Safety Switches with Metal Housing

More than safety.

EUCHNER

More than safety.

Emil Euchner, the company's founder and inventor of the multiple limit switch, circa 1928.

Around the world – the Swabian specialists in motion sequence control for mechanical and systems engineering.

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switchgear for controlling a wide variety of motion sequences in mechanical and systems engineering. In 1953, Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

Automation – Safety – ManMachine

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies to offer the right solution for special requirements – regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector.
EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

Quality, reliability, precision

Quality, reliability and precision are the hallmarks of our corporate philosophy. They represent concepts and values to which we feel totally committed.
At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and, in particular, for their own field of work. This individual commitment to perfection results in products which are ideally tailored to the customers' needs and the requirements of the market. After all: our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' own customers.

EUCHNER – More than safety.

Quality – made by EUCHNER

Contents

Safety Switches with Metal Housing

About this catalog

The catalog *Safety switches with Metal housing* provides an overview of our safety switches with metal housings in the series N1A, NB01, NZ, TZ, NX, TX, STA and the safety hinge ESH. 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 also find important safety instructions in the appendix.

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

Safety switches in metal housing

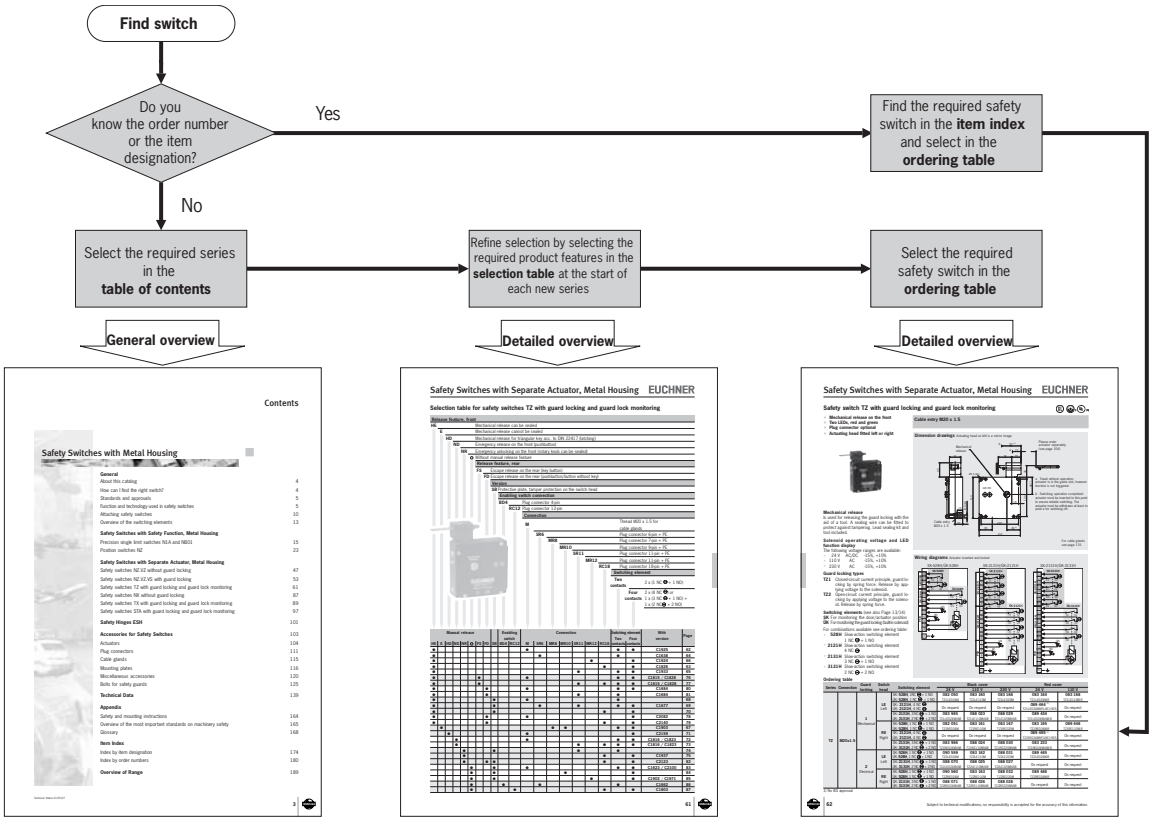
With safety function			With separate actuator						Safety hinge ESH	Accessories
Single hole fixing limit switch		Position switch	Without guard locking		With guard locking	With guard locking and guard locking monitoring				
N1A	NB01	NZ	NZ.VZ	NX	NZ.VZ.VS	TZ	TX	STA		
										
see page 15	see page 15	see page 23	see page 47	see page 87	see page 53	see page 61	see page 89	see page 97	see page 101	see page 103

How can I find the right switch?

There are two ways you can find the right switch:

❶ If you know the order number or the product designation, look for the switch directly in the item index (see page 174 or page 180).

❷ 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 (Specification for 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 employers' liability insurance association (BG) and are given in the lists from the BG.
Furthermore, numerous switches are listed by Underwriters Laboratories (UL). 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:

BG-PRÜFZERT	Switches with this symbol are approved by the German employers' liability insurance association (BG)
c UL us	Switches with this symbol are approved by Underwriters Laboratories (UL, Canada and USA)

Special approvals:

GL	Switches with this symbol are approved by the Germanischer Lloyd (GL)

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 1088 (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 safety 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 safety 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 by a positively driven mechanism when the safety guard is opened.

Safety switch types

In general, a differentiation is made between safety switches with safety function and safety switches with separate actuator.

With safety function

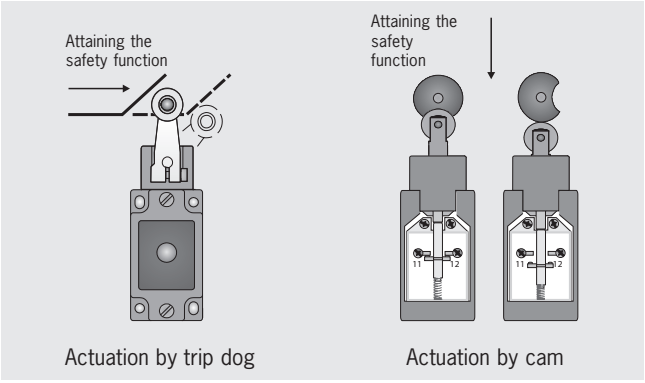
With separate actuator

EUCHNER has safety switches with safety function and safety switches with separate actuator in its range.

Safety switches with safety function

Safety switches with safety function are safety switches in which the actuating element and the switch are fitted in one housing. 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 with safety function.
To actuate a switch with safety function, 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 safety 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 safety 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 guards. 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 safety guards with very little mounting effort.



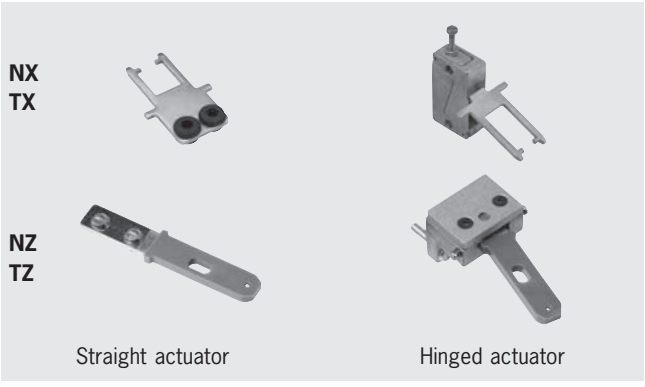
Actuation by trip dog | Actuation by cam

Safety switches with separate actuator

On safety switches with separate actuator, the actuating element is separate to the switch and is attached to the moving part of the safety guard to be monitored. When the safety guard is closed, the actuating element is inserted in the switch. The actuating elements are available in various versions to suit the safety 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 actuating elements.

Actuating elements for switches with separate actuator

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.

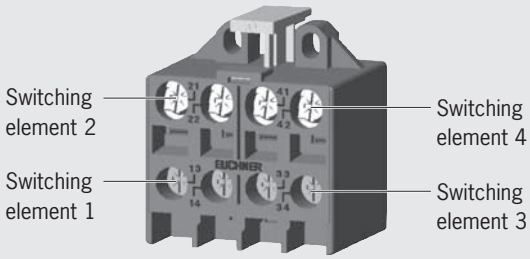


Straight actuator | Hinged actuator

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 (> 1000 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:
- 1 contact switching elements
- 2 contact switching elements with two independent switching elements
- 4 contact switching elements with four independent switching elements

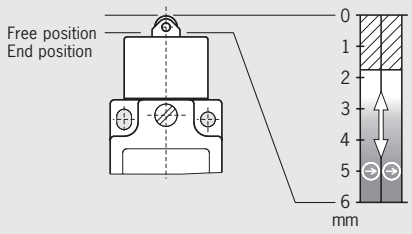


4 contact switching element

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 interlocking solenoid (ÜK). Switching elements are divided into two types as a function of their switching behavior:
- 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.

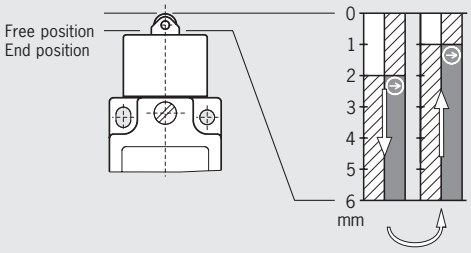


Travel diagram
Slow-action switching element

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 switching 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 elements 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 switching elements that at least one switching element 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.

Explanation of symbols and notation

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

Notation
1 NC ⊖ + 1 NO

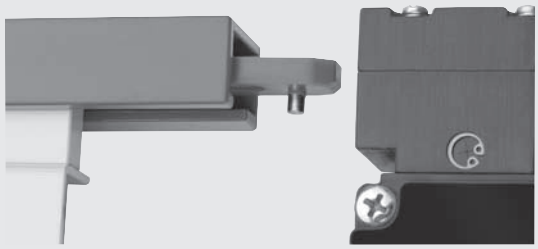
Explanation
Normally closed contacts are represented by NC, normally open contacts with NO. The number defines how many contacts are available. The symbol after the NC defines that the NC contact is a positively driven contact. This switch therefore has one normally closed contact and one normally open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

Auxiliary contacts

Door monitoring contact
In addition to the safety contacts, auxiliary contacts are also required to indicate to the control system that the safety guard is open. As these switching elements do not have any safety function, either NC or NO contacts can be used.

Protection against tampering

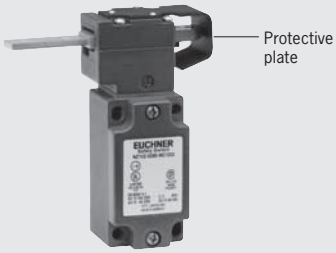
A safety switch can only ensure that operation is free of hazards if it is not bypassed. To prevent tampering on switches with separate actuator, the actuator should be positively mounted on the safety guard. All actuating elements are supplied with safety screws that can be fastened using commonly available 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 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 with safety function can be installed covered so that the actuating element cannot be reached.



Guiding the actuator in a C rail

Protective plate

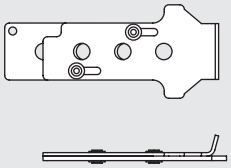
On the switches NZ.VZ, increased protection against bypassing can be achieved by using a protective plate over the switch head. The switch head's rearward opening is then rendered almost inaccessible.



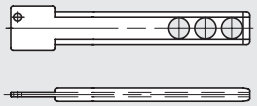
Safety switch with separate actuator with protective plate

Lockout bar

To prevent the unintentional closing of a safety guard, lockout bars are available for switches with separate actuator. The lockout bar is inserted in the safety switch instead of the actuator when the safety 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 with separate actuator 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 with separate actuator with guard locking.

Safety switch NZ.VZ.VS

Safety switch TZ

Safety switch TX

Protection of personnel

Guard locking is required if a hazard cannot be removed immediately by shutting down a machine (e.g. a movement with overtravel). In this case fail-safe control of the locking solenoid for the guard locking is required. This requirement can, for instance, be achieved by a standstill monitor or a safe time-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 lock monitoring required for this function and can therefore be used for protection of personnel.

Process protection

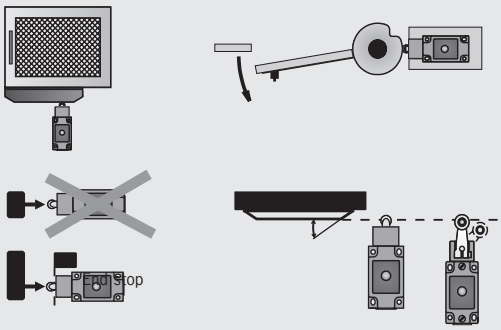
Often a safety guard is only to be locked to prevent interruption to the process due to unintentional opening of the safety guard. In this case the position of the interlocking solenoid does not need to be integrated in the safety circuit. In this situation the series NZ.VZ.VS, TZ, TX and STA safety 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 with safety function, with separate actuator and the actuators

Certain requirements must be met with respect to attaching the safety switches (e. g. EN 1088 Safety of machinery. Interlocking devices associated with guards. Principles for design and selection).
Any installation position can be used, however, the switches must be attached such that their position cannot be changed in operation. On the other hand, if necessary it must be possible to replace the switches at any time 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).

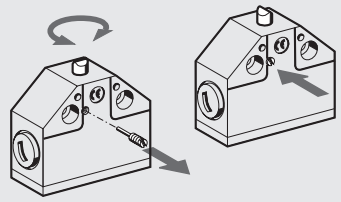


Attaching safety switches and actuators

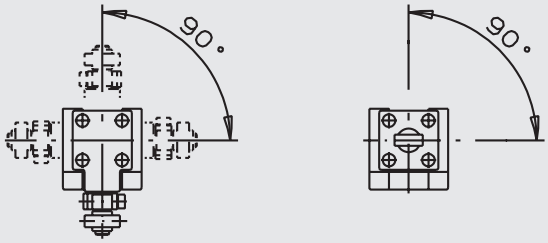
The same applies to the actuators for switches with separate actuator and trip dogs for switches with safety function. A joint without movement is also required here. Above all else, loosening must be prevented. In addition, it must be ensured that cams and trip dogs can only be mounted in the correct 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 with separate actuator 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.

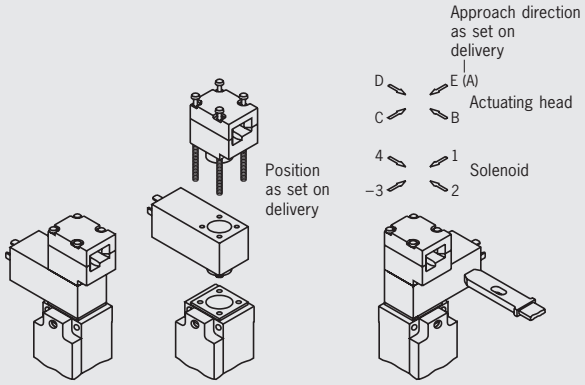


Changing the approach direction
single hole fixing limit switch N1A/NB01

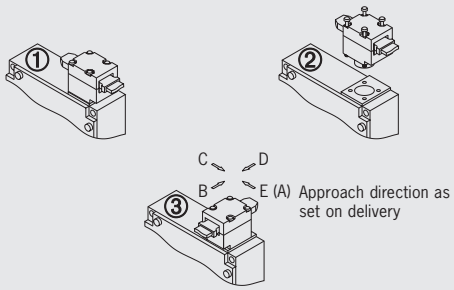


Lever arm Plunger

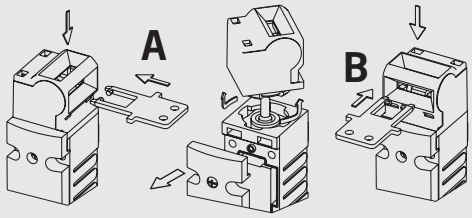
Changing the approach direction safety switch NZ (4 x 90°)



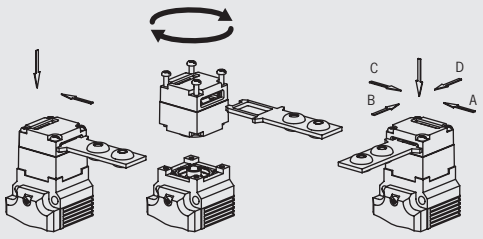
Changing the approach direction safety switch NZ.VZ.VS (4 x 90°)



Changing the approach direction safety switch TZ



Changing the approach direction safety switch NX/TX



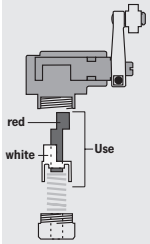
Changing the approach direction safety switch STA

After undoing the four fastening 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 fixings 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

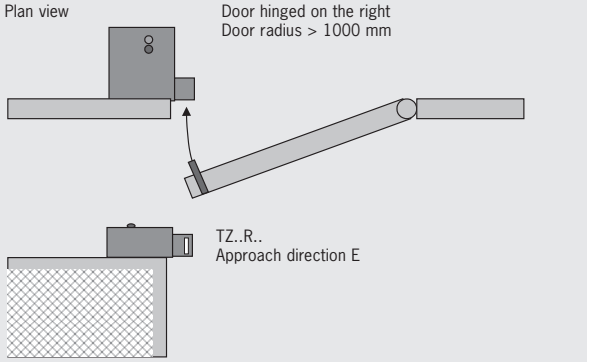


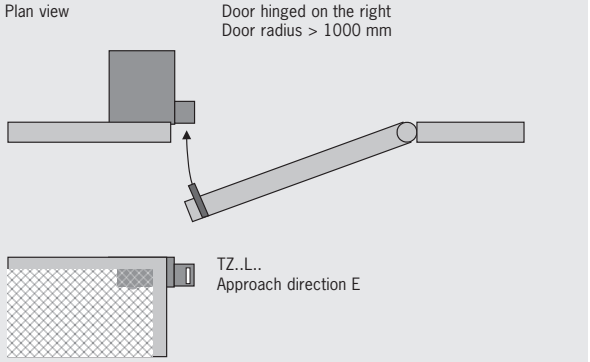
Changing the switching direction position switch NZ.H...

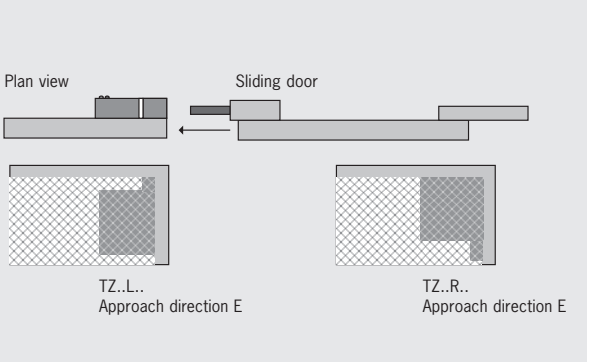
Attaching the safety switch TZ with actuating head fitted on left or right

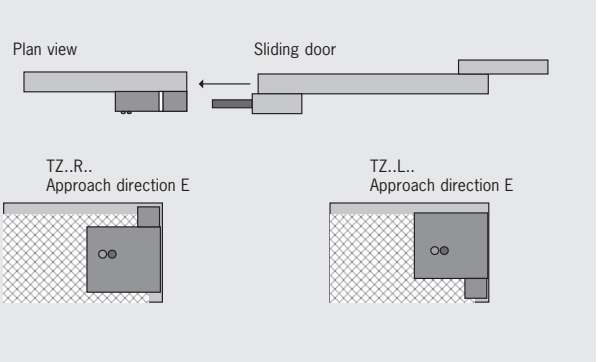
The safety switch TZ can be mounted in a large number of different installation positions. Often the switch is mounted horizontally on the roof of a machine or with a suspended actuating head. The method of attachment depends on whether the switch is to be attached in a protected installation position, 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.

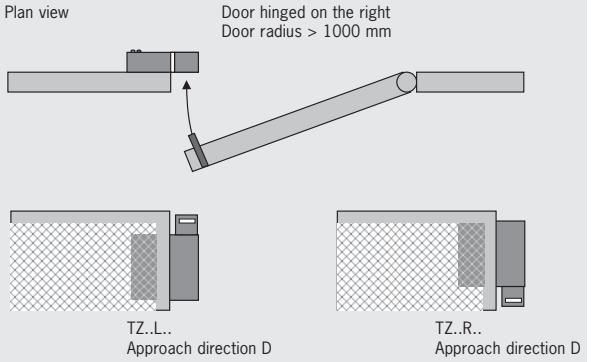
The drawings show that the attachment of the actuating head is very heavily dependent on how the switch is mounted. It is not possible to list all methods of attachment here, as the actuator head can be rotated in 90° steps. As a result there are a very large number of different methods of attachment.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

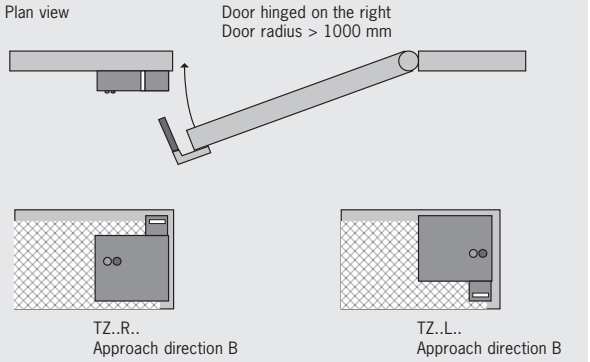


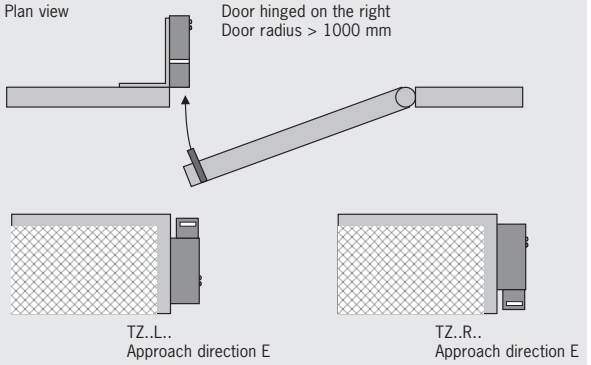


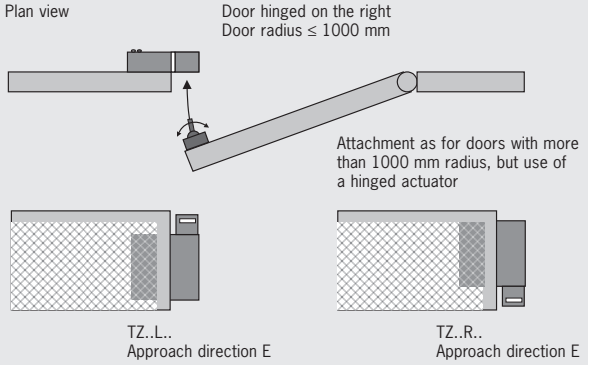












Electrical connection

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. In addition to the appropriate mating connectors, these connectors are available with pre-assembled cables as accessories.

Switch layout for design TZ

- Locking arm

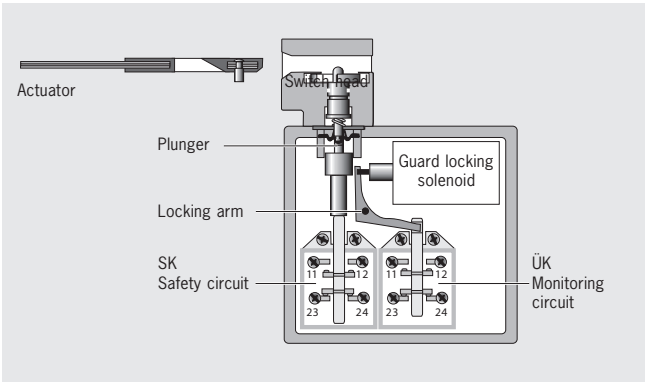
The locking arm ensures that the switch is guard locked by the solenoid. It acts directly on the switching element ÜK; the positively driven contact can only be closed in the locked state (see ⬧ *protection against unintentional closing*).

- SK

The position of the SK switching element is dependent on the position of the actuator or the safety 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 safety 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 interlocking solenoid is controlled correspondingly.



LED indicator TZ

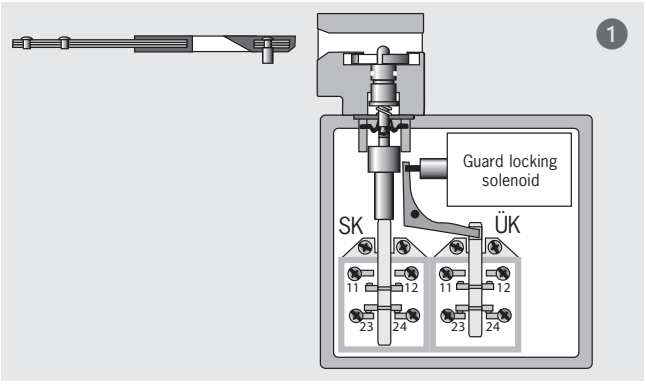
As standard the TZ series is equipped with a red and a green LED. Depending on the switch design, the assignment is pre-wired or can be chosen as required (see also page 153).

Principle of operation of TZ

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

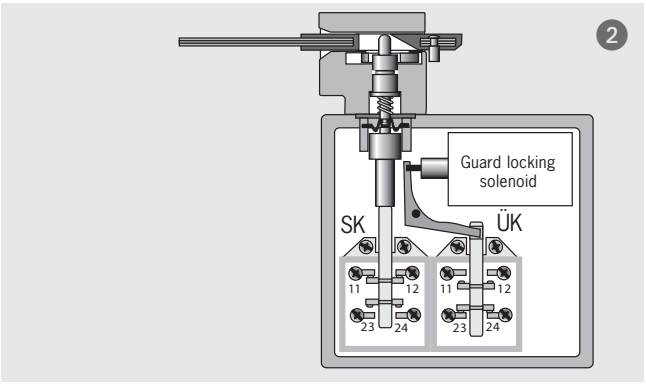
1 Door open and not locked

In the initial state (actuator removed/safety 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 ⬧ *protection against unintentional closing*).



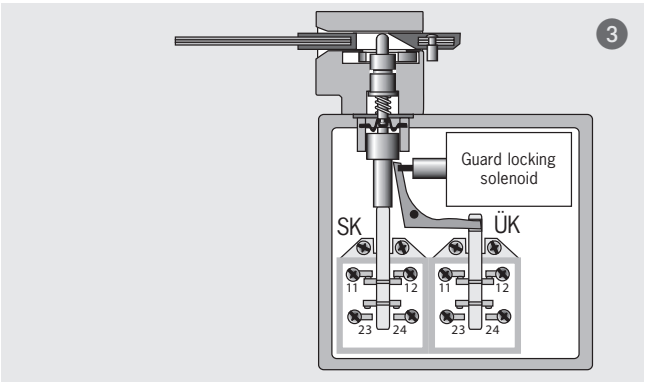
2 Door closed and not locked

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 auxiliary 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 interlocking 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 auxiliary contacts 23-24 are opened. The actuator and the safety guard are locked. This means that the machine connected to the safety circuit can be started.



LED indicator TX

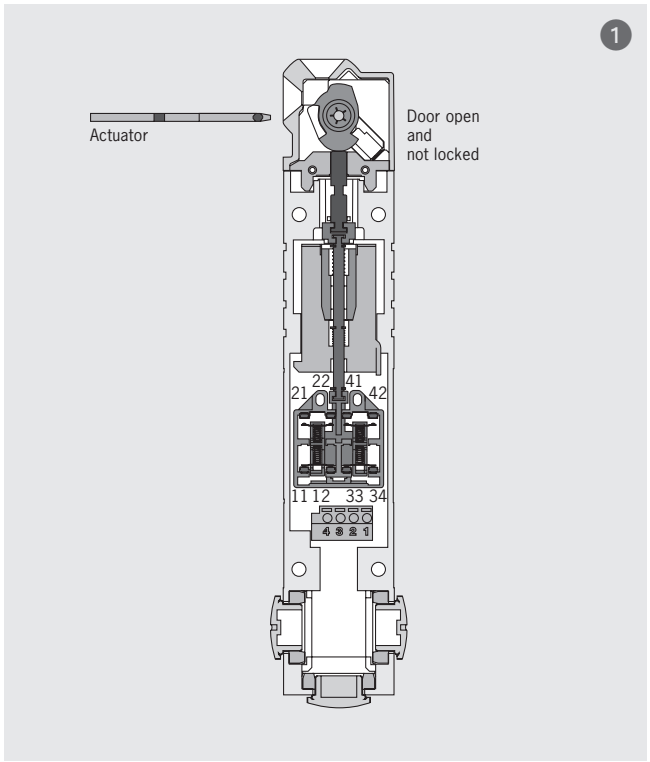
As standard the TX series is equipped with a red and a green LED. Depending on the switch design, the assignment is pre-wired or can be chosen as required .

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.

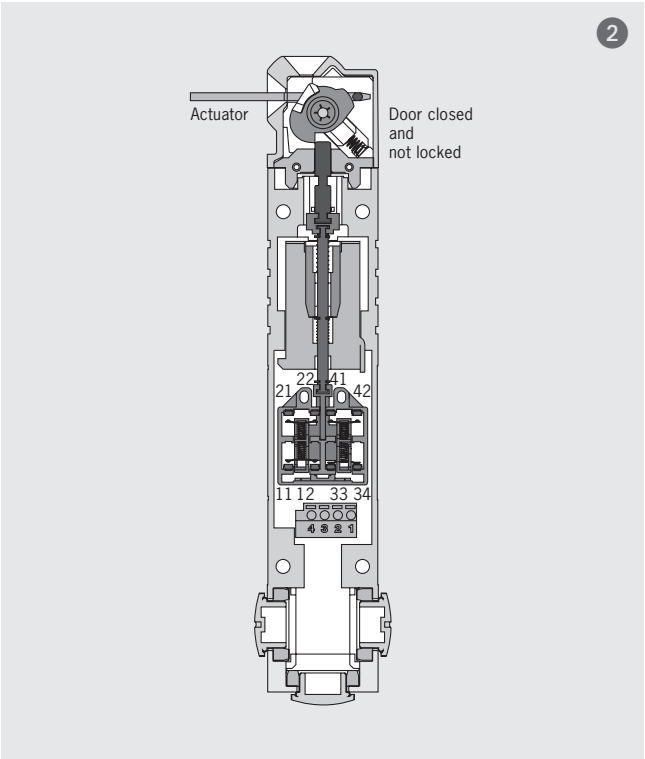
1 Door open and not locked

In the initial state (actuator removed/safety 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 ➧*protection against unintentional closing*).



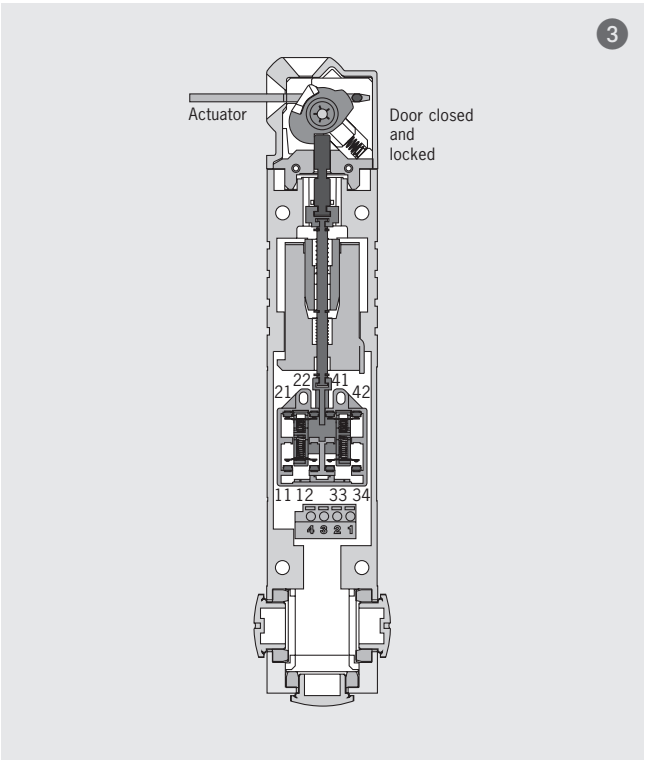
2 Door closed and not locked

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 interlocking 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 interlocking solenoid was activated. The actuator and the safety guard are locked. This means that the machine connected to the safety circuit can be started.



Protection against unintentional closing

The design feature of a guard locking which ensures that the locking mechanism (solenoid plunger) cannot go into the interlock position if the safety guard is open is also referred to in BGI 575 as Protection against unintentional closing.

Switching elements

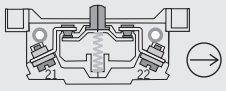
The switching elements used in our safety switches have a dedicated numbering system. A selection of switching elements is available depending on the switch type. In the following overview you can see which switching element is covered by the related number.
Some switching elements are marked with an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

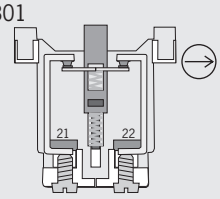
Switching element 508

- Snap-action switching element
- 1 positively driven contact
- For series N1A



Switching element 588

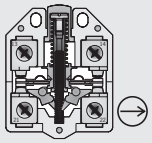
- Slow-action switching element
- 1 positively driven contact
- For series NB01

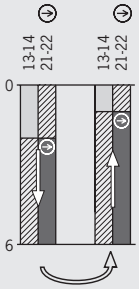


Switching elements with 2 contacts

Switching element 511

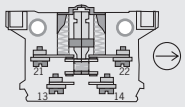
- Snap-action switching element
- 1 positively driven NC contact + 1 NO contact
- For series NZ

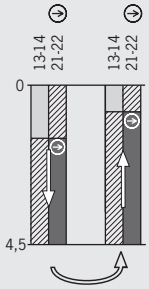




Switching element 514

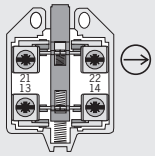
- Snap-action switching element
- 1 positively driven NC contact + 1 NO contact
- For series N1A

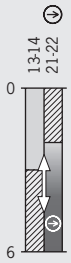




Switching element 528H

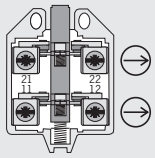
- Slow-action switching element
- 1 positively driven contact + 1 NO contact
- For series NZ / TZ

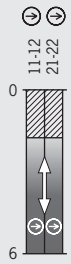




Switching element 538H

- Slow-action switching element
- 2 positively driven contacts
- For series NZ / TZ

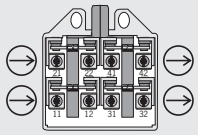


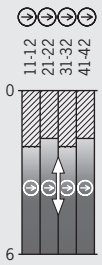


Switching elements with 4 contacts

Switching element 2121H

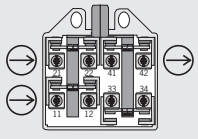
- Slow-action switching element
- 4 positively driven contacts
- For series NZ / TZ / NX

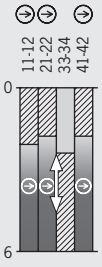




Switching element 2131H

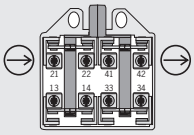
- Slow-action switching element
- 3 positively driven contacts + 1 NO contact (door monitoring contact for STA)
- For series NZ / TZ / NX / STA

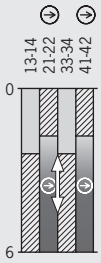




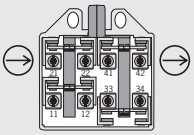
Contact
closed
open
positively opened

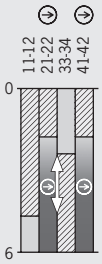
Switching element 3131H
- Slow-action switching element
- 2 positively driven contacts + 2 NO contacts
- For series NZ / TZ / NX



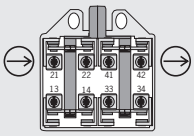


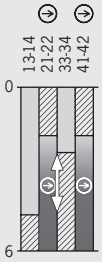
Switching element 4121
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NC contact (door monitoring contact)
- For series TX



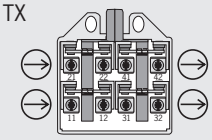


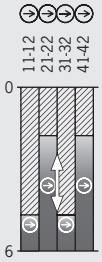
Switching element 4131 (without door monitoring contact)
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NO contact
- For series TX



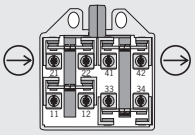


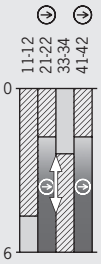
Switching element 4141
- Slow-action switching element
- 2 positively driven contacts + 2 positively driven contacts (door monitoring contact)
- For series TX



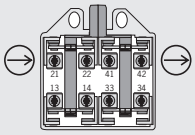


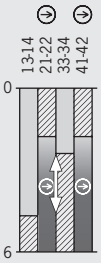
Switching element ETX B
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NC contact (door monitoring contact)
- For series TX



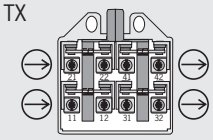


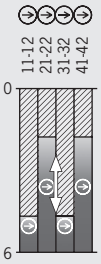
Switching element ETX C
- Slow-action switching element
- 2 positively driven contacts + 1 NO contact + 1 NO contact (door monitoring contact)
- For series TX





Switching element ETX D
- Slow-action switching element
- 2 positively driven contacts + 2 positively driven contacts (door monitoring contact)
- For series TX





Contact
- closed
- open
- positively opened

Selection table for precision single limit switches N1A and NB01

Actuating element

- **N1AD** Chisel plunger
- **N1AR** Roller plunger with steel roller ∅ 8 mm
- **N1ARL** Roller plunger with steel roller ∅ 18 mm
- **N1AW** Domed plunger
- **NB01D** Chisel plunger
- **NB01R** Roller plunger with steel roller ∅ 5 mm

Connection

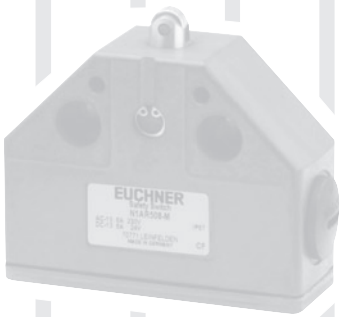
- **M** Thread M16x1.5 or M12x1.5 for cable glands
- **SVM5** M12 plug connector 5-pin, male socket adjustable (270°) for elbow connector

Exterior diaphragm

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

Switching element

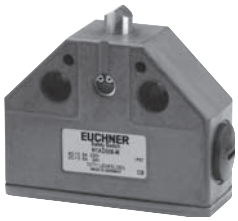
- **One contact** 1 NC ⊖
- **Two contacts** 1 NC ⊖ + 1 NO



Actuating element						Connection		Diaphragm	Switching element		With version	Page
N1AD	N1AR	N1ARL	N1AW	NB01D	NB01R	M	SVM5	AM	One contact	Two contacts		
●						●			●	●	C1292 / C1293	16
●						●		●	●	●		17
●							●			●		17
	●					●			●	●	C1293	18
	●					●		●	●	●		19
	●						●			●		19
		●				●			●	●		20
			●			●	●		●	●		21
				●		●			●			22
					●	●			●			22

Precision single limit switch N1AD with chisel plunger

- **Housing according to DIN 43693**
- **LED optional**
- **Plug connector optional**
- **Exterior diaphragm optional**



Approach direction

Horizontal
Can be adjusted in 90° steps.

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

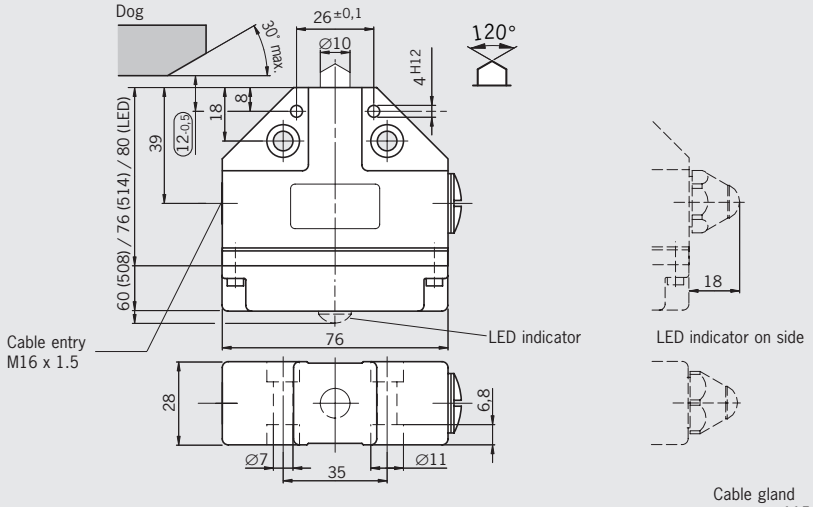
LED function display (optional)
A function display is available for the following voltage ranges:

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

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

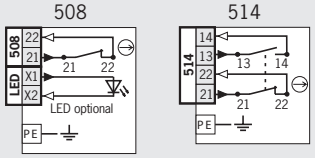
Cable entry M16 x 1.5

Dimension drawings



Cable gland see page 115

Wiring diagrams



Ordering table

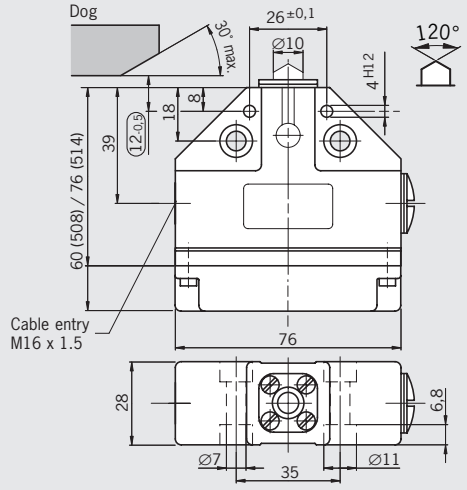
Series	Actuator	Connection	Switching element	Function display: Without LED	12-60 V red LED	110 V red LED	230 V red LED	24 V side red	24 V side yellow
N1A	D Chisel plunger	Cable entry M16 x 1.5	508 1 NC ⊖	083 886 N1AD508-M	087 218 N1AD508LE060-M	087 221 N1AD508LE110-M	087 224 N1AD508LE220-M	087 197 N1AD508-MC1293	087 193 N1AD508-MC1292
		Cable entry M16 x 1.5	514 1 NC ⊖ + 1 NO	083 849 N1AD514-M	-	-	-	On request	On request

1) Approval pending

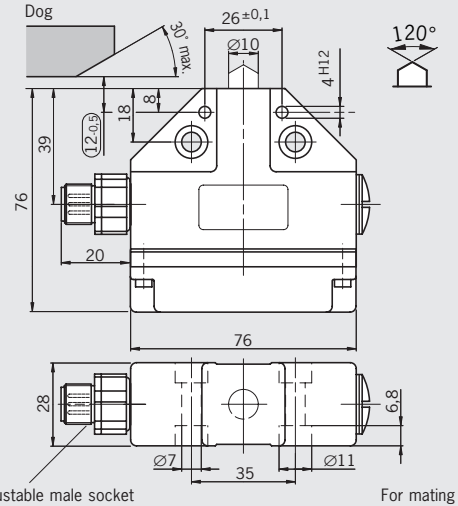
Cable entry M16 x 1.5
Exterior diaphragm

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings



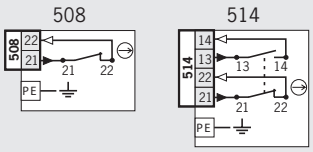
For cable glands see page 115

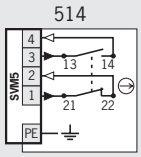


Adjustable male socket (max. 270°)

For mating connectors see page 115

Wiring diagrams





Ordering table

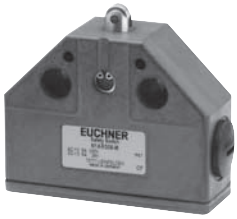
Series	Actuator	Connection	Switching element	Version	Function display Without LED
N1A	D Chisel plunger	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	Exterior diaphragm	**090 546** N1AD508AM-M
			514 1 NC ⊖ + 1 NO	Exterior diaphragm	**091 261** N1AD514AM-M
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO		**087 603** N1AD514SVM5-M

1) Approval pending

For safety precautions see page 164
For technical data see page 139

Precision single limit switch N1AR with roller plunger

- **Housing according to DIN 43693**
- **Steel roller Ø 8 mm**
- **LED optional**
- **Plug connector optional**
- **Exterior diaphragm optional**
- **Bearing optional**



Approach direction

Horizontal
Can be adjusted in 90° steps.

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

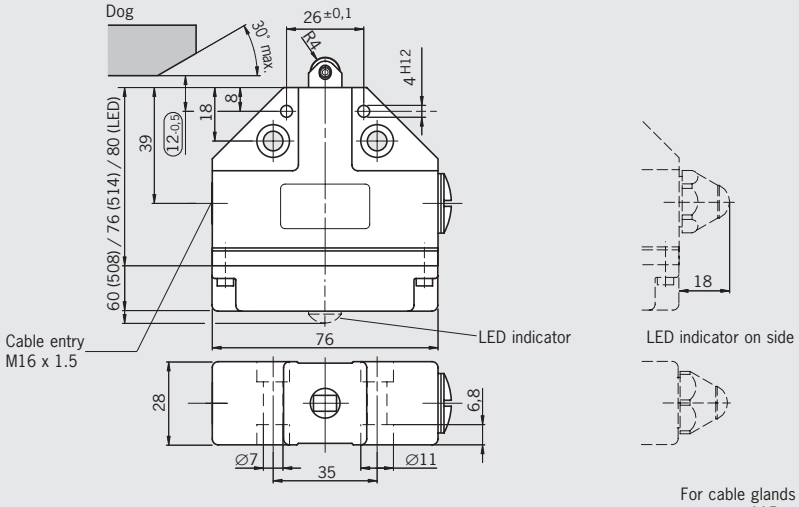
LED function display (optional)
A function display is available for the following voltage ranges:

AC/DC	12-60 V		red
DC	24 V	on side	red
AC	110 V	±15%	red
AC	230 V	±15%	red

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

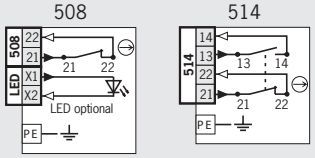
Cable entry M16 x 1.5

Dimension drawings



For cable glands see page 115

Wiring diagrams



Ordering table

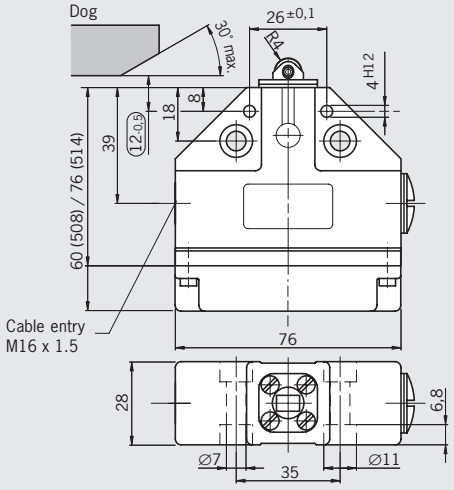
Series	Actuator	Connection	Switching element	Version	Function display				
					Without LED	12-60 V red LED	110 V red LED	230 V red LED	24 V side red
N1A	R Roller plunger Ø 8 mm	Cable entry M16 x 1.5	508 1 NC ⊖	Slide bearing	**083 887** N1AR508-M	**087 219** N1AR508LE060-M	**087 222** N1AR508LE110-M	**087 225** N1AR508LE220-M	**087 198** N1AR508-MC1293
				Ball bearing	**087 245** N1AB508-M	-	-	-	On request
			514 1 NC ⊖ + 1 NO	Slide bearing	**078 487** N1AR514-M	On request	On request	On request	On request
				Ball bearing	**087 247** N1AB514-M	-	-	-	On request

1) Approval pending

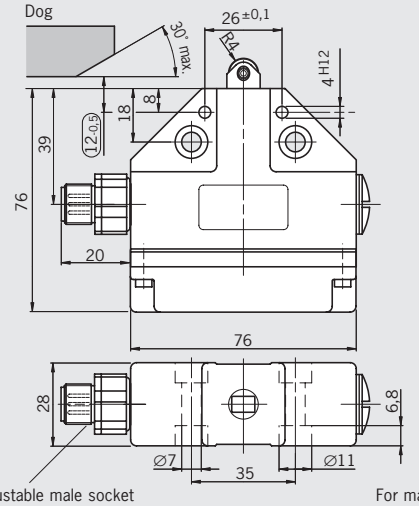
Cable entry M16 x 1.5
Exterior diaphragm

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

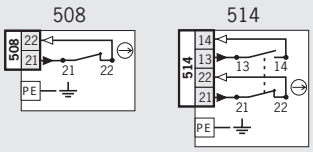


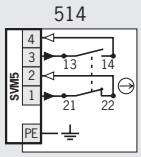
For cable glands see page 115



For mating connectors see page 115

Wiring diagrams





Ordering table

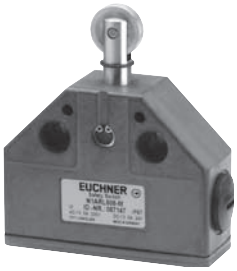
Series	Actuator	Connection	Switching element	Version	Function display Without LED
N1A	**R** Roller plunger Ø 8 mm	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	Exterior diaphragm	**090 547** N1AR508AM-M
			514 1 NC ⊖ + 1 NO	Exterior diaphragm	**087 158** N1AR514AM-M
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO		**087 604** N1AR514SVM5-M

1) Approval pending

For safety precautions see page 164
For technical data see page 139

Precision single limit switch N1ARL with extended roller plunger

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



Approach direction

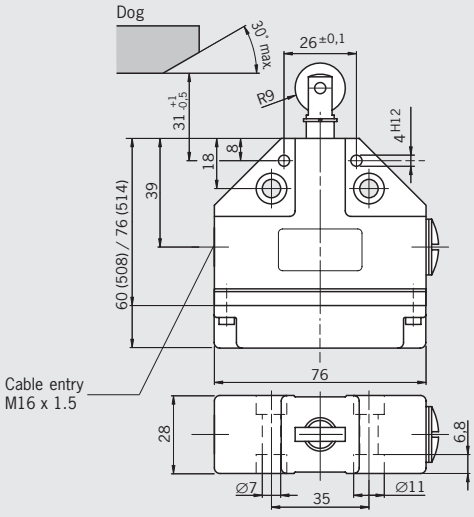
Horizontal
Can be adjusted in 90° steps.

Switching elements (see also page 13)

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

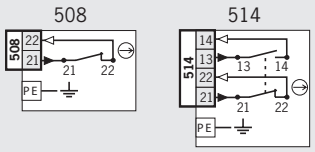
Cable entry M16 x 1.5

Dimension drawings



For cable glands see page 115

Wiring diagrams



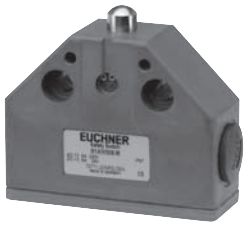
Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
N1A	RL Roller plunger Ø 18 mm	Cable entry M16 x 1.5	508 1 NC ⊖	087 147 N1ARL508-M
			514 1 NC ⊖ + 1 NO	087 204 N1ARL514-M

1) Approval pending

Precision single limit switch N1AW with domed plunger

- **Housing according to DIN 43693**
- **LED optional**
- **Plug connector optional**



Approach direction

Horizontal and vertical

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

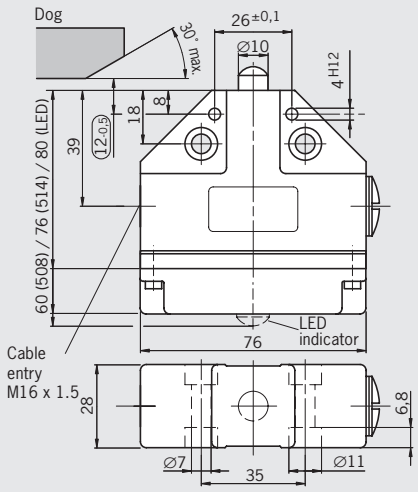
- AC/DC 12-60 V red
- AC 110 V ±15% red
- AC 230 V ±15% red

Switching elements (see also page 13)

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

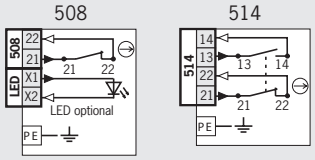
Cable entry M16 x 1.5

Dimension drawings



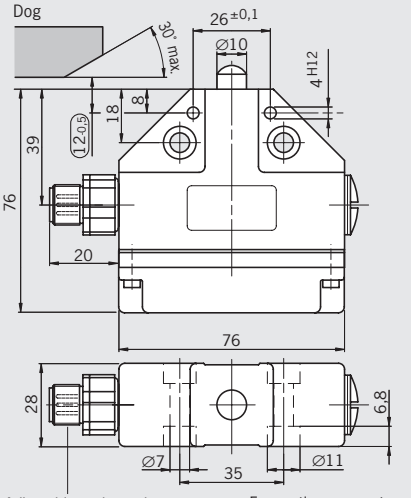
For cable glands see page 115

Wiring diagrams



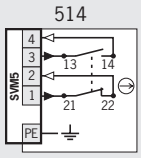
Plug connector SVM5
M12 plug, 5-pin

Dimension drawings



Adjustable male socket (max. 270°)

For mating connectors see page 115



Ordering table

Series	Actuator	Connection	Switching element	Function display			
				Without LED	12-60 V red LED	110 V red LED	230 V red LED
N1A	W Domed plunger	Cable entry **M16 x 1.5**	**508** 1 NC ⊖	**087 205** N1AW508-M	**087 220** N1AW508LE060-M	**087 223** N1AW508LE110-M	**087 226** N1AW508LE220-M
			514 1 NC ⊖ + 1 NO	**083 850** N1AW514-M	-	-	-
		Plug connector **SVM5** (M12 plug)	**514** 1 NC ⊖ + 1 NO	**090 743** N1AW514SVM5-M	-	-	-

1) Approval pending

For safety precautions see page 164
For technical data see page 139

Precision single limit switch NB01

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

Approach direction

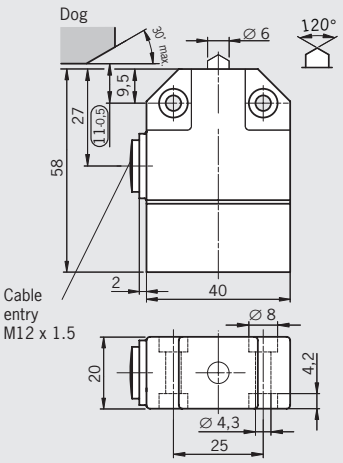
Horizontal
Can be adjusted in 90° steps.

