Safety Switches

NX/TX

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

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Product description

On machines and systems that perform dangerous movements and that could injure persons in the vicinity, the EU Machinery directive requires the fitting of safety guards.

Safety switches have the task of monitoring the position of the moving part of the safety guard. If guard locking is necessary for reasons of process protection or the protection of personnel, safety switches with electromechanical guard locking are used.

The safety switches NX and TX from EUCHNER are characterized by their robust, metal encapsulated housing. This feature enables the switches to be used in many sectors and applications. The advantages of these switches make them the optimal choice for harsh environments.

The safety switches NX/TX have the following specific advantages:

- High degree of protection IP 67
- Housing material made of die-cast alloy
- High quality dipped housing surface finish, resistant to many fuels and oils
- High locking force of 1500 N in locked state on the safety switch TX

The safety function on the safety switch NX is only obtained when the safety guard is opened or the actuator removed. As the switch does not have a locking function, the actuator can be removed from the switch at any time. This means that immediately after the safety guard is opened, the safety contacts are opened and a machine stop is initiated - independent of the machine cycle currently being performed.
These switches are used, for instance, to protect dangerous points that have, e.g. hinged or sliding doors, flaps and removable covers.

The safety switch TX complies with the requirements in EN 1088 sec. 3.4 for an interlocking device with guard locking. On machines and systems with dangerous overtravel, this switch prevents premature operator access to the system.
To perform the cyclic unloading and loading processes on a system as quickly as possible, operators have a tendency to await the safety switch release process by pulling on the safety guard. However, with almost all standard safety switches it is not possible to release the door if the safety door is pulled hard and the safety switch is placed under load.
The EUCHNER safety switch TX3 is designed for exactly this task:
Even at very high tensile forces on the actuator, the safety switch can be reliably released. On release the solenoid coil is briefly over-excited by the integrated electronics. The increased magnetic force makes possible release under load.

The sequential switching characteristic of the safety switch TX enables the actuator to be monitored (inserted/removed) and the solenoid to be monitored (locked/released) using one switching element. This feature yields the benefit of a compact, slim design.
The switch is excellently suited to attachment to safety guards made of aluminum profiles.

The mounting plates developed for this purpose make it possible to straightforwardly and rapidly mount the switch and actuator to the safety guard using slot nuts.

The large opening funnels on the safety switches NX/TX enable the actuator to be reliably inserted in the actuator head even with a safety guard misalignment of ± 5 mm.
Even in the locked state the safety door can move a distance of 6 mm in the actuating direction.
Here the advantage of the safety switch is again clear: it provides the user considerable freedom of movement on the safety door.

The safety switch actuating head can be approached both horizontally and vertically.
The adjustment of the actuating head in 90° steps aids the flexible attachment of the safety switch NX/TX to the safety guard frame. This flexibility results in numerous installation options.
It is also very easy to change the approach direction:
After the removal of the switch cover, the actuating head can be placed in the required position with a light rotary movement (bayonet joint). With the switch cover closed, it is no longer possible to move the actuating head.

If, for safety reasons, the actuating head is to be fastened to the switch such that it cannot be rotated, the actuating head can be fixed in position using the two locking pins included. Changing the approach direction and the use of the locking pins is described on page 5.

The safety switches NX/TX are available in the following versions:

- Cable entry (with metric thread M20 or NPT ½") or plug connector (19-pin Coninvers or 12-pin MIN-SERIES SIZE III, US Standard)
- Mechanical or electrical locking
- Solenoid voltages AC/DC 24 V or AC 110/230 V
- Various switching elements (contact assemblies)
- Switching elements with door monitoring contact or door unlock request contact.

As standard the safety switches TX have a mechanical release that can be operated with the aid of simple tools (screwdriver). As an option EUCHNER can provide a lock or a manually operated release (with and without detent mechanism) as the mechanical release.
Furthermore, as standard this switch has 2 LEDs (red/green) that the user can control as required. The convex displays are fitted to the housing cover such that they are raised and the state of the indicator can be clearly seen from the side even at larger distances.

The solenoids in the safety switch TX are equipped with a bridge rectifier ahead of the solenoid. In this way the guard locking can be operated with both DC and AC. There is no need for external interference suppression units.

