable lever arm

- **Plastic roller ∅ 18**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

switching direction
Right, left or both sides (see page 9).

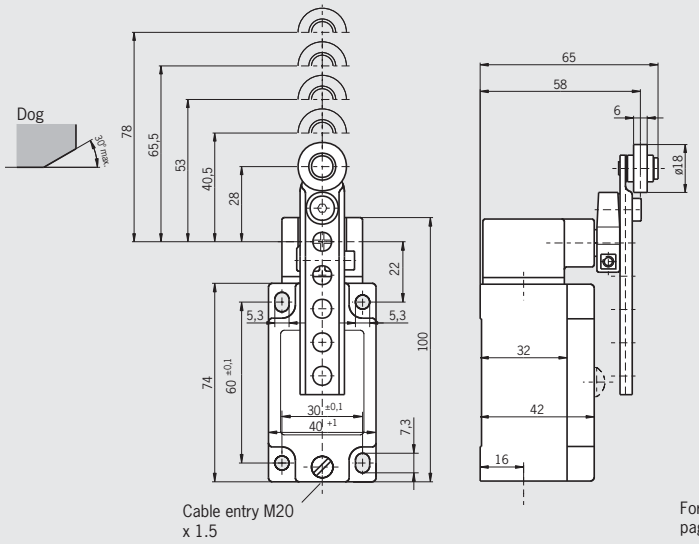
Lever arm adjustment
Lever arm length can be adjusted from 28 mm to 78 mm in steps of 12.5 mm.

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V yellow

Switching elements (see also page 13/14)
- **511** Snap-action switching contact
  1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact
  2 NC ⊖
- **2131H** Slow-action switching contact
  3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact
  2 NC ⊖ + 2 NO

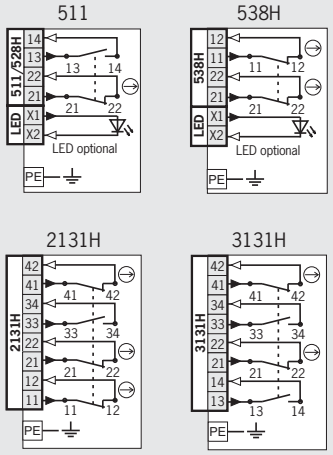
Cable entry M20 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams Switch not actuated



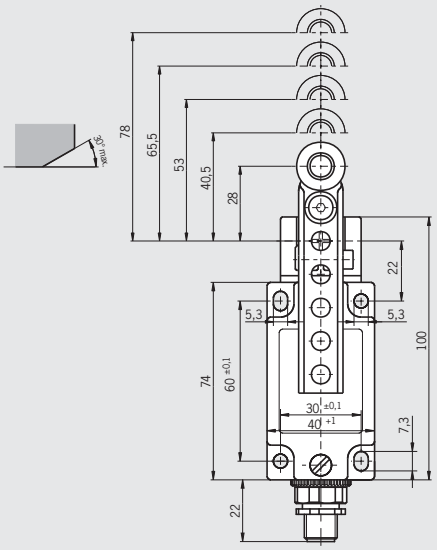
Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
NZ	PB Adjustable lever arm	1 Cable entry **M20 x 1.5**	**511** [1] 1 NC ⊖ + 1 NO	**088618** [1] NZ1PB-511-M
			538H 2 NC ⊖	**090871** NZ1PB-538-M
			2131H 3 NC ⊖ + 1 NO	**090872** NZ1PB-2131-M
			3131H 2 NC ⊖ + 2 NO	**090873** NZ1PB-3131-M

1) No DGUV approval for switching element 511

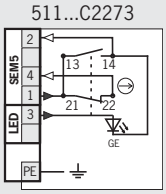
Plug connector SEM5
M12 plug, 5-pin

Dimension drawings



For mating connectors, see page 126

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					12-60 V yellow LED
NZ	**PB** Adjustable lever arm	**2** Plug connector **SEM5** (M12 plug)	**511** 1 NC ⊖ + 1 NO	**C2273** Alternative wiring	**105853** NZ2PS-511SVM5L060GEC2273

For technical data, see page 163

Safety switch NZ.RS.C1588 with roller plunger

- **Version C acc. to EN 50041** (steel roller ∅ 12 mm)
- **Exterior bellows** (material CR rubber)

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

Exterior bellows

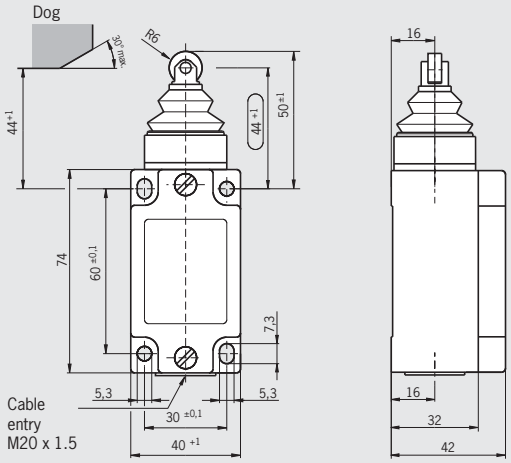
Protection against heavy soiling (dust) and aggressive coolants.

Switching elements (see also page 13)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO

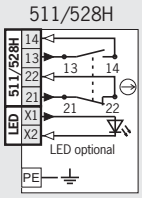
Cable entry M20 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					Without LED
NZ	RS Roller plunger	1 Cable entry M20 x 1.5	511 1 NC ⊖ + 1 NO	C1588 Exterior bellows, red cover	091352 NZ1RS-511-MC1588
			528H 1 NC ⊖ + 1 NO	C1588 Exterior bellows, red cover	091339 NZ1RS-528-MC1588

Safety switch NZ.HB.C569 with roller lever arm

- **Large plastic roller ∅ 30 mm**
- **LED optional**

Cable entry M20 x 1.5

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

switching direction

Right, left or both sides (see page 9).

LED function display (optional)

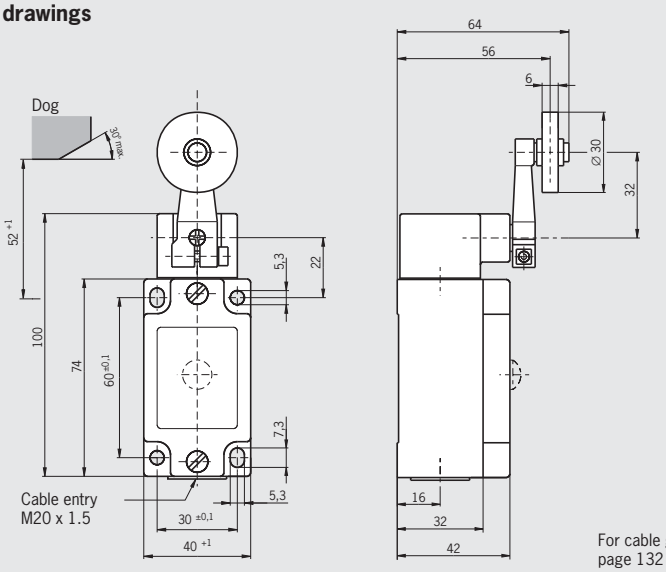
A function display is available for the following voltage ranges:

- AC/DC 12-60 V red

Switching elements (see also page 13)

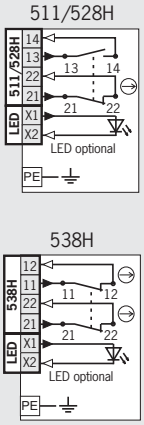
- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖

Dimension drawings



For cable glands, see page 132

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display	
					Without LED	12-60 V red LED
NZ	HB Lever arm	1 Cable entry M20 x 1.5	511 1 NC ⊖ + 1 NO	C569 Large plastic roller ∅ 30 mm	079965 NZ1HB-511-MC569	091091 NZ1HB-511L060-MC569
			528H 1 NC ⊖ + 1 NO	C569 Large plastic roller ∅ 30 mm	079946 NZ1HB-528-MC569	091330 NZ1HB-528L060-MC569
			538H 2 NC ⊖	C569 Large plastic roller ∅ 30 mm	079999 NZ1HB-538-MC569	-

For technical data, see page 163

Safety switch NZ.HS.C1779 with roller lever arm

- **Steel roller ∅ 18 mm**
- **Roller mounted on inside of lever**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

switching direction

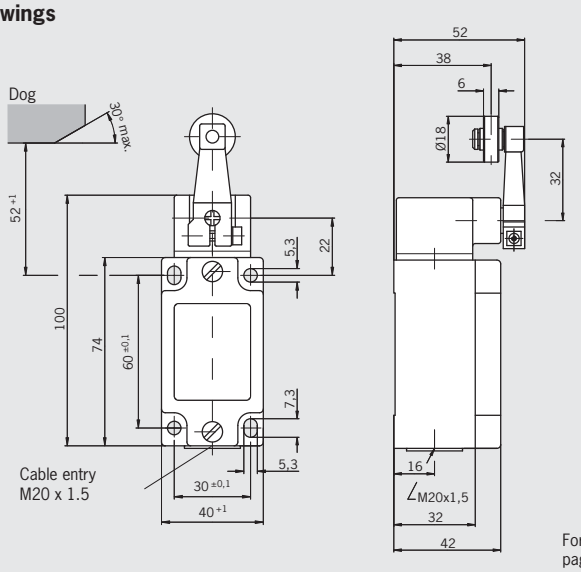
Right, left or both sides (see page 9).

Switching elements (see also page 14)

- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

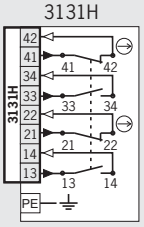
Cable entry M20 x 1.5

Dimension drawings



For cable glands, see page 132

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					Without LED
NZ	**HS** Lever arm	**1** Cable entry **M20 x 1.5**	**3131H** 2 NC ⊖ + 2 NO	**C1779** Roller mounted on inside of lever	**079996** NZ1HS-3131-MC1779

Safety switch NZ.HS.C1833 with roller lever arm

- **Steel roller ∅ 19 mm**
- **With grooved ball bearing**
- **LED on request**

Approach direction

Horizontal

Switch head and lever arm can be adjusted in 90° steps.

switching direction

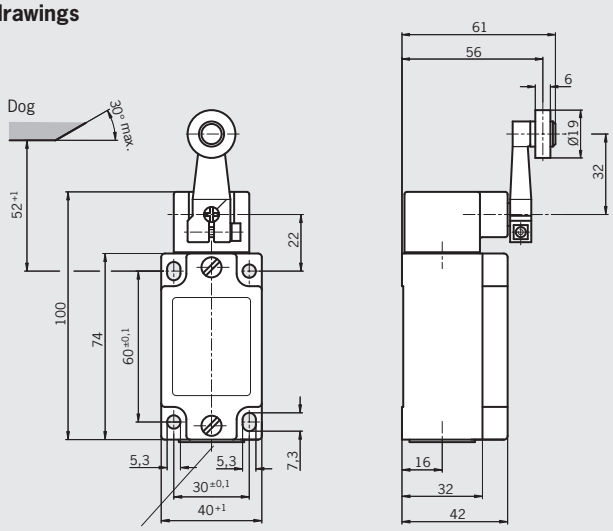
Right, left or both sides (see page 9).

Switching elements (see also page 13)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO

Cable entry M20 x 1.5

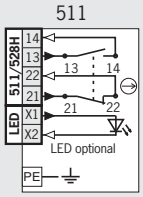
Dimension drawings



Cable entry M20 x 1.5

For cable glands, see page 132

Wiring diagrams Switch not actuated



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display
					Without LED
NZ	**HS** Lever arm	**1** Cable entry **M20 x 1.5**	**511** 1 NC ⊖ + 1 NO	**C1833** With grooved ball bearing	**091312** NZ1HS-511-MC1833

For technical data, see page 163

Selection table for safety switches NZ.VZ

Version

SB Protective plate, tamper protection on the switch head

Connection

M Thread M20x1.5 for cable glands

SVM5 M12 plug connector 5-pin

C16-1 Plug connector 6-pin + PE

SR6 Plug connector 6-pin + PE

MR8 Plug connector 7-pin + PE

MR9 Plug connector 8-pin + PE

MR10 Plug connector 9-pin + PE

SR11 Plug connector 11-pin + PE

Switching element

2 contacts 1 NC ⊖ + 1 NO or 2 NC ⊖

4 contacts 2 NC ⊖ + 2 NO, 3 NC ⊖ + 1 NO or 4 NC ⊖

SB	Connection								Switching element		With version	Page
	M	SVM5	C16-1	SR6	MR8	MR9	MR10	SR11	2 contacts	4 contacts		
	●								●	●		52
		●		●					●			53
								●		●		53
					●	●	●			●		54
●	●								●	●	C1233	55
●			●	●					●		C1420/C1701/C1233	56
●								●		●	C1233	56

Safety switch NZ.VZ

- **Housing according to EN 50041**
- **Various cable entries**
- **Plug connector optional**
- **LED optional**

Approach direction

Horizontal
Adjustable in 90° steps

LED function display (optional)
A function display is available for the following voltage ranges:

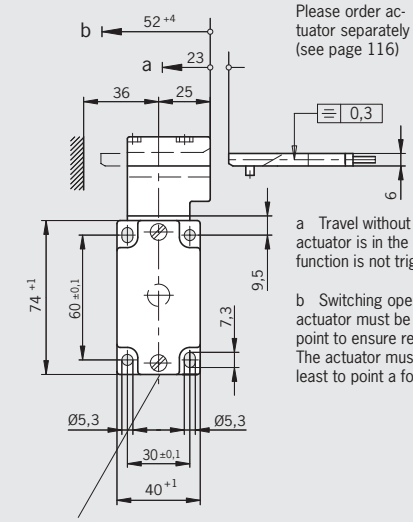
- AC/DC 12-60 V red

Switching elements (see also page 13/14)

- **511** Snap-action switching contact
  1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact
  1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact
  2 NC ⊖
- **2121H** Slow-action switching contact
  4 NC ⊖
- **2131H** Slow-action switching contact
  3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact
  2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings



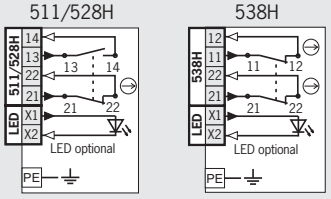
Please order actuator separately (see page 116)

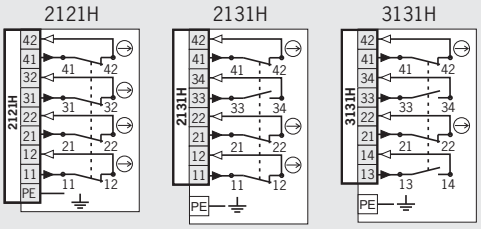
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For cable glands, see page 132

Wiring diagrams actuator inserted





Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	VZ Separate actuator	1 Cable entry **M20 x 1.5**	**511** [1] 1 NC ⊖ + 1 NO	**089479** [1] NZ1VZ-511E-M	-
			528H 1 NC ⊖ + 1 NO	**090671** NZ1VZ-528E-M	**090566** NZ1VZ-528EL060-M
			538H 2 NC ⊖	**085676** NZ1VZ-538E-M	**082119** NZ1VZ-538EL060-M
			2121H 4 NC ⊖	**089486** NZ1VZ-2121E-M	-
			2131H 3 NC ⊖ + 1 NO	**082123** NZ1VZ-2131E-M	-
			3131H 2 NC ⊖ + 2 NO	**082122** NZ1VZ-3131E-M	-

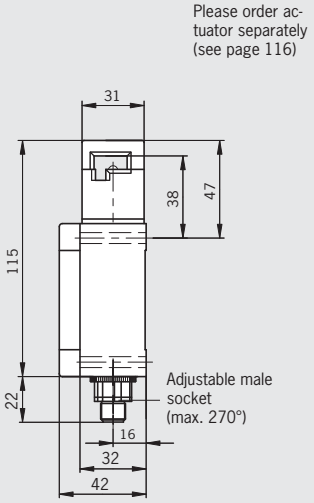
1) No DGUV approval for switching element 511

Plug connector SVM5
M12 plug, 5-pin

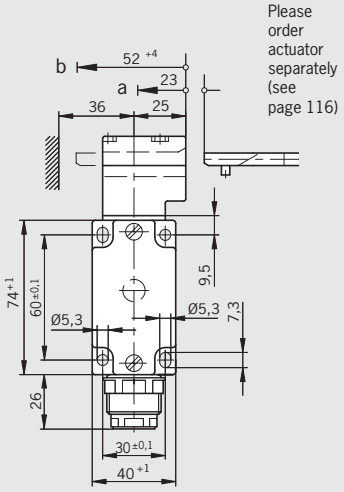
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

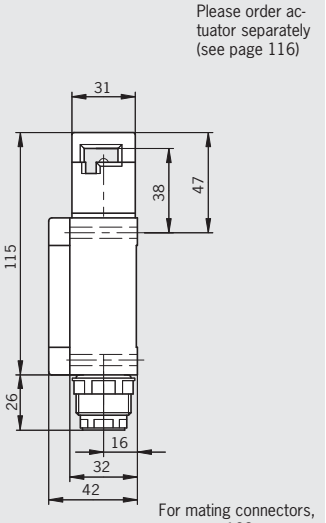
Dimension drawings



For mating connectors, see page 126

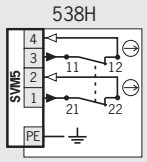


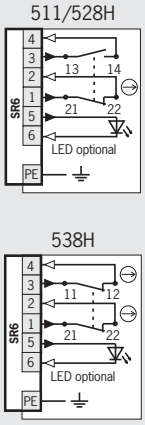
For mating connectors, see page 128

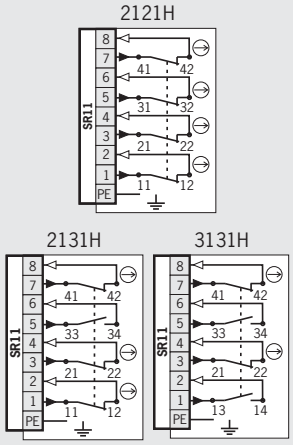


For mating connectors, see page 128

Wiring diagrams actuator inserted







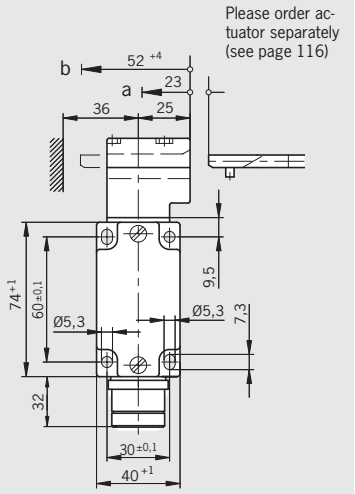
Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	VZ Separate actuator	2 Plug connector SVM5	538H 2 NC ⊖	084905 NZ2VZ-538ESVM5	-
		2 Plug connector SR6	528H 1 NC ⊖ + 1 NO	084885 NZ2VZ-528E	045801 NZ2VZ-528EL060
			538H 2 NC ⊖	090143 NZ2VZ-538E	052108 NZ2VZ-538EL060
		2 Plug connector SR11	2121H 4 NC ⊖	088852 NZ2VZ-2121E	-
			2131H 3 NC ⊖ + 1 NO	090144 NZ2VZ-2131E	-
			3131H 2 NC ⊖ + 2 NO	090145 NZ2VZ-3131E	-

Please turn over

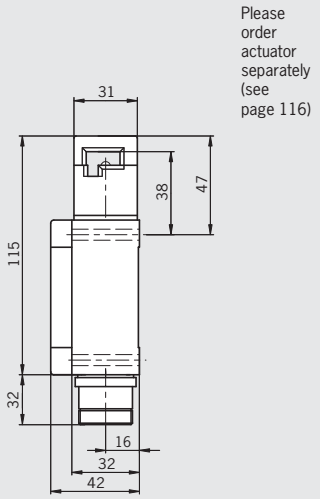
For technical data, see page 163

Plug connector MR8
7-pin + PE



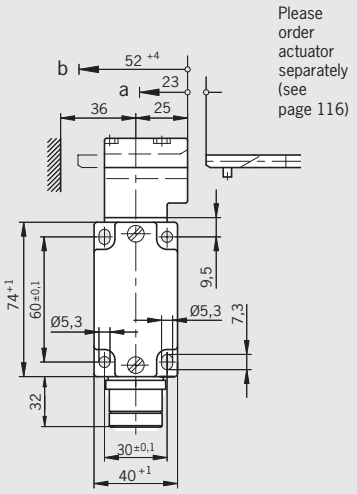
For mating connectors, see page 131

Plug connector MR9
8-pin + PE

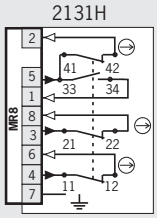


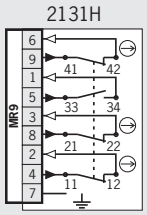
For mating connectors, see page 131

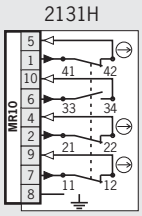
Plug connector MR10
9-pin + PE



For mating connectors, see page 131







Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
NZ	VZ Separate actuator	**1** Plug connector **MR8**	**2131H** 3 NC ⊖ + 1 NO	**092355** NZ2VZ-2131E-8C-GMMF
		1 Plug connector **MR9**	**2131H** 3 NC ⊖ + 1 NO	**077363** NZ2VZ-2131E-9C-GMMF
		1 Plug connector **MR10**	**2131H** 3 NC ⊖ + 1 NO	**095896** NZ2VZ-2131E-10C-FW

Safety switch NZ.VZ

- **Housing according to EN 50041**
- **Protective plate for switch head**
- **Plug connector optional**
- **LED optional**

Approach direction

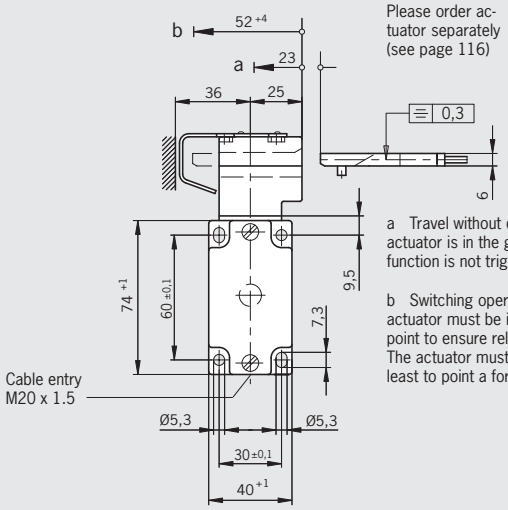
Horizontal
Adjustable in 90° steps

Protective plate for switch head
Makes it more difficult to tamper with the switch.

Switching elements (see also page 13/14)
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO

Cable entry M20 x 1.5

Dimension drawings



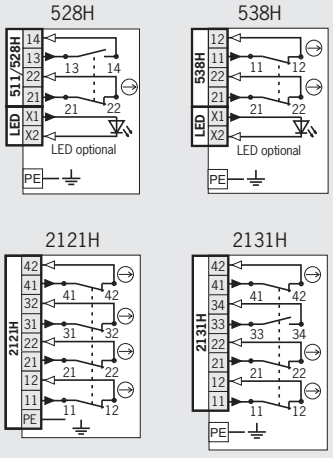
Please order actuator separately (see page 116)

a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For mating connectors, see page 126

Wiring diagrams actuator inserted



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display Without LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	528H 1 NC ⊖ + 1 NO	With protective plate	082137 NZ1VZ-528E-MC1233
			538H 2 NC ⊖	With protective plate	093858 NZ1VZ-538E-MC1233
			2121H 4 NC ⊖	With protective plate	089914 NZ1VZ-2121E-MC1233
			2131H 3 NC ⊖ + 1 NO	With protective plate	093859 NZ1VZ-2131E-MC1233

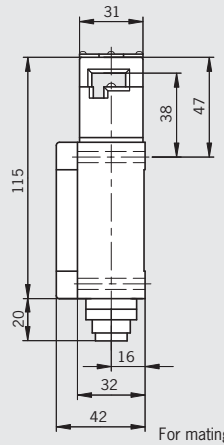
Please turn over

For technical data, see page 163

Plug connector C16-1
6-pin + PE

Dimension drawings

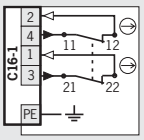
Please order actuator separately (see page 116)



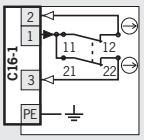
For mating connectors, see page 127

Wiring diagrams actuator inserted

538H...C1701

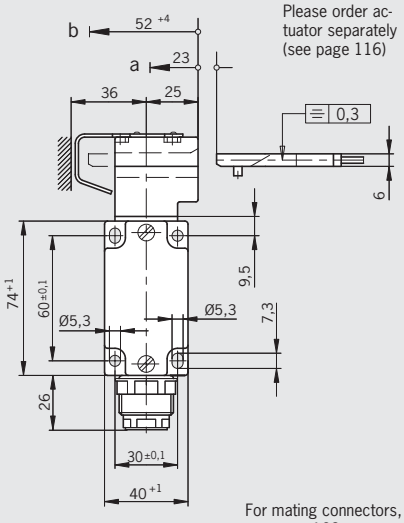


538H...C1420



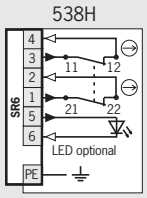
Plug connector SR6
6-pin + PE

Please order actuator separately (see page 116)



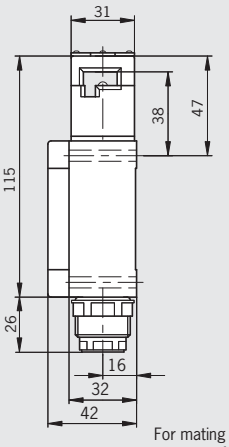
For mating connectors, see page 128

538H



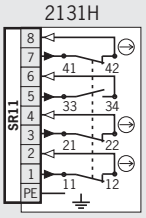
Plug connector SR11
11-pin + PE

Please order actuator separately (see page 116)



For mating connectors, see page 128

2131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display Without LED
NZ	VZ Separate actuator	2 Plug connector C16-1	538H 2 NC ⊖	C1701 With protective plate	071200 NZ2VZ-538EC1701
				C1420 With protective plate Alternative wiring	043296 NZ2VZ-538EC1420
		2 Plug connector SR6	538H 2 NC ⊖	With protective plate	077229 NZ2VZ-538EC1233
		2 Plug connector SR11	2131H 3 NC ⊖ + 1 NO	With protective plate	093857 NZ2VZ-2131EC1233

Selection table for safety switches NZ.VZ.VS with guard locking without guard locking monitoring

Guard locking

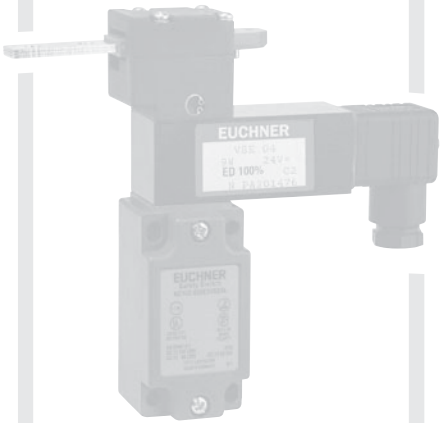
- **VSM** — Mechanical guard locking, closed-circuit current principle
- **VSE** — Electrical guard locking, open-circuit current principle

Connection

- **M** — Thread M20x1.5 for cable glands
- **SR6** — Plug connector 6-pin + PE
- **SR6** — Plug connector 7-pin + PE
- **SR11** — Plug connector 11-pin + PE

Switching element

- **2 contacts** — 2 NC ⊖ or 1 NC ⊖ + 1 NO
- **4 contacts** — 2 NC ⊖ + 2 NO, 3 NC ⊖ + 1 NO



Guard locking		Connection			Switching element		Page
VSM	VSE	M	SR6	SR11	2 contacts	4 contacts	
●		●			●	●	58
●			●		●		59
●				●		●	59
	●	●			●	●	60
	●		●		●		61
	●			●		●	61

Safety switch NZ.VZ.VSM with guard locking without guard locking monitoring

- **Housing according to EN 50041**
- **Plug connector optional**
- **LED optional**

Approach direction

Horizontal
Adjustable in 90° steps

Solenoid operating voltage and optional LED function display

A function display is available for the following voltage ranges:

Solenoid	LED	
DC 24 V ±10%	AC/DC	12-60 V red
AC 110 V ±15%		
AC 230 V ±15%		

Guard locking type

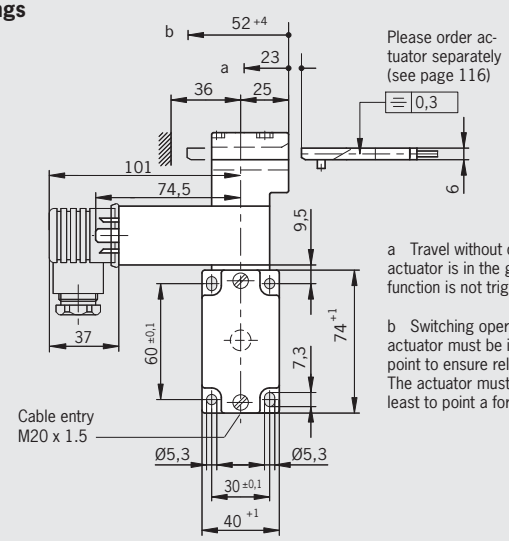
VSM Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings



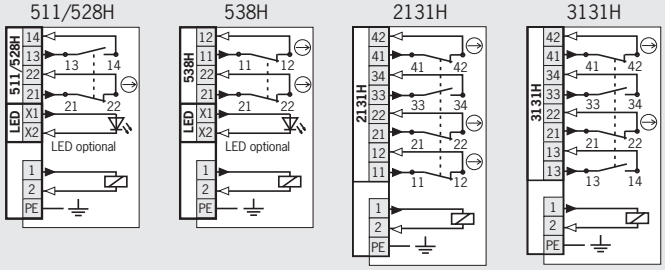
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For solenoid plugs, see page 127

For cable glands, see page 132

Wiring diagrams



Ordering table

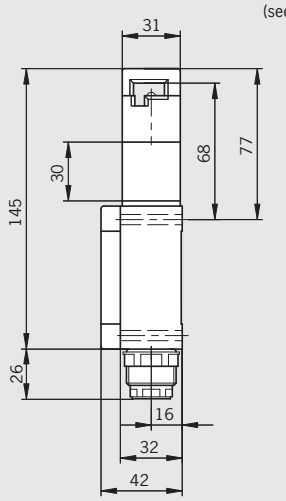
Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display: Without LED	Function display: 12-60 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	VSM Mech. guard locking closed-circuit current principle	04 24 V DC	511 1 NC ⊖ + 1 NO	090339 NZ1VZ-511E3VSM04-M	090344 NZ1VZ-511E3VSM04L060-M
					528H 1 NC ⊖ + 1 NO	082125 NZ1VZ-528E3VSM04-M	082126 NZ1VZ-528E3VSM04L060-M
					538H 2 NC ⊖	082131 NZ1VZ-538E3VSM04-M	082132 NZ1VZ-538E3VSM04L060-M
					2131H 3 NC ⊖ + 1 NO	088049 NZ1VZ-2131E3VSM04-M	-
					3131H 2 NC ⊖ + 2 NO	088050 NZ1VZ-3131E3VSM04-M	-
				07 [1] 110 V AC	528H 1 NC ⊖ + 1 NO	082129 NZ1VZ-528E3VSM07-M	-
					538H 2 NC ⊖	088046 NZ1VZ-538E3VSM07-M	-
					2131H 3 NC ⊖ + 1 NO	088038 NZ1VZ-3131E3VSM07-M	-
					3131H 2 NC ⊖ + 2 NO	088040 NZ1VZ-3131E3VSM07-M	-
				09 [1] 230 V AC	528H 1 NC ⊖ + 1 NO	088045 NZ1VZ-528E3VSM09-M	-
					538H 2 NC ⊖	088044 NZ1VZ-538E3VSM09-M	-
					2131H 3 NC ⊖ + 1 NO	088039 NZ1VZ-2131E3VSM09-M	-
					3131H 2 NC ⊖ + 2 NO	088041 NZ1VZ-3131E3VSM09-M	-

1) Use only solenoid plug with integrated rectifier (see page 127)

Plug connector SR6
6-pin + PE

Dimension drawings

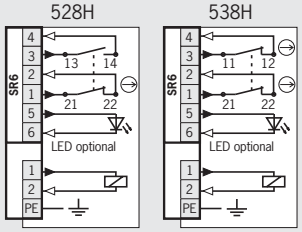
Please order actuator separately (see page 116)



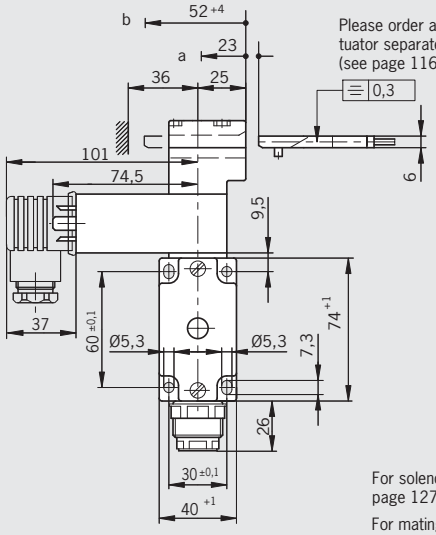
For solenoid plugs, see page 127

For mating connectors, see page 128

Wiring diagrams



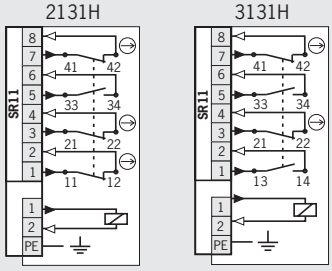
Plug connector SR11
11-pin + PE



Please order actuator separately (see page 116)

For solenoid plugs, see page 127

For mating connectors, see page 128



Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display	
						Without LED	12-60 V red LED
NZ	VZ Separate actuator	2 Plug connector SR6	VSM Mech. guard locking closed-circuit current principle	04 24 V DC	528H 1 NC ⊖ + 1 NO	037299 NZ2VZ-528E3VSM04	045856 NZ2VZ-528E3VSM04L060
					538H 2 NC ⊖	050428 NZ2VZ-538E3VSM04	059427 NZ2VZ-538E3VSM04L060
		2 Plug connector SR11	VSM Mech. guard locking closed-circuit current principle	04 24 V DC	2131H 3 NC ⊖ + 1 NO	074471 NZ2VZ-2131E3VSM04	-
					3131H 2 NC ⊖ + 2 NO	074472 NZ2VZ-3131E3VSM04	-

For technical data, see page 163

Safety switch NZ.VZ.VSE with guard locking without guard locking monitoring

- **Housing according to EN 50041**
- **Plug connector optional**
- **LED optional**

Approach direction

Horizontal
Adjustable in 90° steps

Solenoid operating voltage and optional LED function display

A function display is available for the following voltage ranges:

Solenoid	LED	
DC 24 V ±10%	AC/DC	12-60 V red
AC 110 V ±15%		
AC 230 V ±15%		

Guard locking type

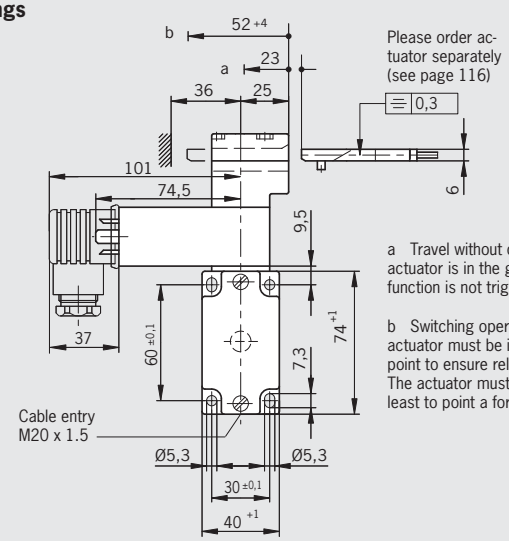
VSE Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

- **511** Snap-action switching contact 1 NC ⊖ + 1 NO
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **538H** Slow-action switching contact 2 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings



Please order actuator separately (see page 116)

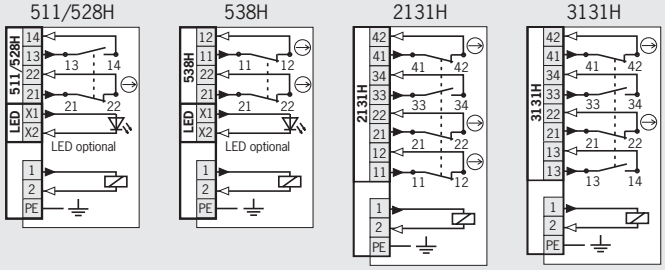
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For solenoid plugs, see page 127

For cable glands, see page 132

Wiring diagrams



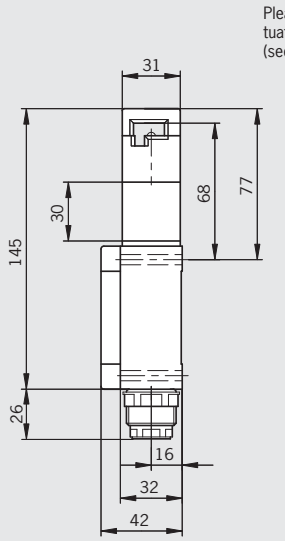
Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display	
						Without LED	12-60 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	VSE Elec. guard locking, open-circuit current principle	04 24 V DC	511 1 NC ⊖ + 1 NO	090343 NZ1VZ-511E3VSE04-M	-
					528H 1 NC ⊖ + 1 NO	079300 NZ1VZ-528E3VSE04-M	082130 NZ1VZ-528E3VSE04I060-M
					538H 2 NC ⊖	089905 NZ1VZ-538E3VSE04-M	082128 NZ1VZ-538E3VSE04L060-M
					2131H 3 NC ⊖ + 1 NO	082134 NZ1VZ-2131E3VSE04-M	-
					3131H 2 NC ⊖ + 2 NO	088051 NZ1VZ-3131E3VSE04-M	-
				07 [1] 110 V AC	528H 1 NC ⊖ + 1 NO	082133 NZ1VZ-528E3VSE07-M	090337 NZ1VZ-528E3VSE07L060-M
					538H 2 NC ⊖	088048 NZ1VZ-538E3VSE07-M	-
					2131H 3 NC ⊖ + 1 NO	088036 NZ1VZ-2131E3VSE07-M	-
				09 [1] 230 V AC	528H 1 NC ⊖ + 1 NO	088047 NZ1VZ-528E3VSE09-M	090346 NZ1VZ-528E3VSE09L060-M
					538H 2 NC ⊖	088035 NZ1VZ-538E3VSE09-M	-
					2131H 3 NC ⊖ + 1 NO	088037 NZ1VZ-2131E3VSE09-M	-
					3131H 2 NC ⊖ + 2 NO	088043 NZ1VZ-3131E3VSE09-M	-

1) Use only solenoid plug with integrated rectifier (see page 127)

Plug connector SR6
6-pin + PE

Dimension drawings

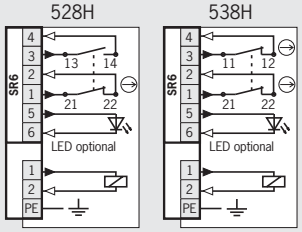


Please order actuator separately (see page 116)

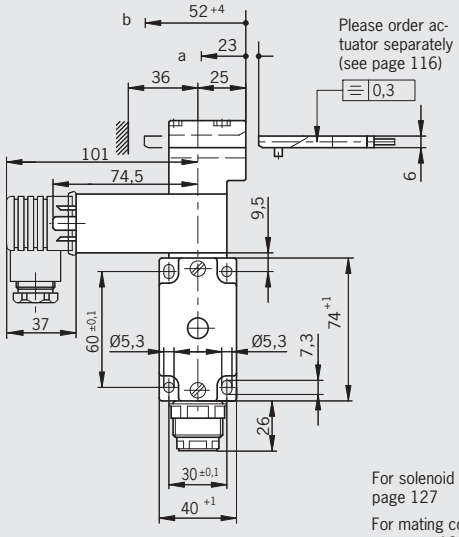
For solenoid plugs, see page 127

For mating connectors, see page 128

Wiring diagrams



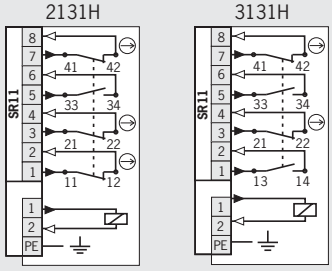
Plug connector SR11
11-pin + PE



Please order actuator separately (see page 116)

For solenoid plugs, see page 127

For mating connectors, see page 128



Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display	
						Without LED	12-60 V red LED
NZ	VZ Separate actuator	2 Plug connector SR6	VSE Elec. guard locking, open-circuit current principle	04 24 V DC	528H 1 NC ⊖ + 1 NO	044894 NZ2VZ-528E3VSE04	046742 NZ2VZ-528E3VSE04L060
					538H 2 NC ⊖	047837 NZ2VZ-538E3VSE04	057921 NZ2VZ-538E3VSE04L060
		2 Plug connector SR11	VSE Elec. guard locking, open-circuit current principle	04 24 V DC	2131H 3 NC ⊖ + 1 NO	074473 NZ2VZ-2131E3VSE04	-
					3131H 2 NC ⊖ + 2 NO	074474 NZ2VZ-3131E3VSE04	-

For technical data, see page 163

Selection table for safety switches TZ with guard locking and guard locking monitoring

Release feature, front

- **HE** Mechanical release can be sealed
- **E** Emergency unlocking
- **HD** Mechanical release for triangular key acc. to DIN 22417 (no automatic return)
- **ND** Release on the front (pushbutton)
- **NR** Emergency unlocking on the front (rotary knob can be sealed)
- **O** Without manual release feature

Release feature, rear

- **FS** Escape release on the rear (key button)
- **FD** Escape release on the rear (pushbutton/button without key)

Version

- **SB** Protective plate, tamper protection on the switch head

Enabling switch connection

- **RC12** Plug connector 4-pin

Connection

- **M** Thread M20x1.5 for cable glands
- **SR6** Plug connector 6-pin + PE
- **MR8** Plug connector 7-pin + PE
- **MR10** Plug connector 9-pin + PE
- **SR11** Plug connector 11-pin + PE
- **MR12** Plug connector 11-pin + PE
- **M23 (RC18)** Plug connector 18-pin + PE

Switching element

- **2 contacts** 2 x (1 NC ⊖ + 1 NO)
- **4 contacts** 2 x (4 NC ⊖) or 1 x (3 NC ⊖ + 1 NO) + 1 x (2 NC ⊖ + 2 NO)

Manual release									Enabling switches	Connection							Switching element		With version	Page
HE	E	HD	ND	NR	O	FS	FD	SB	RC12	M	SR6	MR8	MR10	SR11	MR12	M23 (RC18)	2 contacts	4 contacts		
●										●							●	●	C1925 / C2087	64/69
●											●						●		C1638	65
●														●			●	●	C1933	66
●															●	●		●	C1924/ C1826	67/68
●						●				●							●	●	C1815 / C1828	78
●						●								●		●	●	●	C1815 / C1828	79
●							●			●							●	●	C1684	82
●							●							●			●		C1684	83
●								●			●			●			●		C1677	71
●								●								●		●		72
●							●			●								●	C2082	80
●							●									●		●	C2140	81
	●											●	●				●	●	C1903	70
		●								●								●	C2159	73
			●							●							●	●	C1816 / C1823	74
			●											●		●	●	●	C1816 / C1823	75
				●				●						●			●			76
				●												●		●	C1937	76
				●			●	●								●		●	C2123	84
					●			●		●							●	●	C1623 / C2100	85
					●								●					●		86
					●			●							●			●	C1902 / C1971	86
					●				●							●		●	C1803	87

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release

Is used for releasing the guard locking with the aid of a tool. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Solenoid operating voltage and LED function display

The following voltage ranges are available:

- 24 V AC/DC -15%, +10%
- 110 V AC -15%, +10%
- 230 V AC -15%, +10%

Guard locking types

TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

SK For monitoring the door/actuator position

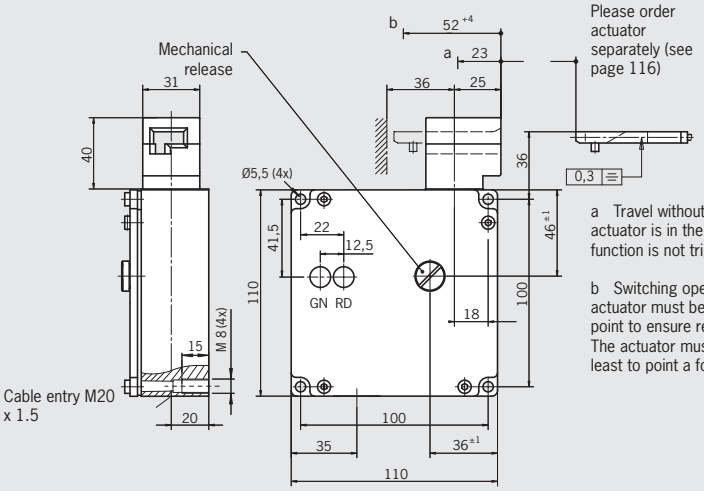
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:

- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)

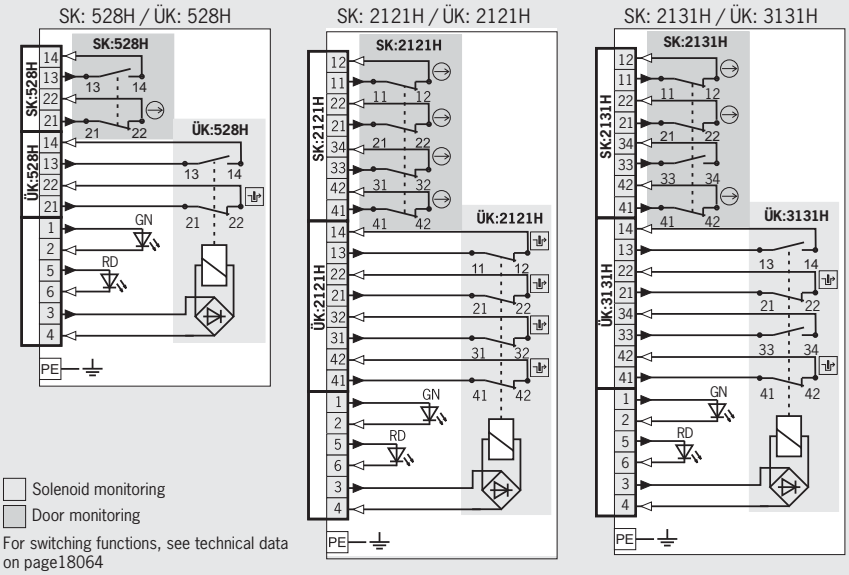


a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18064

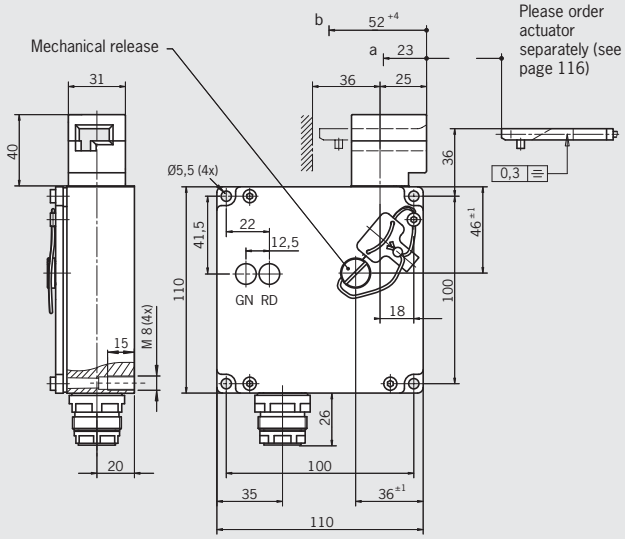
Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Black cover 24 V	Black cover 110 V	Black cover 230 V	Red cover 24 V	Red cover 110 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**082050** TZ1LE024M	**083160** TZ1LE110M	**083166** TZ1LE220M	**083164** TZ1LE024M-R	**083168** TZ1LE110M-R
				SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC	-	-	-	**089464** 1) TZ1LE024MVFG-RC1925	-
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**083965** TZ1LE024MVAB	**088023** TZ1LE110MVAB	**088029** TZ1LE220MVAB	**089434** TZ1LE024MVAB-R	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**082051** TZ1RE024M	**083161** TZ1RE110M	**083167** TZ1RE220M	**083165** TZ1RE024M-R	**089448** TZ1RE110M-R
				SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC	-	-	-	**089465** 1) TZ1RE024MVFG-RC1925	-
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**083966** TZ1RE024MVAB	**088024** TZ1RE110MVAB	**088030** TZ1RE220MVAB	**083233** TZ1RE024MVAB-R	-
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**090559** TZ2LE024M	**083162** TZ2LE110M	**088031** TZ2LE220M	**089445** TZ2LE024M-R	-
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**088070** TZ2LE024MVAB	**088025** TZ2LE110MVAB	**088027** TZ2LE220MVAB	-	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**090560** TZ2RE024M	**083163** TZ2RE110M	**088032** TZ2RE220M	**089446** TZ2RE024M-R	-
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**088071** TZ2RE024MVAB	**088026** TZ2RE110MVAB	**088028** TZ2RE220MVAB	-	-

1) No DGUV approval

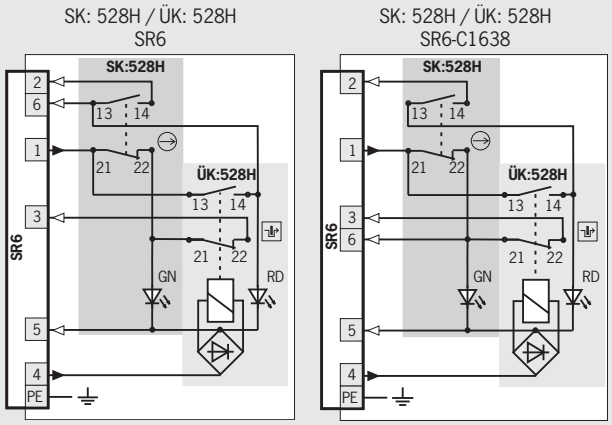
Plug connector SR6
6-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 128

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18065

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V	Black cover 230 V
TZ	SR6 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO		**046502** TZ1LE024SR6	**046503** TZ1LE110SR6	**046504** TZ1LE220SR6
					C1638 2) Wiring	**089476** 2) TZ1LE024SR6-C1638	-	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO		**046190** TZ1RE024SR6	**046191** TZ1RE110SR6	**051879** TZ1RE220SR6
					C1638 2) Wiring	**070529** 2) TZ1RE024SR6-C1638	-	-
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO		**049159** TZ2LE024SR6	**052914** TZ2LE110SR6	**045450** TZ2LE220SR6
					C1638 2) Wiring	**076294** 2) TZ2LE024SR6-C1638	-	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO		**049102** TZ2RE024SR6	**049238** TZ2RE110SR6	**047937** TZ2RE220SR6
					C1638 2) Wiring	**055819** 2) TZ2RE024SR6-C1638	-	-

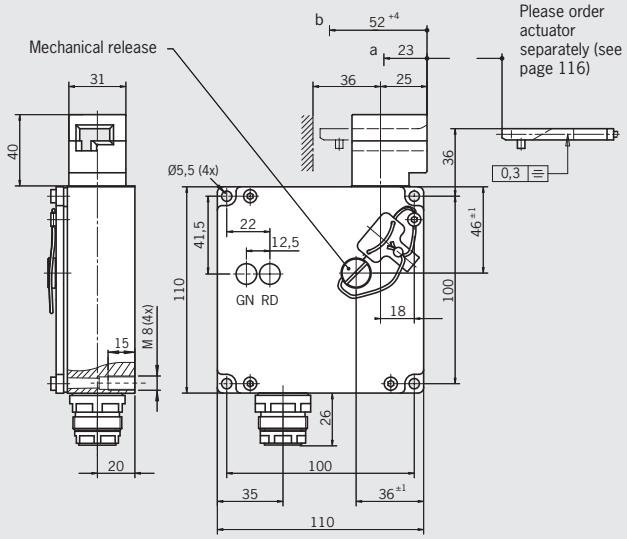
1) Only with solenoid operating voltage AC/DC 24 V 2) No DGUV approval

Please turn over

For technical data, see page 163

Plug connector SR11
11-pin + PE

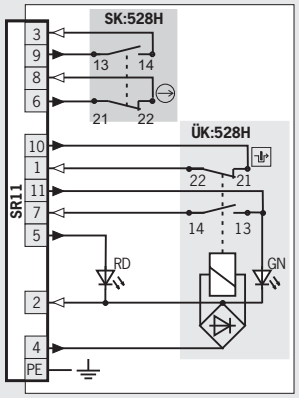
Dimension drawings (actuator head on the left is a mirror image)



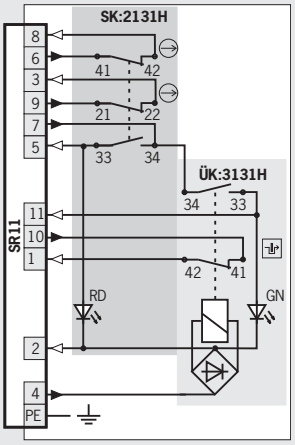
For mating connectors, see page 128

Wiring diagrams actuator inserted and locked

SK: 528H / ÜK: 528H
SR11



SK: 2131H / ÜK: 3131H
SR11-C1933



For switching functions, see technical data on page18066

☐ Solenoid monitoring
☐ Door monitoring

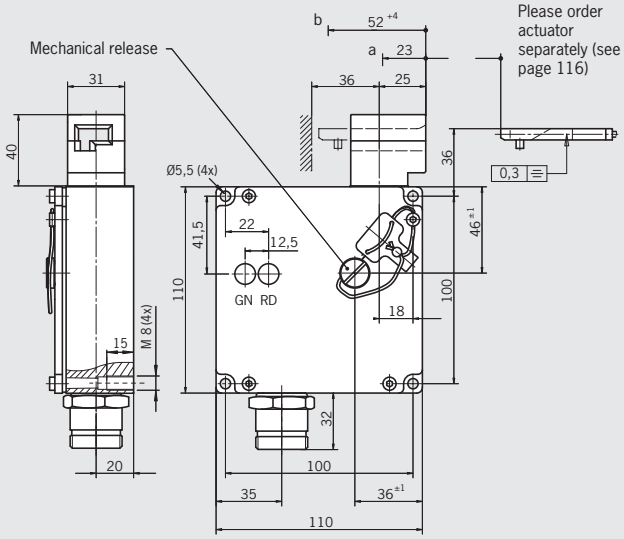
Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	SR11 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO		**070828** TZ1LE024SR11
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	**C1933** 1) Alternative wiring	**083230** 1) TZ1LE024SR11VAB-C1933
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO		**070826** TZ1RE024SR11
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	**C1933** 1) Alternative wiring	**083231** TZ1RE024SR11VAB-C1933
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO		**070958** TZ2LE024SR11
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO		**070957** TZ2RE024SR11

1) No DGUV approval

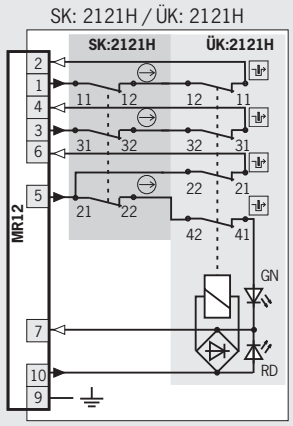
Plug connector MR12
11-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 131

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18067

Solenoid monitoring
Door monitoring

Ordering table

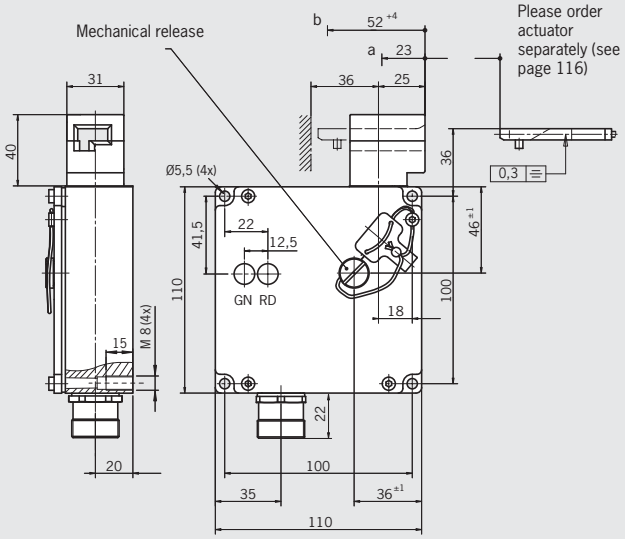
Series	Connection	Guard locking	Switch head	Switching element	Red cover 24 V
TZ	MR12 Plug connector	1 Mechanical	LE Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊕	**083190** TZ1LE024BHAVFG-RC1924
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊕	**083191** TZ1RE024BHAVFG-RC1924

Please turn over

For technical data, see page 163

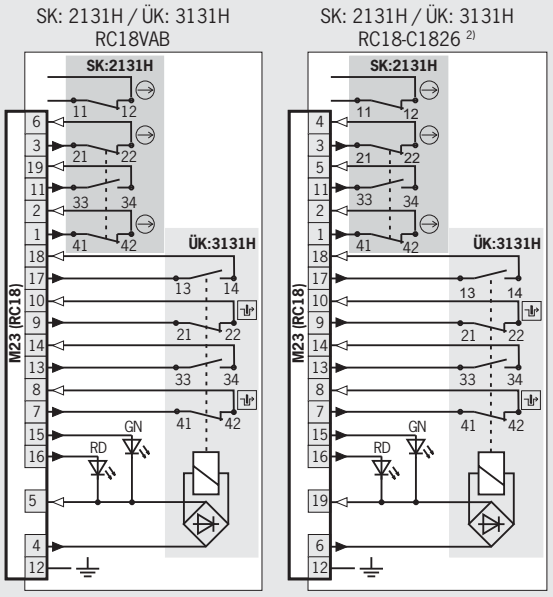
Plug connector M23 (RC18)
18-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 129

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18068

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M23 (RC18) Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO		**084242** TZ1LE024RC18VAB
					C1826 Wiring	**084246** 2) TZ1LE024RC18VAB-C1826
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO		**084243** TZ1RE024RC18VAB
					C1826 Wiring	**084247** 2) TZ1RE024RC18VAB-C1826
		2 Electrical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	**C1826** Wiring	**085180** 2) TZ2LE024RC18VAB-C1826
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	**C1826** Wiring	**085181** 2) TZ2RE024RC18VAB-C1826

2) **Important**: use suitable mating connector with option C1825!