Switching elements (see also page 13)

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

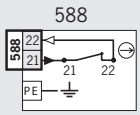
Cable entry M12 x 1.5
Chisel plunger

Dimension drawings



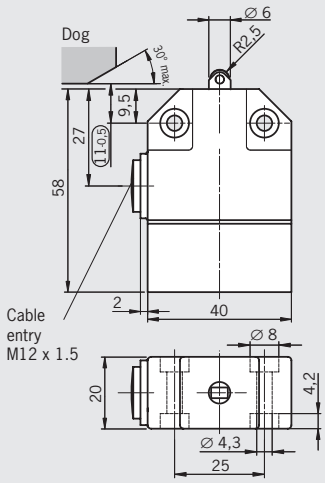
For cable glands see page 115

Wiring diagrams



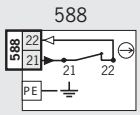
Cable entry M12 x 1.5
Roller plunger

Dimension drawings



For cable glands see page 115

Wiring diagrams



Ordering table

Series	Actuator	Connection	Switching element	Function display Without LED
NB01	**D** Chisel plunger	Cable entry **M12 x 1.5**	**588** 1 NC ⊖	**088 584** NB01D588-M
	R Roller plunger Ø 5 mm	Cable entry **M12 x 1.5**	**588** 1 NC ⊖	**088 583** NB01R588-M

1) Approval pending

Selection table for position switches NZ

Actuating element

WO	Domed 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 (max. 270o) for elbow connector
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

Two contacts	1 NC ⊖ + 1 NO or 2 NC ⊖
Four 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	SR6	MR8	MR9	MR10	SR11	Two contacts	Four contacts		
●									●	●						●	●		24
●											●					●		C1630/C1631	25
●															●		●		25
	●								●	●						●	●	C1912	26
	●										●				●	●	●		27
		●							●							●		C1588	43
		●							●	●						●	●	ATEX	28
		●									●					●		C1630/C1631	29
		●											●		●		●		29
			●						●	●						●	●		30
			●								●					●		C1631	31
			●												●		●		31
				●					●	●						●	●		32
				●							●					●			33
				●											●		●	C1831	33
					●				●	●						●	●	ATEX	34
					●						●					●		C1630	35
					●										●		●		35
					●							●	●	●			●		36
					●				●								●	C1779	45
					●				●							●		C1833	46
						●			●							●		C569	44
						●			●	●						●	●		37
						●					●					●		C1630/C1631	38
						●									●		●		38
						●							●	●			●		39
							●		●							●	●		40
							●				●					●			41
							●								●		●		41
								●	●							●	●		42

Position switch NZ.WO with domed 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
- AC 110 V ±15% red
- AC 230 V ±15% red

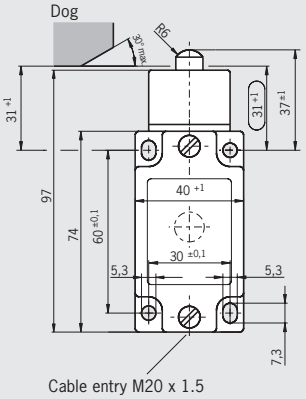
Switching elements (see also page 13/14)

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

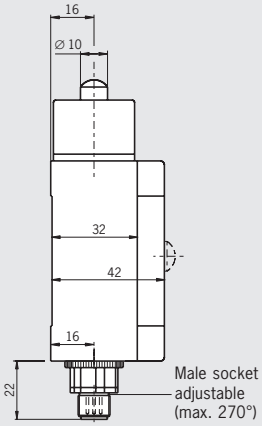
Cable entry M20 x 1.5

Plug connector SVM5
M12 plug, 5-pin

Dimension drawings

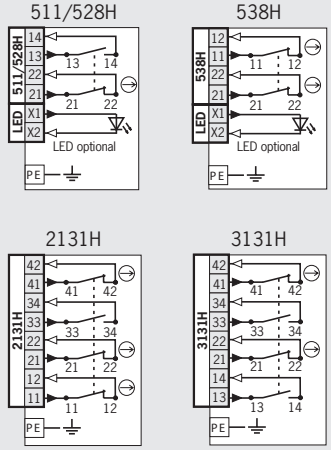


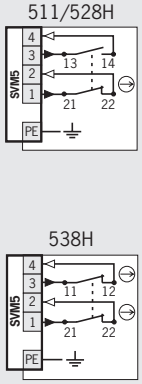
For cable glands see page 115



For mating connectors see page 115

Wiring diagrams Switch not actuated





Ordering table

Series	Connection	Actuator	Switching element	Function display: Without LED	12-60 V red LED	110 V red LED	230 V red LED	12-60 V yellow LED
NZ	1 Cable entry **M20 x 1.5**	WO Domed plunger	**511** [1] 1 NC ⊖ + 1 NO	**088 611** [1] NZ1WO-511-M	**089 057** [1] NZ1WO-511L060-M	**089 059** [1] NZ1WO-511L110-M	**089 060** [1] NZ1WO-511L220-M	**089 058** [1] NZ1WO-511L060GE-M
			528H 1 NC ⊖ + 1 NO	**089 624** NZ1WO-528-M	**089 078** NZ1WO-528L060-M	On request	On request	On request
			538H 2 NC ⊖	**090 878** NZ1WO-538-M	**089 076** NZ1WO-538L060-M	On request	On request	On request
			2131H 3 NC ⊖ + 1 NO	**089 629** NZ1WO-2131-M	-	-	-	-
			3131H 2 NC ⊖ + 2 NO	**089 626** NZ1WO-3131-M	-	-	-	-
	2 Plug connector **SVM5** (M12 plug)	WO Domed plunger	**511** 1 NC ⊖ + 1 NO	**089 014** NZ2WO-511SVM5	On request	-	-	On request
			528H 1 NC ⊖ + 1 NO	**090 923** NZ2WO-528SVM5	On request	-	-	On request
			538H 2 NC ⊖	**090 924** NZ2WO-538SVM5	On request	-	-	On request

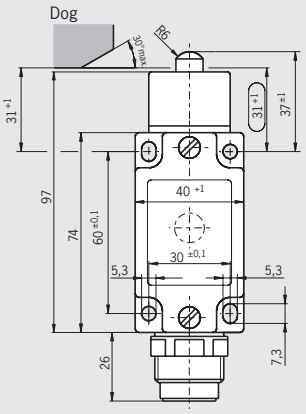
1) No BG approval for switching element 511

Plug connector SR6
6-pin + PE

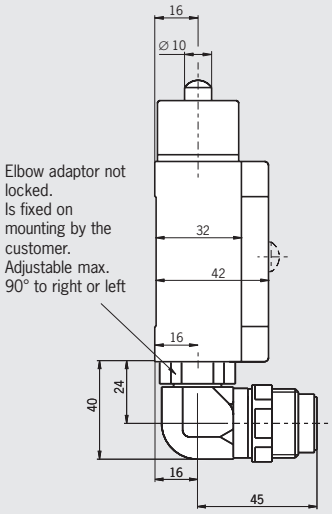
Plug connector SR6 angled
6-pin + PE

Plug connector SR11
11-pin + PE

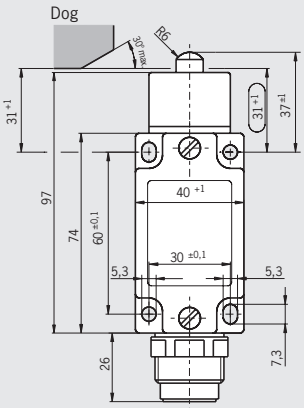
Dimension drawings



For mating connectors see page 112



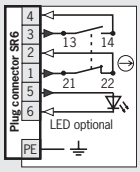
For mating connectors see page 112



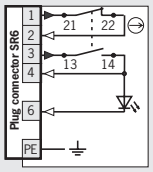
For mating connectors see page 112

Wiring diagrams Switch not actuated

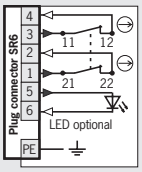
511/528H



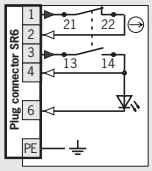
511...C1630



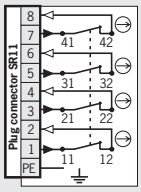
538H



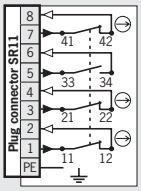
511...C1631



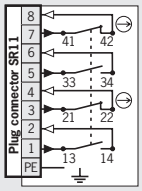
2121H



2131H



3131H



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 Domed plunger	2 Plug connector SR6	511 [1] 1 NC ⊖ + 1 NO		090 909 [1] NZ2WO-511	091 280 [1] NZ2WO-511L060	On request
			511 [1] 1 NC ⊖ + 1 NO	C1630 Alternative wiring	On request	On request	059 481 [1] NZ2WO-511L060C1630
			528H 1 NC ⊖ + 1 NO		090 910 NZ2WO-528	091 279 NZ2WO-528L060	On request
			538H 2 NC ⊖		090 911 NZ2WO-538	087 558 NZ2WO-538L060	On request
		2 Plug connector SR6 angled	511 [1] 1 NC ⊖ + 1 NO	C1631 Alternative wiring	On request	On request	059 482 [1] NZ2WO-511L060C1631
		2 Plug connector SR11	2121H 4 NC ⊖		090 976 NZ2WO-2121	-	-
			2131H 3 NC ⊖ + 1 NO		090 912 NZ2WO-2131	-	-
			3131H 2 NC ⊖ + 2 NO		090 913 NZ2WO-3131	-	-

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.RK with roller plunger

- **Steel roller ⌀ 8 mm**
- **LED optional**
- **Plug connector optional**
- **Bearing optional**

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

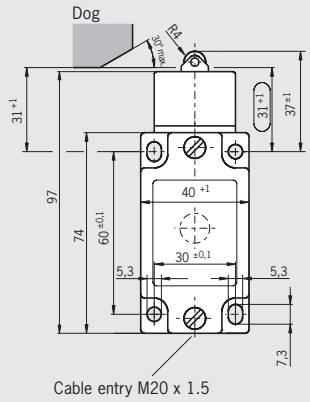
- AC/DC 12-60 V red or yellow
- AC 110 V ±15% red
- AC 230 V ±15% red

Switching elements (see also page 13/14)

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

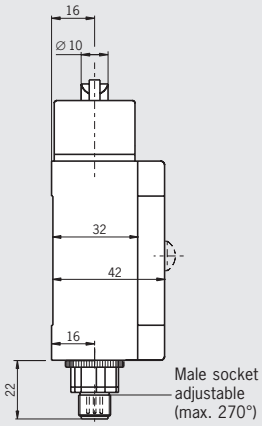
Cable entry M20 x 1.5

Dimension drawings



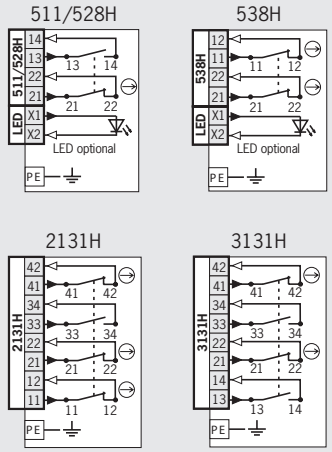
For cable glands see page 115

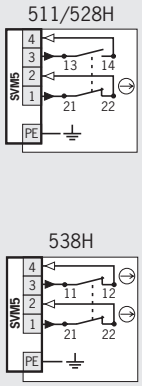
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





Ordering table

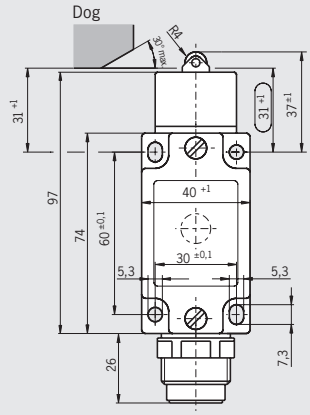
Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	110 V red LED	12-60 V yellow LED
NZ	RK Roller plunger	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO		**088 608**[1] NZ1RK-511-M	**090 354**[1] NZ1RK-511L060-M	**090 355**[1] NZ1RK-511L220-M	On request
			528H 1 NC ⊖ + 1 NO		**090 905** NZ1RK-528-M	**090 358** NZ1RK-528L060-M	On request	On request
			528H 1 NC ⊖ + 1 NO	**C1912** With bearing	**090 572** NZ1RK-528-MC1912	On request	On request	**086 408** NZ1RK-528L060GE-MC1912
			538H 2 NC ⊖		**090 906** NZ1RK-538-M	On request	On request	On request
			2131H 3 NC ⊖ + 1 NO		**090 907** NZ1RK-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO		**090 908** NZ1RK-3131-M	-	-	-
		2 Plug connector SVM5 (M12 plug)	**511** 1 NC ⊖ + 1 NO		**089 007** NZ2RK-511SVM5	On request	-	On request
			528H 1 NC ⊖ + 1 NO		**090 930** NZ2RK-528SVM5	On request	-	On request
			538H 2 NC ⊖		**089 018** NZ2RK-538SVM5	On request	-	On request

1) No BG approval for switching element 511

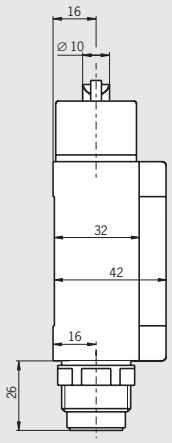
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

Dimension drawings



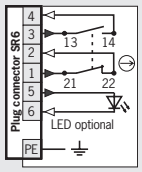
For mating connectors see page 112



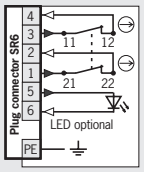
For mating connectors see page 112

Wiring diagrams Switch not actuated

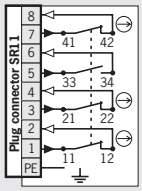
511/528H



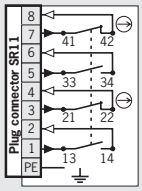
538H



2131H



3131H



Ordering table

Series	Actuator	Connection	Switching element	Function display: Without LED	Function display: 12-60 V red LED	Function display: 110 V red LED
NZ	RK Roller plunger	2 Plug connector SR6	**511** [1] 1 NC ⊖ + 1 NO	**090 016** [1] NZ2RK-511	On request	**088 180** [1] NZ2RK-511L110
			528H 1 NC ⊖ + 1 NO	**090 919** NZ2RK-528	**091 292** NZ2RK-528L060	On request
			538H 2 NC ⊖	**090 920** NZ2RK-538	On request	On request
		2 Plug connector SR11	**2131H** 3 NC ⊖ + 1 NO	**090 921** NZ2RK-2131	-	-
			3131H 2 NC ⊖ + 2 NO	**090 922** NZ2RK-3131	-	-

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.RS with roller plunger

- **Version C according to EN 50041** (steel roller ∅ 12 mm)
- **LED optional**
- **Plug connector optional**
- **ATEX approval optional**

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

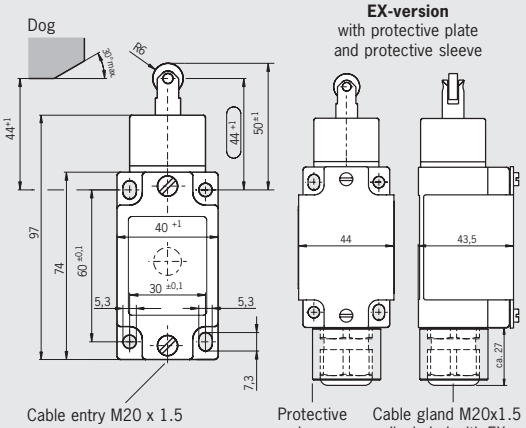
- AC/DC 12-60 V red or yellow
- AC 110 V ±15% red
- AC 230 V ±15% red

Switching elements (see also page 13/14)

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

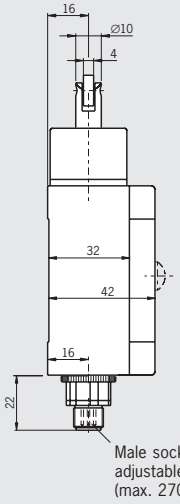
Cable entry M20 x 1.5

Dimension drawings



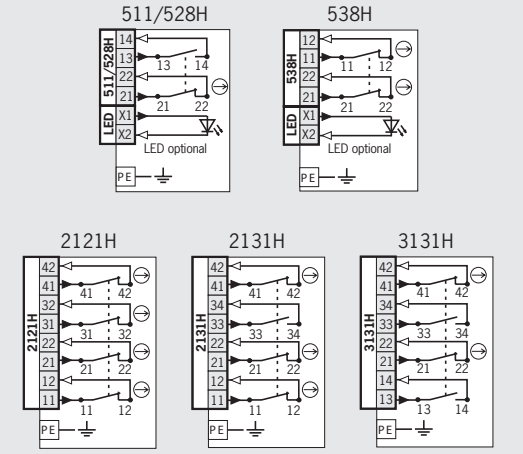
For cable glands see page 115

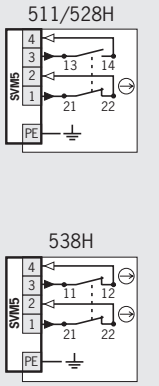
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





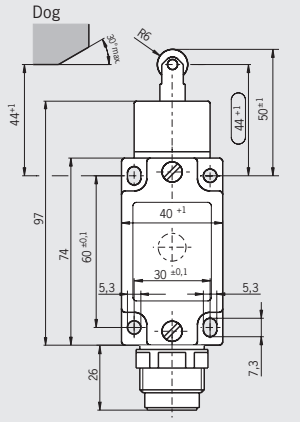
Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	110 V red LED	12-60 V yellow LED
NZ	RS Roller plunger	1 Cable entry M20 x 1.5	511 [1] 1 NC ⊖ + 1 NO		079 960 [1] NZ1RS-511-M	089 053 [1] NZ1RS-511L060-M	089 055 [1] NZ1RS-511L220-M	086 528 [1] NZ1RS-511L060GE-M
			528H 1 NC ⊖ + 1 NO		089 627 NZ1RS-528-M	086 413 NZ1RS-528L060-M	091 291 NZ1RS-528L220-M	On request
			538H 2 NC ⊖		090 936 NZ1RS-538-M	090 555 NZ1RS-538L060-M	On request	090 424 NZ1RS-538L060GE-M
			2121H 4 NC ⊖		087 595 NZ1RS-2121-M	-	-	-
			2131H 3 NC ⊖ + 1 NO		089 633 NZ1RS-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO		089 631 NZ1RS-3131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO	ATEX incl. cable gland	094 169 [2] NZ1RS-3131-M-EX	-	-	-
		2 Plug connector SVM5 (M12 plug)	511 1 NC ⊖ + 1 NO		090 027 NZ2RS-511SVM5	On request	-	On request
			528H 1 NC ⊖ + 1 NO		090 963 NZ2RS-528SVM5	On request	-	On request
			538H 2 NC ⊖		090 964 NZ2RS-538SVM5	On request	-	On request

1) No BG approval for switching element 511
2) Ⓔx II 3 G EEx nC IIC T5 (reduced resistance to impact acc. to EN 61241-1; max. 4 J) / Ⓔx II 3 D Ex tD A22 T90°C (reduced resistance to impact acc. to EN 61241-1; max. 4 J)

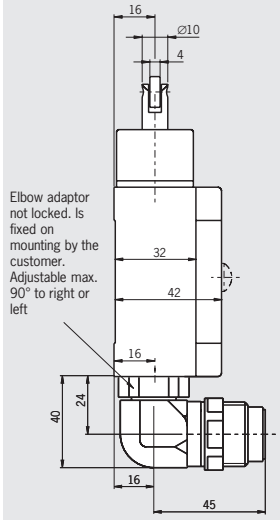
Plug connector SR6
6-pin + PE

Dimension drawings



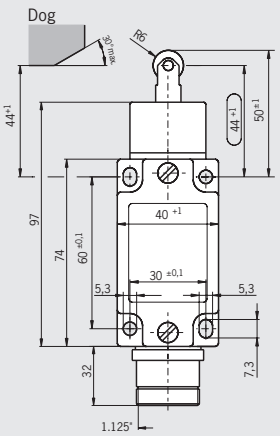
For mating connectors see page 112

Plug connector SR6 angled
6-pin + PE



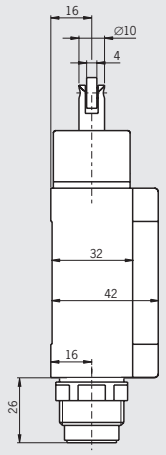
For mating connectors see page 112

Plug connector MR9
8-pin + PE



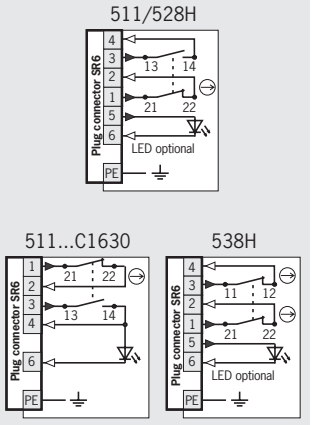
For mating connectors see page 124

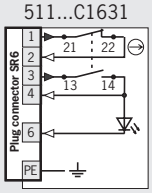
Plug connector SR11
11-pin + PE

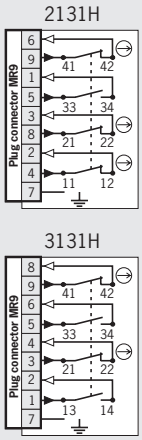


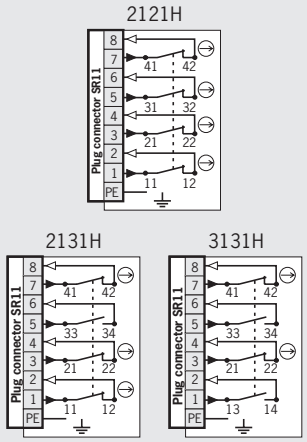
For mating connectors see page 112

Wiring diagrams Switch not actuated









Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	110 V red LED	12-60 V yellow LED
NZ	RS Roller plunger	2 Plug connector SR6	511 [1] 1 NC ⊖ + 1 NO		090 024 [1] NZ2RS-511	090 147 [1] NZ2RS-511L060	091 302 [1] NZ2RS-511L110	089 622 [1] NZ2RS-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	C1630 Alternative wiring	On request	On request	On request	082 400 [1] NZ2RS-511L060C1630
			528H 1 NC ⊖ + 1 NO		090 950 NZ2RS-528	088 197 NZ2RS-528L060	On request	On request
			538H 2 NC ⊖		090 951 NZ2RS-538	090 952 NZ2RS-538L060	On request	On request
		2 Plug connector SR6 angled	511 [1] 1 NC ⊖ + 1 NO	C1631 Alternative wiring	On request	On request	On request	079 350 [1] NZ2RS-511L060C1631
		1....9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO		077 362 [3] NZ1RS-2131-9C-GMMF	-	-	-
			3131H 2 NC ⊖ + 2 NO		087 074 NZ1RS-3131-9C-GMMF	-	-	-
		2 Plug connector SR11	2121H 4 NC ⊖		090 974 NZ2RS-2121	-	-	-
			2131H 3 NC ⊖ + 1 NO		090 149 NZ2RS-2131	-	-	-
			3131H 2 NC ⊖ + 2 NO		090 954 NZ2RS-3131	-	-	-

1) No BG approval for switching element 511
3) No UL approval for safety switch 077 362

For safety precautions see page 164
For technical data see page 139

Position switch NZ.RG with roller plunger

- **Version C according to EN 50041** (plastic roller ∅ 12 mm)
- **LED optional**
- **Plug connector optional**

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

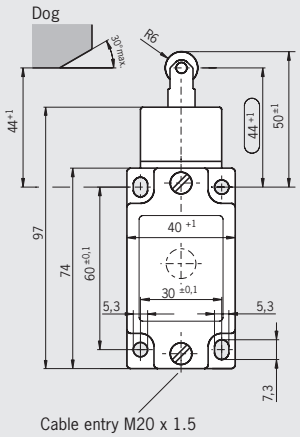
- AC/DC 12-60 V red or yellow
- AC 230 V ±15% red

Switching elements (see also page 13/14)

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

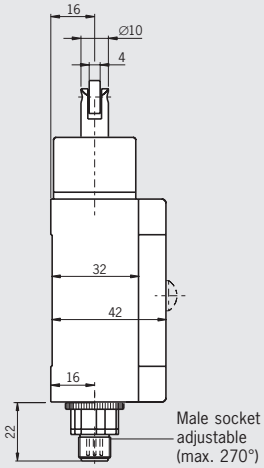
Cable entry M20 x 1.5

Dimension drawings



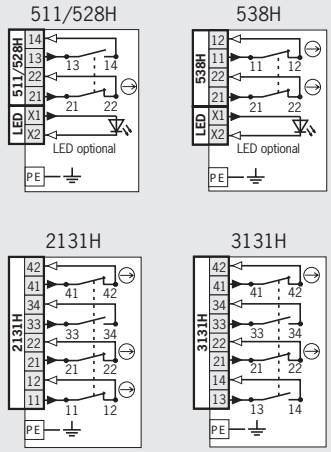
For cable glands see page 115

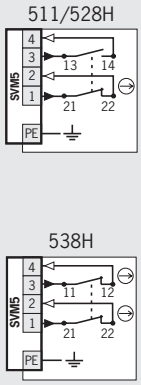
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Function display: Without LED	Function display: 12-60 V red LED	Function display: 230 V red LED
NZ	RG Roller plunger	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO	**088 605** [1] NZ1RG-511-M	**089 052** [1] NZ1RG-511L060-M	**089 054** [1] NZ1RG-511L220-M
			528H 1 NC ⊖ + 1 NO	**090 932** NZ1RG-528-M	**090 008** NZ1RG-528L060-M	On request
			538H 2 NC ⊖	**090 933** NZ1RG-538-M	**090 009** NZ1RG-538L060-M	On request
			2131H 3 NC ⊖ + 1 NO	**090 934** NZ1RG-2131-M	-	-
			3131H 2 NC ⊖ + 2 NO	**090 935** NZ1RG-3131-M	-	-
		2 Plug connector SVM5 (M12 plug)	**511** 1 NC ⊖ + 1 NO	**090 026** NZ2RG-511SVM5	On request	-
			528H 1 NC ⊖ + 1 NO	**090 961** NZ2RG-528SVM5	On request	-
			538H 2 NC ⊖	**090 962** NZ2RG-538SVM5	On request	-

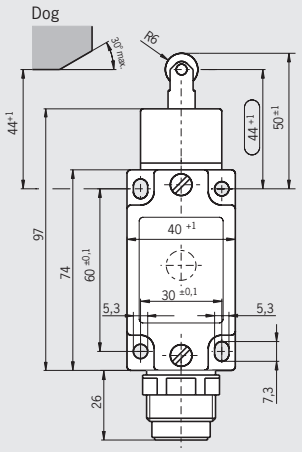
1) No BG approval for switching element 511

Plug connector SR6
6-pin + PE

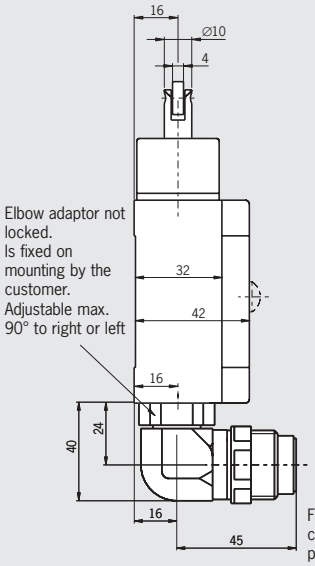
Plug connector SR6 angled
6-pin + PE

Plug connector SR11
11-pin + PE

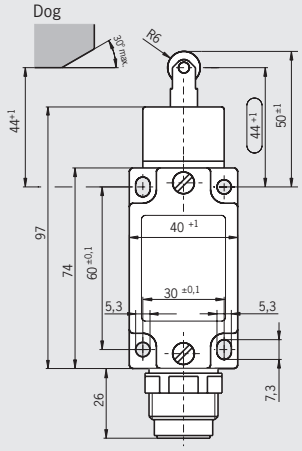
Dimension drawings



For mating connectors see page 112



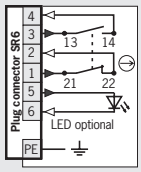
For mating connectors see page 112



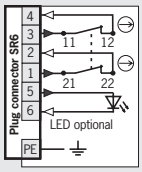
For mating connectors see page 112

Wiring diagrams Switch not actuated

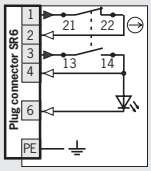
511/528H



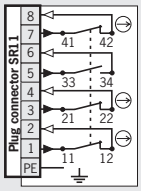
538H



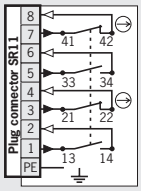
511...1631



2131H



3131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display		
					Without LED	12-60 V red LED	12-60 V yellow LED
NZ	RG Roller plunger	2 Plug connector SR6	**511** [1] 1 NC ⊖ + 1 NO		**090 032** [1] NZ2RG-511	**091 284** [1] NZ2RG-511L060	On request
			528H 1 NC ⊖ + 1 NO		**090 943** NZ2RG-528	**090 944** NZ2RG-528L060	On request
			538H 2 NC ⊖		**090 945** NZ2RG-538	**090 946** NZ2RG-538L060	On request
		2 Plug connector SR6 angled	**511** [1] 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	On request	On request	**074 562** [1] NZ2RG-511L060C1631
		2 Plug connector SR11	**2131H** 3 NC ⊖ + 1 NO		**090 947** NZ2RG-2131	-	-
			3131H 2 NC ⊖ + 2 NO		**090 948** NZ2RG-3131	-	-

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.RL with roller plunger

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

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

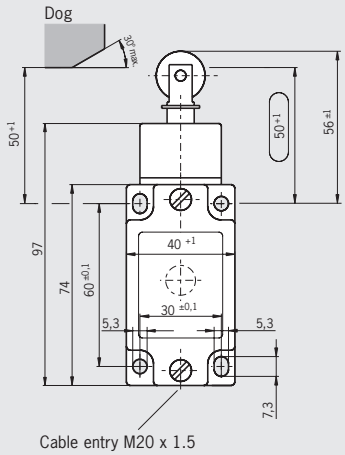
- AC/DC 12-60 V red
- AC 110 V ±15% red
- AC 230 V ±15% red

Switching elements (see also page 13/14)

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

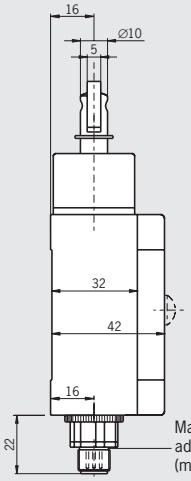
Cable entry M20 x 1.5

Dimension drawings



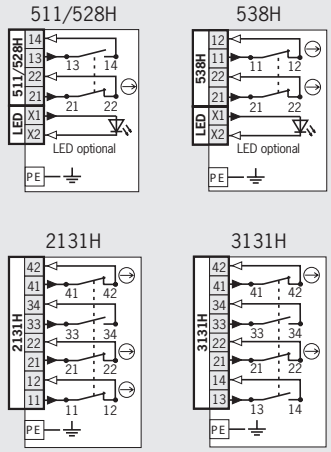
For cable glands see page 115

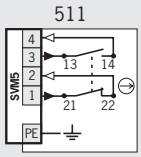
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





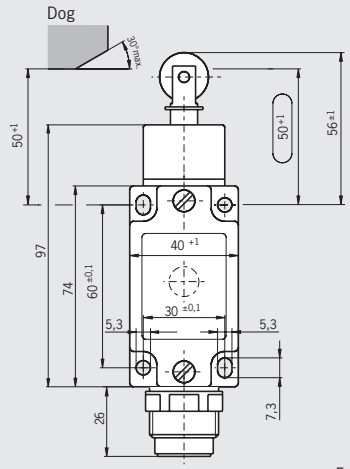
Ordering table

Series	Actuator	Connection	Switching element	Function display: Without LED	12-60 V red LED	110 V red LED	230 V red LED
NZ	RL Roller plunger	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO	**088 614** [1] NZ1RL-511-M	**088 996** [1] NZ1RL-511L060-M	**089 080** [1] NZ1RL-511L110-M	**089 079** [1] NZ1RL-511L220-M
			528H 1 NC ⊖ + 1 NO	**090 937** NZ1RL-528-M	**090 938** NZ1RL-528L060-M	On request	**089 084** NZ1RL-528L220-M
			538H 2 NC ⊖	**090 939** NZ1RL-538-M	**090 940** NZ1RL-538L060-M	On request	On request
			2131H 3 NC ⊖ + 1 NO	**090 941** NZ1RL-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO	**090 942** NZ1RL-3131-M	-	-	-
		2 Plug connector SVM5 (M12 plug)	**511** 1 NC ⊖ + 1 NO	**090 028** NZ2RL-511SVM5	On request	-	-

1) No BG approval for switching element 511

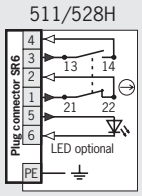
Plug connector SR6
6-pin + PE

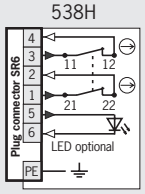
Dimension drawings



For mating connectors see page 112

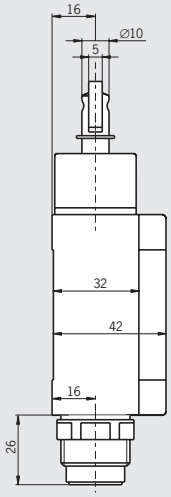
Wiring diagrams Switch not actuated



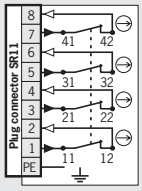


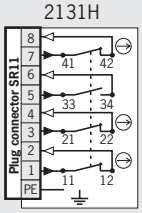
Plug connector SR11
11-pin + PE

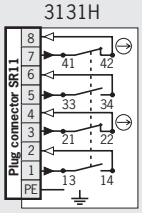
Note:
Roller diameter 16 mm on version with ball bearing (C1831)



For mating connectors see page 112







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 SR6	**511** [1] 1 NC ⊖ + 1 NO		**090 025** [1] NZ2RL-511	**090 955** [1] NZ2RL-511L060
			528H 1 NC ⊖ + 1 NO		**090 956** NZ2RL-528	**091 282** NZ2RL-528L060
			538H 2 NC ⊖		**090 957** NZ2RL-538	**091 278** NZ2RL-538L060
		2 Plug connector SR11	**2121H** 4 NC ⊖		**090 975** NZ2RL-2121	-
			2121H 4 NC ⊖	**C1831** Ball bearing	**095 806** NZ2RL-2121C1831	-
			2131H 3 NC ⊖ + 1 NO		**090 958** NZ2RL-2131	-
			3131H 2 NC ⊖ + 2 NO		**090 959** NZ2RL-3131	-

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.HS with roller lever arm

- **Version A according 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:

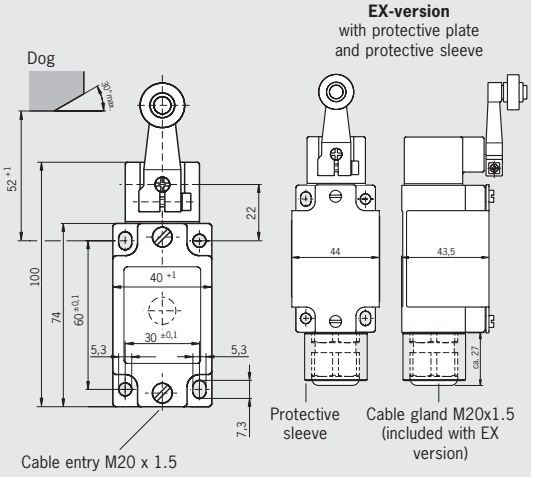
- AC/DC 12-60 V red or yellow
- AC 110 V ±15% red
- AC 230 V ±15% red

Switching elements (see also page 13/14)

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

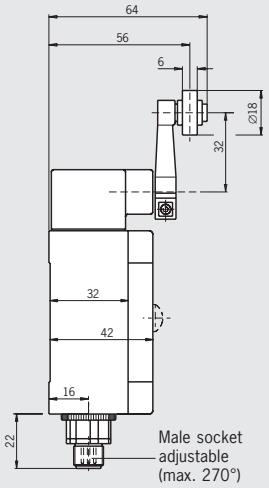
Cable entry M20 x 1.5

Dimension drawings



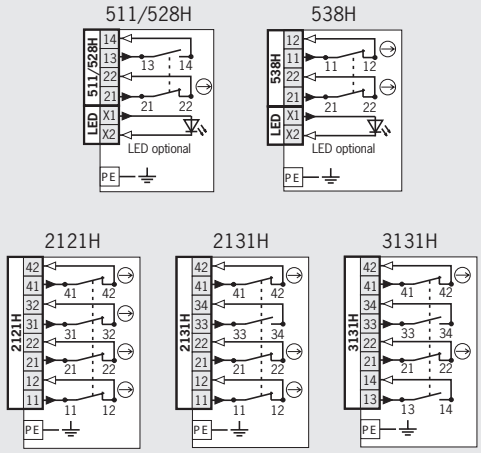
For cable glands see page 115

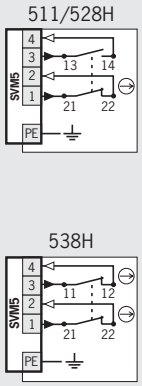
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





Ordering table

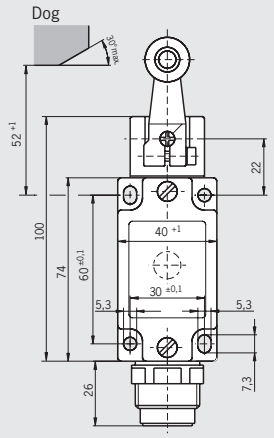
Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	110 V red LED	230 V red LED	12-60 V yellow LED
NZ	HS Lever arm	1 Cable entry M20 x 1.5	511 [1] 1 NC ⊖ + 1 NO		079 953 [1] NZ1HS-511-M	090 035 [1] NZ1HS-511L060-M	090 036 [1] NZ1HS-511L110-M	090 037 [1] NZ1HS-511L220-M	090 038 [1] NZ1HS-511L060GE-M
			528H 1 NC ⊖ + 1 NO		090 970 NZ1HS-528-M	090 971 NZ1HS-528L060-M	090 050 NZ1HS-528L110-M	090 052 NZ1HS-528L220-M	090 049 NZ1HS-528L060GE-M
			538H 2 NC ⊖		090 972 NZ1HS-538-M	090 760 NZ1HS-538L060-M	On request	On request	On request
			2121H 4 NC ⊖		090 254 NZ1HS-2121-M	-	-	-	-
			2131H 3 NC ⊖ + 1 NO		090 973 NZ1HS-2131-M	-	-	-	-
			3131H 2 NC ⊖ + 2 NO		090 747 NZ1HS-3131-M	-	-	-	-
			3131H 2 NC ⊖ + 2 NO	ATEX incl. cable gland	094 167 [2] NZ1HS-3131-M-EX	-	-	-	-
		2 Plug connector SVM5 (M12 plug)	511 1 NC ⊖ + 1 NO		090 867 NZ2HS-511SVM5	On request	-	-	On request
			528H 1 NC ⊖ + 1 NO		090 868 NZ2HS-528SVM5	On request	-	-	On request
			538H 2 NC ⊖		090 869 NZ2HS-538SVM5	On request	-	-	On request

1) No BG approval for switching element 511

2) Ⓔx II 3 G EEx nC IIC T5 (reduced resistance to impact acc. to EN 61241-1; max. 4 J) / Ⓔx II 3 D Ex tD A22 T90°C (reduced resistance to impact acc. to EN 61241-1; max. 4 J)

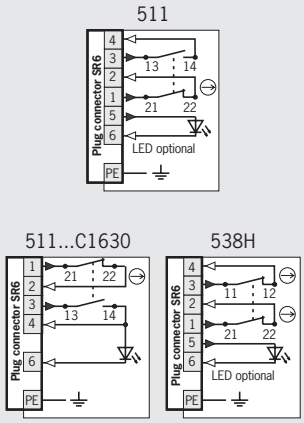
Plug connector SR6
6-pin + PE

Dimension drawings

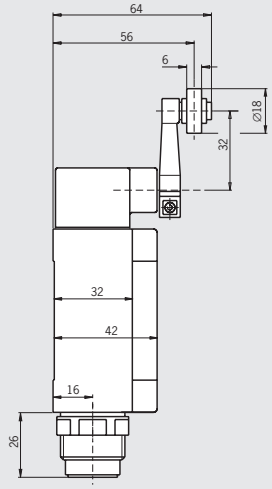


For mating connectors see page 112

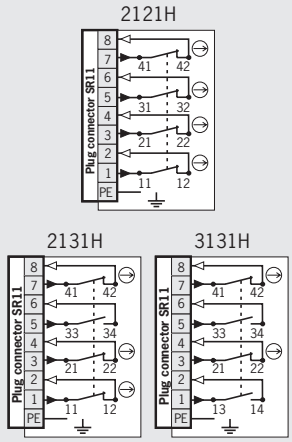
Wiring diagrams Switch not actuated



Plug connector SR11
11-pin + PE



For mating connectors see page 112



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	2 Plug connector SR6	**511** [1] 1 NC ⊖ + 1 NO		**089 093** [1] NZ2HS-511	**089 094** [1] NZ2HS-511L060	**090 697** [1] NZ2HS-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	**C1630** Alternative wiring	On request	On request	**078 473** [1] NZ2HS-511L060C1630
			528H 1 NC ⊖ + 1 NO		**090 852** NZ2HS-528	**088 196** NZ2HS-528L060	On request
			538H 2 NC ⊖		**090 853** NZ2HS-538	**090 854** NZ2HS-538L060	On request
		2 Plug connector SR11	**2121H** 4 NC ⊖		**091 264** NZ2HS-2121	-	-
			2131H 3 NC ⊖ + 1 NO		**090 146** NZ2HS-2131	-	-
			3131H 2 NC ⊖ + 2 NO		**090 856** NZ2HS-3131	-	-

1) No BG approval for switching element 511

Please turn over

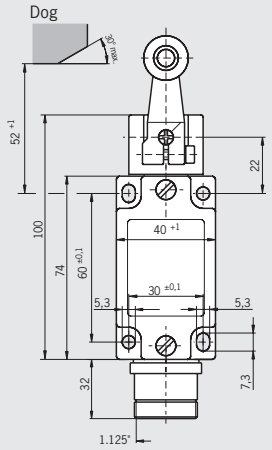
For safety precautions see page 164
For technical data see page 139

Plug connector MR8
7-pin + PE

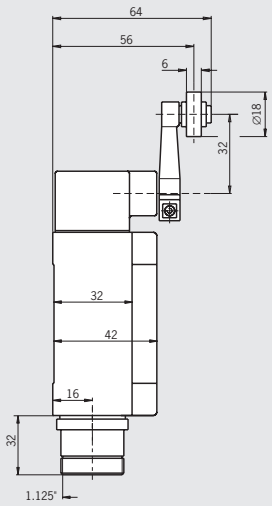
Plug connector MR9
8-pin + PE

Plug connector MR10
9-pin + PE

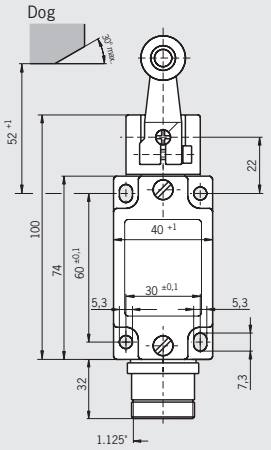
Dimension drawings



For mating connectors see page 124

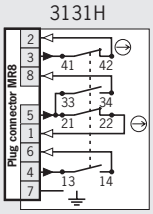


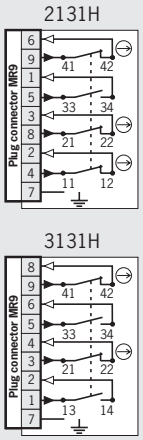
For mating connectors see page 124

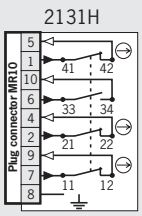


For mating connectors see page 124

Wiring diagrams Switch not actuated







Ordering table

Series	Actuator	Connection element	Switching Without LED	Function display 12-60 V red LED	Function display 12-60 V yellow LED	
NZ	HS Lever arm	1...8C Plug connector MR8	3131H 2 NC ⊖ + 2 NO	086 574 NZ1HS-3131-8C-Ford / PT60577-101K01	-	-
		1...9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO	077 391 [3] NZ1HS-2131-9C-GMMF	-	-
			3131H 2 NC ⊖ + 2 NO	073 508 NZ1HS-3131-9C-GMMF	-	-
		1...10C Plug connector MR10	3131H 2 NC ⊖ + 2 NO	086 574 NZ1HS-3131-10C-FW	-	-

3) No UL approval for safety switch 077 391

Position switch NZ.HB with roller lever arm

- **Version A according 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.

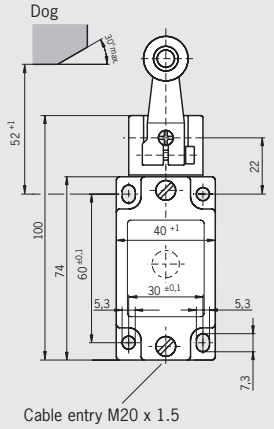
Switching direction
Right, left or both sides (see page 9).

LED function display (optional)
A function display is available for the following voltage ranges:
- AC/DC 12-60 V red or yellow
- AC 230 V ±15% red

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

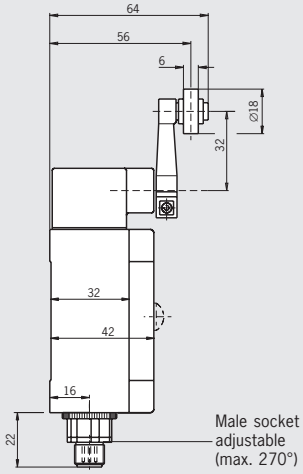
Cable entry M20 x 1.5

Dimension drawings



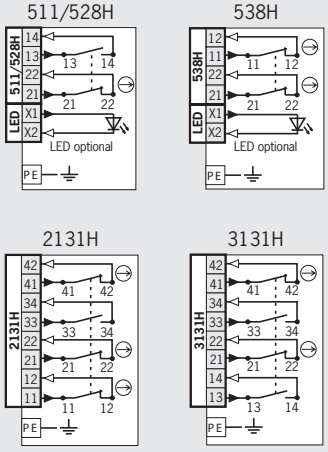
For cable glands see page 115

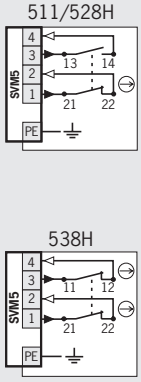
Plug connector SVM5
M12 plug, 5-pin



For mating connectors see page 115

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Function display: Without LED	12-60 V red LED	230 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	079 952 [1] NZ1HB-511-M	090 039 [1] NZ1HB-511L060-M	090 040 [1] NZ1HB-511L220-M	086 525 [1] NZ1HB-511L060GE-M
			528H 1 NC ⊖ + 1 NO	088 199 NZ1HB-528-M	090 965 NZ1HB-528L060-M	090 051 NZ1HB-528L220-M	086 527 NZ1HB-528L060GE-M
			538H 2 NC ⊖	090 966 NZ1HB-538-M	090 967 NZ1HB-538L060-M	On request	On request
			2131H 3 NC ⊖ + 1 NO	090 968 NZ1HB-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO	090 969 NZ1HB-3131-M	-	-	-
		2 Plug connector SVM5 (M12 plug)	511 1 NC ⊖ + 1 NO	090 861 NZ2HB-511SVM5	On request	-	On request
			528H 1 NC ⊖ + 1 NO	090 864 NZ2HB-528SVM5	On request	-	On request
			538H 2 NC ⊖	090 862 NZ2HB-538SVM5	On request	-	On request

1) No BG approval for switching element 511

Please turn over

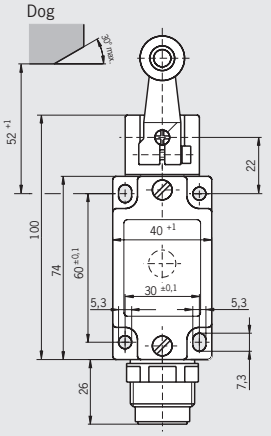
For safety precautions see page 164
For technical data see page 139

Plug connector SR6
6-pin + PE

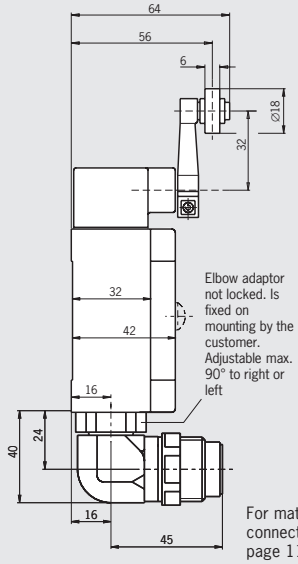
Plug connector SR6 angled
6-pin + PE

Plug connector SR11
11-pin + PE

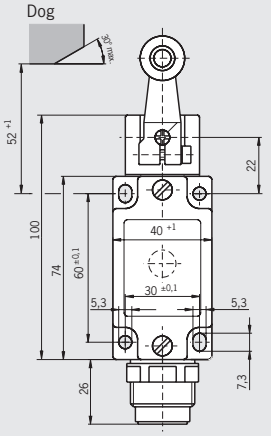
Dimension drawings



For mating connectors see page 112

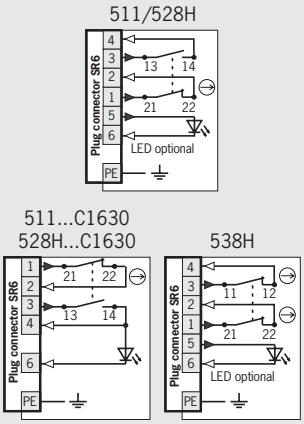


For mating connectors see page 112



For mating connectors see page 112

Wiring diagrams Switch not actuated



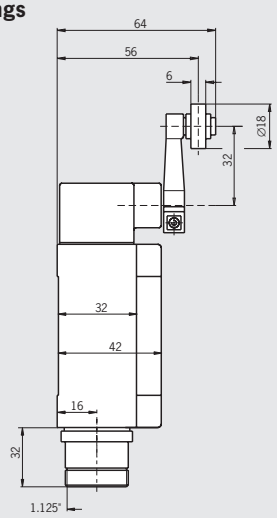
Ordering table

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	HB Lever arm	2 Plug connector SR6	**511** [1] 1 NC ⊖ + 1 NO		**089 091** [1] NZ2HB-511	**089 092** [1] NZ2HB-511L060	On request	**090 719** [1] NZ2HB-511L060GE
			511 [1] 1 NC ⊖ + 1 NO	**C1630** Alternative wiring	On request	On request	On request	**054 121** [1] NZ2HB-511L060C1630
			528H 1 NC ⊖ + 1 NO		**090 845** NZ2HB-528	**090 846** NZ2HB-528L060	**091 281** NZ2HB-528L220	**091 301** NZ2HB-528L060GE
			528H 1 NC ⊖ + 1 NO	**C1630** Alternative wiring	On request	On request	On request	**091 346** NZ2HB-528L060C1630
			538H 2 NC ⊖		**090 847** NZ2HB-538	**090 848** NZ2HB-538L060	On request	On request
		2 Plug connector **SR6** angled	**511** [1] 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	On request	On request	On request	**054 122** [1] NZ2HB-511L060C1631
			528H 1 NC ⊖ + 1 NO	**C1631** Alternative wiring	On request	On request	On request	**091 347** NZ2HB-528L060C1631
		2 Plug connector **SR11**	**2131H** 3 NC ⊖ + 1 NO		**090 136** NZ2HB-2131	-	-	-
			3131H 2 NC ⊖ + 2 NO		**090 137** NZ2HB-3131	-	-	-

1) No BG approval for switching element 511

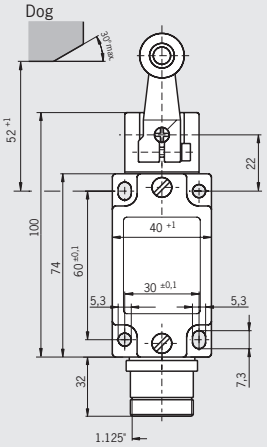
Plug connector MR9
8-pin + PE

Dimension drawings



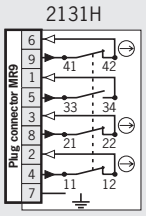
For mating connectors see page 124

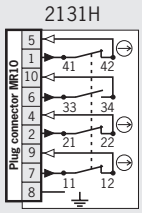
Plug connector MR10
9-pin + PE



For mating connectors see page 124

Wiring diagrams Switch not actuated





Ordering table

Series	Actuator	Connection	Switching element	Function display			
				Without LED	12-60 V red LED	230 V red LED	12-60 V yellow LED
NZ	HB Lever arm	1...9C Plug connector MR9	2131H 3 NC ⊖ + 1 NO	077 390 NZ1HB-2131-9C-GMMF	-	-	-
		1...10C Plug connector MR10	2131H 3 NC ⊖ + 1 NO	095 898 NZ1HB-2131-10C-FW	-	-	-

For safety precautions see page 164
For technical data see page 139

Position 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).

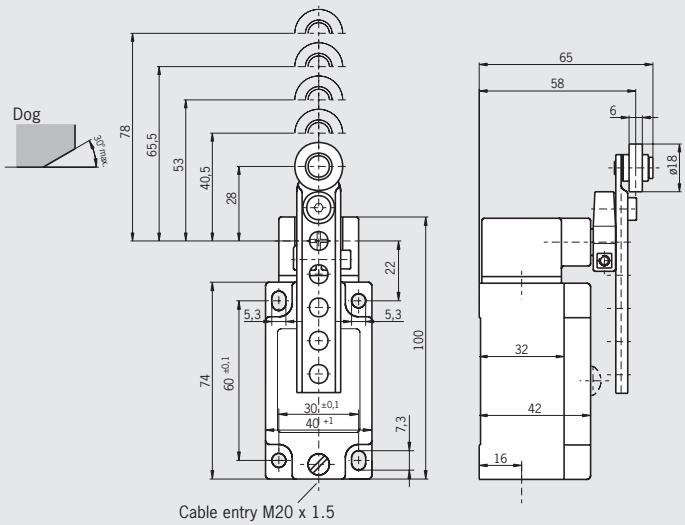
Lever arm adjustment
Lever arm length can be adjusted from 28 mm to 78 mm in steps of 12.5 mm.

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

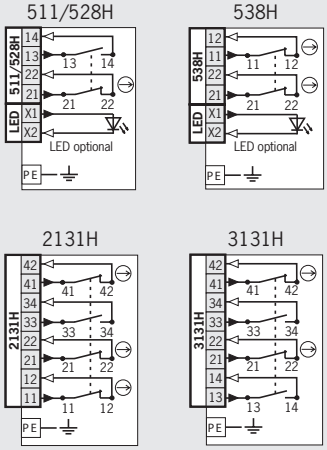
Cable entry M20 x 1.5

Dimension drawings



For cable glands see page 115

Wiring diagrams Switch not actuated



Ordering table

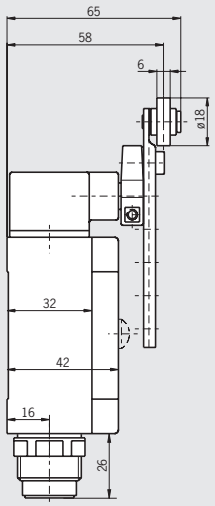
Series	Actuator	Connection	Switching element	Function display: Without LED	12-60 V red LED	230 V red LED	230 V yellow LED
NZ	PS Adjustable lever arm	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO	**088 613** [1] NZ1PS-511-M	On request	On request	On request
			528H 1 NC ⊖ + 1 NO	**090 874** NZ1PS-528-M	**090 430** NZ1PS-528L060-M	**093 521** NZ1PS-528L220-M	**093 523** NZ1PS-528L220GE-M
			538H 2 NC ⊖	**090 875** NZ1PS-538-M	On request	On request	On request
			2131H 3 NC ⊖ + 1 NO	**090 876** NZ1PS-2131-M	-	-	-
			3131H 2 NC ⊖ + 2 NO	**090 877** NZ1PS-3131-M	-	-	-

1) No BG approval for switching element 511

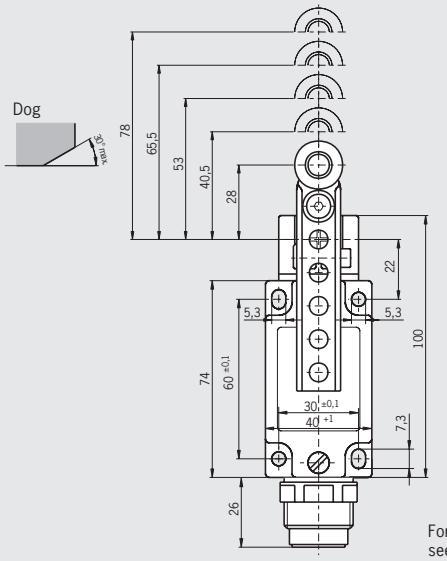
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

Dimension drawings

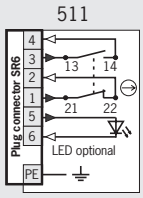


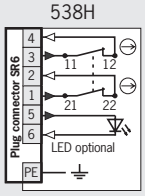
For mating connectors see page 112

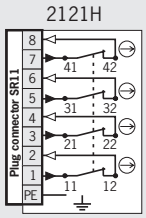


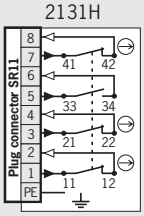
For mating connectors see page 112

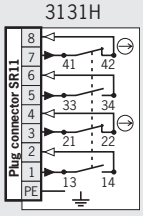
Wiring diagrams Switch not actuated











Ordering table

Series	Actuator	Connection	Switching element	Function display	
				Without LED	12-60 V red LED
NZ	PS Adjustable lever arm steel roller	2 Plug connector SR6	511 [1] 1 NC ⊖ + 1 NO	093 112 [1] NZ2PS-511	090 152 [1] NZ2PS-511L060
			538H 2 NC ⊖	On request	091 632 NZ2PS-538L060
		2 Plug connector SR11	2121H 4 NC ⊖	091 268 NZ2PS-2121	-
			2131H 3 NC ⊖ + 1 NO	090 151 NZ2PS-2131	-
			3131H 2 NC ⊖ + 2 NO	090 150 NZ2PS-3131	-

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.PB with adjustable lever arm

- **Plastic roller ⌀ 18**

Approach direction

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

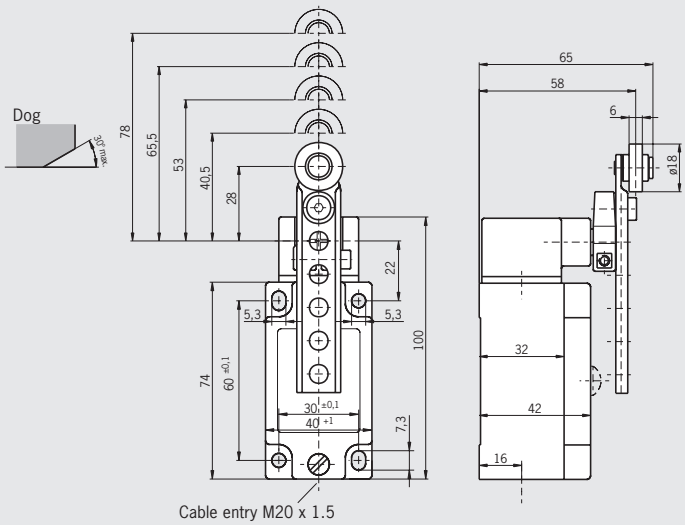
Switching direction
Right, left or both sides (see page 9).