EUCHNER provides switch variants with a door unlock request contact with the following function:
When the actuator is locked and the safety door is pulled, a signal is sent to the control system. Depending on the control concept, the safety guard can be unlocked automatically – when overtraveling machine components have stopped. Particularly on extensive machines the operator is saved the need to walk to the control panel.

The entire safety switch TX range is rounded off by actuators made of stainless steel, a bolt especially designed for aluminum profiles and related accessories.

The 4 switching contacts can handle switching currents from 1 mA to 4 A. The ability to switch low currents makes it possible to connect the safety switches NX/TX directly to safe control systems, as are becoming increasingly important as technology progresses.

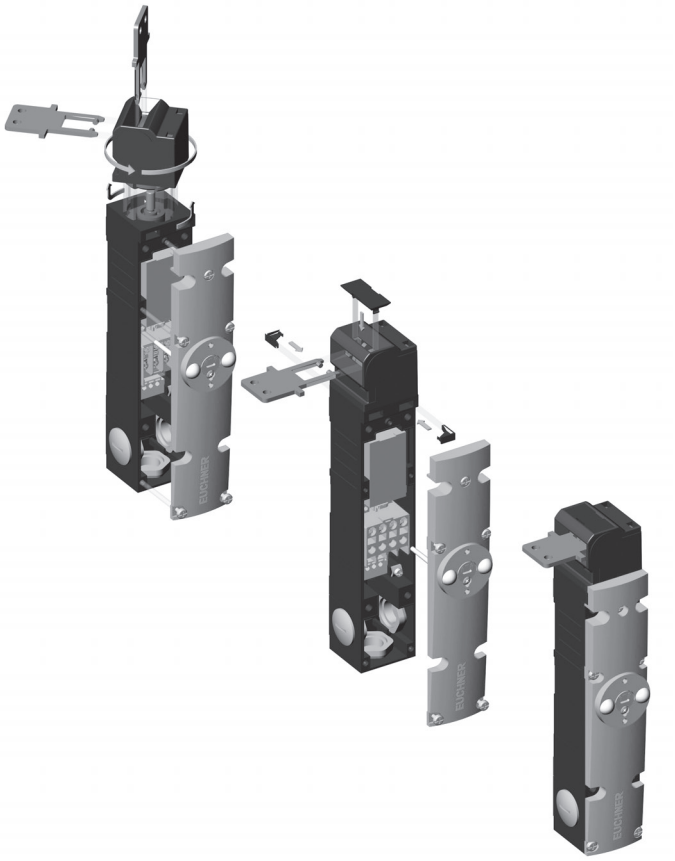
Advantages of the safety switch NX

- Robust housing made of die-cast alloy with cathodically dipped surface finish
  - High corrosion protection
  - Resistant to aggressive liquids
- Slender design
  - Suitable for mounting on profiles
- Large opening funnel for actuators
  - Large tolerances on the insertion of the actuator
  - Actuator insertion also on misalignment of the safety guard (± 5 mm)
- Large freedom of movement of the actuator (up 13 mm actuator travel)
- Straightforward and quick adjustment of the actuating head to 4 approach directions, plus an approach direction from above
- Possible to lock the actuating head against twisting
- 3 cable entries with optional cable entry from the rear
- Optional two LED function display on the safety switch
  - Local status indication at the safety guard
- Actuating head can be replaced

Advantages of the safety switch TX

- Robust housing made of die-cast alloy with cathodically dipped surface finish
  - High corrosion protection
  - Resistant to aggressive liquids
- Slender design
  - Suitable for mounting on profiles
- Large opening funnel for actuators
  - Large tolerances on the insertion of the actuator
  - Actuator insertion also on misalignment of the safety guard (± 5 mm)
- Large freedom of movement of the actuator (up 13 mm actuator travel) in the locked state
- Straightforward and quick adjustment of the actuating head to 4 approach directions, plus an approach direction from above
- Possible to lock the actuating head against twisting
- Pulling the door does not prevent the switch from being released
- 3 cable entries with optional cable entry from the rear
- Different solenoid operating voltages
- 2 LED function displays on the safety switch
  - Local status indication at the safety guard
- Mechanical release from the front (standard)
- Lock for mechanical key release (optional)
- Integrated bridge rectifier on all designs
  - One version for 24 V DC and AC
- Different switching functions with
  - Door monitoring contact and
  - Door unlock request contact
- Actuating head can be replaced

Changing the approach direction
(based on the example of the safety switch TX)
The locking pins supplied can be used to prevent twisting and removal of the actuating head when the housing cover is removed.