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Two cable entries M20x1.5**
- **Two LED indicators, red and green**
- **Plug connector on request**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release

Is used for releasing the guard locking with the aid of a tool. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Solenoid operating voltage and LED function display

The following voltage ranges are available:

- 24 V AC/DC -15%, +10%

Guard locking types

TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)

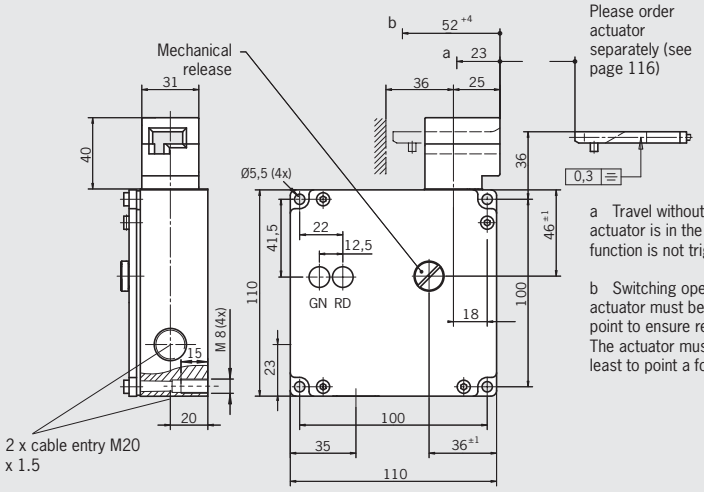
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:

- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry 2 x M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)

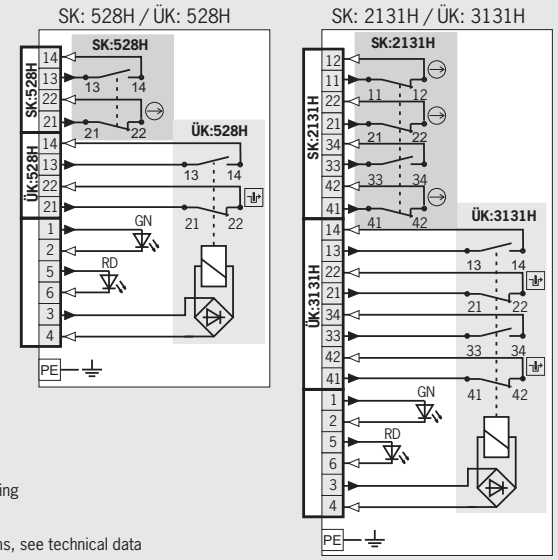


a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18069

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	2 x M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊡ + 1 NO	2 cable entries	**095245** TZ1LE024M-C2087
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	2 cable entries	**113504** TZ1LE024MVAB-C2087
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊡ + 1 NO	2 cable entries	**095253** TZ1RE024M-C2087
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	2 cable entries	**098205** TZ1RE024MVAB-C2087

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Emergency unlocking on the front**
- **Two LED indicators, red and green**
- **Plug connector**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Emergency unlocking
Is used for the manual release of the guard locking without tools. The emergency unlocking mechanism must be returned to the locked state manually.

Solenoid operating voltage and LED function display
The following voltage ranges are available:
- 24 V AC/DC -15%, +10%

Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.
TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

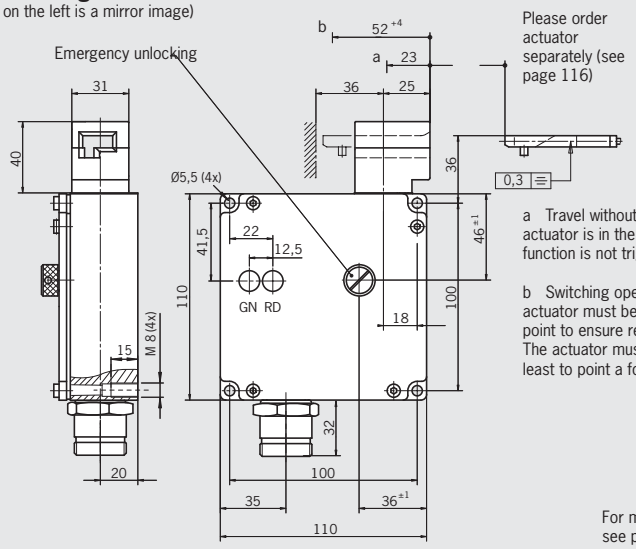
Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2121H** Slow-action switching contact 4 NC ⊖

Plug connector MR8
7-pin + PE

Plug connector MR10
9-pin + PE

Dimension drawings
(actuator head on the left is a mirror image)



Please order actuator separately (see page 116)

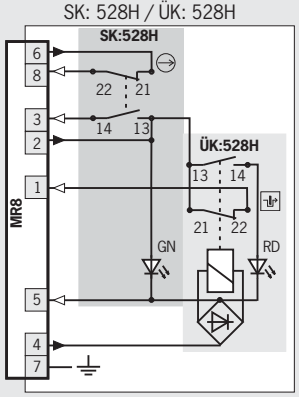
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For mating connectors, see page 131

Wiring diagrams actuator inserted and locked

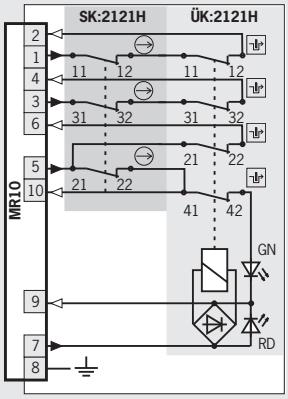
SK: 528H / ÜK: 528H



For switching functions, see technical data on page 180

Solenoid monitoring
Door monitoring

SK: 2121H / ÜK: 2121H
-C1903



For switching functions, see technical data on page 180

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Red cover 24 V
TZ	MR8 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊔ + 1 NO	Emergency unlocking cannot be sealed	**054964** TZ1LE024PG0R8C	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊔ + 1 NO	Emergency unlocking cannot be sealed	**059920** TZ1RE024PG0R8C	-
	MR10 Plug connector	1 Mechanical	LE Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊔	Emergency unlocking cannot be sealed	-	**082095** TZ1LE024BHA-C1903
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊔	Emergency unlocking cannot be sealed	-	**082096** TZ1RE024BHA-C1903
		2 Electrical	LE Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊔	Emergency unlocking cannot be sealed	-	**082083** TZ2LE024BHA-C1903
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊔	Emergency unlocking cannot be sealed	-	**082084** TZ2RE024BHA-C1903

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Protective plate for switch head**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Protective plate for switch head
Makes it more difficult to tamper with the switch.

Solenoid operating voltage and LED function display
The following voltage range is available:
- 24 V AC/DC -15%, +10%

Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.
TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

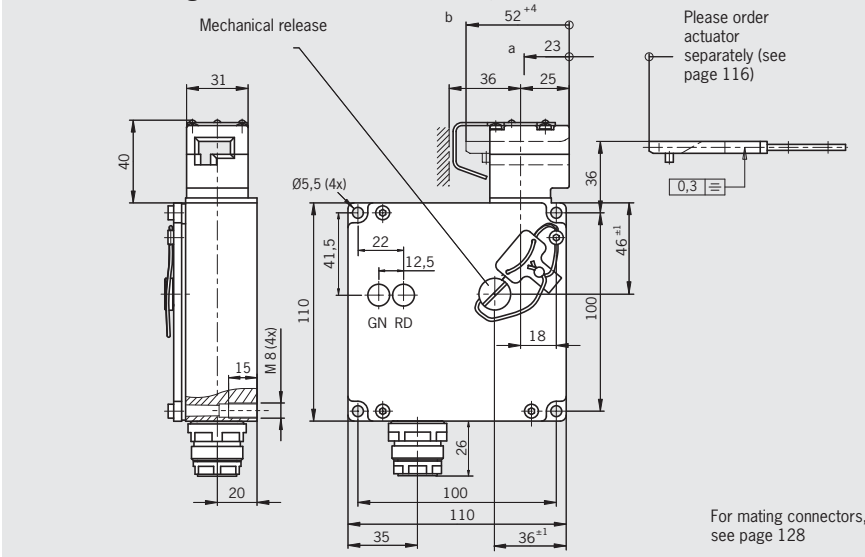
Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Plug connector SR6
6-pin + PE

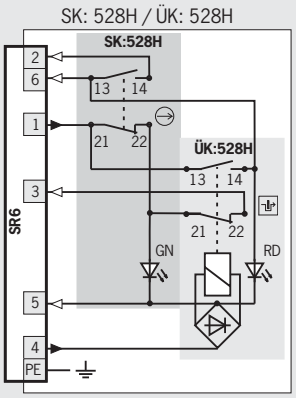
Plug connector SR11
11-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



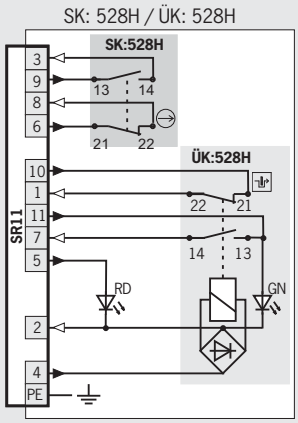
For mating connectors, see page 128

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page 180

Solenoid monitoring
Door monitoring



For switching functions, see technical data on page18071

Solenoid monitoring
Door monitoring

Ordering table

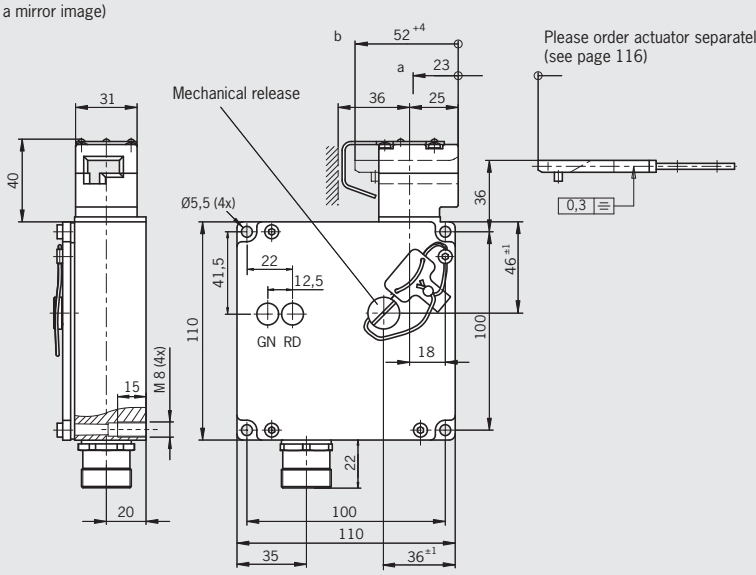
Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	SR6 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**059694** TZ1LE024SR6-C1677
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**059692** TZ1RE024SR6-C1677
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**059852** TZ2LE024SR6-C1677
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**059699** TZ2RE024SR6-C1677
	SR11 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**093860** TZ1LE024SR11-093860
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	With protective plate	**093861** TZ1RE024SR11-093861

Please turn over

For technical data, see page 163

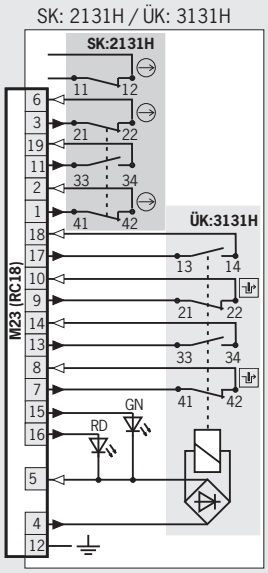
Plug connector M23 (RC18)
18-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 129

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18072

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M23 (RC18) Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	With protective plate	**093862** TZ1LE024RC18VAB-093862
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	With protective plate	**093863** TZ1RE024RC18VAB-093863

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front, release with a triangular key acc. to DIN 22417**
- **Two LED indicators, red and green**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release
This releases the guard locking after operation with a triangular key acc. to DIN 22417.

Solenoid operating voltage and LED function display
The following voltage range is available:
- 24 V AC/DC -15%, +10%

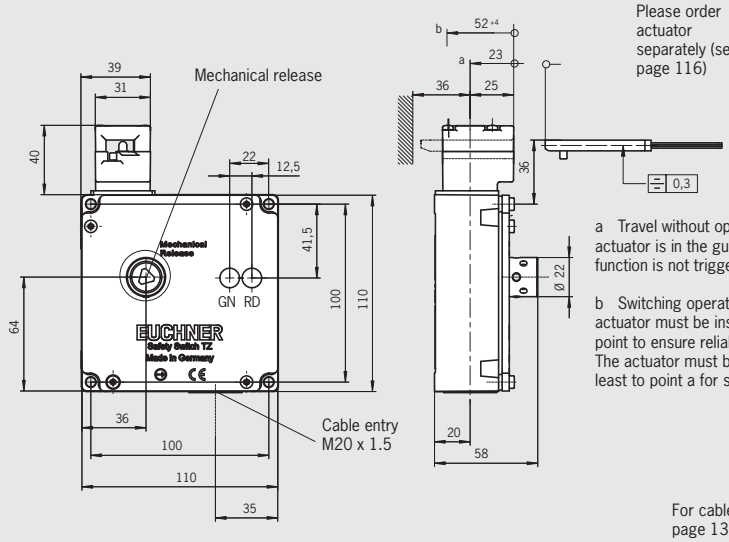
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

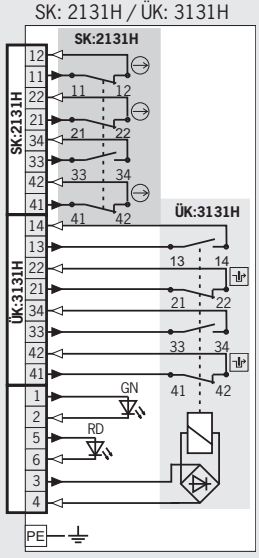
Dimension drawings actuator head on the right is a mirror image



For cable glands, see page 132

Wiring diagrams actuator inserted and locked

SK: 2131H / ÜK: 3131H



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18073

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊞ + 2 NO	Mechanical release with triangular key	**098718** TZ1LB024MVAB-C2159
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊞ + 2 NO	Mechanical release with triangular key	**098717** TZ1RB024MVAB-C2159

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Release on the front with pushbutton**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Release

Is used for the manual release of the guard locking without tools. It is possible to remove the disable and return the switch to its operating state by hand without tools.

Solenoid operating voltage and LED function display

The following voltage range is available:

- 24 V AC/DC -15%, +10%

Guard locking types

TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

SK For monitoring the door/actuator position

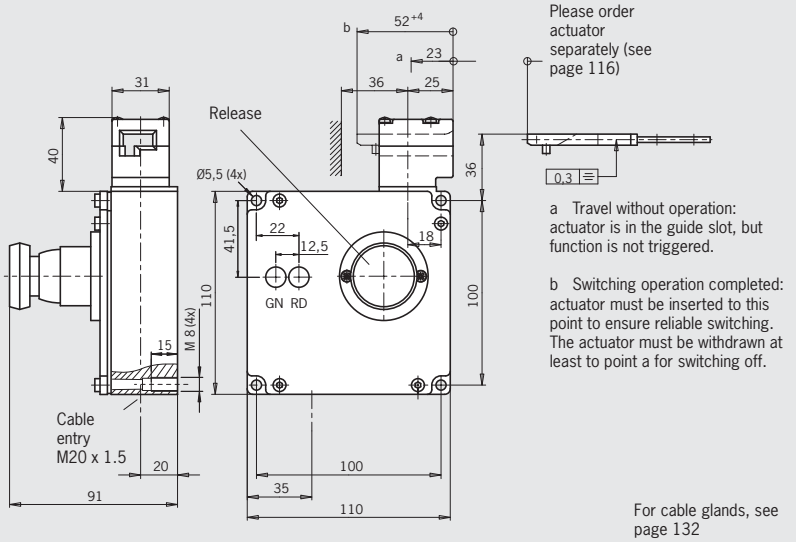
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:

- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)



Please order actuator separately (see page 116)

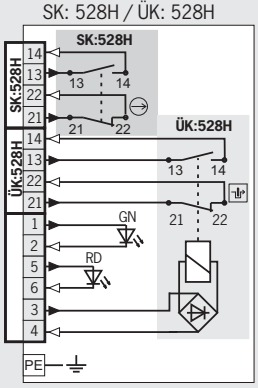
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

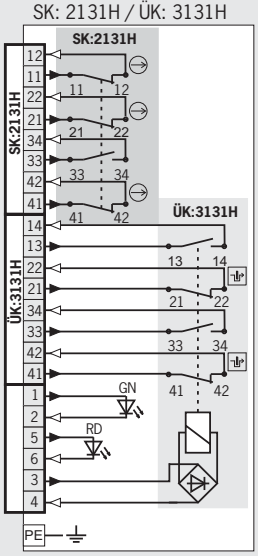
For cable glands, see page 132

Wiring diagrams actuator inserted and locked

SK: 528H / ÜK: 528H



SK: 2131H / ÜK: 3131H



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18074

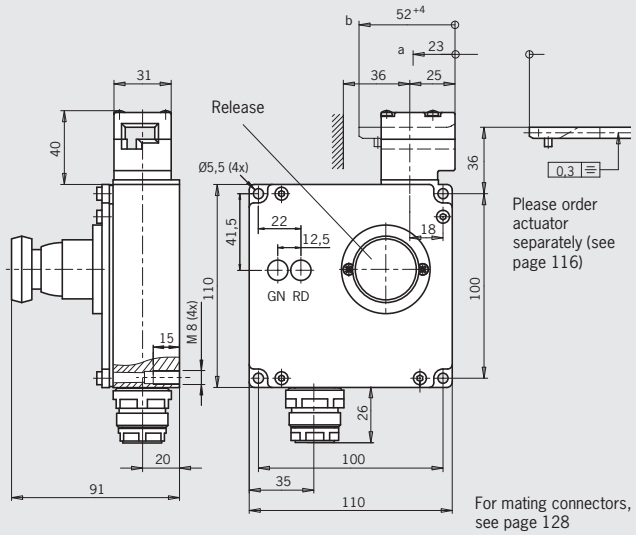
Ordering table

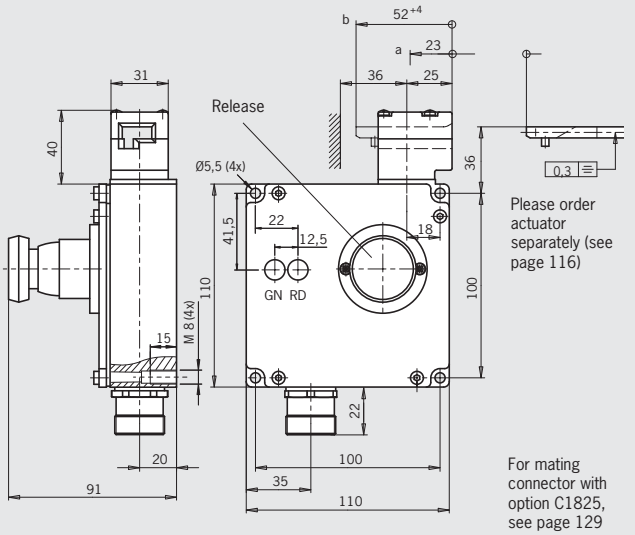
Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Release (blue pushbutton)	**089477** TZ1LE024M-C1816
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Release (blue pushbutton)	**096901** TZ1RE024M-C1816
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Release (blue pushbutton)	**087992** TZ2LE024M-C1816
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊎ + 2 NO	Release (blue pushbutton)	**089455** TZ2LE024MVAB-C1823
			LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Release (blue pushbutton)	**087993** TZ2RE024M-C1816
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊎ + 2 NO	Release (blue pushbutton)	**089456** TZ2RE024MVAB-C1823

Plug connector SR11
11-pin + PE

Plug connector M23 (RC18)
18-pin + PE

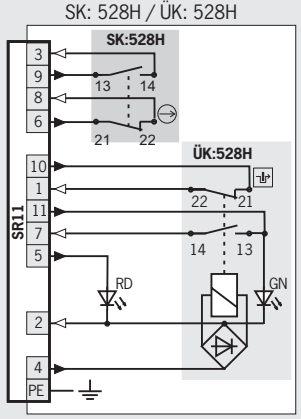
Dimension drawings (actuator head on the left is a mirror image)





Wiring diagrams actuator inserted and locked

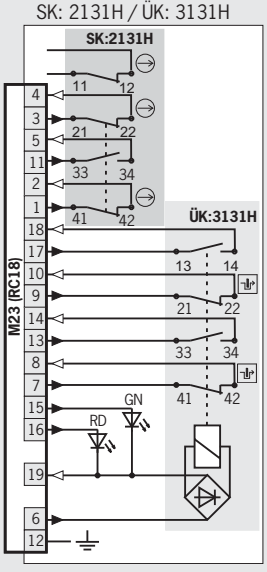
SK: 528H / ÜK: 528H



☐ Solenoid monitoring
☐ Door monitoring

For switching functions, see technical data on page18075

SK: 2131H / ÜK: 3131H



☐ Solenoid monitoring
☐ Door monitoring

For switching functions, see technical data on page 180

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**SR11** Plug connector	**1** Mechanical	**LE** Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO	Release (blue pushbutton)	**077044** TZ1LE024SR11-C1816
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊕ + 1 NO	Release (blue pushbutton)	**077042** TZ1RE024SR11-C1816
	M23 (RC18) [1] Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	Release (blue pushbutton)	**088090** TZ1LE024RC18VAB-C1823
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	Release (blue pushbutton)	**088091** TZ1RE024RC18VAB-C1823

1) **Important**: use suitable mating connector with option C1825!

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Emergency unlocking on the front with rotary knob**
- **Protective plate for switch head optional**
- **Two LED indicators, red and green**
- **Plug connector**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Emergency unlocking
Is used for the manual release of the guard locking without tools. The emergency unlocking mechanism must be returned to the locked state manually. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Protective plate for switch head
Makes it more difficult to tamper with the switch.

Solenoid operating voltage and LED function display
The following voltage range is available:
- 24 V AC/DC -15%, +10%

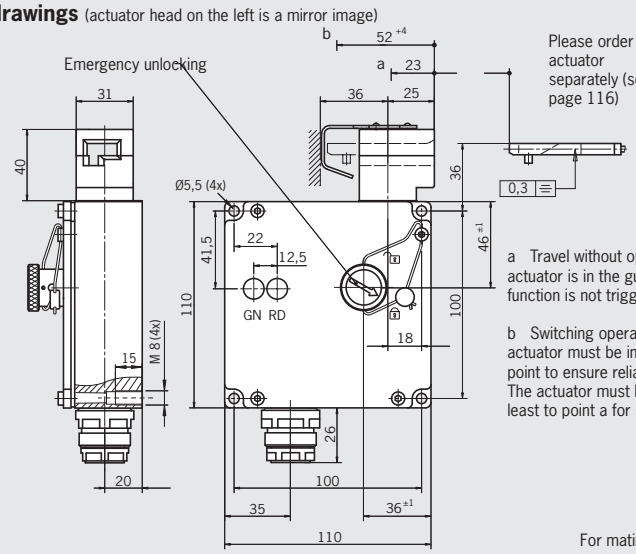
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.
TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Plug connector SR11 with protective plate
11-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



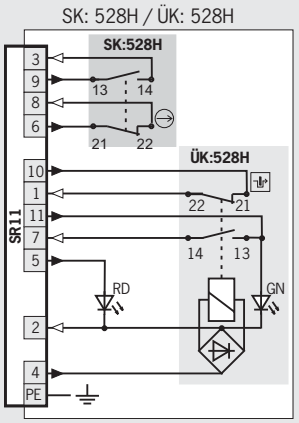
Please order actuator separately (see page 116)

a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For mating connectors, see page 128

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18076

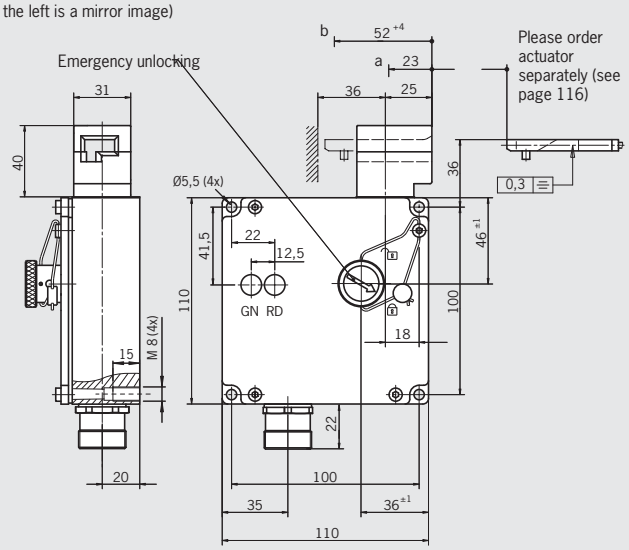
☐ Solenoid monitoring
☐ Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	SR11 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Emergency unlocking (rotary knob), with protective plate	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊎ + 1 NO	Emergency unlocking (rotary knob), with protective plate	**094343** TZ1RE024SR11-094343

Plug connector M23 (RC18)
18-pin + PE

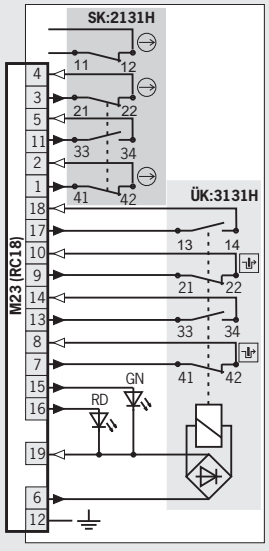
Dimension drawings (actuator head on the left is a mirror image)



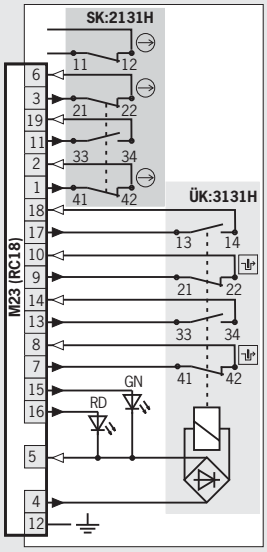
For mating connector with option C1825, see page 129

Wiring diagrams
Actuator inserted and locked

SK: 2131H / ÜK: 3131H
RC18-C1937



SK: 2131H / ÜK: 3131H
RC18VAB-092998/-092999



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18077

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M23 (RC18) [1] Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob)	**074260** TZ1LE024RC18VAB-C1937
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob)	**074261** TZ1RE024RC18VAB-C1937
		2 Electrical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob)	**100778** TZ2LE024RC18VAB-C1937
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob)	**100777** TZ2RE024RC18VAB-C1937
	M23 (RC18) Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob), alternative wiring	**092998** TZ1LE024RC18VAB-092998
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	Emergency unlocking (rotary knob), alternative wiring	**092999** TZ1RE024RC18VAB-092999

1) **Important**: use suitable mating connector with option C1825!

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Escape release on the rear with key button**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Escape release

This is used for manual release of guard locking from within the danger zone without tools. The disable can only be removed and the switch returned to its operating state using a key included (2 keys included).

Solenoid operating voltage and LED function display

The following voltage range is available:

- 24 V AC/DC -15%, +10%

Guard locking types

TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

SK For monitoring the door/actuator position

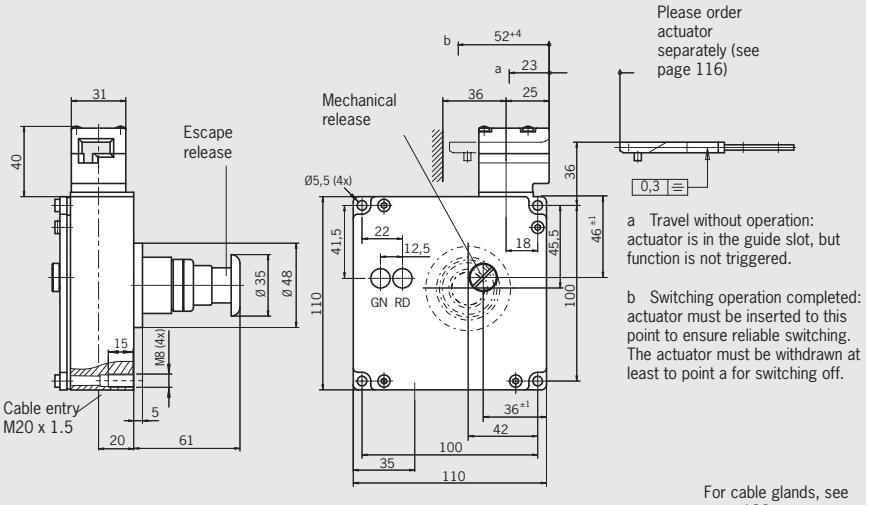
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:

- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)



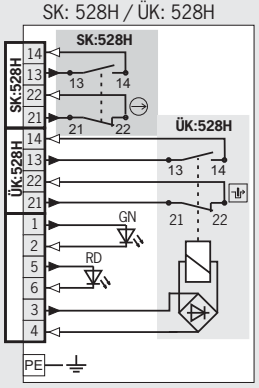
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

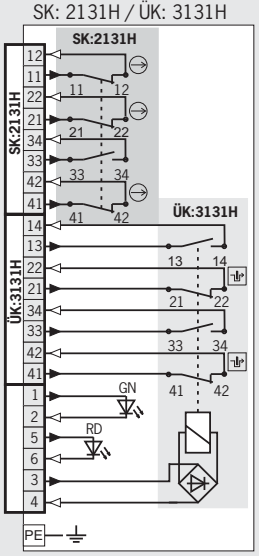
For cable glands, see page 132

Wiring diagrams actuator inserted and locked

SK: 528H / ÜK: 528H



SK: 2131H / ÜK: 3131H



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18078

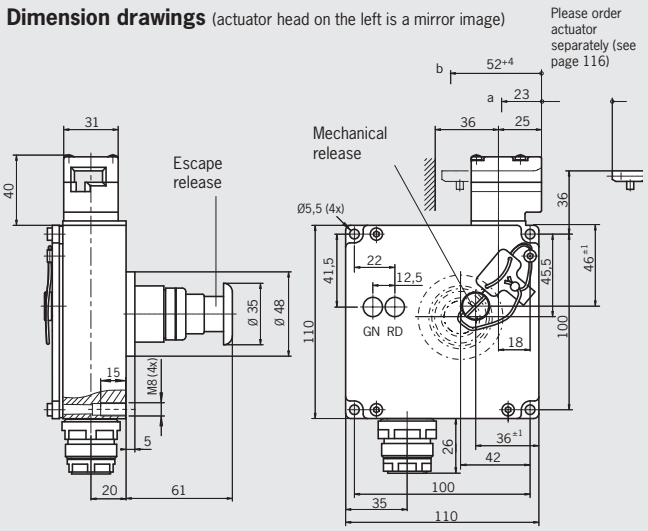
Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (red key button)	**087990** TZ1LE024M-C1815
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (red key button)	**089468** TZ1LE024MVAB-C1828
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (red key button)	**087991** TZ1RE024M-C1815
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (red key button)	**089469** TZ1RE024MVAB-C1828
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (red key button)	**089460** TZ2LE024M-C1815
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (red key button)	**087290** TZ2LE024MVAB-C1828
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (red key button)	**089461** TZ2RE024M-C1815
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (red key button)	**087291** TZ2RE024MVAB-C1828

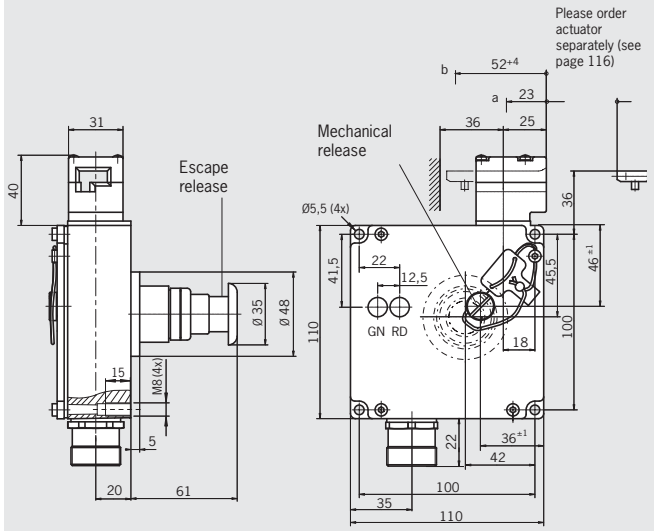
Plug connector SR11
11-pin + PE

Plug connector M23 (RC18)
18-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



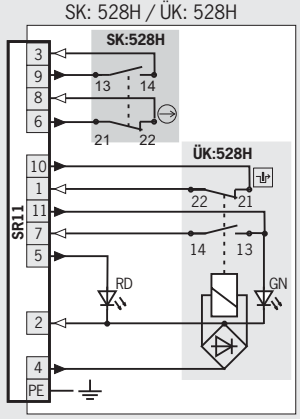
For mating connectors, see page 128



For mating connector with option C1825, see page 129

Wiring diagrams actuator inserted and locked

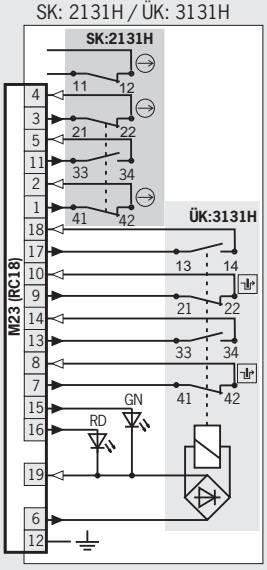
SK: 528H / ÜK: 528H



☐ Solenoid monitoring
☐ Door monitoring

For switching functions, see technical data on page18079

SK: 2131H / ÜK: 3131H



☐ Solenoid monitoring
☐ Door monitoring

For switching functions, see technical data on page 170

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**SR11** Plug connector	**2** Electrical	**LE** Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (key button)	**079660** TZ2LE024SR11-C1815
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	Escape release (key button)	**079661** TZ2RE024SR11-C1815
	M23 (RC18) [1] Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (key button)	**090352** TZ1LE024RC18VAB-C1828
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (key button)	**090353** TZ1RE024RC18VAB-C1828
		2 Electrical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (key button)	**093103** TZ2LE024RC18VAB-C1828
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Escape release (key button)	**093104** TZ2RE024RC18VAB-C1828

1) **Important**: use suitable mating connector with option C1825!

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Escape release on the rear with push-button**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Escape release
This is used for manual release of guard locking from within the danger zone without tools.

Solenoid operating voltage and LED function display
The following voltage ranges are available:
- 24 V AC/DC -15%, +10%
- 110 V AC -15%, +10%

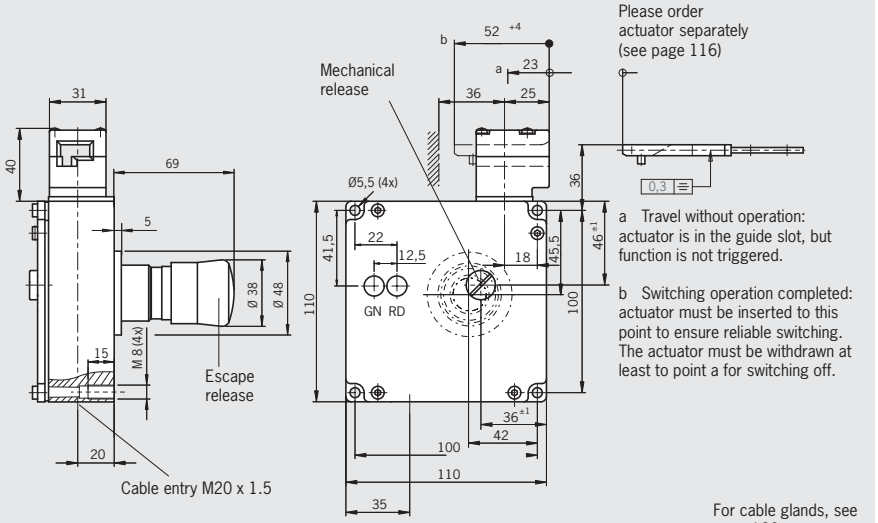
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)

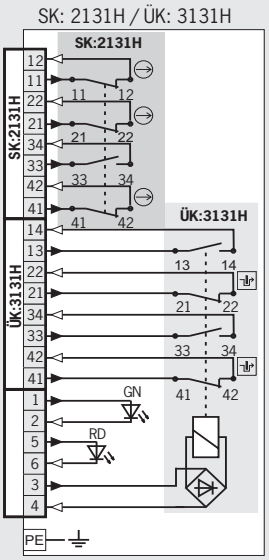


a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page 180

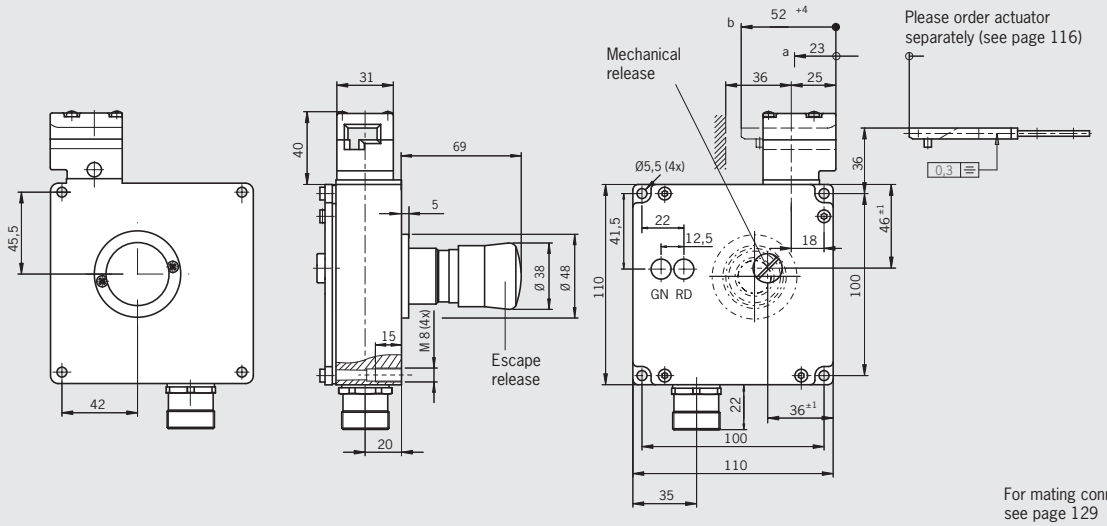
Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	**C2082** Escape release (pushbutton)	**096487** TZ1LE024MVAB-C2082	**095992** TZ1LE110MVAB-C2082
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊡ + 2 NO	**C2082** Escape release (pushbutton)	**096488** TZ1RE024MVAB-C2082	**095103** TZ1RE110MVAB-C2082

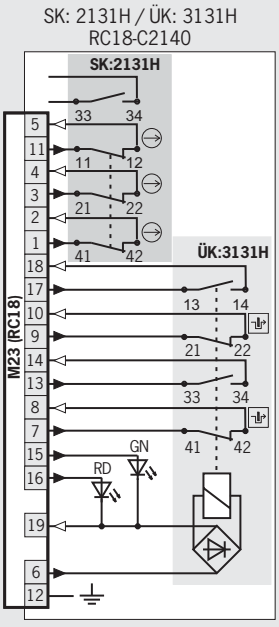
Plug connector M23 (RC18)
18-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 129

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 180

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**M23 (RC18)** Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	**C2140** Escape release (without key)	**098297** TZ1LE024RC18VAB-C2140
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊕ + 2 NO	**C2140** Escape release (without key)	**098298** TZ1RE024RC18VAB-C2140

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Escape release on the rear with push-button**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Escape release
This is used for manual release of guard locking from within the danger zone without tools.

Solenoid operating voltage and LED function display
The following voltage ranges are available:
- 24 V AC/DC -15%, +10%

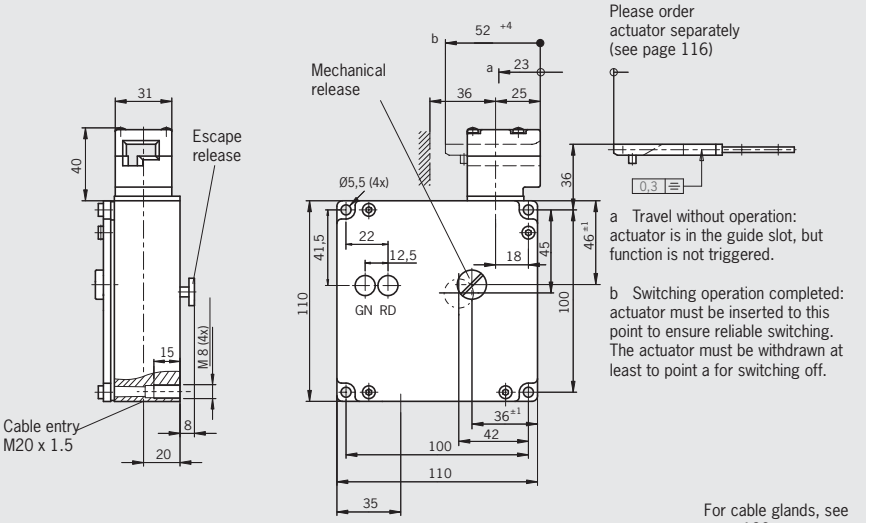
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

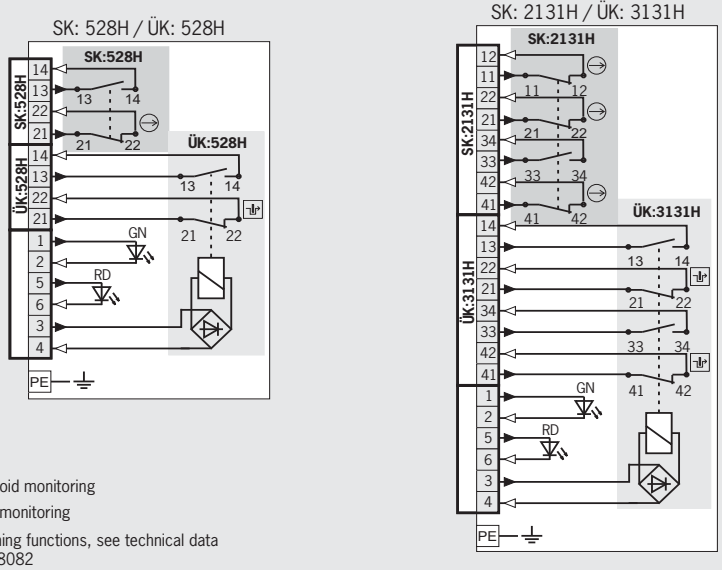
Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)



For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

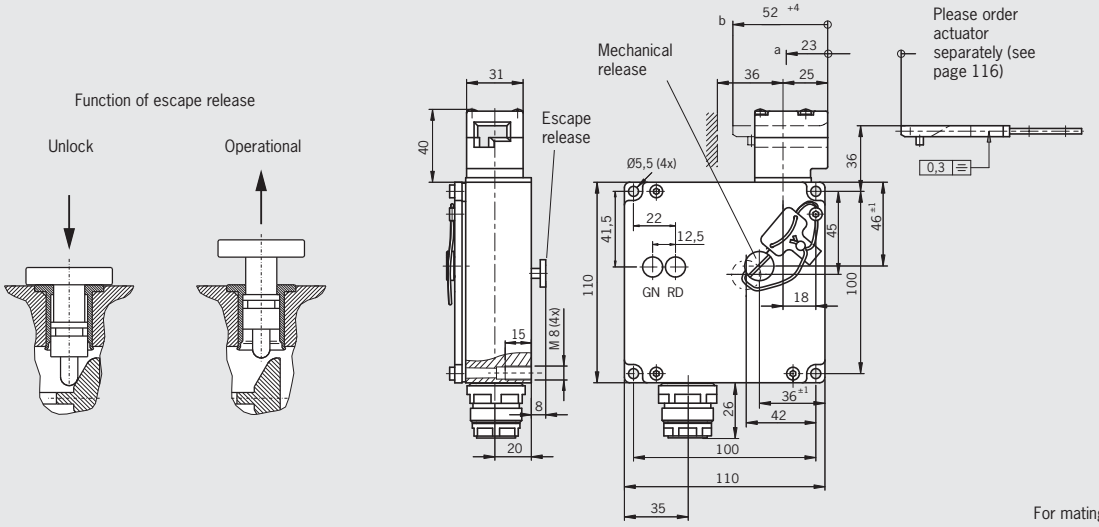
For switching functions, see technical data on page18082

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**C1684** Escape release (pushbutton)	**083170** TZ1LE024M-C1684
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**C1684** Escape release (pushbutton)	**084820** TZ1LE024MVAB-C1684
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC + 1 NO	**C1684** Escape release (pushbutton)	**083171** TZ1RE024M-C1684
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	**C1684** Escape release (pushbutton)	**088084** TZ1RE024MVAB-C1684

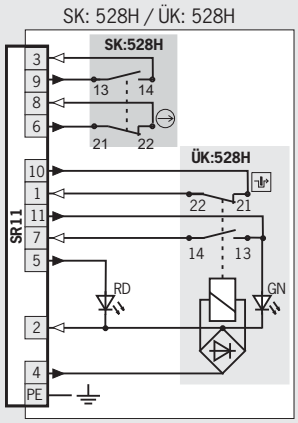
Plug connector SR11
11-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 128

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18083

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**SR11** Plug connector	**1** Mechanical	**LE** Left	SK: **528H**, 1 NC + 1 NO ÜK: **528H**, 1 NC + 1 NO	**C1684** Escape release (pushbutton)	**070886** TZ1LE024SR11-C1684
			RE Right	SK: **528H**, 1 NC + 1 NO ÜK: **528H**, 1 NC + 1 NO	**C1684** Escape release (pushbutton)	**070884** TZ1RE024SR11-C1684

For technical data, see page 163

Safety switch TZ with guard locking and guard locking monitoring

- **Emergency unlocking on the front with rotary knob**
- **Escape release on the rear with push-button**
- **Protective plate for switch head**
- **Two LED indicators, red and green**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Emergency unlocking
Is used for the manual release of the guard locking without tools. The emergency unlocking mechanism must be returned to the locked state manually. Sealing can be fitted to protect against tampering. Lead seal kit and tool included (already pre-assembled on versions with plug connectors).

Escape release
This is used for manual release of guard locking from within the danger zone without tools.

Protective plate for switch head
Makes it more difficult to tamper with the switch.

Solenoid operating voltage and LED function display
The following voltage range is available:
- 24 V AC/DC -15%, +10%

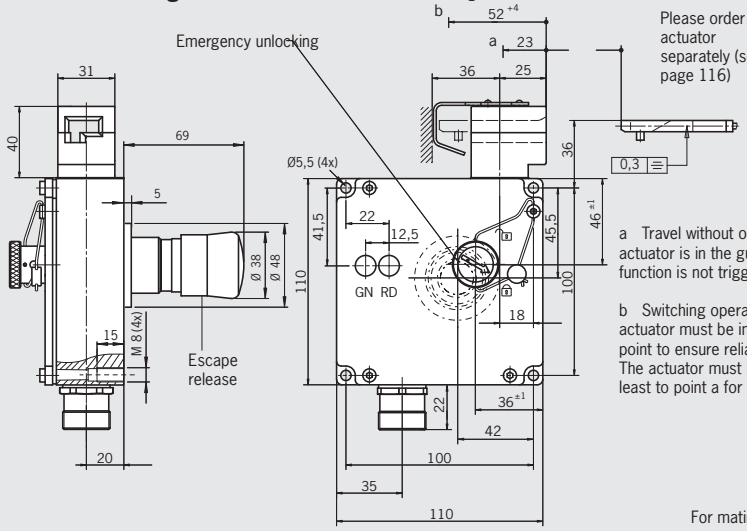
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

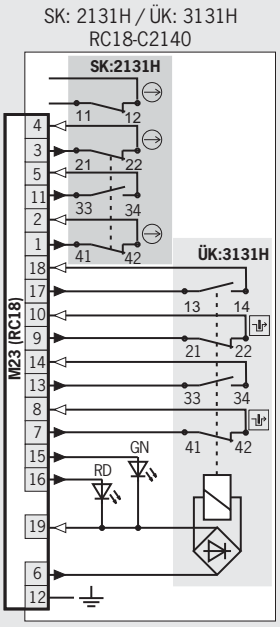
Plug connector M23 (RC18)
18-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



For mating connectors, see page 129

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18084

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**M23 (RC18)** Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Emergency unlocking (rotary knob), escape release (pushbutton), with protective plate	**097347** TZ1LE024RC18VAB-C2123
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Emergency unlocking (rotary knob), escape release (pushbutton), with protective plate	**097348** TZ1RE024RC18VAB-C2123

Safety switch TZ with guard locking and guard locking monitoring

- **Without mechanical release**
- **Protective plate for switch head optional**
- **Two LED indicators, red and green**
- **Plug connector optional**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Protective plate for switch head
Makes it more difficult to tamper with the switch.