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

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

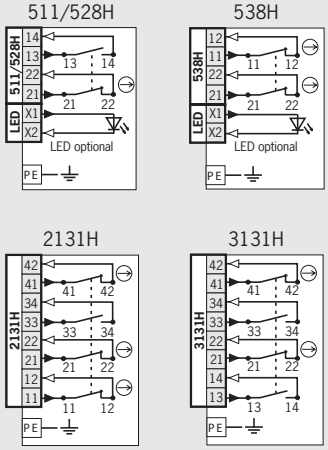
Cable entry M20 x 1.5

Dimension drawings



For cable glands see page 115

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	**088 618** [1] NZ1PB-511-M
			528H 1 NC ⊖ + 1 NO	**090 870** NZ1PB-528-M
			538H 2 NC ⊖	**090 871** NZ1PB-538-M
			2131H 3 NC ⊖ + 1 NO	**090 872** NZ1PB-2131-M
			3131H 2 NC ⊖ + 2 NO	**090 873** NZ1PB-3131-M

1) No BG approval for switching element 511

Position switch NZ.RS.C1588 with roller plunger

- **Version C according to EN 50041** (steel roller ∅ 12 mm)
- **Exterior bellows** (CR-based material)

Approach direction

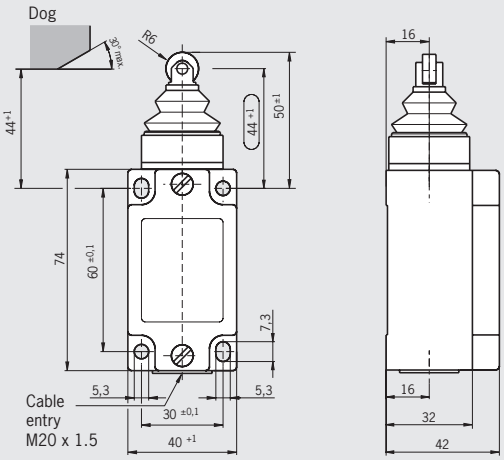
Horizontal
Switch head and lever arm can be adjusted in 90° steps.

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

Switching elements (see also page 13)
- **511** Snap-action switching element 1 NC ⊖ + 1 NO
- **528H** Slow-action switching element 1 NC ⊖ + 1 NO

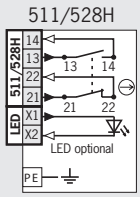
Cable entry M20 x 1.5

Dimension drawings



For cable glands see page 115

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] 1 NC ⊖ + 1 NO	C1588 Exterior bellows, red cover	091 352 [1] NZ1RS-511-MC1588
			528H 1 NC ⊖ + 1 NO	C1588 Exterior bellows, red cover	091 339 NZ1RS-528-MC1588

1) No BG approval for switching element 511

For safety precautions see page 164
For technical data see page 139

Position switch NZ.HB.C569 with roller lever arm

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

Cable entry M20 x 1.5

Approach direction

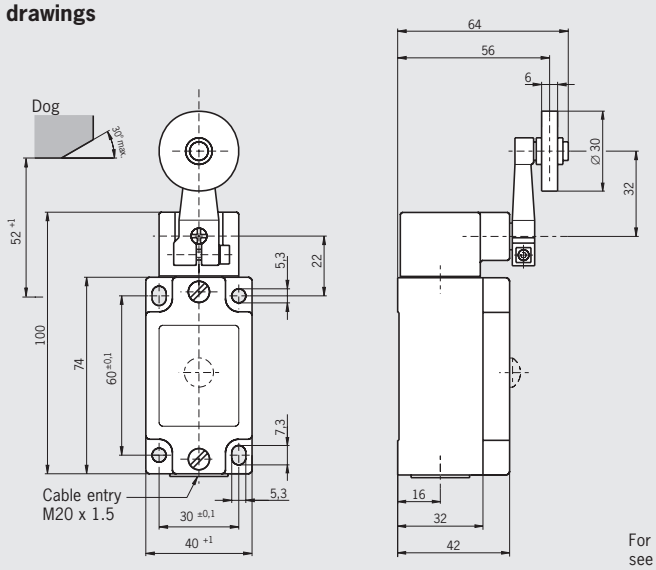
Horizontal
Switch head and lever arm can be adjusted in 90° steps.

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

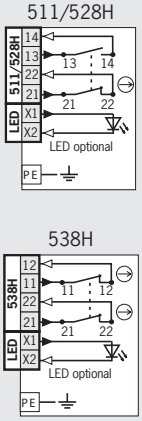
Switching elements (see also page 13)
- **511** Snap-action switching element 1 NC ⊖ + 1 NO
- **528H** Slow-action switching element 1 NC ⊖ + 1 NO
- **538H** Slow-action switching element 2 NC ⊖

Dimension drawings



For cable glands see page 115

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] 1 NC ⊖ + 1 NO	**C569** Large plastic roller ⌀ 30 mm	**079 965** [1] NZ1HB-511-MC569	**091 091** [1] NZ1HB-511L060-MC569
			528H 1 NC ⊖ + 1 NO	**C569** Large plastic roller ⌀ 30 mm	**079 946** NZ1HB-528-MC569	**091 330** NZ1HB-528L060-MC569
			538H 2 NC ⊖	**C569** Large plastic roller ⌀ 30 mm	**079 999** NZ1HB-538-MC569	On request

1) No BG approval for switching element 511

Position switch NZ.HS.C1779 with roller lever arm

GL

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

Cable entry M20 x 1.5

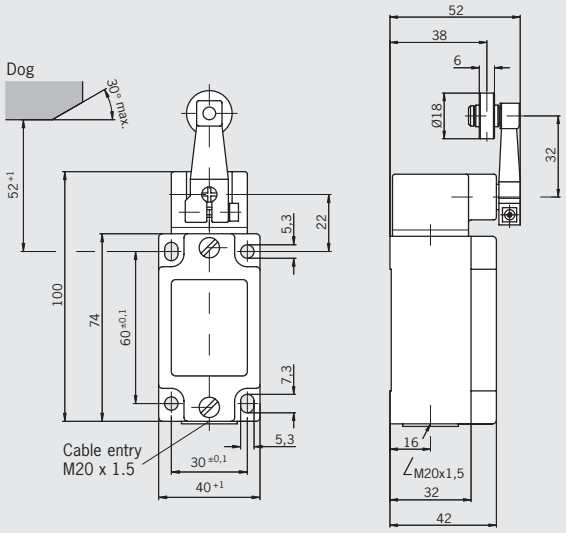
Approach direction

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

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

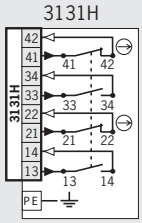
Switching elements (see also page 14)
- **3131H** Slow-action switching element 2 NC ⊖ + 2 NO

Dimension drawings



For cable glands see page 115

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	**079 996** NZ1HS-3131-MC1779

For safety precautions see page 164
For technical data see page 139

Position switch NZ.HS.C1883 with roller lever arm

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

Approach direction

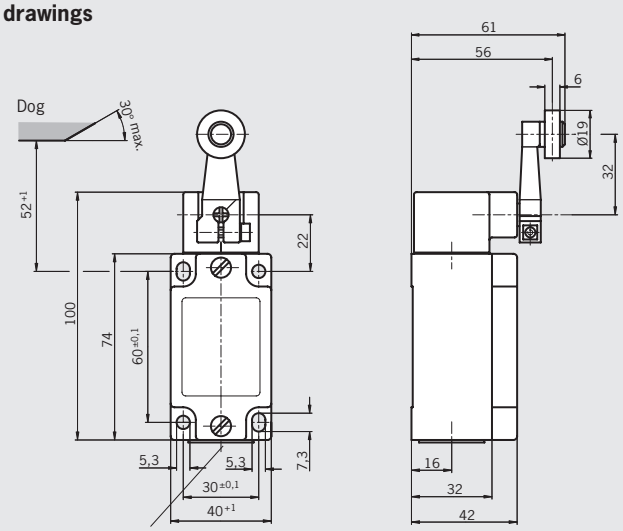
Horizontal
Switch head and lever arm can be adjusted in 90° steps.

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

Switching elements (see also page 13)
- **511** Snap-action switching element 1 NC ⊖ + 1 NO

Cable entry M20 x 1.5

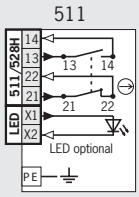
Dimension drawings



Cable entry M20 x 1.5

For cable glands see page 115

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 ball bearing	**091 312** NZ1HS-511-MC1833

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

Two contacts 1 NC ⊖ + 1 NO or 2 NC ⊖

Four 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	Two contacts	Four contacts		
	●								●	●	ATEX	48
		●		●					●			49
								●		●		49
					●	●	●			●		50
●	●								●		C1233	51
●			●	●					●		C1420/C1701/C1233	52
●								●		●	C1233	52

Safety switch NZ.VZ

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

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

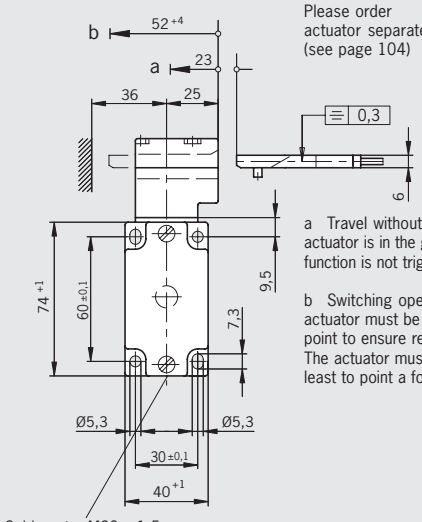
AC/DC	12-60 V		red
AC	110 V	±15%	red
AC	230 V	±15%	red

Switching elements (see also Page 13/14)

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

Cable entry M20 x 1.5

Dimension drawings



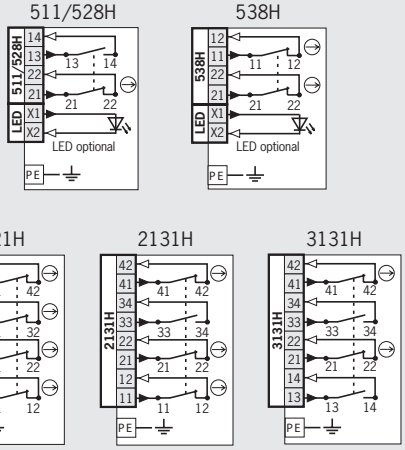
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 115

Wiring diagrams Actuator inserted



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display: Without LED	12-60 V red LED	110 V red LED	230 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	**511** [1] 1 NC ⊖ + 1 NO		**089 479** [1] NZ1VZ-511E-M	On request	On request	On request
			528H 1 NC ⊖ + 1 NO		**090 671** NZ1VZ-528E-M	**090 566** [3] NZ1VZ-528EL060-M	**089 480** [3] NZ1VZ-528EL110-M	**082 121** [3] NZ1VZ-528EL220-M
			538H 2 NC ⊖		**085 676** NZ1VZ-538E-M	**082 119** [3] NZ1VZ-538EL060-M	**089 481** [3] NZ1VZ-538EL110-M	**089 482** [3] NZ1VZ-538EL220-M
			2121H 4 NC ⊖		**089 486** NZ1VZ-2121E-M	-	-	-
			2131H 3 NC ⊖ + 1 NO		**082 123** NZ1VZ-2131E-M	-	-	-
			2131H 3 NC ⊖ + 1 NO	ATEX incl. cable gland	**093 660** [2] NZ1VZ-2131E-M-EX	-	-	-
			3131H 2 NC ⊖ + 2 NO		**082 122** NZ1VZ-3131E-M	-	-	-

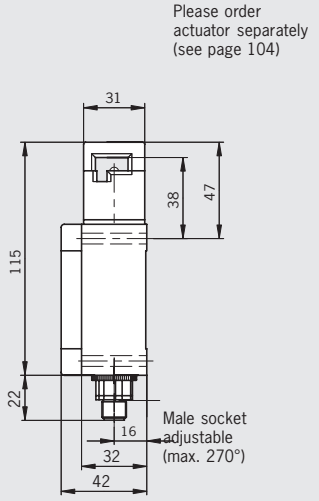
1) No BG approval for switching element 511
2) Ⓔx II 3 G EEx nC IIC T5 X (reduced resistance to impact acc. to EN 61241-1; max. 4 J) / Ⓔx II 3 D Ex tD A22 T90°C X (reduced resistance to impact acc. to EN 61241-1; max. 4 J)
3) Approval pending

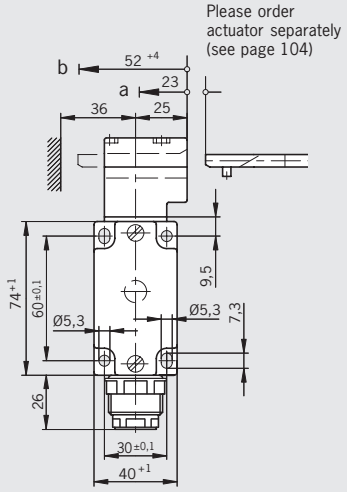
Plug connector SVM5
M12 plug, 5-pin

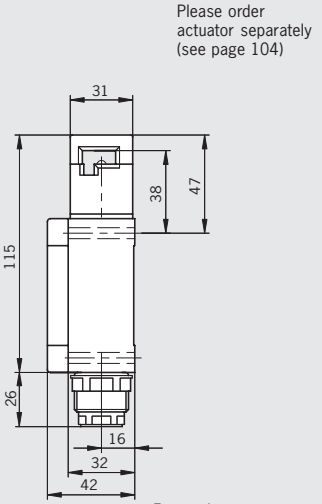
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

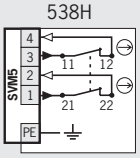
Dimension drawings

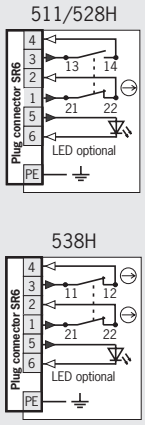


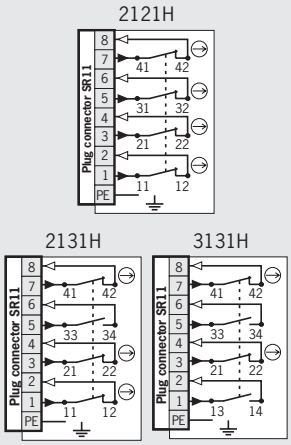




Wiring diagrams Actuator inserted







Ordering table

Series	Actuator	Connection	Switching element	Function display			
				Without LED	12-60 V red LED	110 V red LED	230 V red LED
NZ	VZ Separate actuator	2 Plug connector SVM5	538H 2 NC ⊖	084 905 NZ2VZ-538ESVM5	On request	-	-
		2 Plug connector SR6	511 1 NC ⊖ + 1 NO	On request	045 551 NZ2VZ-511EL060	On request	On request
			528H 1 NC ⊖ + 1 NO	084 885 NZ2VZ-528E	045 801 NZ2VZ-528EL060	059 467 NZ2VZ-528EL110	038 129 NZ2VZ-528EL220
			538H 2 NC ⊖	090 143 NZ2VZ-538E	052 108 NZ2VZ-538EL060	072 234 NZ2VZ-538EL110	059 004 NZ2VZ-538EL220
		2 Plug connector SR11	2121H 4 NC ⊖	088 852 NZ2VZ-2121E	-	-	-
			2131H 3 NC ⊖ + 1 NO	090 144 NZ2VZ-2131E	-	-	-
			3131H 2 NC ⊖ + 2 NO	090 145 NZ2VZ-3131E	-	-	-

3) Approval pending

Please turn over

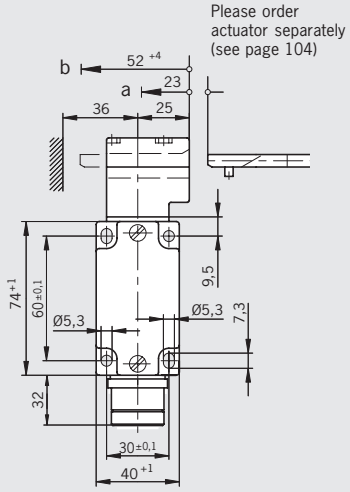
For safety precautions see page 164
For technical data see page 139

Plug connector MR8
7-pin + PE

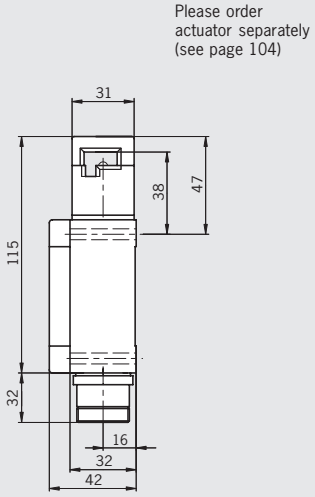
Plug connector MR9
8-pin + PE

Plug connector MR10
9-pin + PE

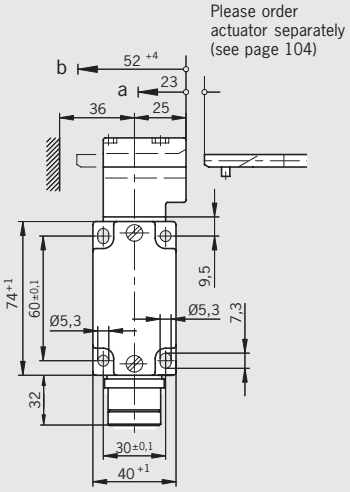
Dimension drawings



For mating connectors see page 124

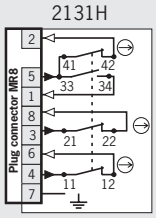


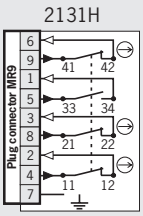
For mating connectors see page 124

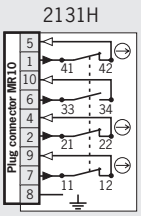


For mating connectors see page 124

Wiring diagrams Actuator inserted







Ordering table

Series	Actuator	Connection	Switching element	Function display			
				Without LED	12-60 V red LED	110 V red LED	230 V red LED
NZ	VZ Separate actuator	1 Plug connector **MR8**	**2131H** 3 NC ⊖ + 1 NO	**092 355** NZ1VZ-2131E-8C-GMMF	-	-	-
		1 Plug connector **MR9**	**2131H** 3 NC ⊖ + 1 NO	**077 363** NZ1VZ-2131E-9C-GMMF	-	-	-
		1 Plug connector **MR10**	**2131H** 3 NC ⊖ + 1 NO	**095 897** NZ1VZ-2131E-10C-FW	-	-	-

3) Approval pending

Safety switch NZ.VZ

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

Approach direction

Horizontal
Can be adjusted in 90° steps.

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

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

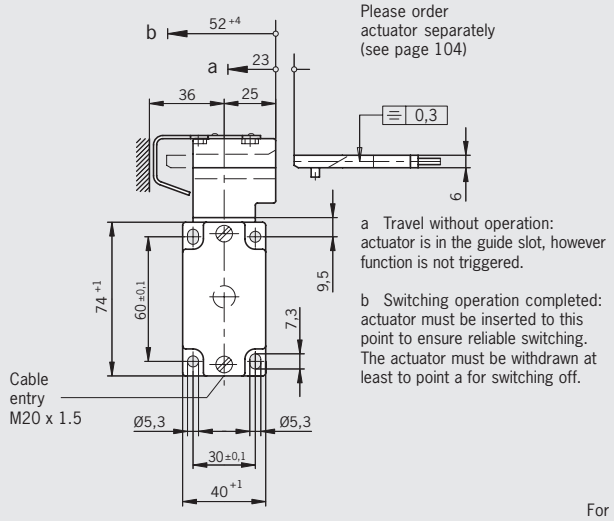
- AC/DC 12-60 V red
- AC 230 V ±15% red

Switching elements (see also Page 13/14)

- **528H** Slow-action switching element 1 NC ⊖ + 1 NO
- **538H** Slow-action switching element 2 NC ⊖
- **2121H** Slow-action switching element 4 NC ⊖
- **2131H** Slow-action switching element 3 NC ⊖ + 1 NO

Cable entry M20 x 1.5

Dimension drawings



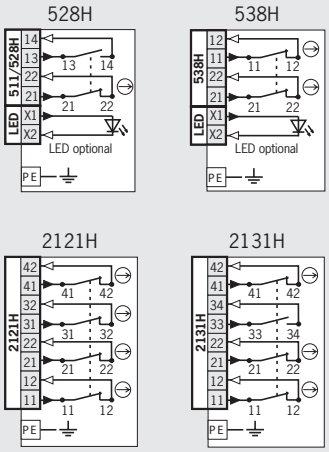
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 115

Wiring diagrams Actuator inserted



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display		
					Without LED	12-60 V red LED	230 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	528H 1 NC ⊖ + 1 NO	With protective plate	082 137 3) NZ1VZ-528E-MC1233	089 497 3) NZ1VZ-528EL060-MC1233	On request
			538H 2 NC ⊖	With protective plate	093 858 3) NZ1VZ-538E-MC1233	On request	089 496 3) NZ1VZ-538EL220-MC1233
			2121H 4 NC ⊖	With protective plate	089 914 3) NZ1VZ-2121E-MC1233	-	-
			2131H 3 NC ⊖ + 1 NO	With protective plate	093 859 3) NZ1VZ-2131E-MC1233	-	-

3) Approval pending

Please turn over

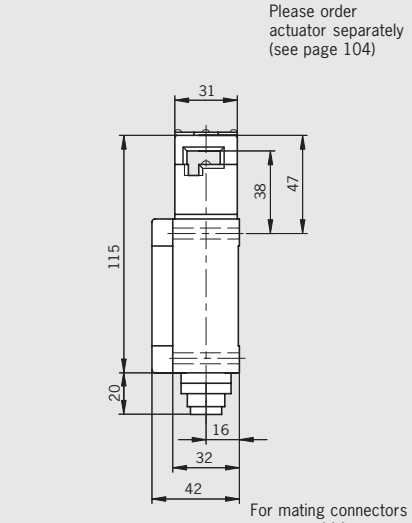
For safety precautions see page 164
For technical data see page 139

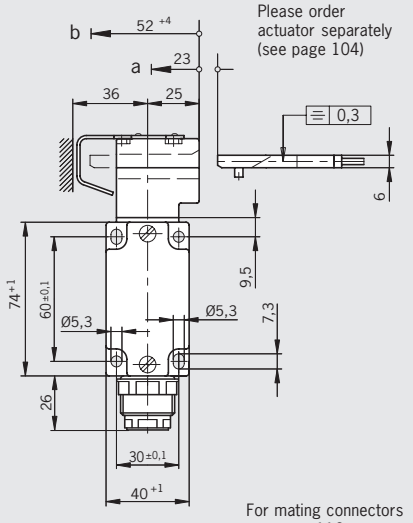
Plug connector C16-1
6-pin + PE

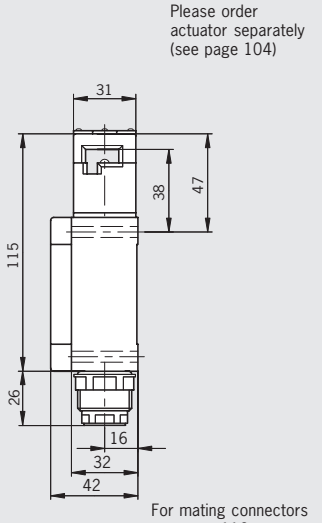
Plug connector SR6
6-pin + PE

Plug connector SR11
11-pin + PE

Dimension drawings

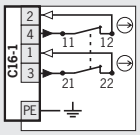




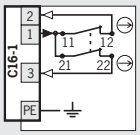


Wiring diagrams Actuator inserted

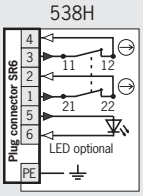
538H...C1701



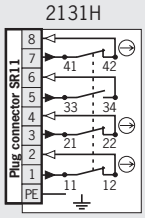
538H...C1420



538H



2131H



Ordering table

Series	Actuator	Connection	Switching element	Version	Function display Without LED
NZ	VZ Separate actuator	**2** Plug connector **C16-1** [4]	**538H** 2 NC ⊖	**C1701** With protective plate	**071 200** NZ2VZ-538EC1701
				C1420 With protective plate Alternative wiring	**043 296** NZ2VZ-538EC1420
		2 Plug connectors **SR6**	**538H** 2 NC ⊖	With protective plate	**077 229** NZ2VZ-538EC1233
		2 Plug connectors **SR11**	**2131H** 3 NC ⊖ + 1 NO	With protective plate	**093 857** NZ2VZ-2131EC1233

3) Approval pending
4) Switch can be replaced by an enabling switch with C16-1 plug connector

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

Guard locking

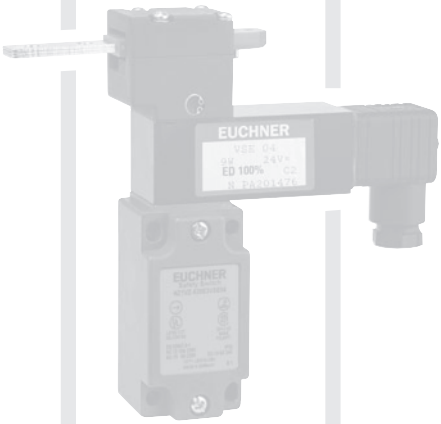
- **VSM** – Mechanical guard locking, closed-circuit current principle
- **VSE** – Electrical guard locking, open-circuit current principle
- **VSH** – Manual release

Connection

- **M** – Thread M20x1.5 for cable glands
- **SR6** – Plug connector 6-pin + PE
- **MR8** – Plug connector 7-pin + PE
- **SR11** – Plug connector 11-pin + PE

Switching element

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



Guard locking			Connection				Switching element		Page
VSM	VSE	VSH	M	SR6	MR8	SR11	Two contacts	Four contacts	
●			●				●	●	54
●				●			●		55
●						●		●	55
	●		●				●	●	56
	●			●			●		57
	●					●		●	57
		●	●					●	58
		●			●			●	59

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

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

Approach direction

Horizontal
Can be adjusted 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	110 V ±15%	red [1]
AC	230 V ±15%	AC	230 V ±15%	red [1]

Guard locking type

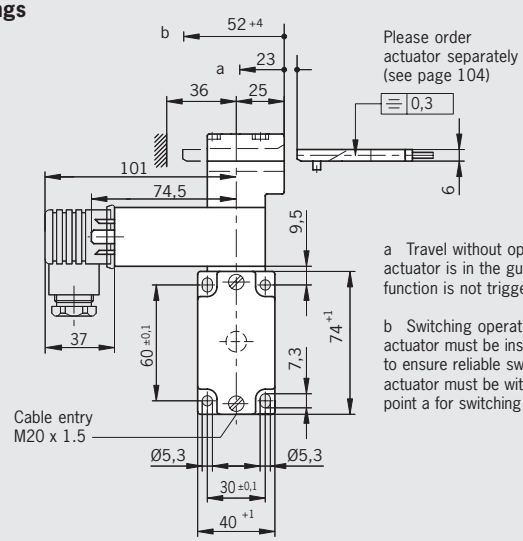
VSM Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

Switching elements (see also page 13/14)

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

Cable entry M20 x 1.5

Dimension drawings



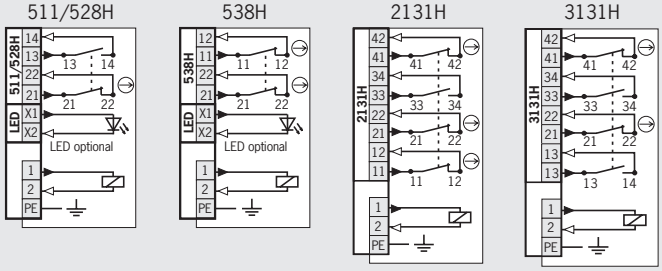
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 plug see page 111
For cable glands see page 115

Wiring diagrams



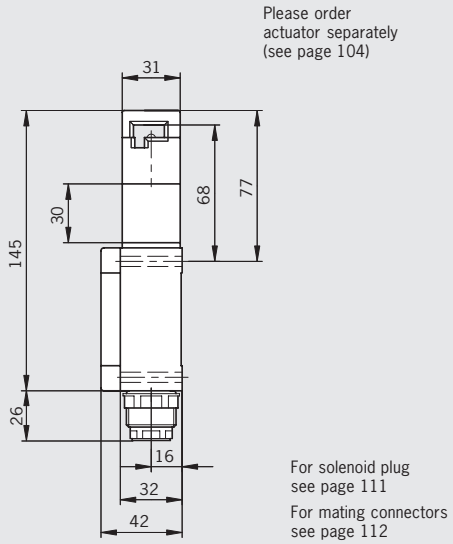
Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display: Without LED	12-60V red LED	110 V red LED	230 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	VSM Mech. guard locking closed-circuit principle	04 24 V DC	511 1 NC ⊖ + 1 NO	090 339 NZ1VZ-511E3VSM04-M	090 344 NZ1VZ-511E3VSM04L060-M	On request	On request
					528H 1 NC ⊖ + 1 NO	082 125 NZ1VZ-528E3VSM04-M	082 126 NZ1VZ-528E3VSM04L060-M	On request	089 488 NZ1VZ-528E3VSM04L220-M
					538H 2 NC ⊖	082 131 NZ1VZ-538E3VSM04-M	082 132 NZ1VZ-538E3VSM04L060-M	On request	090 345 NZ1VZ-538E3VSM04L220-M
					2131H 3 NC ⊖ + 1 NO	088 049 NZ1VZ-2131E3VSM04-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 050 NZ1VZ-3131E3VSM04-M	-	-	-
				07 [1] 110 V AC	528H 1 NC ⊖ + 1 NO	082 129 NZ1VZ-528E3VSM07-M	On request	089 485 NZ1VZ-528E3VSM07L110-M	090 341 NZ1VZ-528E3VSM07L220-M
					538H 2 NC ⊖	088 046 NZ1VZ-538E3VSM07-M	On request	090 340 NZ1VZ-538E3VSM07L110-M	On request
					2131H 3 NC ⊖ + 1 NO	088 038 NZ1VZ-2131E3VSM07-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 040 NZ1VZ-3131E3VSM07-M	-	-	-
				09 [1] 230 V AC	528H 1 NC ⊖ + 1 NO	088 045 NZ1VZ-528E3VSM09-M	090 349 NZ1VZ-528E3VSM09L060-M	On request	090 342 NZ1VZ-528E3VSM09L220-M
					538H 2 NC ⊖	088 044 NZ1VZ-538E3VSM09-M	On request	On request	On request
					2131H 3 NC ⊖ + 1 NO	088 039 NZ1VZ-2131E3VSM09-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 041 NZ1VZ-3131E3VSM09-M	-	-	-

1) Use only solenoid plug with integrated rectifier (see page 111)

Plug connector SR6
6-pin + PE

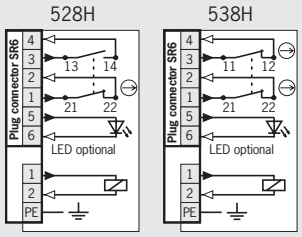
Dimension drawings



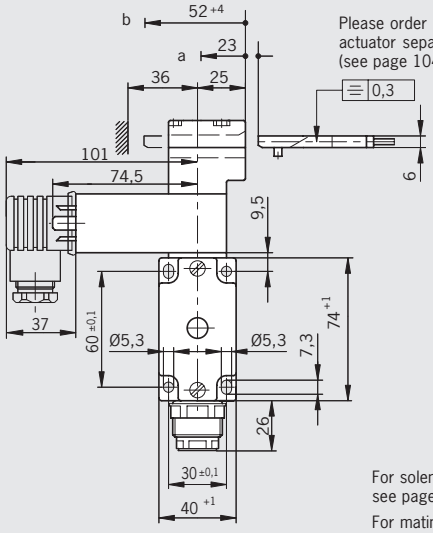
For solenoid plug see page 111

For mating connectors see page 112

Wiring diagrams

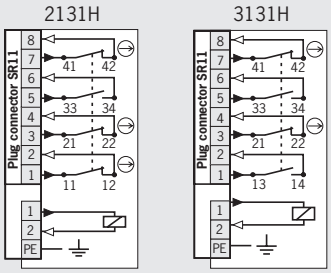


Plug connector SR11
11-pin + PE



For solenoid plug see page 111

For mating connectors see page 112



Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display: Without LED	Function display: 12-60V red LED	Function display: 230 V red LED
NZ	VZ Separate Actuator	2 Plug connector SR6	VSM Mech. guard locking closed-circuit principle 230 V AC	04 24 V DC	528H 1 NC + 1 NO	037 299 NZ2VZ-528E3VSM04	045 856 NZ2VZ-528E3VSM04L060	070 039 NZ2VZ-528E3VSM04L220
					538H 2 NC	050 428 NZ2VZ-538E3VSM04	059 427 NZ2VZ-538E3VSM04L060	On request
				09 [1]	528H 1 NC + 1 NO	055 718 NZ2VZ-528E3VSM09	On request	On request
					538H 2 NC	076 502 NZ2VZ-538E3VSM09	On request	On request
		2 Plug connector SR11	VSM mech. guard locking closed-circuit principle	04 24 V DC	2131H 3 NC + 1 NO	074 471 NZ2VZ-2131E3VSM04	-	-
					3131H 2 NC + 2 NO	074 472 NZ2VZ-3131E3VSM04	-	-

1) Use only solenoid plug with integrated rectifier (see page 111)

For safety precautions see page 164
For technical data see page 139

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

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

Approach direction

Horizontal
Can be adjusted 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	110 V ±15%	red [1]
AC	230 V ±15%	AC	230 V ±15%	red [1]

Guard locking type

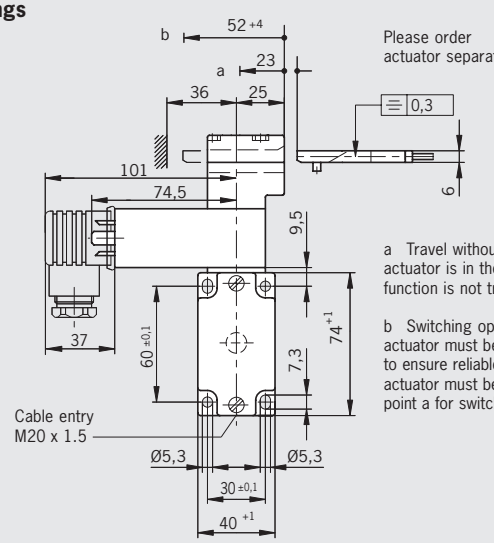
VSE Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

Switching elements (see also page 13/14)

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

Cable entry M20 x 1.5

Dimension drawings



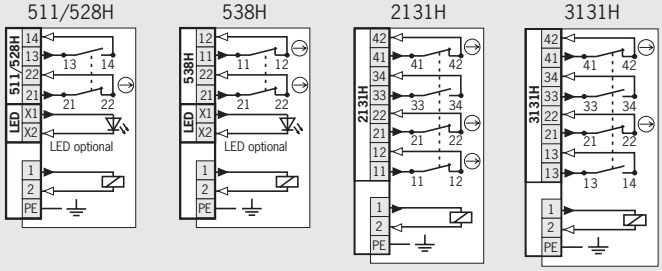
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 plug see page 111
For cable glands see page 115

Wiring diagrams



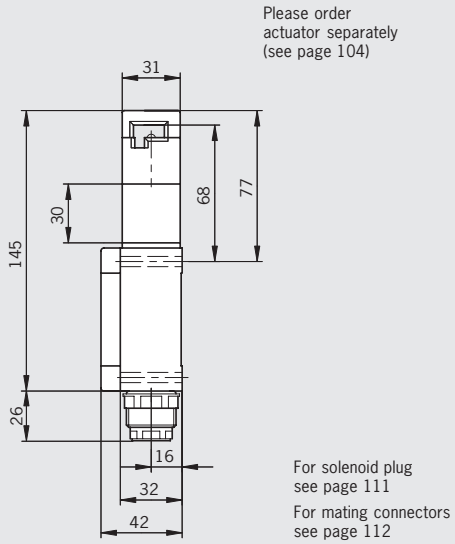
Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display: Without LED	12-60V red LED	110 V red LED	230 V red LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	VSE Electr. guard locking open-circuit current principle	04 24 V DC	511 1 NC ⊖ + 1 NO	090 343 NZ1VZ-511E3VSE04-M	On request	On request	On request
					528H 1 NC ⊖ + 1 NO	079 300 NZ1VZ-528E3VSE04M	082 130 NZ1VZ-528E3VSE04I060-M	On request	091 738 NZ1VZ-528E3VSE04L220-M
					538H 2 NC ⊖	089 905 NZ1VZ-538E3VSE04-M	082 128 NZ1VZ-538E3VSE04L060-M	On request	On request
					2131H 3 NC ⊖ + 1 NO	082 134 NZ1VZ-2131E3VSE04-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 051 NZ1VZ-3131E3VSE04-M	-	-	-
				07 [1] 110 V AC	528H 1 NC ⊖ + 1 NO	082 133 NZ1VZ-528E3VSE07-M	090 337 NZ1VZ-528E3VSE07L060-M	089 484 NZ1VZ-528E3VSE07L110-M	090 336 NZ1VZ-528E3VSE07L220-M
					538H 2 NC ⊖	088 048 NZ1VZ-538E3VSE07-M	On request	090 348 NZ1VZ-538E3VSE07L110-M	On request
					2131H 3 NC ⊖ + 1 NO	088 036 NZ1VZ-2131E3VSE07-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 042 NZ1VZ-3131E3VSE07-M	-	-	-
				09 [1] 230 V AC	528H 1 NC ⊖ + 1 NO	088 047 NZ1VZ-528E3VSE09-M	090 346 NZ1VZ-528E3VSE09L060-M	On request	090 335 NZ1VZ-528E3VSE09L220-M
					538H 2 NC ⊖	088 035 NZ1VZ-538E3VSE09-M	On request	On request	090 334 NZ1VZ-538E3VSE09L220-M
					2131H 3 NC ⊖ + 1 NO	088 037 NZ1VZ-2131E3VSE09-M	-	-	-
					3131H 2 NC ⊖ + 2 NO	088 043 NZ1VZ-3131E3VSE09-M	-	-	-

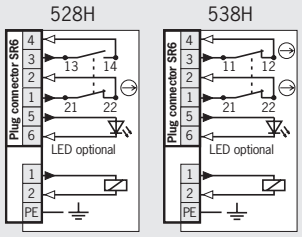
1) Use only solenoid plug with integrated rectifier (see page 111)

Plug connector SR6
6-pin + PE

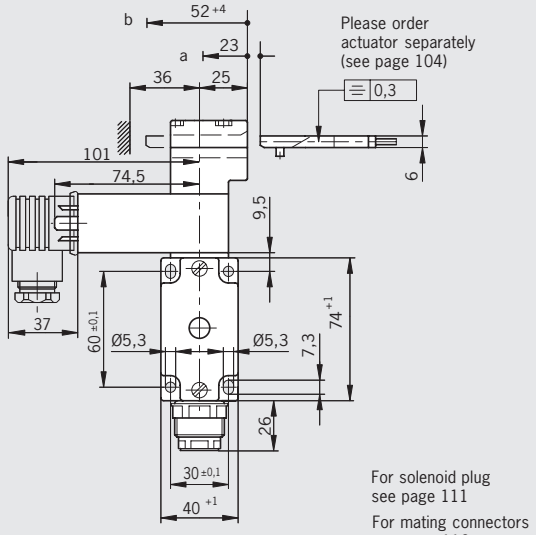
Dimension drawings

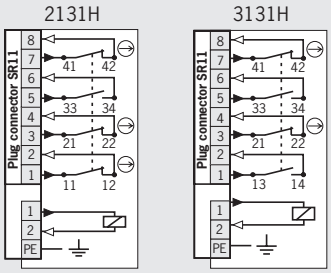


Wiring diagrams



Plug connector SR11
11-pin + PE





Ordering table

Series	Actuator	Connection	Guard locking	Solenoid voltage	Switching element	Function display: Without LED	Function display: 12-60V red LED	Function display: 110 V red LED
NZ	VZ Separate actuator	2 Plug connector SR6	VSE Electr. guard locking open-circuit current principle	04 24 V DC	528H 1 NC ⊖ + 1 NO	044 894 NZ2VZ-528E3VSE04	046 742 NZ2VZ-528E3VSE04L060	On request
					538H 2 NC ⊖	047 837 NZ2VZ-538E3VSE04	057 921 NZ2VZ-538E3VSE04L060	On request
				07 [1] 110 V AC	528H 1 NC ⊖ + 1 NO	On request	On request	070 290 NZ2VZ-528E3VSE07L110
		2 Plug connector SR11	VSE Electr. guard locking open-circuit current principle	04 24 V DC	2131H 3 NC ⊖ + 1 NO	074 473 NZ2VZ-2131E3VSE04	-	-
					3131H 2 NC ⊖ + 2 NO	074 474 NZ2VZ-3131E3VSE04	-	-

1) Use only solenoid plug with integrated rectifier (see page 111)

For safety precautions see page 164
For technical data see page 139

Safety switch NZ.VZ.VSH with guard locking without guard lock monitoring

- **Housing according to EN 50041**
- **Manual release**
- **Plug connector optional**

Approach direction

Horizontal
Can be adjusted in 90° steps.

Guard locking type

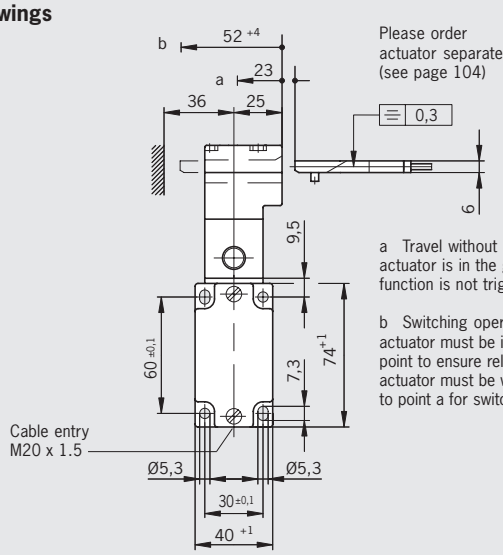
VSH Mechanical locking by spring force. Manual release.

Switching elements (see also Page 13/14)

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

Cable entry M20 x 1.5

Dimension drawings



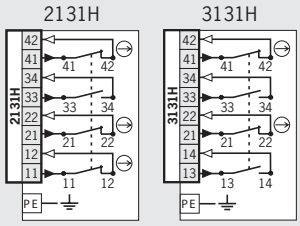
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 115

Wiring diagrams

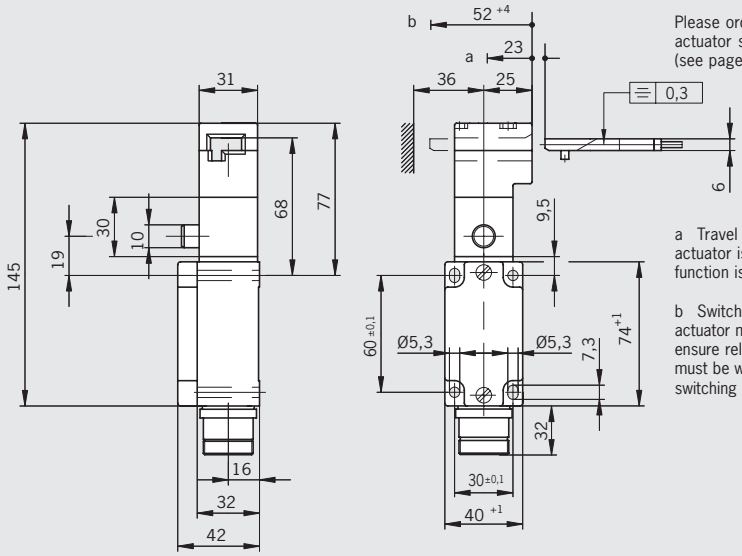


Ordering table

Series	Actuator	Connection	Guard locking	Switching element	Function display Without LED
NZ	VZ Separate actuator	1 Cable entry M20 x 1.5	VSH Manual guard locking not powered	2131H 3 NC ⊖ + 1 NO	089 483 NZ1VZ-2131E3VSH-M
				3131H 2 NC ⊖ + 2 NO	089 915 NZ1VZ-3131E3VSH-M

Plug connector MR8
7-pin + PE

Dimension drawings



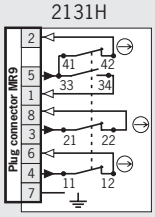
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 124

Wiring diagrams



Ordering table

Series	Actuator	Connection	Guard locking	Switching element	Function display Without LED
NZ	**VZ** Separate actuator	**1...8C** Plug connector **MR8**	**VSH** Manual guard locking not powered	**2131H** 3 NC ⊖ + 1 NO	**093 611** NZ1VZ-2131E3VSH-8C-GMMF

For safety precautions see page 164
For technical data see page 139

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

Release feature, front

- **HE** Mechanical release can be sealed
- **E** Mechanical release cannot be sealed
- **HD** Mechanical release for triangular key acc. to DIN 22417 (latching)
- **ND** Emergency 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

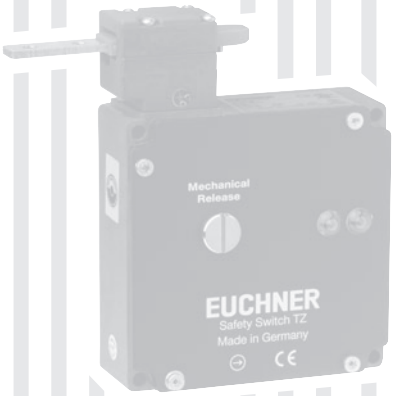
- **BD4** Plug connector 4-pin
- **RC12** Plug connector 12-pin

Connection

- **M** Thread M20 x 1.5 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
- **RC18** Plug connector 18-pin + PE

Switching element

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



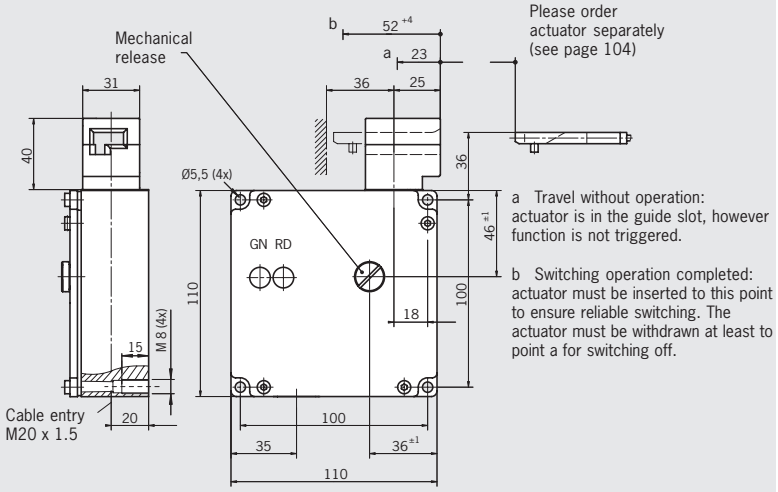
Manual release									Enabling switch		Connection							Switching element		With version	Page
HE	E	HD	ND	NR	O	FS	FD	SB	BD4	RC12	M	SR6	MR8	MR10	SR11	MR12	RC18	Two contacts	Four contacts		
●											●							●	●	C1925	62
●												●						●		C1638	64
●																●			●	C1924	66
●																	●		●	C1826	63
●															●			●	●	C1933	65
●						●					●							●	●	C1815 / C1828	76
●						●									●		●	●	●	C1815 / C1828	77
●							●				●							●	●	C1684	80
●							●								●			●		C1684	81
●								●			●							●			68
●								●				●			●			●	●	C1677	69
●								●									●		●		70
●							●				●								●	C2082	78
●							●										●		●	C2140	79
	●												●	●				●	●	C1903	67
		●									●								●	C2159	71
			●								●							●	●	C1816 / C1823	72
			●												●		●	●	●	C1816 / C1823	73
				●				●							●			●			74
				●													●		●	C1937	75
				●			●	●									●		●	C2123	82
					●			●			●							●	●	C1623 / C2100	83
					●			●						●					●		84
					●			●								●			●	C1902 / C1971	85
					●				●			●						●		C1662	86
					●					●							●		●	C1803	87

Safety switch TZ with guard locking and guard lock monitoring

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

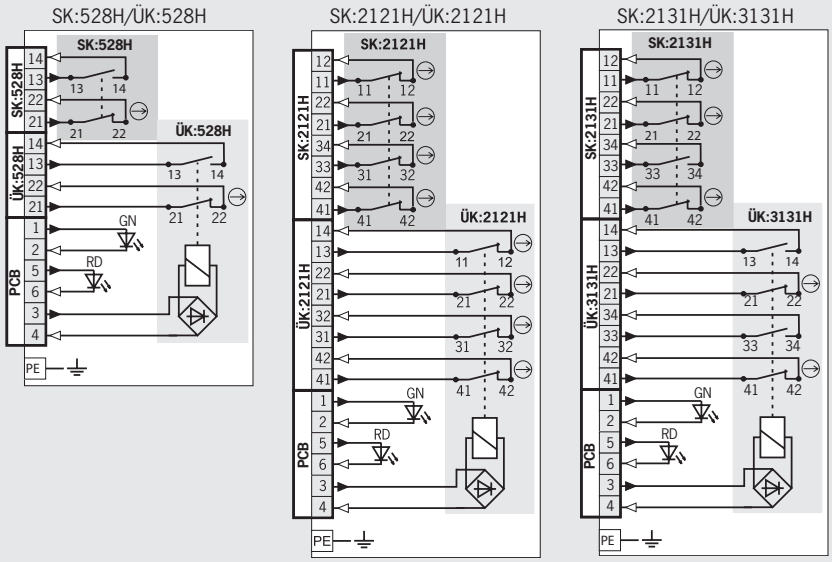
Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



For cable glands see page 115

Wiring diagrams Actuator inserted and locked



Mechanical release

Is used for releasing the guard locking with the aid of a tool. A sealing wire can be fitted to protect against tampering. Lead sealing kit and tool included.

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

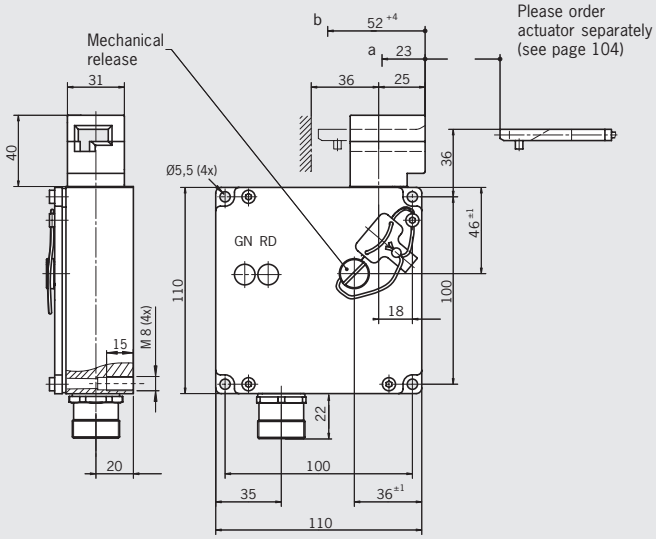
Ordering table

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**, 1NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**082 050** TZ1LE024M	**083 160** TZ1LE110M	**083 166** TZ1LE220M	**083 164** TZ1LE024M-R	**083 168** TZ1LE110M-R
				SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	On request	On request	On request	**089 464** 1) TZ1LE024MVFG-RC1925	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**083 965** TZ1LE024MVAB	**088 023** TZ1LE110MVAB	**088 029** TZ1LE220MVAB	**089 434** TZ1LE024MVAB-R	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**082 051** TZ1RE024M	**083 161** TZ1RE110M	**083 167** TZ1RE220M	**083 165** TZ1RE024M-R	**089 448** TZ1RE110M-R
				SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	On request	On request	On request	**089 465** 1) TZ1RE024MVFG-RC1925	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**083 966** TZ1RE024MVAB	**088 024** TZ1RE110MVAB	**088 030** TZ1RE220MVAB	**083 233** TZ1RE024MVAB-R	On request
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**090 559** TZ2LE024M	**083 162** TZ2LE110M	**088 031** TZ2LE220M	**089 445** TZ2LE024M-R	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**088 070** TZ2LE024MVAB	**088 025** TZ2LE110MVAB	**088 027** TZ2LE220MVAB	On request	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**090 560** TZ2RE024M	**083 163** TZ2RE110M	**088 032** TZ2RE220M	**089 446** TZ2RE024M-R	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**088 071** TZ2RE024MVAB	**088 026** TZ2RE110MVAB	**088 028** TZ2RE220MVAB	On request	On request

1) No BG approval

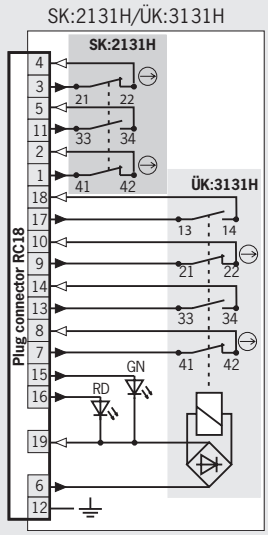
Plug connector RC18
18-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connector with option C1825 see page 113

Wiring diagrams Actuator inserted and locked



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Black cover 24 V
TZ	RC18 [2] Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**084 246** [3] TZ1LE024RC18VAB-C1826
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**084 247** [3] TZ1RE024RC18VAB-C1826
		2 Electrical	LE Left	SK: **2131H**, 3 NC ⊖ +1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**085 180** [3] TZ2LE024RC18VAB-C1826
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**085 181** [3] TZ2RE024RC18VAB-C1826

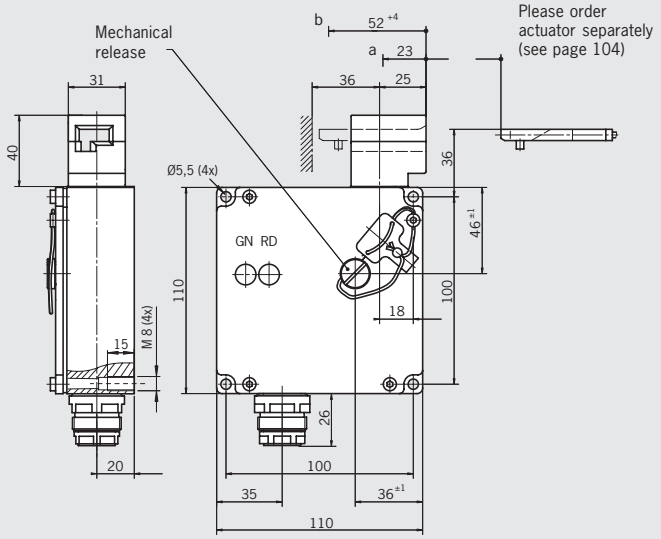
2) **Important**: use suitable mating connector with option C1825!
3) Approval pending

Please turn over

For safety precautions see page 164
For technical data see page 139

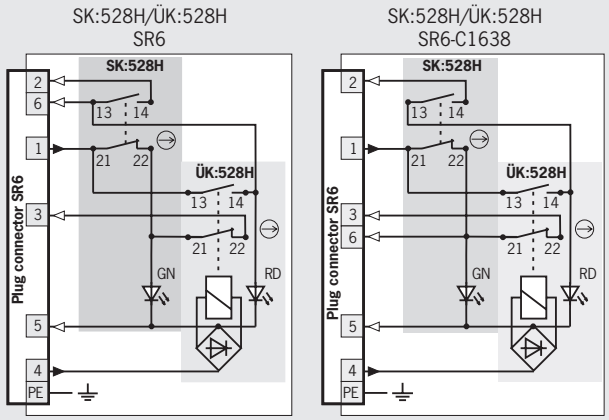
Plug connector SR6
6-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 112

Wiring diagrams Actuator inserted and locked



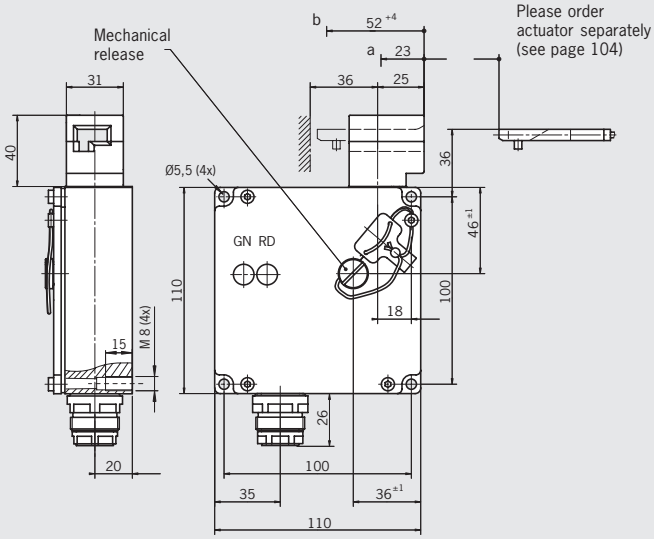
Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V	Black cover 230 V	Red cover 24 V
TZ	SR6 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**046 502** TZ1LE024SR6	**046 503** TZ1LE110SR6	**046 504** TZ1LE220SR6	On request
					C1638 [1] Wiring	**089 476** [1] TZ1LE024SR6-C1638	On request	On request	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**046 190** TZ1RE024SR6	**046 191** TZ1RE110SR6	**051 879** TZ1RE220SR6	On request
					C1638 [1] Wiring	**070 529** [1] TZ1RE024SR6-C1638	On request	On request	On request
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**049 159** TZ2LE024SR6	**052 914** TZ2LE110SR6	**045 450** TZ2LE220SR6	**046 915** TZ2LE024SR6-R
					C1638 [1] Wiring	**076 294** [1] TZ2LE024SR6-C1638	On request	On request	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**049 102** TZ2RE024SR6	**049 238** TZ2RE110SR6	**047 937** TZ2RE220SR6	**059 672** TZ2RE024SR6-R
					C1638 [1] Wiring	**055 819** [1] TZ2RE024SR6-C1638	On request	On request	On request

1) No BG approval

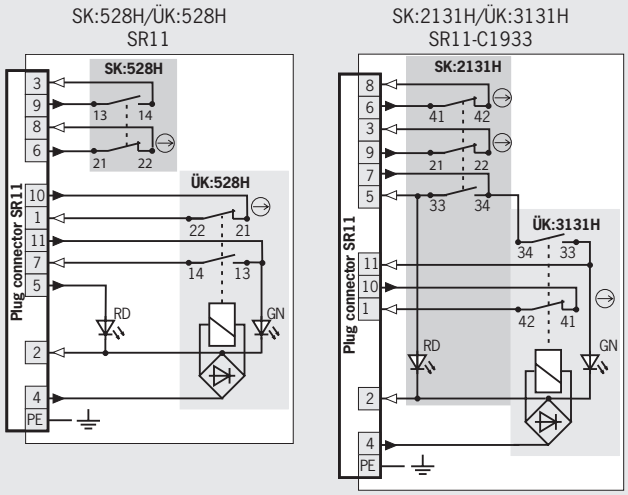
Plug connector SR11
11-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 112

Wiring diagrams Actuator inserted and locked



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		**070 828** TZ1LE024SR11
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C1933** [1] Alternative wiring	**083 230** [1] TZ1LE024SR11VAB-C1933
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**070 826** TZ1RE024SR11
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C1933** [1] Alternative wiring	**083 231** [1] TZ1RE024SR11VAB-C1933
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**070 958** TZ2LE024SR11
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO		**070 957** TZ2RE024SR11

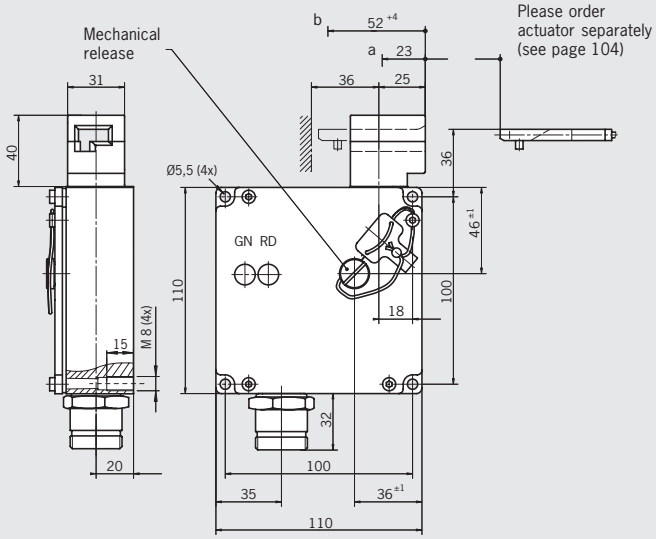
1) No BG approval

Please turn over

For safety precautions see page 164
For technical data see page 139

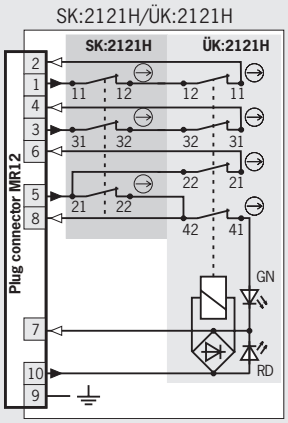
Plug connector MR12
11-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 124

Wiring diagrams Actuator inserted and locked



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V	Black cover 230 V	Red cover 24 V
TZ	**MR12** Plug connector	**1** Mechanical	**LE** Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖		On request	On request	On request	**083 190** TZ1LE024BHAVFG-RC1924
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖		On request	On request	On request	**083 191** TZ1RE024BHAVFG-RC1924

Safety switch TZ with guard locking and guard lock monitoring

- **Mechanical release on the front**
- **Two LEDs, red and green**
- **Plug connectors**
- **Actuating head fitted left or right**

Mechanical release
Is used for releasing the guard locking with the aid of a tool.