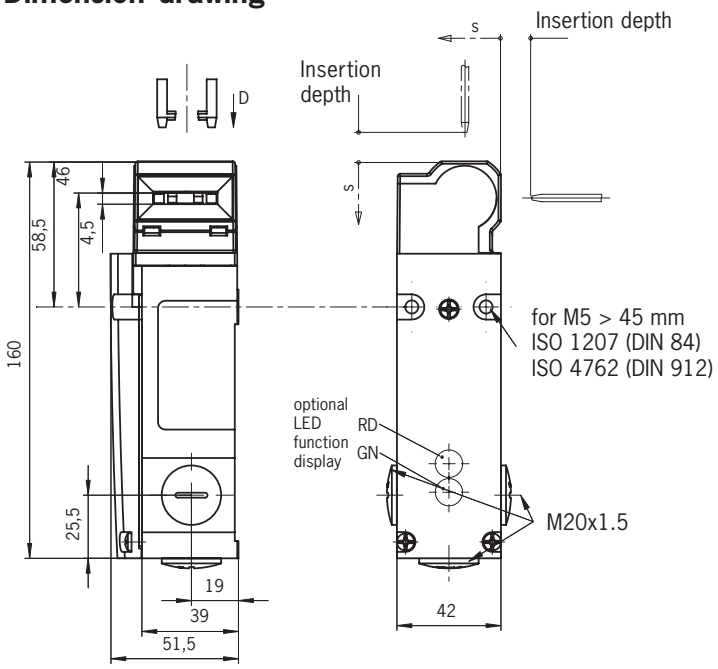


Safety switches NX...

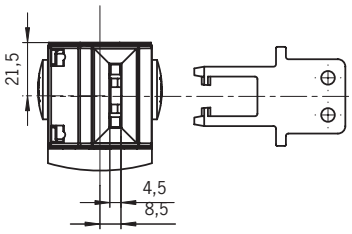
- **With 4 switching elements**
- **With cable entry M20x1.5**
- **With optional LED function display**

* Approval pending

Dimension drawing



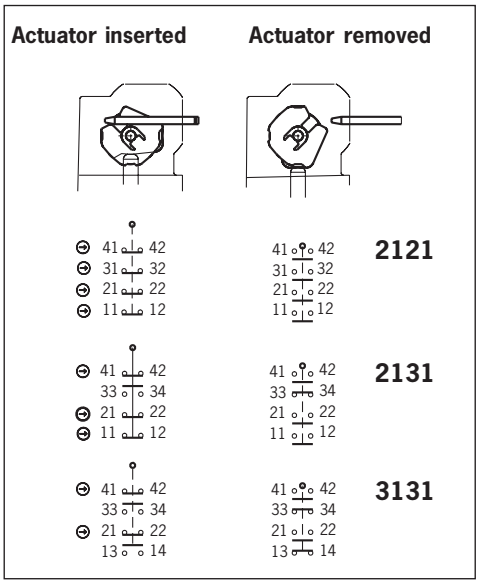
Please order actuator separately.
(See page 19)



Switching element

(Slow-action switching element)

2121 4 NC ⊖
2131 3 NC ⊖ + 1 NO
3131 2 NC ⊖ + 2 NO



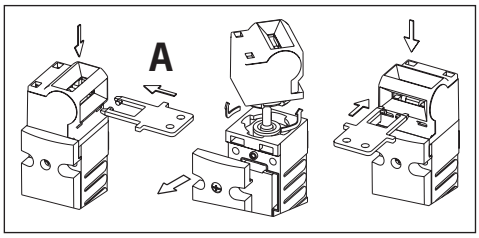
Optional LED function display

Red/green: Wiring customer-specific.

Notes on installation

The safety switch and actuator must be installed properly. The actuator must be positively connected with the mounting surface, e.g. by using safety screws (see page 20) or by welding, riveting, pinning. The safety switch must not be used as an end stop.

Changing the approach direction



⚠ In the event of faults, the complete safety switch must be replaced.