Solenoid operating voltage and LED function display
The following voltage ranges are available:
- 24 V AC/DC -15%, +10%

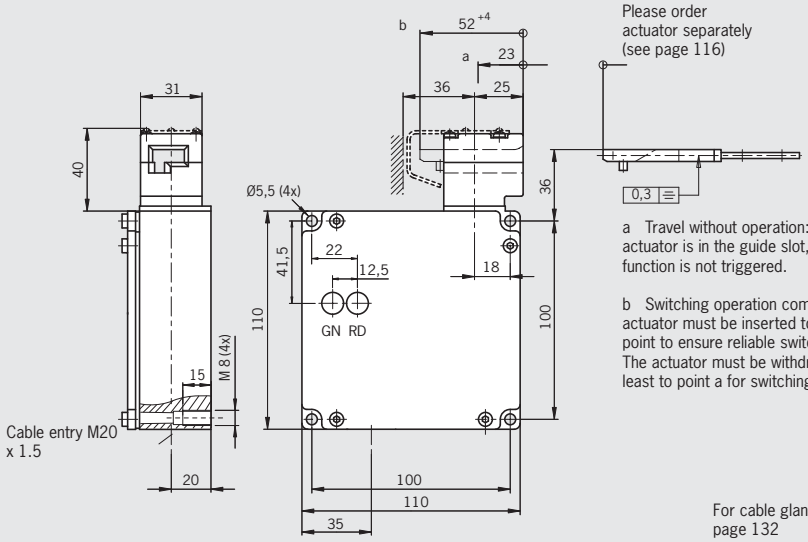
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:
- **528H** Slow-action switching contact 1 NC ⊖ + 1 NO
- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawings (actuator head on the left is a mirror image)



Please order actuator separately (see page 116)

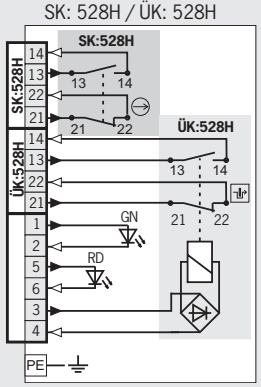
a Travel without operation: actuator is in the guide slot, but function is not triggered.

b Switching operation completed: actuator must be inserted to this point to ensure reliable switching. The actuator must be withdrawn at least to point a for switching off.

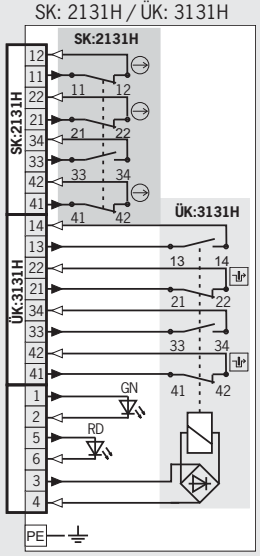
For cable glands, see page 132

Wiring diagrams actuator inserted and locked

SK: 528H / ÜK: 528H



SK: 2131H / ÜK: 3131H



☐ Solenoid monitoring
☐ Door monitoring

For switching functions, see technical data on page18085

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO	Without mechanical release, with protective plate	**083246** TZ1LE024M-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	Without mechanical release, with protective plate	**085170** TZ1LE024MVAB-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	Without mechanical release	**096052** TZ1LE024MVAB-RC2100
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊟ + 1 NO	Without mechanical release, with protective plate	**083247** TZ1RE024M-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	Without mechanical release, with protective plate	**085171** TZ1RE024MVAB-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊟ + 2 NO	Without mechanical release	**096051** TZ1RE024MVAB-RC2100

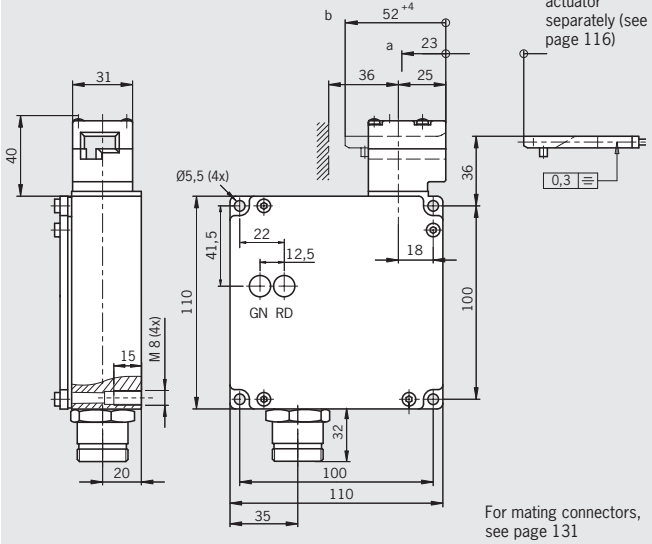
Please turn over

For technical data, see page 163

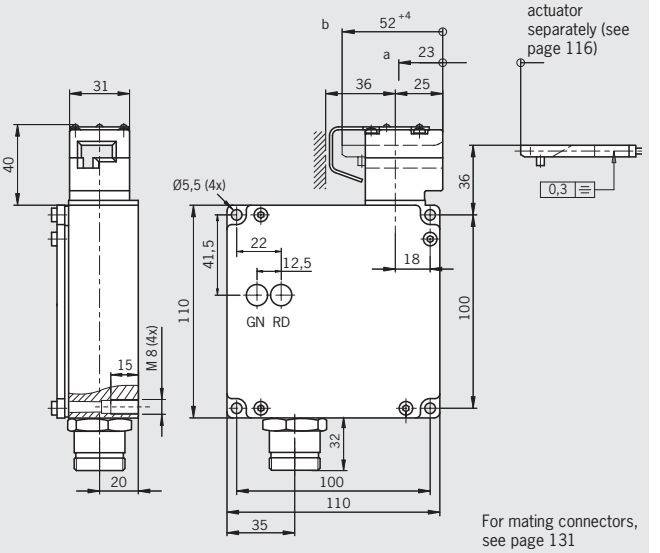
Plug connector MR10
9-pin + PE

Plug connector MR12
11-pin + PE

Dimension drawings (actuator head on the left is a mirror image)



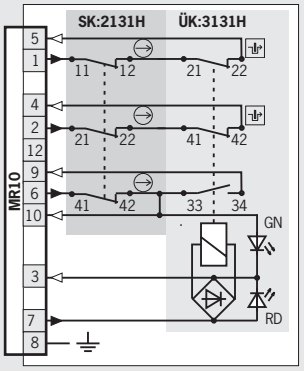
For mating connectors, see page 131



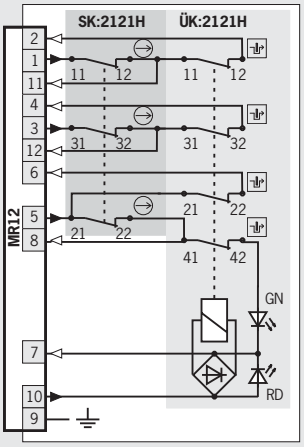
For mating connectors, see page 131

Wiring diagrams actuator inserted and locked

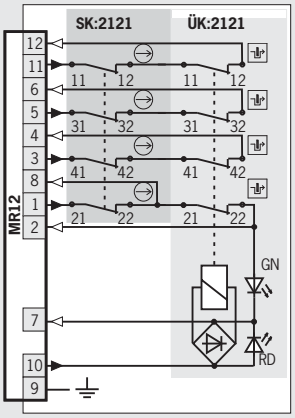
SK: 2131H / ÜK: 3131H
MR10 VAB-F



SK: 2121H / ÜK: 2121H
C1902



SK: 2121H / ÜK: 2121H
RC1971



For switching functions, see technical data on page18086

Solenoid monitoring
Door monitoring

For switching functions, see technical data on page18086

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Red cover 24 V
TZ	**MR10** Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ ÜK: **3131H**, 2 NC ⊟ + 1 NO	Without mechanical release	**095902** TZ1LE024MVAB-10C-FW
			RE Right	SK: **2131H**, 3 NC ⊖ ÜK: **3131H**, 2 NC ⊟ + 1 NO	Without mechanical release	**095903** TZ1RE024MVAB-10C-FW
	MR12 Plug connector	**1** Mechanical	**LE** Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊟	Without mechanical release, with protective plate	**079692** TZ1LE024BHA-C1902
					C1971 Alternative wiring, without mechanical release with protective plate	**085569** TZ1LE024BHAVFG-RC1971
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊟	Without mechanical release, with protective plate	**079693** TZ1RE024BHA-C1902
					C1971 Alternative wiring, without mechanical release with protective plate	**085570** TZ1RE024BHAVFG-RC1971

Safety switch TZ with guard locking and guard locking monitoring

- **Without mechanical release**
- **Two LED indicators, red and green**
- **Plug connector for switch connection**
- **Plug connector for enabling switch**
- **Actuator head fitted left or right**

Approach direction

Horizontal
Adjustable in 90° steps

Solenoid operating voltage and LED function display

The following voltage range is available:

- 24 V AC/DC -15%, +10%

Guard locking types

TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

SK For monitoring the door/actuator position

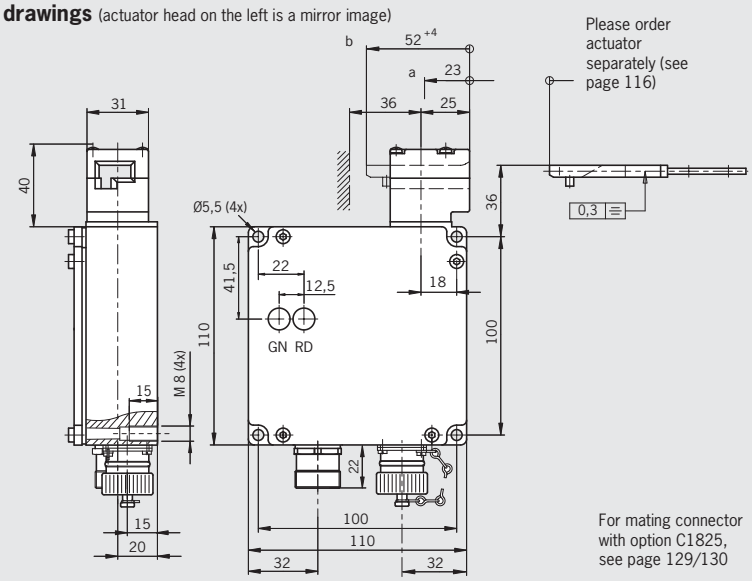
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available, see ordering table:

- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Plug connector M23 (RC18) and RC12 (enabling switch)
18-pin + PE / 12-pin

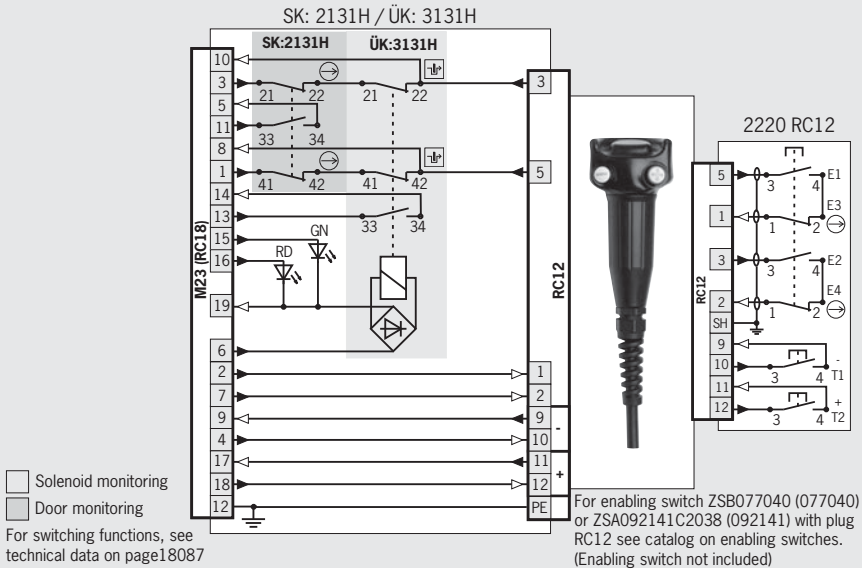
Dimension drawings (actuator head on the left is a mirror image)



Please order actuator separately (see page 116)

For mating connector with option C1825, see page 129/130

Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page18087

For enabling switch ZSB077040 (077040) or ZSA092141C2038 (092141) with plug RC12 see catalog on enabling switches. (Enabling switch not included)

Ordering table

Series	Connection	Enabling switches Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**M23 (RC18)** [1] Plug connector	Enabling switches Plug **RC12**	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Without mechanical release	**091062** TZ1LE024RC18VAB-C1803
				RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Without mechanical release	**091063** TZ1RE024RC18VAB-C1803
			2 Electrical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Without mechanical release	**075955** TZ2LE024RC18VAB-C1803
				RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC + 2 NO	Without mechanical release	**077149** TZ2RE024RC18VAB-C1803

1) **Important**: use suitable mating connector with option C1825!

For technical data, see page 163

Selection table for safety switches NX

Connection	
M	Thread M20x1.5 for cable glands

Switching element	
4 contacts	4 NC ⊖or 3 NC ⊖ + 1 NO or 2 NC ⊖ + 2 NO

Connection M	Switching element 4 contacts		Page
●	●		90

Safety switch NX

- **Cable entry M20 x 1.5**
- **LED indicator optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

LED function display (optional)
A function display (2 LEDs, red and green) is available for the following voltage ranges:

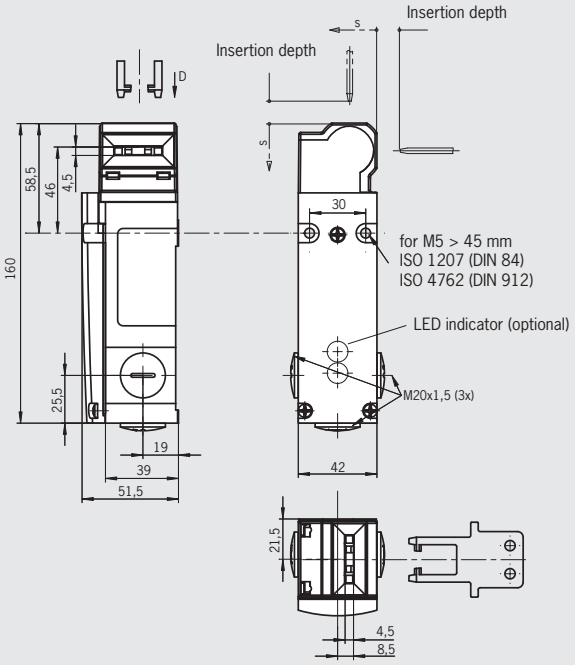
- DC 24 V +10%, -15%

Switching elements (see also page 13/14)

- **2121** Slow-action switching contact 4 NC ⊖
- **2131** Slow-action switching contact 3 NC ⊖ + 1 NO
- **3131** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

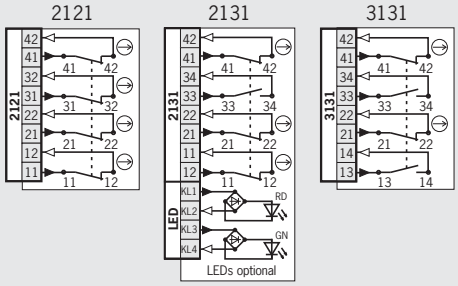
Dimension drawing



Please order actuator separately (see page 120)

For cable glands, see page 132

Wiring diagrams actuator inserted



Ordering table

Series	Connection	Switching element	Version	Order no./item
NX	**1** Cable entry **3 x M20 x 1.5**	**2121** 4 NC ⊖		**092625** NX1-2121A-M
		2131 3 NC ⊖ + 1 NO		**092624** NX1-2131A-M
		2131H 3 NC ⊖ + 1 NO	**L024** LED indicator DC 24 V	**091682** NX1-2131AL024-M
		3131 2 NC ⊖ + 2 NO		**092626** NX1-3131A-M

For technical data, see page 163

Selection table for safety switch TX with guard locking and guard locking monitoring

Release feature, front

HE Mechanical release on the front

Release feature, rear

FE Escape release on the rear

Connection

M	Thread M20x1.5 for cable glands
NPT½"	Thread ½" for cable glands
BH10	Plug connector 9-pin + PE
SR11	Plug connector 11-pin + PE
M23 (RC18)	Plug connector 18-pin + PE
M12	Plug connector 5-pin

Switching element

4 contacts	2 NC ⊖ / 1 NO + 1 NC or 2 NC ⊖ / 1 NO + 1 NO or 2 NC ⊖ + 2 NC ⊖

Manual release		Connection						Switching element	With version	Page
HE	FE	M	NPT½"	BH10	SR11	M23 (RC18)	M12	4 contacts		
●		●	●					●		92
●				●		●		●		93
●		●						●		94
●					●	●		●		95
●	●	●						●	C1991/C2161	96
●	●					●		●	C1991	97
●							●	●	C2129	98

Safety switch TX with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **With door monitoring contact**
- **Plug connector optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Solenoid operating voltage
- AC/DC 24 V +10%, -15%

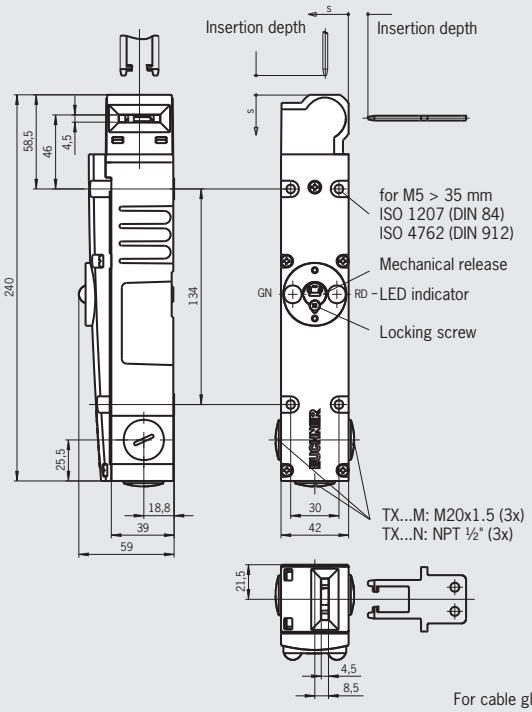
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

Guard locking types
TX1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.
TX2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 14)
- **ETX B** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NC (door monitoring contact)
- **ETX C** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NO (door monitoring contact)
- **ETX D** Slow-action switching contact 2 NC ⊖ + 2 NC ⊖ (door monitoring contacts)

Cable entry M20 x 1.5 / cable entry NPT ½"

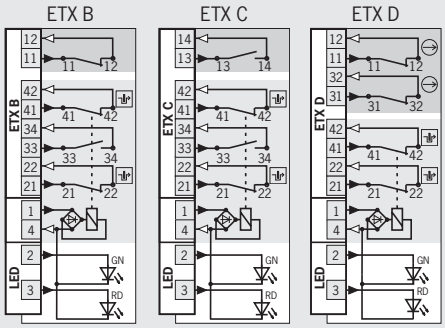
Dimension drawing



Please order actuator separately (see page12092)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

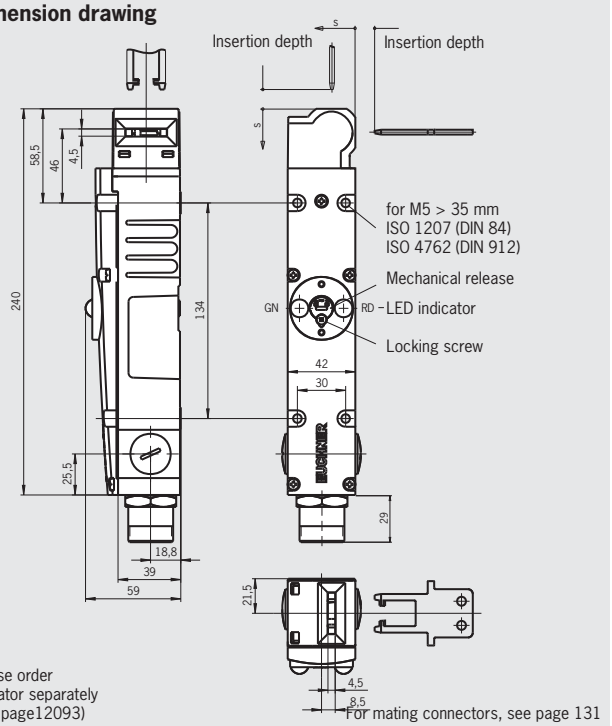
For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V
TX	**M** Cable entry **3 x M20 x 1.5**	**1** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082921** TX1B-A024M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082922** TX1C-A024M
			ETX D 2 NC ⊖ + 2 NC ⊖	**095025** TX1D-A024MC2081
		2 Electrical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082927** TX2B-A024M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082928** TX2C-A024M
			ETX D 2 NC ⊖ + 2 NC ⊖	**095026** TX2D-A024MC2081
	N Cable entry **3 x NPT ½"**	**1** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082944** TX1B-A024N
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082945** TX1C-A024N
		2 Electrical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082946** TX2B-A024N
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082947** TX2C-A024N

Plug connector BH10
9-pin + PE

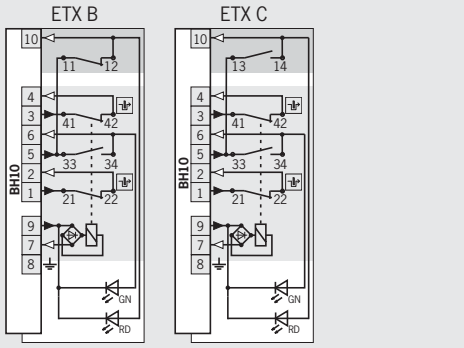
Dimension drawing



Please order actuator separately (see page12093)

For mating connectors, see page 131

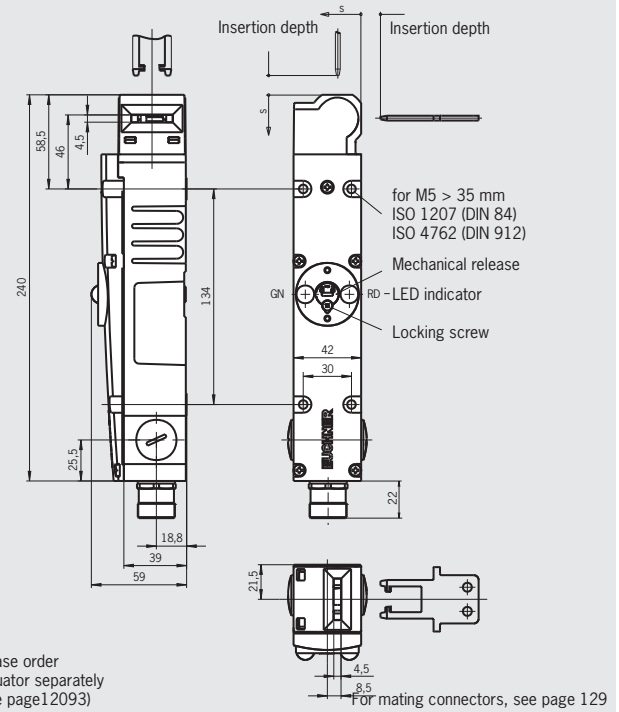
Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

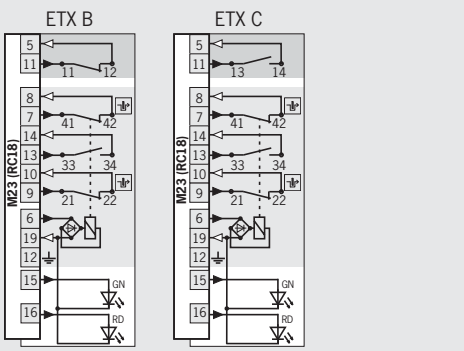
For switching functions, see technical data on page 185

Plug connector M23 (RC18)
18-pin + PE



Please order actuator separately (see page12093)

For mating connectors, see page 129



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V
TX	Plug connector **BH10**	**1** Mechanical	**ETX B** 2 NC ⊣ / 1 NO + 1 NC	**085380** TX1B-A024BH10
		2 Electrical	**ETX B** 2 NC ⊣ / 1 NO + 1 NC	**085381** TX2B-A024BH10
	Plug connector **M23 (RC18)**	**1** Mechanical	**ETX B** 2 NC ⊣ / 1 NO + 1 NC	**082933** TX1B-A024RC18
			ETX C 2 NC ⊣ / 1 NO + 1 NO	**082934** TX1C-A024RC18
		2 Electrical	**ETX B** 2 NC ⊣ / 1 NO + 1 NC	**082939** TX2B-A024RC18
			ETX C 2 NC ⊣ / 1 NO + 1 NO	**082940** TX2C-A024RC18

For technical data, see page 163

Safety switch TX with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Release under load possible**
- **With door monitoring contact**
- **Plug connector optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Solenoid operating voltage
- AC/DC 24 V +10%, -15%

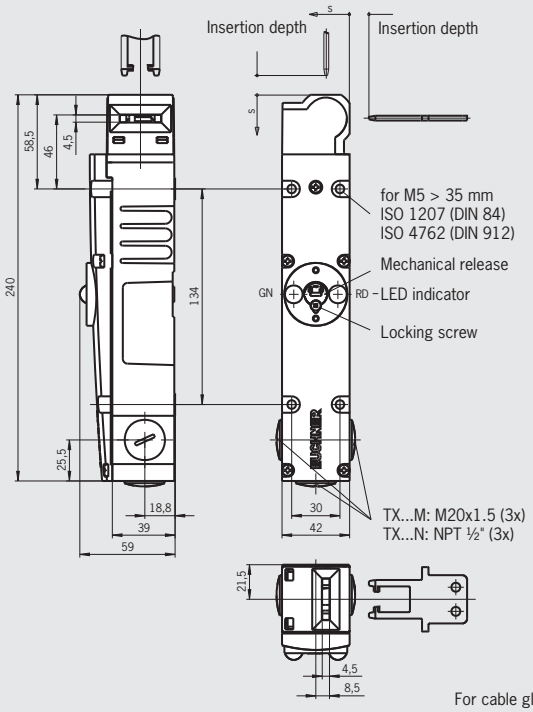
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

Guard locking types
TX3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid. Release under load possible.

Switching elements (see also page 14)
- **ETX B** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NC (door monitoring contact)
- **ETX C** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NO (door monitoring contact)

Cable entry M20 x 1.5 / cable entry NPT ½"

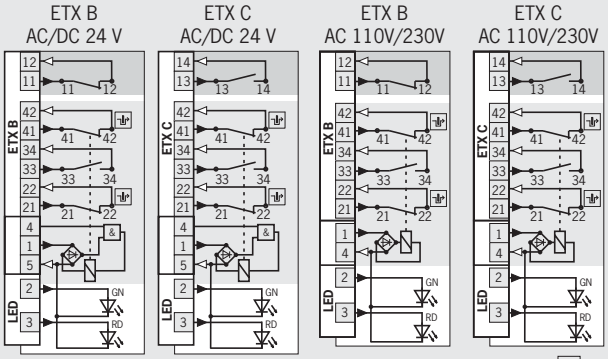
Dimension drawing



Please order actuator separately (see page12094)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



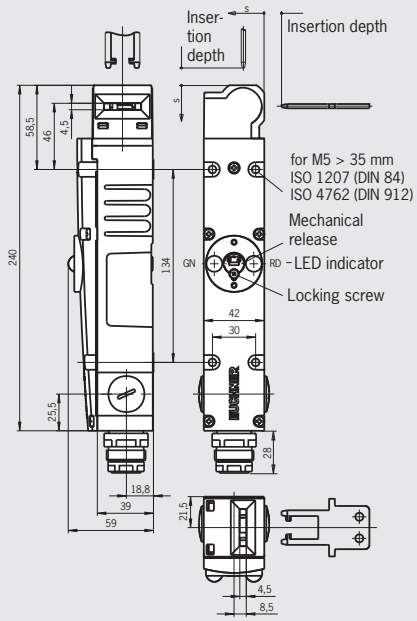
For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V
TX	**M** Cable entry **3 x M20 x 1.5**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082952** TX3B-A024M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082953** TX3C-A024M

Plug connector SR11
11-pin + PE

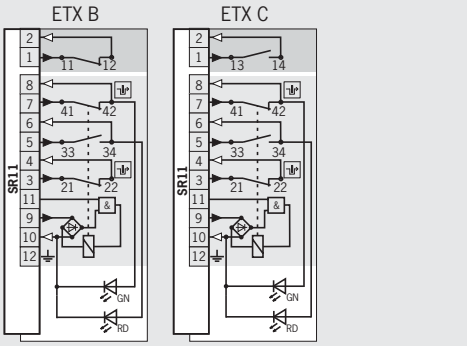
Dimension drawing



Please order actuator separately (see page12095)

For mating connectors, see page 128

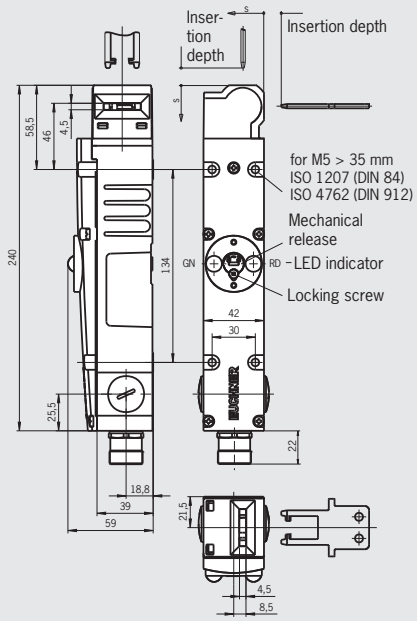
Wiring diagrams actuator inserted and locked



For switching functions, see technical data on page 185

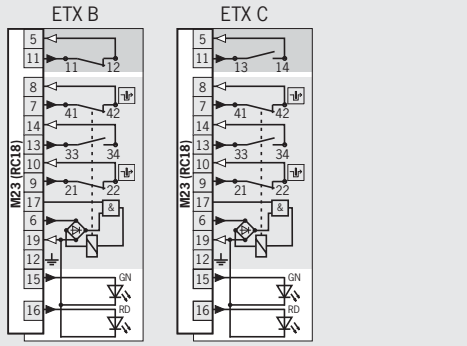
☐ Solenoid monitoring
☐ Door monitoring

Plug connector M23 (RC18)
18-pin + PE



Please order actuator separately (see page12095)

For mating connectors, see page 129



For switching functions, see technical data on page 185

☐ Solenoid monitoring
☐ Door monitoring

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V
TX	Plug connector **SR11**	**3** Mechanical	**ETX B** 2 NC ⏚ / 1 NO + 1 NC	-
			ETX C 2 NC ⏚ / 1 NO + 1 NO	**085396** TX3C-A024SR11
	Plug connector **M23 (RC18)**	**3** Mechanical	**ETX B** 2 NC ⏚ / 1 NO + 1 NC	**082964** TX3B-A024RC18
			ETX C 2 NC ⏚ / 1 NO + 1 NO	**082965** TX3C-A024RC18

For technical data, see page 163

Safety switch TX with guard locking and guard locking monitoring

- **Escape release on the rear**
- **Release under load possible (only TX3 version)**
- **With door monitoring contact**
- **Plug connector optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

Escape release

This is used for manual release of guard locking from within the danger zone without tools. With identification of On/Off position.

Solenoid operating voltage

- AC/DC 24 V +10%, -15%

LED function display

The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

Guard locking types

TX1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

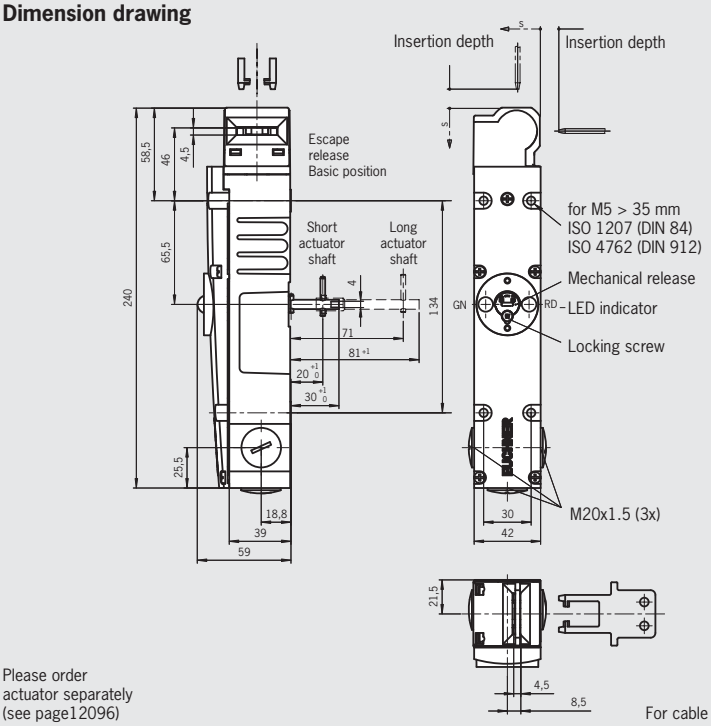
TX3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid. Release under load possible.

Switching elements (see also page 14)

- **ETX B** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NC (door monitoring contact)
- **ETX C** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NO (door monitoring contact)
- **ETX D** Slow-action switching contact 2 NC ⊖ + 2 NC ⊖ (door monitoring contacts)

Cable entry M20 x 1.5

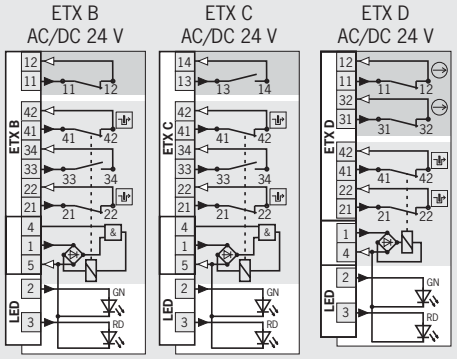
Dimension drawing



Please order actuator separately (see page12096)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



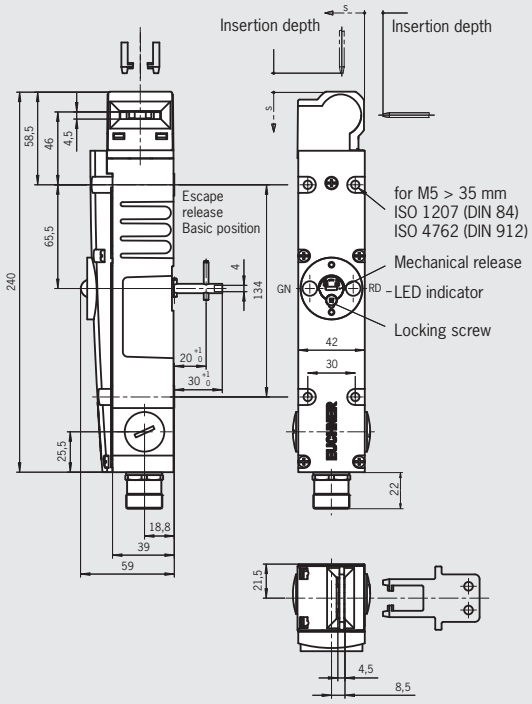
For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
TX	M Cable entry 3 x M20 x 1.5	1 Mechanical	ETX C 2 NC ⊖ / 1 NO + 1 NO	C2161 Long actuator shaft	099489 TX1C-A024MC2161
			ETX D 2 NC ⊖ + 2 NC ⊖	C1991 Short actuator shaft	096173 TX1D-A024MC1991
		3 Mechanical	ETX B 2 NC ⊖ / 1 NO + 1 NC	C1991 Short actuator shaft	085391 TX3B-A024MC1991
			ETX C 2 NC ⊖ / 1 NO + 1 NO	C1991 Short actuator shaft	093118 TX3C-A024MC1991
				C2161 Long actuator shaft	098946 TX3C-A024MC2161

Plug connector M23 (RC18)
18-pin + PE

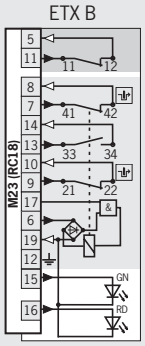
Dimension drawing



Please order actuator separately (see page12097)

For mating connectors, see page 129

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
TX	Plug connector **M23 (RC18)**	**3** Mechanical	**ETX B** 2 NC ⊟ / 1 NO + 1 NC	**C1991** Short actuator shaft	**093559** TX3B-A024RC18C1991

For technical data, see page 163

Safety switch TX with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **With door monitoring contact**
- **Separate plug connector for solenoid monitoring and door monitoring with solenoid operating voltage**
- **For direct connection to PROFIsafe inputs/outputs**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Solenoid operating voltage
- AC/DC 24 V +10%, -15%

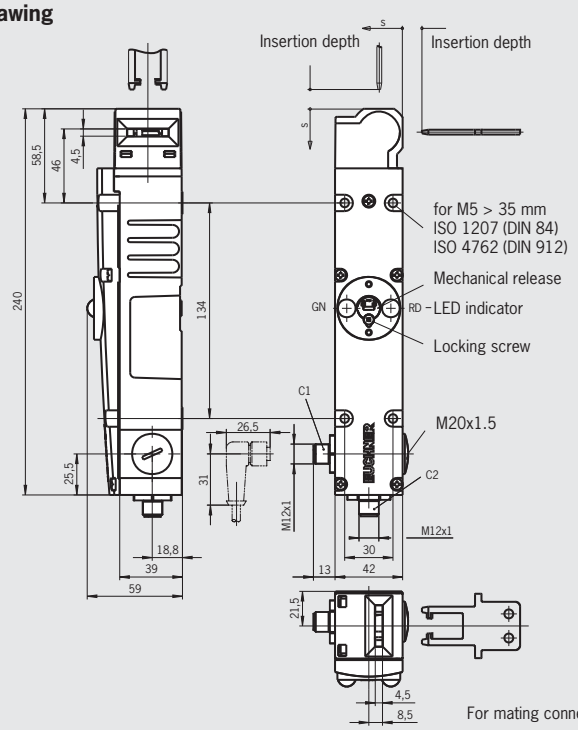
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

Guard locking types
TX1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 14)
- **ETX B** Slow-action switching contact 2 NC ⊖ / 1 NO + 1 NC (door monitoring contact)

Plug connector M12
2 plug connectors, 5-pin

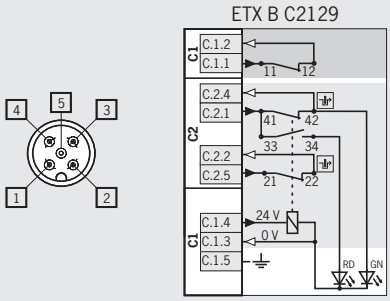
Dimension drawing



Please order actuator separately (see page12098)

For mating connectors, see page 126

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 185

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
TX	Plug connector **2 x M12**	**1** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**C2129**	**097623** TX1B-A024MC2129

Selection table for safety switches SGA

Version

Standard — One actuating head made of metal

Connection

M — Thread M20x1.5 for cable glands

SR11 — Plug connector 11-pin + PE

M23 (RC18) — Plug connector 18-pin + PE

Switching element

4 contacts — 3 NC ⊖ + 1 NO, 4 NC ⊖

Version Standard	Connection M	Connection SR11	Connection M23 (RC18)	Switching element 4 contacts	Page
●	●			●	100
●		●		●	101
●			●	●	102

Safety switch SGA

- **Cable entry M20 x 1.5**
- **Plug connector optional**

Approach direction

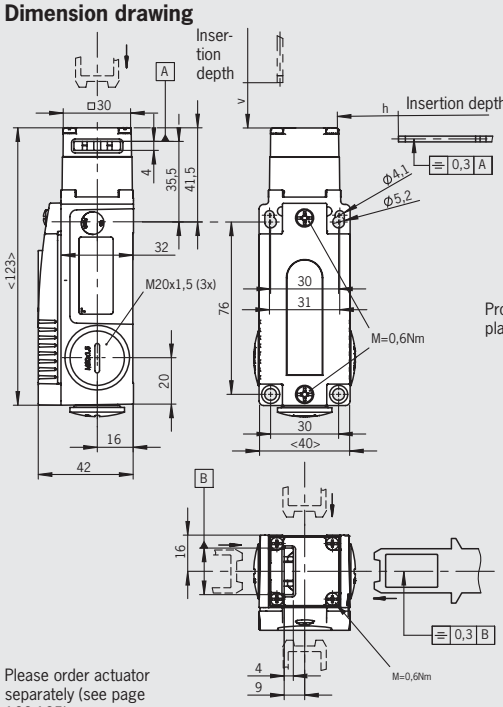
Horizontally and vertically adjustable in 90° steps

Switching elements (see also page 13)

- **2121H** Slow-action switching contact 4 NC ⊖
- **2131H** Slow-action switching contact 3 NC ⊖ + 1 NO

Cable entry M20 x 1.5

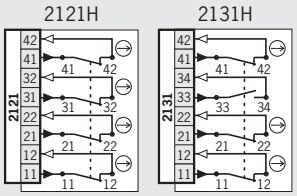
Dimension drawing



Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted



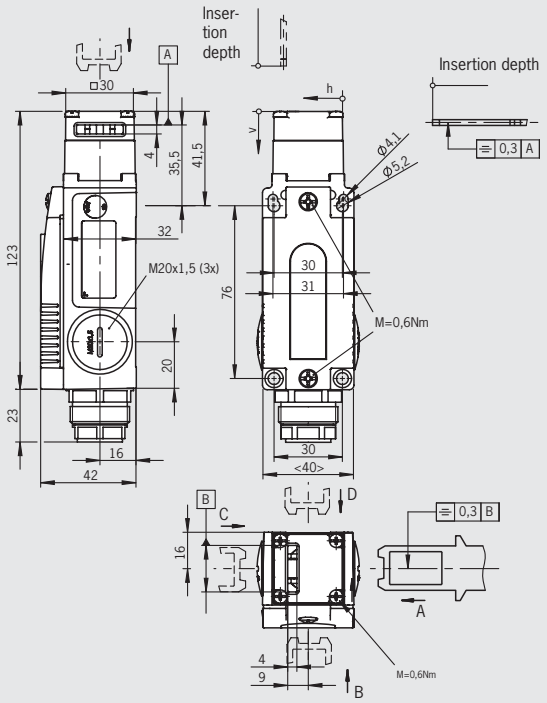
Ordering table

Series	Connection	Switching element	Version	Order no./item
SGA	1 Cable entry **3 x M20 x 1.5**	**2121H** 4 NC ⊖		**103725** SGA1A-2121A-M
		2131H 3 NC ⊖ + 1 NO		**106307** SGA1A-2131A-M
			ATEX incl. cable gland	**123460** 1) SGA1A-2131A-M-EX

1) Ⓔx II 3 G Ex nR IIB T5 Gc / Ⓔx II 3 D Ex tc IIIC T90° Dc X

Plug connector SR11
11-pin + PE

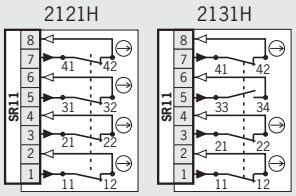
Dimension drawing



Please order actuator separately (see page 122-125)

For plug connectors, see page 128

Wiring diagrams actuator inserted



Ordering table

Series	Connection	Switching element	Order no./item
SGA	**2** Plug connector **SR11**	**2121H** 4 NC ⊖	**116396** SGA2A-2121ASR11
		2131H 3 NC ⊖ + 1 NO	**106736** SGA2E-2131ASR11

For technical data, see page 163

Safety switch SGA

- **2 illuminated pushbuttons**
- **Plug connector M23 (RC18)**

Approach direction

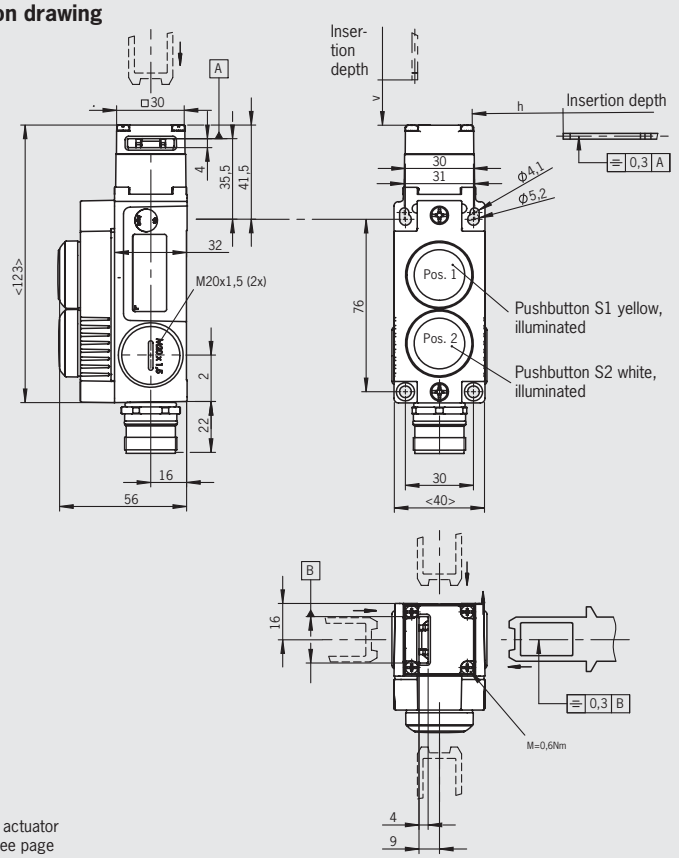
Horizontally and vertically adjustable in 90° steps

Switching elements (see also page 13)

- **2121H** Slow-action switching contact 4 NC ⊖

Plug connector M23 (RC18)
18-pin + PE

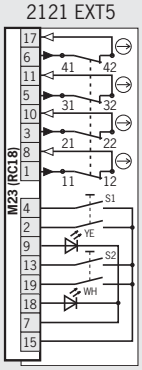
Dimension drawing



Please order actuator separately (see page 122-125)

For plug connectors, see page 129

Wiring diagrams actuator inserted



Ordering table

Series	Connection	Switching element	Version	Order no./item
SGA	**2** Plug connector **M23 (RC18)**	**2121H** 4 NC ⊖	**Pos. 1:** yellow pushbutton **Pos. 2:** white pushbutton	**104012** SGA2A-2121ARC18-EXT5

Selection table for safety switches STA with guard locking and guard locking monitoring

Version

- **Standard** – One actuating head made of metal
- **TW** – *TWIN*, 2 actuating heads made of metal

Release feature

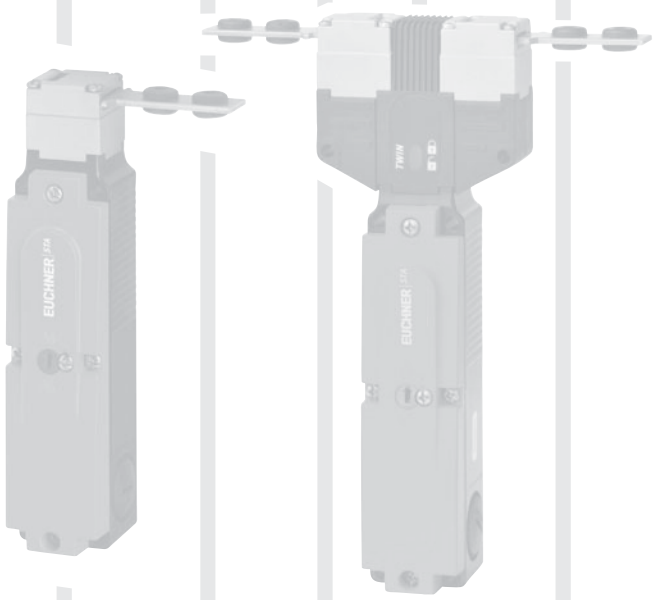
- **HE** – Mechanical release on the front
- **FE** – Escape release on the rear

Door monitoring

- **STA3/4** – With door monitoring contact
- **STA1/2** – Without door monitoring contact

Connection

- **M** – Thread M20x1.5 for cable gland
- **SR11** – Plug connector 11-pin + PE
- **M23 (RC18)** – Plug connector 18-pin + PE



Version		Release feature		Door monitoring		Connection			Page
Standard	TW	HE	FE	STA3/4	STA1/2	M	SR11	M23 (RC18)	
●		●		●		●			104/105
●		●		●			●	●	106
●		●			●	●			107
●		●			●		●		108
●		●	●	●		●			109
	●	●		●		●			110

Safety switch STA with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **With door monitoring contact**
- **Plug connector optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release

Is used for releasing the guard locking with the aid of a tool. To protect against tampering, the mechanical release is sealed with sealing lacquer.

Solenoid operating voltage

- AC/DC 24 V +10%, -15%
- 230 V AC -15%, +10%

LED function display (optional)

A function display (2 LEDs, red and green) is available for the following voltage ranges:

- AC/DC 24 V +10%, -15%

Guard locking types

STA3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the guard locking solenoid.

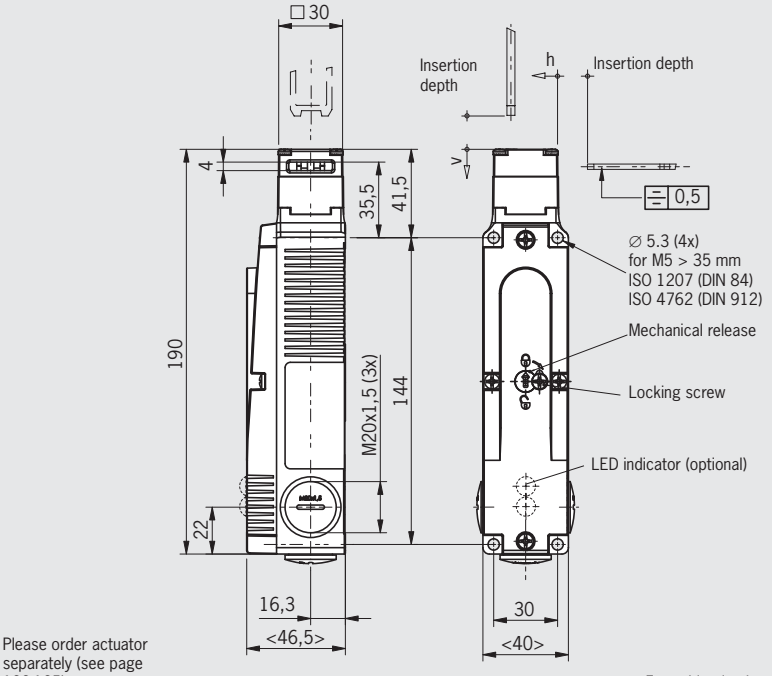
STA4 Open-circuit current principle, guard locking by applying voltage to the guard locking solenoid. Release by spring force.