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

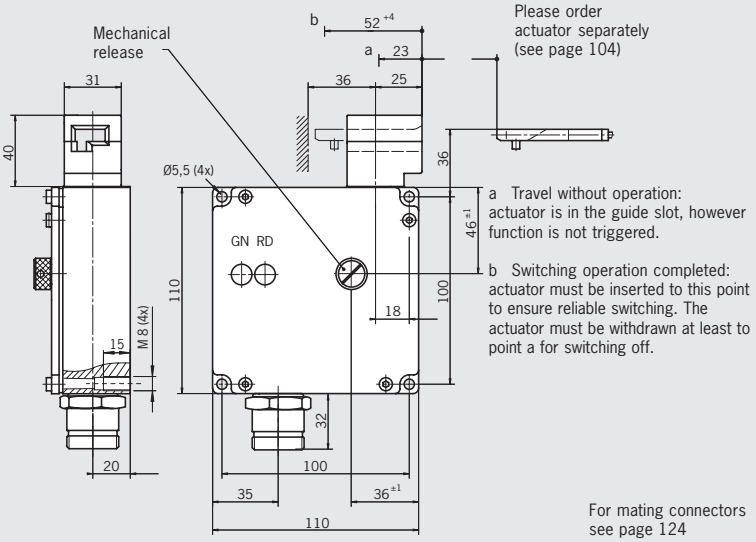
Switching elements (see also Page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

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

Plug connector MR8 7-pin + PE

Plug connector MR10 9-pin + PE

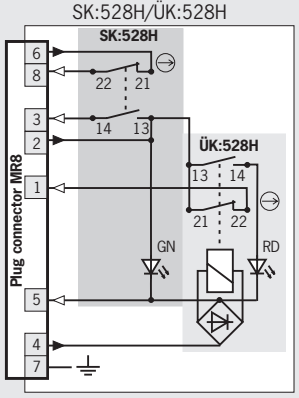
Dimension drawings Actuating head on left is a mirror image



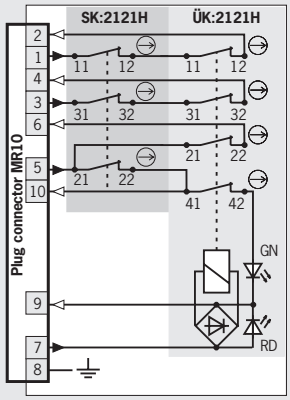
For mating connectors see page 124

Wiring diagrams Actuator inserted and locked

SK:528H/ÜK:528H



SK:2121H/ÜK:2121H -C1903



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 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	Mechanical release cannot be sealed	**054 964** TZ1LE024PG0R8C	**074 917** TZ1LE110PG0R8C	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Mechanical release cannot be sealed	**059 920** TZ1RE024PG0R8C	**074 916** TZ1RE110PG0R8C	On request
	MR10 Plug connector	1 Mechanical	LE Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Mechanical release cannot be sealed	On request	On request	**082 095** TZ1LE024BHA-C1903
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Mechanical release cannot be sealed	On request	On request	**082 096** TZ1RE024BHA-C1903
		2 Electrical	LE Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Mechanical release cannot be sealed	On request	On request	**082 083** TZ2LE024BHA-C1903
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Mechanical release cannot be sealed	On request	On request	**082 084** TZ2RE024BHA-C1903

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

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

Mechanical release
Is used for releasing the guard locking with the aid of a tool. A sealing wire can be fitted to protect against tampering. Lead sealing kit and tool included.

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

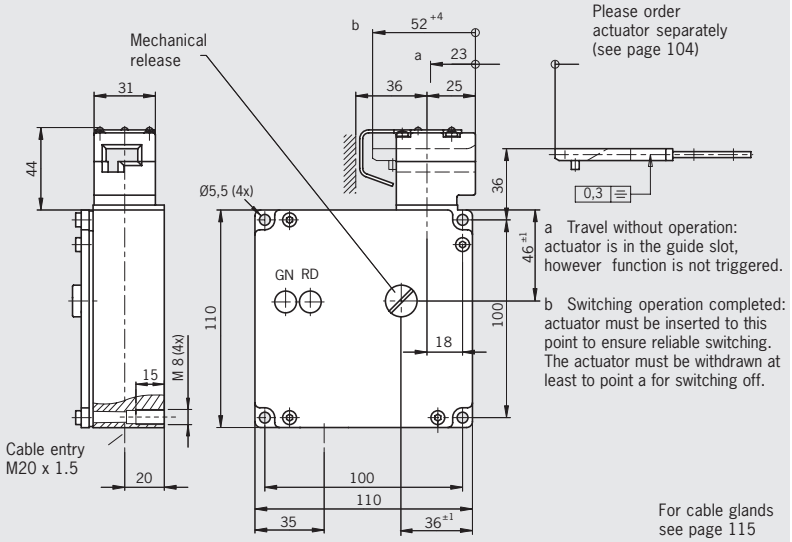
Solenoid operating voltage and LED function display
The following voltage range is available:
- 24 V AC/DC -15%, +10%

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

Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



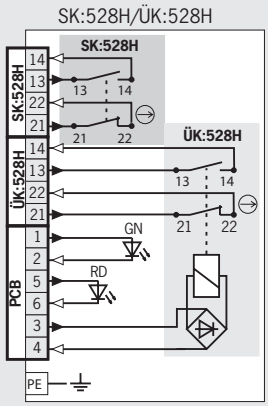
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 115

Wiring diagrams Actuator inserted and locked



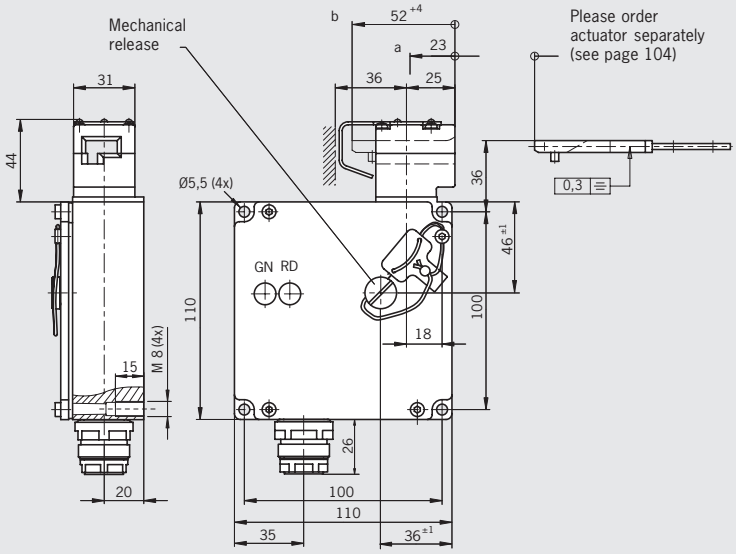
Ordering table

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	With protective plate	**089 470** TZ1LE024M-089470
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**089 471** TZ1RE024M-089471

Plug connector SR6
6-pin + PE

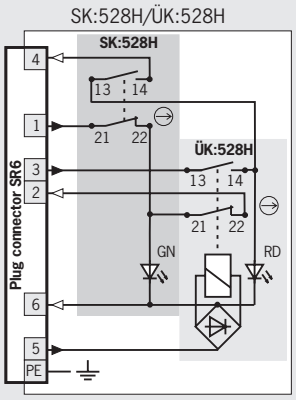
Plug connector SR11
11-pin + PE

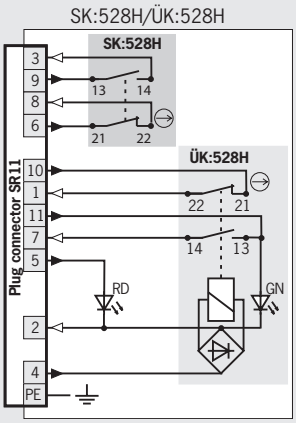
Dimension drawings
Actuating head on left is a mirror image



For mating connectors see page 112

Wiring diagrams
Actuator inserted and locked





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	**059 694** TZ1LE024SR6-C1677
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**059 692** TZ1RE024SR6-C1677
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**059 852** TZ2LE024SR6-C1677
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**059 699** TZ2RE024SR6-C1677
	SR11 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**093 860** TZ1LE024SR11-093860
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	With protective plate	**093 861** TZ1RE024SR11-093861

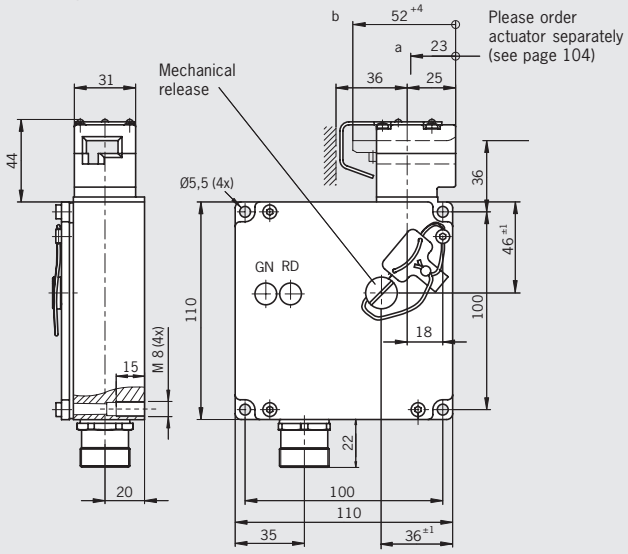
Please turn over

For safety precautions see page 164
For technical data see page 139

GL

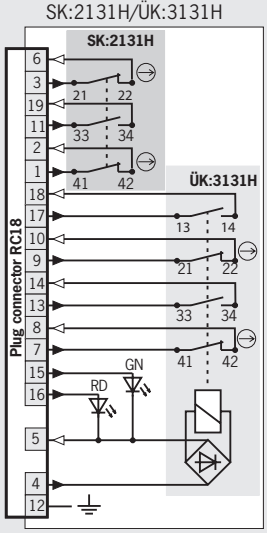
Plug connector RC18
18-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 114

Wiring diagrams Actuator inserted and locked



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	RC18 Plug connector	2 Electrical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	With protective plate	**093 862** TZ1LE024RC18VAB-093862
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	With protective plate	**093 863** TZ1RE024RC18VAB-093863

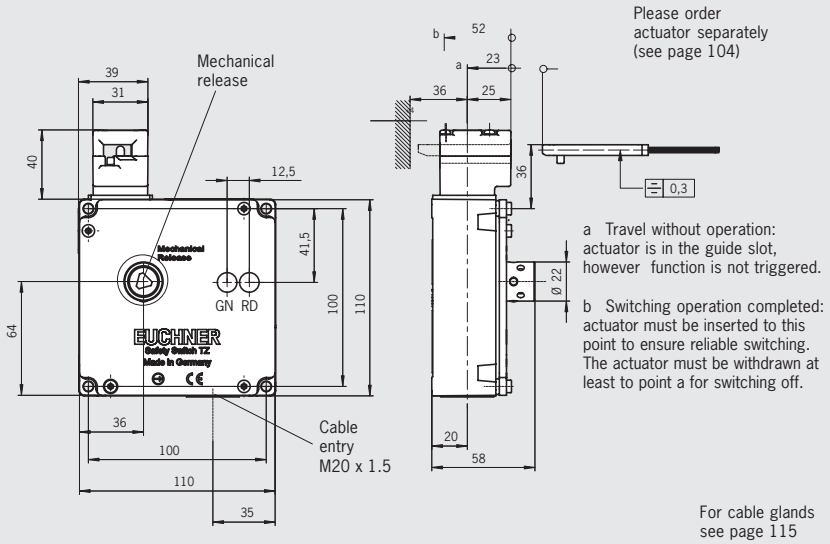
Safety switch TZ with guard locking and guard lock monitoring

GL

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

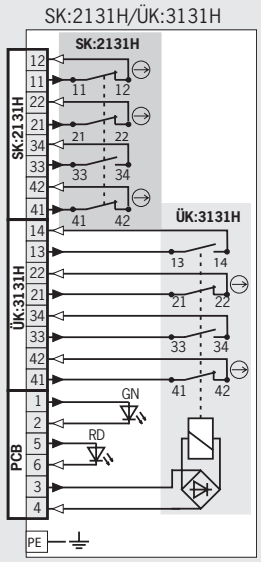
Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



For cable glands see page 115

Wiring diagrams Actuator inserted and locked



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

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	**098 718** TZ1LB024MVAB-C2159
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Mechanical release with triangular key	**098 717** TZ1RB024MVAB-C2159

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

- **Emergency release on the front with pushbutton**
- **Two LEDs, red and green**
- **Plug connector optional**
- **Actuating head fitted left or right**

Emergency 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.

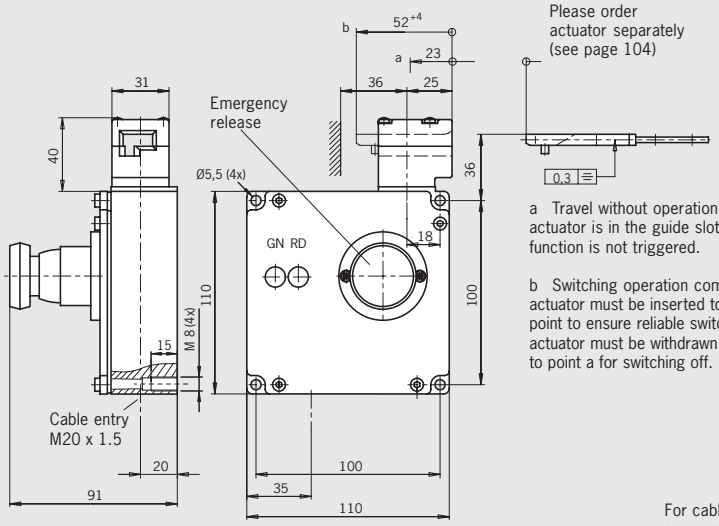
Switching elements (see also Page 13/14)
SK For monitoring the door/actuator position

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

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

Cable entry M20 x 1.5

Dimension drawings
Actuating head on left is a mirror image



Please order actuator separately (see page 104)

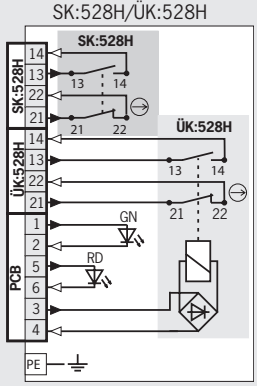
a Travel without operation: actuator is in the guide slot, however function is not triggered.

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.

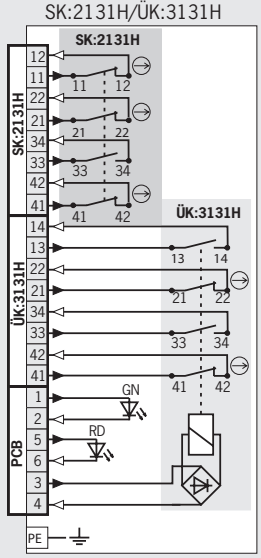
For cable glands see page 115

Wiring diagrams
Actuator inserted and locked

SK:528H/ÜK:528H



SK:2131H/ÜK:3131H



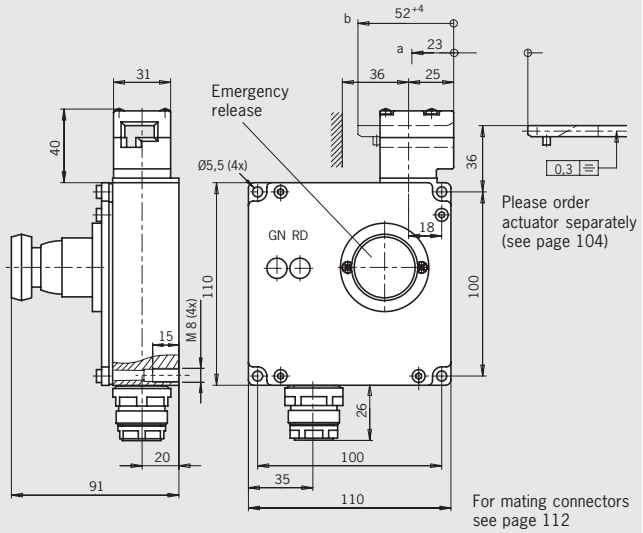
Ordering table

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	Emergency release (blue pushbutton)	**089 477** TZ1LE024M-C1816
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Emergency release (blue pushbutton)	**096 901** TZ1RE024M-C1816
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Emergency release (blue pushbutton)	**087 992** TZ2LE024M-C1816
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency release (blue pushbutton)	**089 455** TZ2LE024MVAB-C1823
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Emergency release (blue pushbutton)	**087 993** TZ2RE024M-C1816
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency release (blue pushbutton)	**089 456** TZ2RE024MVAB-C1823

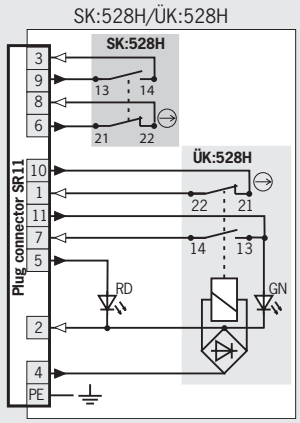
GL

Plug connector SR11
11-pin + PE

Dimension drawings Actuating head on left is a mirror image

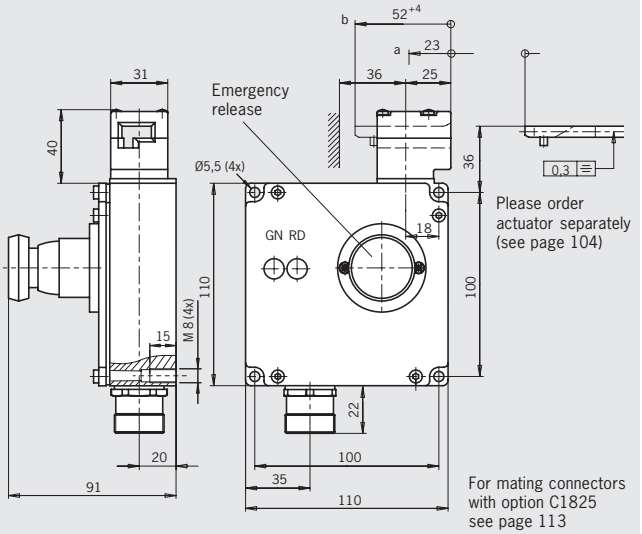


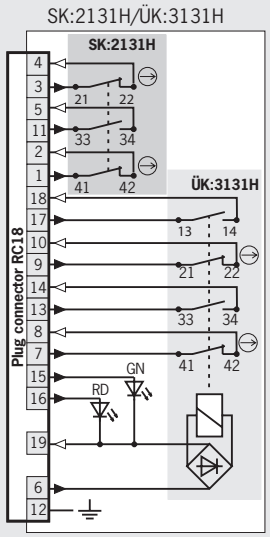
Wiring diagrams Actuator inserted and locked



GL

Plug connector RC18
18-pin + PE





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 release (blue pushbutton)	**077 044** TZ1LE024SR11-C1816
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Emergency release (blue pushbutton)	**077 042** TZ1RE024SR11-C1816
	RC18 [1] Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency release (blue pushbutton)	**088 090** TZ1LE024RC18VAB-C1823
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency release (blue pushbutton)	**088 091** TZ1RE024RC18VAB-C1823

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

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

GL

- **Emergency unlocking on the front with rotary knob**
- **Protective plate for switch head optional**
- **Two LEDs, red and green**
- **Plug connectors**
- **Actuating head fitted left or right**

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. A sealing wire can be fitted to protect against tampering. Lead sealing kit and tool included.

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%

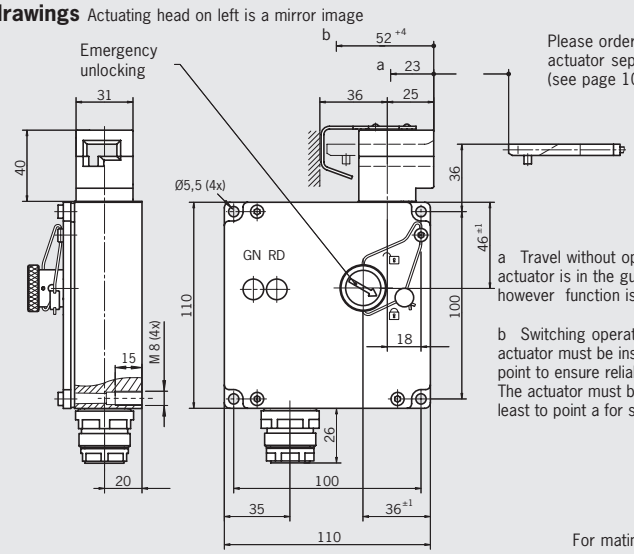
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

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

Plug connector SR11 with protective plate
11-pin + PE

Dimension drawings Actuating head on left is a mirror image



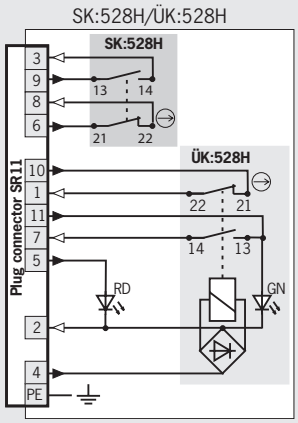
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 112

Wiring diagrams Actuator inserted and locked

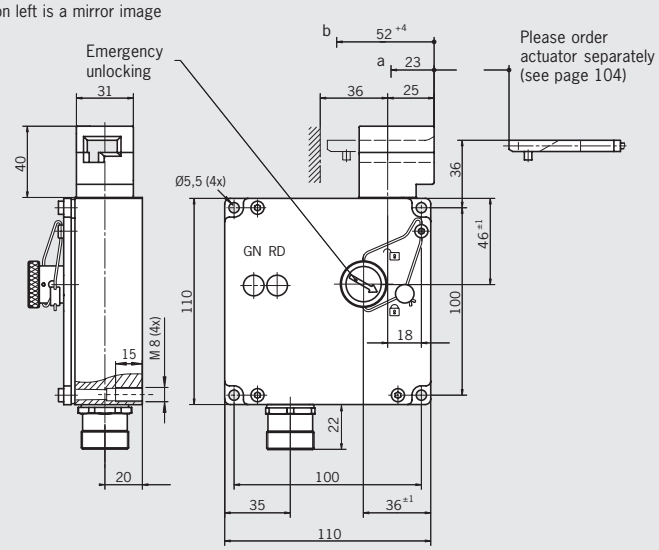


Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	SR11 Plug connector	1 Mechanical	LE Left	SK: **528H**, 1NC ⊖ + 1 NO ÜK: **528H**, 1NC ⊖ + 1 NO	Emergency unlocking (rotary knob), with protective plate	**094 342** TZ1LE024SR11-094342
			RE Right	SK: **528H**, 1NC ⊖ + 1 NO ÜK: **528H**, 1NC ⊖ + 1 NO	Emergency unlocking (rotary knob), with protective plate	**094 343** TZ1RE024SR11-094343

Plug connector RC18
18-pin + PE

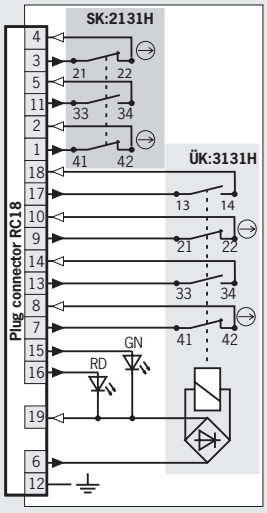
Dimension drawings Actuating head on left is a mirror image



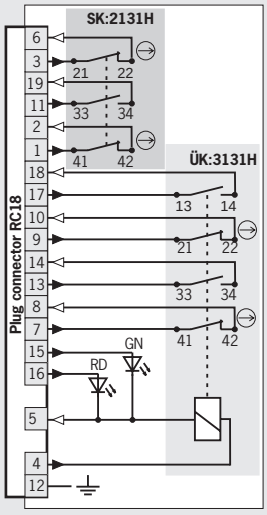
For mating connector with option C1825 see page 113

Wiring diagrams Actuator inserted and locked

SK:2131H/ÜK:3131H
RC18-C1937



SK:2131H/ÜK:3131H
RC18VAB



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**RC18** [1] Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency unlocking (rotary knob)	**074 260** TZ1LE024RC18VAB-C1937
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency unlocking (rotary knob)	**074 261** TZ1RE024RC18VAB-C1937
	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	**092 998** [2] TZ1LE024RC18VAB-092998
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Emergency unlocking (rotary knob), alternative wiring	**092 999** [2] TZ1RE024RC18VAB-092999

1) **Important**: use suitable mating connector with option C1825!
2) No BG approval

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

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

Escape release
Is used for the manual release of the guard locking from within the danger area 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%
- 110 V AC -15%, +10%

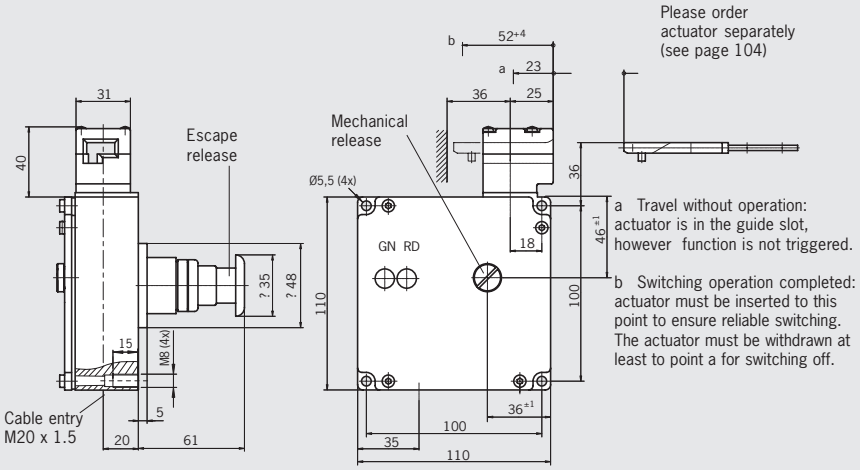
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.
TZ2 Open-circuit current principle, guard locking by applying voltage to the solenoid. Release by spring force.

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

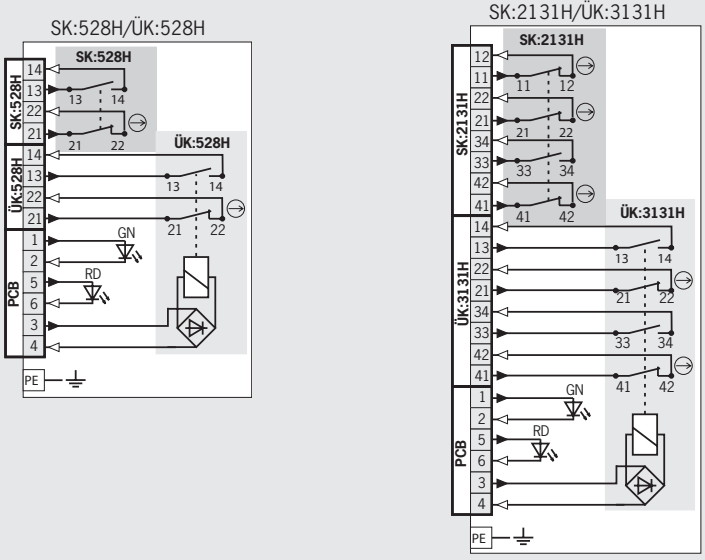
Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



For cable glands see page 115

Wiring diagrams Actuator inserted and locked



Ordering table

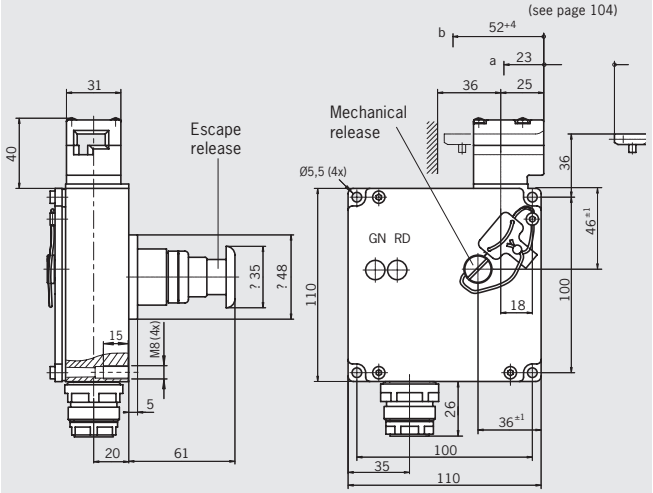
Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Escape release (red key button)	**087 990** TZ1LE024M-C1815	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (red key button)	**089 468** TZ1LE024MVAB-C1828	**094 311** TZ1LE110MVAB-C1828
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Escape release (red key button)	**087 991** TZ1RE024M-C1815	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (red key button)	**089 469** TZ1RE024MVAB-C1828	**094 312** TZ1RE110MVAB-C1828
		2 Electrical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Escape release (red key button)	**089 460** TZ2LE024M-C1815	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (red key button)	**087 290** TZ2LE024MVAB-C1828	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Escape release (red key button)	**089 461** TZ2RE024M-C1815	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (red key button)	**087 291** TZ2RE024MVAB-C1828	On request

GL

Plug connector SR11
11-pin + PE

Dimension drawings Actuating head on left is a mirror image

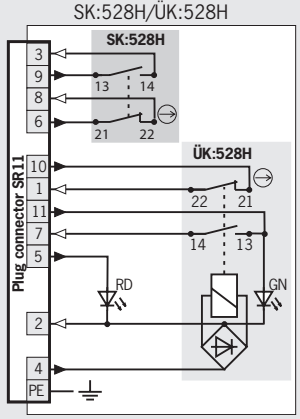
Please order actuator separately (see page 104)



For mating connectors see page 112

Wiring diagrams Actuator inserted and locked

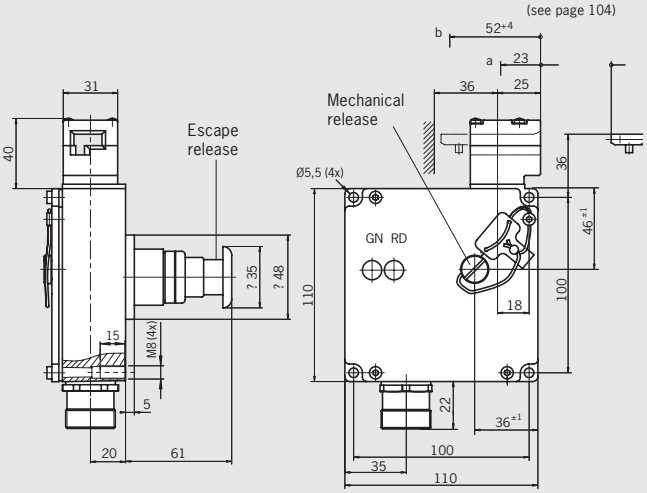
SK:528H/ÜK:528H



GL

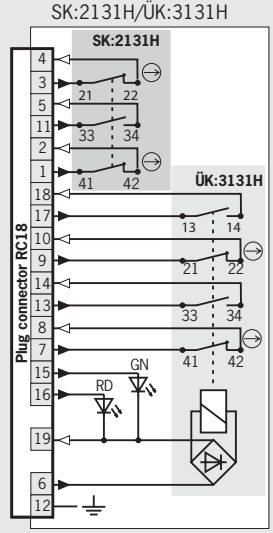
Plug connector RC18
18-pin + PE

Please order actuator separately (see page 104)



For mating connector with option C1825 see page 113

SK:2131H/ÜK:3131H



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 ⊖ + 2 NO	Escape release (key button)	**079 660** TZ2LE024SR11-C1815
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Escape release (key button)	**079 661** TZ2RE024SR11-C1815
	RC18 [1] Plug connector	1 Mechanical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (key button)	**090 352** TZ1LE024RC18VAB-C1828
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (key button)	**090 353** TZ1RE024RC18VAB-C1828
		2 Electrical	LE Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (key button)	**093 103** TZ2LE024RC18VAB-C1828
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Escape release (key button)	**093 104** TZ2RE024RC18VAB-C1828

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

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

- **Mechanical release on the front**
- **Escape release on the rear with pushbutton**
- **Two LEDs, red and green**
- **Plug connector optional**
- **Actuating head fitted left or right**

Escape release
Is used for the manual release of the guard locking from within the danger area 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%

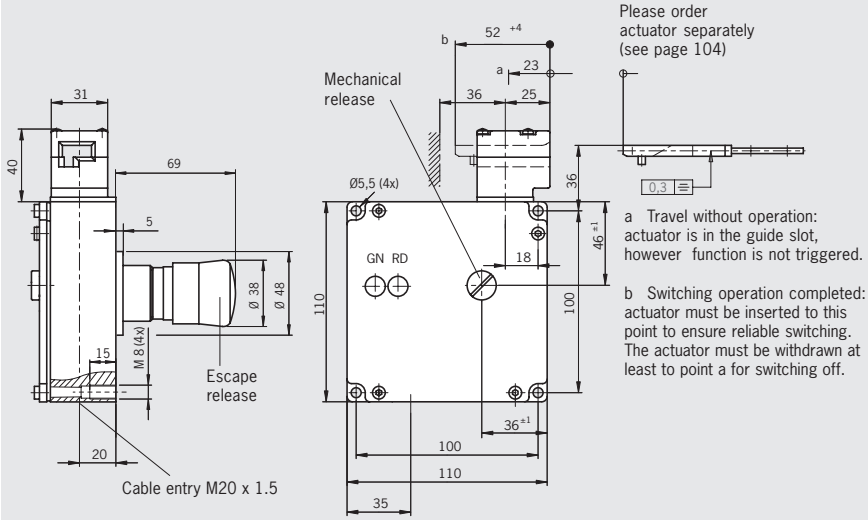
Guard locking types
TZ1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

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

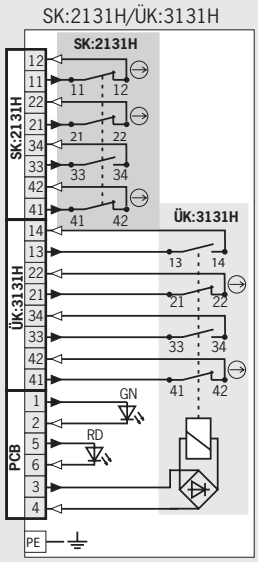
Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



For cable glands see page 115

Wiring diagrams Actuator inserted and locked



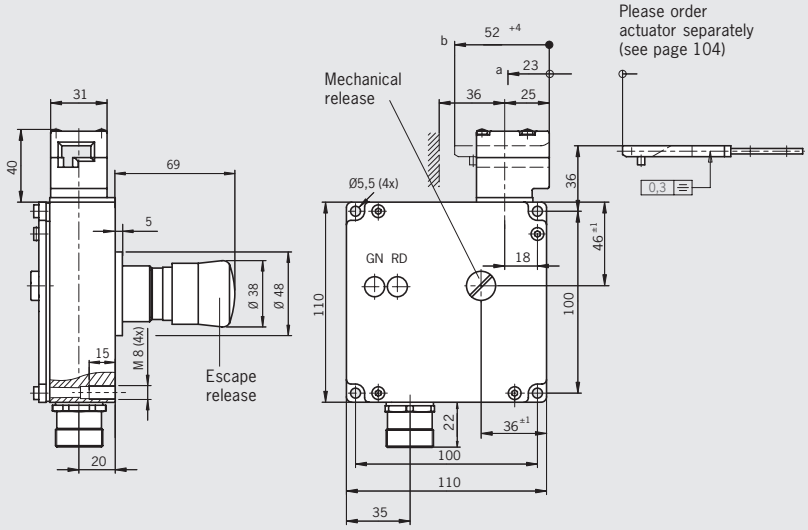
Ordering table

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)	**096 487** TZ1LE024MVAB-C2082	**095 992** TZ1LE110MVAB-C2082
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C2082** Escape release (pushbutton)	**096 488** TZ1RE024MVAB-C2082	**095 103** TZ1RE110MVAB-C2082

GL

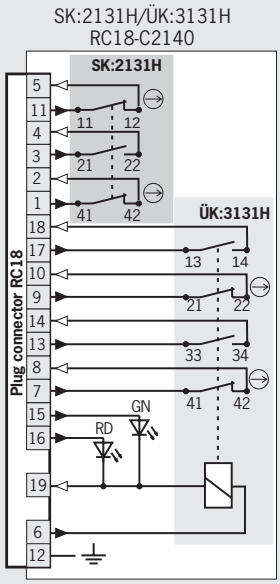
Plug connector RC18
18-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 114

Wiring diagrams Actuator inserted and locked



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**RC18** Plug connector	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C2140** Escape release (pushbutton)	**098 297** TZ1LE024RC18VAB-C2140
			RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C2140** Escape release (pushbutton)	**098 298** TZ1RE024RC18VAB-C2140

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

- **Mechanical release on the front**
- **Escape release on the rear with pushbutton**
- **Two LEDs, red and green**
- **Plug connector optional**
- **Actuating head fitted left or right**

Escape release
Is used for the manual release of the guard locking from within the danger area 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%
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.

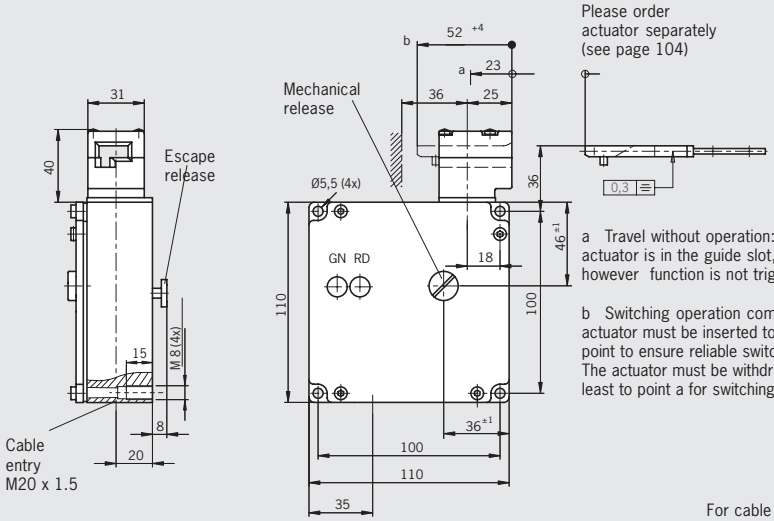
Switching elements (see also Page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available see ordering table:

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

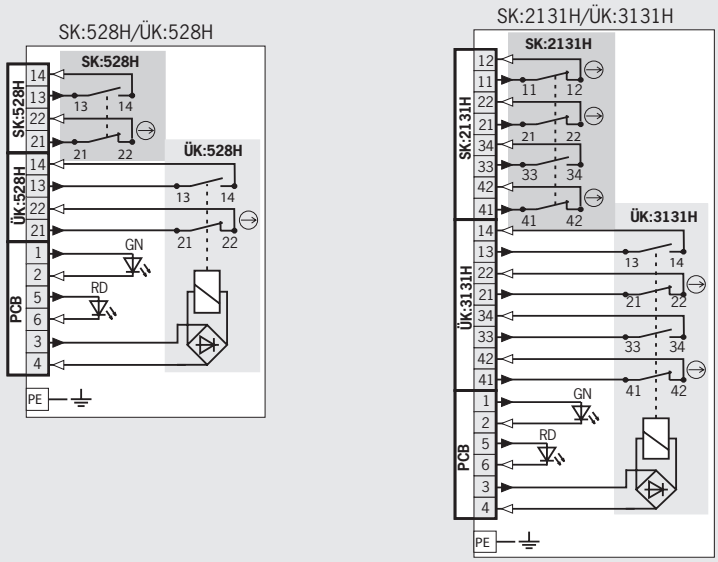
Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



For cable glands see page 115

Wiring diagrams Actuator inserted and locked



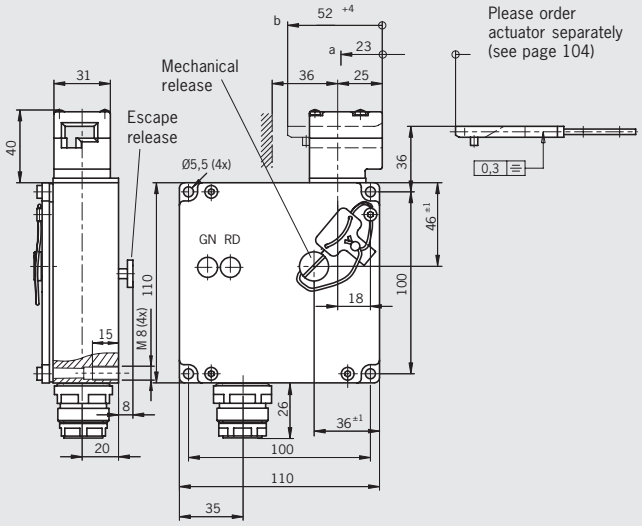
Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V	Black cover 110 V	Black cover 230 V
TZ	M20x1.5	1 Mechanical	LE Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**C1684** Escape release (pushbutton)	**083 170** TZ1LE024M-C1684	**089 924** TZ1LE110M-C1684	**093 770** TZ1LE220M-C1684
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C1684** Escape release (pushbutton)	**084 820** TZ1LE024MVAB-C1684	on request	On request
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**C1684** Escape release (pushbutton)	**083 171** TZ1RE024M-C1684	**089 475** TZ1RE110M-C1684	**093 771** TZ1RE220M-C1684
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	**C1684** Escape release (pushbutton)	**088 084** TZ1RE024MVAB-C1684	On request	On request

GL

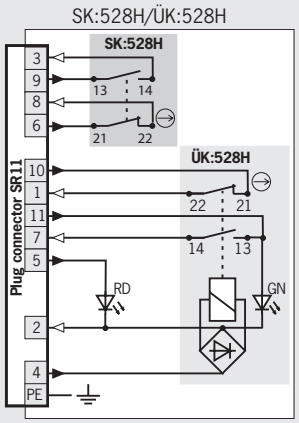
Plug connector SR11
11-pin + PE

Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 112

Wiring diagrams Actuator inserted and locked



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)	**070 886** TZ1LE024SR11-C1684
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	**C1684** Escape release (pushbutton)	**070 884** TZ1RE024SR11-C1684

For safety precautions see page 164
For technical data see page 139

Safety switch TZ with guard locking and guard lock monitoring

GL

- **Emergency unlocking on the front with rotary knob**
- **Escape release on the rear with pushbutton**
- **Protective plate for switch head**
- **Two LEDs, red and green**
- **Actuating head fitted left or right**

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. A sealing wire can be fitted to protect against tampering. Lead sealing kit and tool included.

Escape release
Is used for the manual release of the guard locking from within the danger area 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)

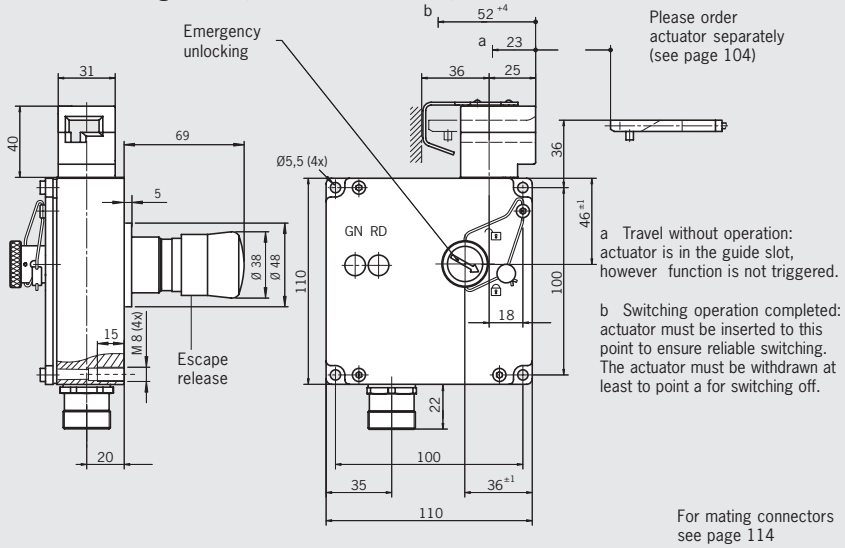
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available see ordering table:

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

Plug connector RC18
18-pin + PE

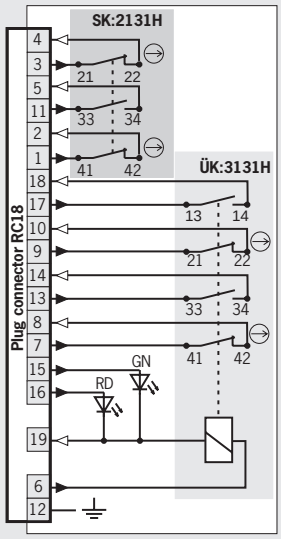
Dimension drawings Actuating head on left is a mirror image



For mating connectors see page 114

Wiring diagrams Actuator inserted and locked

SK:2131H/ÜK:3131H
RC18-C2140



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	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	**097 347** 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	**097 348** TZ1RE024RC18VAB-C2123

Safety switch TZ with guard locking and guard lock monitoring

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

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%
- 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.

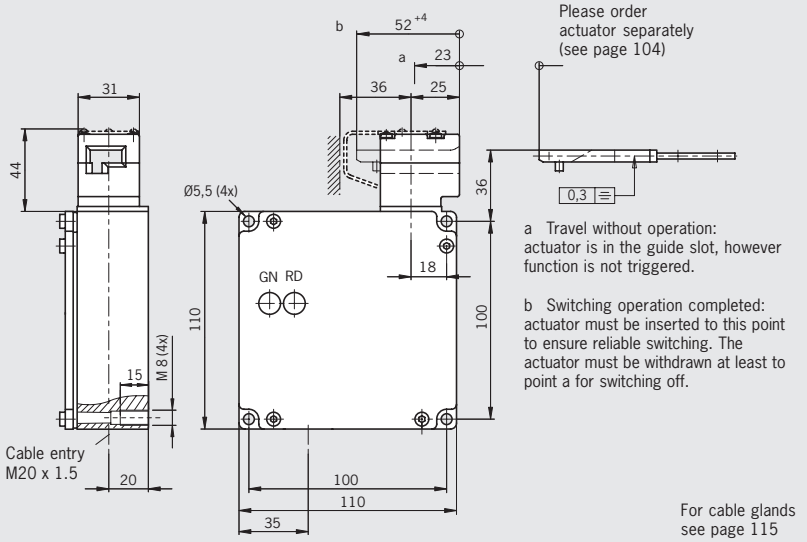
Switching elements (see also Page 13/14)
SK For monitoring the door/actuator position
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available see ordering table:

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

Cable entry M20 x 1.5

Dimension drawings Actuating head on left is a mirror image



Please order actuator separately (see page 104)

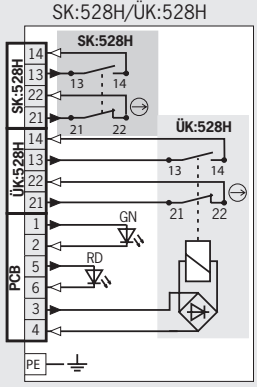
a Travel without operation: actuator is in the guide slot, however function is not triggered.

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.