Technical data

Parameters	Value			Unit
Housing material	Die-cast alloy, cathodically dipped			
Degree of protection according to IEC 529	IP 67			
Installation position	Any			
Mechanical life	> 2 x 10^6 operating cycles			
Ambient temperature	- 20 to + 80			°C
Degree of contamination (external, according to IEC/EN 60947-1)	3			
Approach speed, max.	20			m/min
Actuating force	50			N
Actuation frequency, max.	6700/h			
Weight	Approx. 0.4			kg
Type of connection	Cable gland M20, see page 20			
Switching elements	2121	2131	3131	
Switching elements	4 NC ⊖	3 NC ⊖ + 1 NO	2 NC ⊖ + 2 NO	
Switching principle / contact material	Slow-action switching element / silver alloy, gold flashed			
Connection type switching element	Screw terminals, max. cross-section of a single wire 1.5 mm^2			
Rated impulse withstand voltage U_{imp}	2.5			kV
Rated insulation voltage U_i	250			V@
Utilization category according to IEC 947-5-1	AC-15 I_e 4 A U_e 230 V / DC-13 I_e 4 A U_e 24 V			
Switching voltage, min., at 10 mA	12			V
Switching current, min., at 24 V	1			mA
Conventional thermal current Ith	4			A
Short circuit protection (control circuit fuse)	4			A gG
LED function display	24 +10% -15%			AC/DC V
Connection type LED function display	Screw terminals, max. cross-section of a single wire 1.0 mm^2			
Insertion depth	Standard actuators	Overtravel actuators		
Required insertion depth s_{min}	32	32		mm
Maximum insertion depth s_{max}	33	40		
Actuator travel (in the locked state)	6	13		

Ordering table

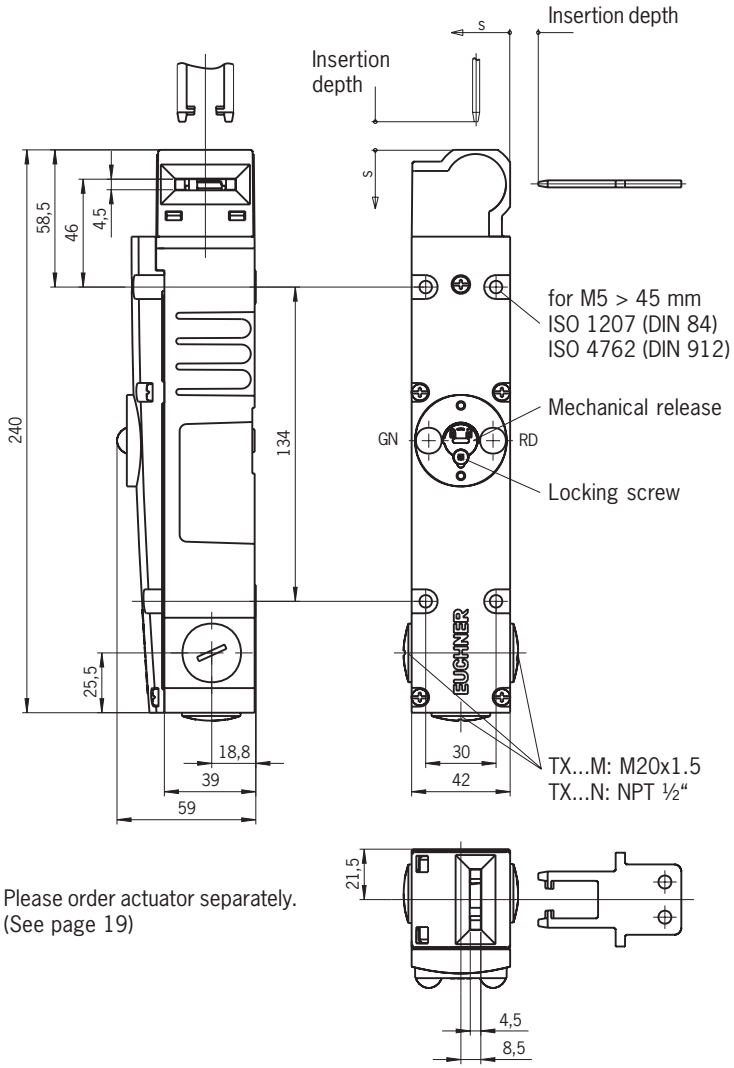
Series	Type of connection	Switching element	Approach direction	Version	Article	Order No.
NX	**M** Cable entry M20x1.5	**2121**	**A**		NX1-2121A-M	092 625
		2131			NX1-2131A-M	092 624
				with LED function display	NX1-2131AL024-M	091 682
		3131			NX1-3131A-M	092 626

Safety switches TX1... / TX2...