Switching elements

- **2131H** Slow-action switching contact 2 NC ⊖ + 1 NO + 1 NC (door monitoring contact)
- **4121H** Slow-action switching contact 2 NC ⊖ + 1 NC / 1 NO (door monitoring contact)
- **4131H** Slow-action switching contact 2 NC ⊖ + 1 NO + 1 NO (door monitoring contact)
- **4141H** Slow-action switching contact 2 NC ⊖ + 2 NC ⊖ (door monitoring contact)

Cable entry M20 x 1.5

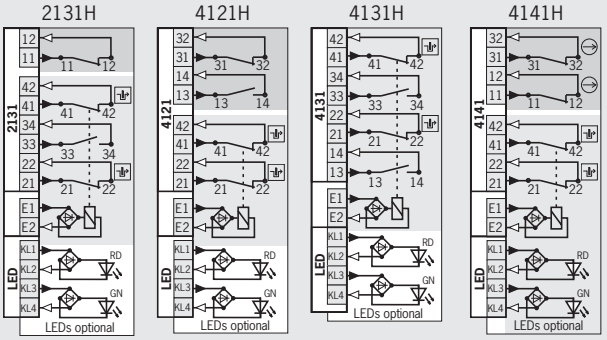
Dimension drawing



Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring

Door monitoring

For switching functions, see technical data on page 191

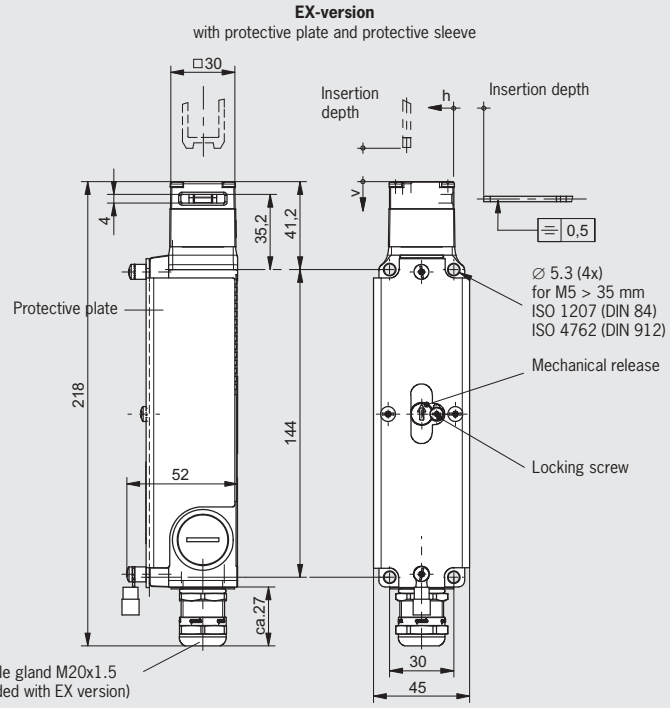
Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V	Solenoid operating voltage AC 230 V
STA	M Cable entry 3 x M20 x 1.5	3 Mechanical	2131H 2 NC ⊖ + 1 NO + 1 NC		096938 STA3A-2131A024M	104171 1) STA3A-2131A230M
			4121H 2 NC ⊖ + 1 NC / 1 NO		096936 STA3A-4121A024M	-
				024L LED indicator AC/DC 24 V	106535 STA3A-4121A024L024M	-
			4131H 2 NC ⊖ + 1 NO + 1 NO		099480 STA3A-4131A024M	-
			4141H 2 NC ⊖ + 2 NC ⊖		099274 STA3A-4141A024M	-
				024L LED indicator AC/DC 24 V	100898 STA3A-4141A024L024M	-
		4 Electrical	2131H 2 NC ⊖ + 1 NO + 1 NC		096939 STA4A-2131A024M	-
				024L LED indicator AC/DC 24 V	103926 STA4A-2131A024L024M	-
			4121H 2 NC ⊖ + 1 NC / 1 NO		096937 STA4A-4121A024M	-
			4131H 2 NC ⊖ + 1 NO + 1 NO		099481 STA4A-4131A024M	-
			4141H 2 NC ⊖ + 2 NC ⊖		109172 STA4A-4141A024M	-

1) Only with solenoid operating voltage AC/DC 24 V

Cable entry M20 x 1.5

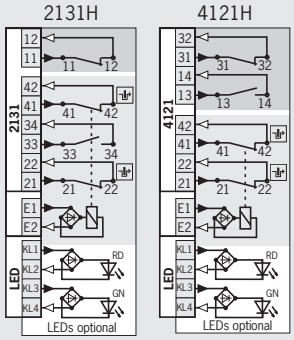
Dimension drawing



Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 191

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	M Cable entry 3 x M20 x 1.5	3 Mechanical	**2131H** 2 NC + 1 NO + 1 NC	**ATEX** incl. cable gland	**115584** STA3A-2131A024MF-EX
			4121H 2 NC + 1 NC / 1 NO	**ATEX** incl. cable gland	**115586** STA3A-4121A024MF-EX
		4 Electrical	**2131H** 2 NC + 1 NO + 1 NC	**ATEX** incl. cable gland	**115585** STA4A-2131A024MF-EX
			4121H 2 NC + 1 NC / 1 NO	**ATEX** incl. cable gland	**123076** STA4A-4121A024MF-EX

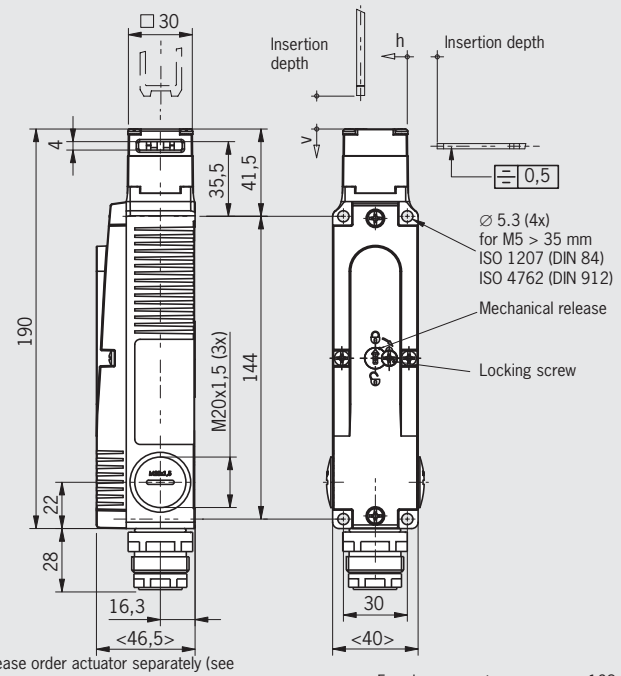
1) Ⓔx II 3 G Ex nR IIB T4 Gc / Ⓔx II 3 D Ex tc IIIC T110° Dc X

Please turn over

For technical data, see page 163

Plug connector SR11
11-pin + PE

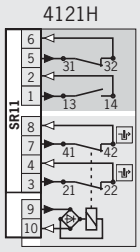
Dimension drawing



Please order actuator separately (see page 122-125)

For plug connectors, see page 128

Wiring diagrams actuator inserted and locked

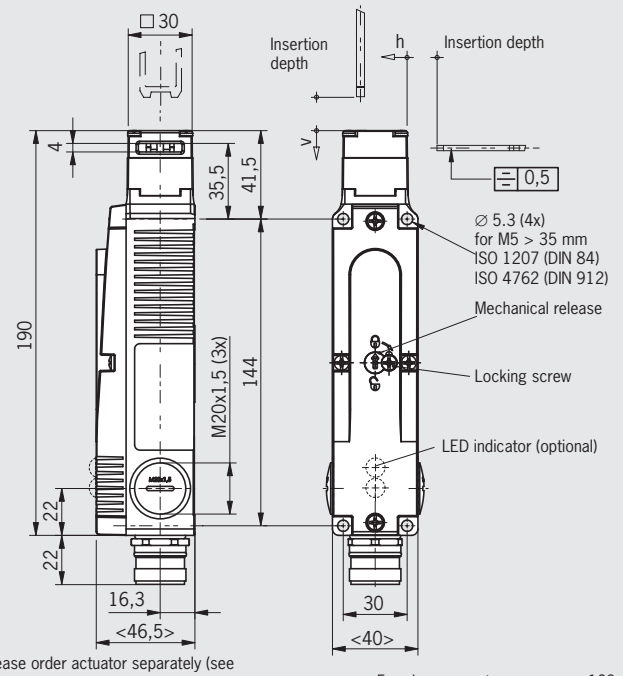


Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 191

Plug connector M23 (RC18)
18-pin + PE

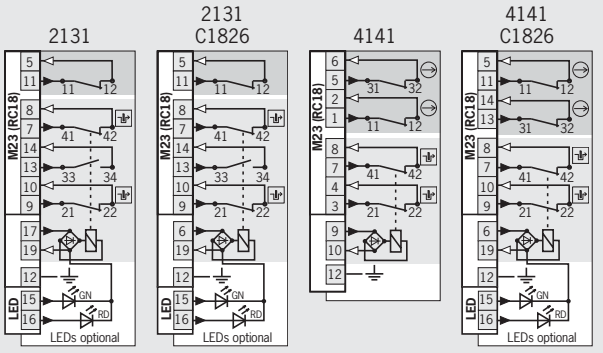
Dimension drawing



Please order actuator separately (see page 122-125)

For plug connectors, see page 129

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 191

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	**SR11** Plug connector	**3** Mechanical	**4121H** 2 NC + 1 NC / 1 NO		**105304** STA3A-4121A024SR11
	M23 (RC18) Plug connector	**3** Mechanical	**2131H** 2 NC + 1 NO + 1 NC	**024L** LED indicator AC/DC 24 V	**099658** STA3A-2131A024L024RC18
				024L LED indicator AC/DC 24 V **C1826** Special wiring	**106623** STA3A-2131A024L024RC18C1826
			4141H 2 NC + 2 NC		**100029** STA3A-4141A024RC18
				024L LED indicator AC/DC 24 V	**114416** STA3A-4141A024L024RC18C1826
		4 Electrical	**2131H** 2 NC + 1 NO + 1 NC	**024L** LED indicator AC/DC 24 V	**105303** STA4A-2131A024L024RC18
				024L LED indicator AC/DC 24 V **C1826** Special wiring	**106622** STA4A-2131A024L024RC18C1826

Safety switch STA with guard locking and guard locking monitoring

- **Mechanical release on the front**
- **Without door monitoring contact**
- **Plug connector optional**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release

Is used for releasing the guard locking with the aid of a tool. To protect against tampering, the mechanical release is sealed with sealing lacquer.

Solenoid operating voltage

- AC/DC 24 V +10%, -15%

Guard locking types

STA1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the guard locking solenoid.

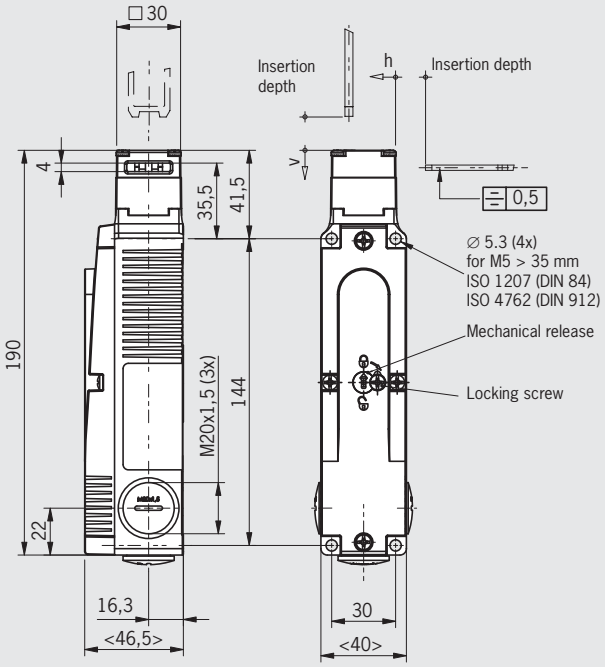
STA2 Open-circuit current principle, guard locking by applying voltage to the guard locking solenoid. Release by spring force.

Switching elements

- **4131H** Slow-action switching contact 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawing

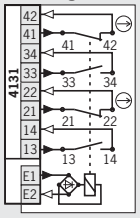


Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked

4131H
(Without door monitoring contact)



For switching functions, see technical data on page 190

Ordering table

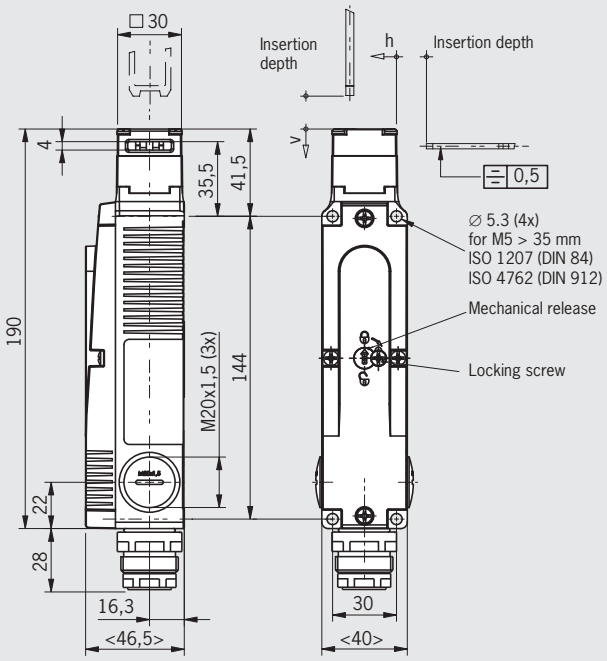
Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V
STA	**M** Cable entry **3 x M20 x 1.5**	**1** Mechanical	**4131H** 2 NC ⊖ + 2 NO	**096439** STA1A-4131A024M
		2 Electrical	**4131H** 2 NC ⊖ + 2 NO	**096935** STA2A-4131A024M

Please turn over

For technical data, see page 163

Plug connector SR11
11-pin + PE

Dimension drawing

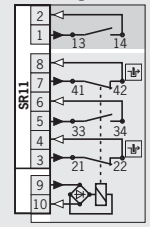


Please order actuator separately (see page 122-125)

For plug connectors, see page 128

Wiring diagrams actuator inserted and locked

4131H
(Without door monitoring contact)



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 190

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	**SR11** Plug connector	**2** Electrical	**4131H** 2 NC + 2 NO		**109574** STA2A-4131A024SR11

Safety switch STA with guard locking and guard locking monitoring

- **Escape release from the rear**
- **With door monitoring contact**

Approach direction

Horizontally and vertically adjustable in 90° steps

Escape release
This is used for manual release of guard locking from within the danger zone without tools. With identification of On/Off position.

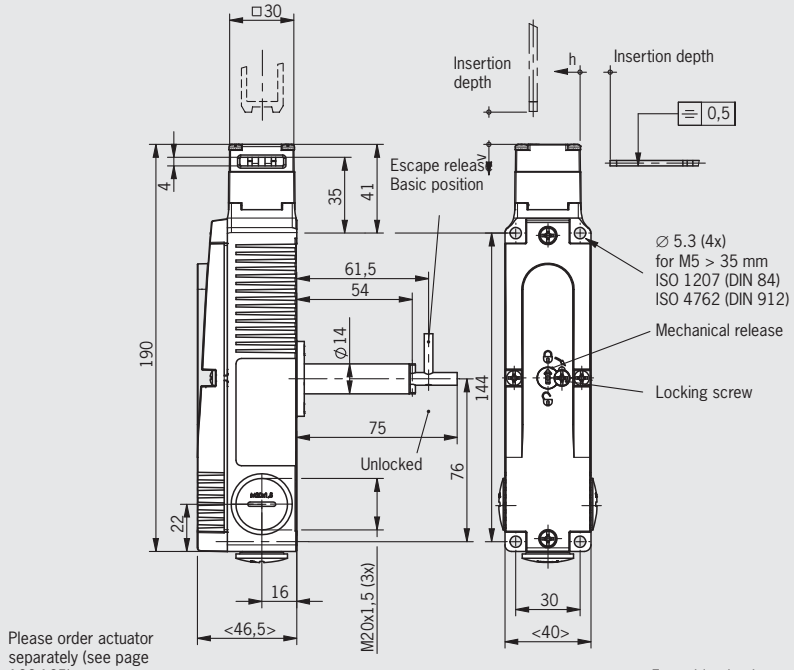
Solenoid operating voltage
- AC/DC 24 V +10%, -15%

Guard locking types
STA3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the guard locking solenoid.

Switching elements
- **2131H** Slow-action switching contact 2 NC ⊖ + 1 NO + 1 NC (door monitoring contact)

Cable entry M20 x 1.5

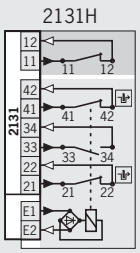
Dimension drawing



Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions, see technical data on page 191

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	**M** Cable entry **3 x M20 x 1.5**	**3** Mechanical	**2131H** 2 NC ⊖ + 1 NO + 1 NC	**C1993** Long actuator shaft	**103660** STA3A-2131A024MC1993

For technical data, see page 163

Safety switch STA-TW with guard locking and guard locking monitoring

- **Actuating heads made of metal**
- **Simultaneous monitoring of two safety doors**
- **Mechanical release on the front**
- **Mechanical key release optional**
- **With door monitoring contact**

Approach direction

Horizontally and vertically adjustable in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. To protect against tampering, the mechanical release is sealed with sealing lacquer.

Mechanical key release
Additional lock on the switch head. Function as for mechanical release. The mechanical key release setting is indicated in the window.
Two keys are included.

Solenoid operating voltage
- AC/DC 24 V +10%, -15%

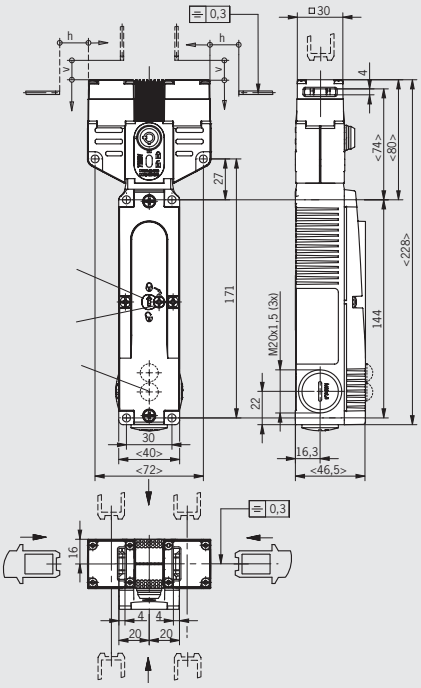
LED function display (optional)
A function display (2 LEDs, red and green) is available for the following voltage ranges:
- AC/DC 24 V +10%, -15%

Guard locking types
STP3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the guard locking solenoid.

Switching elements
- **2131H** Slow-action switching contact 2 NC ⊖ + 1 NO + 1 NC (door monitoring contact)
- **4121H** Slow-action switching contact 2 NC ⊖ + 1 NC / 1 NO (door monitoring contact)

Cable entry M20 x 1.5

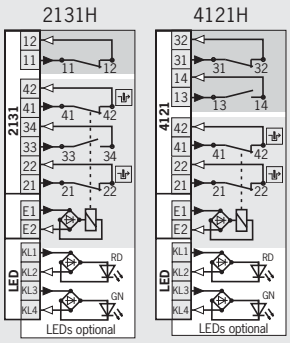
Dimension drawing



Please order actuator separately (see page 122-125)

For cable glands, see page 132

Wiring diagrams actuator inserted and locked



Solenoid monitoring
Door monitoring

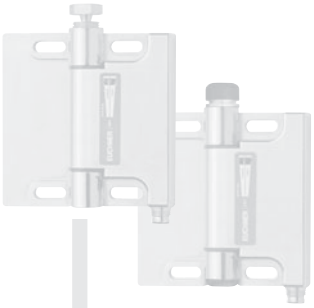
For switching functions, see technical data on page 191

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA-TW	**M** Cable entry **3 x M20 x 1.5**	**3** Mechanical	**2131H** 2 NC + 1 NO + 1 NC		**105617** STA-TW-3A-2131AC024M
				With mechanical key release (identical locking)	**105888** STA-TW-3A-2131AC024M-S1
			4121H 2 NC + 1 NC / 1 NO		**106545** STA-TW-3A-4121AC024M
				024L LED indicator AC/DC 24 V	**106379** STA-TW-3A-4121AC024L024M

Selection table for safety hinge ESH

Switching element	
2 contacts	1 NC ⊖ + 1 NO or 2 NC ⊖



Switching element 2 contacts		Page
●		112

Safety hinge ESH

- **Safety hinge with integrated safety function**
- **Suitable for profile mounting**

The safety hinges ESH are safety devices for monitoring movable guards, such as doors or covers on machinery or systems.
On the safety hinges ESH-ARO... the operating point can be adjusted as often as necessary.

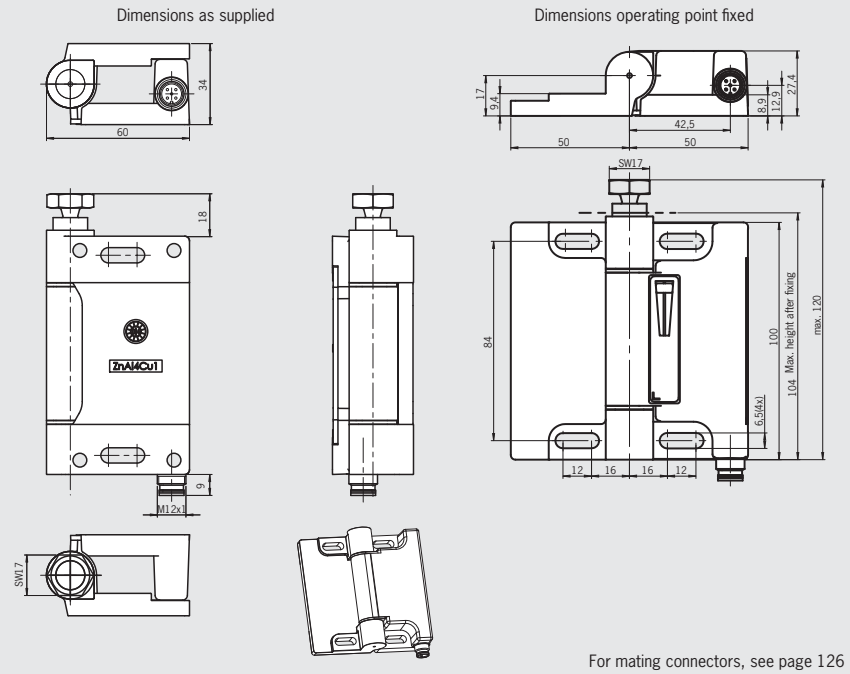
Important: During mounting the axes of the hinges used must be exactly aligned.

Switching elements

- **20** Snap-action switching contact 2 NC ⊖
- **11** Snap-action switching contact 1 NC ⊖ + 1 NO

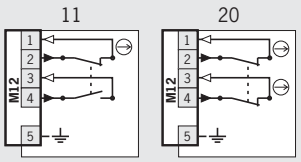
Plug connector M12
4-pin + PE

Dimension drawing



For mating connectors, see page 126

Wiring diagrams



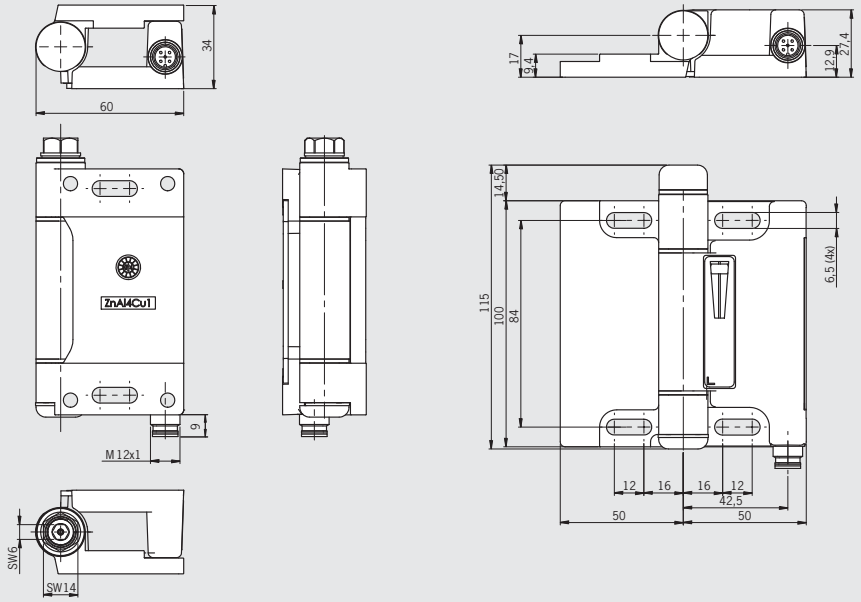
Ordering table

Series	Switching element	Version	Order no./item
Safety hinge **ESH-PRO**	**11** 1 NC ⊖ + 1 NO	Plug connector **M12**	**095895** ESH-PRO-11A-1205
	20 2 NC ⊖	Plug connector **M12**	**095894** ESH-PRO-20A-1205
	-	Matching hinge (without safety function)	**096007** ESH-PRO

▶ **Safety hinge ESH-ARO re-adjustable**

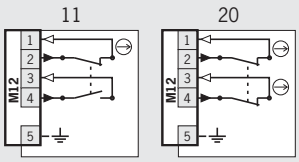
Plug connector M12
4-pin + PE

Dimension drawing



For mating connectors, see page 126

Wiring diagrams

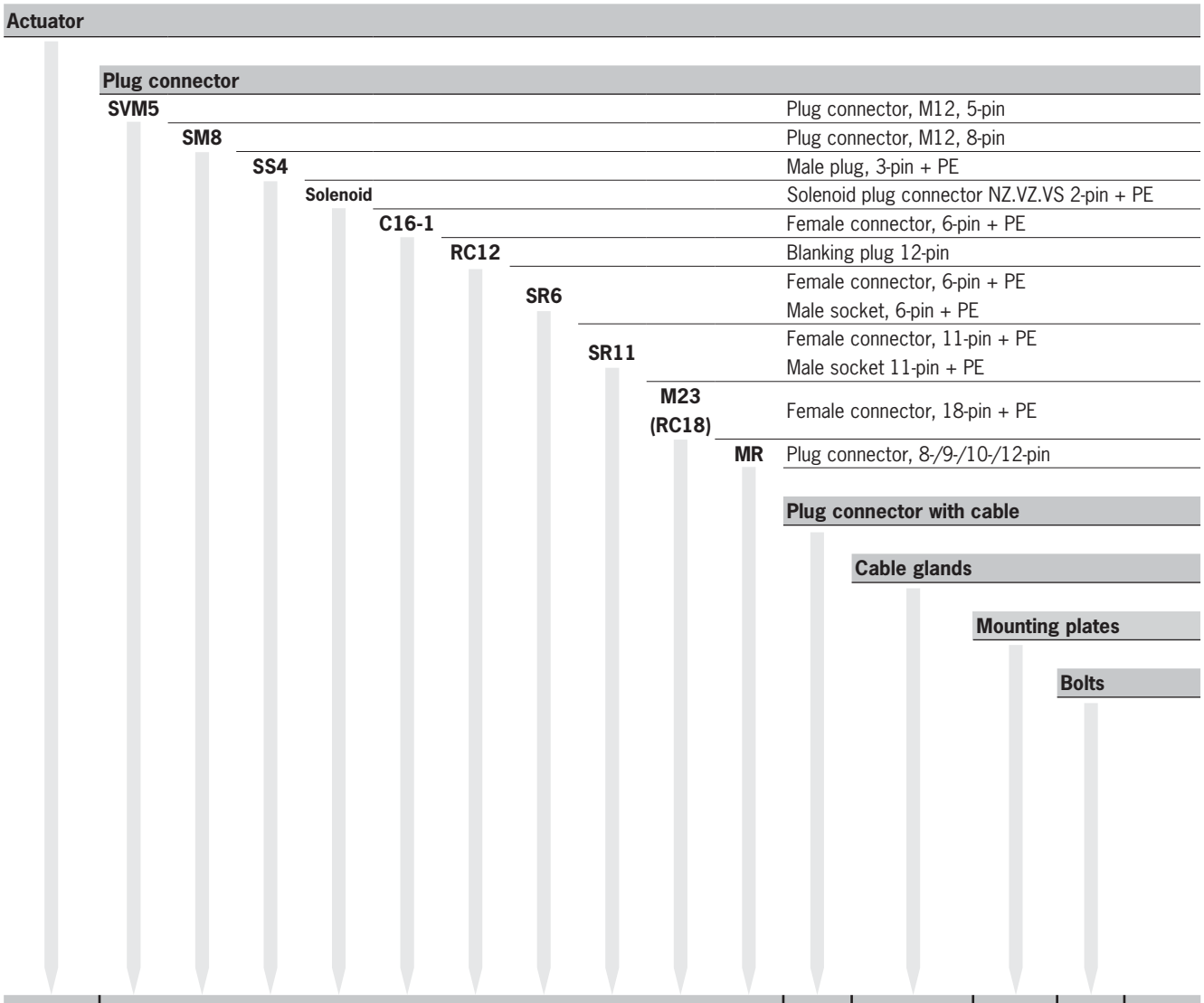


Ordering table

Series	Switching element	Version	Order no./item
Safety hinge **ESH-ARO** re-adjustable	**11** 1 NC ⊖ + 1 NO	Plug connector **M12**	**109409** ESH-ARO-11A-1205
	20 2 NC ⊖	Plug connector **M12**	**106548** ESH-ARO-20A-1205
	-	Matching hinge (without safety function)	**096007** ESH-PRO
	-	Replacement protective cap	**110443** INSTALLATION KIT CAP

For technical data, see page 163

Selection table for accessories



Actuator	Plug connector										With cable	Cable gland	Mounting plates	Bolts	Page
	SVM5	SM8	SS4	Sole-noid	C16-1	RC12	SR6	SR11	MR23 (RC18)	MR					
●															116
	●										●				126
		●									●				126
			●												127
				●											127
					●										127
						●									127
							●				●				128
								●			●				128
									●						129
									●		●				130
										●	●				131
												●			132
													●		133
														●	143

Actuators for safety switches NZ.VZ, NZ.VZ.VS and TZ

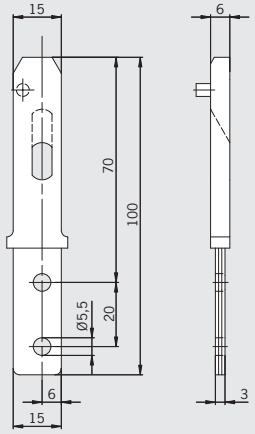
- **Two stainless safety screws per actuator**
- **Increased overtravel optional**
- **Packaging unit 25 pieces optional**

Straight actuator
The straight actuator is used on sliding doors or hinged doors with door radii greater than 1,000 mm. Safety screws prevent unscrewing of the actuator. The safety screws included can be inserted with a normal tool, but cannot be removed again.

Actuator with overtravel
- **4 mm** for doors with normal play
- **16 mm** for doors with large play (optional)

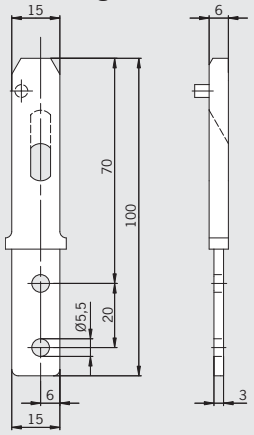
Actuator Z-G straight
overtravel 4 mm

Dimension drawings

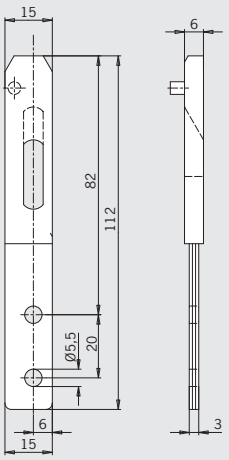


Actuator Z-GME straight
Overtravel 4 mm, solid stainless steel

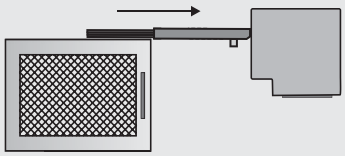
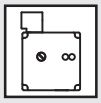
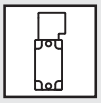
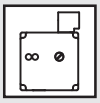
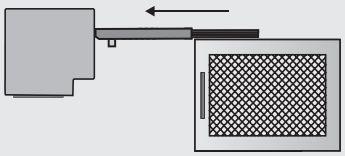
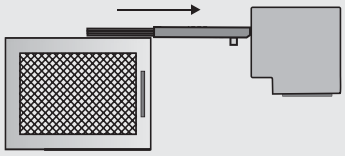
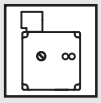
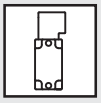
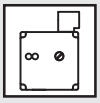
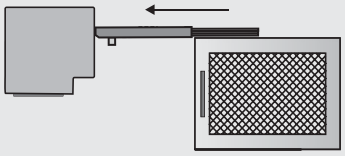
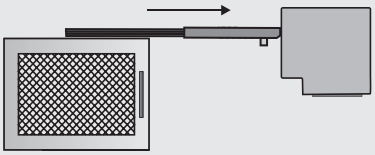
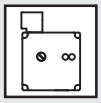
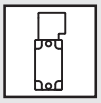
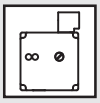
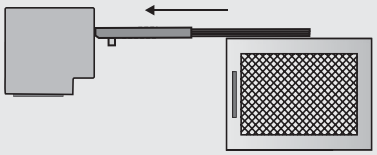
Dimension drawings

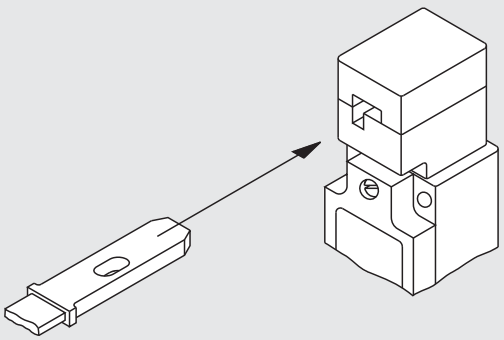


Actuator Z-GN straight
overtravel 16 mm



Selection table for actuators

Actuator					
Straight actuator Z-G 016849 Overtravel 4 mm		 TZ-LE	 NZ	 TZ-RE	
Straight actuator Z-GME 097436 Overtravel 4 mm		 TZ-LE	 NZ	 TZ-RE	
Straight actuator Z-GN 072251 Overtravel 16 mm		 TZ-LE	 NZ	 TZ-RE	



Straight actuator
Z-G 016849
Z-GME 097436
Z-GN 072251

Ordering table

Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Actuator Straight	**Z-G** 4 mm overtravel incl. 2 safety screws M5 x 10	≥ 1,000	1 pcs.	**016849** ACTUATOR-Z-G
			25 pcs.	**074411** ACTUATOR-Z-G/V25
	Z-GME 4 mm overtravel, made of solid stainless steel incl. 2 safety screws M5x10	≥ 1,000	1 pcs.	**097436** ACTUATOR-Z-GME
	Z-GN 16 mm overtravel incl. 2 safety screws M5x10	≥ 1,000	1 pcs.	**072251** ACTUATOR-Z-GN

For technical data, see page 163

Actuators for safety switches NZ.VZ, NZ.VZ.VS and TZ

- **Two stainless safety screws per actuator**
- **Smaller door radii optional**
- **Packaging unit 25 pieces optional**

Hinged actuator
For door radii less than 1,000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuator head. Depending on the movement of the guard, the actuator must be selected for left/right or top/bottom.

Option C2241
Hinged actuator made of stainless steel.

Hinged actuator Z-R/Z-LL
Radius ≥ 200 mm, guard hinged on left/right

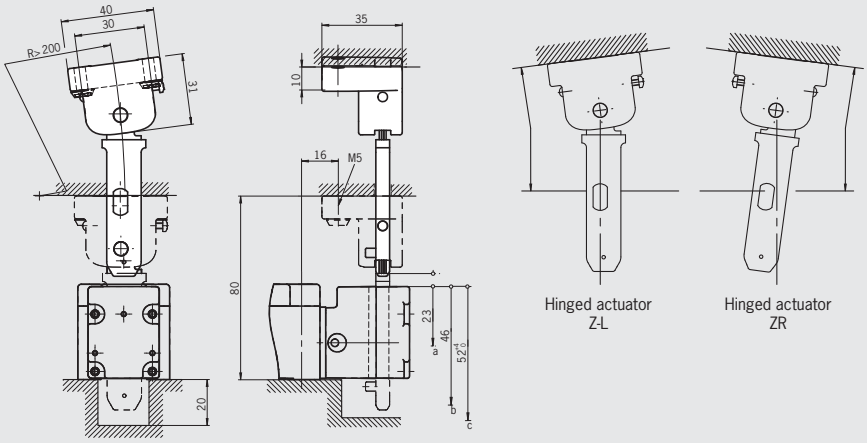
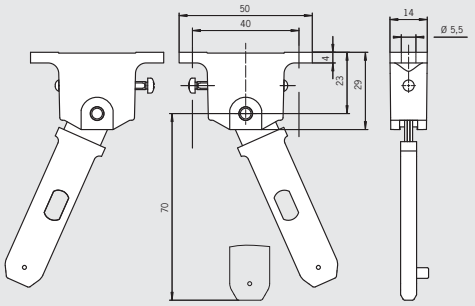
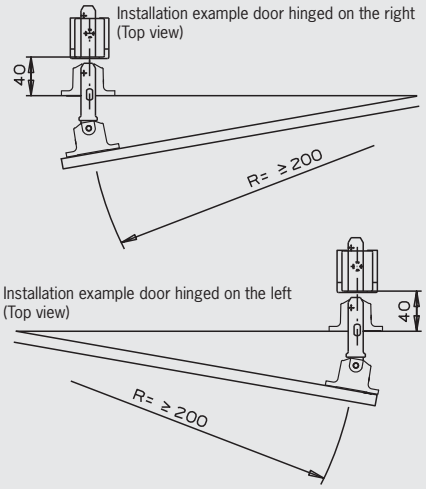


Illustration of actuator Z-L

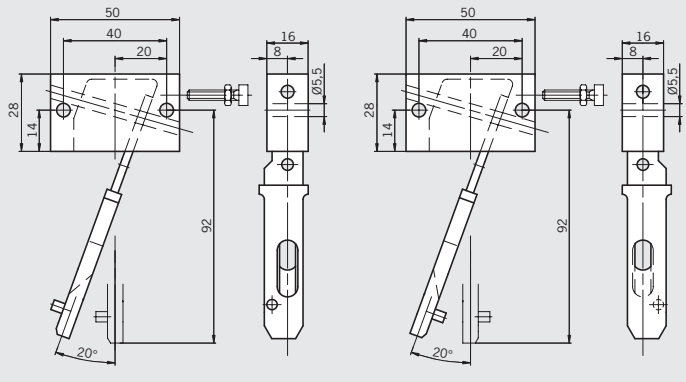
Hinged actuator Z-R-C2194/Z-L-C2194
Radius ≥ 200 mm, guard hinged on left/right



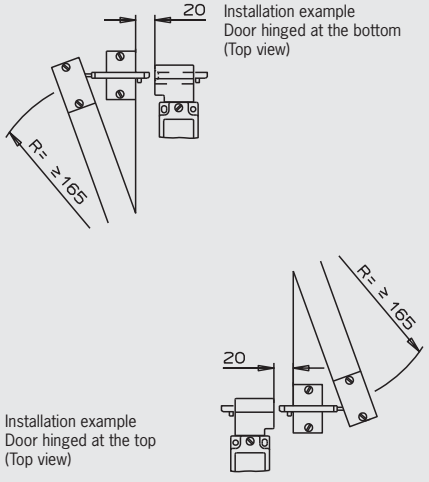
Z-L Z-R



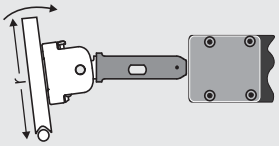
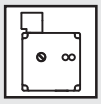
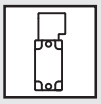
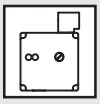
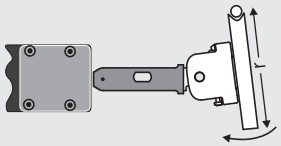
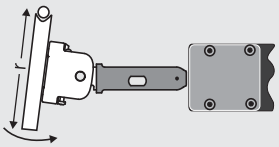
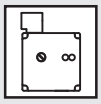
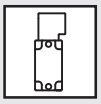
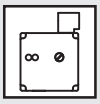
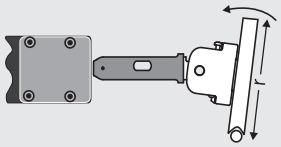
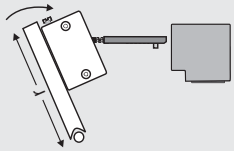
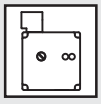
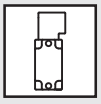
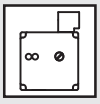
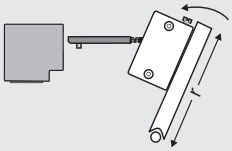
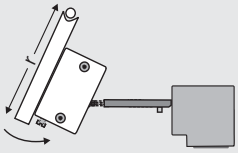
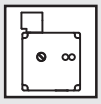
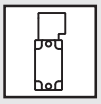
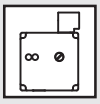
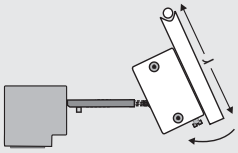
Hinged actuator Z-U/Z-O/Z-U-C2241/Z-O-C2241
Radius ≥ 165 mm, guard hinged at bottom/top

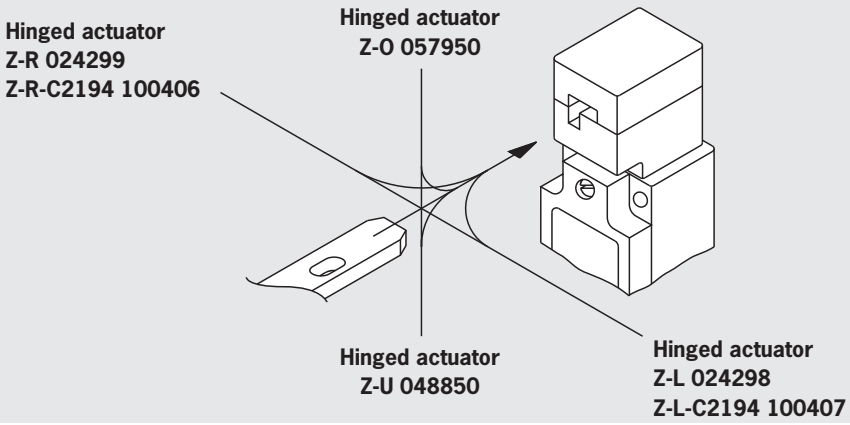


Z-U Z-O



Selection table for actuators

Actuator					
Hinged actuator Z-L 024298 Z-L-C2194 100407		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-R 024299 Z-R-C2194 100406		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-U 048850		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-O 057950		 TZ-LE	 NZ	 TZ-RE	



Ordering table

Designation	Design	Version	Min. door radius r [mm]	Packaging unit	Order no./item
Hinged actuator	**Z-R** Guard hinged on the left incl. 2 safety screws M5 x 16		≥ 200	1 pcs.	**024299** HINGED ACTUATOR Z-R
				25 pcs.	**074412** HINGED ACTUATOR-Z-R/V25
	Z-L Guard hinged on the right incl. 2 safety screws M5 x 16		≥ 200	1 pcs.	**024298** HINGED ACTUATOR Z-L
				25 pcs.	**074413** HINGED ACTUATOR-Z-L/V25
	Z-R-C2194 Guard hinged on the left incl. 2 safety screws M5x10	**C2194** Smaller door radius	≥ 200	1 pcs.	**100406** HINGED ACTUATOR-Z-R-C2194
	Z-L-C2194 Guard hinged on the right incl. 2 safety screws M5 x 10	**C2194** Smaller door radius	≥ 200	1 pcs.	**100407** HINGED ACTUATOR-Z-L-C2194
	Z-U Guard hinged at bottom incl. 2 safety screws M5 x 25		≥ 165	1 pcs.	**048850** HINGED ACTUATOR Z-U
				25 pcs.	**074414** HINGED ACTUATOR-Z-U/V25
		C2241 Stainless steel	≥ 165	1 pcs.	**103845** HINGED ACTUATOR-Z-U-C2241
	Z-O Guard hinged at top incl. 2 safety screws M5 x 25		≥ 165	1 pcs.	**057950** HINGED ACTUATOR Z-O
				25 pcs.	**074415** HINGED ACTUATOR-Z-O/V25
		C2241 Stainless steel	≥ 165	1 pcs.	**104068** HINGED ACTUATOR-Z-O-C2241

For technical data, see page 163

Actuators for safety switches NX/TX

- **Actuators made of stainless steel**
- **Two stainless safety screws per actuator**
- **With rubber bush**

Straight actuator
The straight actuator is used on sliding doors or hinged doors with door radii greater than 300 mm. Safety screws prevent unscrewing of the actuator.

Actuator with overtravel
- **1 mm** for doors with normal play
- **8 mm** for doors with large play (optional)

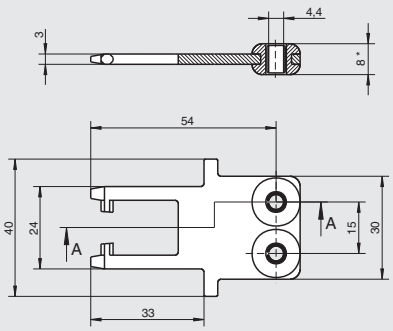
Actuator with rubber bush
For flexible mounting of the actuator.

Hinged actuator
For door radii less than 300 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuator head. Depending on the movement of the guard, the actuator must be selected for left/right or top/bottom.

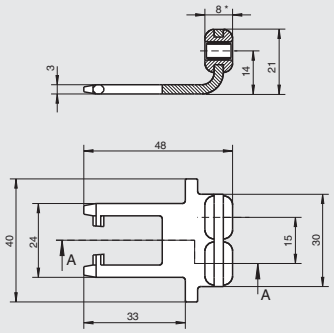
Screws made of stainless steel
The safety screws included can be inserted with a normal tool, but cannot be removed again.

Actuator X-GQ straight
Rubber bush, overtravel 1 mm

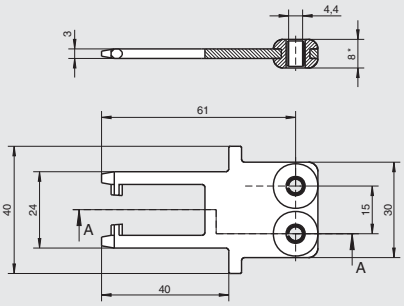
Dimension drawings



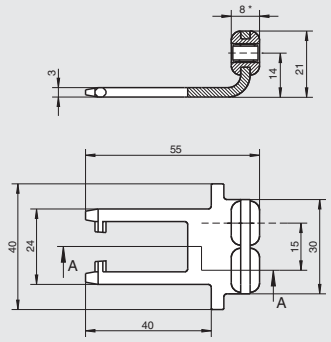
Actuator X-WQ bent
Rubber bush, overtravel 1 mm



Actuator X-GNQ straight
Rubber bush, overtravel 8 mm



Actuator X-WNQ bent
Rubber bush, overtravel 8 mm

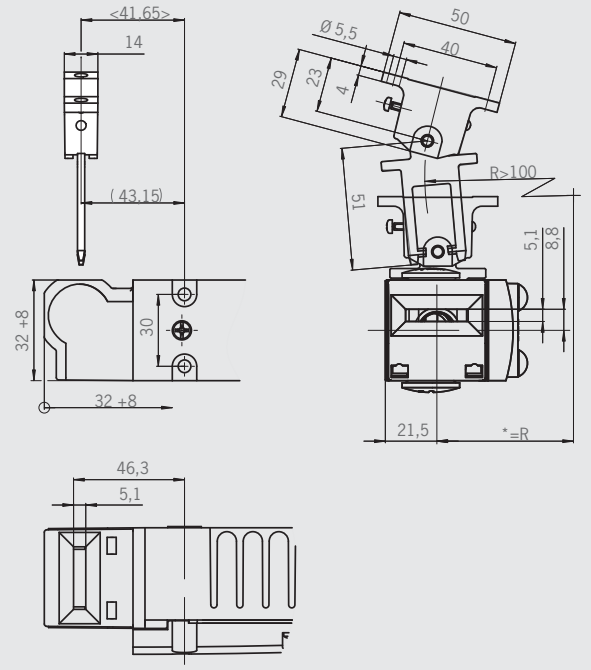


Ordering table

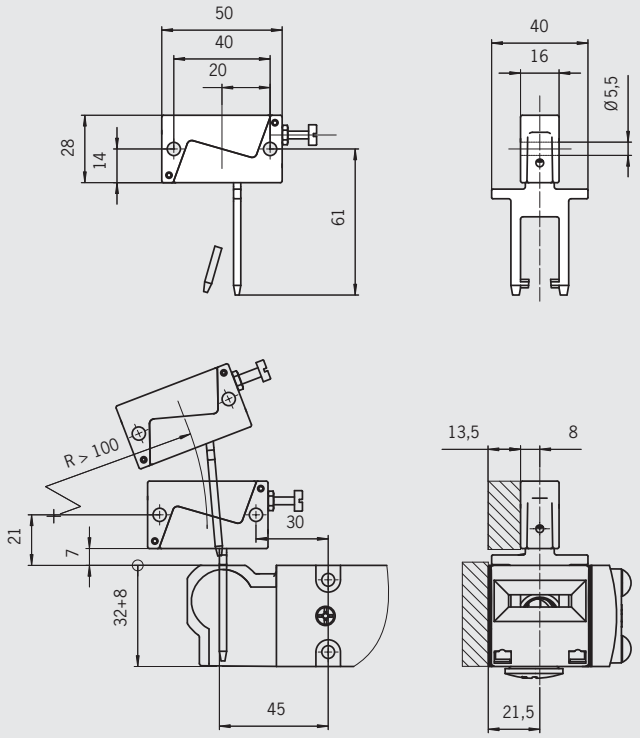
Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Actuator Straight rubber bush	**X-GQ** 1 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**079739** ACTUATOR-X-GQ
Actuator Angled rubber bush	**X-WQ** 1 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**079740** ACTUATOR-X-WQ
Actuator Straight rubber bush, overtravel	**X-GNQ** 8 mm overtravel incl. 2 safety screws M4 x 14	440	1 pcs.	**079741** ACTUATOR-X-GNQ
Actuator Angled rubber bush, overtravel	**X-WNQ** 8 mm overtravel incl. 2 safety screws M4 x 14	440	1 pcs.	**079742** ACTUATOR-X-WNQ

* The dimension 8 relates to the fitted state

Hinged actuator X-LR-N
Radius ≥ 100 mm, guard hinged on right/left



Hinged actuator X-OU-N
Radius ≥ 100 mm, guard hinged at bottom/top



Ordering table

Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Hinged actuator	**X-LR-N** Guard hinged on the right or left incl. 2 safety screws M5 x 10	≥ 100	1 pcs.	**098082** HINGED ACTUATOR-X-LR-N
	X-OU-N Guard hinged at top or bottom incl. 2 safety screws M5 x 10	≥ 100	1 pcs.	**097906** HINGED ACTUATOR-X-OU-N

For technical data, see page 163

Actuators for safety switches SGA/STA

- **Two stainless safety screws per actuator**
- **Actuator with rubber bush**

Notice
Type S actuators must not be used in conjunction with insertion funnels.
L actuators must be used for insertion funnels.

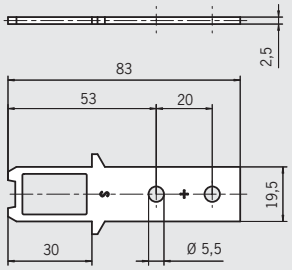
Straight actuator
Suitable for a maximum tensile force of 3,000 N. The straight actuator is used on sliding doors or hinged doors with door radii greater than 300 mm. Safety screws prevent unscrewing of the actuator.

Bent actuator
Suitable for a maximum tensile force of 1500 N.

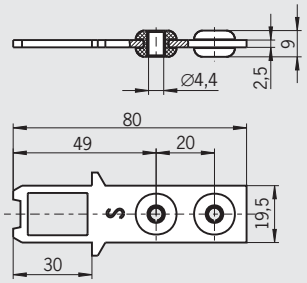
Screws made of stainless steel
The safety screws included can be inserted with a normal tool, but cannot be removed again.

Standard actuator S, straight
Without rubber bush, overtravel 5 mm

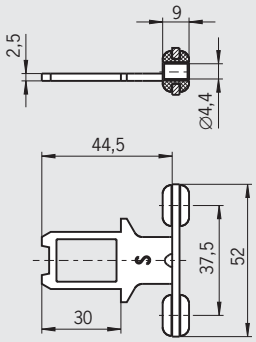
Dimension drawings



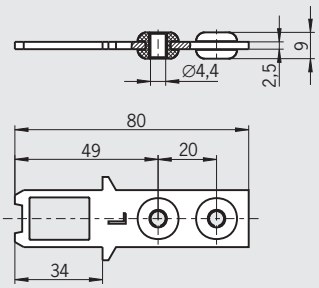
Standard actuator S, straight
With rubber bush, overtravel 5 mm



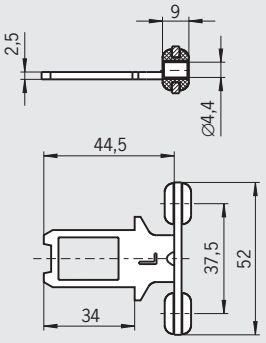
Standard actuator S, bent
With rubber bush, overtravel 5 mm



Actuator L, straight, for insertion funnel
With rubber bush, overtravel 5 mm



Actuator L, bent, for insertion funnel
With rubber bush, overtravel 5 mm



Ordering table

Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Actuator S Straight	**S-G-SN-C2115** Without rubber bush, 5 mm overtravel incl. 2 safety screws M5 x 10	300	1 pcs.	**097861** ACTUATOR S-G-SN-C2115
	S-GT-SN With rubber bush, 5 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**095738** ACTUATOR S-GT-SN
Actuator S Angled	**S-WQ-SN** With rubber bush, 5 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**095740** ACTUATOR S-WQ-SN
Actuator L Straight	**S-GT-LN** With rubber bush, 5 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**095739** ACTUATOR S-GT-LN
Actuator L Angled	**S-WQ-LN** With rubber bush, 5 mm overtravel incl. 2 safety screws M4 x 14	300	1 pcs.	**095741** ACTUATOR S-WQ-LN

- **Two stainless safety screws per actuator**
- **Actuators with and without rubber bush**

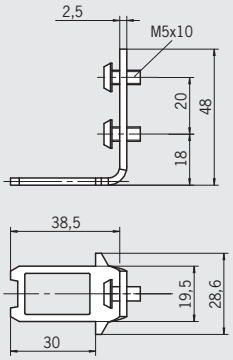
Notice
Type S actuators must not be used in conjunction with insertion funnels.
L actuators must be used for insertion funnels.

Bent actuator
Suitable for a maximum tensile force of 1,000 N.

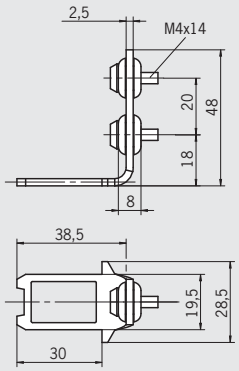
Screws made of stainless steel
The safety screws included can be inserted with a normal tool, but cannot be removed again.