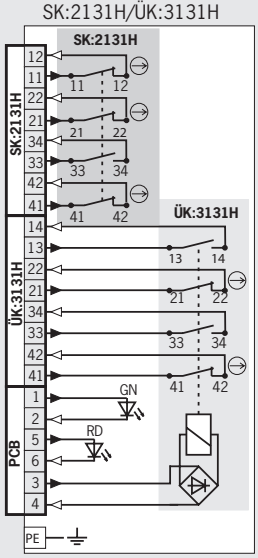
For cable glands see page 115

Wiring diagrams Actuator inserted and locked

SK:528H/ÜK:528H



SK:2131H/ÜK:3131H



Ordering table

Series	Connection	Guard locking	Switch head	Switching element	Version	Red cover	Black cover	
						24 V	24 V	110 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	-	**083 246** TZ1LE024M-C1623	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release, with protective plate	-	**085 170** TZ1LE024MVAB-C1623	**089 466** TZ1LE110MVAB-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**096 052** TZ1LE024MVAB-RC2100	-	-
			RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Without mechanical release, with protective plate	-	**083 247** TZ1RE024M-C1623	On request
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release, with protective plate	-	**085 171** TZ1RE024MVAB-C1623	**088 063** TZ1RE110MVAB-C1623
				SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**096 051** TZ1RE024MVAB-RC2100	-	-

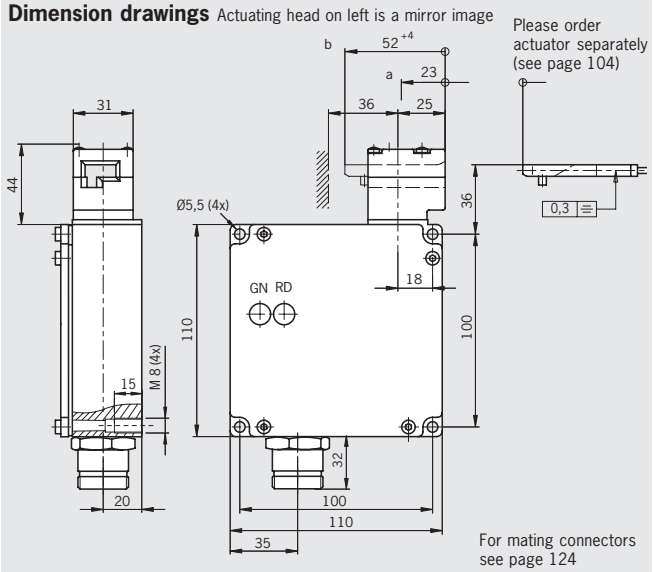
Please turn over

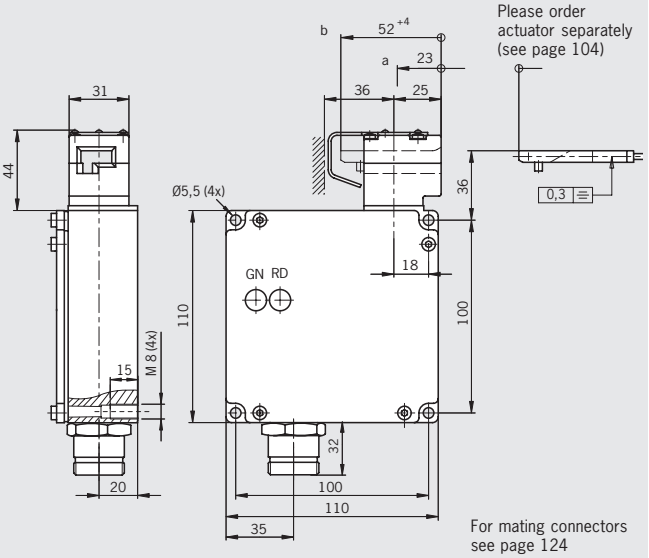
For safety precautions see page 164
For technical data see page 139

Plug connector MR10
9-pin + PE

Plug connector MR12
11-pin + PE

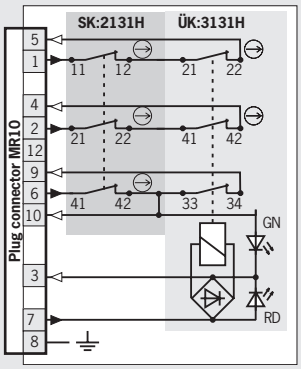
Dimension drawings
Actuating head on left is a mirror image



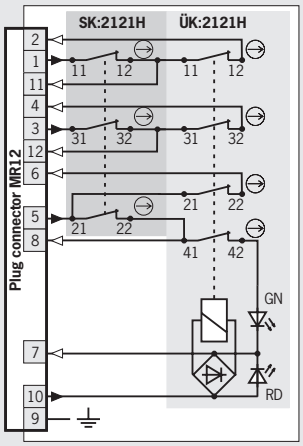


Wiring diagrams
Actuator inserted and locked

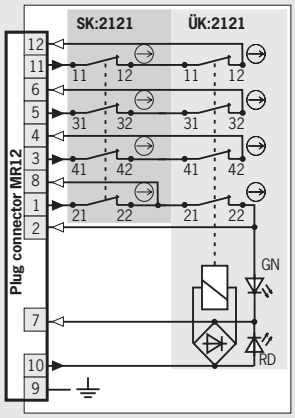
SK:2131H/ÜK:3131H
MR10 VAB-F



SK:2121H/ÜK:2121H
C1902



SK:2121H/ÜK:2121H
RC1971



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	**095 904** [1] TZ1LE024MVAB-F
			RE Right	SK: **2131H**, 3 NC ⊖ ÜK: **3131H**, 2 NC ⊖ + 1 NO	Without mechanical release	**095 905** [1] TZ1RE024MVAB-F
	MR12 Plug connector	Mechanical	**LE** Left	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Without mechanical release, with protective plate	**079 692** TZ1LE024BHA-C1902
					C1971 Alternative wiring, without mechanical release, with protective plate	**085 569** TZ1LE024BHAVFG-RC1971
			RE Right	SK: **2121H**, 4 NC ⊖ ÜK: **2121H**, 4 NC ⊖	Without mechanical release, with protective plate	**079 693** TZ1RE024BHA-C1902
					C1971 Alternative wiring, without mechanical release, with protective plate	**085 570** TZ1RE024BHAVFG-RC1971

1) No BG approval

Safety switch TZ with guard locking and guard lock monitoring

GL

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

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

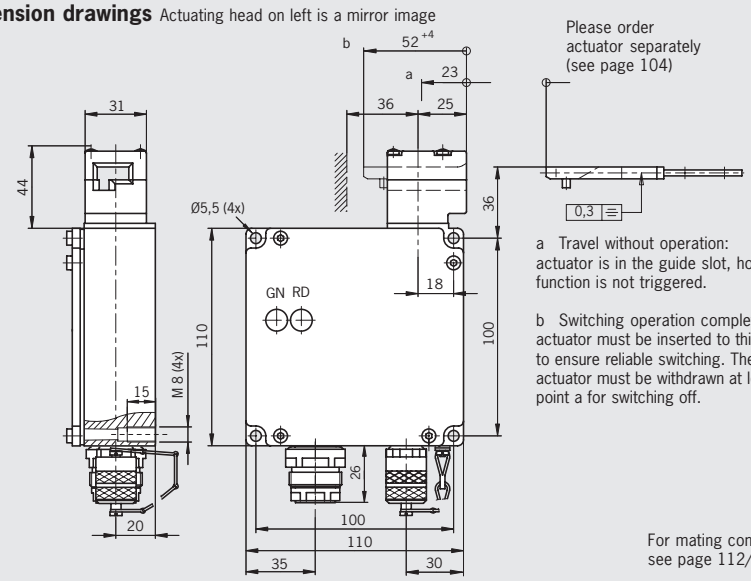
ÜK For monitoring the guard locking (built-in solenoid)

For combinations available see ordering table:

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

Plug connector SR6 and BD4 (enabling switch)
6-pin + PE / 4-pin

Dimension drawings Actuating head on left is a mirror image



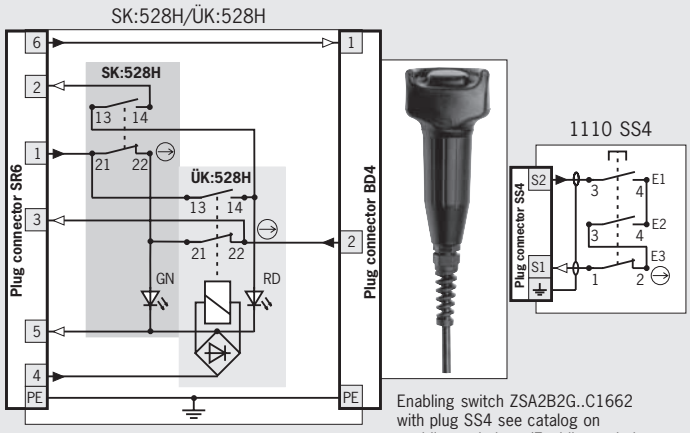
Please order actuator separately (see page 104)

a Travel without operation: actuator is in the guide slot, however 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 112/111

Wiring diagrams Actuator inserted and locked



Enabling switch ZSA2B2G..C1662 with plug SS4 see catalog on enabling switches. (Enabling switch not included)

Ordering table

Series	Connection	Enabling switch connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	SR6 Plug connector	Enabling switch plug **BD4**	1 Mechanical	**LE** Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Without mechanical release	**070 527** TZ1LE024SR6-C1662
				RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Without mechanical release	**054 781** TZ1RE024SR6-C1662
			2 Electrical	**LE** Left	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖+ 1 NO	Without mechanical release	**059 307** TZ2LE024SR6-C1662
				RE Right	SK: **528H**, 1 NC ⊖ + 1 NO ÜK: **528H**, 1 NC ⊖ + 1 NO	Without mechanical release	**059 305** TZ2RE024SR6-C1662

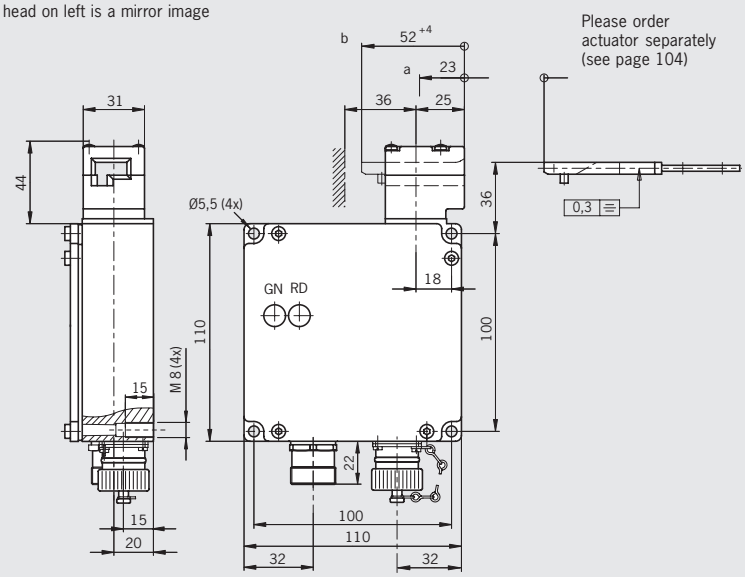
Please turn over

For safety precautions see page 164
For technical data see page 139

GL

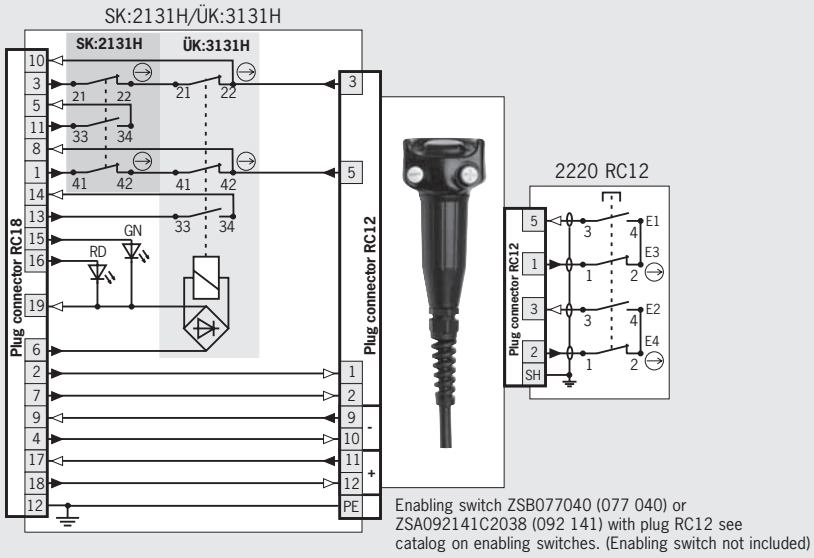
Plug connector RC18 and RC12 (enabling switch)
18-pin + PE / 12-pin

Dimension drawings Actuating head on left is a mirror image



For mating connector
with option C1825
see page 111/113

Wiring diagrams Actuator inserted and locked



Enabling switch ZSB077040 (077 040) or
ZSA092141C2038 (092 141) with plug RC12 see
catalog on enabling switches. (Enabling switch not included)

Ordering table

Series	Connection	Enabling switch connection	Guard locking	Switch head	Switching element	Version	Black cover 24 V
TZ	**RC18** [1] Plug connector	Enabling switch plug **RC12**	**1** Mechanical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**091 062** TZ1LE024RC18VAB-C1803
				RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**091 063** TZ1RE024RC18VAB-C1803
			2 Electrical	**LE** Left	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**075 955** TZ2LE024RC18VAB-C1803
				RE Right	SK: **2131H**, 3 NC ⊖ + 1 NO ÜK: **3131H**, 2 NC ⊖ + 2 NO	Without mechanical release	**077 149** TZ2RE024RC18VAB-C1803

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

Selection table for safety switches NX

Connection

M Thread M20x1.5 for cable glands

Switching element

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

Connection M	Switching element four contacts		Page
●	●		88

Safety switch NX

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

Approach direction

Horizontal and vertical
Can be adjusted in 90° steps

Switching elements (see also page 13/14)

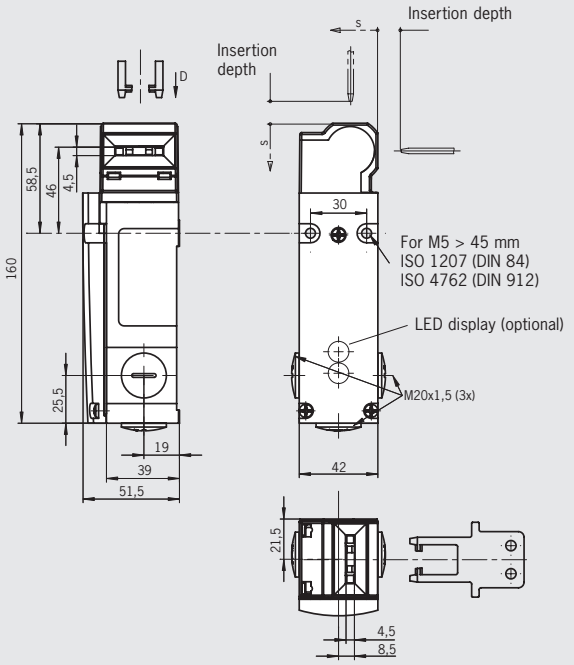
- **2121** Slow-action switching element
  4 NC ⊖
- **2131** Slow-action switching element
  3 NC ⊖ + 1 NO
- **3131** Slow-action switching element
  2 NC ⊖ + 2 NO

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

- DC 24 V +10%, -15%

Cable entry M20 x 1.5

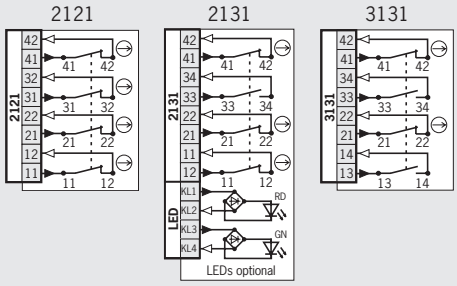
Dimension drawing



Please order actuator separately (see page 106)

For cable glands see page 115

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 ⊖		**092 625** NX1-2121A-M
		2131 3 NC ⊖ + 1 NO		**092 624** NX1-2131A-M
		2131 3 NC ⊖ + 1 NO	**L024** LED display DC 24 V	**091 682** NX1-2131AL024-M
		3131 2 NC ⊖ + 2 NO		**092 626** NX1-3131A-M

Selection table for safety switches TX with guard locking and guard lock 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

BH12 Plug connector 11-pin + PE

RC18 Plug connector 18-pin + PE

M12 Plug connector 5-pin

Switching element

Four contacts
- 2 NC ⊖ / 1 NO + 1 NC or
- 2 NC ⊖ / 1 NO + 1 NO or
- 2 NC ⊖ + 2 NC ⊖

Manual release		Connection							Switching element	Version	Page
HE	FE	M	NPT½“	BH10	SR11	BH12	RC18	M12	four contacts		
●		●	●						●		90
●				●			●		●		91
●		●	●						●		92
●					●	●	●		●		93
●	●	●					●		●	C1991/C2161	94
●	●						●		●	C1991	95
●								●	●	C2129	96

Safety switch TX with guard locking and guard lock monitoring

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

Approach direction

Horizontal and vertical
Can be adjusted 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%
AC	110 V	+10%, -15%
AC	230 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.

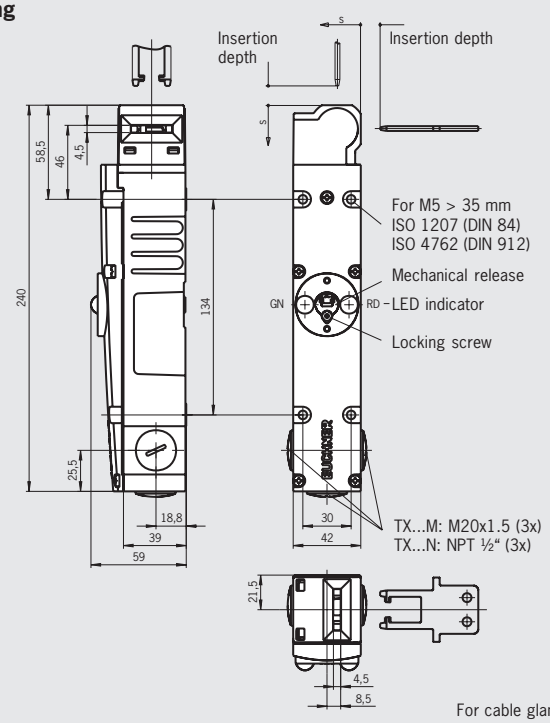
TX2 Open-circuit current principle, guard locking by applying voltage to the solenoid.
Release by spring force.

Switching elements (see also page 14)

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

Cable entry M20 x 1.5 / cable entry NPT ½"

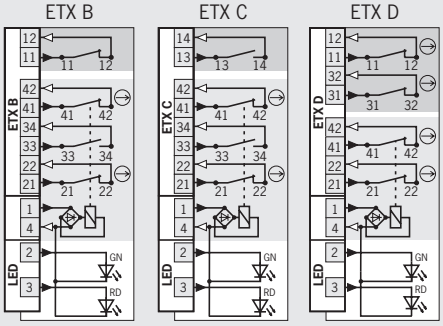
Dimension drawing



Please order actuator separately (see page 106)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

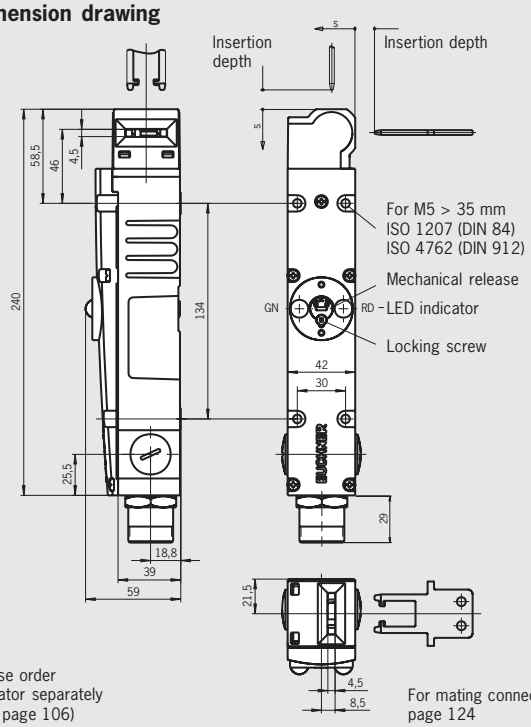
For switching functions see technical data on page 159

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V	AC 110 V	AC 230 V
TX	M Cable entry 3 x M20 x 1.5	1 Mechanical	ETX B 2 NC ⊖ / 1 NO + 1 NC	082 921 TX1B-A024M	085 383 TX1B-A110M	085 385 TX1B-A230M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	082 922 TX1C-A024M	085 384 TX1C-A110M	085 386 TX1C-A230M
			ETX D 2 NC ⊖ + 2 NC ⊖	095 025 TX1D-A024MC2081	-	-
		2 Electrical	ETX B 2 NC ⊖ / 1 NO + 1 NC	082 927 TX2B-A024M	085 387 TX2B-A110M	085 389 TX2B-A230M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	082 928 TX2C-A024M	085 388 TX2C-A110M	085 390 TX2C-A230M
			ETX D 2 NC ⊖ + 2 NC ⊖	095 026 TX2D-A024MC2081	-	-
	N Cable entry 3 x NPT ½"	1 Mechanical	ETX B 2 NC ⊖ / 1 NO + 1 NC	082 944 TX1B-A024N	085 382 TX1B-A110N	On request
			ETX C 2 NC ⊖ / 1 NO + 1 NO	082 945 TX1C-A024N	On request	On request
		2 Electrical	ETX B 2 NC ⊖ / 1 NO + 1 NC	082 946 TX2B-A024N	On request	On request
			ETX C 2 NC ⊖ / 1 NO + 1 NO	082 947 TX2C-A024N	On request	On request

Plug connector BH10
9-pin + PE

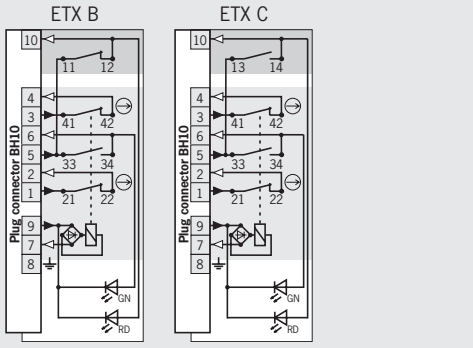
Dimension drawing



Please order actuator separately (see page 106)

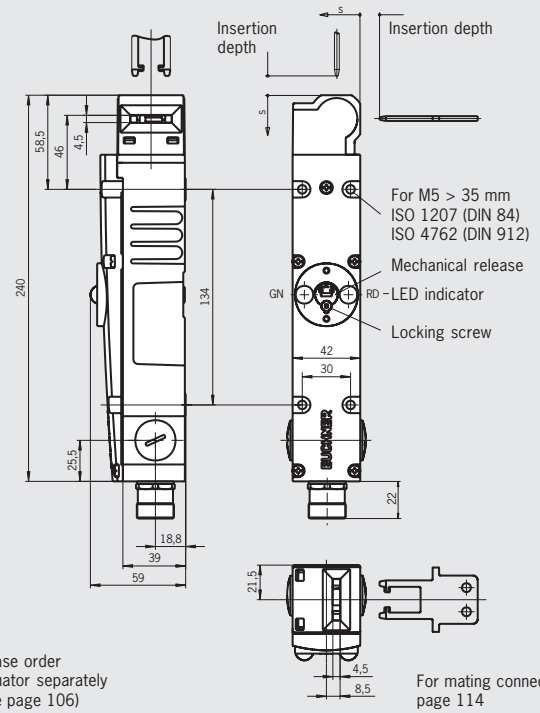
For mating connectors see page 124

Wiring diagrams Actuator inserted and locked



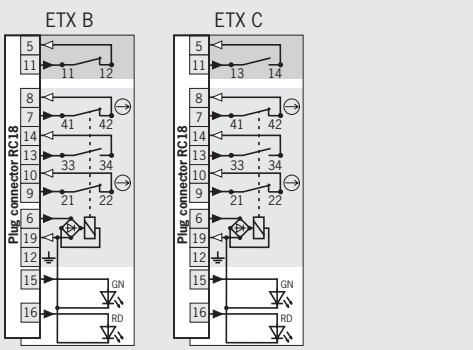
For switching functions see technical data on page 159

Plug connector RC18
18-pin + PE



Please order actuator separately (see page 106)

For mating connectors see page 114



For switching functions see technical data on page 159

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V	AC 110 V	AC 230 V
TX	Plug connector **BH10**	**1** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**085 380** TX1B-A024BH10	On request	On request
		2 Electrical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**085 381** TX2B-A024BH10	On request	On request
	Plug connector **RC18**	**1** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 933** TX1B-A024RC18	-	-
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 934** TX1C-A024RC18	-	-
		2 Electrical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 939** TX2B-A024RC18	-	-
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 940** TX2C-A024RC18	-	-

For safety precautions see page 164
For technical data see page 139

Safety switch TX with guard locking and guard lock monitoring

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

Approach direction

Horizontal and vertical
Can be adjusted 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%
- AC 110 V +10%, -15%
- AC 230 V +10%, -15%

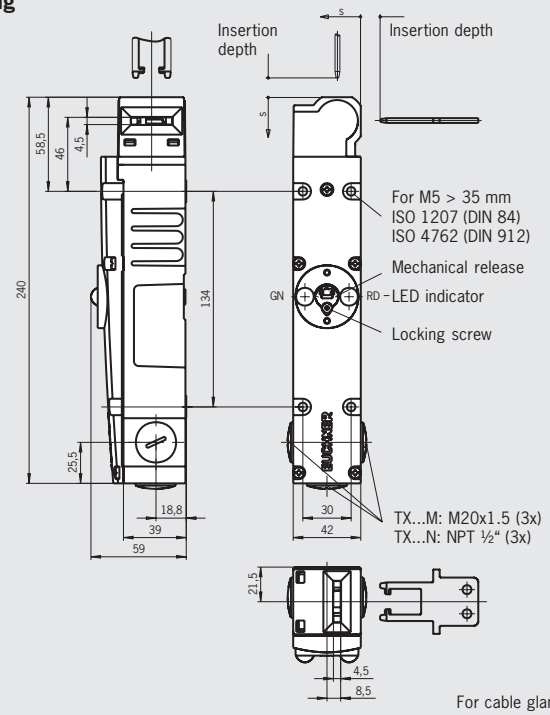
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

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

Cable entry M20 x 1.5 / cable entry NPT ½“

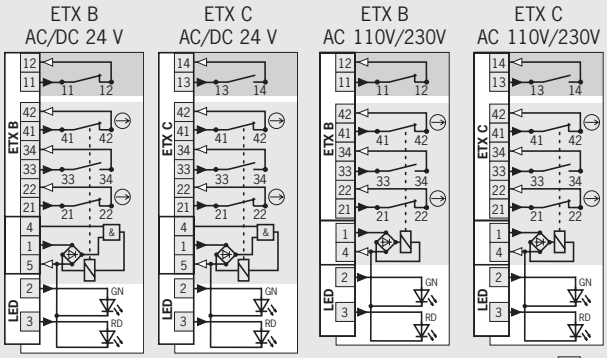
Dimension drawing



Please order actuator separately (see page 106)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked



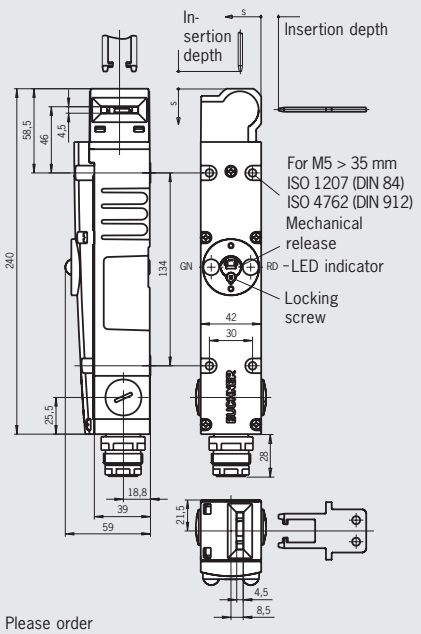
For switching functions see technical data on page 159

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage		
				AC/DC 24 V	AC 110 V	AC 230 V
TX	**M** Cable entry **3 x M20 x 1.5**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 952** TX3B-A024M	**082 988** TX3B-A110M	**082 976** TX3B-A230M
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 953** TX3C-A024M	**082 989** TX3C-A110M	**082 977** TX3C-A230M
	N Cable entry **3 x NPT ½“**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 997** TX3B-A024N	On request	On request
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 998** TX3C-A024N	On request	On request

Plug connector SR11
11-pin + PE

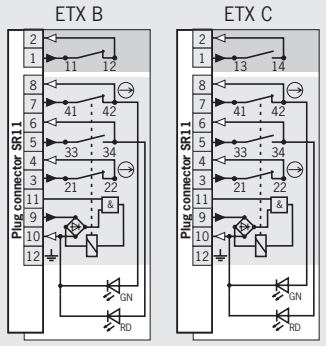
Dimension drawing



Please order actuator separately (see page 106)

For mating connectors see page 112

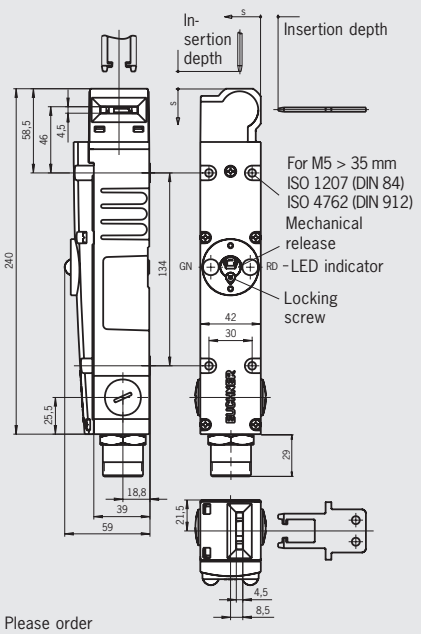
Wiring diagrams Actuator inserted and locked



For switching functions see technical data see page 159

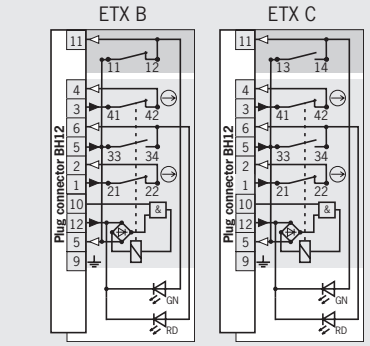
Solenoid monitoring
Door monitoring

Plug connector BH12
11-pin + PE



Please order actuator separately (see page 106)

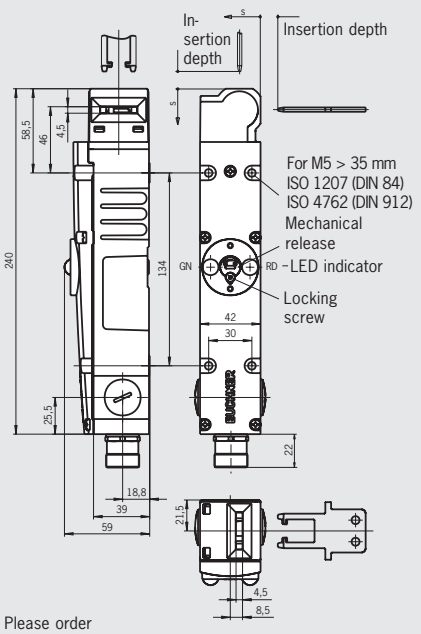
For mating connectors see page 124



For switching functions see technical data see page 159

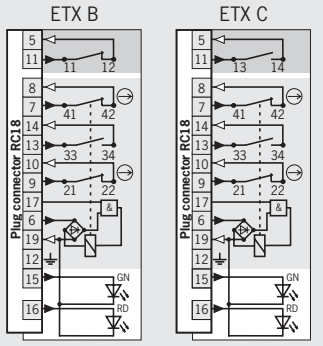
Solenoid monitoring
Door monitoring

Plug connector RC18
18-pin + PE



Please order actuator separately (see page 106)

For mating connectors see page 114



For switching functions see technical data see page 159

Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switching element	Solenoid operating voltage AC/DC 24 V	AC 110 V	AC 230 V
TX	Plug connector **SR11**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	On request	-	-
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**085 396** TX3C-A024SR11	-	-
	Plug connector **BH12**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 999** TX3B-A024BH12	On request	On request
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**083 000** TX3C-A024BH12	On request	On request
	Plug connector **RC18**	**3** Mechanical	**ETX B** 2 NC ⊖ / 1 NO + 1 NC	**082 964** TX3B-A024RC18	-	-
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 965** TX3C-A024RC18	-	-

1) With cable entry M or NPT ½", AC/DC 24 V

For safety precautions see page 164
For technical data see page 139

Safety switch TX with guard locking and guard lock monitoring

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

Approach direction

Horizontal and vertical
Can be adjusted in 90° steps

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

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

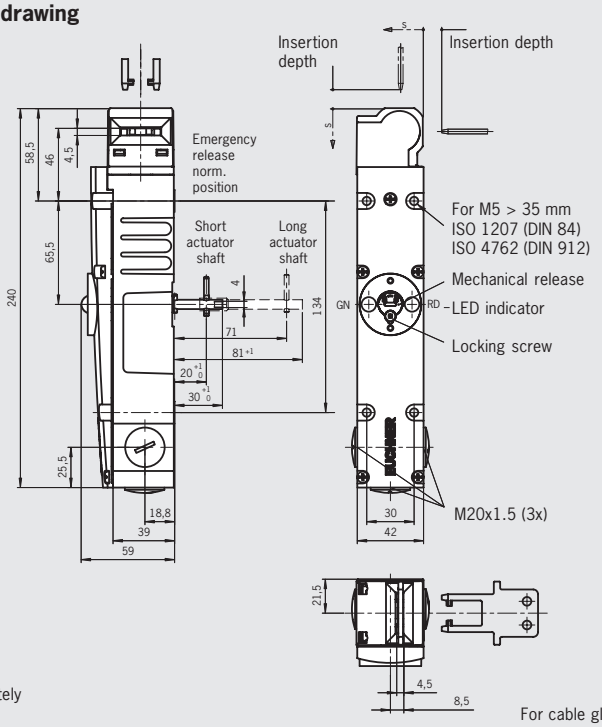
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

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

Cable entry M20 x 1.5

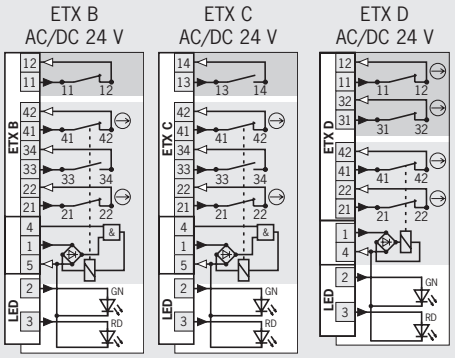
Dimension drawing



Please order actuator separately (see page 106)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked



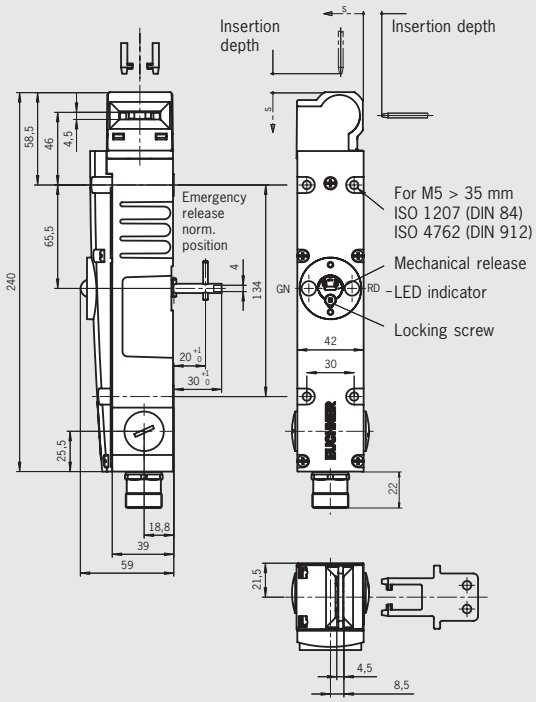
For switching functions see technical data on page 159

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	099 489 TX1C-A024MC2161
			ETX D 2 NC ⊖ + 2 NC ⊖	C1991 Short actuator shaft	096 173 TX1D-A024MC1991
		3 Mechanical	ETX B 2 NC ⊖ / 1 NO + 1 NC	C1991 Short actuator shaft	085 391 TX3B-A024MC1991
			ETX C 2 NC ⊖ / 1 NO + 1 NO	C1991 Short actuator shaft	093 118 TX3C-A024MC1991
				C2161 Long actuator shaft	098 946 TX3C-A024MC2161

Plug connector RC18
18-pin + PE

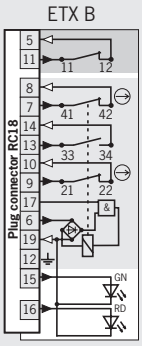
Dimension drawing



Please order actuator separately (see page 106)

For mating connectors see page 114

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions see technical data on page 159

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
TX	Plug connector **RC18**	**3** Mechanical	**ETX B** 2 NC ⊖ 1 NO + 1 NC	**C1991** Short actuator shaft	**093 559** TX3B-A024RC18C1991

For safety precautions see page 164
For technical data see page 139

Safety switch TX with guard locking and guard lock 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

Horizontal and vertical
Can be adjusted 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%
AC	110 V	+10%, -15%
AC	230 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

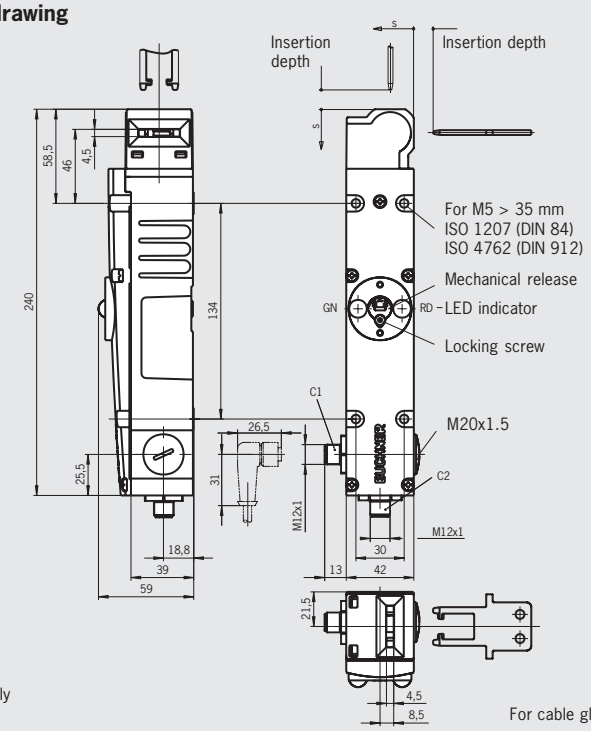
TX1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid.

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 element 2 NC ⊖ / 1 NO + 1 NC (door monitoring contact)

Plug connector M12
2 plug connectors, 5-pin

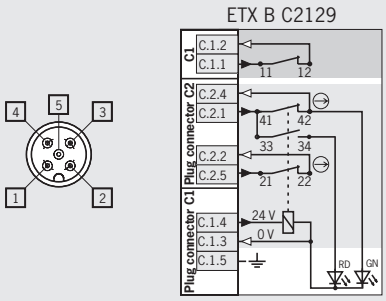
Dimension drawing



Please order actuator separately (see page 106)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions see technical data on page 159

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**	**097 623** TX1B-A024MC2129

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

Release feature

HE Mechanical release on the front

Door monitoring

STA3/4 With door monitoring contact

STA1/2 Without door monitoring contact

Connection

M Thread M20x1.5 for cable gland

Release feature	Door monitoring		Connection	Page
HE	STA3/4	STA1/2	M	
●	●		●	98
●		●	●	99

Safety switch STA with guard locking and guard lock monitoring

- **Mechanical release on the front**
- **With door monitoring contact**

Approach direction

Horizontal and vertical

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%
- AC 110 V +10%, -15%
- AC 230 V +10%, -15%

Guard locking types

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

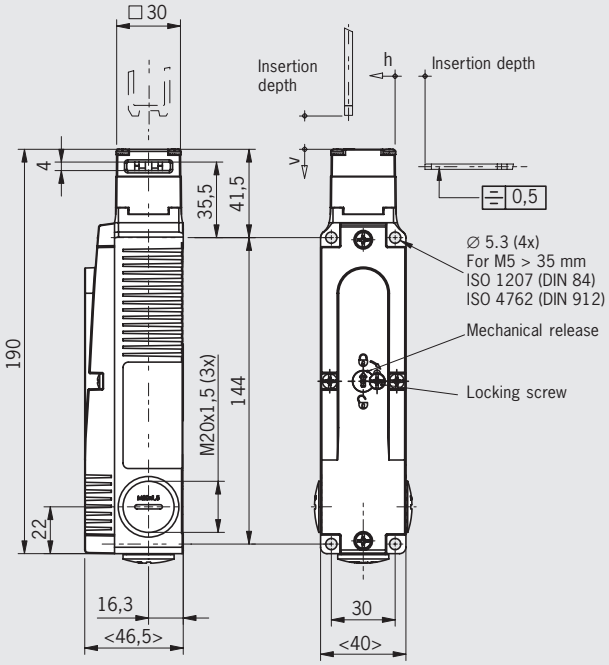
STA4 Open-circuit current principle, guard locking by applying voltage to the interlocking solenoid. Release by spring force.

Switching elements (see also page 13)

- **2131** Slow-action switching element 2 NC ⊖ + 1 NO + 1 NC (door monit. contact)
- **4121** Slow-action switching element 2 NC ⊖ + 1 NC / 1 NO (door monit. contact)
- **4131** Slow-action switching element 2 NC ⊖ + 1 NO + 1 NO (door monit. contact)
- **4141** Slow-action switching element 2 NC ⊖ + 2NC (door monit. contacts)

Cable entry M20 x 1.5

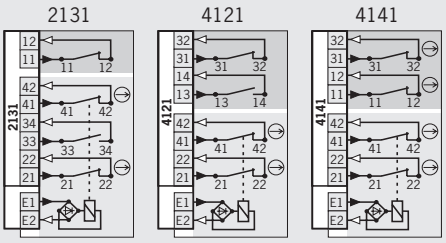
Dimension drawing



Please order actuator separately (see page 108)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked



Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	M Cable entry 3 x M20x1.5	3 Mechanical	**2131** 2 NC ⊖ + 1 NO + 1 NC		**096 938** STA3A-2131A024M
			4121 2 NC ⊖ + 1 NC / 1 NO		**096 936** STA3A-4121A024M
			4141 2 NC ⊖ + 2 NC		**099 274** STA3A-4131A024M
		4 Electrical	**2131** 2 NC ⊖ + 1 NO + 1 NC		**096 939** STA4A-2131A024M
			4121 2 NC ⊖ + 1 NC / 1 NO		**096 937** STA4A-4121A024M

Safety switch STA with guard locking and guard lock monitoring

- **Mechanical release on the front**
- **Without door monitoring contact**

Approach direction

Horizontal and vertical

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%
- AC 110 V +10%, -15%
- AC 230 V +10%, -15%

Guard locking types

STP1 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the interlocking solenoid.

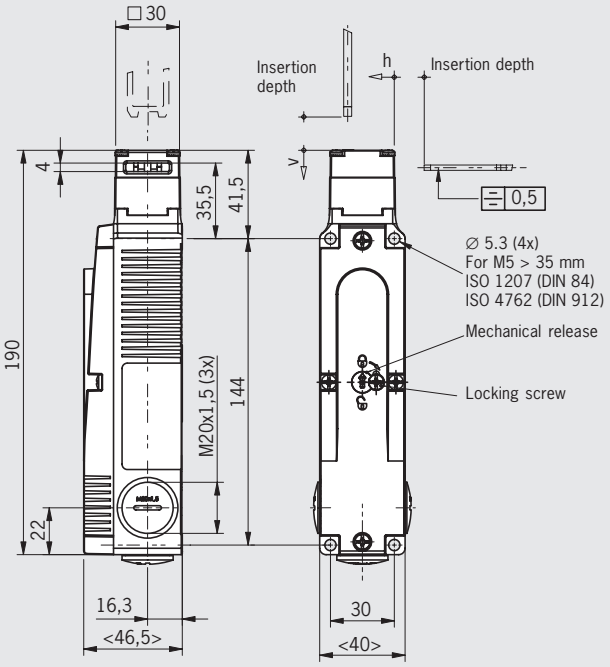
STP2 Open-circuit current principle, guard locking by applying voltage to the interlocking solenoid. Release by spring force.

Switching elements (see also page 13)

- **4131** Slow-action switching element 2 NC ⊖ + 2 NO

Cable entry M20 x 1.5

Dimension drawing

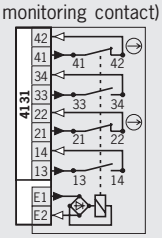


Please order actuator separately (see page 108)

For cable glands see page 115

Wiring diagrams Actuator inserted and locked

4131
(without door monitoring contact)



Solenoid monitoring
Door monitoring

Ordering table

Series	Connection	Guard locking	Switching element	Version	Solenoid operating voltage AC/DC 24 V
STA	**M** Cable entry **3 x M20x1.5**	**1** Mechanical	**4131** 2 NC ⊖ + 2 NO		**096 439** STA1A-4131A024M
		2 Electrical	**4131** 2 NC ⊖ + 2 NO		**096 935** STA2A-4131A024M

For safety instructions see page 164
For technical data see page 139

Selection table for safety hinges ESH

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

Switching element two contacts		Page
●		**102**

Safety hinge ESH

- **Hinge with integrated safety function**
- **Suitable for profile assembly**

The safety hinges ESH are safety devices for monitoring movable safety guards, such as doors or covers on machinery or systems.
Safety hinges comply with the regulations of EN 60947-5-1 Annex K and comply with the requirements of the employers' liability insurance associations for machines, installations and personnel protection. The safety switch signals that the safety guard is closed. The switch does not perform guard locking!

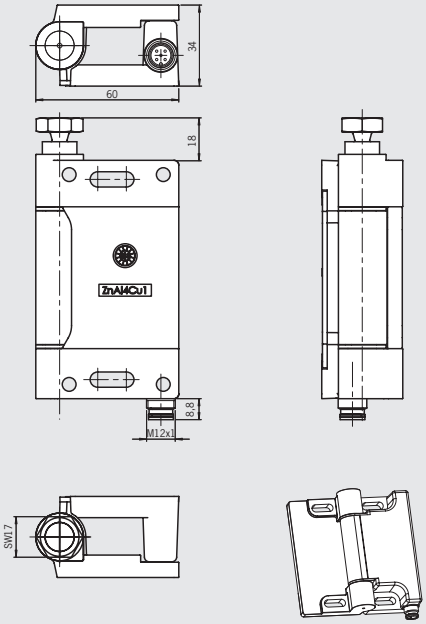
Switching elements

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

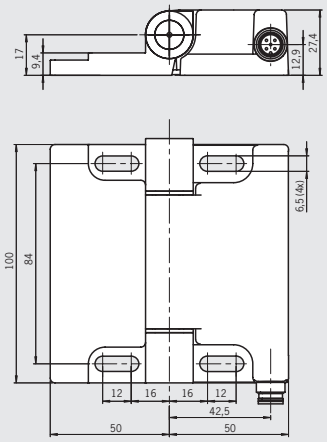
Plug connector M12
4-pin + PE

Dimension drawing

Dimensions as supplied

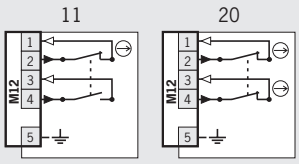


Dimensions operating point fixed



For mating connectors see Page 115

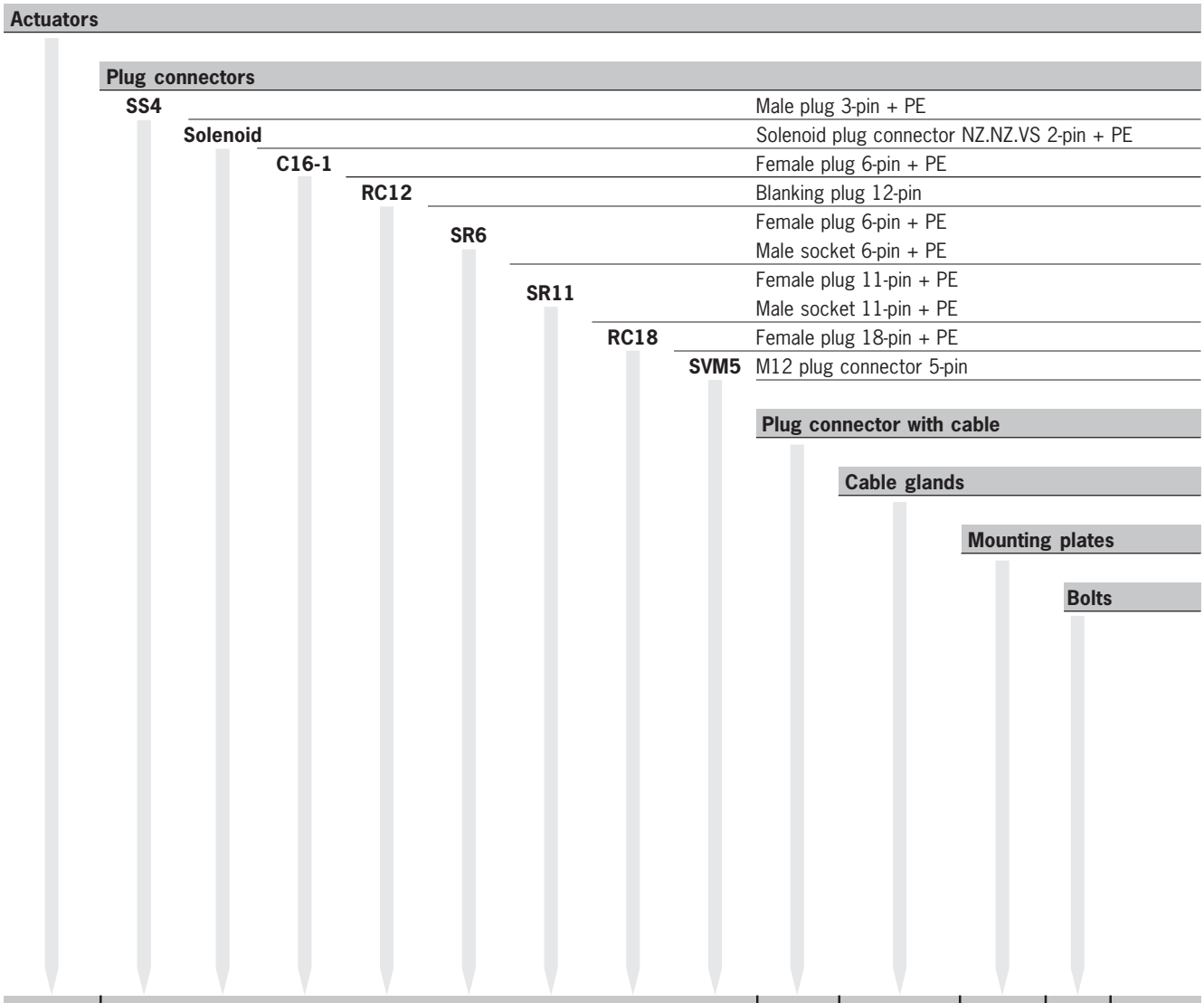
Wiring diagrams



Ordering table

Designation	Switching element	Version	Order No.
Safety hinge **ESH-PRO**	**11** 1 NC ⊖ + 1 NO	Plug connector **M12**	**095 895** ESH-PRO-11A-1205
	20 2 NC ⊖	Plug connector **M12**	**095 894** ESH-PRO-20A-1205
	-	Plain hinge	**096 007** ESH-PRO

Selection table for accessories



Actuators	Plug connectors								With cable	Cable glands	Mounting plates	Bolts	Page
	SS4	Solenoid	C16-1	RC12	SR6	SR11	RC18	SVM5					
●													104
	●												111
		●											111
			●										111
				●									111
					●				●				112
						●			●				112
							●						113
							●		●				114
								●	●				115
										●			115
											●		116
												●	125

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

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

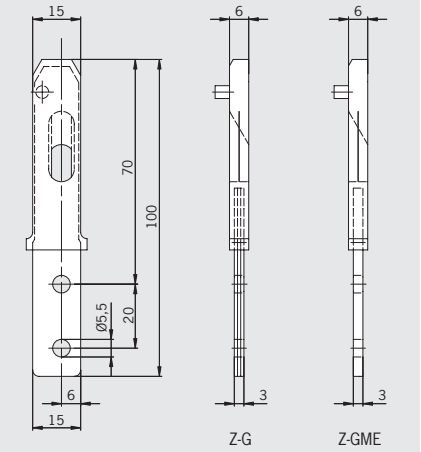
Straight actuator
The straight actuator is used on sliding doors or hinged doors with door radii greater than 1000 mm. Safety screws prevent unscrewing of the actuator. The safety screws included can be inserted with a normal tool, but cannot be removed again.

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

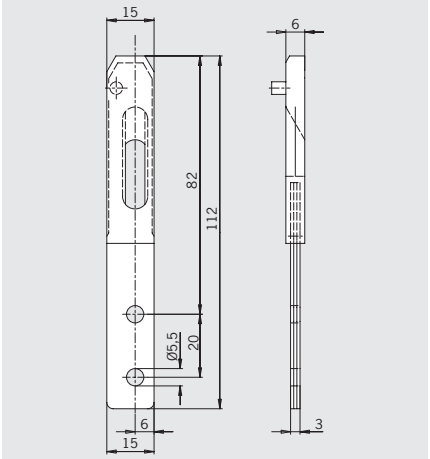
Hinged actuator
For door radii less than 1000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuating head. Depending on the movement of the safety guard, the actuator must be selected for left/right or top/bottom.

Actuator Z-G and Z-GME straight
Overtravel 4 mm

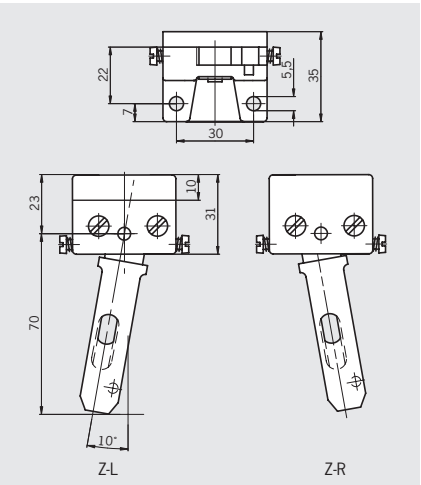
Dimension drawings



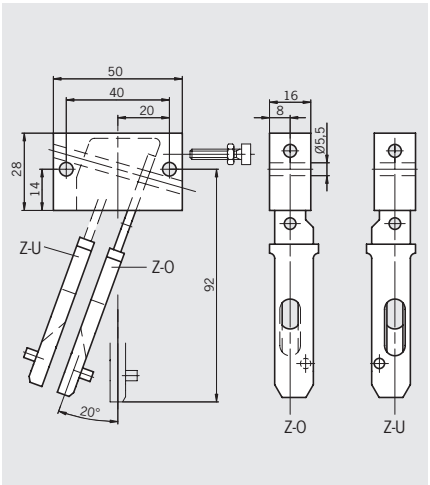
Actuator Z-GN straight
Overtravel 16 mm



Hinged actuator Z-R/Z-LL
Safety guard hinged on the right/left



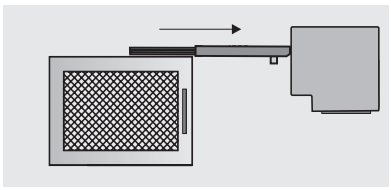
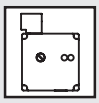
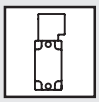
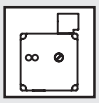
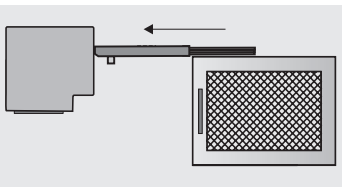
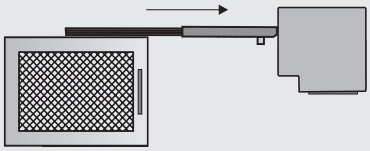
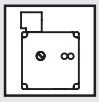
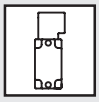
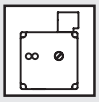
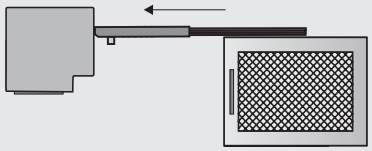
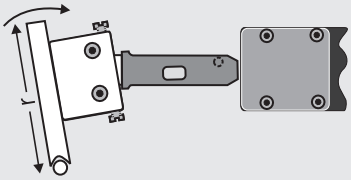
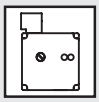
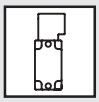
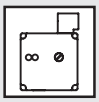
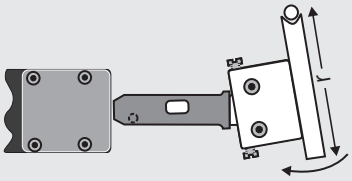
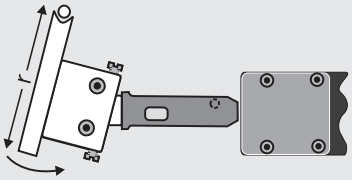
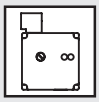
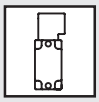
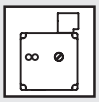
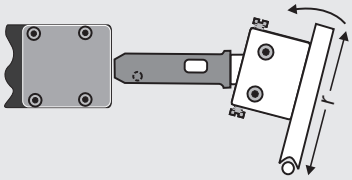
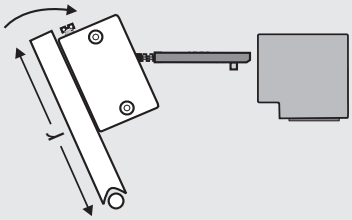
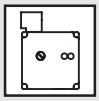
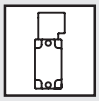
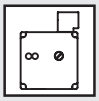
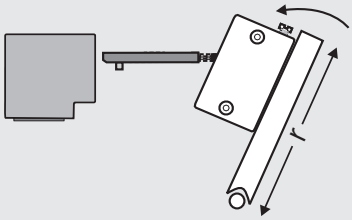
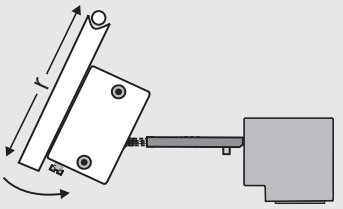
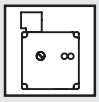
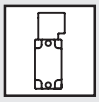
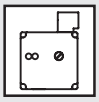
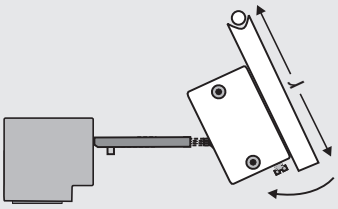
Hinged actuator Z-U/Z-O
Safety guard hinged at bottom/top

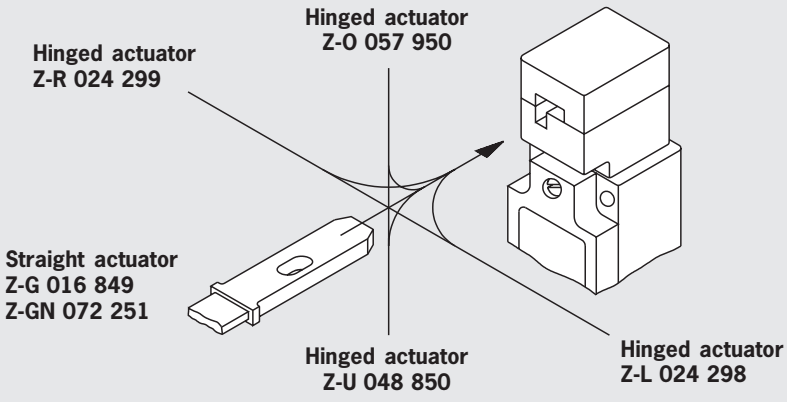


Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Actuator straight	**Z-G** 4 mm overtravel incl. 2 safety screws M5 x 10	≥ 1000	1 ea.	**016 849** ACTUATOR-Z-G
			25 ea.	**074 411** ACTUATOR-Z-G/V25
	Z-GME 4 mm overtravel, made of solid stainless steel incl. 2 safety screws M5x10	≥ 1000	1 ea.	**097 436** ACTUATOR-Z-GME
	Z-GN 16 mm overtravel incl. 2 safety screws M5x10	≥ 1000	1 ea.	**072 251** ACTUATOR-Z-GN
Hinged actuator	**Z-R** Safety guard hinged on the left incl. 2 safety screws M5 x 16	≥ 400	1 ea.	**024 299** HINGED ACTUATOR-Z-R
			25 ea.	**074 412** HINGED ACTUATOR-Z-R/V25
	Z-L Safety guard hinged on the right incl. 2 safety screws M5 x 16	≥ 400	1 ea.	**024 298** HINGED ACTUATOR-Z-L
			25 ea.	**074 413** HINGED ACTUATOR-Z-L/V25
	Z-U Safety guard hinged at bottom incl. 2 safety screws M5 x 25	≥ 165	1 ea.	**048 850** HINGED ACTUATOR-Z-U
			25 ea.	**074 414** HINGED ACTUATOR-Z-U/V25
	Z-O Safety guard hinged at top incl. 2 safety screws M5 x 25	≥ 165	1 ea.	**057 950** HINGED ACTUATOR-Z-O
			25 ea.	**074 415** HINGED ACTUATOR-Z-O/V25

Selection table for actuators

Actuator					
Actuator straight Z-G 016 849 overtravel 4 mm		 TZ-LE	 NZ	 TZ-RE	
Actuator straight Z-GN 072 251 overtravel 16 mm		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-L 024 298		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-R 024 299		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-U 048 850		 TZ-LE	 NZ	 TZ-RE	
Hinged actuator Z-O 057 950		 TZ-LE	 NZ	 TZ-RE	



For safety precautions see page 164
For technical data see page 139

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
- **2 mm** for doors with normal play
- **7 mm** for doors with large play (optional)

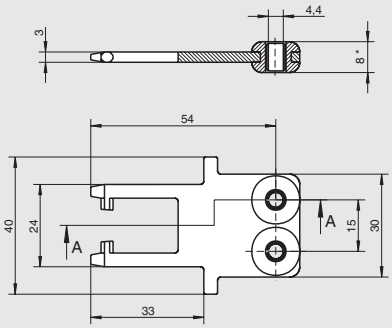
Actuators with rubber bushings
For flexible mounting of the actuator.