- **With 4 switching elements, with door monitoring contact**
- **With cable entry M20x1.5 or NPT ½"**
- **With plug connector BH10 or RC18**

* with cable entry M or NPT ½“, AC/DC 24 V

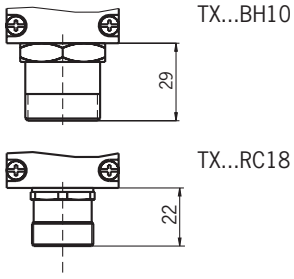
Dimension drawing TX...M / TX...N



Please order actuator separately.
(See page 19)

Dimension drawing TX...BH10 / TX...RC18

Please order related plug connector separately.
(See page 21)



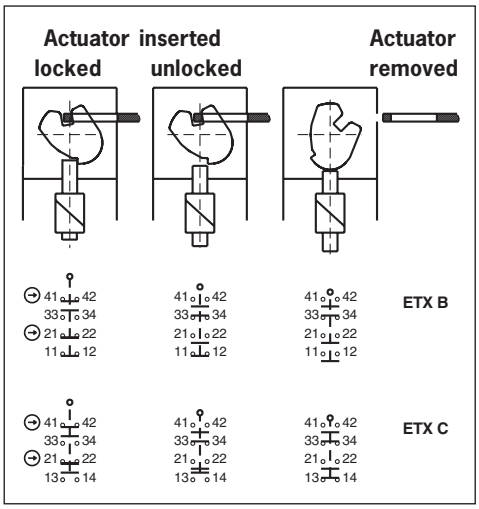
Notes on installation

The safety switch and actuator must be installed properly. The actuator must be positively connected with the mounting surface, e.g. by using safety screws (see page 20) or by welding, riveting, pinning. The safety switch must not be used as an end stop.

Switching element

(Slow-action switching element)

ETX B	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NC ⊖
ETX C	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NO



Locking methods

TX1: Actuator inserted, mechanically locked. Release by applying voltage.
TX2: Lock by applying voltage.

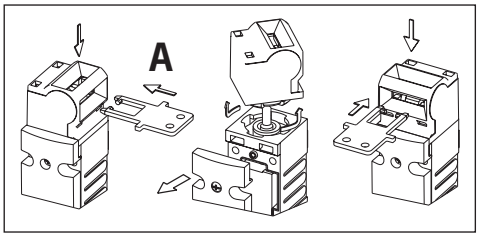
LED function display

Red/green: Wiring customer-specific.
The LED voltage is same as the solenoid operating voltage U_B.

Mechanical release

Safety switches can be unlocked by means of the mechanical release in the event of power failure, for example. The mechanical release must be sealed again after use to prevent tampering (for example with sealing lacquer).

Changing the approach direction



⚠ In the event of faults, the complete safety switch must be replaced.

Technical data

Parameters		Value			Unit
Housing material		Die-cast alloy, cathodically dipped			
Degree of protection according to IEC 529	TX...M / TX...N	IP 67			
	TX...BH10 / TX...RC18	IP 65			
Installation position		Any			
Mechanical life		> 1 x 10^6 operating cycles			
Ambient temperature		- 20 to + 80			°C
Approach speed, max.		20			m/min
Insertion/extraction force actuator (not locked)		20			N
Locking force (locked)		1500			N
Weight		Approx. 0.8			kg
Type of connection	TX...M	Cable gland M20, see page 20			
	TX...N	Cable gland NPT ½", see page 20			
	TX...BH10	Plug connector, 10-pin (9+PE), see page 21			
	TX...RC18	Plug connector, 19-pin (18+PE), see page 21			
Switching elements		ETX B	ETX C		
Switching elements	Guard locking monitoring	2 NC ⊖ + 1 NO	2 NC ⊖ + 1 NO		
	Door monitoring	1 NC	1 NO		
Switching principle / contact material		Slow-action switching element / silver alloy, gold flashed			
Connection type switching element		Screw terminals, max. cross-section of a single wire 1.5 mm²			
Rated impulse withstand voltage U_{imp}		2.5			kV
Rated insulation voltage U_i	TX...M / TX...N	250			V≅
	TX...BH10 / TX...RC18	50			
Utilization category acc. to IEC 947-5-1	TX...M / TX...N	AC-15 I_e 4 A U_e 230 V / DC-13 I_e 4 A U_e 24 V			
	TX...BH10 / TX...RC18	AC-15 I_e 4 A U_e 24 V / DC-13 I_e 4 A U_e 24 V			
Switching voltage, min., at 10 mA		12			V
Switching current, min., at 24 V		1			mA
Conventional thermal current I_{th}		4			A
Short circuit protection (control circuit fuse)		4			A gG
Connection type printed circuit board		Cage-pull clamps, max. cross-section of a single wire 1.5 mm²			
Solenoid					
Solenoid operating voltage U_B (-15%/+10%)		24	110	230	AC/DC V
Power consumption P_B		8			W
Duty cycle		100 %			
Insertion depth		Standard actuators	Overtravel actuators		
Required insertion depth s_{min}		32	32		mm
Maximum insertion depth s_{max}		33	40		
Actuator travel (in the locked state)		6	13		