Standard actuator S, bent
Without rubber bush, overtravel 5 mm

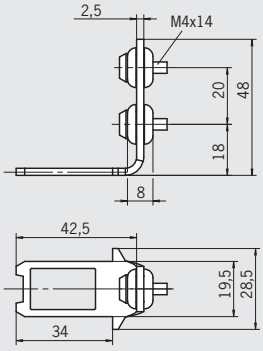
Dimension drawings



Standard actuator S, bent
With rubber bush, overtravel 5 mm



Actuator L, bent, for insertion funnel
With rubber bush, overtravel 5 mm



Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order no.
Actuator S Angled	**S-W-SN** Without rubber bush, overtravel 5 mm incl. 2 non-removable screws M5 x 10	300	1 pcs.	**115073** ACTUATOR S-W-SN-C2115
	S-WT-SN With rubber bush, overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 pcs.	**105808** ACTUATOR S-WT-SN-C2115
Actuator L Angled	**S-WT-LN** With rubber bush, overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 pcs.	**105809** ACTUATOR S-WT-LN-C2115

For technical data, see page 163

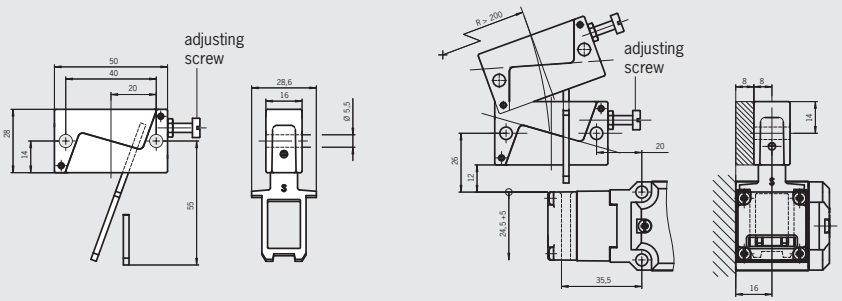
Hinged actuators for safety switches SGA/STA

- **Actuators made of stainless steel**
- **Two stainless safety screws per actuator**
- **For doors hinged at top and bottom**
- **For doors hinged on the right and left**

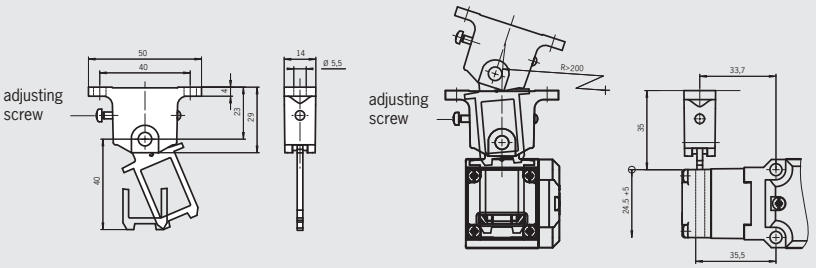
Hinged actuator
For door radii less than 1,000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuating head. Depending on the movement of the guard, the actuator must be selected for left/right or top/bottom.

Hinged actuator S-OU-SN
Radius ≥ 200 mm, guard hinged at top/bottom, overtravel 5 mm

Dimension drawings



Hinged actuator S-LR-SN
Radius ≥ 200 mm, guard hinged on left/right, overtravel 5 mm



Ordering table

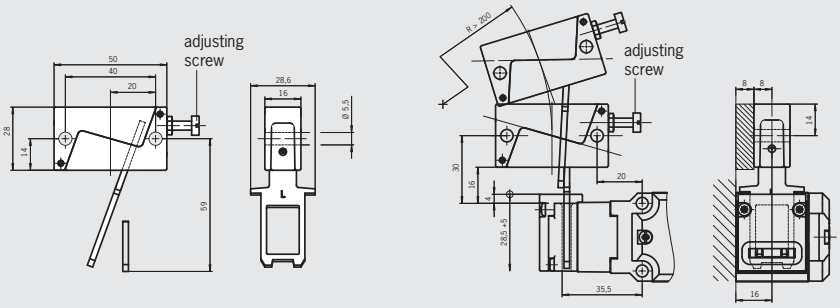
Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Hinged actuator	**S-OU-SN** For doors hinged at top and bottom 5 mm overtravel incl. 2 safety screws M5 x 25	200	1 pcs.	**095315** HINGED ACTUATOR-S-OU-SN
	S-LR-SN For doors hinged on the left and right 5 mm overtravel incl. 2 safety screws M5 x 10	200	1 pcs.	**096838** HINGED ACTUATOR-S-LR-SN

- **Actuators made of stainless steel**
- **Two stainless safety screws per actuator**
- **For doors hinged at top and bottom**
- **For doors hinged on the right and left**

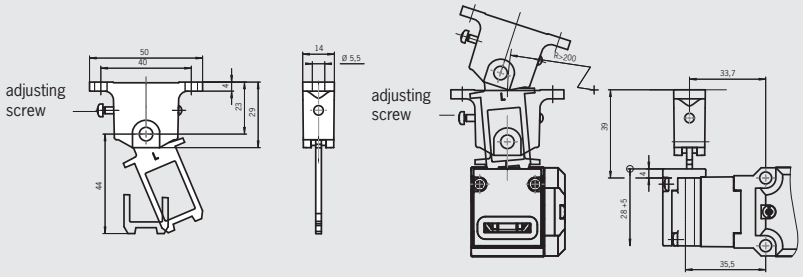
Hinged actuator
For door radii less than 1,000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuating head. Depending on the movement of the guard, the actuator must be selected for left/right or top/bottom.

Hinged actuator S-OU-LN for insertion funnel
Radius ≥ 200 mm, guard hinged at top/bottom, overtravel 5 mm

Dimension drawings



Hinged actuator S-LR-LN for insertion funnel
Radius ≥ 200 mm, guard hinged on left/right, overtravel 5 mm



Ordering table

Designation	Design	Min. door radius r [mm]	Packaging unit	Order no./item
Hinged actuator	**S-OU-LN** For doors hinged at top and bottom 5 mm overtravel incl. 2 safety screws M5 x 25	200	1 pcs.	**096697** HINGED ACTUATOR-S-OU-LN
	S-LR-LN For doors hinged on the left and right 5 mm overtravel incl. 2 safety screws M5 x 10	200	1 pcs.	**096844** HINGED ACTUATOR-S-LR-LN

For technical data, see page 163

Plug connector M12

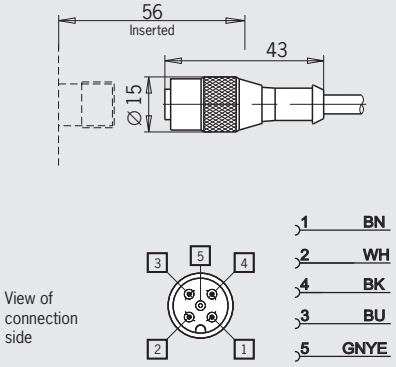
For safety switches series NZ and N1A

- **Plug connector M12 with cable**
- **90° angled optional**

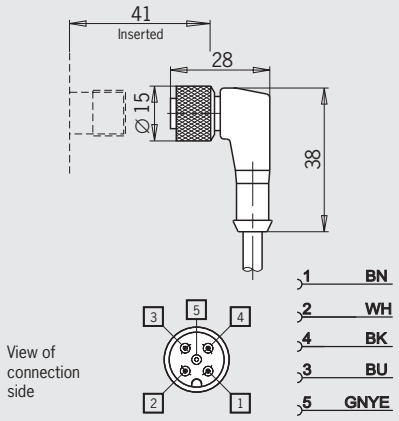
Cable
Cable sleeve PUR, color black, halogen free, flame retardant. Reduction of toxic gases and smoke in case of fire.

Plug connector SGLF with cable
M12 plug, 5-pin

Dimension drawings

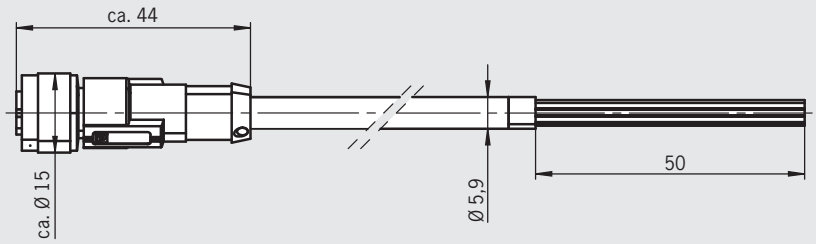


Plug connector SWLF with cable angled, M12 plug, 5-pin

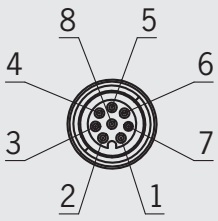


Straight plug connector with cable
M12-plug, 8-pin, flying lead

Dimension drawings



Wiring diagram
(view of connection side)



Pin	Wire color
1	WH
2	BN
3	GN
4	YE
5	GY
6	PK
7	BU
8	RD

Ordering table

Designation	Number of pins	Version	Cable length 5 m	10 m	20 m	30 m
Plug connector M12	**5** 5 x 0.34 mm²	**SGLF** Female connector M12 for male plug SVM5	**073461** SGLF5-5000P	-	-	-
		SWLF Female connector M12, angled, for male plug SVM5	**073462** SWLF5-5000P	-	-	-
	8 8 x 0.25 mm²	Female connector M12 for male plug SM8	**115112** C-M12F08-08X025PU05,0-MA	**115113** C-M12F08-08X025PU10,0-MA	**115114** C-M12F08-08X025PU20,0-MA	**115257** C-M12F08-08X025PU30,0-MA

Plug connectors SS4, C16-1, RC12 and solenoid plugs

For safety switches series NZ and TZ

- **Plugs and sockets**
- **Blanking plug**
- **Solenoid plugs**

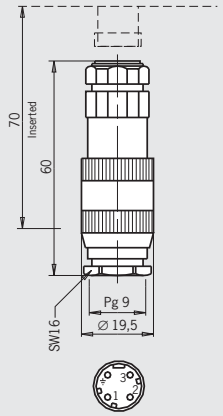
Blanking plug
To cover the socket for the enabling switch on the safety switch TZ with socket RC12.

Plug connector for solenoid locking NZ.VZ.VS

- Without rectifier
  For the connection of DC.
- With rectifier
- For the connection of AC 110 V - AC 230 V.

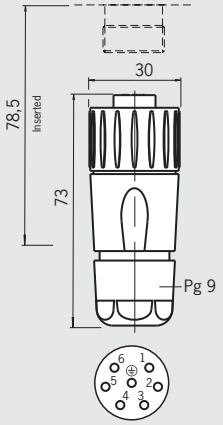
Male plug SS4
3-pin + PE

Dimension drawings



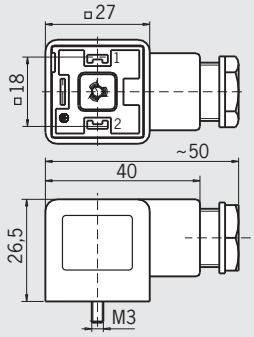
View of connection side, plug

Female connector C16-1
6-pin + PE

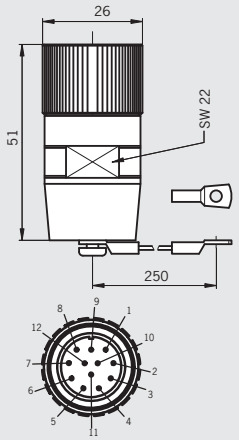


View of connection side, socket

Solenoid plug NZ.VZ.VS
2-pin + PE

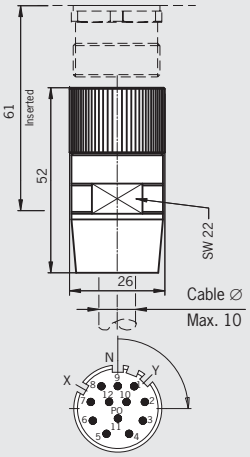


Blanking plug RC12
12-pin



View of connection side, plug

Male plug RC12
12-pin



View of connection side, plug

Ordering table

Designation	Version	Order no./item
SS4 3-pin + PE	Plug for socket BD4	**002787** SS4
C16-1 1) 6-pin + PE	Female connector	**043861** Cable socket 6 + PE
RC12 1) 12-pin	Male plug	**073294** RC-12P1N8A8096
	Blanking plug without bridges	**073293** RC-12P1N8A8300
Solenoid plugs NZ.VZ..VS 2-pin + PE	Fir DC without rectifier	**028345** Plug connector for solenoid locking
	For AC with rectifier max. AC 240 V	**028338** Plug connector with rectifier for solenoid locking

For information on crimp contacts, see page 162.
1) Crimp contacts are included.

For technical data, see page 163

Plug connectors SR6 and SR11

- **Plugs and sockets**
- **Crimp contacts**
- **90° angled optional**
- **Cable optional**
- **Coding shells**

Angled plug connector
On plug connectors without cables the direction of the cable exit can be adjusted.

Male socket
For fitting in safety switches.

Coding shells
Two coding shells and screws. Only matching connectors can be mated when coding shells are used.

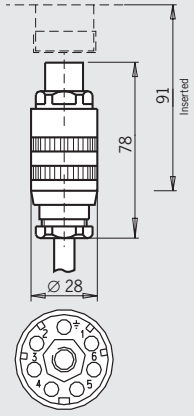
Cable (optional)
Cable sleeve PUR, color gray, conductor cross-section 1.0 mm².

Connector assignment for plug with cable

SR6		SR11	
Pin	**Wire**	**Pin**	**Wire**
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
⏚	7	7	7
		8	8
		9	9
		10	10
		11	11
		⏚	12

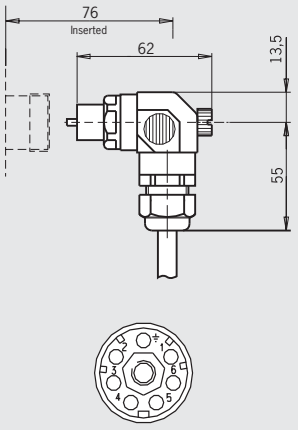
Female connector SR6 EF
6-pin + PE

Dimension drawings



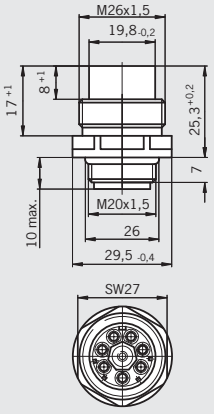
View of connection side, socket contact carrier adjustable

Female connector SR6 WF angled 6-pin + PE



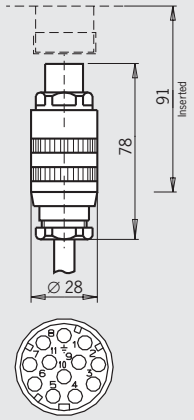
View of connection side, socket contact carrier adjustable

Male socket SR6 AM
6-pin + PE



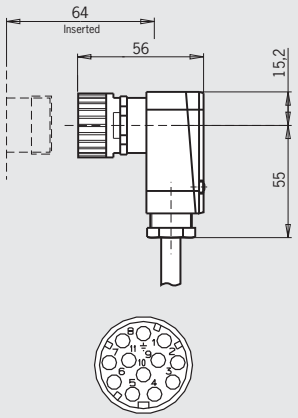
View of connection side, plug

Female connector SR11 EF
11-pin + PE



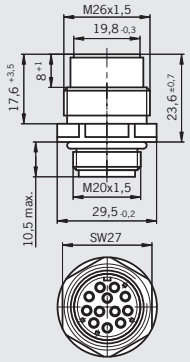
View of connection side, socket contact carrier adjustable

Female connector SR11 WF angled 11-pin + PE



View of connection side, socket contact carrier adjustable

Male socket SR11 AM
11-pin + PE



View of connection side, plug

Ordering table

Designation	Version	Cable					
		without	**5 m**	**10 m**	**15 m**	**20 m**	**25 m**
SR6 [1] 6-pin + PE	**EF** Female connector	**013176** SR6EF	**077632** C-M26F07-07X1,0PU05,0-MA-077632	**077633** C-M26F07-07X1,0PU10,0-MA-077633	**077634** C-M26F07-07X1,0PU15,0-MA-077634	**098128** C-M26F07-07X1,0PU20,0-MA-098128	-
	WF Female connector angled	**024999** SR6WFPG11R	**077638** C-R22F07-07X1,0PU05,0-MA-077638	**077639** C-R22F07-07X1,0PU10,0-MA-077639	**077640** C-R22F07-07X1,0PU15,0-MA-077640	-	-
	CI Coding shells	**013178** SR6K	-	-	-	-	-
	AM Male socket, connection M20x1.5	**087180** SR6AM2-M20	-	-	-	-	-
SR11 [1] 11-pin + PE	**EF** Female connector	**070859** SR11EF	**077629** C-M26F12-12X1,00PU05,0-MA-077629	**077630** C-M26F12-12X1,00PU10,0-MA-077630	**077631** C-M26F12-12X1,00PU15,0-MA-077631	**096632** C-M26F12-12X1,0PU20,0-MA-096632	**094749** C-M26F12-12X1,0PU25,0-MA-094749
	WF Female connector angled	**054773** SR11WF	**077635** C-M26F12-12X1,0PU05,0-MA-077635	**077636** C-M26F12-12X1,0PU10,0-MA-077636	**077637** C-M26F12-12X1,0PU15,0-MA-077637	-	-
	AM Male socket, connection M20x1.5	**091296** SR11AM2-M20	-	-	-	-	-
SR6 and SR11	**Socket crimp contacts** Conductor cross-section 0.5 - 1.5 mm²	**071260** SRF	-	-	-	-	-
	Pin crimp contacts Conductor cross-section 0.5 - 1.5 mm²	**071261** SRM	-	-	-	-	-

1) Crimp contacts are included.For information on crimp contacts, see page 162.

Plug connector M23 (RC18) and M23 (RC18) with option C1825

- **Straight and angled plug connectors**
- **With and without plug connector**

Crimp contacts
With 19 crimp pins for conductor cross-section 0.75 - 1.00 mm².

Option C1825
With 16 crimp pins for conductor cross-section 0.25 - 0.5 mm² and 3 pins for conductor cross-section 0.75 - 1.0 mm² for control of the guard locking solenoid. This plug is easier to connect.
Important: Only for switch with option C1826.

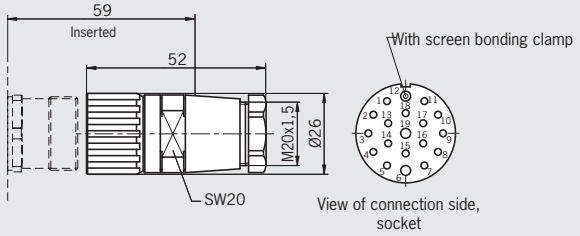
Angled plug connector (optional)
On plug connectors with cables the direction of the cable exit can be chosen on left/right. On plug connectors without cables the direction can be adjusted in 45° steps.

Coupling socket
Coupling socket straight, 19-pin, with screen bonding clamp. Suitable for extension of female connector RC18EF-C1825 and RC18WF-C1825.

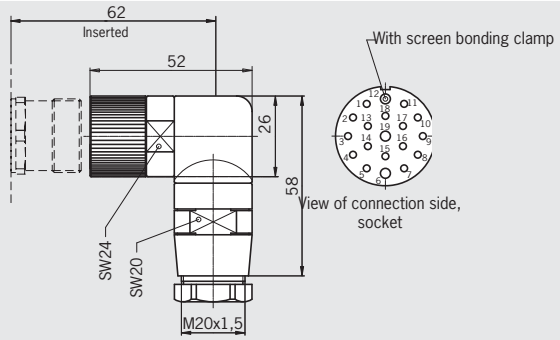
Halogen-free cable
Cable sleeve PUR, color black, halogen-free, silicone-free. Reduction of toxic gases and smoke in case of fire.
Conductor cross-section 0.5 mm² or 1.0 mm².

Female connector M23 (RC18) / M23 (RC18)..C1825
18-pin + PE (for cable diameter 10 ... 14 mm)

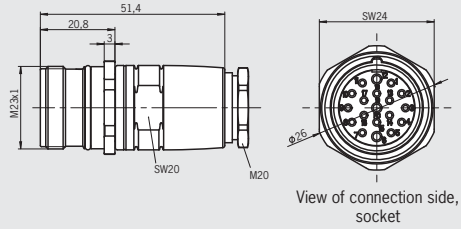
Dimension drawings



Female connector M23 (RC18) / M23 (RC18)..C1825
Angled 18-pin + PE (for cable diameter 10 ... 14 mm)



Coupling socket M23 (RC18) / M23 (RC18)..C1825
18-pin + PE (for cable diameter 10 ... 14 mm)



Ordering table

Designation	Version	Without cable
M23 (RC18) [2] 18-pin + PE	**EF** Female connector	**074616** RC18EF
	WF Female connector angled [1]	**074617** RC18WF
	Replacement pin crimp contacts Conductor cross-section 19 x 0.75 - 1 mm²	**094309** Pin crimp contact RCF
	EF-C1825 Female connector	**077025** RC18EF-C1825
	WF-C1825 Female connector angled [1]	**077026** RC18WF-C1825
	Replacement crimp contacts Conductor cross-section 16 x 0.25 - 0.5 mm² 3 x 0.75 - 1 mm²	**094310** Pin crimp contact RCF-C1825
	EM-C1825 Coupling socket	**129500** RC18EM-C1815
	Replacement crimp contacts Conductor cross-section 16 x 0.25 - 0.5 mm² 3 x 0.75 - 1 mm²	**155811** Pin crimp contact RCM-C1825

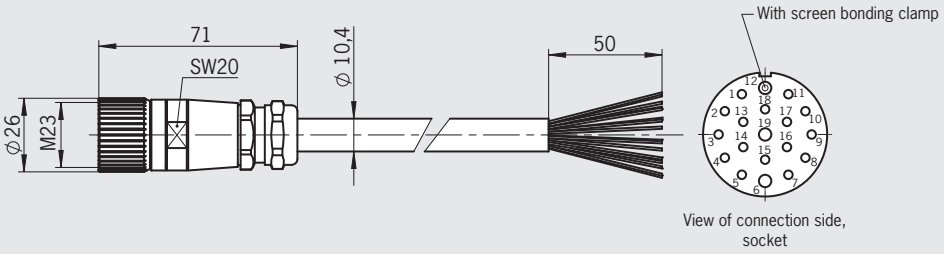
For information on crimp contacts, see page 162.
1) Plug connector RC18 on the switches STA not aligned.
2) Crimp contacts are included.

For technical data, see page 163

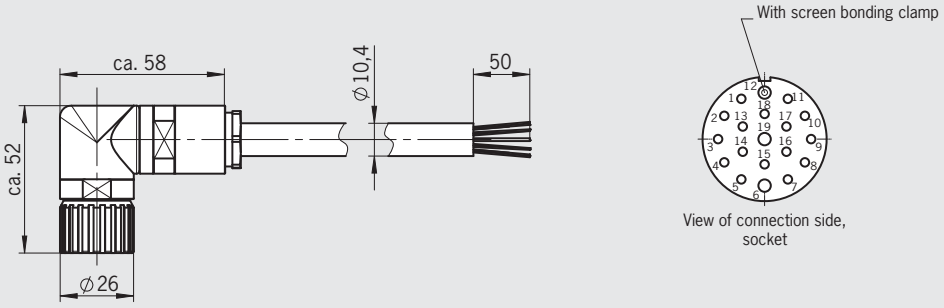
Plug connector M23 (RC18) and M23 (RC18) option C1825 with cable

Female connector M23 (RC18) / M23 (RC18)..C1825 with cable
18-pin + PE / 19-pin PUR

Dimension drawings



Female connector M23 (RC18) / M23 (RC18)..C1825 angled with cable 18-pin + PE



Connector assignment plug M23 (RC18) with cable and option C1825

Pin	Wire color	Cross-section [mm]
1	VT	0.5
2	RD	0.5
3	GY	0.5
4	RD/BU	0.5
5	GN	0.5
6	BU	1.0
7	GY/PK	0.5
8	GN/WH	0.5
9	YE/WH	0.5
10	GY/WH	0.5
11	BK	0.5
12	GN/YE	1.0
13	PK	0.5
14	BN/GY	0.5
15	BN/YE	0.5
16	BN/GN	0.5
17	WH	0.5
18	YE	0.5
19	BN	1.0

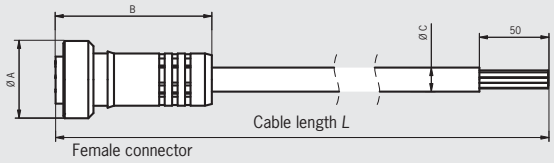
Ordering table

Descrp.	Version	Cable									
		1.5 m	3 m	6 m	8 m	10 m	15 m	20 m	25 m	30 m	40 m
RC18 18-pin + PE with cable	Straight female connector	**092761** C-M23F19-19XDIF-PU01,5-MA-092761	**092816** C-M23F19-19XDIF-PU03,0-MA-092816	**077014** C-M23F19-19XDIF-PU06,0-MA-077014	**077015** C-M23F19-19XDIF-PU08,0-MA-077015	**092898** C-M23F19-19XDIF-PU010,0-MA-092898	**077016** C-M23F19-19XDIF-PU15,0-MA-077016	**092726** C-M23F19-19XDIF-PU20,0-MA-092726	**092727** C-M23F19-19XDIF-PU25,0-MA-092727	**095993** C-M23F19-19XDIF-PU30,0-MA-095993	**102490** C-M23F19-19XDIF-PU40,0-MA-102490
	Female connector angled cable exit left	**092906** C-M23F19-19XDIF-PU01,5-MA-092906	**092908** C-M23F19-19XDIF-PU03,0-MA-092908	**077018** C-M23F19-19XDIF-PU06,0-MA-077018	**077019** C-M23F19-19XDIF-PU08,0-MA-077019	**092901** C-M23F19-19XDIF-PU010,0-MA-092901	**077020** C-M23F19-19XDIF-PU15,0-MA-077020	**092910** C-M23F19-19XDIF-PU20,0-MA-092910	**092912** C-M23F19-19XDIF-PU25,0-MA-092912	-	-
	Female connector angled cable exit right	**092907** C-M23F19-19XDIF-PU01,5-MA-092907	**092909** C-M23F19-19XDIF-PU03,0-MA-092909	**085194** C-M23F19-19XDIF-PU06,0-MA-085194	**085195** C-M23F19-19XDIF-PU08,0-MA-085195	**092902** C-M23F19-19XDIF-PU010,0-MA-092902	**085196** C-M23F19-19XDIF-PU15,0-MA-085196	**092911** C-M23F19-19XDIF-PU20,0-MA-092911	**092913** C-M23F19-19XDIF-PU25,0-MA-092913	-	-

Plug connectors MR8/MR9/MR10/MR12 with cable

Female connector with cable
8-, 9-, 10-, 12-pin

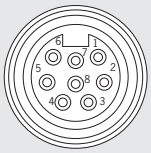
Dimension drawings



Dimension	8-pin	9-pin	10-pin	12-pin
A	∅ 29	∅ 32	∅ 32	∅ 32
B	59	64	64	64
C	∅ 8.9	∅ 9.7	∅ 9.8	∅ 10.4

Pin assignment (conductor cross-section 0.82 mm² / 18 AWG)

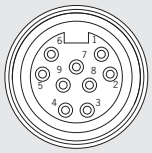
8-pin



View of connection side, socket

Pin	Wire color
1	OG
2	BU
3	WH/BK
4	BK
5	WH
6	RD
7	GN/YE
8	RD/BK

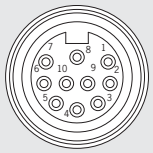
9-pin



View of connection side, socket

Pin	Wire color
1	OG
2	BU
3	RD/BK
4	GN/BK
5	WH
6	RD
7	GN/YE
8	WH/BK
9	BK

10-pin



View of connection side, socket

Pin	Wire color
1	OG
2	BU
3	WH/BK
4	RD/BK
5	GN/BK
6	OG/BK
7	RD
8	GN/YE
9	BK
10	WH

12-pin

View of connection side, socket

Pin	Wire color
1	OG
2	BU
3	WH/BK
4	RD/BK
5	GN/BK
6	OG/BK
7	BU/BK
8	BK/WH
9	GN/YE
10	RD
11	WH
12	BK

Ordering table

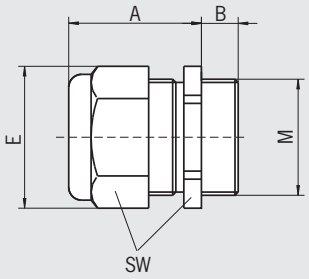
Version	Connection	Material	Cable length *L* [mm]								
			910	1,800	3,600	6,000	9,100	12,100	15,200	18,200	24300
Female connector with cable	MR8	PVC	-	100938	-	100940	100941	100942	103152	103153	-
		PUR	-	102506	100945	100946	102507	102508	102509	103149	103150
	MR9	PVC	100947	102502	100948	102503	102504	103154	-	103156	-
		PUR	-	102510	102511	102512	102513	102514	102515	103151	-
	MR10	PVC	-	100949	100950	100951	100952	102505	100953	103157	-
		PUR	-	102516	102517	102518	100956	102519	102520	102521	-
	MR12	PVC	-	-	100960	100961	100962	103158	103159	103160	-
		PUR	-	-	100967	102522	102523	102524	102525	102526	-

For technical data, see page 163

Cable glands

- **M12 x 1.5**
- **M16 x 1.5**
- **M20 x 1.5**

Cable glands
Suitable for various cable diameters. Versions available in plastic and metal.



Item	Thread	Cable ∅ [mm]	A [mm]	B [mm]	E [mm]	SW [mm]
EKV.12/04	M12 x 1.5	4 - 6.5	20	5	15.5	14
EKV.16/04	M16 x 1.5	4 - 6.5	20	6	20	18
EKP.16/05	M16 x 1.5	5 - 10	28	8	22	20
EKV.16/06	M16 x 1.5	6.5 - 9.5	20	6	20	18
EKV.20/06	M20 x 1.5	6.5 - 9.5	20	6	24.4	22
EKP.20/06	M20 x 1.5	6 - 12	26	11	27	24
EKV.20/09	M20 x 1.5	9 - 13	20	6	24.4	22
EKV.12/06	NPT ½"	6 - 12	22	13	27	24
EKVPO.12/06	NPT ½"	6 - 12	26	13	27	24

Ordering table

Thread	Version	Material	
		Metal	Plastic
M12 x 1.5	Cable diameter 4 - 6.5 mm	**086327** EKVM12/04	-
M16 x 1.5	Cable diameter 4 - 6.5 mm	**086328** EKVM16/04	-
	Cable diameter 5 - 10 mm	-	**084572** EKPM16/05
	Cable diameter 6.5 - 9.5 mm	**086330** EKVM16/06	-
M20 x 1.5	Cable diameter 6 - 12 mm	-	**077679** EKPM20/06
	Cable diameter 6.5 - 9.5 mm	**077683** EKVM20/06	-
	Cable diameter 9 - 13 mm	**077684** EKVM20/09	-
NPT ½"	Cable diameter 6 - 12 mm	**077691** EKVN12/06	**077692** EKPON12/06

Mounting plates EMP for safety switches NZ.VZ

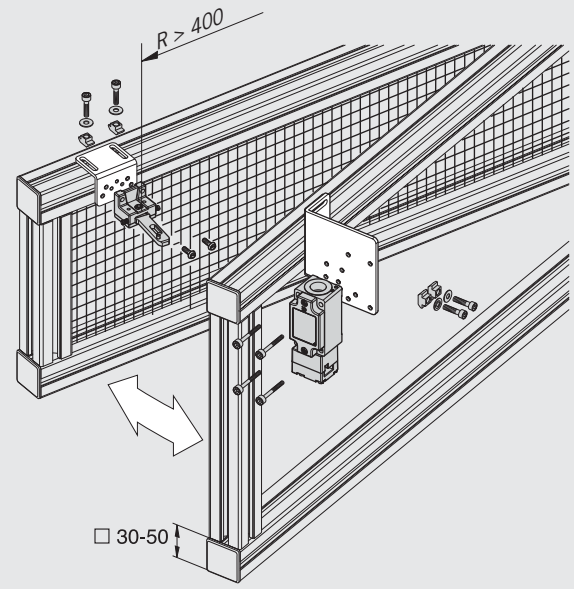
- **For vertical and horizontal mounting of safety switch NZ.VZ**

The mounting plates are used for fastening safety switches NZ and actuators to guards. The safety switches can be attached vertically or horizontally.

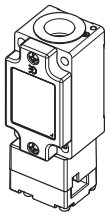
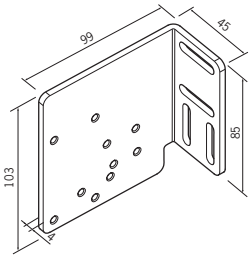
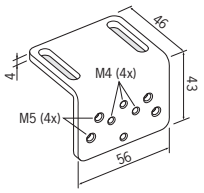
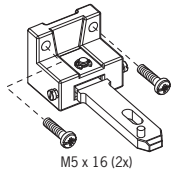
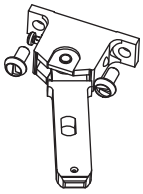
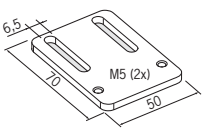
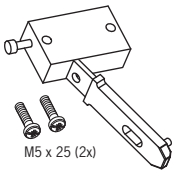
Note

- Mounting plate material: galvanized St37.

Installation example, safety switch vertical



Ordering table

Switch	Mounting plate Switch	Installation method Switch	Mounting plate Actuator	Actuator	Minimum distance hinged actuator to switch
NZ... 	**085753** EMP-SC 	**A** Vertical	**093457** EMP-B1 	**024298** **024299**  Page 118	> 400 mm
		B Horizontal		**100406** **100407**  Page 118	> 200 mm
			093458 EMP-B2 	**048850** **057950**  Page 118	> 165 mm

For technical data, see page 163

Mounting plates EMP for safety switches STA

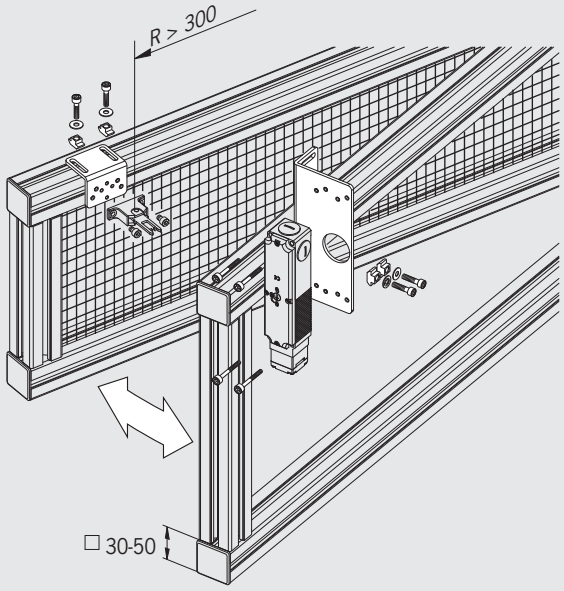
- **For vertical and horizontal mounting of safety switch STA**

The mounting plates are used for fastening safety switches STA and actuators to guards. The safety switches can be attached vertically or horizontally.

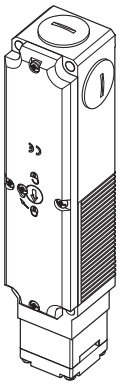
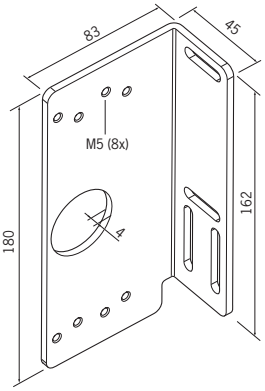
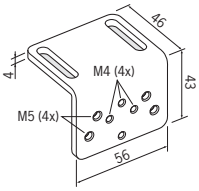
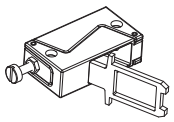
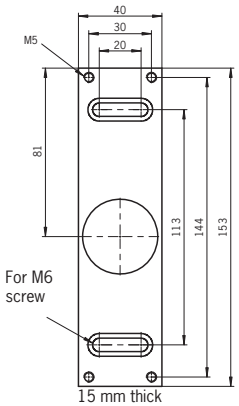
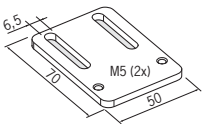
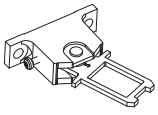
Note

- Mounting plate material: galvanized St37.

Installation example, safety switch vertical



Ordering table

Switch	Mounting plate Switch	Installation method Switch	Mounting plate Actuator	Actuator	Minimum distance hinged actuator to switch
STA... 	**093456** EMP-SB 	**A** Vertical	**093457** EMP-B1 	**095315** **096697**  Page 124/125	> 200 mm
	126026 AM-P 	**B** Horizontal	**093458** EMP-B2 	**096838** **096844**  Page 124/125	> 200 mm

Mounting plates EMP for safety switches TX

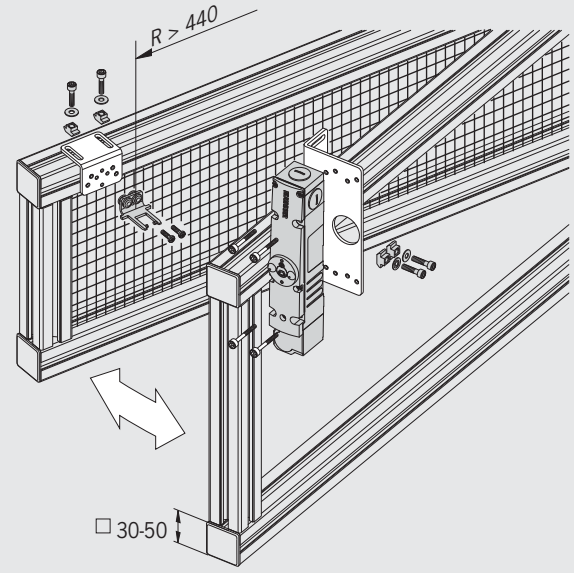
- **For vertical mounting of safety switch TX**

The mounting plates are used for fastening safety switches TX and actuators to guards. The safety switches can be attached vertically.

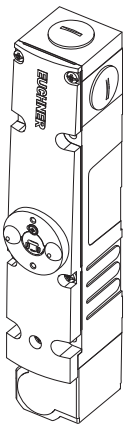
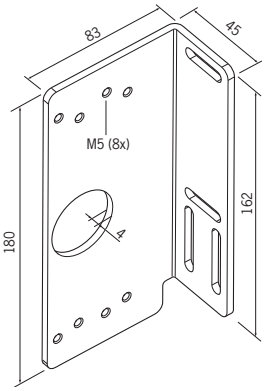
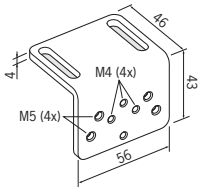
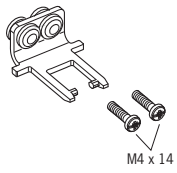
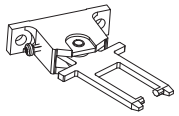
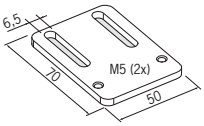
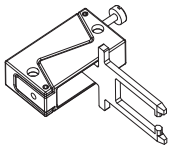
Note

- Mounting plate material: galvanized St37.
- The mounting plate EMP-SB is also suitable for the safety switches TX...C1991 with escape release from the rear.

Installation example, safety switch vertical



Ordering table

Switch	Mounting plate Switch	Installation method Switch	Mounting plate Actuator	Actuator	Minimum distance hinged actuator to switch
TX... 	**093456** EMP-SB 	**C** Vertical	**093457** EMP-B1 	**079740** **079742**  Page 120	> 400 mm
				098082  Page 121	> 100 mm
			093458 EMP-B2 	**097906**  Page 121	> 100 mm

For technical data, see page 163

Mounting plates EMP for safety switches TZ

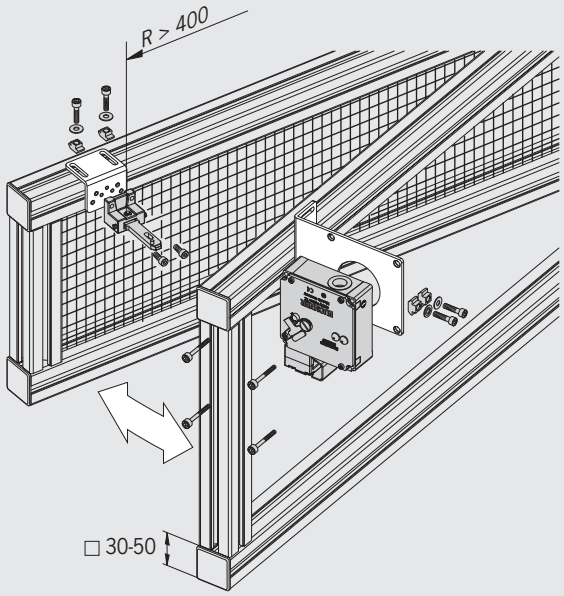
- **For vertical and horizontal mounting of safety switch TZ**

The mounting plates are used for fastening safety switches TZ and actuators to guards. The safety switches can be attached horizontally or vertically.
The mounting plate EMP-SA is also suitable for safety switches with escape release from the rear.

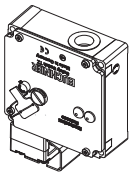
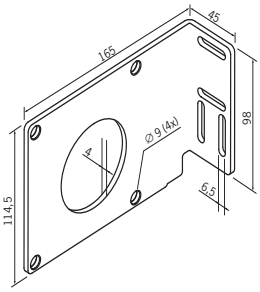
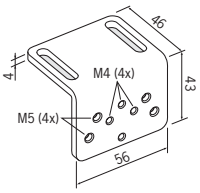
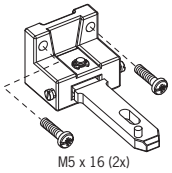
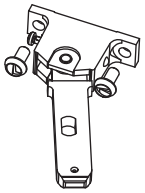
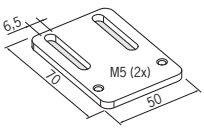
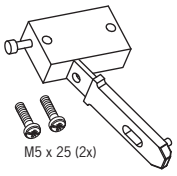
Note

- Mounting plate material: galvanized St37.
- The mounting plate EMP-SA is also suitable for the safety switches TZ...C1684, TZ... C1815 and TZ...C1828 with escape release from the rear.

Installation example, safety switch vertical



Ordering table

Switch	Mounting plate Switch	Installation method Switch	Mounting plate Actuator	Actuator	Minimum distance hinged actuator to switch
TZ... 	**094401** EMP-SA 	**A** Vertical	**093457** EMP-B1 	**024298** **024299**  Page 118	> 400 mm
		B Horizontal		**100406** **100407**  Page 118	> 200 mm
			093458 EMP-B2 	**048850** **057950**  Page 118	> 165 mm

Miscellaneous accessories

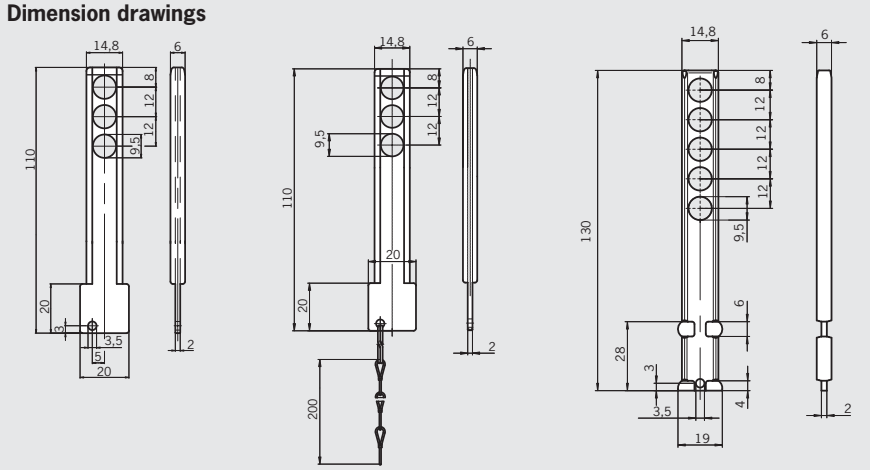
- **Lockout bar**
- **Insertion funnel**

Lockout bar
With the safety door open, can be slid into the actuator head on a switch type 2 instead of an actuator. Removal can be prevented using a commercially available padlock. For the protection of people in areas with a possible hazard.
Cannot be used in combination with the protective plate.

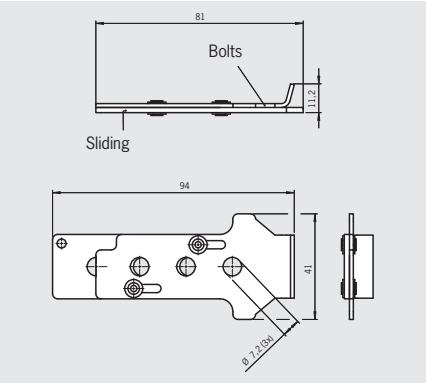
Insertion funnel
If an insertion funnel is used, even inexactly positioned actuators are inserted reliably in the actuating head due to the large opening funnel, thus protecting the safety switch against mechanical influences.

Lockout bars
For safety switches series NZ.VZ and TZ

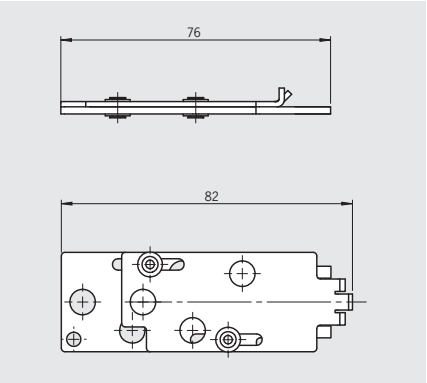
Dimension drawings



Lockout bar
For safety switches NX and TX

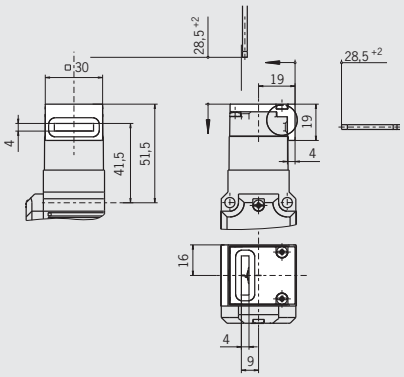


Lockout bar
For safety switch STA



Insertion funnel
For safety switches STA/STP

Dimension drawings



Minimum door radius with insertion funnel
R > 300 mm

Ordering table

Designation	Version	Use	Order no./item
Lockout bar	3 holes	For safety switches series NZ.VZ and TZ without protective plate	**046730** Lockout bar Z
	3 holes with chain	For safety switches series NZ.VZ and TZ without protective plate	**091305** Lockout bar with chain
	3 holes	For safety switch STA	**105701** Lockout bar STP
	5 holes	For safety switches series NZ.VZ and TZ without protective plate	**086538** Lockout bar Z
	3 holes	For safety switches NX and TX	**096098** Lockout bar TX
Insertion funnel	incl. 2 fixing screws	For safety switches STA/STP	**093157** Insertion funnel STA

For technical data, see page 163

Miscellaneous accessories

- **Protective plate**
- **Replacement head for NZ.VZ**
- **Lead seal kit**
- **LED function display**
- **Safety screws**

Protective plate
Optimal protection against tampering on safety switches type 2 (NZ.VZ and TZ). The protective plate prevents modification of the safety switch via the actuator outlet opening.

Replacement head for NZ.VZ
Replacement head for a safety switch type 2 (NZ.VZ). With 4 safety screws and replacement screws. As the switches are safety components, in case of defects we recommend replacing the entire safety switch. **Not suitable for the safety switches TZ!**

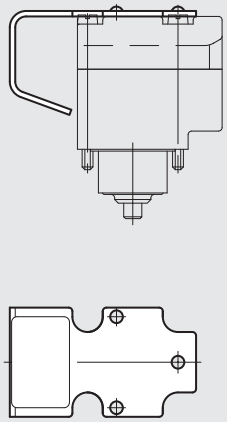
Lead seal kit TZ
For sealing the mechanical release on the safety switch TZ. The locking screw is included.

Lead seal kit TZ-C1937
For sealing the emergency unlocking on the safety switch TZ.

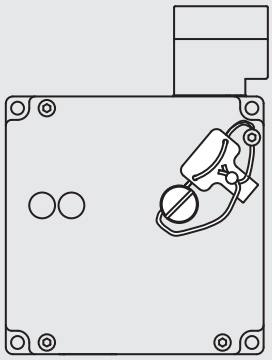
Safety screws
To prevent unscrewing of actuators and actuating heads. The screws can be tightened using a normal tool, but cannot be removed again.

Protective plate

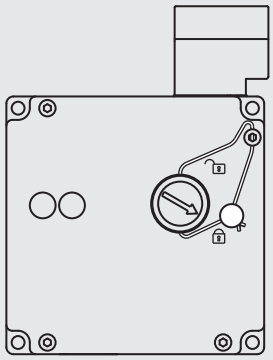
Dimension drawings



Lead seal kit TZ



Lead seal kit TZ-C1937



Ordering table

Designation	Version	Use	Order no./item
Protective plate		For safety switch type 2 (NZ.VZ and TZ)	**059136** Protective plate NZ/TZ
Replacement head NZ.VZ		Not suitable for safety switch TZ!	**076250** Actuating head NZVZ
Lead seal kit	Consisting of lead seal, wire, locking screw and key	For safety switches TZ	**048257** Lead seal kit TZ
	Consisting of lead seal and sealing wire	For safety switches TZ with rotating emergency unlocking	**087256** Lead seal kit TZ-C1937
Safety screws Packaging unit: 100 pcs.	**M4 x 14**	For actuator 079739, 079740, 079741 and 079742	**074063** M4X14/V100
	M5 x 10	For actuator 016849, 072251, 100406 and 100407	**073455** M5X10/V100
	M5 x 16	For hinged actuator 024299 and 024298	**073456** M5X16/V100
	M5 x 25	For hinged actuator 048850 and 057950	**073457** M5X25/V100
	M3 x 40	For actuator head NZ and TZ	**075530** M3X40/V100
	M3 x 70	For actuator head NZ.VZ..VSE and NZ.VZ..VSM	**075531** M3X70/V100

Miscellaneous accessories

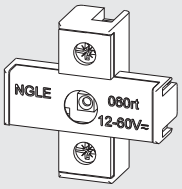
▶ **LED function display**

LED function display
Upgrade kits with LEDs are available for the safety switches N1A and NZ. The intensity of the light from the indicators is always the same, independent of the voltage applied.

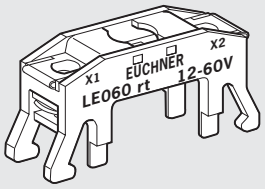
Notice: The LED function display can only be used in conjunction with double switching elements.

LED function display

Dimension drawings



NGLE...



LE...

Ordering table

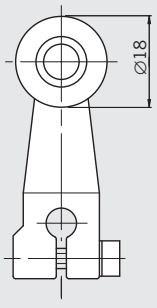
Designation	Version	Voltage					
		12-60 V red LED	12-60 V yellow	12-60 V green	110 V LED red	230 V red LED	230 V yellow LED
LED function display NGLE	For safety switch NZ	**029220** NGLE060RT	**029222** NGLE060GE	**029221** NGLE060GR	**045822** NGLE110RT	**045825** NGLE220RT	**045827** NGLE220GE
LED function display LE	For safety switch N1A	**035495** LE060RT	**035497** LE060GE	**035496** LE060GR	**045579** LE110RT	**045582** LE220RT	**045584** LE220GE

▶ **Replacement roller arm**

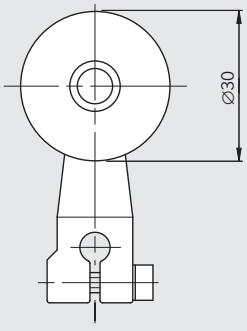
Replacement roller arm
Replacement roller lever for safety switches type 1 with lever arm. As the switches are safety components, in case of defects we recommend replacing the entire switch. Complete switch heads are not available.

Replacement roller arm

Dimension drawings



NHS (steel roller)
NHB (plastic roller)



NHBC569

Ordering table

Designation	Version	Order no./item
Replacement roller arm	**Replacement plunger** For NZ.HS	**012043** Roller arm NHS
	Replacement plunger For NZ.HB	**012042** Roller arm NHB
	replacement plunger For NZ.HB...C569	**012044** Roller arm NHBC569

For technical data, see page 163

Miscellaneous accessories

- **Emergency unlocking for safety switches STA and TX**
- **Release for safety switches TX**
- **Lock for emergency unlocking with manual return for safety switches TX**
- **Triangular key for safety switches TZ**

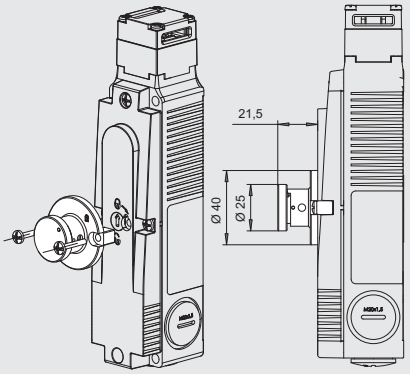
Emergency unlocking
Is used for the manual release of the guard locking without tools. The emergency unlocking mechanism must be returned to the locked state manually. Sealing can be fitted to protect against tampering.
Attention: Prior to mounting, the locking screw for the mechanical release must be removed.

Release
Is used for the manual release of the guard locking. The integrated spring automatically resets the emergency unlocking to the locked state. Sealing can be fitted to protect against tampering.
Attention: Prior to mounting, the locking screw for the mechanical release must be removed.

Lock
The lock is used in combination with safety switch TX. The mechanical key release enables authorized personnel to actuate the mechanical release using the related key in certain situations. The unlocking mechanism holds the solenoid in the "unlocked" position.
Two screws are used to fix the lock to the cover of the safety switch TX (above the mechanical release).
Attention: Prior to mounting, the locking screw for the mechanical release must be removed.