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 actuating head. Depending on the movement of the safety guard, the actuator must be selected for left/right or top/bottom.

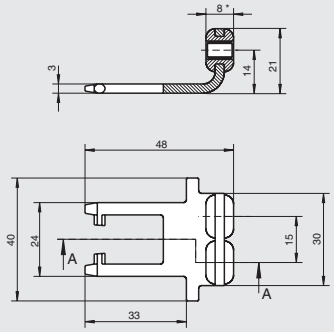
Screws made of stainless steel
The safety screws included can be inserted with a normal tool, but cannot be removed again.

Actuator X-GQ straight
Rubber bush, overtravel 2 mm

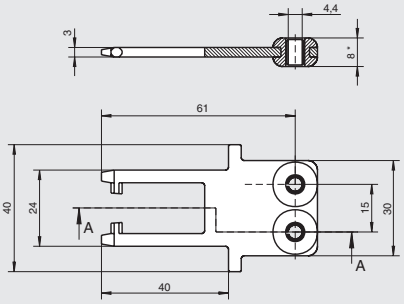
Dimension drawings



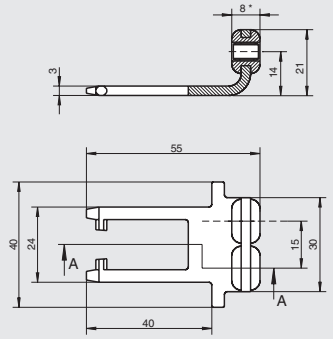
Actuator X-WQ bent
Rubber bush, overtravel 2 mm



Actuator X-GNQ straight
Rubber bush, overtravel 7 mm



Actuator X-WNQ bent
Rubber bush, overtravel 7 mm

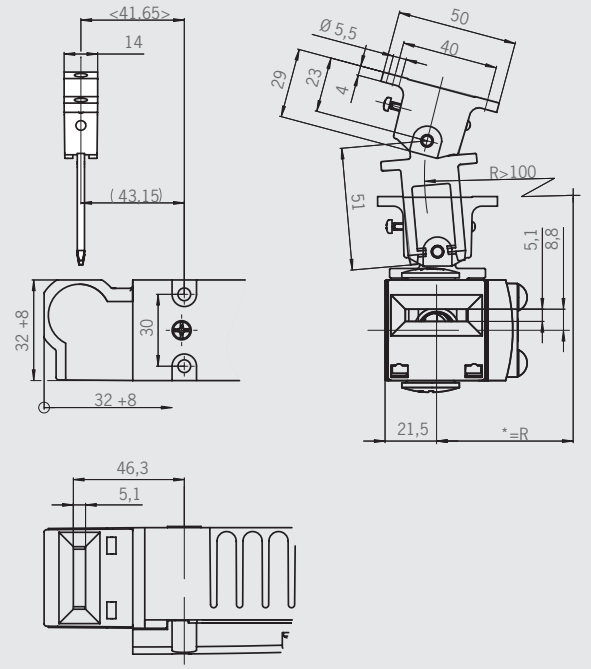


Ordering table

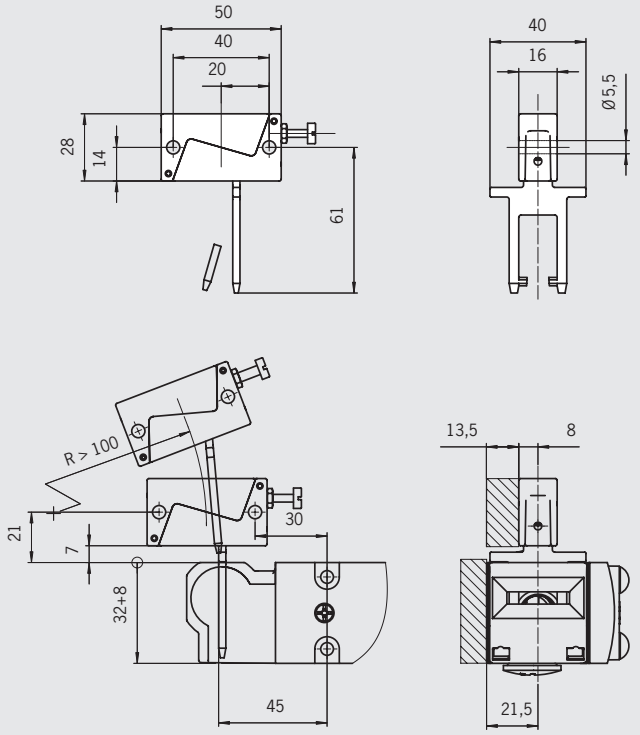
Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Actuator straight rubber bush	**X-GQ** Overtravel 2 mm incl. 2 safety screws M4 x 14	300	1 ea.	**079 739** ACTUATOR-X-GQ
Actuator bent rubber bush	**X-WQ** Overtravel 2 mm incl. 2 safety screws M4 x 14	300	1 ea.	**079 740** ACTUATOR-X-WQ
Actuator straight rubber bush, overtravel	**X-GNQ** Overtravel 7 mm incl. 2 safety screws M4 x 14	440	1 ea.	**079 741** ACTUATOR-X-GNQ
Actuator bent rubber bush, overtravel	**X-WNQ** Overtravel 7 mm incl. 2 safety screws M4 x 14	440	1 ea.	**079 742** ACTUATOR-X-WNQ

* The dimension 8 relates to the fitted state

Hinged actuator X-LR-N
Safety guard hinged on the right/left



Hinged actuator X-OU-N
Safety guard hinged at bottom/top



Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Hinged actuator	**X-LR-N** Safety guard hinged on the right or left incl. 2 safety screws M5 x 10	≥ 100	1 ea.	**098 082** HINGED ACTUATOR-X-LR-N
	X-OU-N Safety guard hinged at top or bottom incl. 2 safety screws M5 x 10	≥ 100	1 ea.	**097 906** HINGED ACTUATOR-X-OU-N

For safety precautions see page 164
For technical data see page 139

Actuators for safety switches STA

- **Two stainless safety screws per actuator**
- **Actuators with rubber bushings**

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

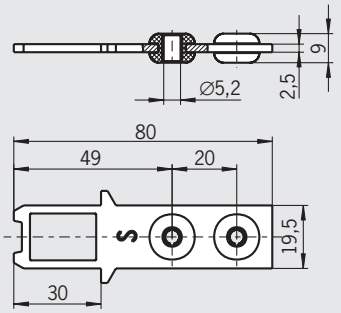
Straight actuator
Suitable for a maximum tensile force of 2500 N. The straight actuator is used on sliding doors or hinged doors with door radii greater than 300 mm. Safety screws prevent unscrewing of the actuator.

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

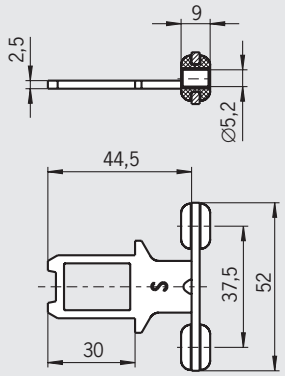
Screws made of stainless steel
The safety screws included can be inserted with a normal tool, but cannot be removed again.

Standard actuator S, straight
Rubber bush, overtravel 5 mm

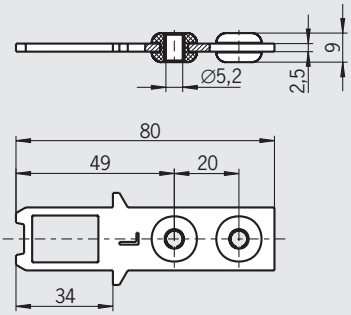
Dimension drawings



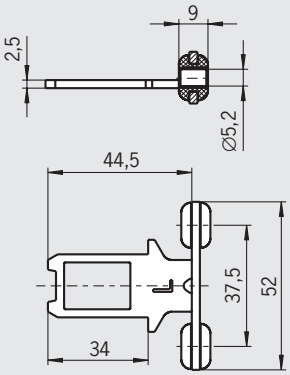
Standard actuator S, bent
Rubber bush, overtravel 5 mm



Actuator L, straight, for insertion funnel
Rubber bush, overtravel 5 mm



Actuator L, bent, for insertion funnel
Rubber bush, overtravel 5 mm



Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Actuator S straight	**S-GT-SN** Overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 ea.	**095 738** ACTUATOR S-GT-SN
Actuator S bent	**S-WQ-SN** Overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 ea.	**095 740** ACTUATOR S-WQ-SN
Actuator L straight	**S-GT-LN** Overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 ea.	**095 739** ACTUATOR S-GT-LN
Actuator L bent	**S-WQ-LN** Overtravel 5 mm incl. 2 safety screws M4 x 14	300	1 ea.	**095 741** ACTUATOR S-WQ-LN

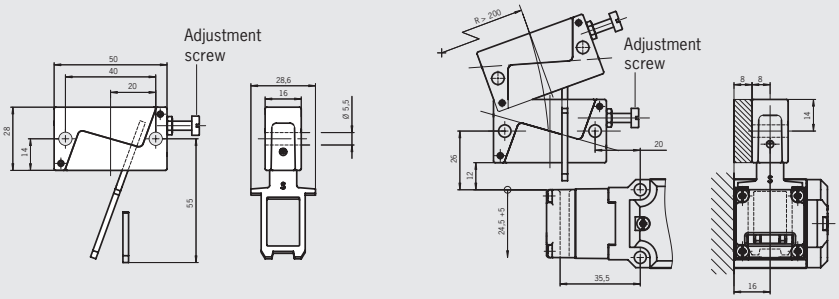
Hinged actuators for safety switches STA

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

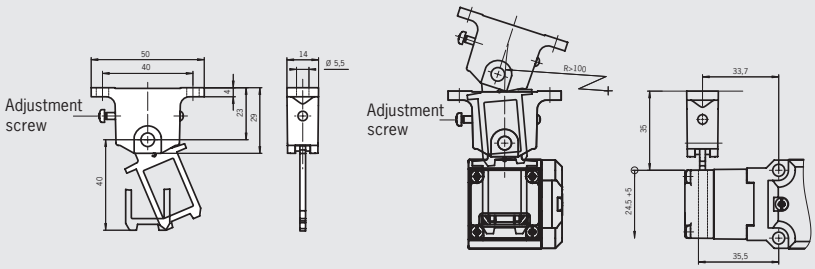
Hinged actuator
For door radii less than 1000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuating head. Depending on the movement of the safety guard, the actuator must be selected for left/right or top/bottom.

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

Dimension drawings



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



Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Hinged actuator	**S-OU-SN** For top and bottom hinged doors overtravel 5 mm incl. 2 safety screws M5 x 25	200	1 ea.	**095 315** HINGED ACTUATOR-S-OU-SN
	S-LR-SN For left and right hinged doors overtravel 5 mm incl. 2 safety screws M5 x 10	100	1 ea.	**096 838** HINGED ACTUATOR-S-LR-SN

For safety precautions see page 164
For technical data see page 139

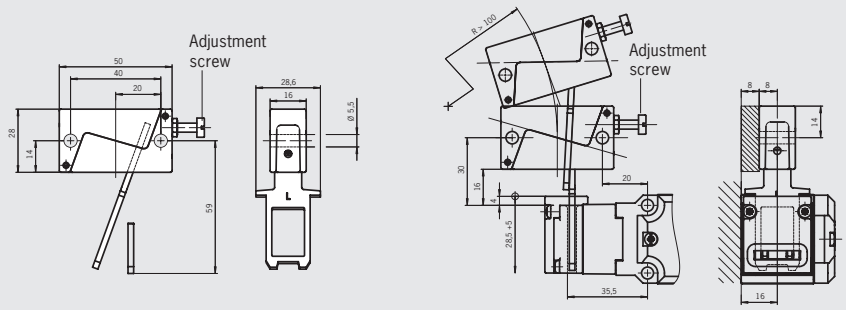
Hinged actuators for safety switches STA

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

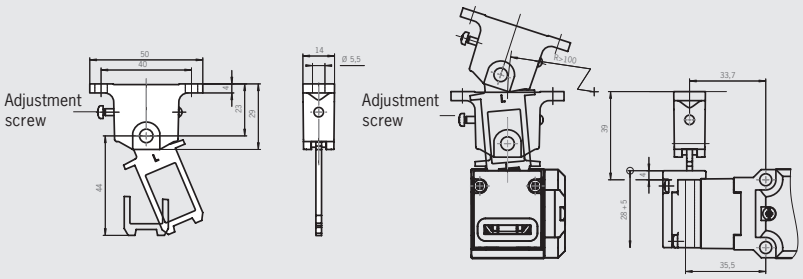
Hinged actuator
For door radii less than 1000 mm a hinged actuator should be used. The spring action movement of the actuator prevents damage due to the actuator jamming in the actuating head. Depending on the movement of the safety guard, the actuator must be selected for left/right or top/bottom.

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

Dimension drawings



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



Ordering table

Designation	Version	Min. door radius r [mm]	Packaging unit	Order No.
Hinged actuator	**O-OU-LN** For top and bottom hinged doors overtravel 5 mm incl. 2 safety screws M5 x 25	200	1 ea.	**096 697** HINGED ACTUATOR-S-OU-LN
	S-LR-LN For left and right hinged doors overtravel 5 mm incl. 2 safety screws M5 x 10	100	1 ea.	**096 844** HINGED ACTUATOR-S-LR-LN

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

For safety switches series NZ and TZ

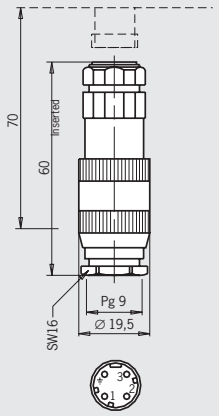
- **Plugs and sockets**
- **Dummy plug**
- **Solenoid plugs**

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.

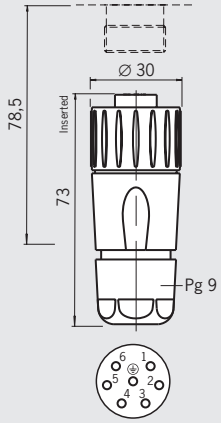
Male plug SS4
3-pin + PE

Dimension drawings



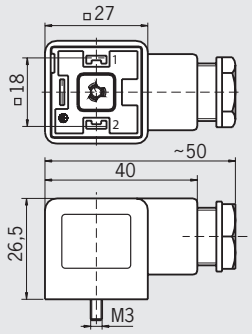
View of connection side, plug

Female plug C16-1
6-pin + PE

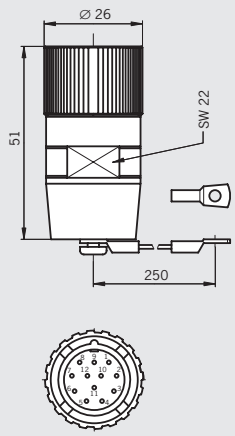


View of connection side, socket

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

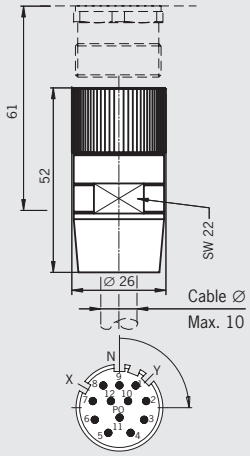


Blanking plug RC12
12-pin



View of connection side, plug

Male plug RC12
12-pin



View of connection side, plug

Ordering table

Designation	Version	Order No.
SS4 3-pin + PE	Male plug to socket BD4	**002 787** SS4
C16-1 [1] 6-pin + PE	Female plug	**043 861** Cable socket 6 + PE
RC12 [1] 12-pin	Male connector	**073 294** RC-12P1N8A8096
	Blanking plug without bridges	**073 293** RC-12P1N8A8300
Solenoid plug **NZ..VZ..VS** 2-pin + PE	For DC without rectifier	**028 345** Plug connector for solenoid locking
	For AC with rectifier AC 110 V - AC 230 V	**028 338** Plug connector with rectifier for solenoid locking

For information on crimp contacts see page 124.
1) Crimp contacts are included.

For safety precautions see page 164
For technical data see page 139

Plug connectors SR6 and SR11

For safety switches series NZ and TZ

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

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

Male socket
For fitting in safety switches.

Coding shells
Two coding shells and screws. If used only matching connectors can be mated.

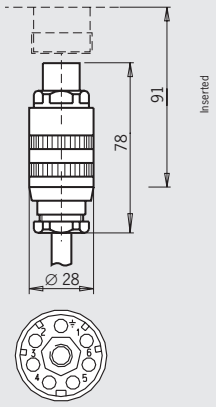
Cable (optional)
Cable sleeve PUR, color gray, wire cross-section 1.0 mm².

Pin 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
y	7	7	7
		8	8
		9	9
		10	10
		11	11
		⏚	12

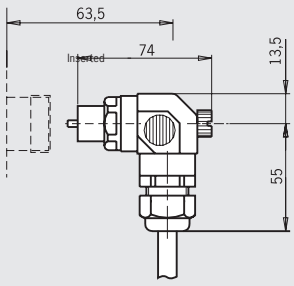
Female plug SR6 EF
6-pin + PE

Dimension drawings



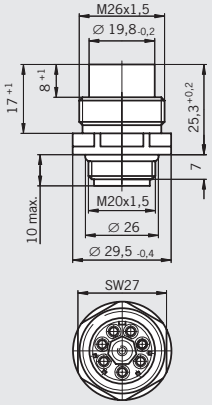
View of connection side, socket
Contact carrier can be adjusted

Female plug SR6 WF
angled 6-pin + PE



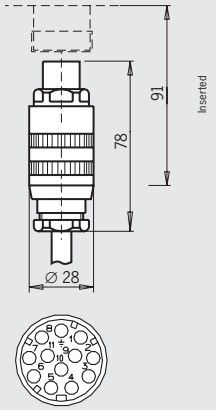
View of connection side, socket
Contact carrier can be adjusted

Male socket SR6 AM
6-pin + PE



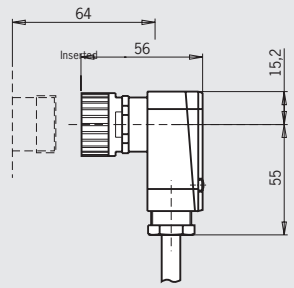
View of connection side, plug

Female plug SR11 EF
11-pin + PE



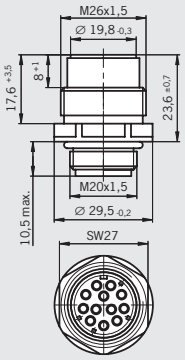
View of connection side, socket
Contact carrier can be adjusted

Female plug SR11 WF
angled 11-pin + PE



View of connection side, socket
Contact carrier can be adjusted

Male socket SR11 AM
11-pin + PE



View of connection side, plug

Ordering table

Designation	Version	Cable					
		None	5 m	10 m	15 m	20 m	25 m
SR6 [1] 6-pin + PE	**EF** Female plug	**013 176** SR6EF	**077 632** SR6EF-5000	**077 633** SR6EF-10000	**077 634** SR6EF-15000	**098 128** SR6EF-20000	–
	WF Female plug angled	**024 999** SR6WF	**077 638** SR6WF-5000	**077 639** SR6WF-10000	**077 640** SR6WF-15000	–	–
	K Coding shells	**013 178** SR6K	–	–	–	–	–
	AM Male socket, connection M20 x 1.5	**087 180** SR6AM2-M20	–	–	–	–	–
SR11 [1] 11-pin + PE	**EF** Female plug	**070 859** SR11EF	**077 629** SR11EF-5000	**077 630** SR11EF-10000	**077 631** SR11EF-15000	**096 632** SR11EF-20000	**094 749** SR11EF-25000
	WF Female plug angled	**054 773** SR11WF	**077 635** SR11WF-5000	**077 636** SR11WF-10000	**077 637** SR11WF-15000	–	–
	AM Male socket, connection M20 x 1.5	**091 296** SR11AM2-M20	–	–	–	–	–
SR6 and **SR11**	**Socket crimp contact** Wire cross-section 0.5 - 1.5 mm	**071 260** SRF	–	–	–	–	–
	Pin crimp contacts Wire cross-section 0.5 - 1.5 mm	**071 261** SRM	–	–	–	–	–

For information on crimp contacts see page 124.
1) Crimp contacts are included.

Plug connectors RC18 and RC18 with option C1825

For safety switches TZ

- **90° angled optional**
- **Cable optional**
- **Halogen-free cable optional**

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

Option C1825
With 16 crimp pins for wire cross-section 0.38 - 0.5 mm² and 3 pins for wire cross-section 0.75 - 1.0 mm² for control of the interlocking solenoid. This plug is easier to connect.
Important: only for switch with option C1825.

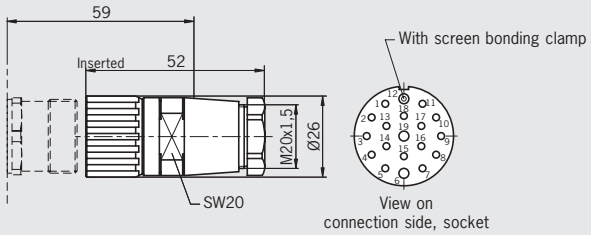
Plug connector angled (optional)
On plug connectors with cables the direction of the cable exit can be chosen on left/right. On plug connectors without cables the direction can be adjusted.

Cable (optional)
Cable sleeve PUR, color black, wire cross-section 0.5 mm² or 1.0 mm².

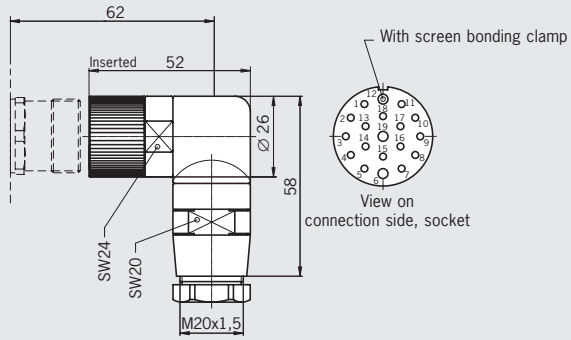
Cable halogen-free (optional)
Cable sleeve PUR, color black, halogen-free, silicone-free. Reduction of toxic gases and smoke in case of fire.
Wire cross-section 0.5 mm² or 1.0 mm².

Female plug RC18 / RC18..C1825
18-pin + PE

Dimension drawings



Female plug RC18 / RC18..C1825
angled 18-pin + PE



Ordering table

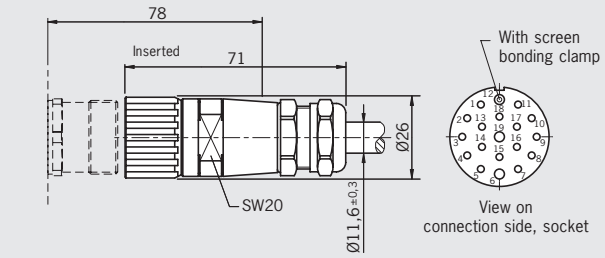
Designation	Version	Without cable
RC18 [2] 18-pin + PE	**EF** Female plug [1]	**074 616** RC18EF
	WF Female plug angled [1]	**074 617** RC18WF
	Replacement socket crimp contacts [1] Wire cross-section 19 x 0.75 - 1 mm²	**094 309** Pin crimp contact RCM
	EF-C1825 Female plug	**077 025** RC18EF-C1825
	WF-C1825 Female plug angled	**077 026** RC187WF-C1825
	Replacement socket crimp contacts Wire cross-section 16 x 0.38 - 0.5 mm² 3 x 0.75 - 1 mm²	**094 310** Pin crimp contact RCM-C1825

For information on crimp contacts see page 124.
1) Suitable for safety switches TZ without option C1825.
2) Crimp contacts are included.

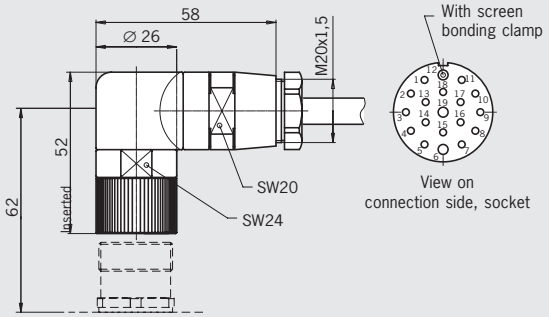
For safety precautions see page 164
For technical data see page 139

Female plug RC18 / RC18..C1825 with cable
18-pin + PE

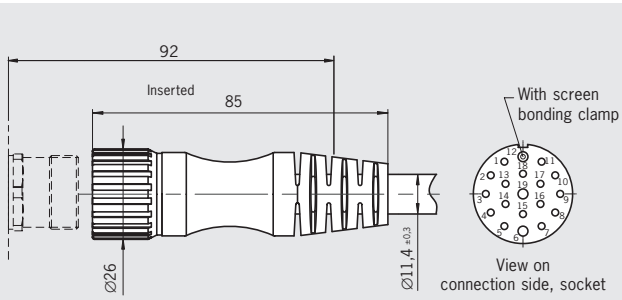
Dimension drawings



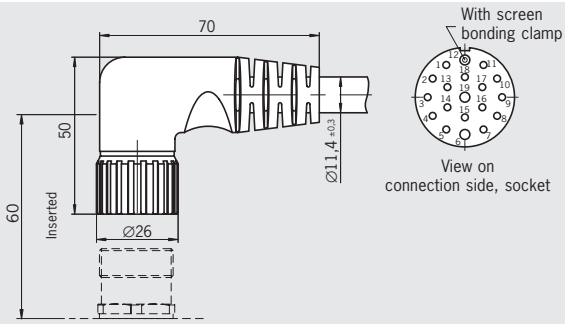
Female plug RC18 / RC18..C1825 angled with cable 18-pin + PE



Female plug RC18 / RC18..C1825 with cable halogen-free
18-pin + PE



Female plug RC18 / RC18..C1825 angled with cable halogen-free 18-pin + PE



Pin assignment plug RC18 with cable and option C1825

Pin	Wire color	Wire 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

Desig.	Version	Cable 1.5 m	3 m	6 m	8 m	10 m	15 m	20 m	25 m	30 m
RC18 + PE with cable	EF-C1825 Female plug	092 761 RC18EF1,5M-C1825	092 816 RC18EF3M-C1825	077 014 RC18EF6M-C1825	077 015 RC18EF8M-C1825	092 898 RC18EF10M-C1825	077 016 RC18EF15M-C1825	092 726 RC18EF20M-C1825	092 727 RC18EF25M-C1825	095 993 RC18EF30M-C1825
	WFL-C1825 Female plug angled left	092 906 RC18WF1,5ML-C1825	092 908 RC18WF3ML-C1825	077 018 RC18WF6ML-C1825	077 019 RC18WF8ML-C1825	092 901 RC18WF10ML-C1825	077 020 RC18WF15ML-C1825	092 910 RC18WF20ML-C1825	092 912 RC18WF25ML-C1825	–
	WFR-C1825 Female plug angled cable exit right	092 907 RC18WF1,5MR-C1825	092 909 RC18WF3MR-C1825	085 194 RC18WF6MR-C1825	085 195 RC18WF8MR-C1825	092 902 RC18WF10MR-C1825	085 196 RC18WF15MR-C1825	092 911 RC18WF20MR-C1825	092 913 RC18WF25MR-C1825	–
RC18 18-pin + PE with cable halogen-free	EFF-C1825 Female plug	092 883 RC18EF1,5MF-C1825	092 884 RC18EF3MF-C1825	092 885 RC18EF6MF-C1825	092 886 RC18EF8MF-C1825	092 887 RC18EF10MF-C1825	092 888 RC18EF15MF-C1825	092 889 RC18EF20MF-C1825	092 890 RC18EF25MF-C1825	–
	WFLF-C1825 Female plug angled cable exit left	092 891 RC18WF1,5MLF-C1825	092 893 RC18WF3MLF-C1825	092 697 RC18WF2MLF-C1825	092 895 RC18WF8MLF-C1825	092 699 RC18WF10MLF-C1825	092 701 RC18WF15MLF-C1825	092 704 RC18WF20MLF-C1825	092 724 RC18WF25MLF-C1825	–
	WFR-C1825 Female plug angled cable exit right	092 892 RC18WF1,5MRF-C1825	092 894 RC18WF3MRF-C1825	092 698 RC18WF6MRF-C1825	092 896 RC18WF8MRF-C1825	092 700 RC18WF10MRF-C1825	092 702 RC18WF15MRF-C1825	092 708 RC18WF20MRF-C1825	092 725 RC18WF25MRF-C1825	–

Plug connectors SGLF and SWLF with cable

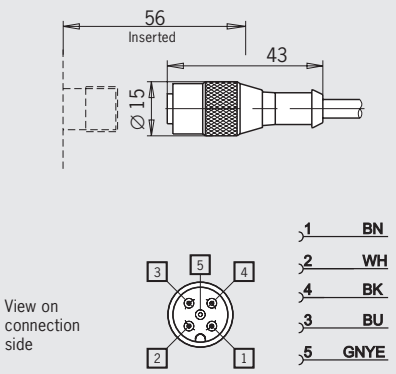
For safety switches series NZ and N1A

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

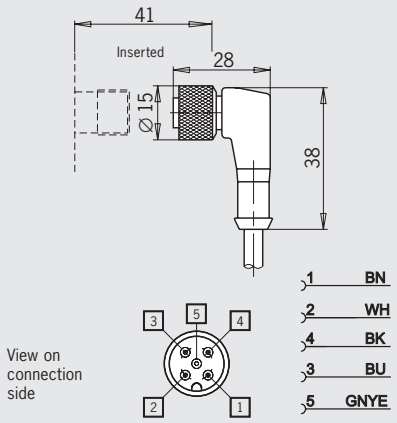
Cable
Cable sleeve PUR, color black, halogen-free, flame retardant. Reduction of toxic gases and smoke in case of fire. Wire cross-section 0.34 mm².

Plug connector SGLF with cable
M12 plug, 5-pin

Dimension drawings



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



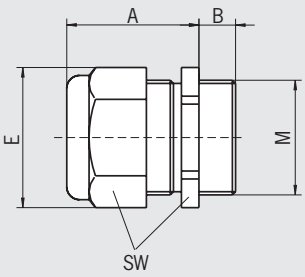
Ordering table

Type	Number of pins	Version	Cable length 5 m
SGLF	**5**	Female plug M12 for male plug SVM5	**073 461** SGLF5-5000P
SWLF	**5**	Female plug M12 angled for male plug SVM5	**073 462** SWLF5-5000P

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 Ø [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	**086 327** EKVM12/04	–
M16 x 1.5	Cable diameter 4 - 6.5 mm	**086 328** EKVM16/04	–
	Cable diameter 5 - 10 mm	–	**084 572** EKPM16/05
	Cable diameter 6.5 - 9.5 mm	**086 330** EKVM16/06	-
M20 x 1.5	Cable diameter 6 - 12 mm	–	**077 679** EKPM20/06
	Cable diameter 6.5 - 9.5 mm	**077 683** EKVM20/06	–
	Cable diameter 9 - 13 mm	**077 684** EKVM20/09	–
NPT ½"	Cable diameter 6 - 12 mm	**077 691** EKVN12/06	**077 692** EKPON12/06

For safety precautions see page 164
For technical data see page 139

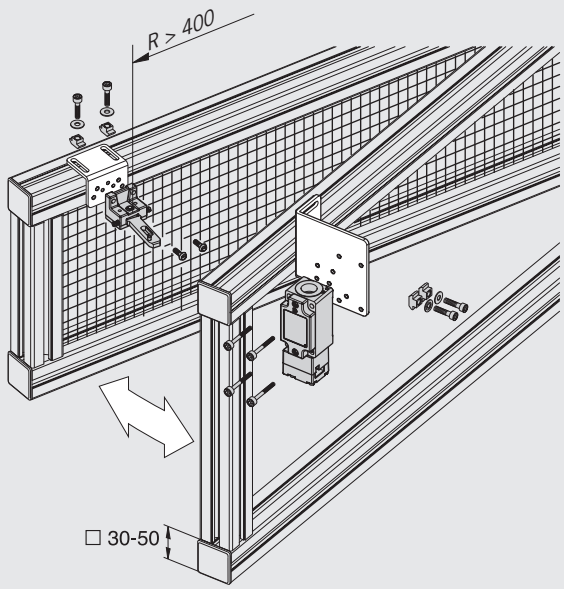
Mounting plates EMP for safety switches NZ

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

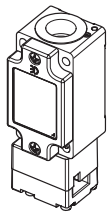
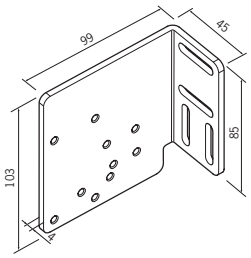
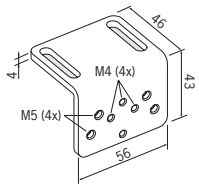
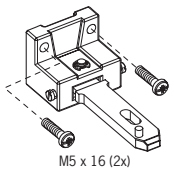
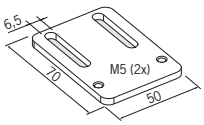
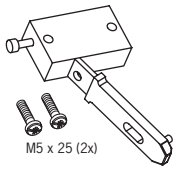
The mounting plates are used for fastening safety switches NZ and actuators to safety guards. The safety switches can be attached vertically and horizontally.

Note
- Mounting plate material: St37 galvanized

Mounting example, safety switch vertical



Ordering table

Switch	Installation method switch	Mounting plate switch	Mounting plate actuator	Actuator	Minimum distance hinge axis to switch
NZ... 	**A** Vertical	**085 753** Mounting plate NZ 	**093 457** EMP-B1 	**024 298** **024 299**  Page 104	> 400 mm
	B Horizontal		**093 458** EMP-B2 	**048 850** **057 950**  Page 104	> 165 mm

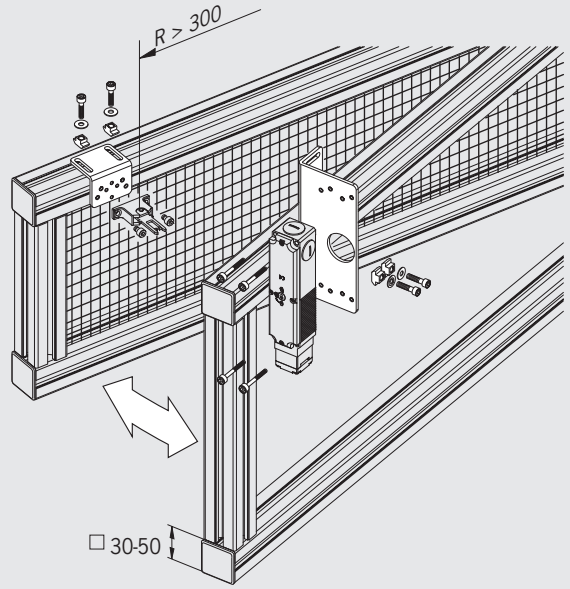
Mounting plates EMP for safety switches STA

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

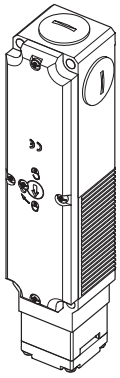
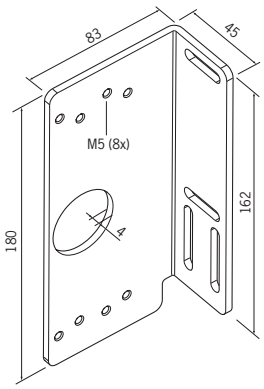
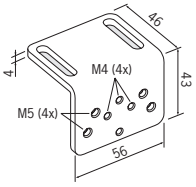
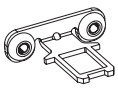
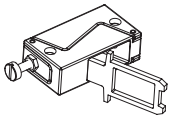
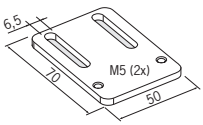
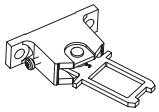
The mounting plates are used for fastening safety switches STA and actuators to safety guards. The safety switches can be attached vertically and horizontally.

Note
- Mounting plate material: St37 galvanized

Mounting example, safety switch vertical



Ordering table

Switch	Installation method switch	Mounting plate switch	Mounting plate actuator	Actuator	Minimum distance hinge axis to switch
STA... 	**A** Vertical	**093 456** EMP-SB 	**093 457** EMP-B1 	**095 740**  Page 108	> 300 mm
				095 315 **096 697**  Page 109/110	> 200 mm
	B Horizontal		**093 458** EMP-B2 	**096 838** **096 844**  Page 109/110	> 100 mm

For safety precautions see page 164
For technical data see page 139

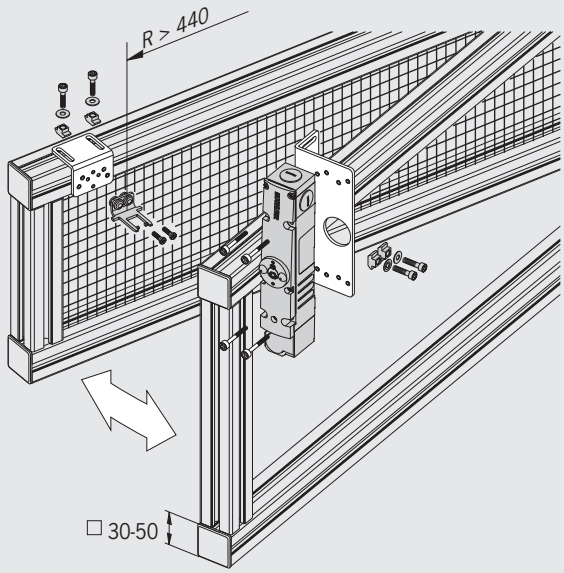
Mounting plates EMP for safety switches TX

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

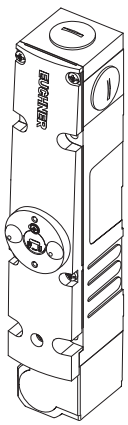
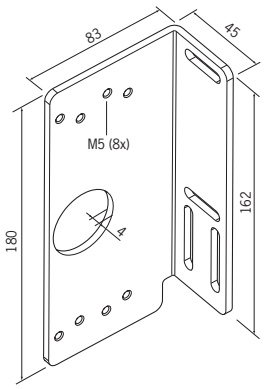
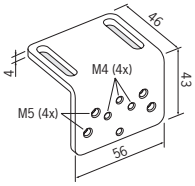
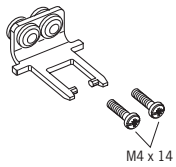
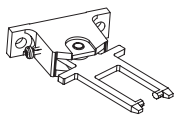
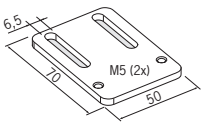
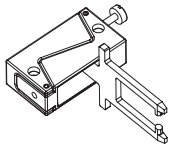
The mounting plates are used for fastening safety switches TX and actuators to safety guards. The safety switches can be attached vertically.

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

Mounting example, safety switch vertical



Ordering table

Switch	Installation method switch	Mounting plate switch	Mounting plate actuator	Actuator	Minimum distance hinge axis to switch
TX... 	**C** Vertical	**093 456** EMP-SB 	**093 457** EMP-B1 	**079 740** **079 742**  Page 106	> 400 mm
				098 082  Page 107	> 100 mm
			093 458 EMP-B2 	**097 906**  Page 107	> 100 mm

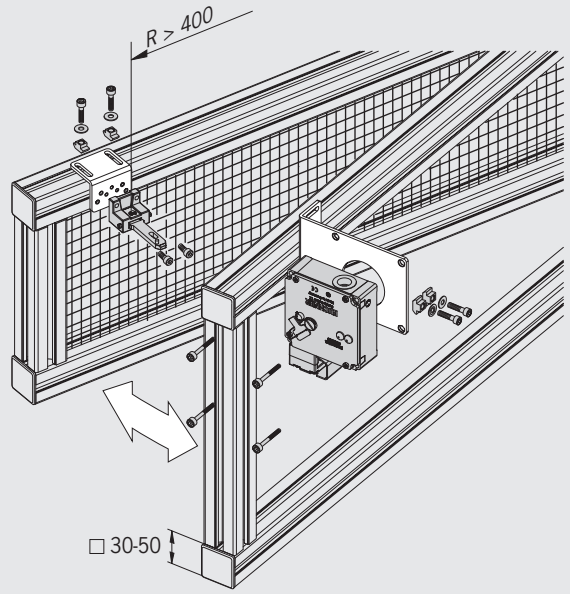
Mounting plates EMP for safety switches TZ

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

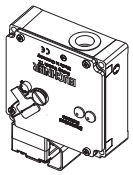
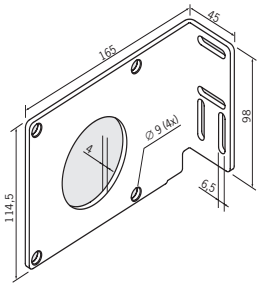
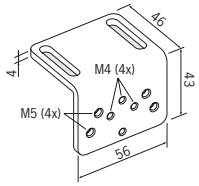
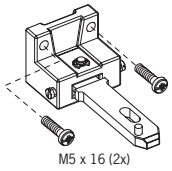
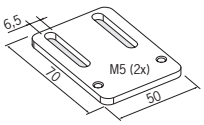
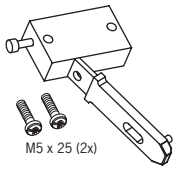
The mounting plates are used for fastening safety switches TZ and actuators to safety guards. The safety switches can be attached horizontally or vertically.
The mounting plate EMP-SA is also suitable for safety switches with escape release from the rear.

Note
- Mounting plate material: St37 galvanized
- 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.

Mounting example, safety switch vertical



Ordering table

Switch	Installation method switch	Mounting plate switch	Mounting plate actuator	Actuator	Minimum distance hinge axis to switch
TZ... 	**A** Vertical	**094 401** EMP-SA 	**093 457** EMP-B1 	**024 298** **024 299**  Page 104	> 400 mm
	B Horizontal		**093 458** EMP-B2 	**048 850** **057 950**  Page 104	> 165 mm

For safety precautions see page 164
For technical data see page 139

Miscellaneous accessories

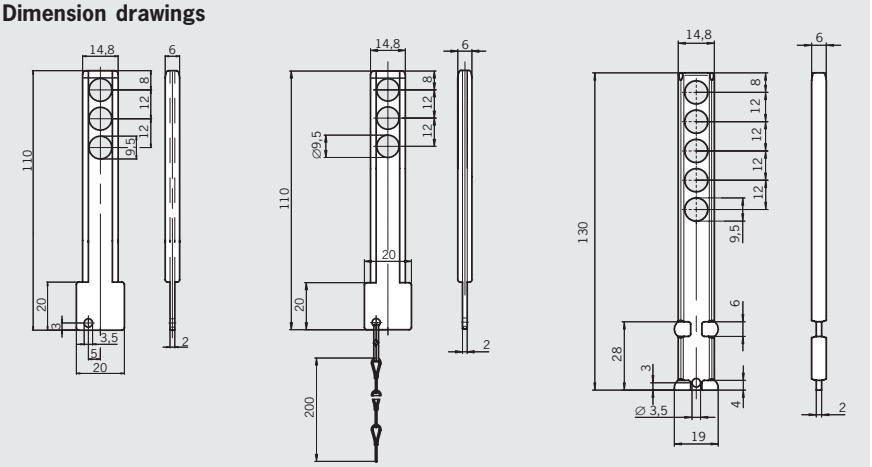
- **Lockout bar**
- **Insertion funnel**

Lockout bar
With the safety door open, can be slid into the actuating head on a switch with separate actuator 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.

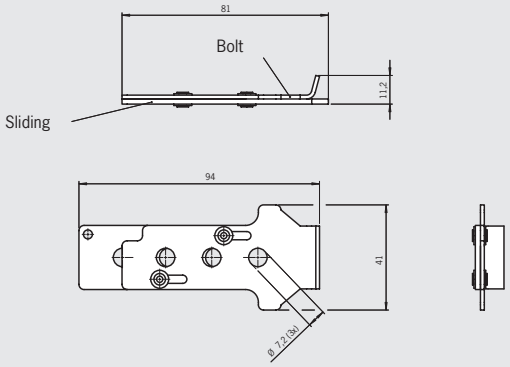
Insertion funnel
If an insertion funnel is used, even inexactly positioned actuators are inserted reliably in the actuating head due to the large opening aperture, thus protecting the safety switch against mechanical influences.

Lockout bars for safety switches NZ..VZ and TZ

Dimension drawings

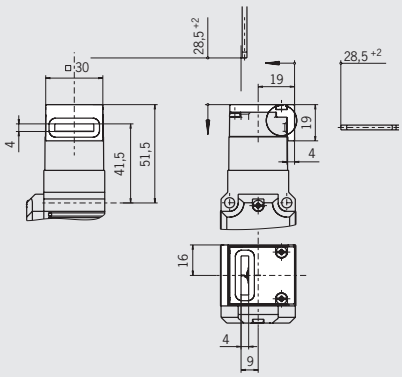


Lockout bar for safety switches NX and TX



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.
Lockout bar	3 holes	For safety switches series NZ..VZ and TZ without protective plate	**046 730** Lockout bar Z
	3 holes with chain	For safety switches series NZ..VZ and TZ without protective plate	**091 305** Lockout bar with chain
	5 holes	For safety switches series NZ..VZ and TZ without protective plate	**086 538** Lockout bar Z
	3 holes	For safety switches NX and TX	**096 098** Lockout bar TX
Insertion funnel	Incl. 2 fastening screws	For safety switches STA/STP	**093 157** Insertion funnel STA

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 with separate actuator (NZ..VZ and TZ). The protective plate prevents modification of the switch via the actuator outlet opening.

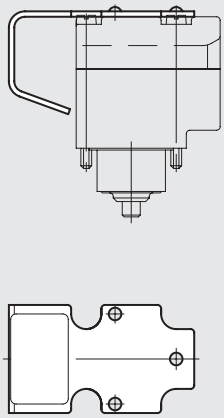
Replacement head for NZ..VZ
Replacement head for a safety switch with separate actuator (NZ..VZ). With 4 safety screws and replacement screws. As the switches are safety components, in case of defects we recommend replacing the entire safety switch. Not suitable for the safety switches TZ!

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

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



Ordering table

Designation	Version	Use	Order No.
Protective plate		For safety switches with separate safety function (NZ..VZ and TZ)	**059 136** Protective plate NZ/TZ
Replacement head NZ..VZ		Not suitable for safety switches TZ!	**076 250** Actuating head NZVZ
Lead seal kit	Comprising seal and wire	For safety switches TZ with locking screw and key	**048 257** Lead seal kit TZ
		For safety switches TZ with rotary emergency unlocking	**087 256** Lead seal kit TZ-C1937
Safety screws VPE: 100 ea.	**M4 x 14**	For actuators 079 739, 079 740, 079 741 and 079 742	**074 063** M4X14/V100
	M5 x 10	For straight actuators 016849 and 072251	**073 455** M5X10/V100
	M5 x 16	For hinged actuators 024299 and 024298	**073 456** M5X16/V100
	M5 x 25	For hinged actuators 048850 and 057950	**073 457** M5X25/V100
	M3 x 40	For actuator head NZ and TZ	**075 530** M3X40/V100
	M3 x 70	For actuator head NZ..VZ..VSE and NZ..VZ..VSM	**075 531** M3X70/V100

For safety precautions see page 164
For technical data see page 139

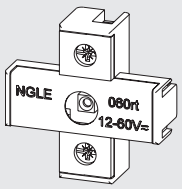
Miscellaneous accessories

▶ **LED function display**

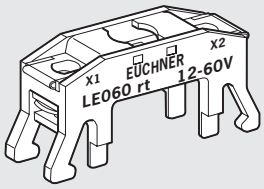
LED function display
Upgrade kits with LEDs are available for the safety switches N1A and NZ. The intensity of the light from the indicators is always the same independent of the voltage applied.

LED function display

Dimension drawings



NGLE...



LE...

Ordering table

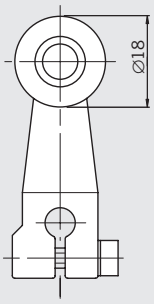
Designation	Version	Voltage					
		12-60 V red LED	12-60 V yellow	12-60 V green	110 V red LED	230 V red LED	230 V yellow LED
LED function display NGLE	For safety switches NZ	**029 220** NGLE060RT	**029 222** NGLE060GE	**029 221** NGLE060GR	**045 822** NGLE110RT	**045 825** NGLE220RT	**045 827** NGLE220GE
LED function display LE	For safety switches N1A	**035 495** LE060RT	**035 497** LE060GE	**035 496** LE060GR	**045 579** LE110RT	**045 582** LE220RT	**045 584** LE220GE

▶ **Replacement roller arm**

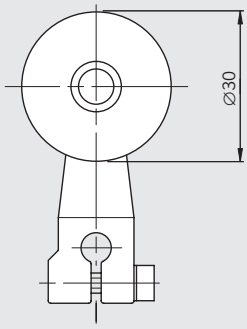
Replacement roller arm
Replacement roller lever for safety switches with safety function with lever arm. As the switches are safety components, in case of defects we recommend replacing the entire switch. Complete switch heads are not available.

Replacement roller arm

Dimension drawings



NHS (steel roller)
NHB (plastic roller)



NHBC569

Ordering table

Designation	Version	Order No.
Replacement roller arm	**Replacement plunger** for NZ.HS	**012 043** Roller arm NHS
	Replacement plunger for NZ.HB	**012 042** Roller arm NHB
	Replacement plunger for NZ.HB...C569	**012 044** Roller arm NHBC569

Miscellaneous accessories

- **Emergency unlocking with manual return for safety switches TX**
- **Emergency unlocking with automatic return for safety switches TX**
- **Lock for emergency unlocking with manual return for safety switches TX**

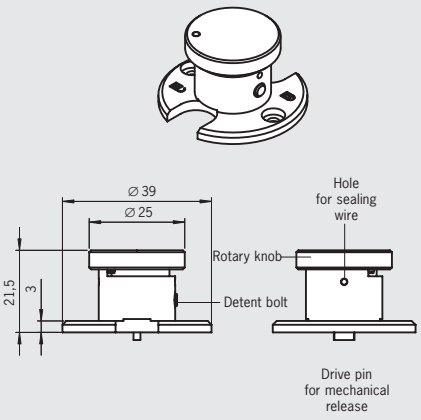
Emergency unlocking
Is used for the manual release of the guard locking without tools. The emergency unlocking mechanism must be returned to the locked state manually. A sealing wire can be fitted to protect against tampering.
Attention: Prior to mounting, the locking screw for the mechanical release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

Lockout bar
Is used for the manual release of the guard locking. The integrated spring automatically returns the emergency unlocking to the locked state. A sealing wire can be fitted to protect against tampering.
Attention: Prior to mounting, the locking screw for the mechanical release must be removed.

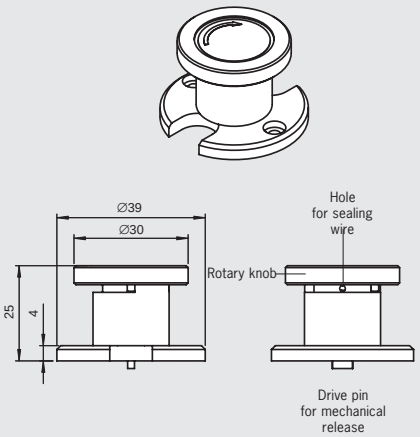
Lock
The lock is used in combination with safety switch TX. The mechanical key release enables authorized personnel to actuate the mechanical release using the related key in certain situations. The unlocking mechanism holds the solenoid in the "unlocked" position.
Two screws are used to fix the lock 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 switches TX

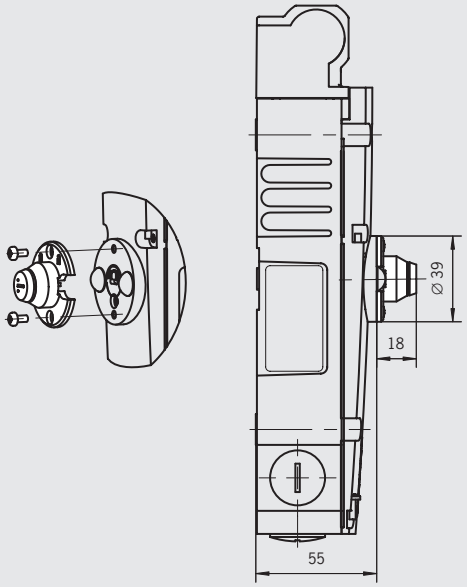
Dimension drawings



Mechanical release
For safety switches TX



Lock
For safety switches TX



Ordering table

Designation	Version	Use	Order No.
Emergency unlocking	Incl. 2 screws M3 x 6	For safety switches TX	**094 771** Emergency unlocking TX
Mechanical release	Incl. 2 screws M3 x 6	For safety switches TX	**094 773** Mechanical release TX
Lead seal kit		For emergency unlocking TX and mechanical release TX	**087 256** Lead seal kit
Lock	Unique (unique key needed to open)	For safety switches TX	**079 796** Lock TX
	Identical (identical locks)	For safety switches TX	**079 795** Lock TX
	Replacement key (2 ea.) for identical lock	For safety switches TX	**077 206** Replacement key TX

For safety precautions see page 164
For technical data see page 139

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

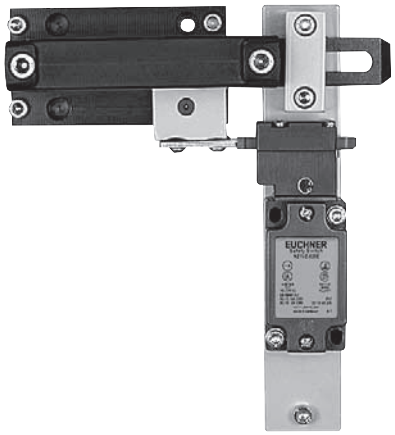
Type	Version	Manufacturer's designation	
SVM5 5 pins	Female plug M12	**99-0436-57-05** Cable socket	**Binder** www.binder-connector.de
	Female flange connector M12	**09-3442-700-05** Flange connector with wires	
	Dummy plug M12	**08-2425-000-000** Protective cap for socket with retaining strap	
CE5 3-pin + 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
	Female crimp contacts for C16-1, VPE 100 pcs.	**VN02 016 0002 (1)** Single contact, silver, 0.5-1.5 mm²	
	Dummy plug	**T6483 000** Protective cap for female receptacle	
MR 7, 8, 9, 10 and 12 pins	Straight female plug (7-pin), pre-assembled for built-in connector MR7	**MIN-7FPX-..** Female plugs with cable	**MENCOM** www.mencomcorp.com
	Straight female plug (8-pin), pre-assembled for built-in connector MR8	**MIN-8FPX-..** Female plugs with cable	
	Straight female plug (9-pin), pre-assembled for built-in connector MR9	**MIN-9FP-..** Female plugs with cable	
	Straight female plug (10-pin), pre-assembled for built-in connector MR10	**MIN-10FP-..** Female plugs with cable	
	Straight female plug (12-pin), pre-assembled for built-in connector MR12	**MIN-12FP-..** Female plugs with cable	
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 socket)	**09 20 010 3101** Socket contact insert crimp connection	
	Socket contacts for crimping	**09 33 000 6220** Socket crimp contacts 0.5 mm²	
	Dummy plug	**09 20 010 5425** Cover	
RC17-Y coded 17-pin	Female flange connector, solder 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 connectors	Function	Manufacturer's designation	
SR6 and SR11	Crimp tool	**932 507-002** XCZ 0701	**Hirschmann** www.hirschmann.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-Z 2378** Crimp pliers for machined contacts	**Coninvers** www.coninvers.com
	Extraction tool	**RC-Z 2097** Extraction tool/insertion tool	
RC18	Crimp tool	**RC-Z 2378** Crimp pliers for machined contacts	
	Extraction tool	**RC-Z 2274** 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	

Bolts for safety guards

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



Special features

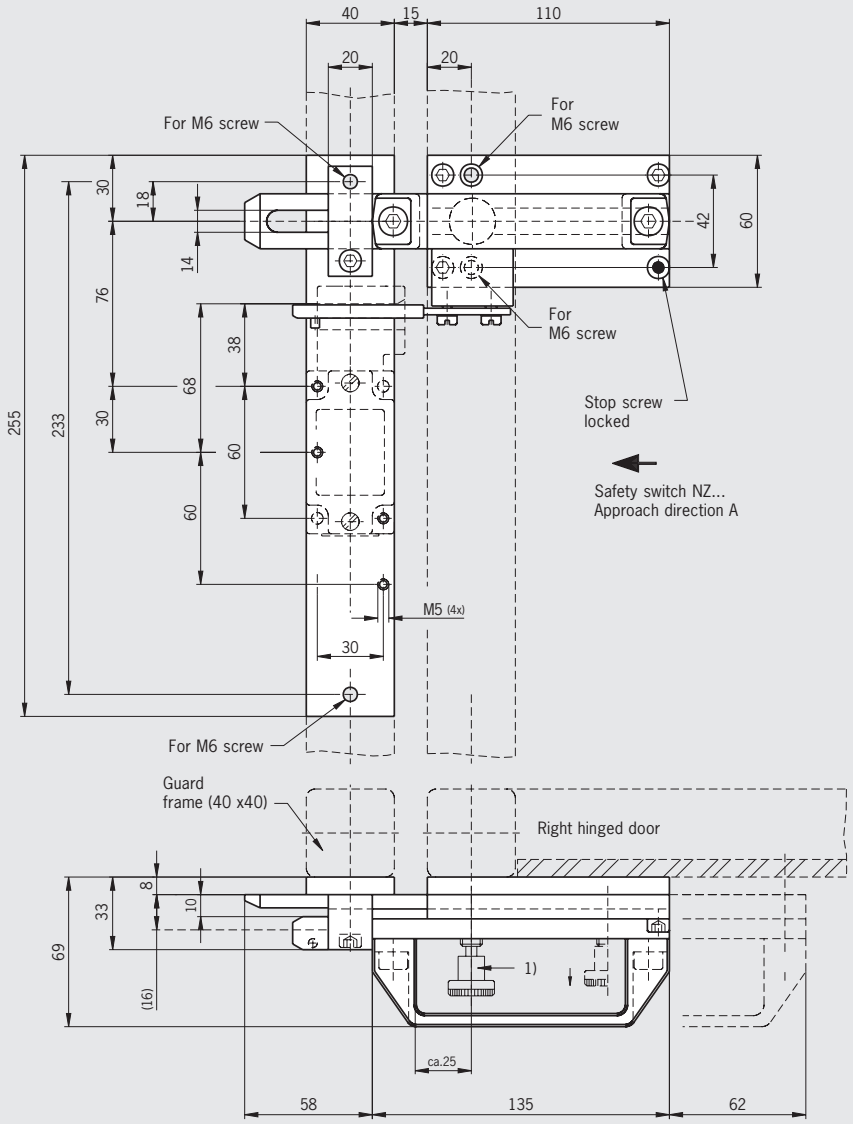
- **NZ-.B** bolt engages in open and closed position
  - Prevents accidental opening and closing of the bolt
- **NZ-.R2** bolt engages in open and closed position. Unlocked by pulling the detent knob upward

Features

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

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

Dimension drawings (here: shown with detent knob)



1) Bolt with detent mechanism:
Latches in open position and prevents unintended closing of the bolt.
When the bolt is closed, the knob engages and prevent unintended opening.
Unlocked by pulling the detent knob upward.