Ordering table

Series / Locking	Type of connection	Switching element	Approach direction	Article	Order No. Solenoid operating voltage 024	110	230
TX1 Mechanical locking	**M** Cable entry M20x1.5	**ETX B**	**A**	TX1B-A...M	082 921	085 383	085 385
		ETX C		TX1C-A...M	082 922	085 384	085 386
	N Cable entry NPT ½"	**ETX B**		TX1B-A...N	082 944	on request	on request
		ETX C		TX1C-A...N	082 945		
	BH10 Plug connector BH10	**ETX B**		TX1B-A...BH10	085 380		
	RC18 Plug connector RC18	**ETX B**		TX1B-A...RC18	082 933	–	–
		ETX C		TX1C-A...RC18	082 934		
TX2 Electrical locking	**M** Cable entry M20x1.5	**ETX B**	**A**	TX2B-A...M	082 927	085 387	085 389
		ETX C		TX2C-A...M	082 928	085 388	085 390
	N Cable entry NPT ½"	**ETX B**		TX2B-A...N	082 946	on request	on request
		ETX C		TX2C-A...N	082 947		
	BH10 Plug connector BH10	**ETX B**		TX2B-A...BH10	085 381		
	RC18 Plug connector RC18	**ETX B**		TX2B-A...RC18	082 939	–	–
		ETX C		TX2C-A...RC18	082 940		

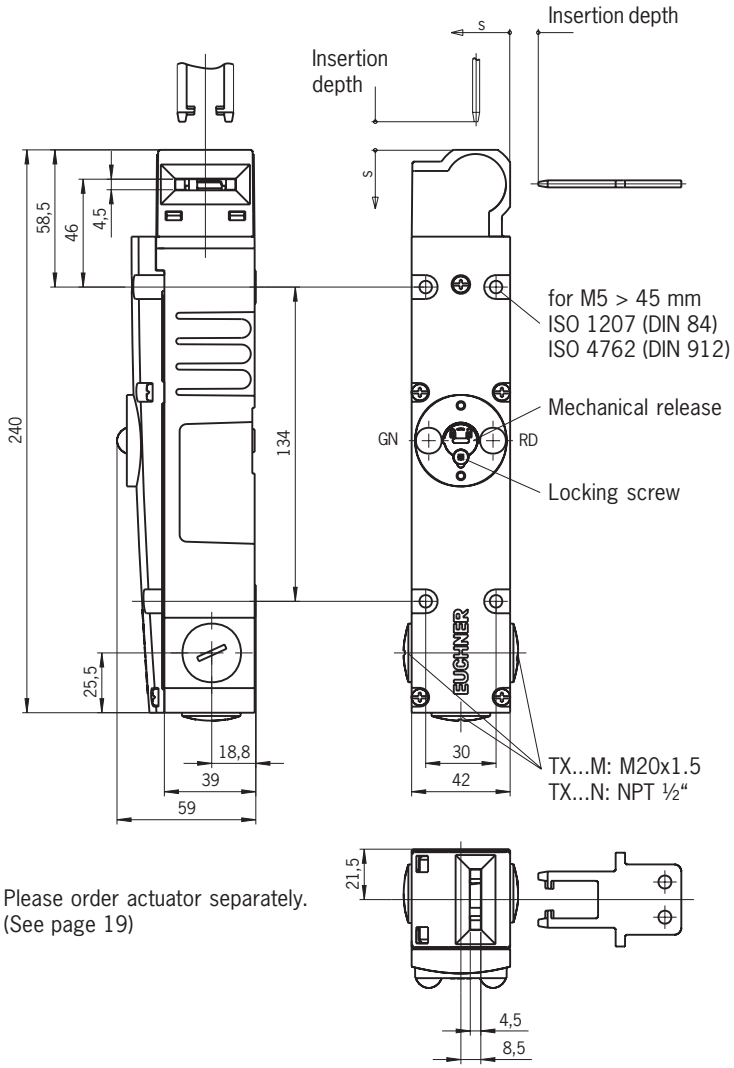
Ordering example: **TX1**, mech. locking, switching element **ETX B**, approach direction **A**, solenoid operating voltage **024** V DC, cable entry **M20**
TX1B-A 024 M **Order No. 082 921**