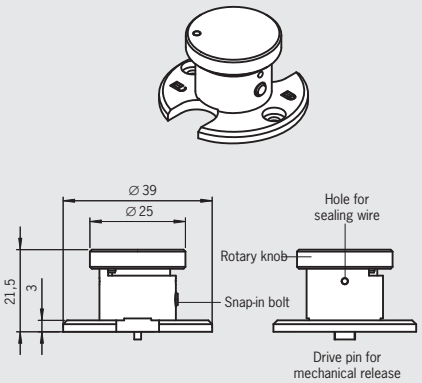
- Please order safety switch TX separately
- 2 keys are included
- Every safety switch of series TX can be upgraded to include a lock

Emergency unlocking
For safety switch STA

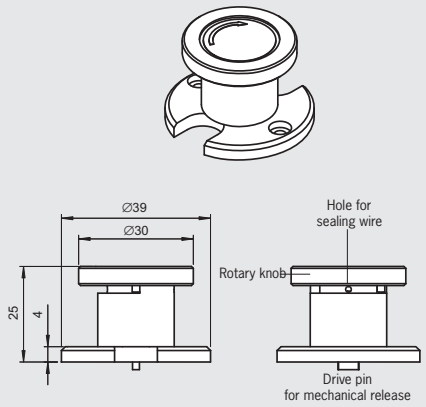


Emergency unlocking
For safety switches TX

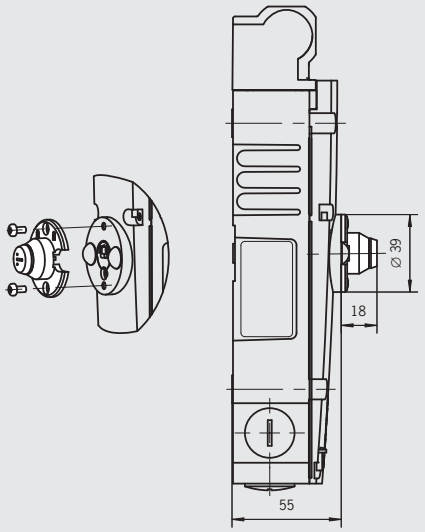
Dimension drawings



Release
For safety switches TX



Lock
For safety switches TX



Ordering table

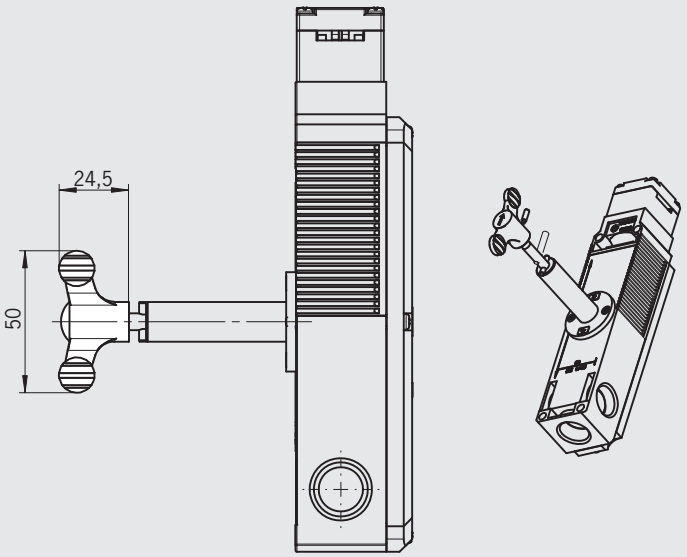
Designation	Version	Use	Order no./item
Emergency unlocking	incl. 2 screws 3.5 x 19	For safety switch STA	**099876** Emergency unlocking STA
	incl. 2 screws M3 x 6	For safety switches TX	**094771** Emergency unlocking TX
Release	incl. 2 screws M3 x 6	For safety switches TX	**094773** Release with automatic return TX
Lead seal kit		For emergency unlocking TX and release TX	**087256** Lead seal kit
Lock	Unique locking (unique key needed to open)	For safety switches TX	**079796** Lock TX
	Identical locking (identical locks)	For safety switches TX	**079795** Lock TX
	Replacement key (2 x) for identical locking	For safety switches TX	**077206** Replacement key TX
triangular key	DIN 22417 M5 100 mm	For safety switches TZ	**103057** Triangular key

Miscellaneous accessories

- **Handle for escape release**

Handle for escape release
Can be mounted on all escape release actuator shafts C1993 for safety switches STA for easier use.

Handle for escape release
For safety switch STA



Ordering table

Designation	Use	Order no./item
Handle for escape release	For safety switch STA With escape releases with long actuator shaft (74.7 mm)	**105329** Escape release handle

For technical data, see page 163

Miscellaneous accessories

- **Wire front release (bowden) (no automatic return)**
- **Handle for wire front release (bowden)**
- **Safety screws**
- **replacement screws**

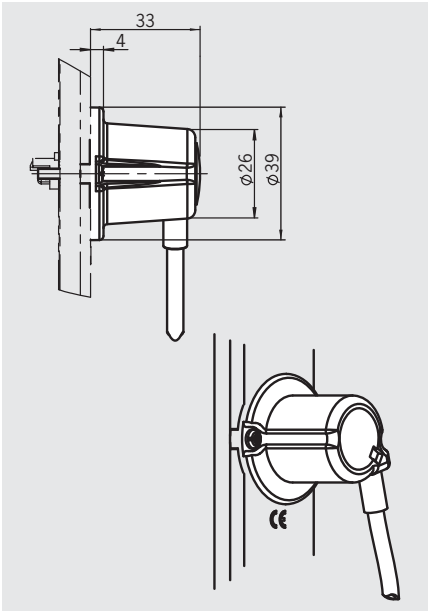
Wire front release (bowden)
Flexible routing of the pull wire permits release of the guard locking in inaccessible installation situations.

- Usage as emergency unlocking if the safety switch is mounted in an inaccessible position
- Usage as escape release for unlocking the guard locking from the danger zone
- Can be retrofitted to all series STA safety switches

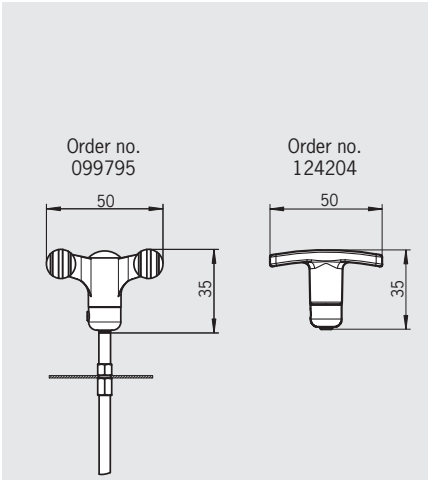
Safety screws
To prevent unscrewing of actuators and actuating heads. The screws can be tightened using a normal tool, but cannot be removed again.

Replacement screws
For mounting actuating heads (not safety screws).

Wire front release (bowden)
For safety switch STA



Handle for wire front release (bowden)
For safety switch STA

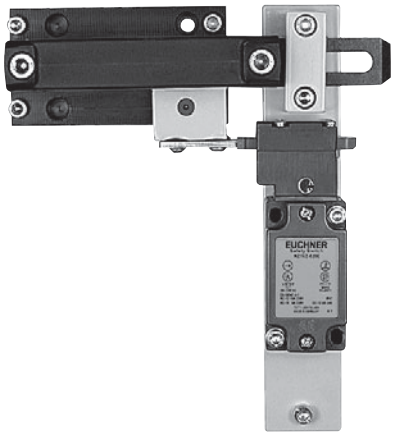


Ordering table

Designation	Version	Detent mechanism	Use	Order no.
Wire front release (bowden) incl. pull wire and sheath	Length 6 m (2 m sheathed)	No automatic return	For safety switch STA	**096230** AE-B-A1-02,0-096230
		Automatic return	For safety switch STA	**097747** AE-B-A1-02,0-F-097747
	Length 6 m (3 m sheathed)	No automatic return	For safety switch STA	**098313** AE-B-A1-03,0-098313
		Automatic return	For safety switch STA	**111233** AE-B-A1-03,0-F-111233
	Length 6 m (4 m sheathed)	No automatic return	For safety switch STA	**098314** AE-B-A1-04,0-098314
Bowden cable Without sheath	Length 6 m	Automatic return	For safety switch STA	**124770** AE-B-A1-06,0-F-124770
		No automatic return	For safety switch STA	**125582** AE-B-A1-06,0-125582
Sheath For bowden cable	Length 50 m	-	For safety switch STA	**123032** AY-CAH-50,0-123032
Handle for wire front release (bowden)		-	For safety switch STA	**099795** Handle for wire front release (bowden)
				124204 AY-HDL-124204

Bolts for guards

- **For safety switches NZ.VZ and NZ.VZ.VS**
- **Bolt NZ-.B with ball detent mechanism**
- **Bolt NZ-.R2 with detent knob**
- **For doors hinged on the right or left**



Special features

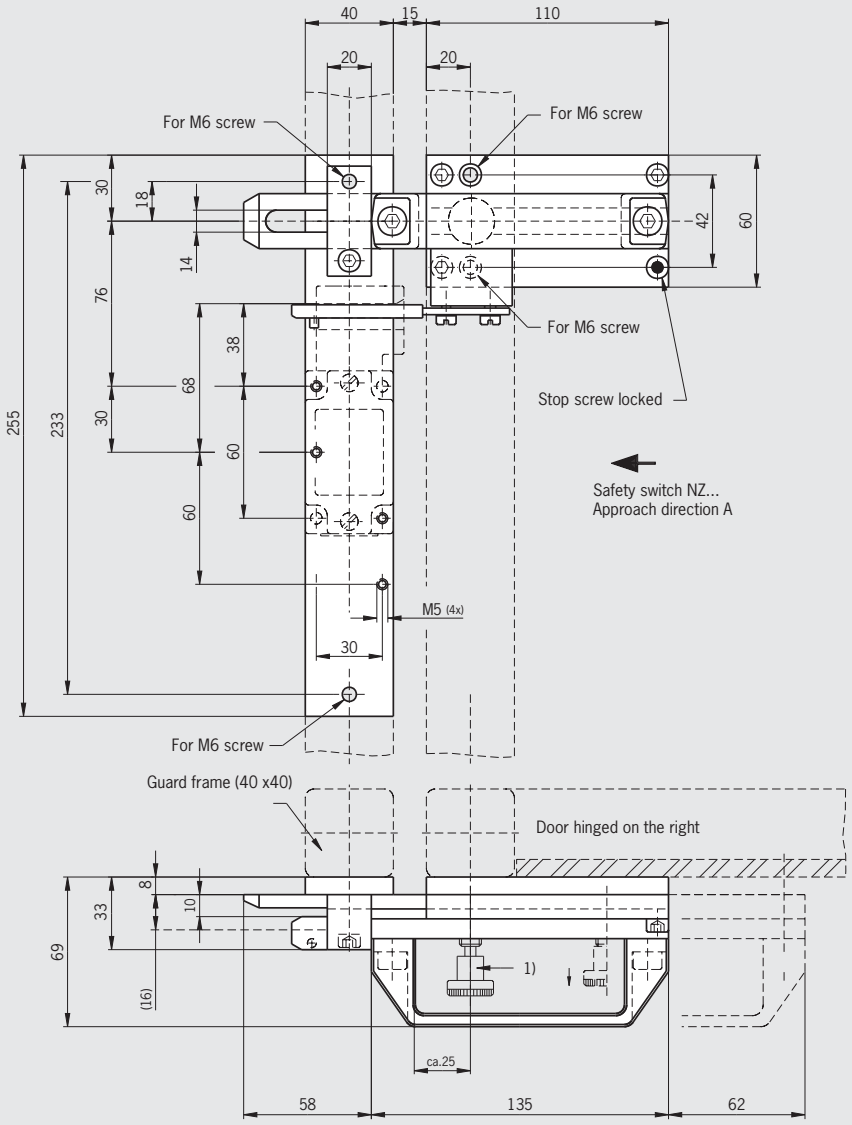
- Bolt **NZ-.B** latches in open and closed position
  - Prevents unintentional opening and closing of the bolt
- Bolt **NZ-.R2** latches in open and closed position. Unlocked by pulling the detent knob upward

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Easy to use
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Bolt for safety switches NZ.VZ and NZ.VZ.VS

Dimension drawings (here: shown with detent knob)



1) Bolt with detent mechanism:
latches in open position and prevents unintentional closing of the bolt.
Latches in closed position and prevents unintentional opening of the bolt.
Unlocked by pulling the detent knob upward.

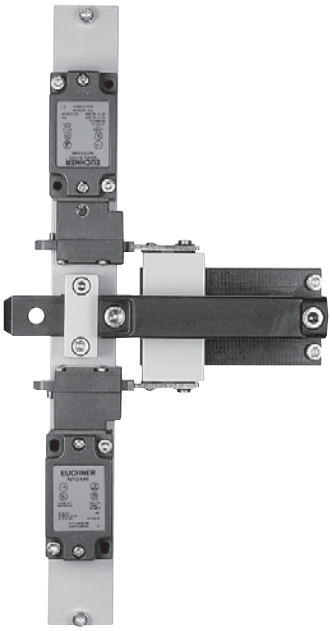
Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ-A	Without	For doors hinged on the right, actuator included	**057734** Bolt NZ-A
Bolt NZ-C	Without	For doors hinged on the left, actuator included	**057735** Bolt NZ-C
Bolt NZ-AB	Ball detent mechanism	For doors hinged on the right, actuator included	**083890** Bolt NZ-AB
Bolt NZ-CB	Ball detent mechanism	For doors hinged on the left, actuator included	**083892** Bolt NZ-CB
Bolt NZ-AR2	Detent knob	For doors hinged on the right, actuator included	**078455** Bolt NZ-AR2
Bolt NZ-CR2	Detent knob	For doors hinged on the left, actuator included	**078456** Bolt NZ-CR2

For technical data, see page 163

Bolts for guards

▶ **For 2 safety switches NZ.VZ on one bolt**



Special features

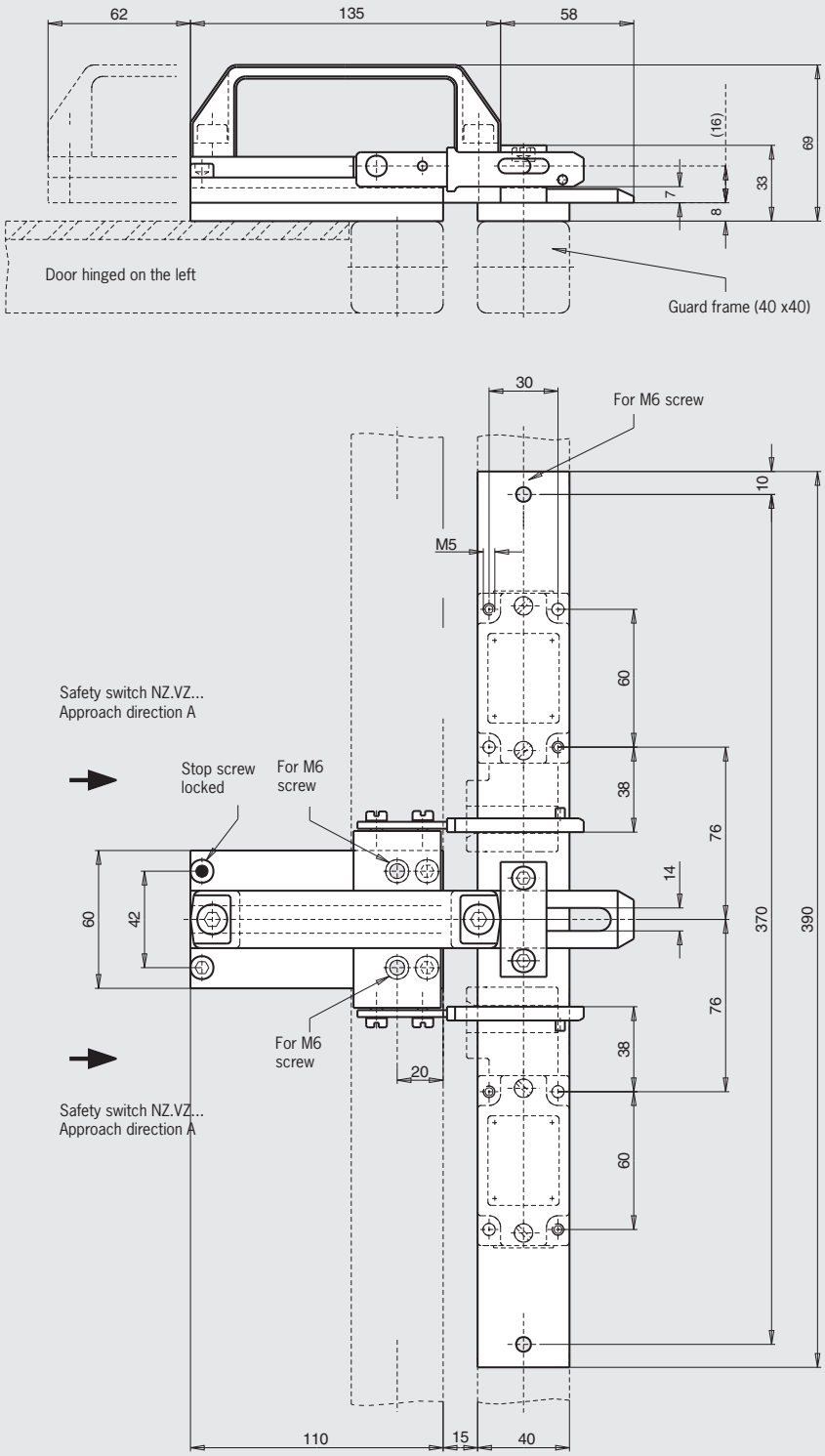
- One bolt for 2 safety switches
  - A higher safety category according to EN ISO 13849-1 (e.g. category 4) is achieved
- Bolt can be used for doors hinged on the right or left

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Bolt for 2 safety switches NZ.VZ on one bolt

Dimension drawings

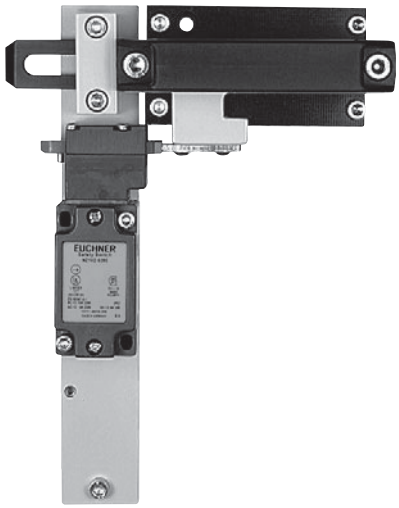


Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ-AC	Without	For doors hinged on the right or left, 2 safety switches on one bolt, actuator included	**076188** Bolt NZ-AC

Bolts for guards

- **For safety switches NZ.VZ**
- **Lever for escape release from the danger zone**
- **Bolt with detent knob**
- **For doors hinged on the right or left**



Special features

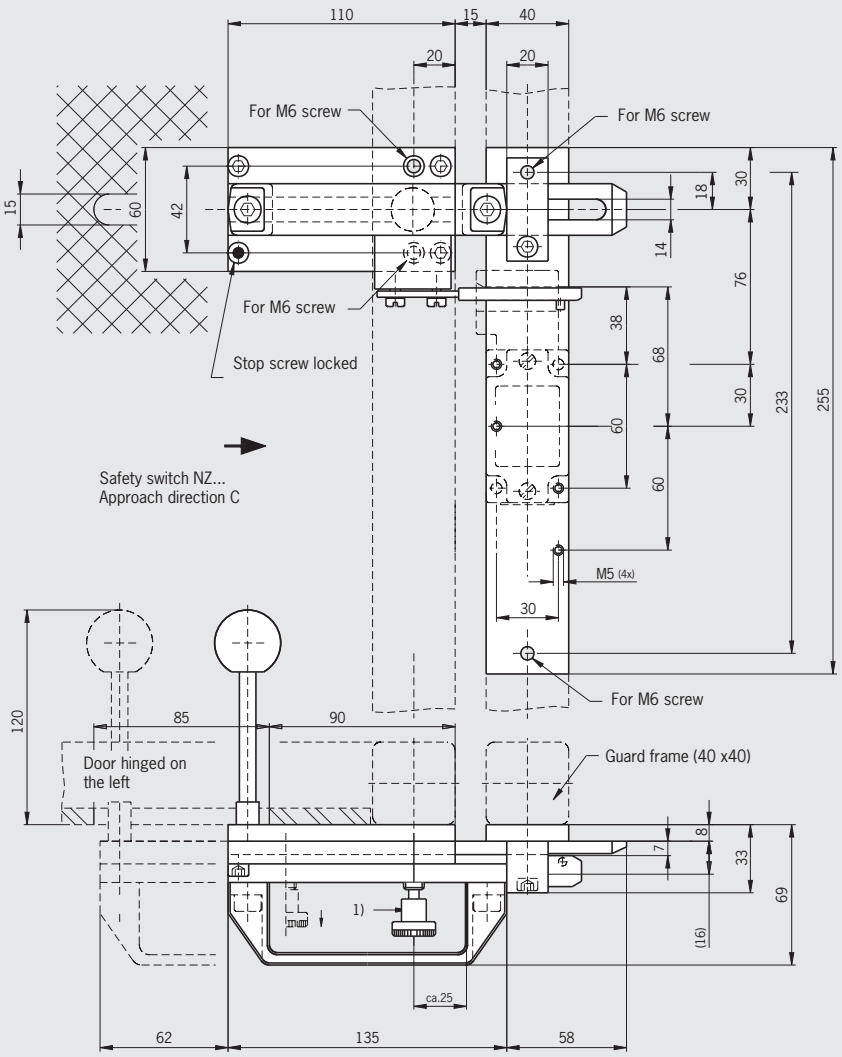
- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Bolt for safety switches NZ.VZ

Dimension drawings



1) Bolt with detent mechanism:
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pulling the detent knob upward.

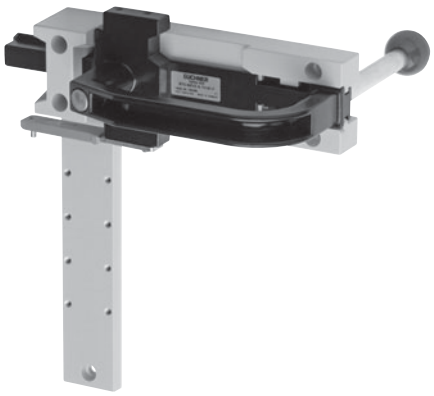
Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ-AF	Detent knob	For doors hinged on the right, Escape release from the danger zone, actuator included	**078451** Bolt NZ-AF
Bolt NZ-CF	Detent knob	For doors hinged on the left, Escape release from the danger zone, actuator included	**078452** Bolt NZ-CF

For technical data, see page 163

Bolts for guards

- **For safety switches NZ.VZ and NZ.VZ.VS**
- **Material: Die-cast aluminum**
- **Lever for escape release from the danger zone (optional)**
- **For doors hinged on the right or left**



Special features
(only for bolt BTC-NZVZ-S-TH-01-F with escape release)

- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt. Unlocked by pressing the knob
- Lever for escape release from the danger zone (optional)

Features

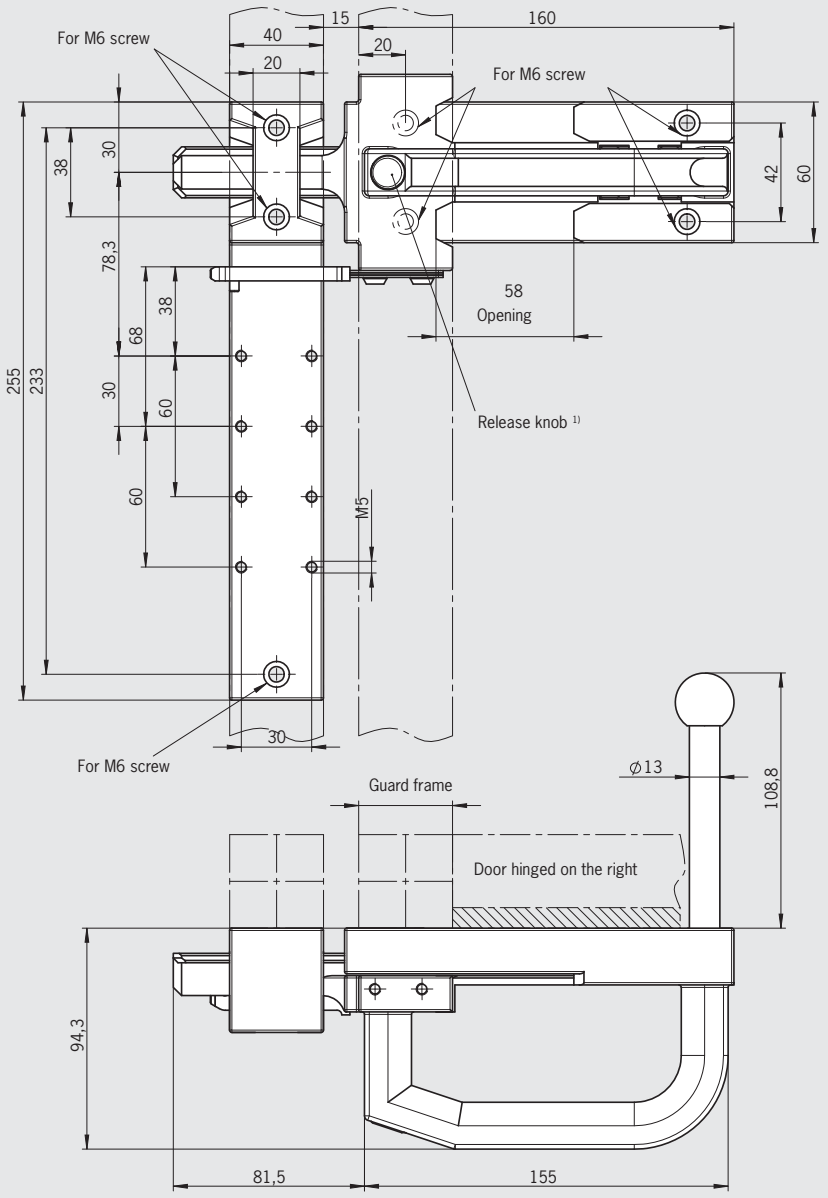
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary

Notes

- Actuator included
- Order safety switch separately

Bolt for safety switches NZ.VZ and NZ.VZ.VS

Dimension drawings (here: shown with escape release)



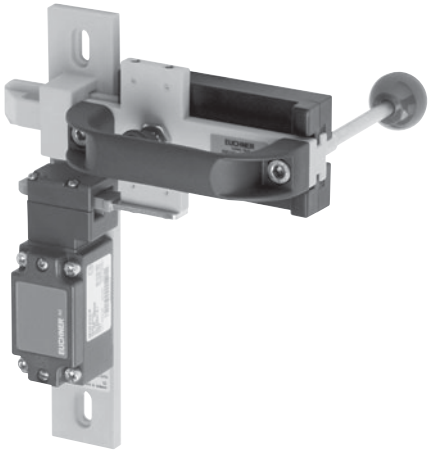
1) Bolt with detent mechanism (only for bolt BTC-NZVZ-S-TH-01-F with escape release):
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pressing the knob

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt BTC-NZVZ-S-TH-01-F	1 x detent mechanism open	For doors hinged on the right or left, with escape release	**104399** Bolt BTC-NZVZ-S-TH-01-F
Bolt BTC-NZVZ-S-TH-00-X	Without	For doors hinged on the right or left, without escape release	**104398** Bolt BTC-NZVZ-S-TH-00-X

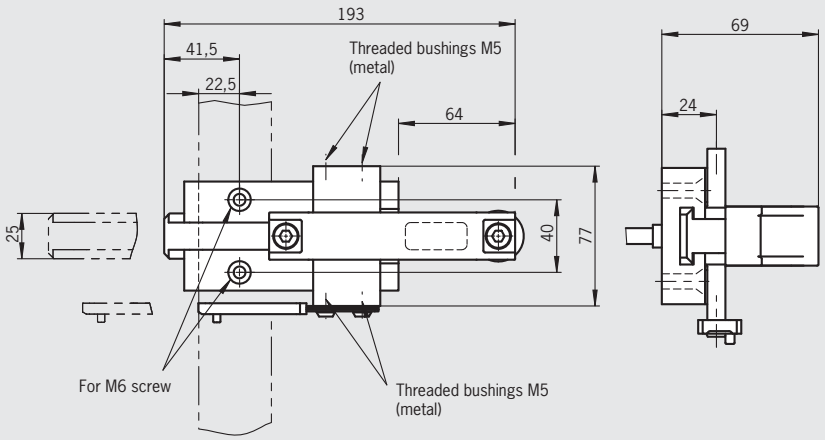
Bolts for guards

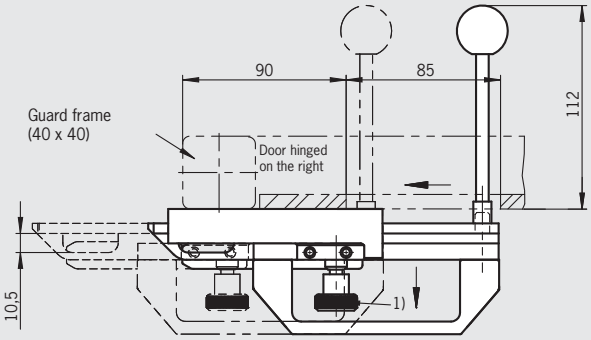
- **For safety switches NZ.VZ**
- **Material: reinforced plastic**
- **Lever for escape release from the danger zone**
- **Bolt with detent knob**
- **For doors hinged on the right or left**



Bolt for safety switches NZ.VZ

Dimension drawings





1) Bolt with detent mechanism (only for bolts with escape release): latches in open position and prevents unintentional closing of the bolt. Unlocked by pulling the detent knob upward.

Special features

- Bolt with detent mechanism (only bolts with escape release)
  Bolt latches in open position to prevent unintentional closing of the bolt

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Notes

- Functions only in conjunction with switch bracket **NZ-GFK**
- Actuator included
- Order safety switch separately
- Order switch bracket separately

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ-GFK	Without	For doors hinged on the right or left, without escape release, Actuator included	**096617** Bolt NZ-GFK
Switch bracket NZ-GFK		Separate	**096614** Switch bracket NZ-GFK

For technical data, see page 163

Bolts for guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ...**
- **Bolt with ball handle**
- **For doors hinged on the right or left**

Special features

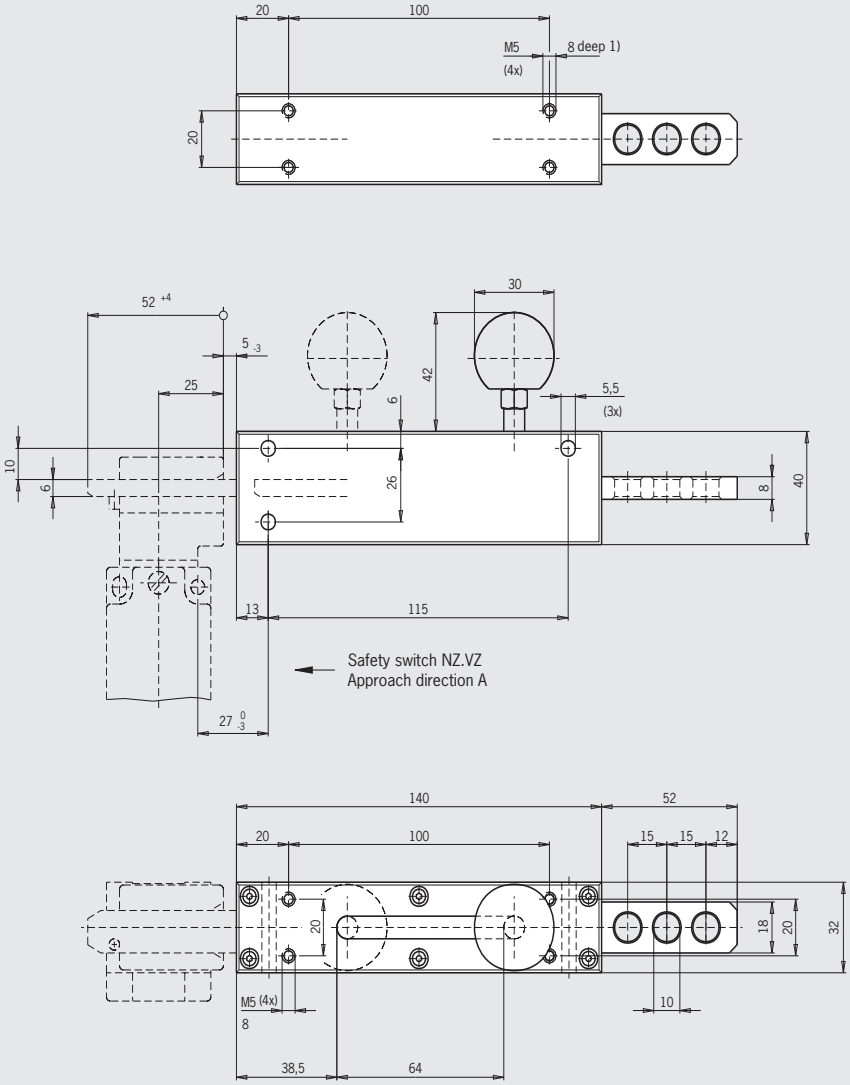
- On bolt **NZ/TZ-S1**, actuating pin on bottom
  - Safety switch fastened as shown in illustration
- On bolt **NZ/TZ-S2**, actuating pin on top
  - Safety switch fastened rotated by 180°
- After the door is opened, the actuator is automatically withdrawn into the bolt by a built-in return spring
  - The operator is protected
    When the door is open there is no risk of injury due to protruding actuator
  - The actuator is protected
    When hinged doors are closed it is ensured that the actuator is not used as an end stop

Features

- Three holes enable padlocks to be attached

Bolt for safety switches NZ.VZ, NZ.VZ.VS and TZ

Dimension drawings



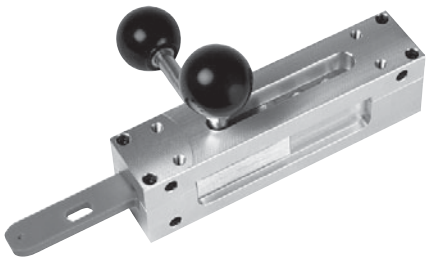
1) Bolt fastening

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ/TZ-S1	without	For doors hinged on the right or left, actuating pin on bottom, Actuator included	**028357** Bolt NZ/TZ-S1
Bolt NZ/TZ-S2	without	For doors hinged on the right or left, actuating pin on top, Actuator included	**028359** Bolt NZ/TZ-S2

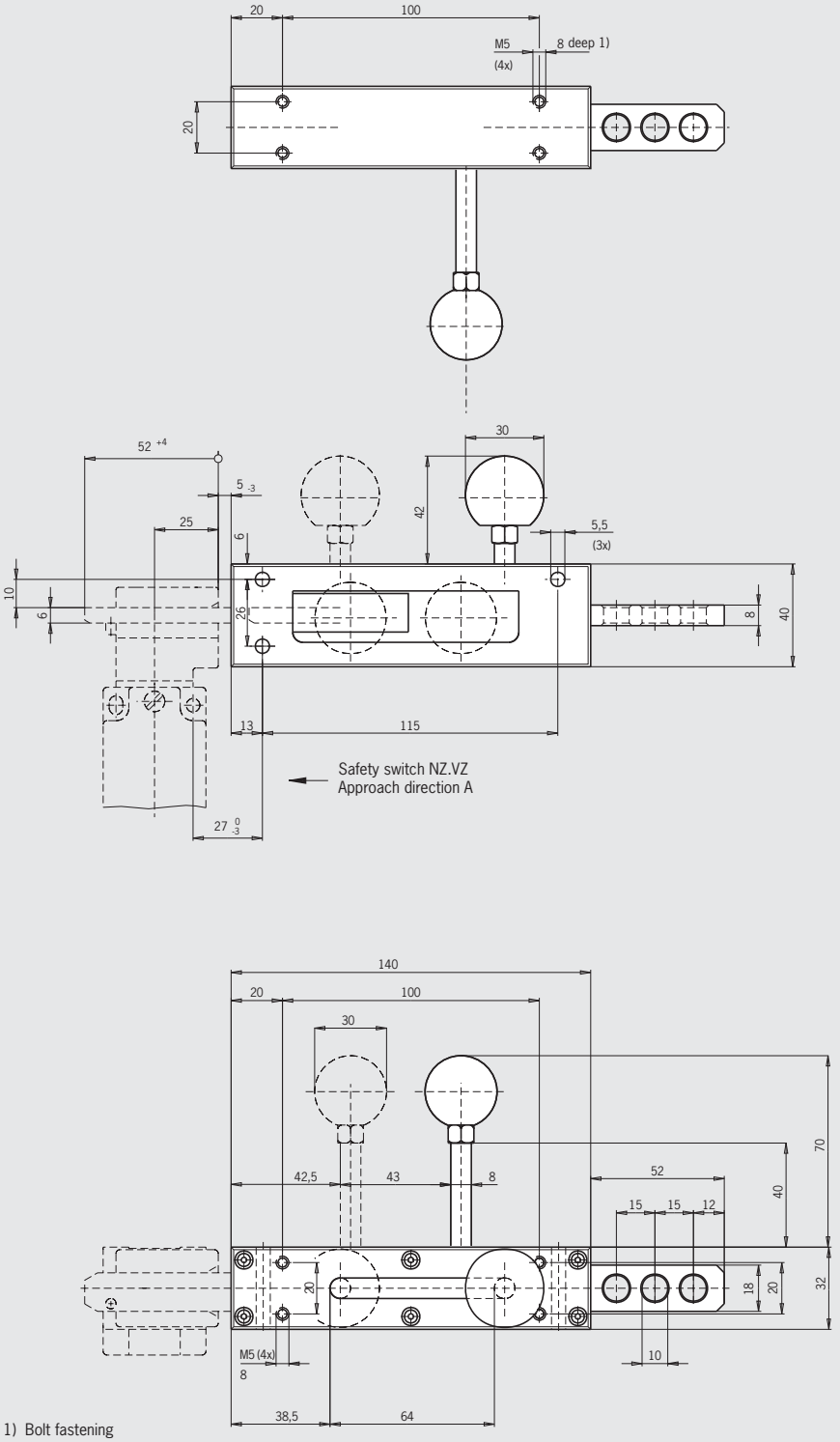
Bolts for guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ with escape release**
- **Lever for escape release from the danger zone**
- **Bolt with ball handle**
- **For doors hinged on the right or left**



Bolt for safety switches NZ.VZ, NZ.VZ.VS and TZ with escape release

Dimension drawings



1) Bolt fastening

Special features

- After the door is opened, the actuator is automatically withdrawn into the bolt by a built-in return spring
  - The operator is protected
    When the door is open there is no risk of injury due to protruding actuator
  - The actuator is protected
    When hinged doors are closed it is ensured that the actuator is not used as an end stop

Features

- The lever for the escape release only enables the doors to be **opened** from inside the danger zone
- Three holes enable padlocks to be attached

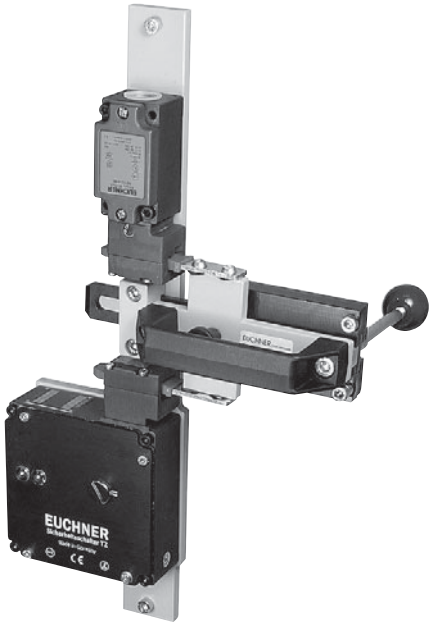
Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ/TZ-S1/AF	Without	For doors hinged on the right, escape release from the danger zone, Actuator included	**079786** Bolt NZ/TZ-S1/AF
Bolt NZ/TZ-S1/CF	Without	For doors hinged on the left, escape release from the danger zone, Actuator included	**079785** Bolt NZ/TZ-S1/CF

For technical data, see page 163

Bolts for guards

- **For safety switches NZ.VZ and TZ with escape release**
- **Lever for escape release from the danger zone**
- **For 2 safety switches on one bolt (NZ and TZ)**
- **For doors hinged on the right or left**



Special features

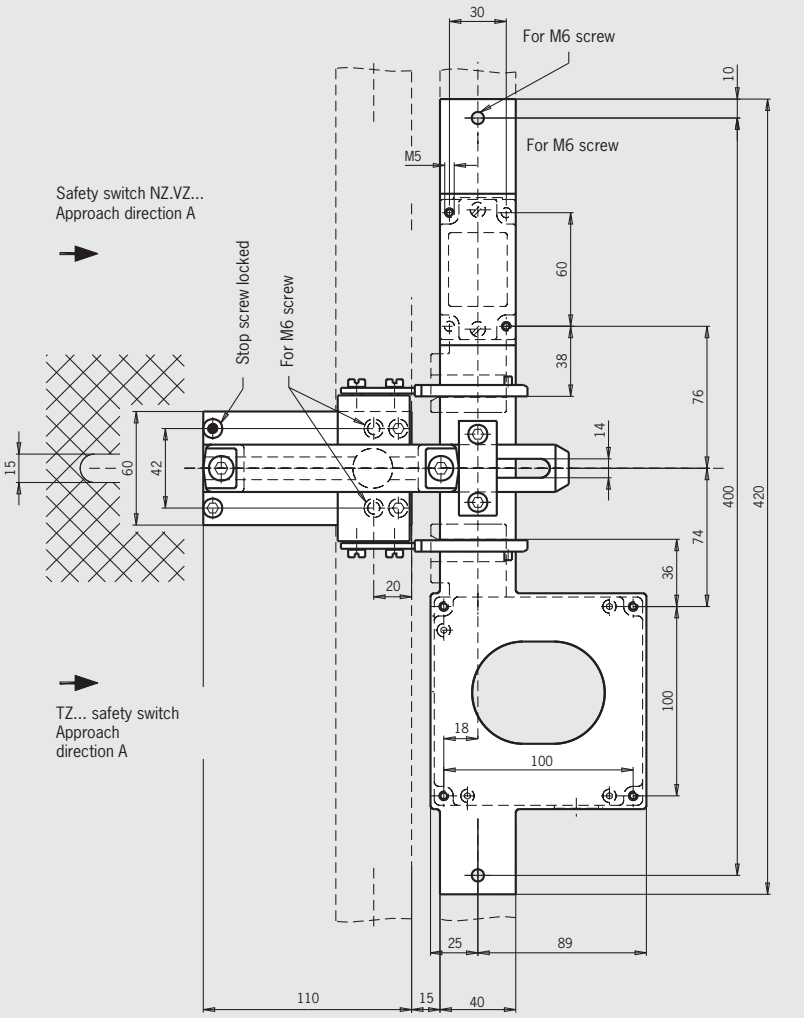
- One bolt for 2 safety switches (NZ and TZ with guard locking)
  - A higher safety category according to EN ISO 13849-1 (e.g. category 4) is achieved
- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt

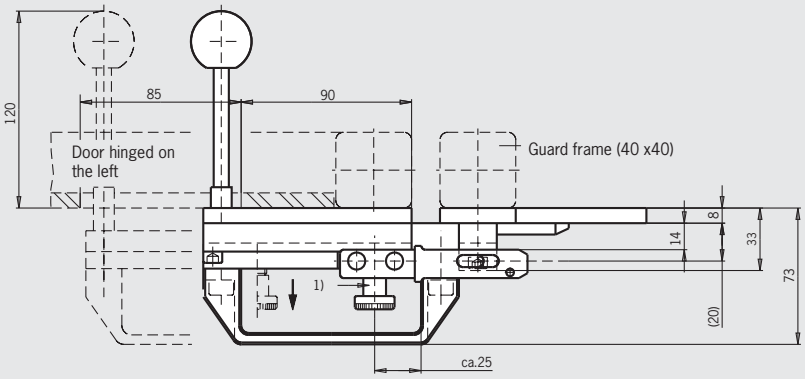
Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Bolt for 2 safety switches NZ.VZ and TZ on one bolt

Dimension drawings





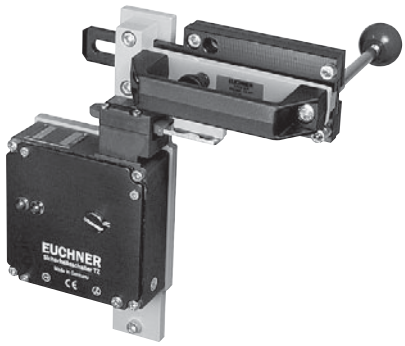
1) Bolt with detent mechanism:
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pulling the detent knob upward.

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt NZ/TZ-ACF	Detent knob	For doors hinged on the right or left, 2 safety switches on one bolt, escape release from the danger zone, Actuator included	**083900** Bolt NZ/TZ-ACF

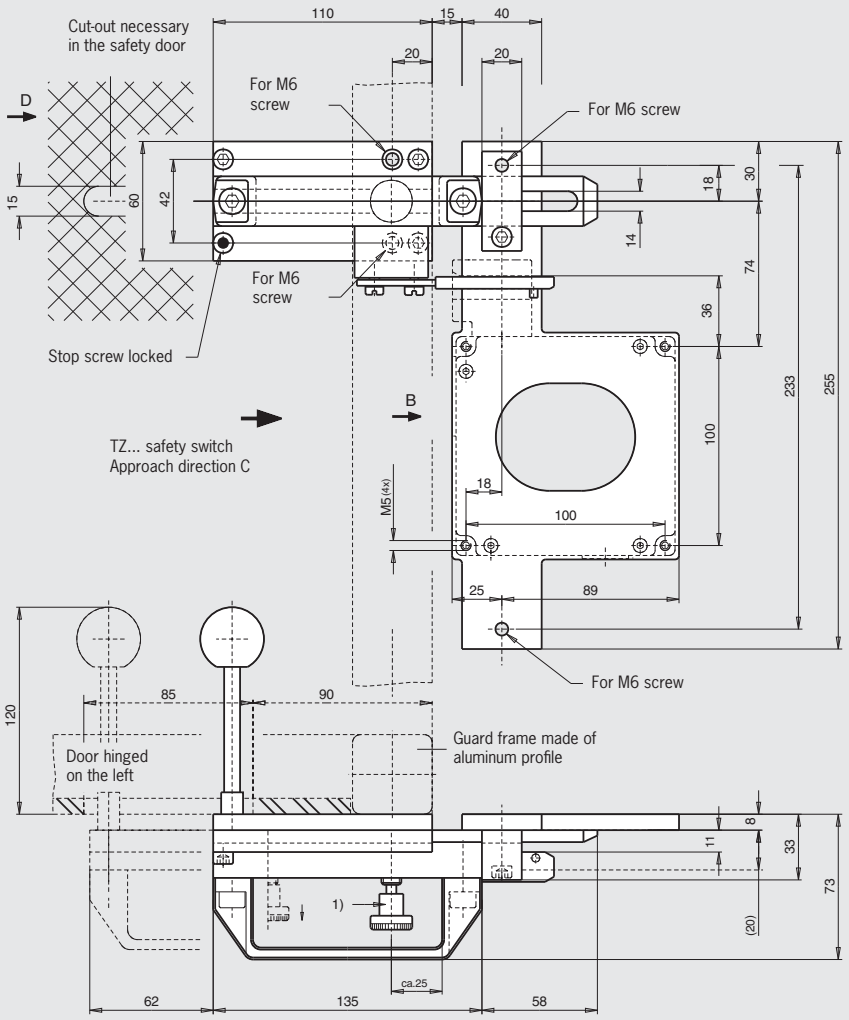
Bolts for guards

- **For safety switches TZ with escape release**
- **Lever for escape release from the danger zone**
- **Optional stainless steel bolt**
- **For doors hinged on the right or left**



Bolt for safety switch TZ with escape release

Dimension drawings



1) Bolt with detent mechanism:
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pulling the detent knob upward.