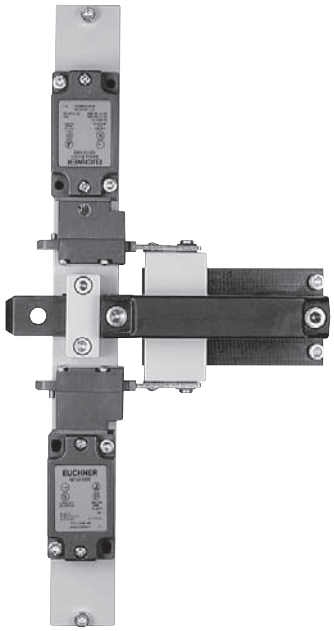
Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ-A	None	For right hinged doors, actuator included	**057 734** Bolt NZ-A
Bolt NZ-C	None	For left hinged doors, actuator included	**057 735** Bolt NZ-C
Bolt NZ-AB	Ball detent mechanism	For right hinged doors, actuator included	**083 890** Bolt NZ-AB
Bolt NZ-CB	Ball detent mechanism	For left hinged doors, actuator included	**083 892** Bolt NZ-CB
Bolt NZ-AR2	Detent knob	For right hinged doors, actuator included	**078 455** Bolt NZ-AR2
Bolt NZ-CR2	Detent knob	For left hinged doors, actuator included	**078 456** Bolt NZ-CR2

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

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



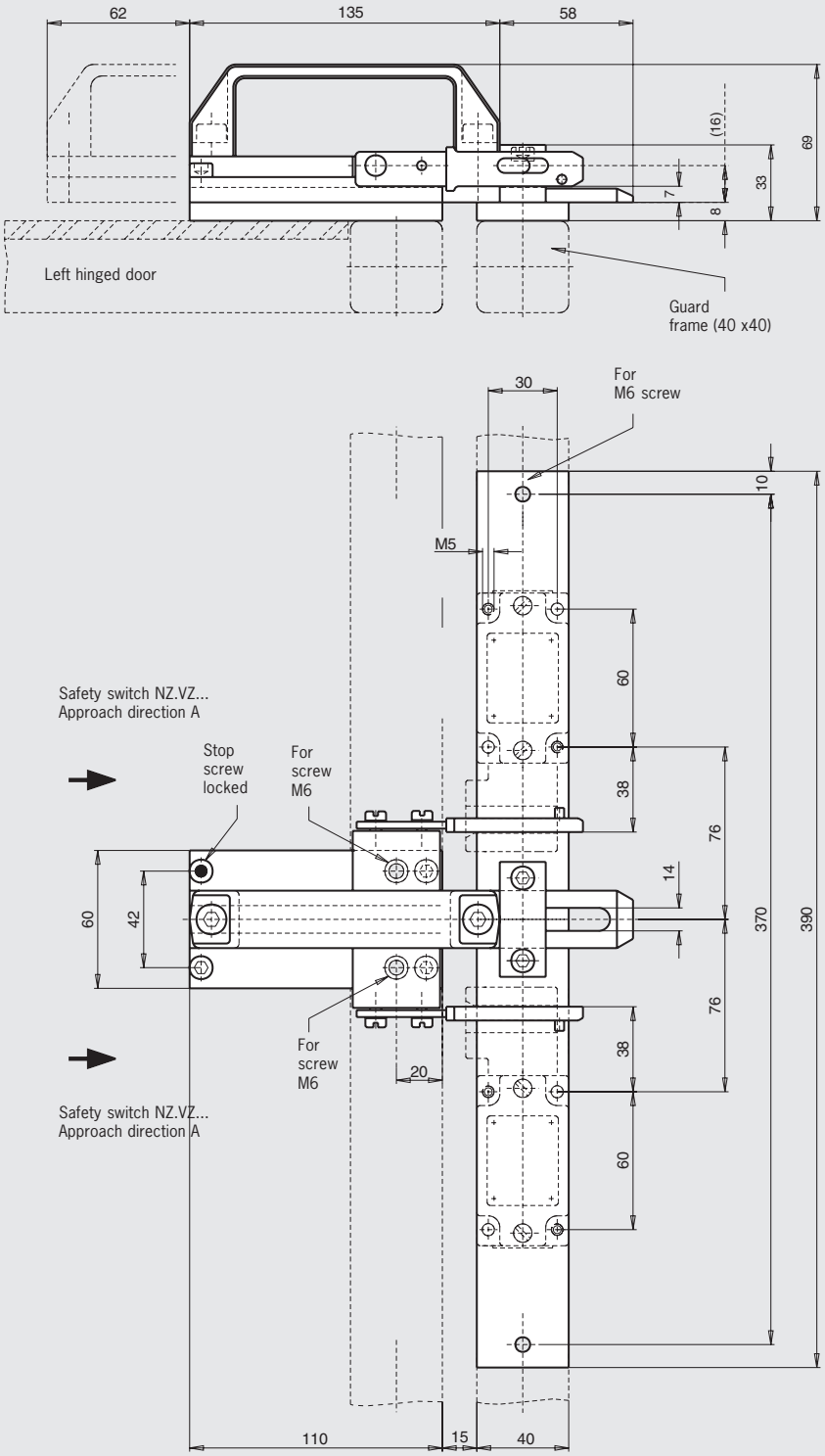
Special features
- One bolt for 2 safety switches
  - High control category (e. g. category 4) is achieved
- Bolt can be used for doors hinged on the right or left

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

Notes
- The function of the bolt NZ-ACF with escape release is the same as the function of the bolt NZ/TZ-ACF (see page 133)

Bolt for 2 safety switches NZ.VZ on one bolt

Dimension drawings

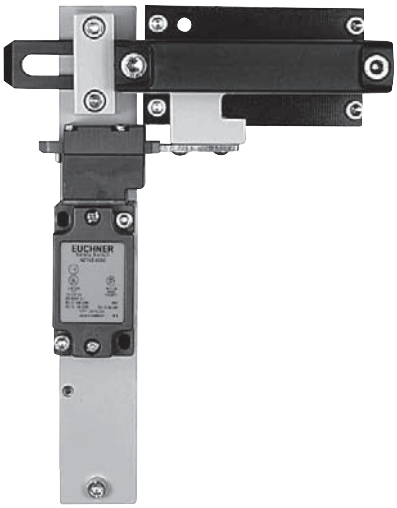


Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ-AC	None	For right or left hinged doors, 2 safety switches on one bolt, actuator included	**076 188** Bolt NZ-AC

Bolts for safety guards

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



Special features

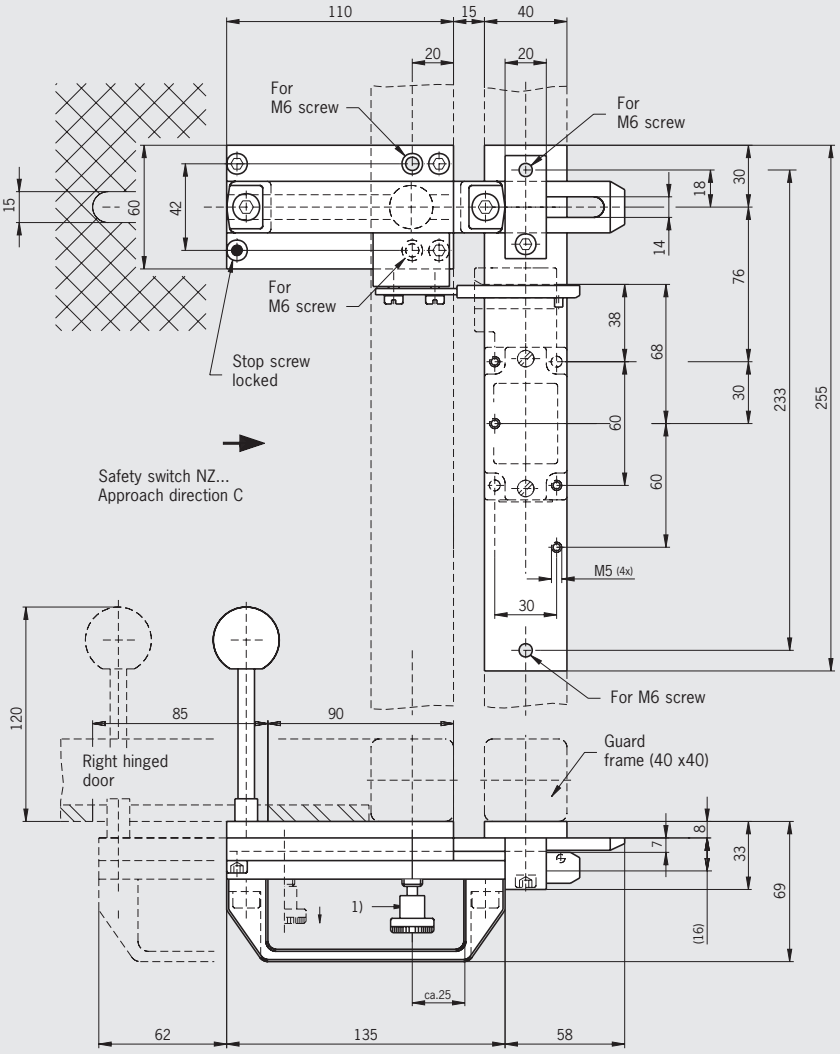
- Bolt with detent mechanism
  - The bolt latches in open position to prevent unintended closing

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Robust version 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 unintended closing of the bolt.
Unlocked by pulling the detent knob upward.

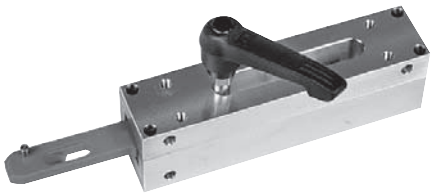
Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ-AF	Detent knob	For right hinged doors, escape release from the danger area, actuator included	**078 451** Bolt NZ-AF
Bolt NZ-CF	Detent knob	For left hinged doors, escape release from the danger area, actuator included	**078 452** Bolt NZ-CF

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ...**
- **Bolt with hand lever**
- **For right or left hinged doors**



Special features

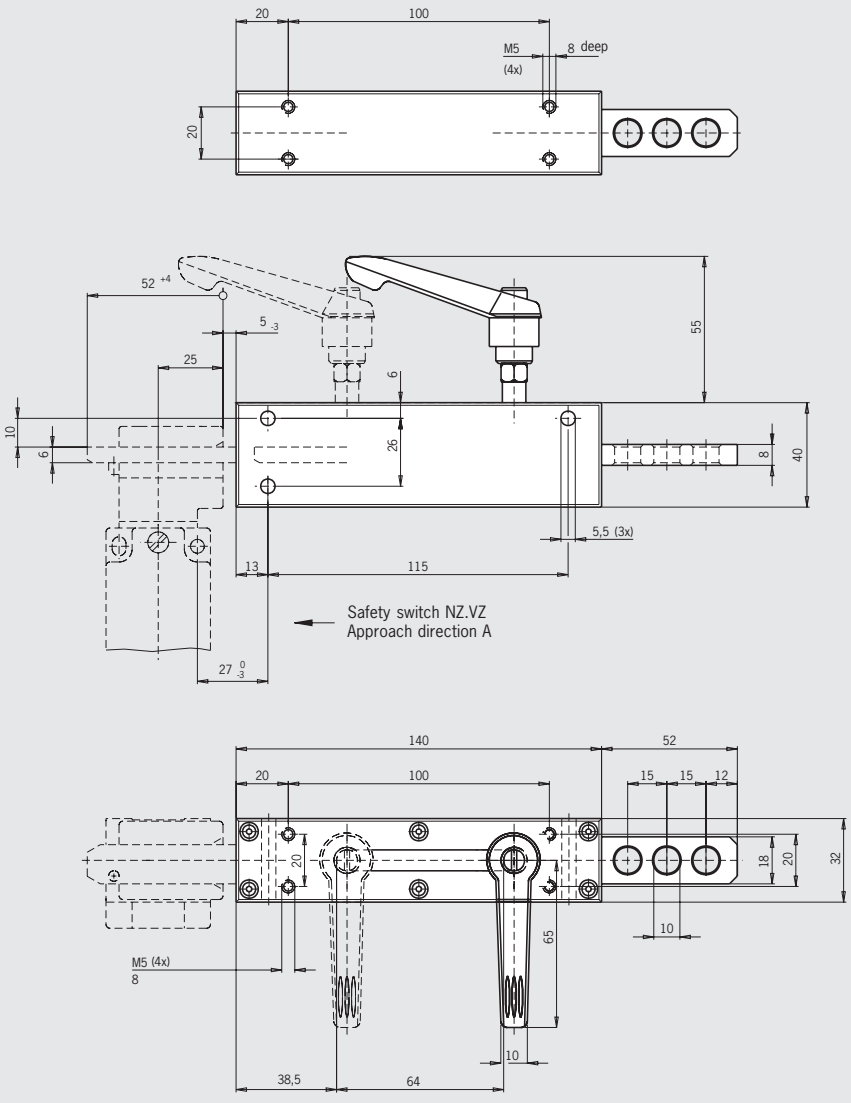
- The hand lever can be permanently set to 20 rotary positions (in 18° increments)
- On bolt **NZ/TZ-G1**, actuating pin on bottom
  - Safety switch fastened as shown in illustration
- On bolt **NZ/TZ-G2**, actuating pin on top
  - „ Safety switch fastened rotated by 180°
- After the door is opened, 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



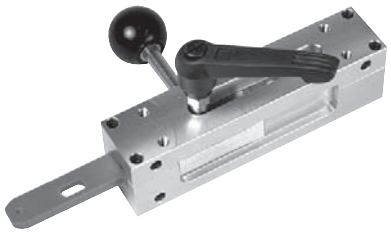
1) Bolt fastening

Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-G1	None	For right or left hinged doors, actuating pin on bottom, actuator included	**028 358** Bolt NZ/TZ-G1
Bolt NZ/TZ-G2	None	For right or left hinged doors, actuating pin on top, actuator included	**028 360** Bolt NZ/TZ-G2

Bolts for safety guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ...C1828**
- **Lever for escape release from the danger area**
- **Bolt with hand lever**
- **For right or left hinged doors**



Special features

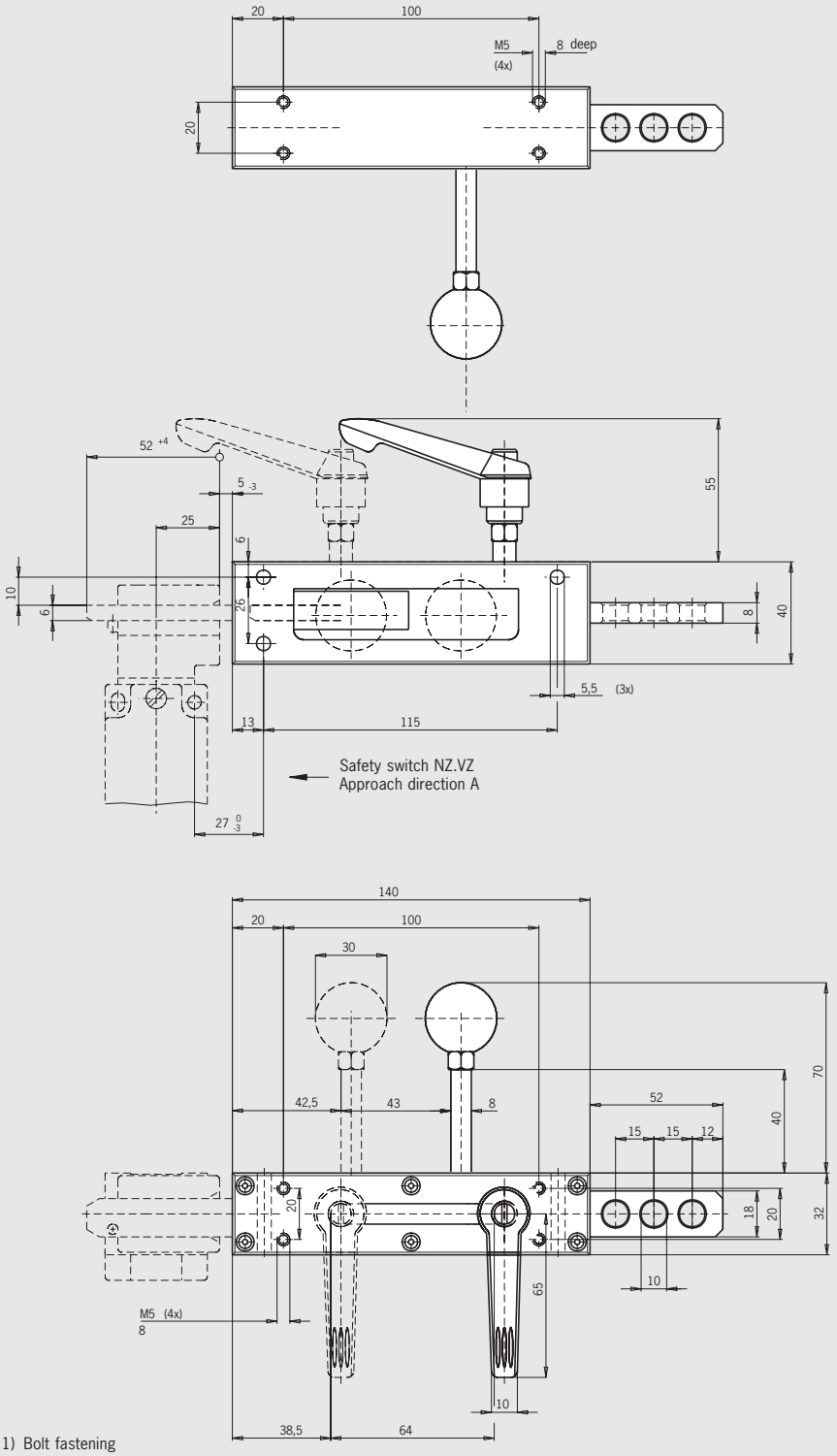
- The hand lever can be permanently set to 20 rotary positions (in 18° increments)
- After the door is opened, the actuator is automatically withdrawn into the bolt by a built-in return spring
  - The operator is protected
    When the door is open there is no risk of injury due to protruding actuator
  - 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 area
- Three holes enable padlocks to be attached

Bolt for safety switches NZ.VZ, NZ.VZ.VS and TZ...C1828

Dimension drawings



1) Bolt fastening

Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-G1/AF	None	For right or left hinged doors, escape release from the danger area, actuator included	**079 788** Bolt NZ/TZ-G1/AF
Bolt NZ/TZ-G1/CF	None	For right or left hinged doors, escape release from the danger area, actuator included	**079 787** Bolt NZ/TZ-G1/CF

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

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

Special features

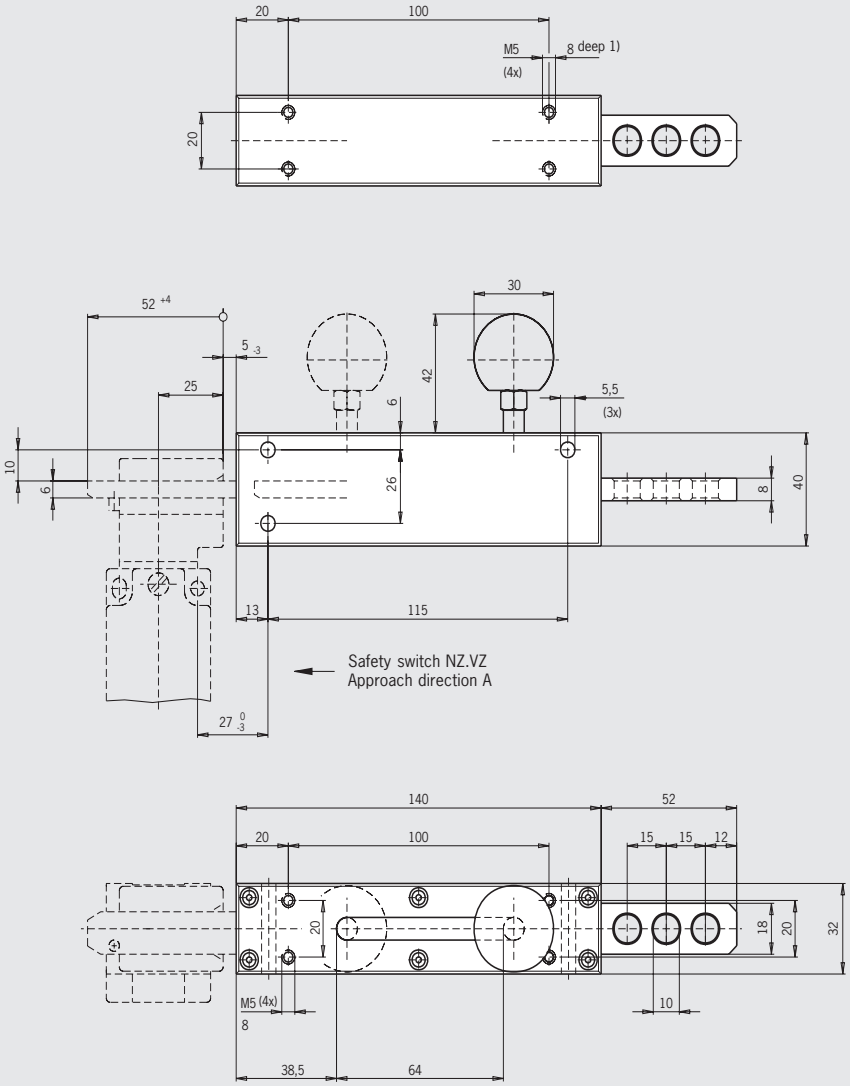
- On bolt **NZ/TZ-S1**, actuating pin on bottom
  - Safety switch fastened as shown in illustration
- On bolt **NZ/TZ-S2**, actuating pin on top
  - Safety switch fastened rotated by 180°
- After the door is opened, the actuator is automatically withdrawn into the bolt by a built-in return spring
  - 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



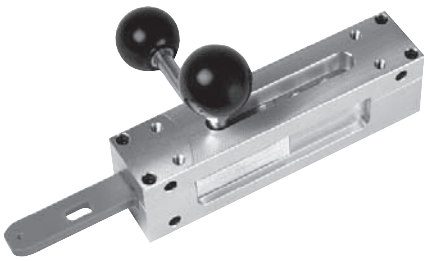
1) Bolt fastening

Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-S1	None	For right or left hinged doors, actuating pin on bottom, actuator included	**028 357** Bolt NZ/TZ-S1
Bolt NZ/TZ-S2	None	For right or left hinged doors, actuating pin on top, actuator included	**028 359** Bolt NZ/TZ-S2

Bolts for safety guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ...C1828**
- **Lever for escape release from the danger area**
- **Bolt with ball handle**
- **For right or left hinged doors**



Special features

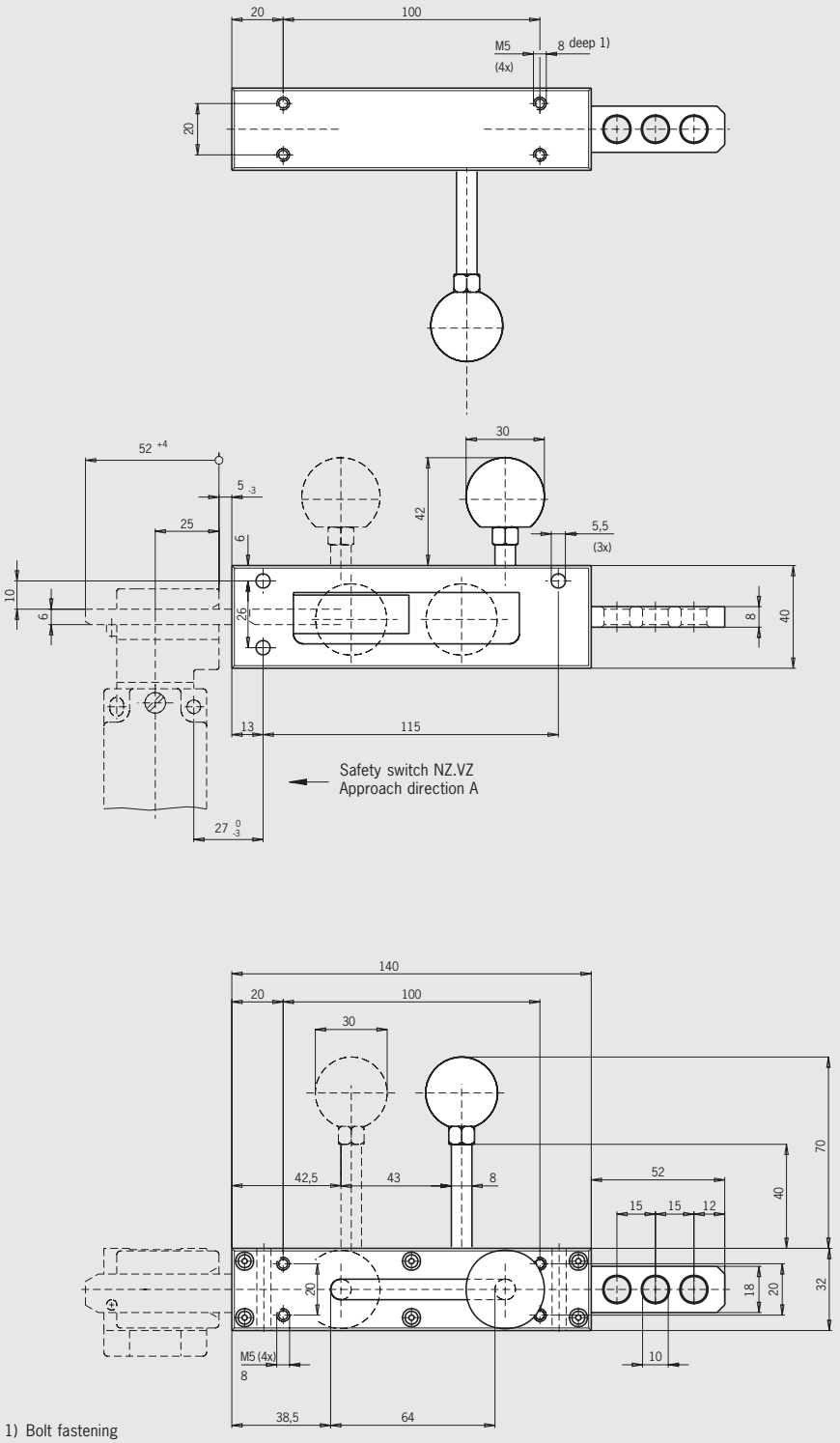
- After the door is opened, the actuator is automatically withdrawn into the bolt by a built-in return spring
  - The operator is protected
    When the door is open there is no risk of injury due to protruding actuator
  - The actuator is protected
    When hinged doors are closed it is ensured that 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 area
- Three holes enable padlocks to be attached

Bolt for safety switches NZ.VZ, NZ.VZ.VS and TZ...C1828

Dimension drawings



1) Bolt fastening

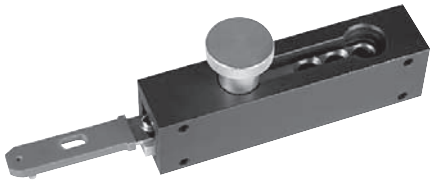
Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-S1/AF	None	For right or left hinged doors, escape release from the danger area, actuator included	**079 786** Bolt NZ/TZ-S1/AF
Bolt NZ/TZ-S1/CF	None	For right or left hinged doors, escape release from the danger area, actuator included	**079 785** Bolt NZ/TZ-S1/CF

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

- **For safety switches NZ.VZ, NZ.VZ.VS and TZ...**
- **Bolt with knurled knob**
- **For right or left hinged doors**



Special features

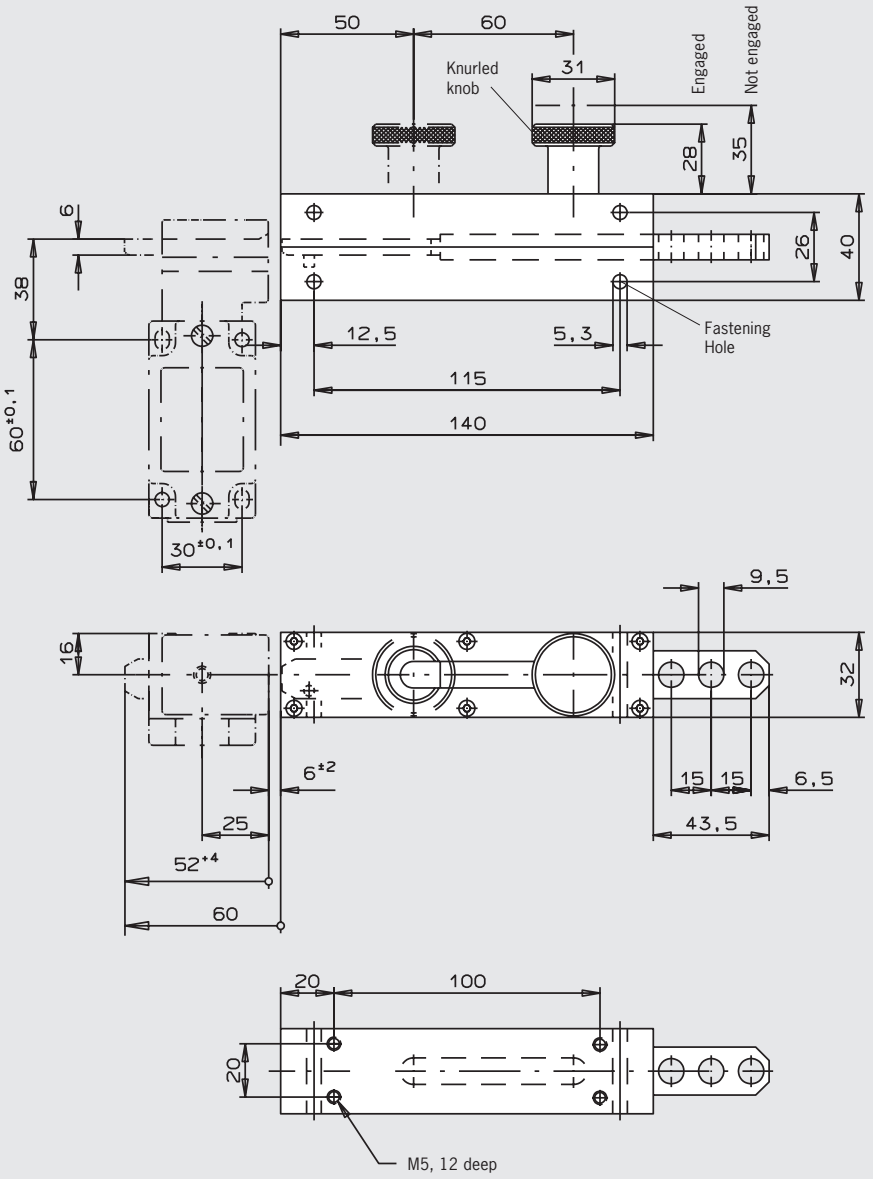
- Bolt knob engages in open and closed position. The actuator can be inserted in the safety switch by pulling the knurled knob

Features

- Three holes enable padlocks to be attached

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

Dimension drawings

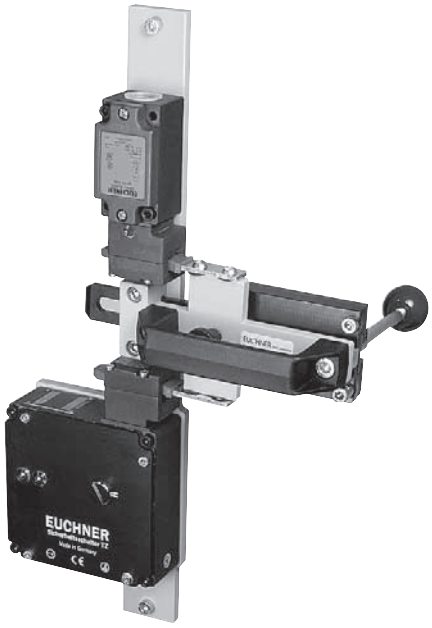


Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-Z	Knurled knob	For right or left hinged doors, actuator included	**057 770** Bolt NZ/TZ-Z

Bolts for safety guards

- **For safety switches NZ.VZ, TZ...C1684, TZ...C1815 and TZ...C1828**
- **Lever for escape release from the danger area**
- **For 2 safety switches on one bolt (NZ and TZ)**
- **For right or left hinged doors**



Special features

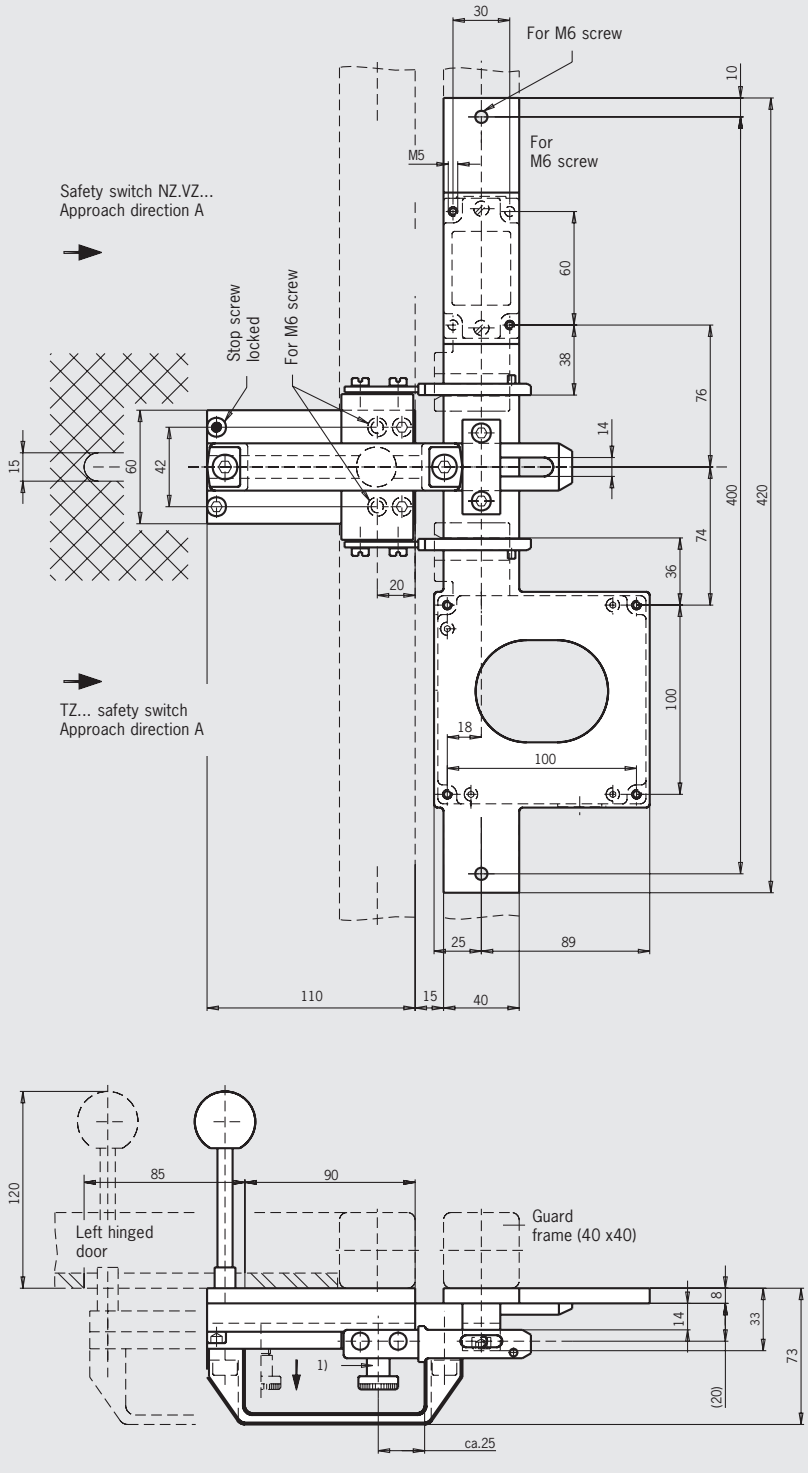
- One bolt for 2 safety switches (NZ and TZ with guard locking)
  - High control category (e. g. category 4) is achieved
- Bolt with detent mechanism
  - The bolt latches in open position to prevent unintended closing

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Robust version 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



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

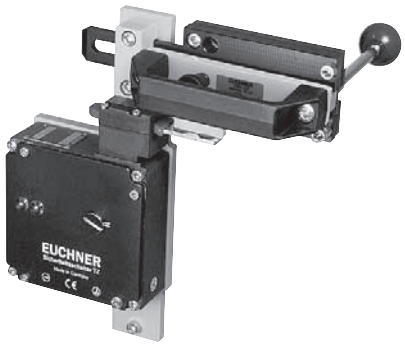
Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt NZ/TZ-ACF	Detent knob	For right or left hinged doors, 2 safety switches on one bolt, escape release from the danger area, actuator included	**083 900** Bolt NZ/TZ-ACF

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

- **For safety switches with escape release TZ...C1815 and TZ...C1828**
- **Lever for escape release from the danger area**
- **For right or left hinged doors**



Special features

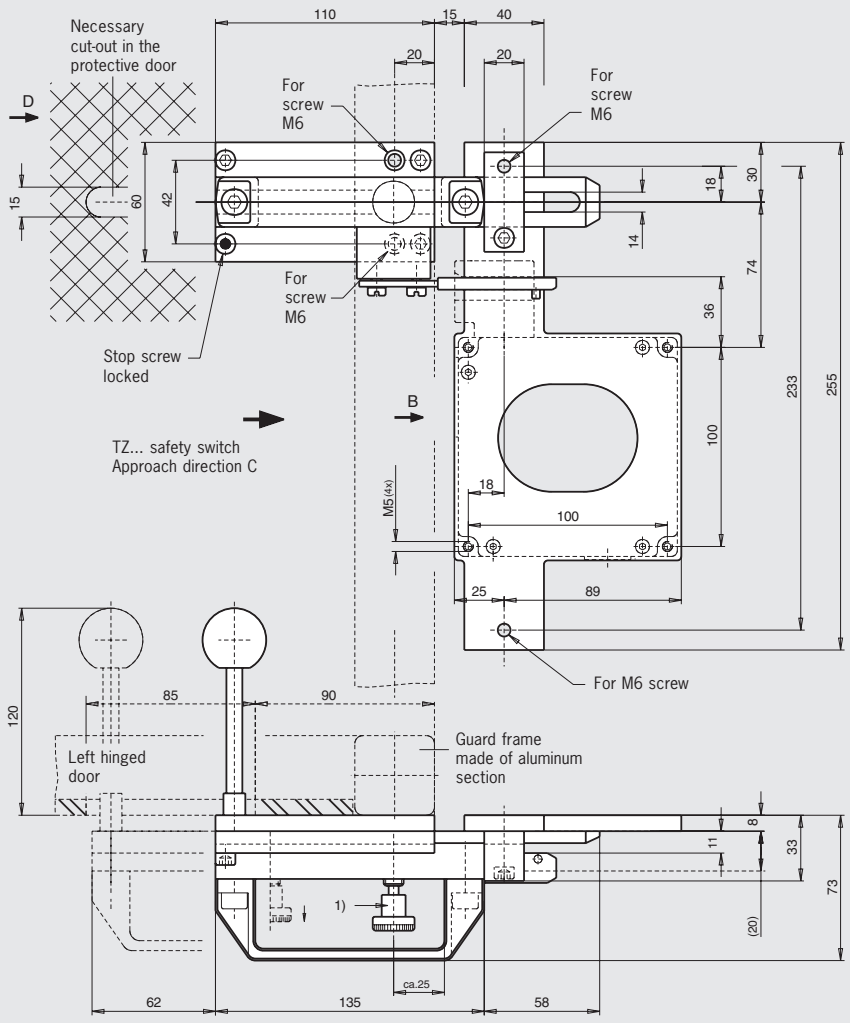
- Bolt with detent mechanism
  - The bolt latches in open position to prevent unintended closing

Features

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

Bolt for safety switches TZ...C1815 and TZ...C1828

Dimension drawings



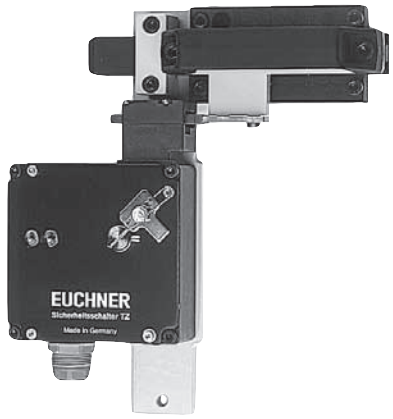
1) Bolt with detent mechanism:
Latches in open position and prevents unintended closing of the bolt.
Unlocked by pulling the detent knob upward.

Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt TZ-AF	Detent knob	For right hinged doors, escape release from the danger area, actuator and switch bracket included	**076 200** Bolt TZ-AF
Bolt TZ-CF	Detent knob	For left hinged doors, escape release from the danger area, actuator and switch bracket included	**076 199** Bolt TZ-CF

Bolts for safety guards

- **For safety switches TZ**
- **Optional stainless steel bolt, 1.4301**
- **For right or left hinged doors**



Features

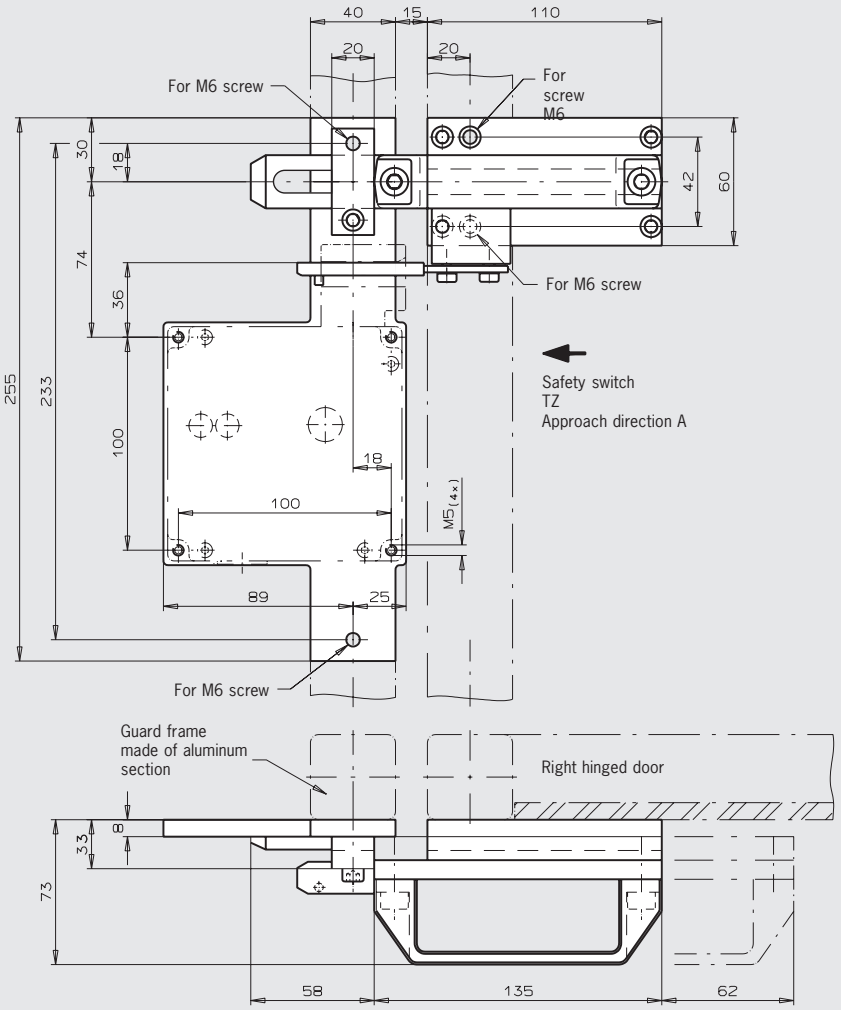
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Easy to use
- Distinctive yellow color for easy recognition
- Robust version for heavy doors
- No additional door handle necessary
- Slot on the bolt permits attachment of padlocks

Version in stainless steel 1.4301

- Suitable for use in the chemical and foodstuff industries
- Screw material stainless steel V2A
- Handle material polypropylene
- Slide strip material polyethylene

Bolts for safety switches series TZ

Dimension drawings



Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt TZ-A	None	For right hinged doors actuator and switch bracket included	**057 736** Bolt TZ-A
Bolt TZ-C	None	For left hinged doors actuator and switch bracket included	**057 737** Bolt TZ-C
Bolt TZ-A-NIRO	None	For right hinged doors, bolt made of bade of stainless steel 1.4301, actuator and switch bracket included	**079 798** Bolt TZ-A-NIRO
Bolt TZ-C-NIRO	None	For left hinged doors, bolt made of bade of stainless steel 1.4301, actuator and switch bracket included	**079 799** Bolt TZ-C-NIRO
Bolt TZ-A-NIRO-C2101	None	For right hinged doors, bolt made of bade of stainless steel 1.4301, screws made of stainless steel V2A, handle and slide strips made of stainless steel 1.4301, actuator and switch bracket included (similar to figure)	**096 057** Bolt TZ-A-NIRO-C2101
Bolt TZ-C-NIRO-C2101	None	For left hinged doors, bolt made of bade of stainless steel 1.4301, screws made of stainless steel V2A, handle and slide strips made of stainless steel 1.4301, actuator and switch bracket included (similar to figure)	**096 058** Bolt TZ-C-NIRO-C2101

For safety precautions see page 164
For technical data see page 139

Bolts for safety guards

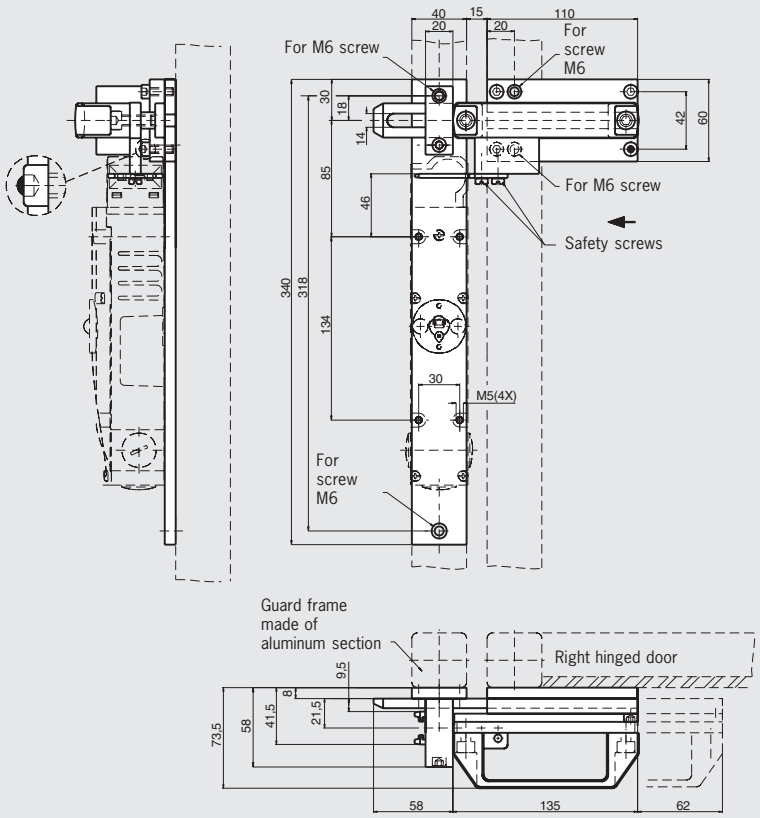
- **For safety switches TX and NX**
- **For right or left hinged doors**

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

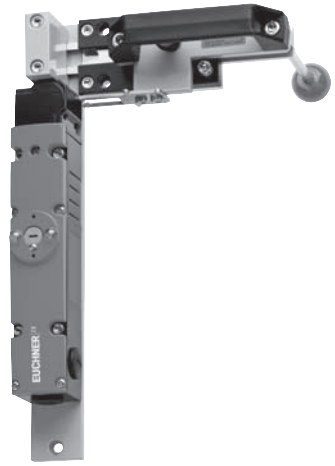


Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt TX-A	None	Without escape release, for right hinged doors actuator and switch bracket included	**082 990** Bolt TX-A
Bolt TX-C	None	Without escape release, for left hinged doors actuator and switch bracket included	**082 991** Bolt TX-C

Bolts for safety guards

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

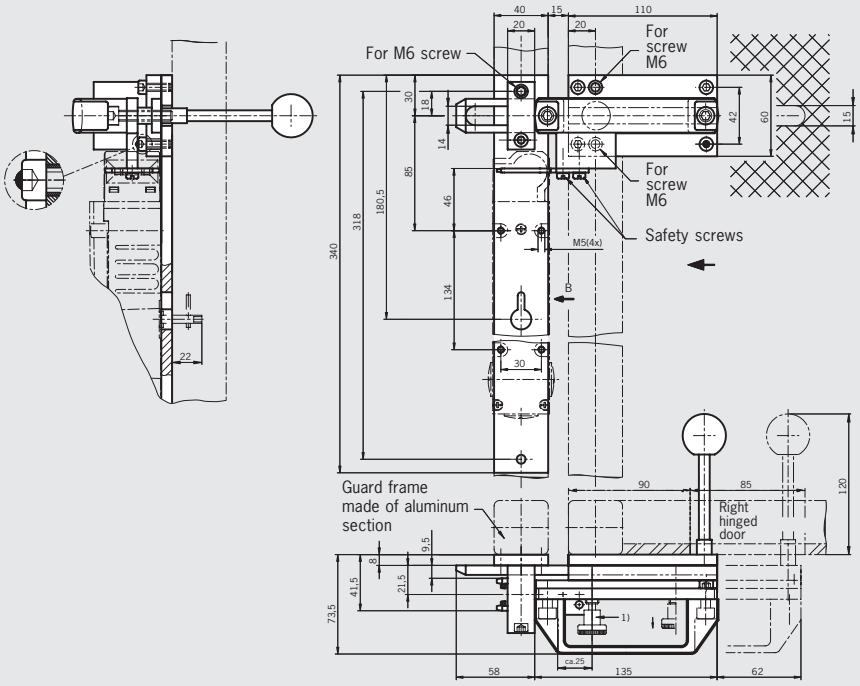


Features

- 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
with escape release

Dimension drawings



Ordering table

Designation	Detent mechanism	Version	Order No.
Bolt TX-AF	Detent knob	With escape release, for right hinged doors actuator and switch bracket included	**085 392** Bolt TX-AF
Bolt TX-CF	Detent knob	With escape release, for left hinged doors actuator and switch bracket included	**085 393** Bolt TX-CF

For safety precautions see page 164
For technical data see page 139

Accessories for bolts

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

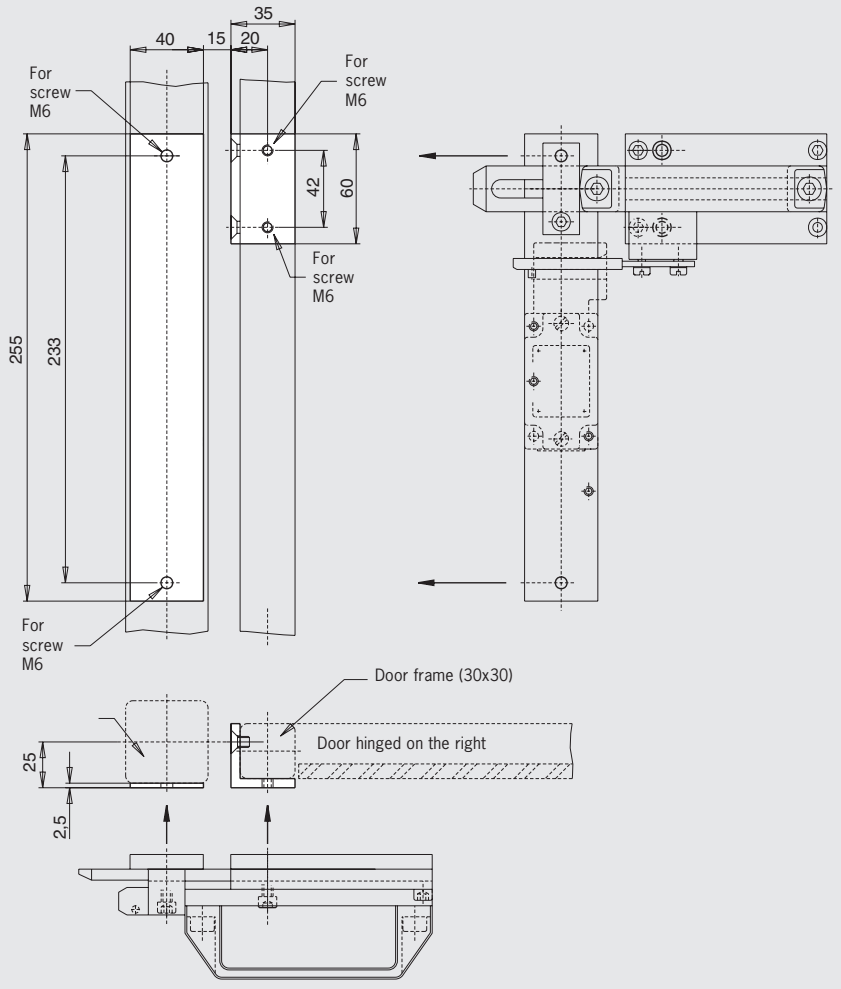
Adapter NZ/TZ

Using the adapter set the **NZ...** and **TZ...** bolts can be fastened to aluminum profiles (Bosch EcoSafe)
The adapter set is only suitable for protection cross-beams 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

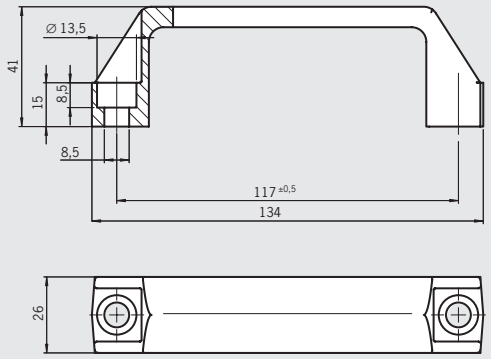


Replacement handle

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

Adapter NZ/TZ...

Dimension drawings



Ordering table

Designation	Version	Order No.
Adapter NZ/TZ 45/30	Incl. 4 fastening screws for elbow adapter	**079 033** Adapter NZ/TZ 45/30
Bolt handle/V5	Packaging unit 5 pieces, screws not included	**093 500** Bolt handle/V5

Overview

Safety switch series

- **N1A** Precision single limit switch
- **NB01** Precision 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
- **STA** Safety switch STA
- **ESH** Safety hinge ESH

Accessories for safety switches

Safety switch series										Accessories		Page
N1A	NB01	NZ	NZ.VZ	NZ.VZ.VS	TZ	NX	TX	STA	ESH			
●												140
	●											142
		●										143
			●									147
				●								149
					●							152
						●						155
							●					157
								●				160
									●			162
										●		163

Precision 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.