Special features

- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Version in stainless steel

- Suitable for use in the chemical and foodstuff industries
- Screw material stainless steel
- Handle material polypropylene
- Slide strip material polyethylene

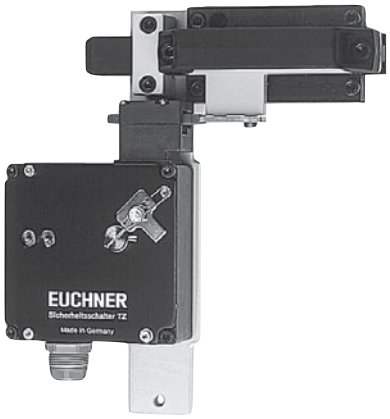
Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt TZ-AF	Detent knob	For doors hinged on the right, escape release from the danger zone, actuator and switch bracket included	**076200** Bolt TZ-AF
Bolt TZ-CF	Detent knob	For doors hinged on the left, escape release from the danger zone, actuator and switch bracket included	**076199** Bolt TZ-CF
Bolt TZ-CF-NIRO	Detent knob	For doors hinged on the left, stainless steel bolt, actuator and switch bracket included	**121716** Bolt TZ-CF-NIRO
Bolt TZ-C-NIRO	Without	For doors hinged on the left, stainless steel bolt, actuator and switch bracket included	**117194** Bolt TZ-C-NIRO
Bolt TZ-A-NIRO	Without	For doors hinged on the right, stainless steel bolt, actuator and switch bracket included	**117193** Bolt TZ-A-NIRO

For technical data, see page 163

Bolts for guards

- **For safety switches TZ**
- **Optional stainless steel bolt**
- **For doors hinged on the right or left**



Features

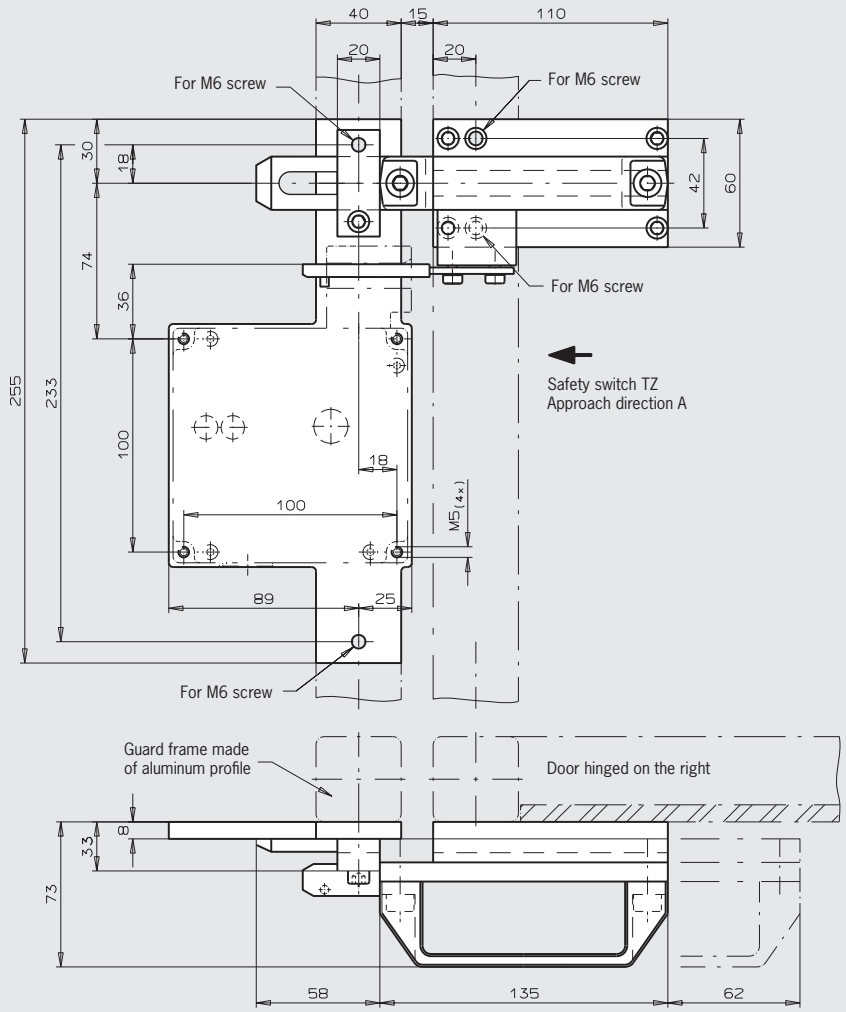
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Easy to use
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Version in stainless steel

- Suitable for use in the chemical and foodstuff industries
- Screw material stainless steel
- Handle material polypropylene
- Slide strip material polyethylene

Bolts for safety switches series TZ

Dimension drawings

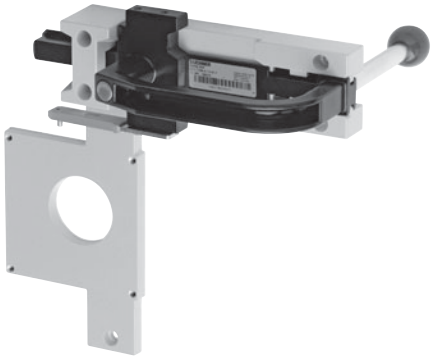


Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt TZ-A	Without	For doors hinged on the right Actuator and switch bracket included	**057736** Bolt TZ-A
Bolt TZ-C	Without	For doors hinged on the left Actuator and switch bracket included	**057737** Bolt TZ-C
Bolt TZ-A-NIRO	Without	For doors hinged on the right, stainless steel bolt, Actuator and switch bracket included	**079798** Bolt TZ-A-NIRO
Bolt TZ-C-NIRO	Without	For doors hinged on the left, stainless steel bolt, Actuator and switch bracket included	**079799** Bolt TZ-C-NIRO
Bolt TZ-A-NIRO-C2101	Without	For doors hinged on the right, stainless steel bolt, Screws made of stainless steel, handle and slide strips made of stainless steel 1.4 Actuator and switch bracket included	**096057** Bolt TZ-A-NIRO-C2101
Bolt TZ-C-NIRO-C2101	without	For doors hinged on the left, stainless steel bolt, Screws made of stainless steel, handle and slide strips made of stainless steel 1.4 Actuator and switch bracket included	**096058** Bolt TZ-C-NIRO-C2101

Bolts for guards

- **For safety switches TZ**
- **Material: Die-cast aluminum**
- **Lever for escape release from the danger zone (optional)**
- **For doors hinged on the right or left**



Special features
(only for bolt BTC-TZ00 A/C-TH-01-F with escape release)

- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt. Unlocked by pressing the knob
- Lever for escape release from the danger zone (optional)

Features

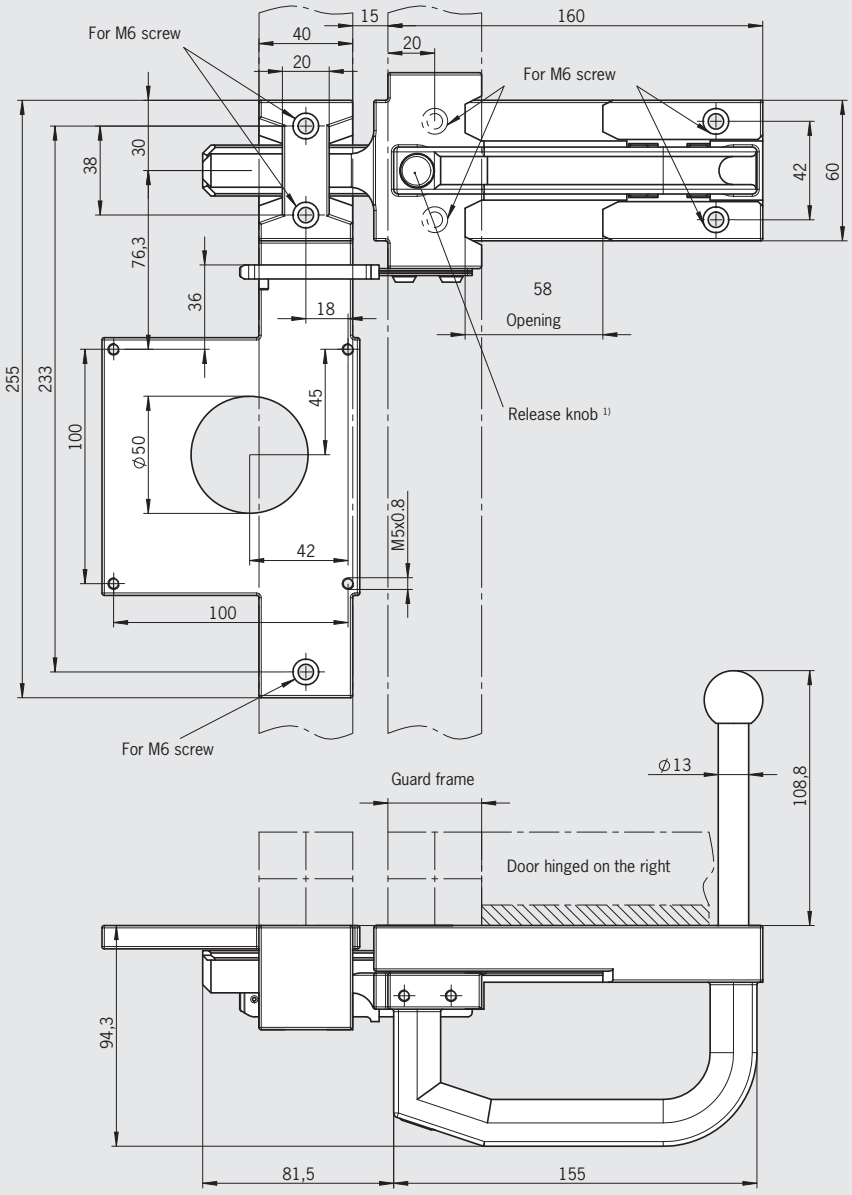
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary

Notes

- Actuator included
- Order safety switch separately

Bolts for safety switches series TZ

Dimension drawings (here: bolt for doors hinged on the right with escape release)



1) Bolt with detent mechanism (only for bolt BTC-TZ00-A/C-TH-01-F with escape release):
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pressing the knob

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt BTC-TZ00-A-TH-01-F	1 x detent mechanism open	For doors hinged on the right, with escape release	**106279** Bolt BTC-TZ00-A-TH-01-F
Bolt BTC-TZ00-C-TH-01-F	1 x detent mechanism open	For doors hinged on the left, with escape release	**106281** Bolt BTC-TZ00-C-TH-01-F
Bolt BTC-TZ00-A-TH-00-X	Without	For doors hinged on the right, without escape release	**106278** Bolt BTC-TZ00-A-TH-00-X
Bolt BTC-TZ00-C-TH-00-X	Without	For doors hinged on the left, without escape release	**106280** Bolt BTC-TZ00-C-TH-00-X

For technical data, see page 163

Bolts for guards

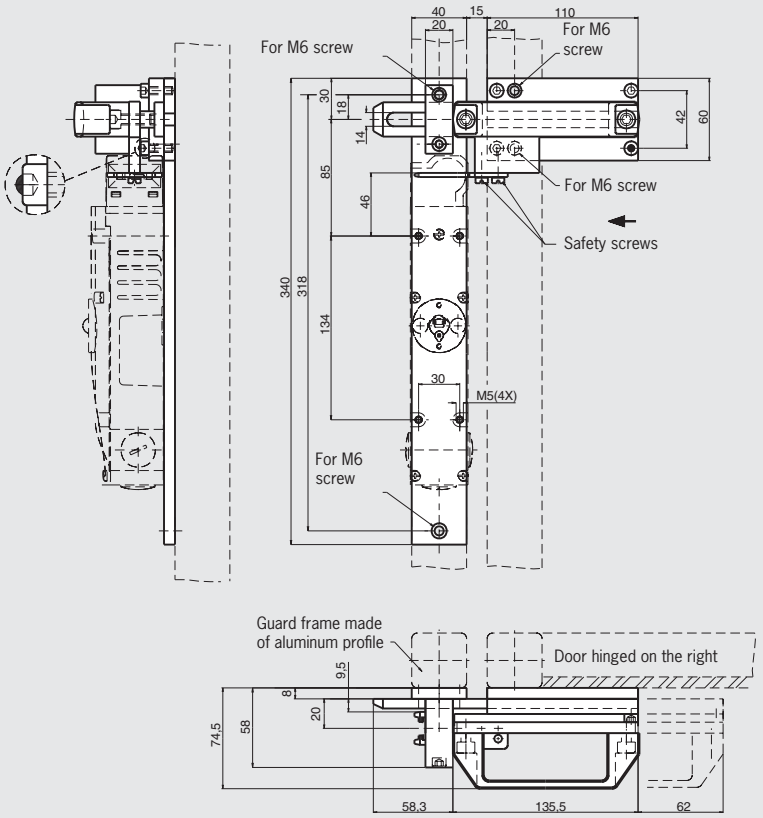
- **For safety switches TX and NX**
- **For doors hinged on the right or left**

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- No additional door handle necessary
- Slot on the bolt tongue permits attachment of padlocks

Bolt for safety switches series TX and NX

Dimension drawings

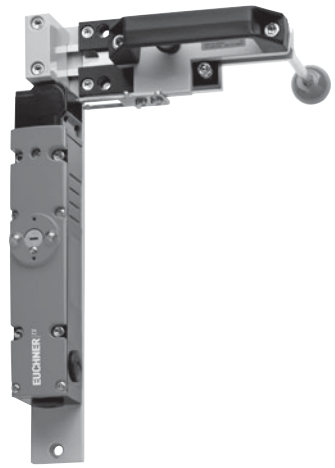


Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt TX-A	without	Without escape release, for doors hinged on the right, actuator and switch bracket included	**082990** Bolt TX-A
Bolt TX-C	without	Without escape release, for doors hinged on the left, actuator and switch bracket included	**082991** Bolt TX-C

Bolts for guards

- **For safety switches with escape release TX...C1991/C2161**
- **For doors hinged on the right or left**

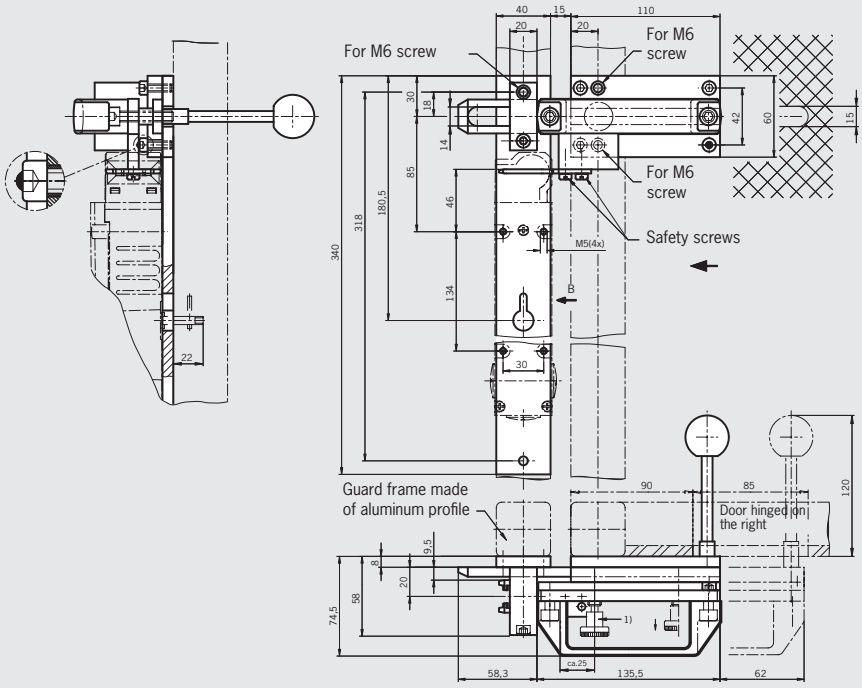


Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- No additional door handle necessary
- Slot on the bolt tongue permits attachment of padlocks

Bolts for safety switches series TX...C1991/C2161
with escape release

Dimension drawings



Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt TX-AF	Detent knob	With escape release, for doors hinged on the right, actuator and switch bracket included	**085392** Bolt TX-AF
Bolt TX-CF	Detent knob	With escape release, for doors hinged on the left, actuator and switch bracket included	**085393** Bolt TX-CF

For technical data, see page 163

Bolts for guards for safety switches STP/STA/SGP/SGA

- **Lever for escape release from the danger zone (optional)**

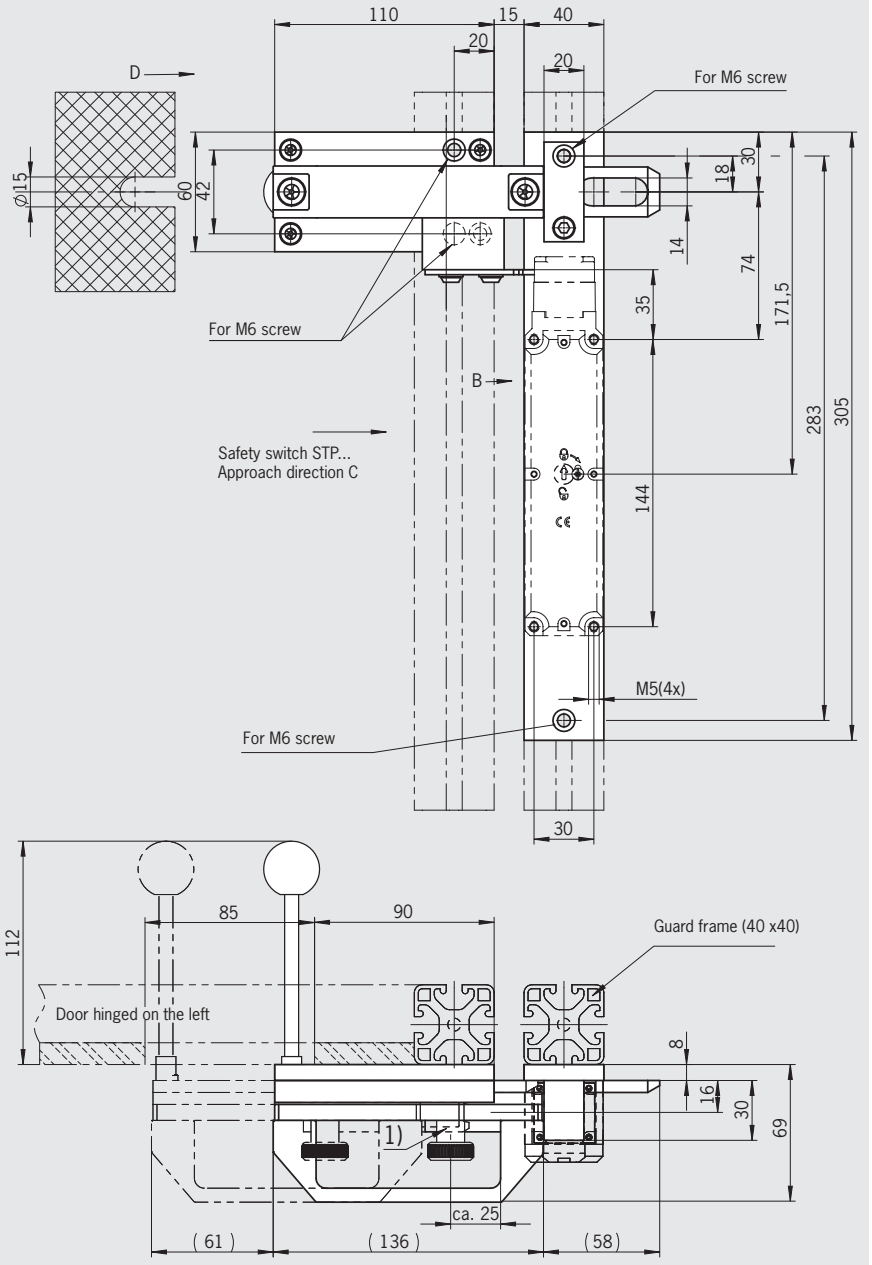
Special features
(only for bolt S-AF and S-CF with escape release)
- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt
- Lever for escape release from the danger zone (optional)

Features
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Notes
- The bolts are only suitable for the series **STP.../STA.../SGP.../SGA...**
- Actuator included
- Order safety switch separately

Bolt for safety switches STP.../STA.../SGP.../SGA...

Dimension drawings (here: shown with escape release)



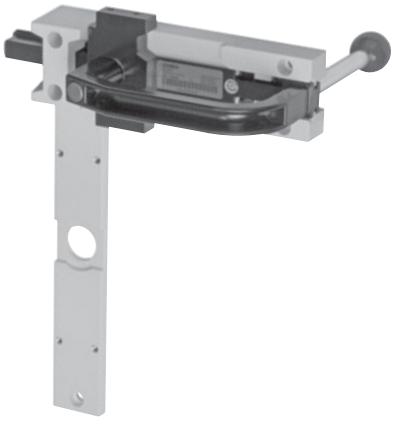
1) Bolt with detent mechanism (only for bolt S-AF and S-CF with escape release):
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pulling the detent knob upward.

Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt S-AF	**Detent knob**	For doors hinged on the right with escape release	**096390** Bolt S-AF
Bolt S-CF	**Detent knob**	For doors hinged on the left with escape release	**096391** Bolt S-CF
Bolt S-A	**without**	For doors hinged on the right without escape release	**096384** Bolt S-A
Bolt S-C	**without**	For doors hinged on the left without escape release	**096385** Bolt S-C

Bolt for guards for safety switches STA/SGA

- **Material: Die-cast aluminum**
- **Lever for escape release from the danger zone (optional)**
- **For doors hinged on the right or left**



Special features
(only for bolt BTC-ST/G-S-TH-01-F with escape release)

- Bolt with detent mechanism
  Bolt latches in open position to prevent unintentional closing of the bolt. Unlocked by pressing the knob
- Lever for escape release from the danger zone (optional)

Features

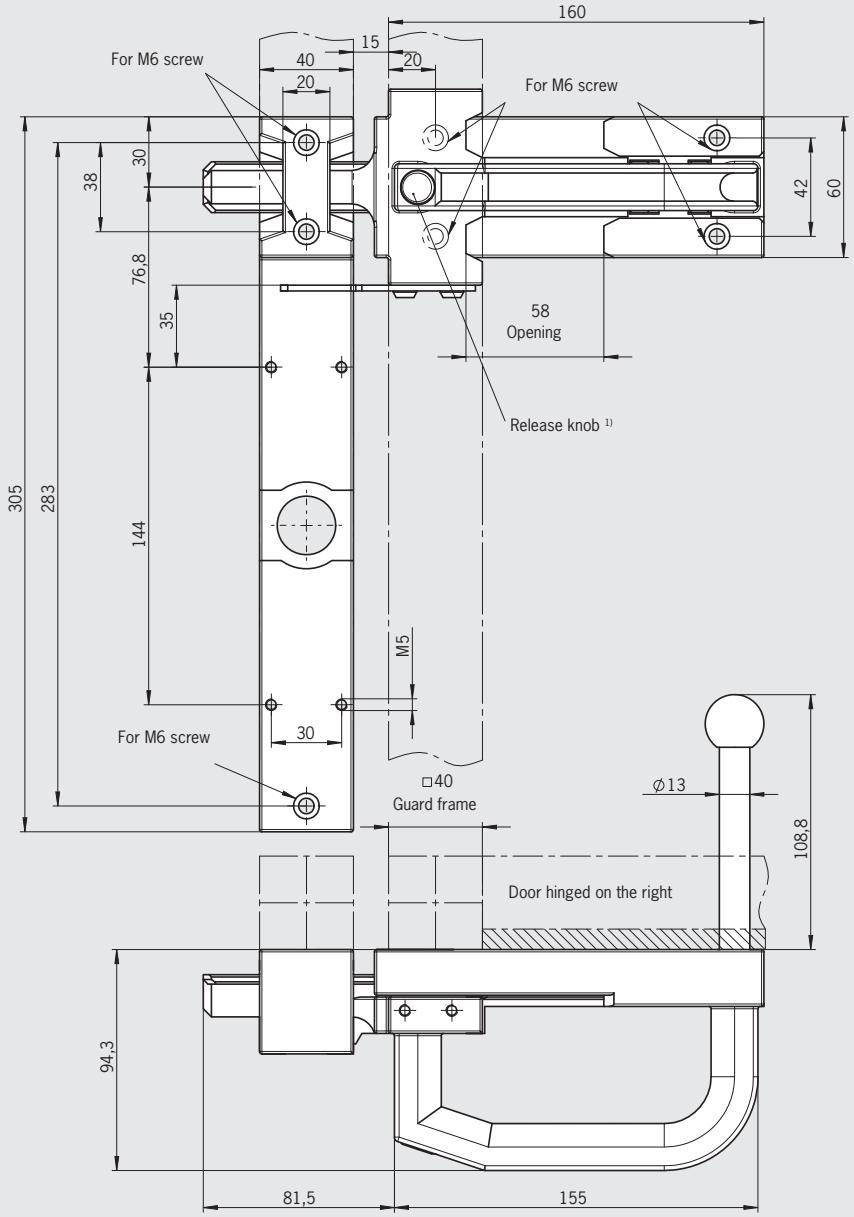
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary

Notes

- The bolts are only suitable for series **STA.../SGA...**
- Actuator included
- Order safety switch separately

Bolt for safety switch STA.../SGA...

Dimension drawings (here: shown with escape release)



1) Bolt with detent mechanism (only for bolt BTC-ST/G-S-TH-01-F with escape release):
latches in open position and prevents unintentional closing of the bolt.
Unlocked by pressing the knob

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt BTC-ST/G-S-TH-01-F	1 x detent mechanism open	For doors hinged on the right or left, with escape release	**106285** Bolt BTC-ST/G-S-TH-01-F
Bolt BTC-ST/G-S-TH-00-X	without	For doors hinged on the right or left, without escape release	**106284** Bolt BTC-ST/G-S-TH-00-X

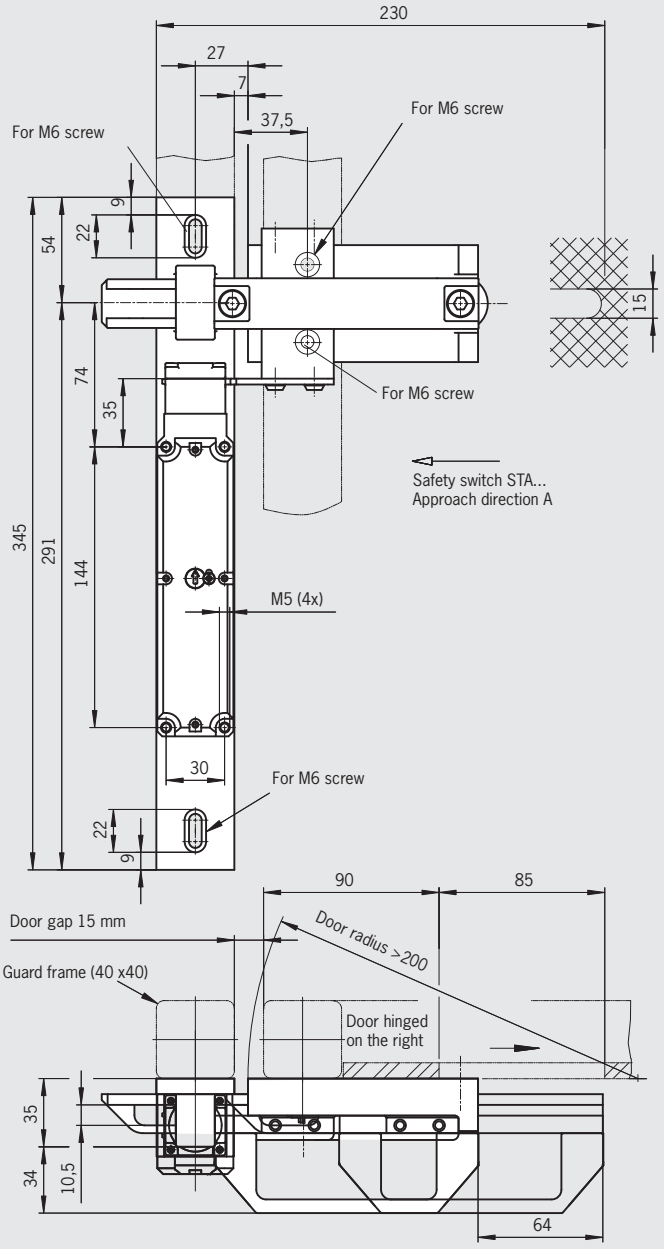
For technical data, see page 163

Bolt for guards for safety switches SGA/STA

- **Material: reinforced plastic**
- **For doors hinged on the left or right**

Bolt for safety switch SGA/STA

Dimension drawings



Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Rugged construction for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Notes

- Functions only in conjunction with switch bracket **TP-GFK**
- Actuator included
- Order safety switch separately
- Order switch bracket separately

Ordering table

Designation	Detent mechanism	Version	Order no./item
Bolt STP-GFK	without	For doors hinged on the right or left, without escape release (also for SGA/STA)	**098121** Bolt STP-GFK
Switch bracket TP-GFK		Separate (also for SGA/STA)	**096613** Switch bracket TP-GFK

Accessories for bolts

- **Adapter NZ/TZ... for safety switches NZ.../TZ... for Bosch EcoSafe 45x45 and 30x30**
- **Replacement handle for EUCHNER bolts**

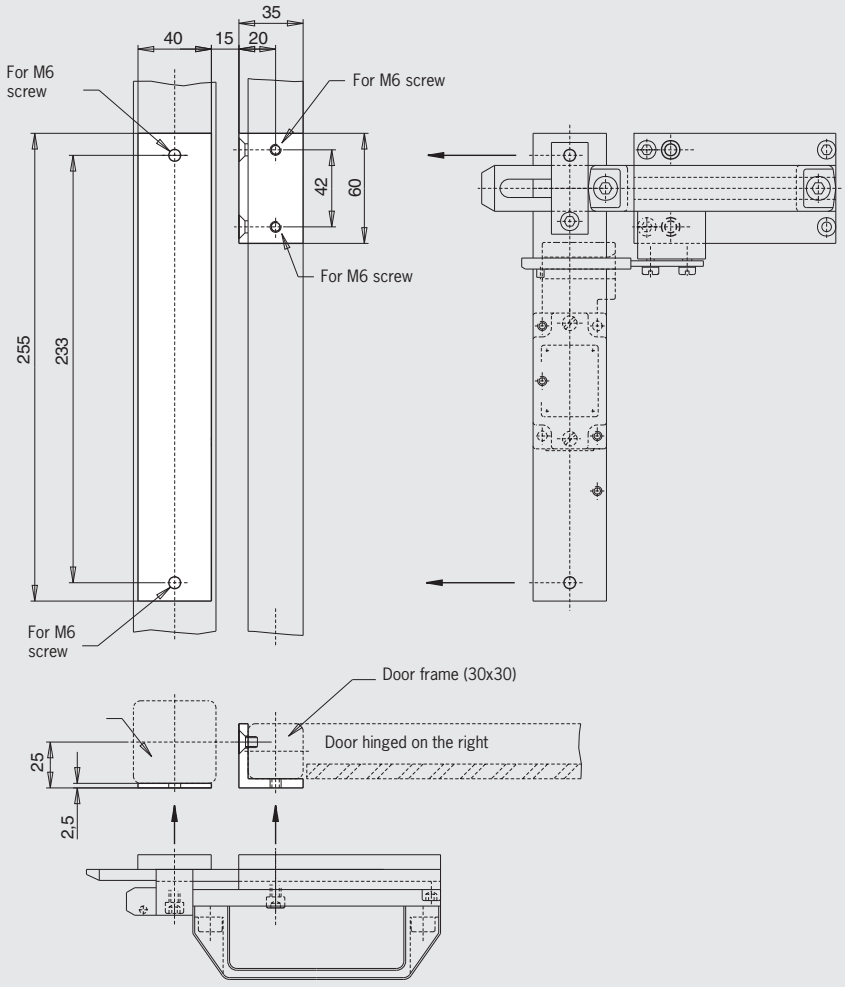
Adapter NZ/TZ

Using the adapter set the bolts **NZ...** and **TZ...** can be fastened to aluminum profiles (Bosch EcoSafe).
The adapter set is only suitable for profiles 45x45 mm in combination with safety doors 30x30 mm

- Simple screw mounting
- Symmetrical design for doors hinged on the right or left

Adapter NZ/TZ...

Dimension drawings

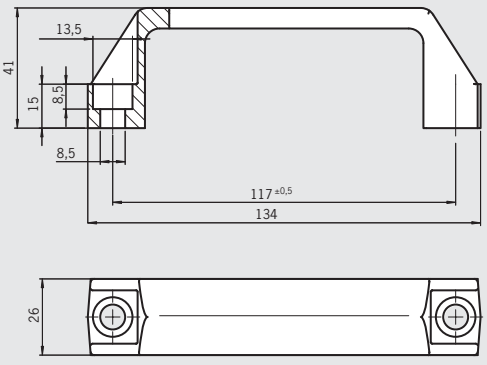


Replacement handle for EUCHNER bolts

- Material: plastic, reinforced polypropylene (PP)
- Color: black, matt
- Temperature resistance up to 100 °C

Replacement handle EUCHNER bolts

Dimension drawings



Ordering table

Designation	Version	Order no./item
Adapter NZ/TZ 45/30	incl. 4 fixing screws for elbow adapter	**079033** Adapter NZ/TZ 45/30
Bolt handle/V5	Packaging unit 5 pieces, screws not included	**093500** Bolt handle/V5

For technical data, see page 163

Accessories for bolts

- **Replacement bolt slide for EUCHNER bolt NZ.../TZ...**

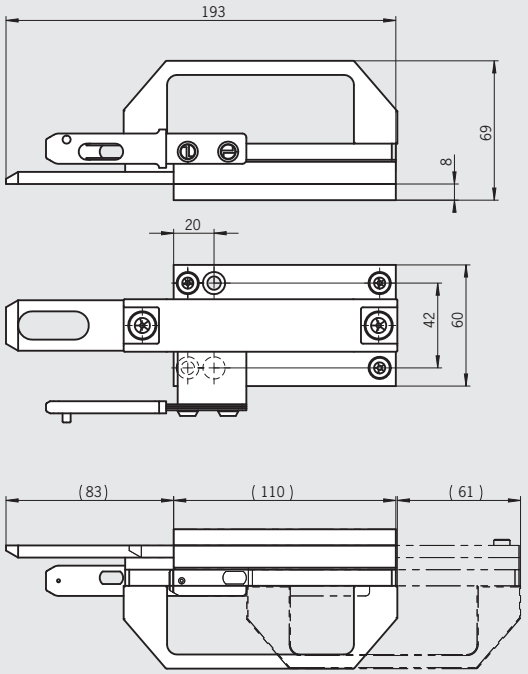
Features
- With upright handle

Notes
- Actuator included

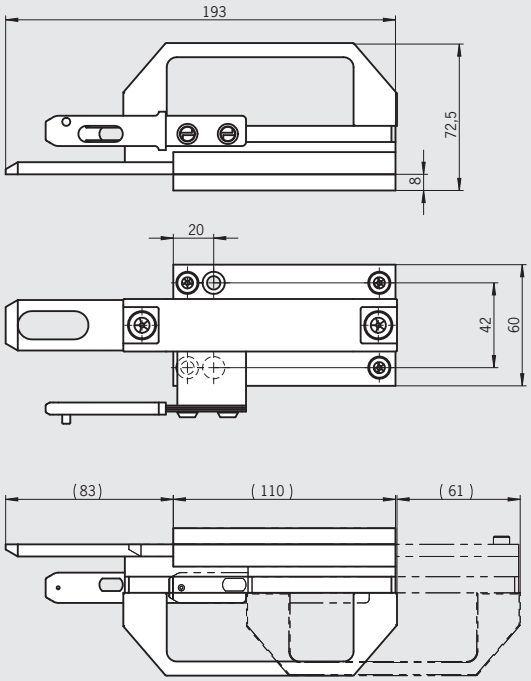
Bolt slide NZ.../TZ...

Dimension drawings

Bolt slide NZ...
(NZ-A shown)



Bolt slide TZ...
(TZ-A shown)



Ordering table

Designation	Version	Order no./item
Bolt slide NZ-A	For safety switches NZ..., for doors hinged on the right, actuator included	**116559** BOLT SLIDE NZ-A
Bolt slide NZ-C	For safety switches NZ..., for doors hinged on the left, actuator included	**116560** BOLT SLIDE NZ-C
Bolt slide TZ-A	For safety switches TZ..., for doors hinged on the right, actuator included	**116561** BOLT SLIDE TZ-A
Bolt slide TZ-A	For safety switches TZ..., for doors hinged on the left, actuator included	**116562** BOLT SLIDE TZ-C

Accessories for bolts

- **Switch bracket for NZ.../TZ...**

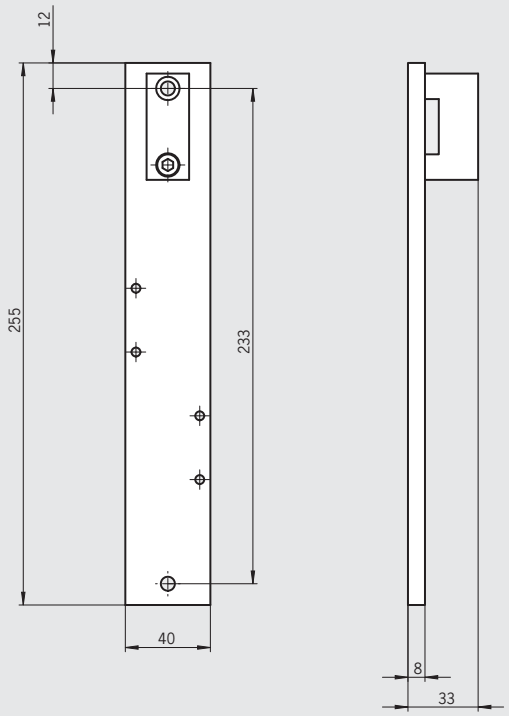
Features

- Simple screw mounting
- Symmetrical design for doors hinged on the right or left

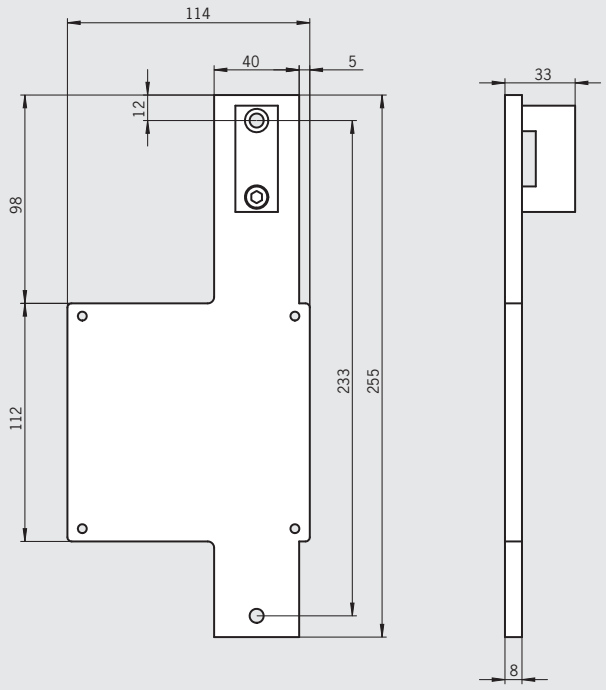
Switch bracket NZ.../TZ...

Dimension drawings

Switch bracket NZ...



Switch bracket TZ...



Ordering table

Designation	Version	Order no./item
Switch bracket NZ	For safety switches NZ... in conjunction with bolt slide NZ...	**116563** SWITCH BRACKET NZ
Switch bracket TZ	For safety switches TZ... in conjunction with bolt slide TZ...	**116564** SWITCH BRACKET TZ

For technical data, see page 163

List of plug connector suppliers

We provide no guarantee for the completeness and correctness of the ordering data given. The data was valid in October 2004. The related manufacturers reserve the right to make changes without notice. The plug connectors and accessories listed are also available from other manufacturers.

▸ Plug connectors and accessories

For plug connector	Function	Manufacturer's designation	
SVM5 5 pins	Female connector M12	**99-0436-57-05** Cable socket	**Binder** www.binder-connector.de
	Female flange connector M12	**09-3442-700-05** flange connector with flexible wires	
	Blanking plug M12	**08-2425-000-000** Protective cap for socket with retaining strap	
CE5 3-pin + N + PE	Mating connector (socket)	**CEE plug as per CEE standard**	
C16-1 6 pins + PE	Female flange connector	**T3107 500** Female receptacle	**Amphenol-Tuchel** www.amphenol-tuchel.com
	Socket crimp contacts for C16-1, VPE 100 pcs.	**VN02 016 0002 (1)** Single contact, silver, 0.5-1.5 mm²	
	Blanking plug	**T6483 000** Protective cap for female receptacle	
HAN10 10 pins + PE	Flange connector 1 cable exit	**19 20 010 0251** Socket housing 1 cable exit	**Harting** www.harting.com
	Socket contacts (installation for flange connector)	**09 20 010 3101** Socket contact insert crimp connection	
	socket contacts for crimping	**09 33 000 6220** Socket crimp contacts 0.5 mm²	
	Blanking plug	**09 20 010 5425** Cover	
RC17-Y coded 17 pins	Female flange connector, solderable for male plug RC17Y)	**RC-17S1Y122000** Flange plug connector 17-pin	**Coninvers** www.coninvers.com
	Blanking plug	**RC-17P1N8A83NN** Protective cap for socket with retaining strap	

▸ Crimp and extraction tools

For plug connector	Function	Manufacturer's designation	
SR6 and SR11	Crimp tool	**932 507-002** XZC 0701	**Hirschmann** www.hirsch-mann.com
	Extraction tool	**931 812-001** XWA 164	
C16-1	Crimp tool	**TA0500 + TA0000163 + TA0002016001** Crimp pliers, jaws and contact receptacle	**Amphenol-Tuchel** www.amphenol-tuchel.com
	Extraction tool	**FG 0300 1461** Extraction tool	
RC12	Crimp tool	**RC-Z2504** Crimp pliers for machined contacts	**Coninvers** www.coninvers.com
	Extraction tool	**RC-Z2494** Extraction tool/insertion tool	
M23 (RC18)	Crimp tool	**RC-Z2504** Crimp pliers for machined contacts	
	extraction tool	**RC-Z2274 / RC-Z2494** [1] Extraction tool	
VP19	Crimp tool	**T98143 DAK 83S-30 / 11-7576T3** Insertion tool	**Litton/Veam** www.littonveam.com
	Extraction tool	**46592-MT50 / 11-7576T3** Removal tool	
UT23	Crimp tool	**Y16RCM** Crimping tool for machined contacts	**Burndy** www.burndy.com
	Extraction tool	**RX2025GE1** Extraction tool	
TB24	Crimp tool	**WT10-04** Crimp tool	**Thomas & Betts** www.tnb.com
	Extraction tool	**TRT16** Contact removal tool	

1) Only with option C1825

Overview

Safety switch series	
N1A	Single limit switches
NB01	Single limit switch, small design
NZ	Position switch NZ
NZ.VZ	Safety switch NZ.VZ
NZ.VZ.VS	Safety switch NZ.VZ.VS
TZ	Safety switch TZ
NX	Safety switch NX
TX	Safety switch TX
SGA	Safety switch SGA
STA	Safety switch STA
STA-TW	Safety switch STA-TW
ESH	Safety hinge ESH

Accessories for safety switches

Safety switch series												Accessories		Page
N1A	NB01	NZ	NZ.VZ	NZ.VZ.VS	TZ	NX	TX	SGA	STA	STA-TW	ESH			
●														164
	●													166
		●												168
			●											172
				●										175
					●									178
						●								181
							●							183
								●						187
									●					189
										●				192
											●			194
												●		195

Single limit switch N1A...

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	2 x 10^7 operating cycles	

Switch

Parameter	Value				Unit
Housing material	Die-cast aluminum, anodized				
Ambient temperature	- 25 ... + 80				°C
Weight	Approx. 0.25				kg
Approach speed, min.	0.1				m/min
Switching element	**N1AD**	**N1AR/N1AB**	**N1ARL**	**N1AW**	
Approach speed, max. [1], depending on actuator	40	80	20	10	m/min
Operating point accuracy depending on actuator [2]	± 0.002	± 0.01	± 0.1	± 0.002	mm

Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching contact	Snap-action switching contact	
Switching element with 1 switching contact	**508** 1 NC ⊖	-	
Switching element with 2 switching contacts	-	**514** 1 NC ⊖ + 1 NO	
Mechanical life	30 x 10^6 operating cycles	1 x 10^6 operating cycles	
Actuating force, min.	15	30	N
Contact closing time	-	< 5	ms
Contact bounce time	-	< 3	ms
Min. switching current at 24 V DC	10		mA
Switching current, max.	6		A
Rated impulse withstand voltage U_{imp}	4		kV
Contact material	Silver alloy, gold flashed		

Connection, cable entry M16 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M16 x 1.5		
Connection cross-section, max.		1.5 mm² per flexible wire		
Degree of protection acc. to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		**508**	**514**	
Conventional thermal current I_{th}		10	10	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		10	6	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 6 A U_e 230 V	I_e 2.5 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 6 A U_e 24 V	

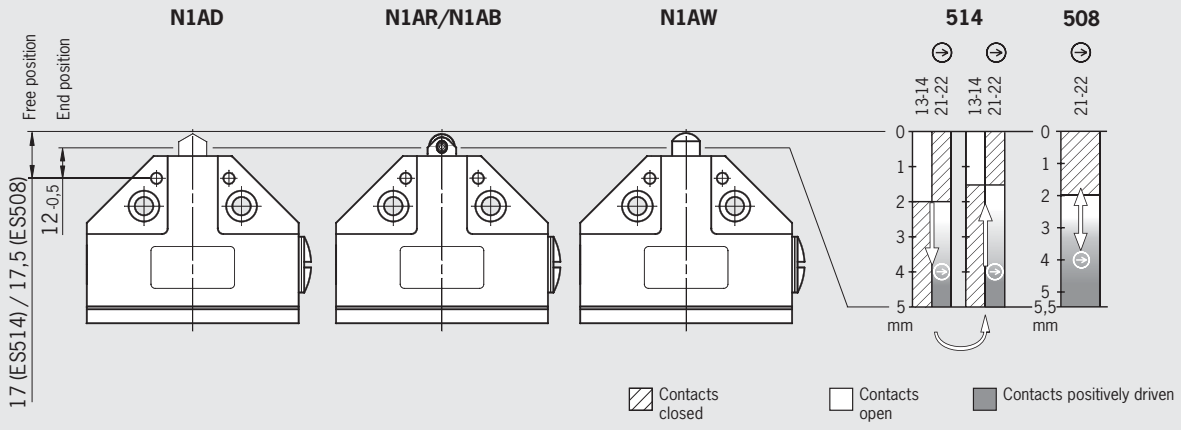
1) The approach speed given applies in conjunction with EUCHNER trip dogs at an approach angle of 30°. At a smaller approach angle this approach speed can be exceeded.
2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles

Connection, plug connector SVM5 (M12)

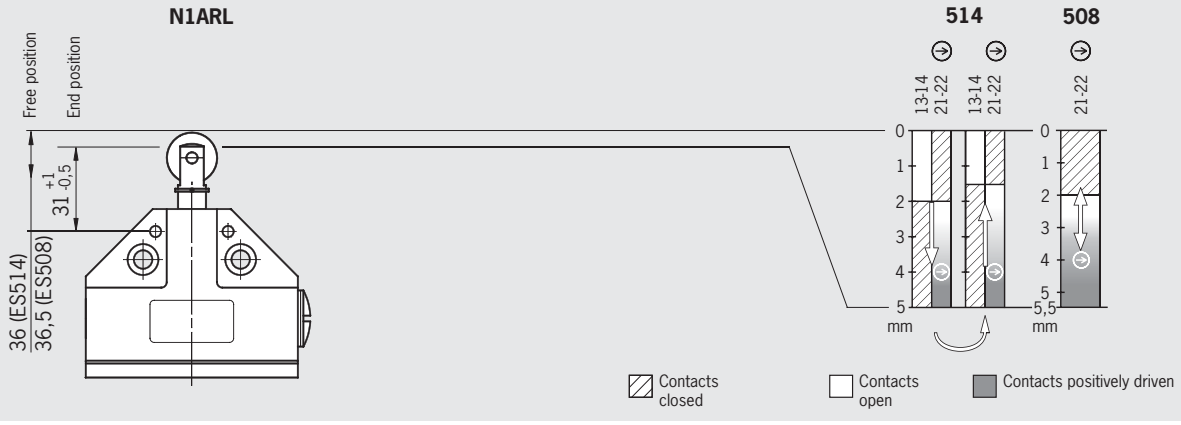
Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection acc. to IEC 60529		IP 67 3)	
Rated insulation voltage U_i		30	V AC/DC
Switching element		**514**	
Conventional thermal current I_{th}		10	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 30 V	
	DC-13	I_e 4 A U_e 24 V	

3) Screwed tight with the related plug connector (see page 126)

Travel diagram N1AD/N1AR/N1AB/N1AW



Travel diagram N1ARL



Single limit switch NB01...

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1		
Parameter	**Value**	**Unit**
B_{10d}	2×10^7 operating cycles	

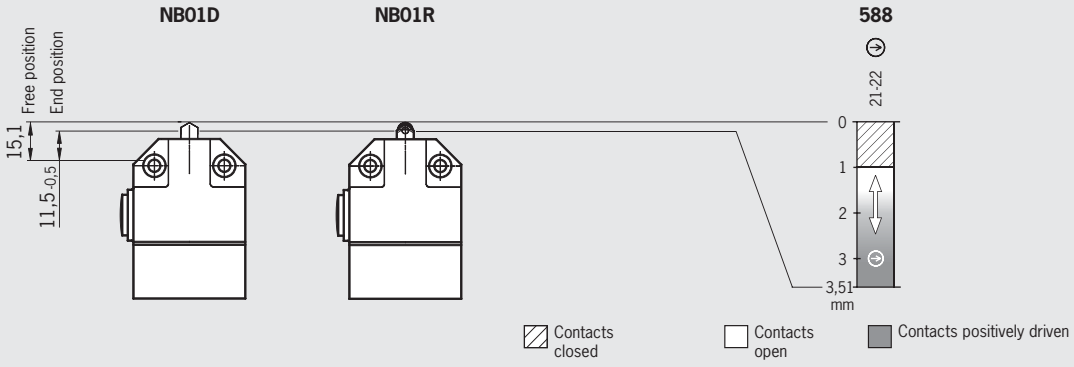
Switch			
Parameter	**Value**		**Unit**
Housing material	Die-cast aluminum, anodized		
Ambient temperature	- 25 ... + 70		°C
Weight	Approx. 0.2		kg
Switching element	**NB01D**	**NB01R**	m/min
Approach speed, max. [1], depending on actuator	20	50	
Operating point accuracy depending on actuator [2]	± 0.02	± 0.05	mm

Switching element		
Parameter	**Value**	**Unit**
Switching principle	Slow-action switching contact	
Switching element with 1 switching contact	**588** 1 NC ⊖	
Mechanical life	10×10^6 operating cycles	
Actuating force, min.	15	N
Min. switching current at 24 V DC	1	mA
Switching current, max.	6	A
Rated impulse withstand voltage U_{imp}	4	kV
Contact material	Silver alloy, gold flashed	

Connection, cable entry M12 x 1.5			
Parameter		**Value**	**Unit**
Connection		Screw terminal	
Version		M12 x 1.5	
Connection cross-section, max.		1.5 mm² per flexible wire	
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Switching element		**588**	
Conventional thermal current I_{th}		6	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 3 A U_e 24 V	

1) The approach speed given applies in conjunction with EUCHNER trip dogs at an approach angle of 30°. At a smaller approach angle this approach speed can be exceeded.

Travel diagram NB01D/NB01R



Position switch NZ...

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	2 x 10^7 operating cycles	

Switch

Parameter	Value							Unit
Housing material	Anodized die-cast alloy							
Mechanical life	30 x 10^6 operating cycles							
Ambient temperature	- 25 ... + 80							°C
Weight	Approx. 0.3							kg
Approach speed, min.	0.1							m/min
Approach speed, max. [1], depending on actuator	**HB**	**HS**	**PB**	**PS**	**RG, RL, RS**	**RK**	**WO**	m/min
	300	60	120	30	20	50	10	
Actuating force, min.	15							N

Switching element

Parameter	Value			Unit
Switching principle	Snap-action switching contact	Slow-action switching contact		
Switching element with 2 switching contacts	**511** 1 NC ⊖ + 1 NO	**528H** 1 NC ⊖ + 1 NO	**538H** 2 NC ⊖	
Switching element with 4 switching contacts	-	**2121H** 4 NC ⊖	**2131H** 3 NC ⊖ + 1 NO	**3131H** 2 NC ⊖ + 2 NO
Min. switching current at 24 V DC	1	1		mA
Switching current, max.	6	4		A
Contact closing time	< 4	-		ms
Contact bounce time	< 3	-		ms
Rated impulse withstand voltage U_{imp}	2.5			kV
Contact material	Silver alloy, gold flashed			

Connection, cable entry M20 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M20 x 1.5		
Connection cross-section, max.		1.5 mm² per flexible wire		
Degree of protection acc. to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching contact **511**	Slow-action switching contact **528H, 538H, 2121H, 2131H, 3131H**	
Conventional thermal current I_{th}		6	4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	4	A gG
Utilization category acc. to IEC 60947-5-1	AC-12	I_e 10 A U_e 230 V	-	
	AC-15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V	

1) The approach speed given applies in conjunction with EUCHNER trip dogs at an approach angle of 30°. At a smaller approach angle this approach speed can be exceeded.