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**	**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 element	Snap-action switching element	
Switching element with 1 switching element	**508** 1 NC	-	
Switching element with 2 switching elements	-	**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}	2.5		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		
Conductor cross-section max.		Per wire 1.5 mm²		
Degree of protection according to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		**508**	**514**	
Conventional thermal current I_{th}		6	6	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		6	6	A gG
Utilization category 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	

Connection, plug connector SVM 5 (M12)

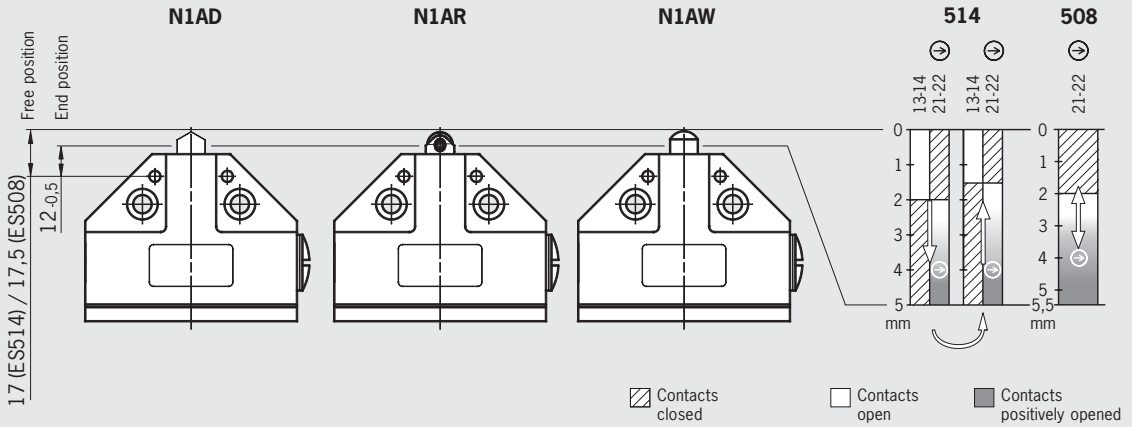
Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection according to IEC 60529		IP 67 [3]	
Rated insulation voltage U_i		30	V AC/DC
Switching element		**514**	
Conventional thermal current I_{th}		4	A
Short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

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. 2000 operating cycles

3) Screwed tight with the related plug connector (see page 115)

Travel diagram N1AD/N1AR/N1AW



Travel diagram N1ARL

Precision 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.

Switch

Parameter	Value		Unit
Housing material	Die-cast aluminum, anodized		
Ambient temperature	- 5 ... + 60		°C
Weight	Approx. 0.2		kg
Switching element	**NB01D**	**NB01R**	
Approach speed max. [1] depending on actuator	20	50	m/min
Operating point accuracy depending on actuator	± 0.02	± 0.05	mm

Switching element

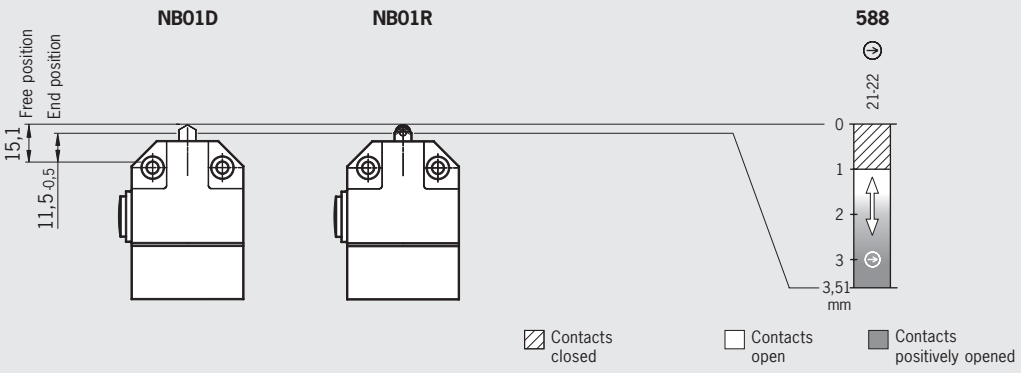
Parameter	Value	Unit
Switching principle	Slow-action switching element	
Switching element with 1 switching element	**588** 1 NC	
Mechanical life	10 x 10^6 operating cycles	
Actuating force, min.	15	N
Min. switching current at 24 V DC	1	mA
Switching current max.	6	A
Rated impulse withstand voltage U_{imp}	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	
Conductor cross-section max.		Per wire 1.5 mm²	
Degree of protection according 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 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.

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**	
	300	60	120	30	20	80	10	m/min
Actuating force, min.	15							N

Switching element

Parameter	Value			Unit
Switching principle	Snap-action switching element	Slow-action switching element		
Switching elements with 2 switching elements	**511** 1 NC + 1 NO	**528H** 1 NC + 1 NO	**538H** 2 NC	
Switching elements with 4 switching elements	-	**2121H** 4 NC	**2131H** 3 NC + 1 NO	**3131H** 2 NC + 2 NO
Min. switching current at 24 V DC	10	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		
Conductor cross-section max.		Per wire 1.5 mm²		
Degree of protection according to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching element **511**	Slow-action switching element **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 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 SVM 5 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE), male socket adjustable (max. 270o) for elbow connector	
Degree of protection according to IEC 60529		IP 67 [2]	
Rated insulation voltage Ui		30	V AC/DC
Switching element		Snap-action switching element **511**, Slow-action switching element **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 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	

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) Screwed tight with the related plug connector (see page 115)

Connection, plug connector SR6

Parameter		Value		Unit
Connection		Plug connector according to DIN 43651		
Version		SR6 (6-pin + PE)		
Degree of protection according to IEC 60529		IP 65 [2]		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching element **511**	Slow-action switching element **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 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 according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	I_e 4 A U_e 24 V	

Connection, plug connector MR9

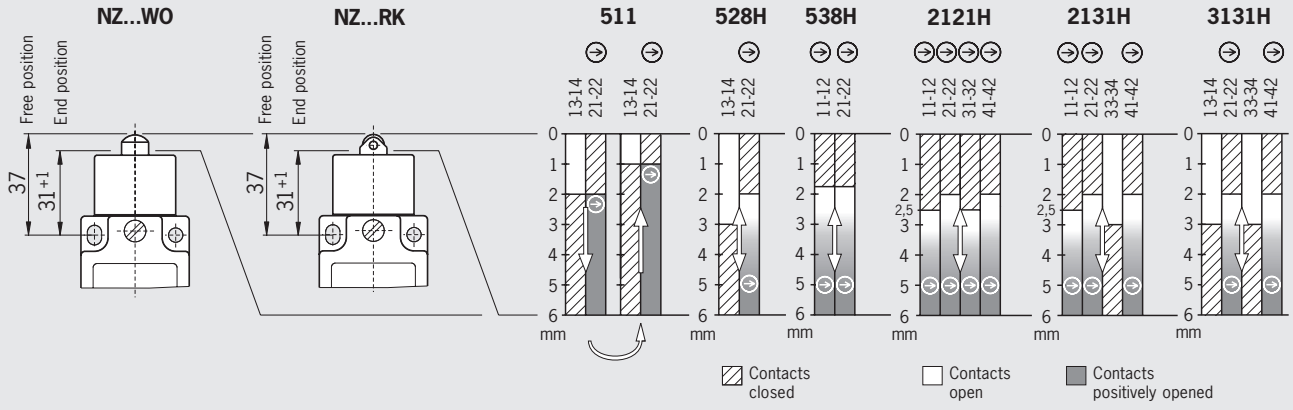
Parameter		Value	Unit
Connection		Plug connector	
Version		MR9 (8-pin + PE)	
Degree of protection according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	I_e 4 A U_e 24 V	

Connection, plug connector SR11

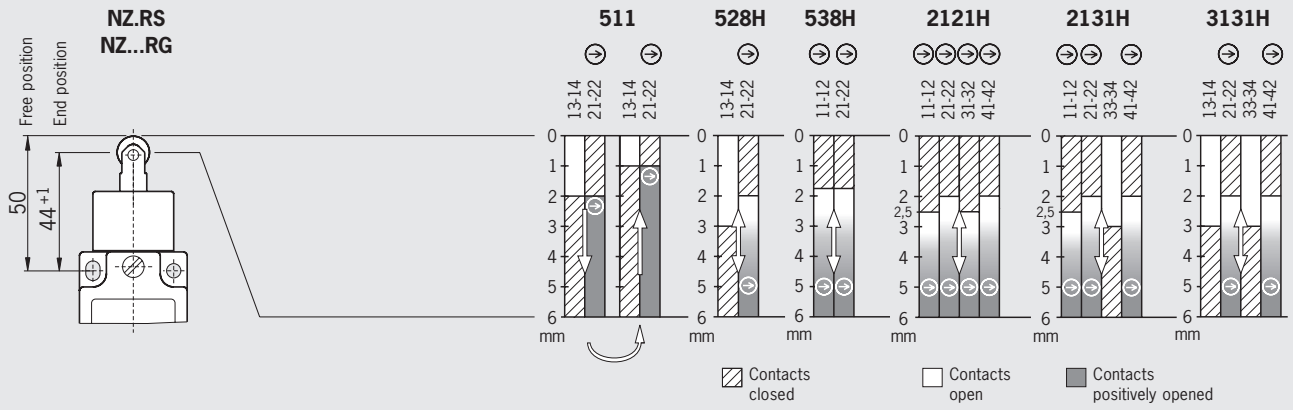
Parameter		Value	Unit
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching element **2121H, 2131H, 3131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 50 V	
	DC13	I_e 4 A U_e 24 V	

2) Screwed tight with the related plug connector (see page 112)

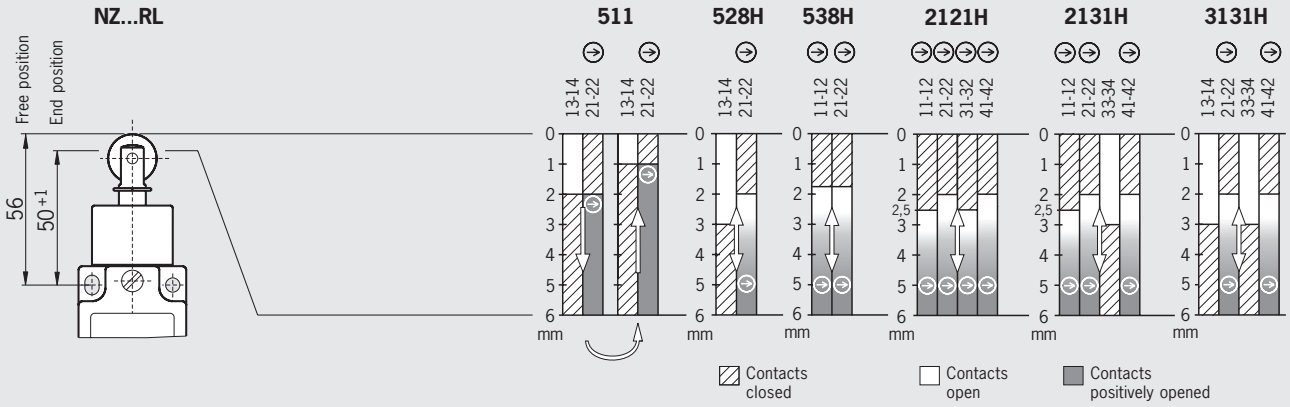
Travel diagram NZ.WO/NZ.RK



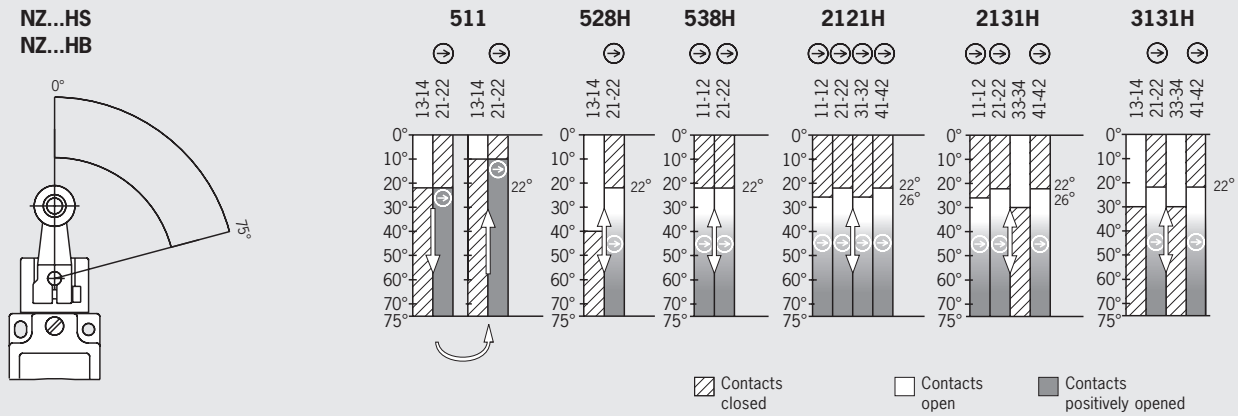
Travel diagram NZ.RS/NZ.RG



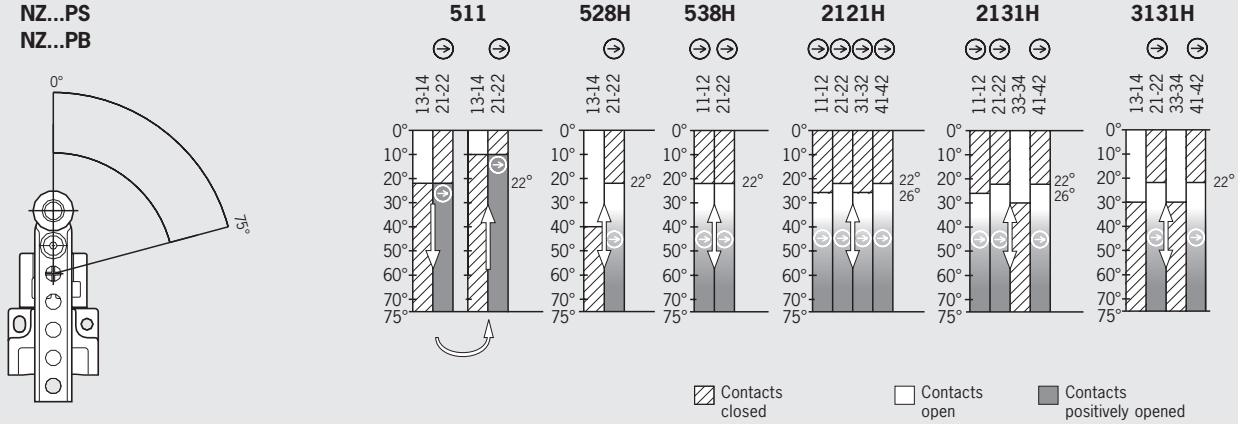
Travel diagram NZ.RL



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.

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
Max. approach speed	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 element	Slow-action switching element		
Switching elements with 2 switching elements	**511** 1 NC + 1 NO	**528H** 1 NC + 1 NO	**538H** 2 NC	
Switching elements with 4 switching elements	-	**2121H** 4 NC	**2131H** 3 NC + 1 NO	**3131H** 2 NC + 2 NO
Min. switching current at 24 V DC	10	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		
Conductor cross-section max.		Per wire 1.5 mm²		
Degree of protection according to IEC 60529		IP 67		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching element **511**	Slow-action switching element **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 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 SVM 5 (M12)

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

1) Screwed tight with the related plug connector (see page 115)

Connection, plug connector C16-1

Parameter		Value	Unit
Connection		Plug connector	
Version		C16-1 (6-pin + PE)	
Degree of protection according to IEC 60529		IP 67 [1]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	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 according to IEC 60529		IP 65 [1]		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching element **511**	Slow-action switching element **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 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 according to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **2131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	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 according to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **2131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	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 according to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching element **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 to IEC 60947-5-1	AC15	I_e 4 A U_e 50 V	
	DC13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 112)

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.

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
Max. approach speed	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.	2000	N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1500	N

Switching element

Parameter	Value			Unit
Switching principle	Snap-action switching element	Slow-action switching element		
Switching elements with 2 switching elements	**511** 1 NC + 1 NO	**528H** 1 NC + 1 NO	**538H** 2 NC	
Switching elements with 4 switching elements	-	**2121H** 4 NC	**2131H** 3 NC + 1 NO	**3131H** 2 NC + 2 NO
Min. switching current at 24 V DC	10	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 (not for NZ.VZ.VSH)

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 43 650			
Conductor cross-section	For technical data on the solenoid plug see page 101			
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		
Conductor cross-section max.		Per wire 1.5 mm²		
Degree of protection according to IEC 60529		IP 65		
Rated insulation voltage U_i		250		V AC/DC
Switching element		Snap-action switching element **511**	Slow-action switching element **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 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) Use only solenoid plug with integrated rectifier

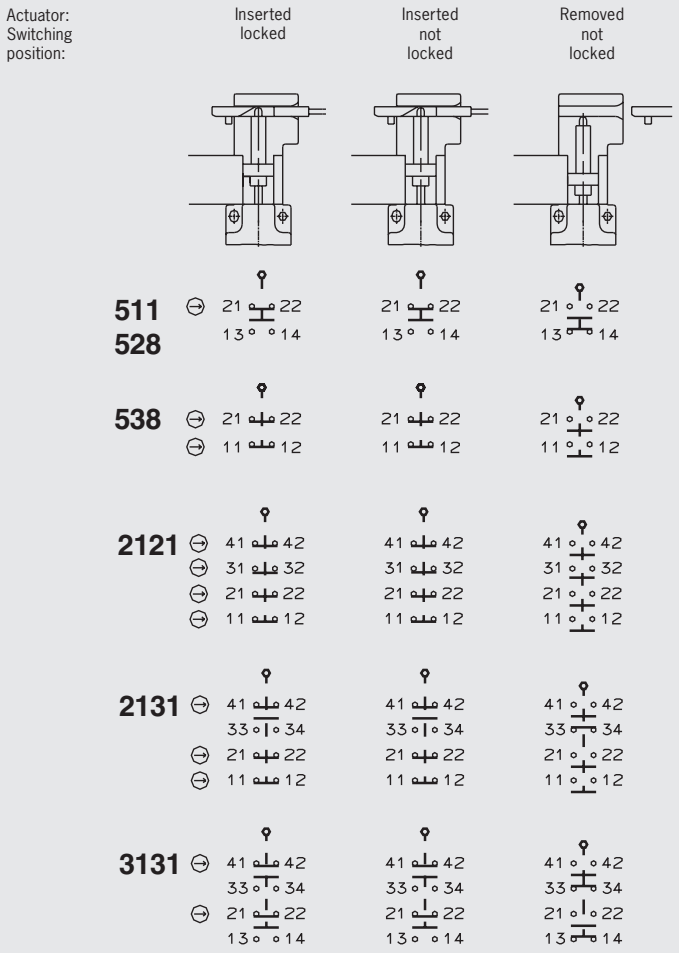
Connection, plug connector SR6 			
Parameter		**Value**	**Unit**
Connection		Plug connector according to DIN 43651	
Version		SR6 (6-pin + PE)	
Degree of protection according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **528H, 538H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category 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 MR8 			
Parameter		**Value**	**Unit**
Connection		Plug connector	
Version		MR8 (7-pin + PE)	
Degree of protection according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		250	V AC/DC
Switching element		Slow-action switching element **2131H**	
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	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 according to IEC 60529		IP 65 [2]	
Rated insulation voltage U_i		50	V AC/DC
Switching element		Slow-action switching element **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 to IEC 60947-5-1	AC15	I_e 4 A U_e 50 V	
	DC13	I_e 4 A U_e 24 V	

2) Screwed tight with the related plug connector (see page 112)

Switching functions NZ.VZ.VS



Safety switch TZ with guard locking and guard lock monitoring

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

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. 1.2	kg
Max. approach speed	20	m/min
Actuating force	35	N
Extraction force	30	N
Retention force	10	N
Locking force, max.	2000	N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1500	N

Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching element		
Switching elements with 2 switching elements	SK: **528H** / ÜK: **528H** 1 NC + 1 NO / 1 NC +1 NO		
Switching elements	SK: **2131H** / ÜK: **3131H**	SK: **2121H** / ÜK: **2121H**	
with 4 switching elements	3 NC + 1 NO / 2 NC +2 NO	4 NC / NC	
Switching current, min., at 24 V	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%	AC 230 V +10/-15%	
Duty cycle ED	100			%
Power consumption	7			W

Connection, cable entry M20 x 1.5

Parameter		Value		Unit
Connection		Screw terminal		
Version		M20 x 1.5		
Conductor cross-section max.		per wire 1.5 mm²		
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 to IEC 60947-5-1	AC15	Ie 4 A Ue 230 V		
	DC13	Ie 4 A Ue 24 V		

Connection, plug connector RC18

Parameter		Value	Unit
Connection		Plug connector	
Version		RC18 (18-pin + PE)	
Degree of protection according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 110 V	
	DC13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 113)

Connection, plug connector SR6

Parameter		Value	Unit
Connection		Plug connector	
Version		SR6 (6-pin + PE)	
Degree of protection according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	I_e 4 A U_e 24 V	

1) Screwed tight with the related plug connector (see page 112)

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 SR11

Parameter		Value	Unit
Connection		Plug connector	
Version		SR11 (11-pin + PE)	
Degree of protection according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 50 V	
	DC13	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 according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	I_e 4 A U_e 24 V	

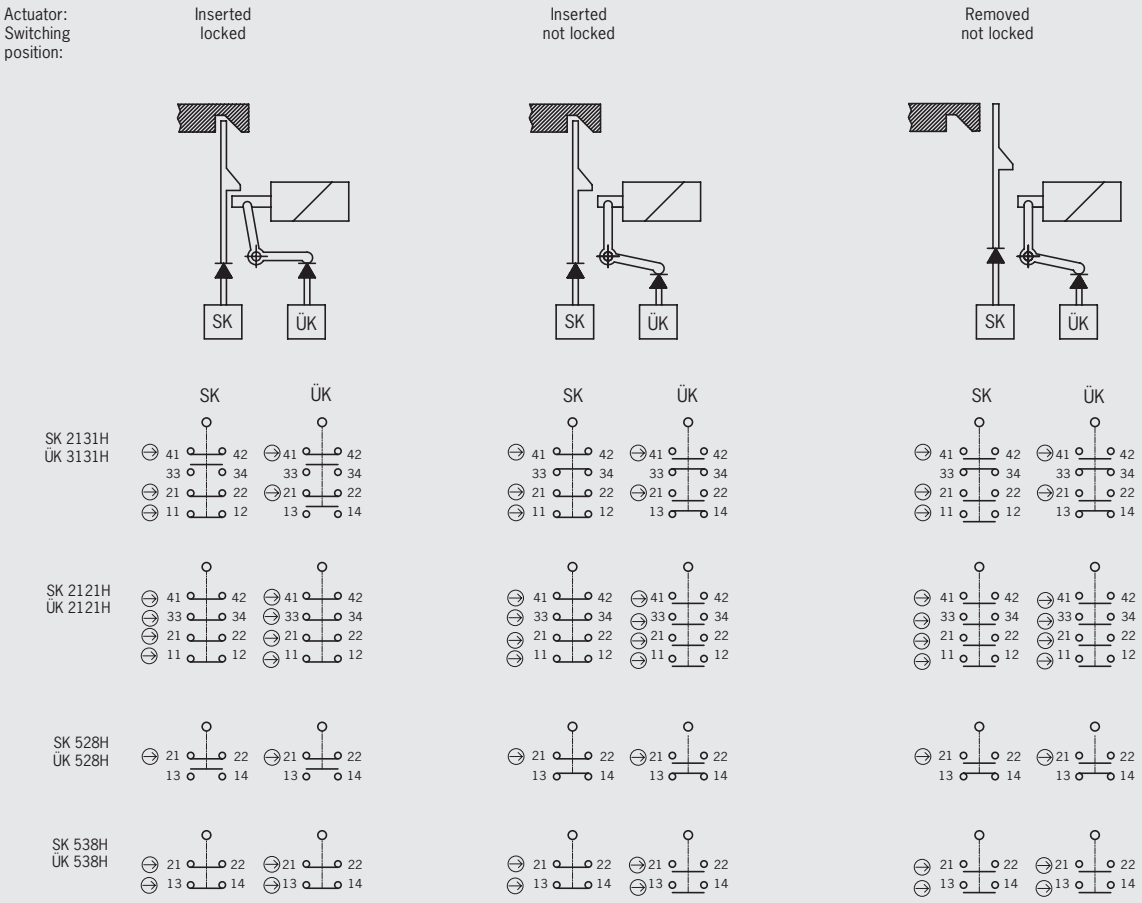
Connection, plug connector MR10

Parameter		Value	Unit
Connection		Plug connector	
Version		MR10 (9-pin + PE)	
Degree of protection according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 230 V	
	DC13	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 according 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 to IEC 60947-5-1	AC15	I_e 4 A U_e 60 V	
	DC13	I_e 4 A U_e 24 V	

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.

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
Max. approach speed	20		m/min
Actuating force	40		N
Extraction force	50		N
Retention force	10		N
Insertion depth	Standard actuators	Overtravel actuator	
Required insertion depths $_{min}$	32	32	mm
Maximum insertion depth s_{max}	33	40	mm
Actuator travel (in the locked state)	6	13	mm

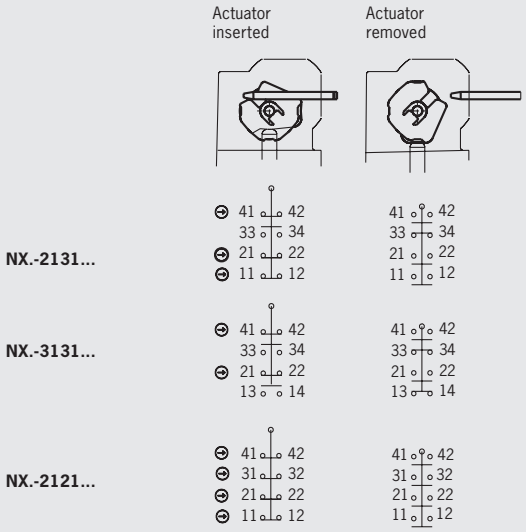
Switching element

Parameter	Value			Unit
Switching principle	Slow-action switching element			
Switching elements with 4 switching elements	**2121** 4 NC	**2131** 3 NC + 1 NO	**3131** 2 NC + 2 NO	
Switching current, min., 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	
Conductor cross-section		0.34 ... 1.5	mm²
Degree of protection according 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 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 lock monitoring

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

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
Max. approach speed	20		m/min
Actuating force	35		N
Extraction force	35		N
Retention force	20		N
Locking force, max.	1700		N
Locking force F_{Zh} in accordance with test principles GS-ET-19	1300		N
Insertion depth	Standard actuators	Overtravel actuator	
Required insertion depths $_{min}$	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 element			
Switching elements	**ETX B**	**ETX C**	**ETX D**	
with 4 switching elements	2 NC + 1 NO + 1 NC	2 NC + 1 NO + 1 NO	2 NC + 2 NC	
Switching current, min., 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%	AC 230 V +10/-15%	
Connection	Reverse polarity protected, integrated bridge rectifier			
Duty cycle ED	100			%
Power consumption	8			W

Connection, cable entry M20 x 1.5

Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Conductor cross-section max.		0.34 ... 1.5 mm²	
Degree of protection according 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 to IEC 60947-5-1	AC15	Ie 4 A Ue 230 V	
	DC13	Ie 4 A Ue 24 V	

Connection, cable entry NPT ½“

Parameter		Value	Unit
Connection		Screw terminal	
Version		NPT ½“	
Conductor cross-section max.		0.34 ... 1.5 mm²	
Degree of protection according 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 to IEC 60947-5-1	AC15	Ie 4 A Ue 230 V	
	DC13	Ie 4 A Ue 24 V	

Connection, plug connector BH10

Parameter		Value	Unit
Connection		Plug connector	
Version		9-pin + PE	
Degree of protection according 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 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 BH12

Parameter		Value	Unit
Connection		Plug connector	
Version		11-pin + PE	
Degree of protection according 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 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

Connection, plug connector SR11

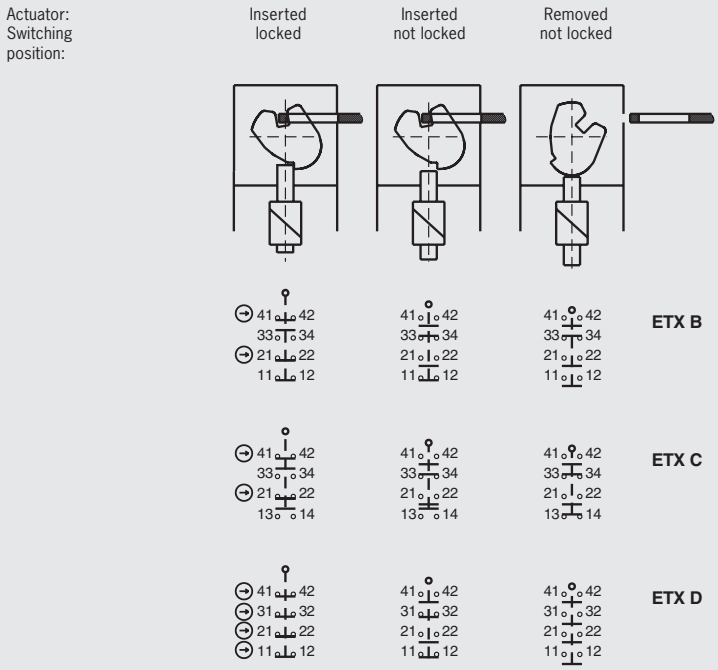
Parameter		Value	Unit
Connection		Plug connector	
Version		11-pin + PE	
Degree of protection according to IEC 60529		IP 65 [1]	
Rated insulation voltage U_i		50	V AC/DC
Rated impulse withstand voltage U_{imp}		1.5	kV
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category 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 RC18

Parameter		Value	Unit
Connection		Plug connector	
Version		18-pin + PE	
Degree of protection according 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 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 113)

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		41–42, 33–34, 21–22, 11–12	41–42, 33–34, 21–22, 11–12	41–42, 33–34, 21–22, 11–12
	ETX C		41–42, 33–34, 21–22, 13–14	41–42, 33–34, 21–22, 13–14	41–42, 33–34, 21–22, 13–14
Switch version	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 STA... with guard locking and guard lock monitoring

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

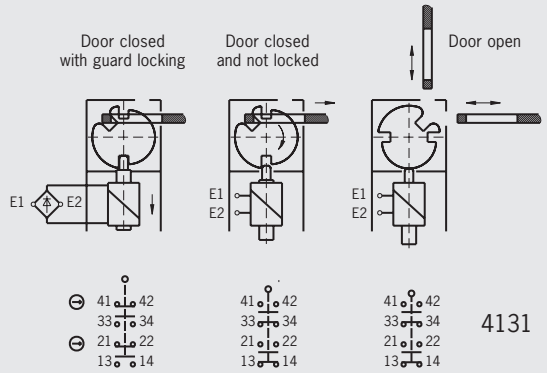
Switch Parameter	Value		Unit
Housing material	Anodized die-cast		
Mechanical life	1 x 10^6 operating cycles		
Ambient temperature	- 20 ... + 80		°C
Weight	Approx. 0.6		kg
Max. approach speed	20		m/min
Actuating force	35		N
Extraction force (not locked)	30		N
Retention force	20		N
Locking force, max.	Approach direction		
	From top (v)	Side (h)	
	2500	2500	N
Locking force F_{Zh} in accordance with test principles GS-ET-19	Approach direction		
	From top (v)	Side (h)	
Straight actuator	2000	2000	N
Insertion depth (minimum required travel + permissible overtravel)	Standard actuator S	Actuator L for insertion funnel	
Approach direction side (h)	24.5 + 5	28.5 + 5	mm
Approach direction from top (v)	24.5 + 5	28.5 + 5	mm

Switching element Parameter	Value				Unit
Switching principle	Slow-action switching element				
Switching elements	**2131**	**4121**	**4131**	**4141**	
with 4 switching elements	2 NC + 1 NO + 1 NC	2 NC + 1 NC + 1 NO	2 NC + 2 NO	2 NC + 2 NC	
Switching current, min., at 24 V DC	1				mA
Switching voltage, min., at 10 mA	12				V
Contact material	Silver alloy, gold flashed				

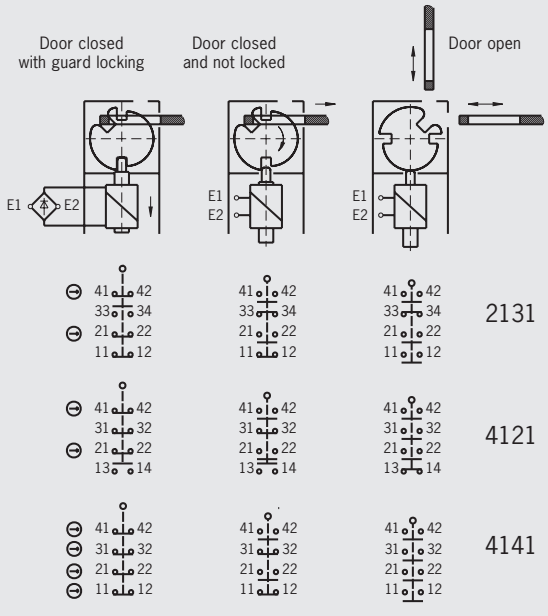
Guard locking Parameter	Value	Unit
Solenoid operating voltage	AC/DC 24 V +10/-15%	
Connection	Reverse polarity protected, integrated bridge rectifier	
Duty cycle ED	100	%
Power consumption	8	W

Connection, cable entry M20 x 1.5 Parameter		Value	Unit
Connection		Screw terminal	
Version		M20 x 1.5	
Conductor cross-section max.		0.34 ... 1.5	mm^2
Degree of protection according to IEC 60529		IP 67	
Rated impulse withstand voltage U_{imp}		2.5	kV
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 to IEC 60947-5-1	AC15	Ie 4 A Ue 230 V	
	DC13	Ie 4 A Ue 24 V	

Switching functions STA1/STA2 without door monitoring contact



Switching functions STA3/STA4 with door monitoring contact



Safety switch ESH

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

Switch

Parameter	Value	Unit
Housing material	Die-cast zinc	
Ambient temperature	- 25 ... + 70	°C
Weight	Approx. 0.77	kg
Pivoting angle	- 10 ... 180	°
Max. load as per mechanical life test acc. to EN 1935	Grade 12 (100 kg door weight)	

Switching element

Parameter	Value		Unit
Switching principle	Snap-action switching element		
Switching element with 2 switching elements	**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 M12

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin + PE)	
Degree of protection according to IEC 60529		IP 67 [1)]	
Rated insulation voltage Ui		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 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 115)

Accessories for safety switches

Solenoid plug

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	Pillar terminals and tab 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	

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	

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	

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	

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	

Safety precautions

Safety switches perform a personal protection function. Incorrect installation or tampering can lead to severe injuries to personnel.
Prior to installation, use and maintenance, it is imperative that you read the operating instructions. Also take into account the following points:

- Safety switches must **not** be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.
- The switching operation on safety switches with separate actuator must only be triggered by actuators specifically provided for this purpose which are permanently connected to the safety guard.
- Mounting and electrical connection must be performed only by authorized personnel.
- Safety switches and actuators must not be used as an end stop.
- Switching elements are not allowed to be replaced on safety switches.
- Series NZ..VZ..VS and TZ safety switches with locking solenoids are not allowed to be used in potentially explosive atmospheres.
- If damaged or worn, safety switches must be replaced as a unit.

Assembly instructions

Safety switches with safety function

- To obtain the required isolating distance, the trip dog setting distance shown in the dimension drawing must be observed (see technical data, travel diagrams). Actuating elements, e. g. cam approach guides, must be positively mounted according to EN 1088, i.e. riveted, welded or secured in some other way against becoming loose.
- Safety switches must not be used as an end stop.
  It must be ensured that the safety switch does not move after adjustment.
  It must be possible to replace safety switches without the need for re-adjustment.

Safety switches with separate actuator

- The safety switch and actuator must be installed properly. The actuator must be positively mounted, e. g. by using safety screws (are included with the actuator) or by welding, riveting, or pinning.
- Safety switches must not be used as an end stop.
  Safety switches must be mounted such that they can be replaced.
- A hazard analysis must be prepared as per the Machinery Directive. The hazardous point must be classified with the aid of type C standards or EN 954-1 or its successor. Safety switches must be chosen to match this classification and the information given in DIN EN 1088.

Overview of the most important standards on machinery safety

Type A standards		
(EN 292-1)	ISO 12100-1	Safety of machinery. Basic concepts, general principles for design. Part 1: Basic terminology, methodology
(EN 292-2) withdrawn	ISO 12100-2	Safety of machinery. Basic concepts, general principles for design. Part 2: Technical principles and specifications
EN 1050 withdrawn	ISO/DIS 14121	Safety of machinery. Principles for risk assessment
Type B standards		
EN 294		Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs
EN 418		Safety of machinery. Emergency stop equipment, functional aspects. Principles for design
EN 547-1		Safety of machinery- Human body measurements. Part 1: Principles for determining the dimensions required for openings for whole body access into machinery
EN 574		Safety of machinery. Two-hand control circuits. Functional aspects. Principles for design
EN 811		Safety of machinery. Safety distances to prevent danger zones being reached by the lower limbs
EN 953		Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards
EN 954-1	ISO 13849-1	Safety of machinery. Safety related parts of control systems. Part 1: General principles for design
EN 954-2	ISO 13849-2	Safety of machinery. Safety related parts of control systems. Part 2: Validation
EN 954-100		Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen – Leitfaden für Benutzung und Anwendung der EN 954-1 (Safety of machinery. Safety related parts of control systems. Guidelines on the use and application of EN 954-1)
EN 999		Safety of machinery. The positioning of protective equipment in respect of approach speeds of parts of the human body
EN 1037		Safety of machinery. Prevention of unexpected start-up
EN 1088		Safety of machinery. Interlocking devices associated with guards. Principles for design and selection.
EN 60204-1	IEC 60204-1	Safety of machinery. Electrical equipment of machines. Part 1: General requirements
EN 60204-11	IEC 60204-11	Safety of machinery. Electrical equipment of machines. Part 11: Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV
EN 60204-31	IEC 60204-31	Safety of machinery. Electrical equipment of machines. Part 31: Particular safety and EMC requirements for sewing machines, units and systems
EN 60204-32	IEC 60204-32	Safety of machinery. Electrical equipment of machines. Part 32: Requirements for hoisting machines
EN 62061	IEC 62061	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
EN 61496-1	IEC 61496-1	Safety of machinery. Electro-sensitive protective equipment. Part 1: General requirements and tests
EN 61496-3	IEC 61496-3	Safety of machinery. Electro-sensitive protective equipment. Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse reflection (AOPDDR)
EN 61508	IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems.
Type C standards		
EN 201		Rubber and plastics machines. Injection moulding machines. Safety requirements
EN 415-1		Safety of packaging machines. Part 1: Terminology and classification of packaging machines and associated equipment
EN 415-2		Safety of packaging machines. Part 2: Pre-formed rigid container packaging machines
EN 415-3		Safety of packaging machines. Part 3: Form, fill and seal machines
EN 415-4		Safety of packaging machines. Part 4: Palletizers and depalletizers

EN 422		Rubber and plastics. Machines. Safety. Blow moulding machines intended for the production of hollow articles. Requirements for the design and construction
EN 692		Mechanical presses. Safety
EN 693		Machine tools. Safety. Hydraulic presses
EN 775	ISO 10218	Industrial robots. Recommendations for safety
EN 931		Footwear manufacturing machines. Lasting machines. Safety requirements
EN 848-1		Safety of woodworking machines. One side moulding machines with rotating tool. Part 1: Single spindle vertical moulding machines
EN 848-2		Safety of woodworking machines. One side moulding machines with rotating tool. Part 2: Single spindle handfed/integrated fed routing machines
EN 848-3		Safety of woodworking machines. One side moulding machines with rotating tool. Part 3: Numerical control (NC) boring machines and routing machines
EN 972		Tannery machines. Reciprocating roller machines. Safety requirements
EN 1010		Safety of machinery. Safety requirements for the design and construction of printing and paper converting machines.
EN 1114-1		Rubber and plastics machines. Extruders and extrusion lines. Part 1: Safety requirements for extruders
EN 1114-2		Rubber and plastics machines. Extruders and extrusion lines. Part 2: Safety requirements for die face pelletizers
EN 1114-3		Rubber and plastics machines. Extruders and extrusion lines. Part 3: Safety requirements for haul-offs
EN 1218-1		Safety of woodworking machines. Tenoning machines. Part 1: Single end tenoning machines with sliding table
EN 1870-1		Safety of woodworking machines. Circular sawing machines. Part 1: Circular saw benches (with and without sliding table) and dimension saws
EN 1870-9		Safety of woodworking machines. Circular sawing machines. Part 9: Double blade circular sawing machines for cross-cutting with integrated feed and with manual loading and/or unloading
EN ISO 11111	ISO 11111	Textile machinery. Safety requirements
EN 12415		Safety of machine tools. Small numerically controlled turning machines and turning centres
EN 12417		Machine tools. Safety. Machining centres
EN 12478		Safety of machine tools. Large numerically controlled turning machines and turning centres
EN 12622		Safety of machine tools. Hydraulic press brakes

OSHA standards		
29 CFR 1910.147		The Control of Hazardous Energy
29 CFR 1910.211		Definitions
29 CFR 1910	Subpart O	Machinery and Machine Guarding
29 CFR 1910.212		General Requirements for all machines
29 CFR 1910.213		Woodworking machinery requirements
29 CFR 1910.215		Abrasive wheel machinery
29 CFR 1910.217		Mechanical power presses
29 CFR 1910.217	App A	Mandatory requirements for certification / validation of safety systems for presence sensing device initiation of mechanical power presses
29 CFR 1910.217	App B	Nonmandatory guidelines for certification / validation of safety systems for presence sensing device initiation of mechanical power presses
29 CFR 1910.217	App C	Mandatory requirements for OSHA recognition of thirdparty validation organizations for the PDSI standard
29 CFR 1910.219		Mechanical Power-transmission Apparatus
29 CFR 1910	Subpart P	Hand and Portable Power Tools and Other Hand-Held Equipment
29 CFR 1910.242		Hand and portable powered tools and equipment, general
29 CFR 1910.243		Guarding of portable powered tools
29 CFR 1910	Subpart S	Electrical

29 CFR 1910.303	General requirements
29 CFR 1910.304	Wiring design and protection
29 CFR 1910.305	Wiring methods, components, and equipment for general use
29 CFR 1926.300	General Requirements
29 CFR 1926.301	Hand Tools
29 CFR 1926.302	Power-operated Hand Tools
29 CFR 1926.303	Abrasive Wheels and Tools
29 CFR 1926.304	Woodworking Tools
29 CFR 1926.307	Mechanical Power –Transmission Apparatus
29 CFR 1926.555	Conveyors

ANSI Standards	
ANSI B5.37-1970	External Cylindrical Grinding Machines - Centerless
ANSI B5.42-198	External Cylindrical Grinding Machines – Universal
ANSI B5.52M-1980	Presses, General Purpose, Single Point Gap Type, Mechanical Power (Metric)
ANSI B7.1-2000	Safety Code for the Use, Care and Protection of Abrasive Wheels
ANSI B11.1-1988	Machine Tools – Mechanical Power Presses, Safety Requirement for Construction, Care, and Use
ANSI B11.3-1982	Power Press Brakes, Safety Requirements for the Construction, Care, and Use of
ANSI B11.4-1993	Shears - Safety Requirement for Construction, Care, and Use
ANSI B11.9-1975	Grinding Machines, Safety Requirements for the Construction, Care, and Use of
ANSI B11.12-1975	Roll-Forming and Roll-Bending Machines - Safety Requirement for Construction, Care, and Use
ANSI B11.19-1999	Performance Criteria for the Design, Construction, Care and Operation of Safeguarding when Referenced by the Other Machine Tool Safety Standards
ANSI B11.20	Manufacturing Systems/Cells
ANSI B11-TR3-2000	Risk Assessment and Risk Reduction - A Guide to Estimate, Evaluate and Reduce Risks Associated with Machine Tools
ANSI B15.1-53	Code for Mechanical Power Transmission Apparatus
ANSI B20.1-57	Safety Code for Conveyors, Cableways, and Related Equipment
ANSI B65.1-1995	Safety Standard – Printing Press Systems
ANSI O1.1-54	Safety Code for Woodworking Machinery

RIA, NFPA Standards	
NFPA 79 (2002)	Electrical Standard for Industrial Machinery
RIA 15.06-1999	Industrial Robots and Robot Systems - Safety Requirements

JIS standards in English	
JIS B 6014:1980	General code of safety for machine tools
JIS B 6507:1981	General code of safety for wood working machinery
JIS B 6607:1983	Safety standards for construction of band saw machines with feed carriages
JIS B 9650:1988	General design rules for safety and sanitation of food processing machinery
JIS B 9651:1988	Design rules for safety and sanitation of baking machinery
JIS B 9652:1988	Design rules for safety and sanitation of cake making machinery
JIS B 9653:1988	Design rules for safety and sanitation of meat processing machinery
JIS B 9654:1988	Design rules for safety and sanitation of marine product machinery

Glossary

Actuating force
Switches with safety function:
The actuating force is the minimum force required to perform a switching operation.

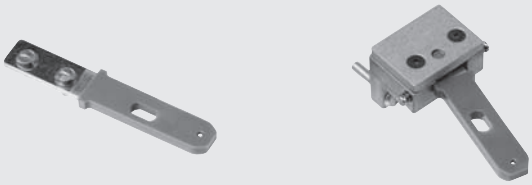
Switches with separate actuator:
The actuating force is the force required to insert the actuator in order to thus perform a switching operation.

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 with safety function:
Mechanical element on a safety position switch that triggers the switching operation. Actuators are available in different forms, for example as roller plungers, chisel plunger or roller arms.

Roller plunger Chisel plunger Roller arm

Switches with separate actuator:
On switches *with separate actuator* the actuating element is separate from the *safety switch*. The design of the actuators is matched (coded) to the safety switch so that *tampering* using simple means (screwdriver, pieces of wire) is not possible



Hinged actuator

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.

Bolt
Bolts function as follows: the bolt tongue mechanically guides the *actuator* when it is inserted in 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 holder 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 with guard locking

Category
The *categories* according to EN 954-1 (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.

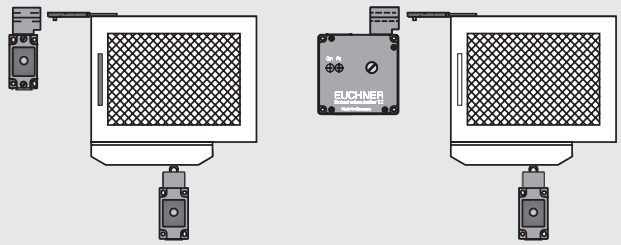
Closed-circuit current principle
On a *safety guard* with *guard locking* based on the closed-circuit current principle, the safety guard is locked by spring force until the interlocking solenoid is supplied with power. Unlocking is by solenoid force. The term *mechanical guard locking* is also used.

Cyclic mode
An *operating mode* in which the working space on the machine is opened during every operating cycle and the operator therefore frequently needs to work in the *danger area*.

Danger area
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. After the IP there are 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 (BGI 575)

Diversity
Diversity is the use of two different concepts to provide a function. For instance, the use of a switch *with safety function* and a switch *with separate actuator* on a *safety 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 safety guard without guard locking, with system diversity.

Movable safety guard with guard locking, with system diversity.

Electrical guard locking
Guard locking based on the *open-circuit current principle*.

Emergency release
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 NO contacts.

Enabling switch
If a *safety 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 safety guard from within the *danger area* 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*

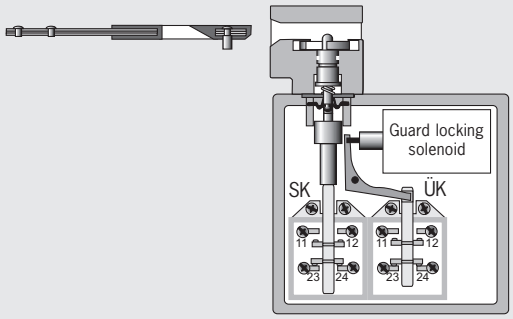
Extraction force
The extraction force is the required minimum force to achieve positively driven opening of all NC contacts.

Guard locking
The guard locking retains a movable safety guard in the closed position until the machine can no longer pose any risk of injury. With the guard locking open, unintentional starting of the machine is prevented.

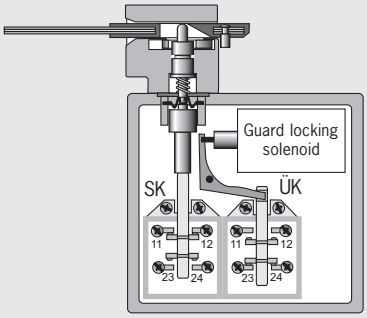
Guard lock monitoring
The guard lock monitoring monitors the position of the interlocking solenoids. This device is positively linked to the switching element ÜK via a locking arm. On intentional or unintentional unlocking of the interlocking solenoid, the positively driven contact in this switching element is actuated and therefore signals the position of the interlocking solenoid.

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

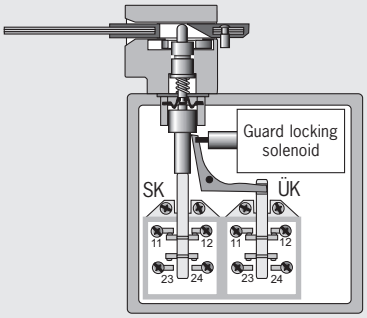
❶ Door open and not locked



❷ Door closed and not locked

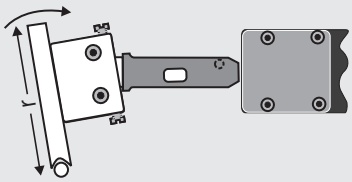


❸ Door closed and locked



Hazardous states
Potentially hazardous conditions are states that could result in injury. ◦*Safety switches*, if the ◦*safety guard* used correctly, prevent this hazard (cf. ◦*safe state*).

Hinged actuator
The hinged actuator is, unlike the straight actuator, spring mounted and as a result the actuator can be inserted in the actuator 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 1088 an interlocking device is a mechanical, electrical or other device with the purpose of preventing operation of the machine under certain conditions (usually as long as a ◦*movable safety guard* is not closed).

Locking force
The locking force is the force that ◦*guard locking* can withstand on switches ◦*with separate actuator*.
The locking force in accordance with GS-ET 19 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} in accordance with GS-ET 19 is 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
On the failure of ◦*guard locking*, the locking can be released from the access side using a mechanical release. 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.

Movable safety guard
A movable ◦*safety guard* is the part of the machine that is used as a barrier to protect against hazards. Movable safety guards form a physical barrier to the ◦*danger area*. They can be, e. g. safety doors, covers, fences, housings, etc.

Open-circuit current principle
On a ◦*safety guard* with ◦*guard locking* based on the open-circuit current principle, the safety guard is locked until the power supply to the interlocking 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 the selection of an operating mode can cause a hazardous situation, the selection of this operating mode must be prevented by suitable means (e. g. key-operated switch, access code). The selection of an 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 operating mode selection 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 behaviour under **F**ault conditions
Proximity switches with defined behavior under fault conditions (see EN 60947-5-3).

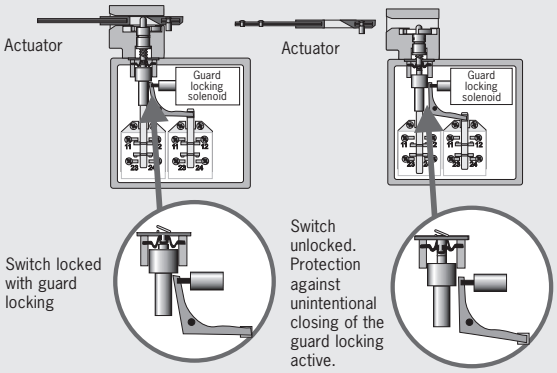
Position switch
Position switches are used to acquire the position of axes or moving ◦*safety guards*. As soon as a position switch is used as a safety-relevant component, the term position switch with safety function or safety-related position switch is used. In this case the switching element must 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, positively driven contact
The achievement of contact separation by a positive movement of the ◦*actuating element* is termed positively driven. ◦*Switching elements* with this switching behavior are termed positively driven contacts. These NC contacts are drawn with the symbol shown below. Switches must also meet the requirements of EN 60947-5-1 annex K.

Symbol for a positively driven contact

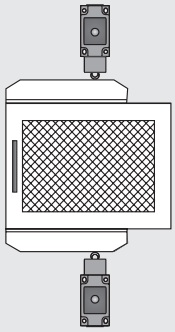
Protection against unintentional closing
Protection against unintentional closing of an interlocking device with ◦*guard locking* mechanically prevents the ◦*safety switch* changing to the locked position with the ◦*safety guard* open and therefore signaling a safe state.



Protective plate
For switches with separate actuator, 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 always maintain the same safety function 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 954-1), 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 safety 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 switch 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 and the severity of injury in a hazardous situation.

Risk assessment
The ▸*standard* EN 1050 contains procedures necessary to perform a risk assessment. The risk assessment initially involves a risk analysis and a subsequent risk evaluation. In EN 954-1 there is a simple procedure for determining the required ▸*category* to match the ▸*risk*.

Safe state
A safe state is provided if no hazard can be produced by a system or machine on correct use (cf. ▸*hazardous situations*).

Safety guard
A safety guard is intended to protect people, products and the environment from hazards. A differentiation is made between ▸*movable safety guards* and fixed safety guards.

Safety relays
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 ▸*safety guard* is opened. In this way unintentional machine starting is prevented when the safety 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).

Single-fault tolerance
Single-fault tolerance means that even after the occurrence of a single failure, the agreed safe function continues to be provided.

Slow-action contact element
A slow-action contact element is characterized by the opening of the switching element as a function of the speed at which the ▸*actuator* is moved.

Snap-action contact element
On snap-action contact elements the ▸*switching element jumps* to the other switch state from a defined ▸*actuator* position. The movement of the switching element is independent of the speed at which the actuator is moved. Snap-action contact elements typically have hysteresis.

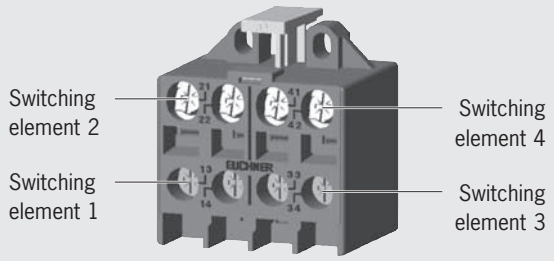
Standards
The European Machinery directive states that if harmonized standards are observed, it is allowed to assume that the directive is met. Standards specify the requirements of the directive in more detail and as a rule represent the *general state-of-the-art*. Manufacturers of ▸*safety switches* must comply with EN 60947-5. All EUCHNER safety switches comply with this standard.

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 (EN 60204-1).

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 60204-1.

Switching elements
Switching elements are fitted in position switches. Switching elements are available with a normally closed function, with a normally open function and as ▸*positively driven contacts*. EUCHNER supplies switching elements with one, two, three and four contacts for the various switch types. Switching elements can be ▸*slow-action contact elements* or ▸*snap-action contact elements*.



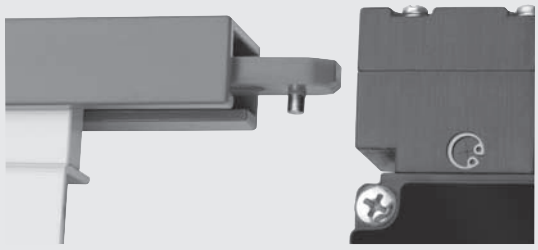
Quadruple switching element

Tampering
Tampering is the conscious disabling or bypassing of ▸*safety guards* and their components. ▸*Safety switches* and other safety device must be designed such that the protective function cannot be changed or bypassed 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* (BGI 575) is:
- The dismantling of parts
- 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 safety guards, straightforward and correct operation of machines and systems must be possible. If this aspect is not taken into account, the probability of bypassing 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.

With safety function and with separate actuator (switches)
▸*Safety switches* are divided into two different functional types. On switches with safety function the ▸*actuator* is permanently connected to the switch, on switches with separate actuator, the actuator is separate and is mounted on the ▸*safety guard*.


With safety function


With separate actuator

Index by item designation

Index by order number

Overview of Range

Automation

Position Switches
- Position Switches
- Position Switches according to EN 50 041

Precision Multiple Limit Switches

Inductive Limit Switches

Plug Connectors

Trip Rails/Trip Dogs

Inductive Ident Systems

Safety

Safety Switches, Metal Housing
- Safety Switches NZ/TZ
- Safety Switches NX/TX

Safety Switches, Plastic Housing
- Safety Switches NM
- Safety Switches NP/GP/TP
- Safety Switches STM
- Safety Switches STP

Non-Contact Safety Switches
- Non-Contact Safety Switches CES/CEM, Transponder Coding
- Non-Contact Safety Switches CMS, Magnetic Coding

Safety Products with integrated Bus Interface

Bolts for Safety Guards

Enabling Switches

Safety Relays
- Safety Relays ESM
- Modular Safety System ESM-F

Rope Pull Switches

ManMachine

Joystick Switches

Electronic Handwheels

Pendant Stations
- Pendant Stations HBA
- Pendant Stations HBE/HBL

Electronic-Key-System

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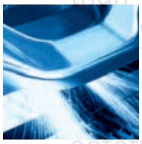
Automation



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