Connection, plug connector SVM5, MDC5, SEM5 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection acc. to IEC 60529		IP 67 [2]	
Rated insulation voltage U_i		30	V AC/DC
Switching element		Snap-action switching contact **511**, Slow-action switching contact **528H**, **538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 30 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR6

Parameter		Value		Unit
Connection		Plug connector according to DIN 43651		
Version		SR6 (6-pin + PE)		
Degree of protection acc. to IEC 60529		IP 65 [2]		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching contact **511**	Slow-action switching contact **528H**, **538H**	
Conventional thermal current I_{th}		6	4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V	

Connection, plug connector SM8 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		8-pin	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		30	V AC/DC
Rated impulse withstand voltage U_{imp}		1.5	kV
Conventional thermal current I_{th}		1	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		1	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 1 A U_e 24 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector MR8

Parameter		Value	Unit
Connection		Plug connector	
Version		MR8 (7-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector MR9

Parameter		Value	Unit
Connection		Plug connector	
Version		MR9 (8-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

2) Screwed tight with the related plug connector (see page 126, 128 and 131)

Connection, plug connector MR10

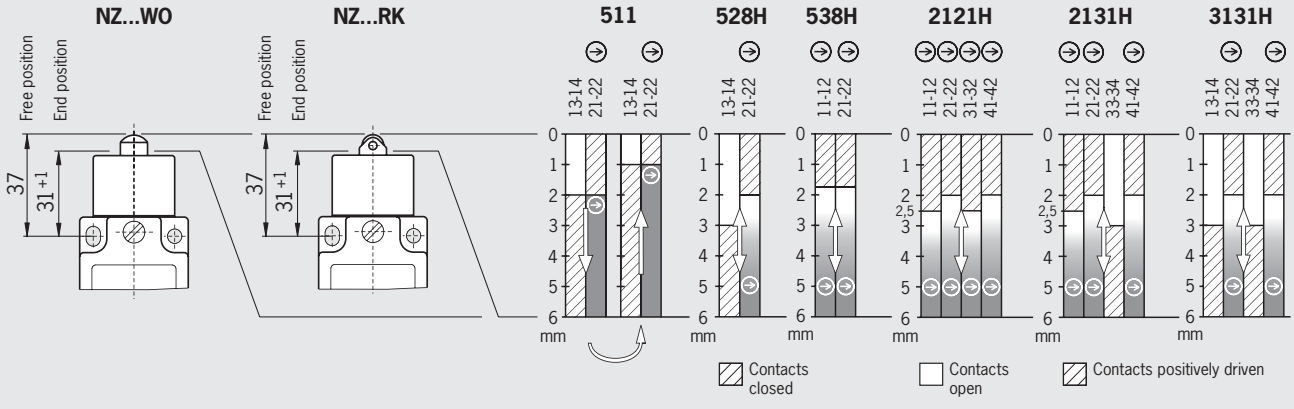
Parameter		Value	Unit
Connection		Plug connector	
Version		MR10 (9-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11

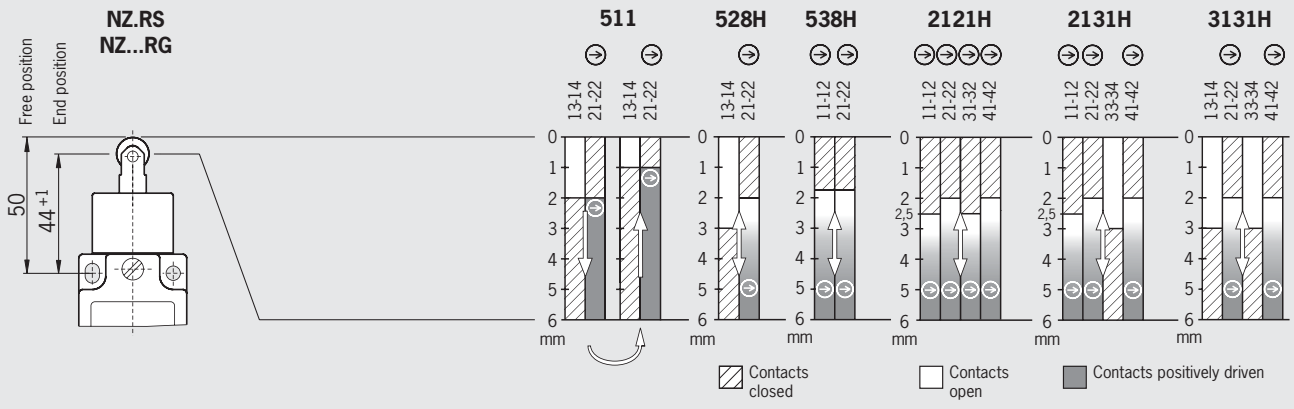
Parameter		Value	Unit
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching contact **2121H, 2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

2) Screwed tight with the related plug connector (see page 131 and 128)

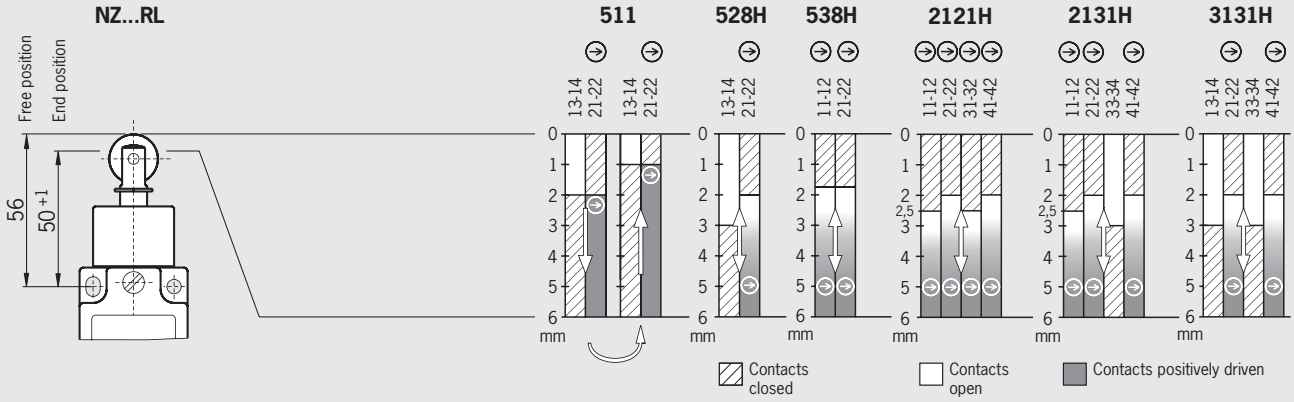
Travel diagram NZ.WO/NZ.RK



Travel diagram NZ.RS/NZ.RG

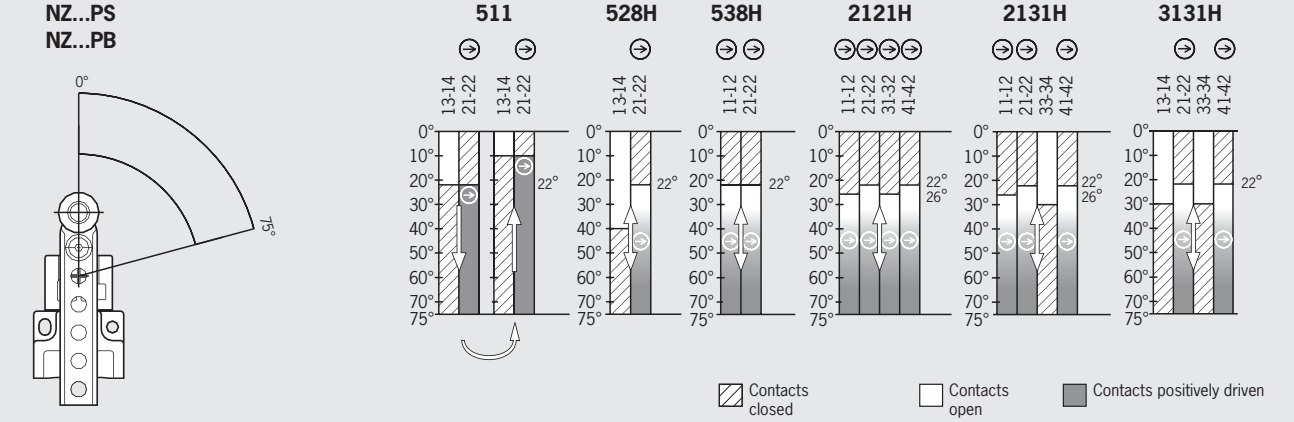


Travel diagram NZ.RL



Travel diagram NZ.HS/NZ.HB

Travel diagram NZ.PS/NZ.PB



Safety switch NZ.VZ

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	4.5 x 10^6 operating cycles	

Switch

Parameter	Value	Unit
Housing material	Anodized die-cast alloy	
Mechanical life	2 x 10^6 operating cycles	
Ambient temperature	- 25 ... + 80	°C
Weight	Approx. 0.3	kg
Approach speed, max.	20	m/min
Approach speed, min.	0.02 (for switching element ES511)	m/min
Actuating force	35	N
Extraction force	35	N
Retention force	8	N

Switching element

Parameter	Value			Unit
Switching principle	Snap-action switching contact	Slow-action switching contact		
Switching element with 2 switching contacts	**511** 1 NC ⊖ + 1 NO	**528H** 1 NC ⊖ + 1 NO	**538H** 2 NC ⊖	
Switching element with 4 switching contacts	-	**2121H** 4 NC ⊖	**2131H** 3 NC ⊖ + 1 NO	**3131H** 2 NC ⊖ + 2 NO
Min. switching current at 24 V DC	1	1		mA
Switching current, max.	6	4		A
Contact closing time	< 4	-		ms
Contact bounce time	< 3	-		ms
Rated impulse withstand voltage U_{imp}	2.5			kV
Contact material	Silver alloy, gold flashed			

Connection, cable entry M20 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M20 x 1.5		
Connection cross-section, max.		1.5 mm² per flexible wire		
Degree of protection acc. to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching contact **511**	Slow-action switching contact **528H, 538H, 2121H, 2131H, 3131H**	
Conventional thermal current I_{th}		6	4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	4	A gG
Utilization category acc. to IEC 60947-5-1	AC-12	I_e 10 A U_e 230 V	-	
	AC-15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V	

Connection, plug connector SVM5 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection acc. to IEC 60529		IP 67 1)	
Rated insulation voltage U_i		30	V AC/DC
Switching element		Slow-action switching contact **538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 30 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector C16-1

Parameter		Value	Unit
Connection		Plug connector	
Version		C16-1 (6-pin + PE)	
Degree of protection acc. to IEC 60529		IP 67 1)	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 30 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR6

Parameter		Value		Unit
Connection		Plug connector according to DIN 43651		
Version		SR6 (6-pin + PE)		
Degree of protection acc. to IEC 60529		IP 65 1)		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching contact **511**	Slow-action switching contact **528H**, **538H**	
Conventional thermal current I_{th}		6	4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V	

Connection, plug connector MR8

Parameter		Value	Unit
Connection		Plug connector	
Version		MR8 (7-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 1)	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **2131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector MR9

Parameter		Value	Unit
Connection		Plug connector	
Version		MR9 (8-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 1)	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **2131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 126, 127, 128 and 131)

Connection, plug connector MR10 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		MR10 (9-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching contact **2121H, 2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 131 and 128)

Safety switch NZ.VZ.VS... with guard locking

The technical data on switches, switching elements and guard locking apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	4.5 x 10^6 operating cycles	

Switch

Parameter	Value	Unit
Housing material	Anodized die-cast alloy	
Mechanical life	2 x 10^6 operating cycles	
Ambient temperature	- 25 ... + 80	°C
Weight	Approx. 0.7	kg
Approach speed, max.	20	m/min
Approach speed, min.	0.02 (for switching element ES511)	m/min
Actuating force	45	N
Extraction force	40	N
Retention force	35	N
Locking force, max.	2,000	N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1,500	N

Switching element

Parameter	Value			Unit
Switching principle	Snap-action switching contact	Slow-action switching contact		
Switching element with 2 switching contacts	**511** 1 NC ⊖ + 1 NO	**528H** 1 NC ⊖ + 1 NO	**538H** 2 NC ⊖	
Switching element with 4 switching contacts	-	**2131H** 3 NC ⊖ + 1 NO	**3131H** 2 NC ⊖ + 2 NO	
Min. switching current at 24 V DC	1	1		mA
Switching current, max.	6	4		A
Contact closing time	< 4	-		ms
Contact bounce time	< 3	-		ms
Rated impulse withstand voltage U_{imp}	2.5			kV
Contact material	Silver alloy, gold flashed			

Guard locking

Parameter	Value			Unit
Solenoid operating voltage	DC 24 V +10/-15%	AC 110 V +10/-15% 1)	AC 230 V +10/-15% 1)	
Connection	Switch mounted connector (2-pin + PE) according to DIN 43650			
Connection cross-section	For technical data on the solenoid plug, see page 127			
Duty cycle	100			%
Power consumption	< 10			W

1) Use only solenoid plug with integrated rectifier

Connection, cable entry M20 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M20 x 1.5		
Connection cross-section, max.		1.5 mm² per flexible wire		
Degree of protection acc. to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching contact **511**	Slow-action switching contact **528H, 538H, 2131H, 3131H**	
Conventional thermal current I_{th}		6	4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	4	A gG
Utilization category acc. to IEC 60947-5-1	AC-12	I_e 10 A U_e 230 V	-	
	AC-15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V	

Connection, plug connector SR6

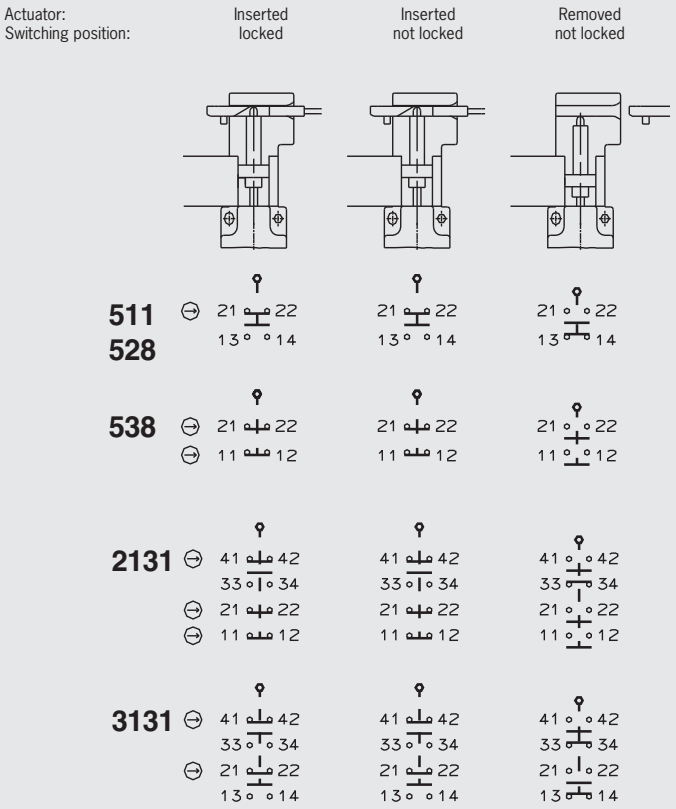
Parameter		Value	Unit
Connection		Plug connector according to DIN 43651	
Version		SR6 (6-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching contact **528H**, **538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11

Parameter		Value	Unit
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching contact **2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

2) Screwed tight with the related plug connector (see page 128)

Switching functions NZ.VZ.VS



Safety switch TZ with guard locking and guard locking monitoring

The technical data on switches, switching elements and guard locking apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	3 x 10^6 operating cycles	

Switch

Parameter	Value	Unit
Housing material	Anodized die-cast alloy	
Mechanical life	1 x 10^6 operating cycles	
Ambient temperature	- 25 ... + 80	°C
Weight	Approx. 1.2	kg
Approach speed, max.	20	m/min
Actuating force	35	N
Extraction force	30	N
Retention force	10	N
Locking force, max.	2,000	N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1,500	N

Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching contact		
Switching element with 2 switching contacts	SK: **528H** / ÜK: **528H** 1 NC ⊖ + 1 NO / 1 NC ⊖ + 1 NO		
Switching element with 4 switching contacts	SK: **2131H** / ÜK: **3131H** 3 NC ⊖ + 1 NO / 2 NC ⊖ + 2 NO	SK: **2121H** / ÜK: **2121H** 4 NC ⊖ / 4 NC ⊖	
Min. switching current at 24 V DC	1		mA
Rated impulse withstand voltage U_{imp}	2.5		kV
Contact material	Silver alloy, gold flashed		

Guard locking

Parameter	Value			Unit
Solenoid operating voltage	AC/DC 24 V +10/-15%	AC 110 V +10/-15% [1]	AC 230 V +10/-15% [1]	
Duty cycle	100			%
Power consumption	10			W

Connection, cable entry M20 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M20 x 1.5		
Connection cross-section, max.		1.5 mm² per flexible wire		
Degree of protection acc. to IEC 60529		IP 67	IP 65: With escape release TZ...C1815, TZ...C1828 With emergency release TZ...C1816, TZ...C1823	
Rated insulation voltage U_i		250		V AC/DC
Conventional thermal current I_{th}		4		A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4		A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V		
	DC-13	I_e 4 A U_e 24 V		

Connection, plug connector SR6 			
Parameter		**Value**	**Unit**
Connection		Plug connector according to DIN 43651	
Version		SR6 (6-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Standard wiring TZ...SR6
The green LED indicates the state of the safety circuit and the red LED the state of the monitoring circuit.

Green only: Safety circuit closed
Red only: Actuator unlocked, safety circuit open

The exact states of the safety circuit and the actuator can be seen in the adjacent table for the safety switch TZ...SR6.

LED		Actuator		Safety circuit	
Red	Green	Locked	unlocked	closed	open
ON	ON		X	X	
ON	OFF		X		X
OFF	ON	X		X	
OFF	OFF	Not defined or no power			

Connection, plug connector MR8 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		MR8 (7-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector MR10 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		MR10 (9-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector MR12 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		MR12 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		230	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 60 V	
	DC-13	I_e 4 A U_e 24 V	

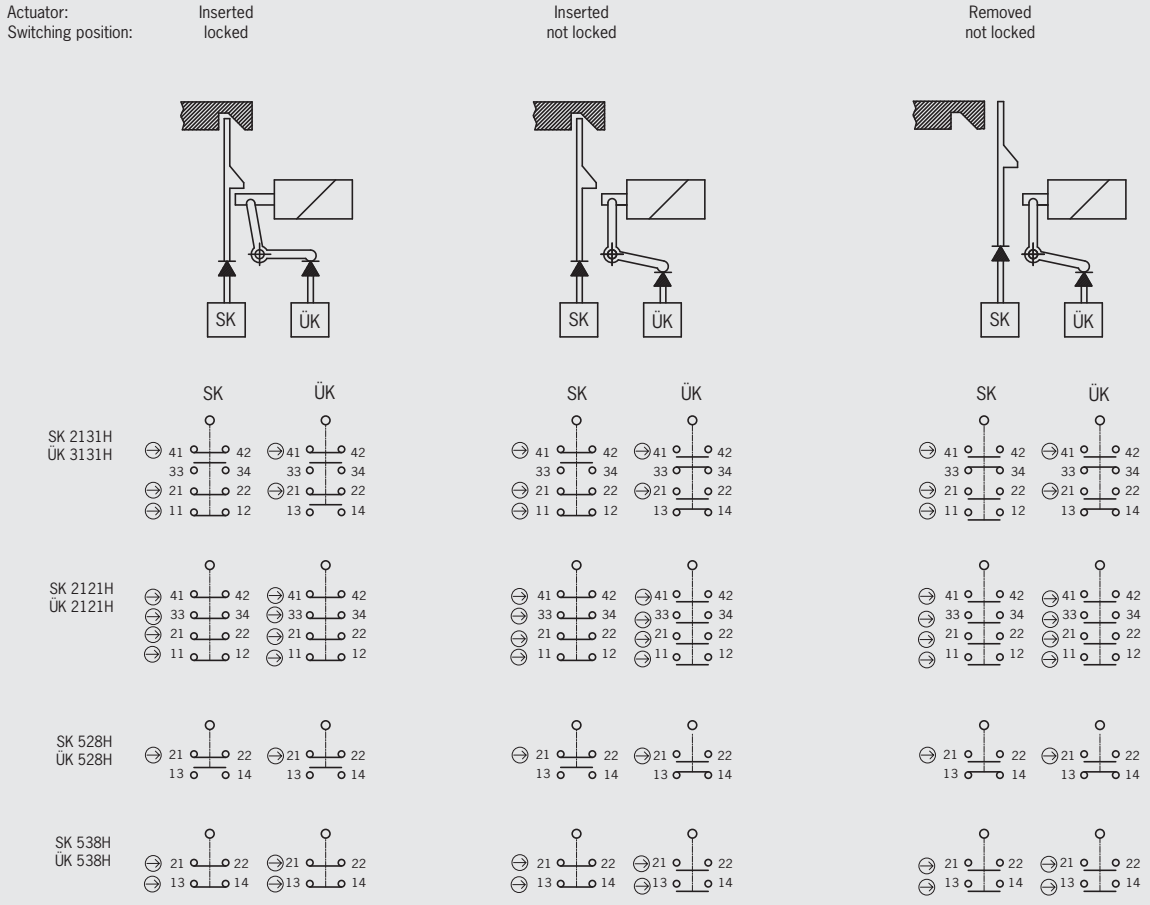
Connection, plug connector SR11 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 128 and 131)

Connection, plug connector M23 (RC18)		18-pol	
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		M23 (RC18, 18-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		110	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 110 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 129 and 130)

Switching functions TZ



Safety switch NX

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	4.5 x 10^6 operating cycles	

Switch

Parameter	Value		Unit
Housing material	Die-cast alloy, cathodically dipped		
Mechanical life	2 x 10^6 operating cycles		
Ambient temperature	- 20 ... + 80		°C
Weight	Approx. 0.4		kg
Approach speed, max.	20		m/min
Actuating force	40		N
Extraction force	50		N
Retention force	10		N
Insertion depth	Standard actuator	Overtravel actuator	
Required insertion depth s_{min}	32	32	mm
Maximum insertion depth s_{max}	33	40	mm
Actuator travel (in the locked state)	6	13	mm

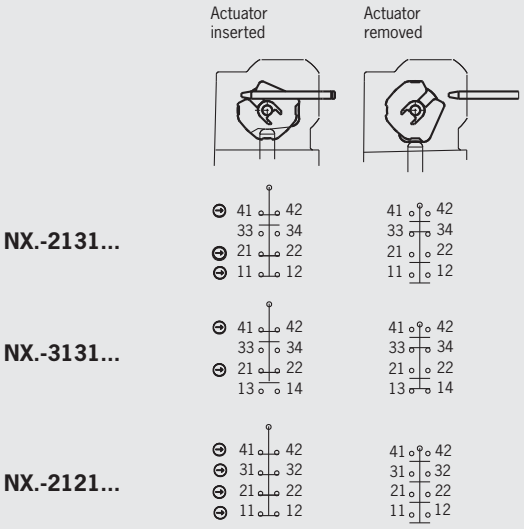
Switching element

Parameter	Value			Unit
Switching principle	Slow-action switching contact			
Switching element with 4 switching contacts	**2121** 4 NC ⊖	**2131** 3 NC ⊖ + 1 NO	**3131** 2 NC ⊖ + 2 NO	
Min. switching current at 24 V DC	1			mA
Switching voltage, min., at 10 mA	12			V
Contact material	Silver alloy, gold flashed			

Connection, cable entry M20 x 1.5

Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Connection cross-section		0.34 ... 1.5	mm^2
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Switching functions NX



Safety switch TX... with guard locking and guard locking monitoring

The technical data on switches, switching elements and guard locking apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	6 x 10^6 operating cycles	

Switch

Parameter	Value		Unit
Housing material	Die-cast alloy, cathodically dipped		
Mechanical life	> 1 x 10^6 operating cycles		
Ambient temperature	- 20 ... + 80		°C
Weight	Approx. 0.8		kg
Approach speed, max.	20		m/min
Actuating force	35		N
Extraction force	35		N
Retention force	20		N
Locking force, max.	1,700		N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1,300		N
Insertion depth	Standard actuator	Overtravel actuator	
Required insertion depth s_{min}	32	32	mm
Maximum insertion depth s_{max}	33	40	mm
Actuator travel (in the locked state)	6	13	mm

Switching element

Parameter	Value			Unit
Switching principle	Slow-action switching contact			
Switching element with 4 switching contacts	**ETX B** 2 NC ⊖ + 1 NO + 1 NC	**ETX C** 2 NC ⊖ + 1 NO + 1 NO	**ETX D** 2 NC ⊖ + 2 NC ⊖	
Min. switching current at 24 V DC	1			mA
Switching voltage, min., at 10 mA	12			V
Contact material	Silver alloy, gold flashed			

Guard locking

Parameter	Value			Unit
Solenoid operating voltage	AC/DC 24 V +10/-15%	AC 110 V +10/-15% [1]	AC 230 V +10/-15% [1]	
Connection	Reverse polarity protected, integrated bridge rectifier			
Duty cycle	100			%
Power consumption	8			W

Connection, cable entry M20 x 1.5

Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Connection cross-section		0.34 ... 1.5	mm^2
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, cable entry NPT ½"			
Parameter		**Value**	**Unit**
Connection		Screw terminal	
Version		NPT ½"	
Connection cross-section, max.		0.34 ... 1.5 mm²	
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SVM5 (M12)			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection acc. to IEC 60529		IP 67 [1]	
Rated insulation voltage U_i		30	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 30 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector BH10			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		BH10 (9-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 24 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		1.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

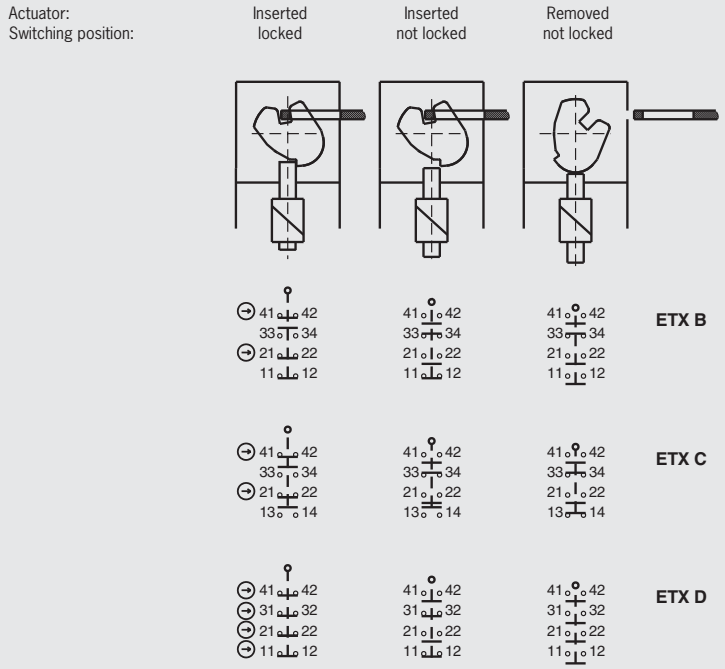
1) Screwed tight with the related plug connector (see page 126, 131 and 128)

Connection, plug connector M23 (RC18)

Parameter		Value	Unit
Connection		Plug connector	
Version		M23 (RC18, 18-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 1)	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 24 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 129 and 130)

Switching functions TX



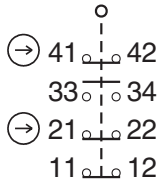
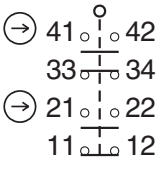
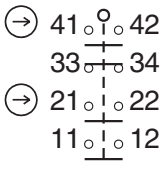
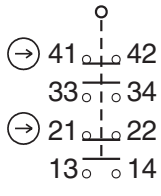
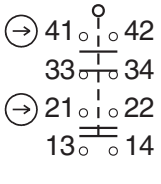
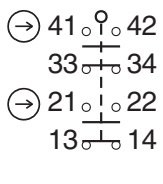
Switching characteristics safety switch TX3... (mechanical guard locking)

The application of a voltage U_B/U_S when the actuator is not inserted does not produce **any** change in the state of the switching element.

Solenoid operating voltage U_B
On versions TX...110 and TX...230 release is performed using the voltage U_B.
A control voltage U_S is not necessary.

Control voltage U_S
On the version TX...24 an additional control voltage U_S is only required if U_B cannot supply the required current of 2 A for T_{IMP} = 250 ms when the solenoid is switched on.
Otherwise, the connection terminals U_S and U_B must be bridged on the version TX...24.

Safety switch TX3... with door monitoring contact (mechanical guard locking)

			Actuator inserted		Actuator removed
			locked	not locked	
Switching element	ETX B				
	ETX C				
Switch design	TX3...24	Control voltage U_S	0 V	24 V	24 V or 0 V
		Operating voltage U_B	0 V	24 V	24 V or 0 V
	TX3...110 / TX3...230	Control voltage U_S	Not connected		
		Operating voltage U_B	0 V	110 V or 230 V	110 V, 230 V or 0 V

Safety switch SGA

The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	3 x 10^6 operating cycles	

Switch

Parameter	Value	Unit
Housing material	Anodized die-cast	
Mechanical life	2 x 10^6 operating cycles	
Ambient temperature	- 20 ... + 80	°C
Weight	Approx. 0.275	kg
Approach speed, max.	20	m/min
Actuating force	25	N
Extraction force	25	N
Retention force	10	N
Insertion depth (minimum required travel + permissible overtravel)	Actuator *S* standard	
Lateral approach direction (h)	24.5 + 5	mm
Approach direction from above (v)	24.5 + 5	mm

Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching contact		
Switching element with 4 switching contacts	**2121** 4 NC ⊖	**2131** 3 NC ⊖ + 1 NO	
Min. switching current at 24 V DC	1		mA
Switching voltage, min., at 10 mA	12		V
Contact material	Silver alloy, gold flashed		

Connection, cable entry M20 x 1.5

Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Connection cross-section		0.34 ... 1.5	mm^2
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		1.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector M23 (RC18) 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		M23 (RC18, 18-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 24 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 128, 129 and 130)

Safety switch STA... with guard locking and guard locking monitoring

The technical data on switches, switching elements and guard locking apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	1.2 x 10^7 operating cycles	

Switch

Parameter	Value		Unit
Housing material	Anodized die-cast		
Mechanical life	1 x 10^6 operating cycles		
Ambient temperature	- 20 ... + 80		°C
Weight	Approx. 0.6		kg
Approach speed, max.	20		m/min
Actuating force	35		N
Extraction force (not locked)	30		N
Retention force	20		N
Locking force, max.	Approach direction		N
	From top (v)	Side (h)	
	3,000	3,000	
Locking force F_{Zh} in accordance with test principles GS-ET-19	Approach direction		N
	From top (v)	Side (h)	
	2,300	2,300	
Insertion depth (minimum required travel + permissible overtravel)	Actuator *S* standard	Actuator L for insertion funnel	
Lateral approach direction (h)	24.5 + 5	28.5 + 5	mm
Approach direction from above (v)	24.5 + 5	28.5 + 5	mm

Switching element

Parameter	Value				Unit
Switching principle	Slow-action switching contact				
Switching element with 4 switching contacts	**2131** 2 NC ⊖ + 1 NO + 1 NC	**4121** 2 NC ⊖ + 1 NC + 1 NO	**4131** 2 NC ⊖ + 2 NO	**4141** 2 NC ⊖ + 2 NC ⊖	
Min. switching current at 24 V DC	1				mA
Switching voltage, min., at 10 mA	12				V
Contact material	Silver alloy, gold flashed				

Guard locking

Parameter	Value	Unit
Solenoid operating voltage	AC/DC 24 V +10/-15%	
Connection	Reverse polarity protected, integrated bridge rectifier	
Duty cycle	100	%
Power consumption	8	W

Connection, cable entry M20 x 1.5

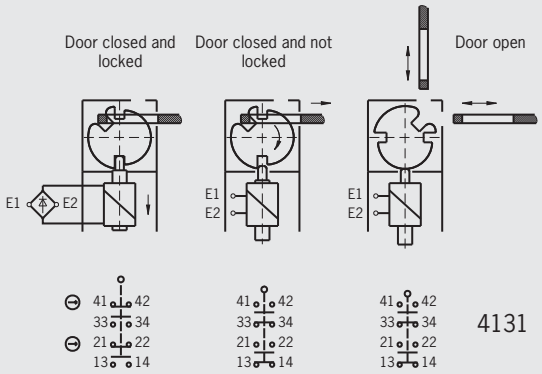
Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Connection cross-section		0.34 ... 1.5	mm^2
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Connection, plug connector SR11		12-pol	
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		1.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 50 V	
	DC-13	I_e 4 A U_e 24 V	

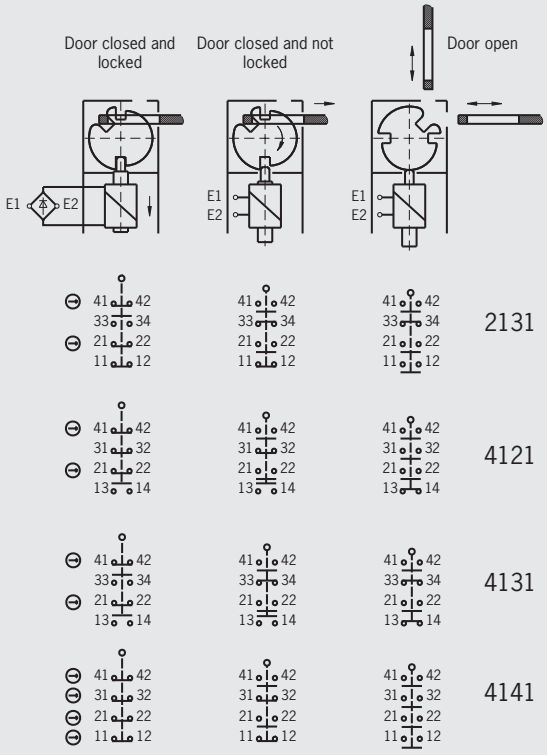
Connection, plug connector M23 (RC18)		18-pol	
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		M23 (RC18, 18-pin + PE)	
Degree of protection acc. to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		110	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 110 V	
	DC-13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 128, 129 and 130)

Switching functions STA1/STA2
Without door monitoring contact



Switching functions STA3/STA4
With door monitoring contact



Safety switch STA-TW with guard locking and guard locking monitoring

The technical data on switches, switching elements and guard locking apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	4.5 x 10^6 operating cycles	

Switch

Parameter		Value	Unit
Housing material	Housing	Anodized die-cast	
	Actuating heads	Die-cast aluminum	
	Cam in actuating head	Stainless steel	
Mechanical life		1 x 10^6 operating cycles	
Ambient temperature		- 20 ... + 55	°C
Weight		Approx. 0.62	kg
Approach speed, max.		20	m/min
Actuating force		35	N
Extraction force (not locked)		30	N
Retention force		20	N
Locking force, max.		Approach direction	N
		Top (v) / Side (h)	
		2,500 / 2,500	
Locking force F_{Zh} in accordance with test principles GS-ET-19		Approach direction	N
		Top (v) / Side (h)	
		2,000 / 2,000	
Insertion depth (minimum required travel + permissible overtravel)		Actuator *S* standard	
Lateral approach direction (h)		24.5 + 5	mm
Approach direction from above (v)		24.5 + 5	mm

Switching element

Parameter	Value	Unit
Switching principle	Slow-action switching contact	
Switching element with 4 switching contacts	**2131**: 2 NC ⊖ + 1 NO + 1 NC / **4121**: 2 NC ⊖ + 1 NC + 1 NO	
Min. switching current at 24 V DC	1	mA
Switching voltage, min., at 10 mA	12	V
Contact material	Silver alloy, gold flashed	

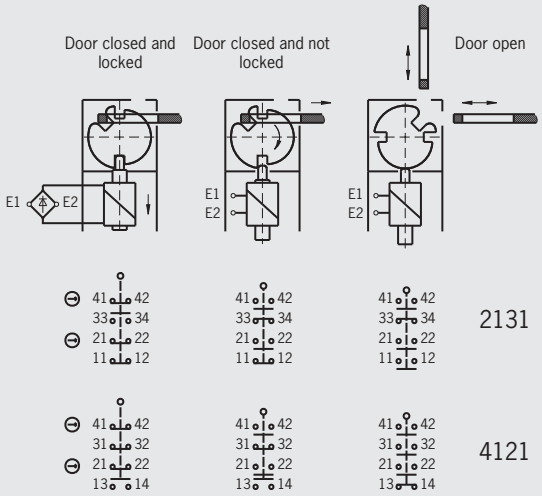
Guard locking

Parameter	Value	Unit
Solenoid operating voltage	AC/DC 24 V +10/-15%	
Connection	Reverse polarity protected, integrated bridge rectifier	
Duty cycle	100	%
Power consumption	8	W

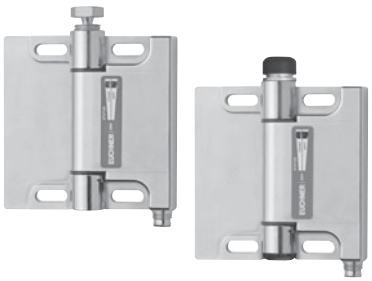
Connection, cable entry M20 x 1.5

Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Connection cross-section		0.34 ... 1.5	mm^2
Degree of protection acc. to IEC 60529		IP 67	
Rated insulation voltage U_i		250	V AC/DC
Rated impulse withstand voltage U_{imp}		2.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 4 A U_e 230 V	
	DC-13	I_e 4 A U_e 24 V	

Switching functions STA-TW



Safety hinge ESH



The technical data on switches and switching elements apply to all connections. Further technical data are given for the connection selected.

Reliability values acc. to EN ISO 13849-1

Parameter	Value	Unit
B_{10d}	2 x 10^6 operating cycles	

Switch

Parameter	Value	Unit
Housing material	Die-cast zinc, nickel-plated	
Ambient temperature	- 25 ... + 70	°C
Weight	Approx. 0.77	kg
Pivoting angle	- 10 ... 180	°
Max. load as per mechanical life test according to EN 1935	Door hinge class 12 (100 kg door weight)	m/min

Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching contact		
Switching element with 2 switching contacts	**20** 2 NC ⊖	**11** 1 NC ⊖ + 1 NO	
Mechanical life	1 x 10^6 operating cycles		
Operating point	4° from fixing point		
Positively driven	Approx. 10° from fixing point		
Actuation frequency	max. 1200/h		
Degree of contamination (external, according to EN 60947)	3 (industrial)		
Min. switching current at 24 V DC	1		mA
Rated impulse withstand voltage U_{imp}	2.5		kV
Contact material	Silver alloy		

Connection, plug connector SVM5 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE)	
Degree of protection acc. to IEC 60529		IP 67 [1)]	
Rated insulation voltage U_i		60	V AC/DC
Conventional thermal current I_{th}		3	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		2	A gG
Utilization category acc. to IEC 60947-5-1	AC-15	I_e 1.5 A U_e 30 V	
	DC-13	I_e 2 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 126)

Accessories for safety switches

Solenoid plugs

Parameter	Value	Unit
Housing material	Plastic	
Number of pins	3 (2 + PE)	
Nominal voltage max.	240	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 65	
Connection	female connector terminals and flat-head terminals	

SS4

Parameter	Value	Unit
Housing material	Brass matt chromium plated	
Number of pins	4 (3 + PE)	
Cable diameter	6 - 8	mm
Nominal voltage max.	250	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	Soldered connections	

M12 with cable (SGLF, SWLF)

Parameter	Value	Unit
Housing material	Metal / plastic	
Number of pins	5	
Nominal voltage max.	30	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 68	
Connection	5 open cable ends	

SR6

Parameter	Value	Unit
Housing material	Plastic	
Number of pins	7 (6 + PE)	
Cable diameter	7 - 9	mm
Nominal voltage max.	250	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 65	
Connection	Crimp contacts 0.5 to 1.5 mm^2	

M12 with cable

Parameter	Value	Unit
Housing material	Metal / plastic	
Number of pins	8	
Nominal voltage max.	30	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	8 open cable ends	

SR11

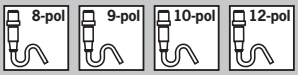
Parameter	Value	Unit
Housing material	Plastic	
Number of pins	12 (11 + PE)	
Cable diameter	8 - 10	mm
Nominal voltage max.	50	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 65	
Connection	Crimp contacts 0.5 to 1.5 mm^2	

RC12

Parameter	Value	Unit
Housing material	Metal	
Number of pins	12	
Cable diameter	10.5	mm
Nominal voltage max.	150	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	12 crimp contacts 0.75 to 1.0 mm^2	

RC18			
Parameter		**Value**	**Unit**
Housing material		Metal	
Number of pins		19 (18 + PE)	
Cable diameter		10 - 14	mm
Nominal voltage max.		32	V AC/DC
Degree of protection according to IEC 60529 (inserted)		IP 65	
Connection		19 crimp contacts 0.75 to 1.0 mm^2	

RC18..C1825			
Parameter		**Value**	**Unit**
Housing material		Metal	
Number of pins		19 (18 + PE)	
Cable diameter		10 - 14	mm
Nominal voltage max.		32	V AC/DC
Degree of protection according to IEC 60529 (inserted)		IP 65	
Connection		16 crimp contacts 0.38 to 0.5 mm^2 3 crimp contacts 0.75 to 1.0 mm^2	

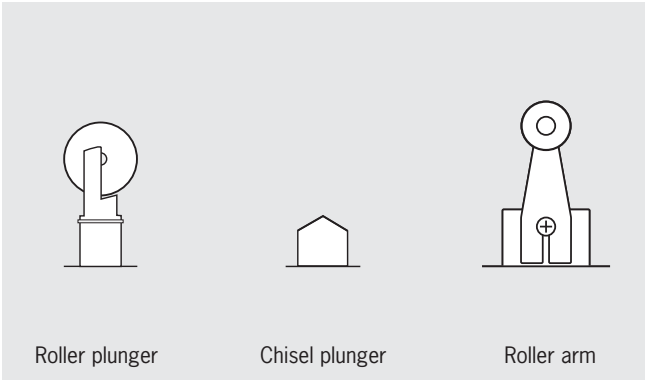
M8/MR9/MR10/MR12 with cable			
Parameter		**Value**	**Unit**
Housing material		PVC/PUR	
Number of pins		8 / 9 / 10 / 12	
Nominal voltage max.		300	V AC/DC
Degree of protection according to IEC 60529 (inserted)		IP 67	
Connection		Plug connector/flying leads	

Glossary

Actuating force
Switches ‣*type 1*:
The actuating force is the minimum force required to perform a switching operation.
Switches ‣*type 2*:
The actuating force is the force required to insert the ‣*actuator* in order to thus perform a switching operation.

Actuation (electrical / mechanical)
Transition of a moving contact from one switch position to another. This will result in a change to the switch state of an item of switchgear. A differentiation is made between electrical actuation (e.g. switching on – switching off) and mechanical actuation (e.g. closing – opening).

Actuator/actuating element
Switches type 1:
Mechanical element on a safety position switch that triggers the switching operation. Actuators are available in different designs, for example, as roller plungers, chisel plunger or roller arms.

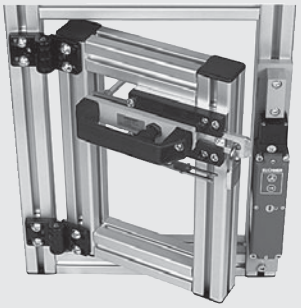


Roller plunger Chisel plunger Roller arm

Approach speed
Speed at which a ‣*position switch* can be mechanically actuated. The permitted approach speed is dependent on the shape and material of the ‣*actuating element* and the approach angle. The higher the approach speed, the shallower the approach angle that should be chosen.

Automatic mode
The automatic mode is an ‣*operating mode* in which, unlike the ‣*manual mode*, only system starting is triggered by human intervention. All other actions are performed automatically.

Bolts
Bolts function as follows: The bolt tongue mechanically guides the ‣*actuator* when it is inserted into the ‣*safety switch* actuating head. The bolt mounted on the door frame comprises a protruding bolt tongue, the handle and the actuator, mounted offset somewhat to the rear. The switch bracket with the safety switch is fitted to the frame. The bolt absorbs forces that act on the switch and the ‣*actuator* and that could damage the switch and actuator.



Bolt for safety switch

Category
The ‣*categories* according to EN ISO 13849-1 (B, 1, 2, 3 and 4) provide an assessment of the performance of safety-related parts of a control system on the occurrence of failures.

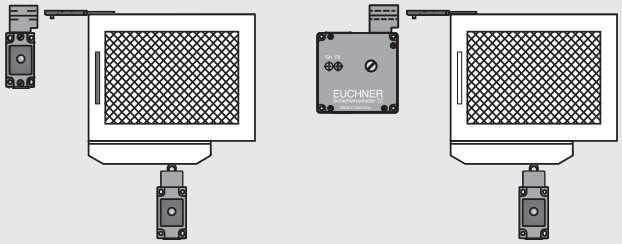
Closed-circuit current principle
On a ‣*guard* with ‣*guard locking* based on the closed-circuit current principle, the guard is locked by spring force until the guard locking solenoid is supplied with power. Unlocking is by solenoid force. The term ‣*mechanical guard locking* is also used.

Cyclic mode
An ‣*operating mode* in which each the working space on the machine is opened during every operating cycle and the operator therefore frequently needs to work in the ‣*danger zone*.

Danger zone
Any area in or around a machine in which a person is subject to a risk of injury or a health hazard.
The hazard can
- Either be present continuously on the correct use of the machine (movement of hazardous moving parts, arcs during welding, etc.)
- Or can occur unexpectedly (unintentional, unexpected starting, etc.).

Degree of protection
The degree of protection is defined according to EN 60529-1 and is given as an IP. “IP” is followed by two digits; the first digit gives the degree of protection against the penetration of solid foreign bodies and the second digit gives the degree of protection against the penetration of liquids. For ‣*safety switches* the degree of protection IP 55 is to be provided as a matter of preference (DGUV Information 203-079).

Diversity
Diversity is the use of two different concepts to provide a function. For instance, the use of a switch ▸*type 1* and a switch ▸*type 2* on a ▸*guard*. Here it is assumed that a single failure cannot affect two different concepts in the same way. Diversity also makes ▸*tampering* more difficult and the safety of ▸*redundant systems* is increased.



Movable guard without guard locking, diverse layout.

Movable guard with guard locking, diverse layout.

Electrical guard locking
Guard locking based on the ▸*open-circuit current principle*.

Emergency release for guard locking
The emergency release is used to unlock ▸*guard locking* in an emergency. The guard locking can be unlocked without tools.

Safety switch with guard locking and emergency release

Emergency unlocking
The emergency unlocking is used to unlock ▸*guard locking* in an emergency. The guard locking can be unlocked without tools and from the access side. With the emergency unlocking, the switch engages in the unlocked position and can only be reset to its original position after an action similar to a repair.

Safety switch with guard locking and emergency unlocking

Enable path
An enable path is used to generate a safety-related output signal. Enable paths act to the exterior like normally open contacts.

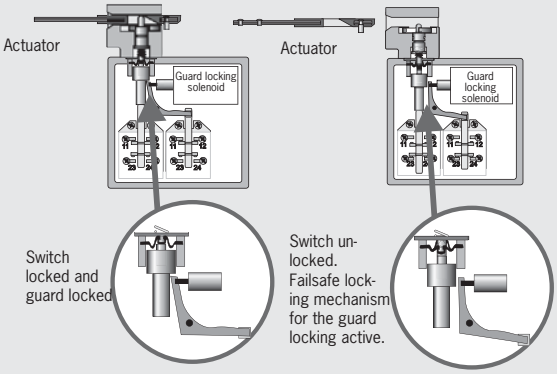
Enabling switches
If a ▸*guard* is open, movements are only to be possible if the controls are operated continuously. These are controls with automatic return to their original position. In general the term enabling switches is used here.

Enabling switch with +/– buttons

Escape release
The escape release must make it possible to unlock the guard from within the ▸*danger zone* without the use of tools. The device must be manually operated and must positively act on the ▸*locking mechanism*. Actuation must result in permanent disabling of the ▸*guard locking*.

Extraction force (also: positively driven opening force)
The extraction force is the required minimum force to achieve positively driven opening of the NC contacts.

Failsafe locking mechanism
The design feature of a ▸*guard locking* which ensures that the locking mechanism (solenoid plunger) cannot go into the locking position if the ▸*guard* is open is also referred to in DGUV Information 203-079 as failsafe locking mechanism.
The failsafe locking mechanism on an interlocking device with ▸*guard locking* mechanically prevents the ▸*safety switch* changing to the locked position with the ▸*guard* open and therefore signaling a safe state.



Guard
A ▸*guard* is the part of the machine that is used as a barrier to protect against hazards. Guards form a physical barrier to the ▸*danger zone*. They can be, e.g. safety doors, covers, fences, housings, etc.

Guard locking monitoring

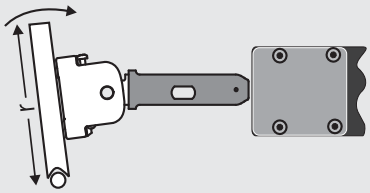
The guard locking monitoring monitors the position of the guard locking solenoids. This device is positively linked to the switching element ÜK via a locking arm. On intentional or unintentional unlocking of the guard locking solenoid, the ⬧*positively driven contact* in this switching element is actuated and therefore signals the position of the guard locking solenoid. The sectional drawings show the safety switch TZ in its three switch states:

Hazardous states

Are states that could result in injury. ⬧*Safety switches* prevent this hazard on the correct use of the ⬧*guard* (cf. ⬧*Safe state*).

Hinged actuator

The hinged actuator, unlike the straight ⬧*actuator*, is spring mounted and as a result the actuator can be inserted in the actuating head without problems even with small door radii. With larger radii, a straight actuator can be used.



Hinged actuator

Interlocking, interlocking device

According to EN ISO 14119 an interlocking device is a mechanical, electrical or other device with the purpose of preventing operation of hazardous machine under certain conditions (usually as long as a ⬧*guard* is not closed).

Locking force

The locking force F_{Zh} is the force that ⬧*guard locking* can withstand without damage.

The locking force in accordance with EN ISO 14119 includes an additional safety coefficient (S = 1.3) which is prescribed by the employers' liability insurance association in its test principles.

The locking force F_{Zh} acc. to EN ISO 14119 can be calculated as follows:

$$F_{Zh} = \frac{\text{Locking force, max.}}{\text{Safety coefficient}}$$

Manual mode

Manual mode is an ⬧*operating mode* in which the machine movements are not performed automatically, but using individual commands from the user.

Mechanical guard locking

Guard locking based on the ⬧*closed-circuit current principle*.

Mechanical release

The mechanical release makes it possible to access the machine if there is a malfunction, e. g. a power failure. Unlocking is performed using a tool or a key. The mechanical release should be protected against misuse (seal, lacquer).

Safety switch with mechanical release

Mounting safety switches and actuators

⬧*Safety switches* must be mounted such that they are adequately secured against changes to their position. Easy bypassing of the ⬧*safety switch* must be prevented.

Open-circuit current principle

On a ⬧*guard* with ⬧*guard locking* based on the open-circuit current principle, the guard is locked until the power supply to the guard locking solenoid is interrupted. Unlocking is by spring force. The term ⬧*electrical guard locking* is also used.

Operating modes

Every machine can have one or more operating modes that are defined by the type of machine and their application. If selection of operating mode can cause a hazardous situation, selection of this operating mode must be prevented by suitable means (e.g. key-operated switch, access code). Selection of operating mode on its own is not allowed to trigger machine operation. A separate action on the part of the operator must be required to start the operation of the machine. A means of indication of the selected operating mode is to be provided (e.g. the position of an operating mode selector switch, an indicator, a screen indication, etc.). Technical protective measures must remain effective for all operating modes. If it is necessary to disable technical protective measures (e.g. for setting up or maintenance work), a device for selection of operating mode is to be provided that can be secured in the required operating mode (e.g. locked with a key) so that automatic operation can be prevented. In addition, one or more of the following devices should be provided:

- Movement enable using an ⬧*enabling switch*. The machine only runs as long as the enabling switch is operated.
- A portable control unit with a device for shutting down in an emergency or an enabling device. If a portable control unit is used, it must only be possible to trigger a movement from this point
- Movement speed or movement energy restriction
- Movement area restriction

PDF

The abbreviation PDF can have several meanings in safety engineering:

1 **P**robability of **D**angerous **F**ailure

According to EN 61508, PDF is the probability of failure of a component and is used to determine the Safety Integrity Level (⬧*SIL*) for the overall machine.

2 **P**roximity **D**evices with defined behavior under **F**ault conditions

Proximity switches with defined behavior under fault conditions (see EN 60947-5-3).

Position switches
Position switches are used to acquire the position of axes or moving ‣*guards*. As soon as a position switch is used as a safety-relevant component, the term position switch with safety function or safety-related position switch is used. In this case the switching element must contain at least one ‣*positively driven contact*.

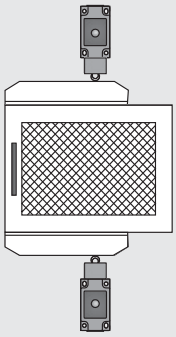
Positive actuation
Positive actuation is the positive movement of a moving mechanical component together with another component – either by direct contact or via rigid parts. The second component is, as a result, moved positively by the first.

Positively driven opening force
‣*Extraction force* **Single-fault tolerance**
Single-fault tolerance means that even after the occurrence of a single failure, the agreed safe function continues to be provided.

Protective plate
For switches type 2, a protective plate is available as an option; this plate makes it more difficult to tamper with the actuating head.

Protective plate on safety switch without guard locking

Redundancy
Redundancy is the use of more than one system to retain the same safety function at all times, even on the failure of individual components.
Even for the use of a ‣*position switch* with two positively driven NC contacts, the term redundant (dual-channel) system is often used. However, here it is to be noted that only duplication of the safety contacts is achieved, the mechanical drive (trip dog and plunger) remains single-channel as before. To setup a redundant system (from safety category 3 according to EN ISO 13849-1), both the mechanism (two ‣*position switches*) and the electronics should be of dual-channel layout. The safety of a redundant system is further increased by ‣*diversity*.


Movable guard with redundant safety switches

Retention force
The retention force is the maximum force that is allowed to be applied to the ‣*actuator* with the ‣*safety switch* in the locked state so that the guard locking cannot be unlocked.
In the case of switches without guard locking, the retention force is the maximum force that may be applied to the ‣*actuator* in the withdrawal direction while still guaranteeing reliable contact.

Risk
The combination of the probability of occurrence of harm and the severity of that harm in a hazardous situation.

Risk assessment
The ‣*standard* EN ISO 12100 contains procedures necessary to perform a risk assessment. The risk assessment initially involves a risk analysis and a subsequent risk evaluation. In EN ISO 13849-1 there is a simple procedure for determining the required ‣*category* to match the ‣*risk*.

Standards
The European Machinery Directive states that if harmonized standards are observed, it is allowed to assume that the directive is met. Standards specify the requirements of the directive in more detail and as a rule represent the *general state-of-the-art*. Manufacturers of ‣*safety switches* must comply with EN 60947-5. All EUCHNER safety switches comply with this standard.

Safe state
A safe state is provided if no hazard can be produced by an installation or machine on correct use (cf. ‣*Hazardous states*).

Safeguard
A safeguard is intended to protect personnel, products and the environment against hazards. A differentiation is made between ‣*guards* and protective devices.

Safety relay
Safety relays are used to evaluate switchgear connected (‣*safety switches*, emergency stop switchgear, etc.). They ensure that the OSSD (Output Signal Switching Device) is opened.

Safety relay ESM

Safety Switch
A safety switch is part of a safety chain. It provides a safe signal in the input circuit. A stop signal is generated when the ‣*guard* is opened. In this way unintentional machine starting is prevented if the guard is open, that is ‣*interlocking* is achieved.

SIL (Safety Integrity Level)
According to EN 61508 the objective for the probability of failure on the execution of risk-reducing functions. The standard defines the requirements that are necessary to achieve a specific safety level (SIL).

Snap-action contact elements
On snap-action contact elements the ‣*switching element jumps* to the other switch state from a defined ‣*actuator* position. The movement of the switching contact is independent of the speed at which the actuator is moved. Snap-action contact elements typically have hysteresis.

Start (automatic or manual)
An item of safety switchgear (e.g. ‣*safety relay*) can be started manually or automatically. On a manual start, an enable signal is generated after the Start button is pressed and a ‣*safe state* has been detected. This function is also termed static operation and is stipulated for emergency stop devices (EN 60204-1).
On an automatic start, an enable signal is generated after a safe state has been detected without any manual enable. This function is also termed dynamic operation and is not allowed for emergency stop devices.

Stop category
EN 60204-1 defines various stop categories; here stopping refers to the shutdown of the machine.
Stop category 0 means that the machine is shutdown by the immediate shutdown of the power.
Stop category 1 means that the machine is shutdown in a controlled manner while the supply of power is maintained to bring the machine to a standstill. Once standstill has been reached, the power is interrupted.
Stop category 2 means that the machine is shutdown in a controlled manner while the supply of power is maintained to bring the machine to a standstill. The power is not interrupted at standstill. This stop category is not allowed to be used for shutdown in an emergency according to EN 60204.

Tampering
Tampering is the conscious disabling or bypassing of ‣*guards* and their components. ‣*Safety switches* and other safety devices must be designed such that the protective function cannot be changed or defeated by hand or using *one* simple action. Simple actions include using:

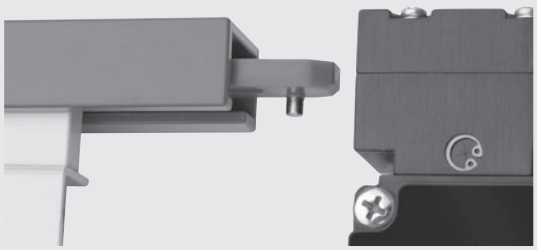
- Screwdrivers
- Ball-point pens
- Nails
- Pieces of wire
- Adhesive tape
- etc.

Actions that are not regarded as simple are actions that require more than one work step with tools.

The inability to *bypass by simple means* (DGUV Information 203-079) is:

- The removal or turning away of components of the locking surface with the aid of heavy tools (e.g. crowbar, angle grinder)
- The turning of the safety switch away from its protective position
- The use of a second ‣*actuator*
- The bridging of the contacts

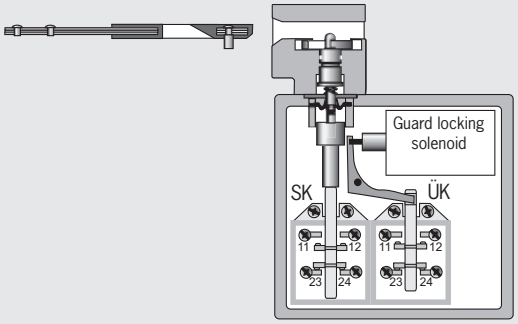
It should be taken into account in the design that, despite ‣*guards*, straightforward and correct operation of machines and installations must be possible. If this aspect is not taken into account, the probability of defeating safety measures will increase.



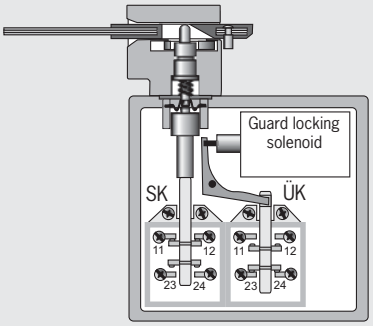
Guiding the actuator in a C rail

Testing
Testing is intended to ensure that a safety system functions correctly. Testing can be performed automatically, by the control system, in the form of monitoring or testing during the process. Depending on the requirements, a combination of automatic and manual testing is also possible. The testing must be repeated at defined intervals as a function of the risk analysis. Testing is required for ‣*category* 2 and 4 according to EN 954-1 and should also be performed for category 3.

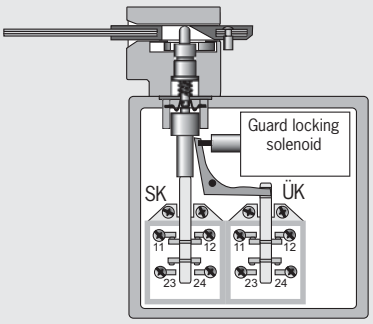
❶ Door open and not locked



❷ Door closed and not locked



❸ Door closed and locked



Index by item designation

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