Safety switches TX3...

- **Release under load possible**
- **With 4 switching elements, with door monitoring contact**
- **With cable entry M20x1.5 or NPT ½“**
- **With plug connector BH12 or RC18**

* with cable entry M or NPT ½“, AC/DC 24 V

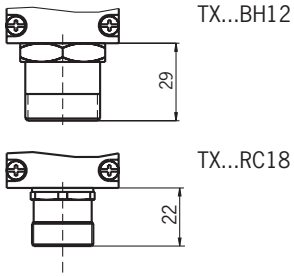
Dimension drawing TX...M / TX...N



Please order actuator separately.
(See page 19)

Dimension drawing TX...BH12 / TX...RC18

Please order related plug connector separately.
(See page 21)



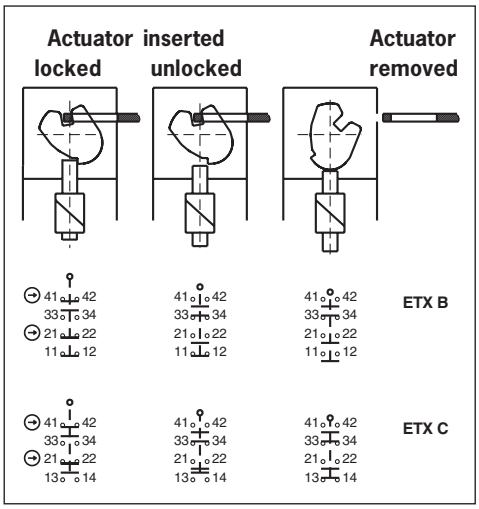
Notes on installation

The safety switch and actuator must be installed properly. The actuator must be positively connected with the mounting surface, e.g. by using safety screws (see page 20) or by welding, riveting, pinning. The safety switch must not be used as an end stop.

Switching element

(Slow-action switching element)

ETX B	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NC ⊖
ETX C	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NO



Locking methods

TX3: Actuator inserted, mechanically locked. Release by applying voltage.

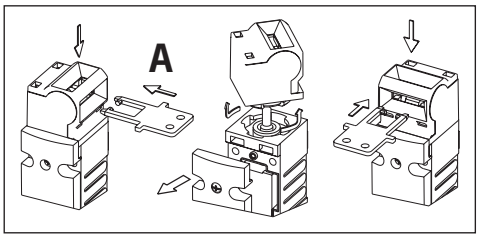
LED function display

Red/green: Wiring customer-specific.
The LED voltage is same as the solenoid operating voltage U_B.

Mechanical release

Safety switches can be unlocked by means of the mechanical release in the event of power failure, for example. The mechanical release must be sealed again after use to prevent tampering (for example with sealing lacquer).

Changing the approach direction



⚠ In the event of faults, the complete safety switch must be replaced.

Technical data

Parameters		Value			Unit
Housing material		Die-cast alloy, cathodically dipped			
Degree of protection according to IEC 529	TX...M / TX...N	IP 67			
	TX...BH12 / TX...RC18	IP 65			
Installation position		Any			
Mechanical life		> 1 x 10^6 operating cycles			
Ambient temperature		- 20 to + 80			°C
Approach speed, max.		20			m/min
Insertion/extraction force actuator (not locked)		20			N
Locking force (locked)		1500			N
Weight		Approx. 0.8			kg
Type of connection	TX...M	Cable gland M20, see page 20			
	TX...N	Cable gland NPT ½", see page 20			
	TX...BH12	Plug connector, 12-pin (11+PE), see page 21			
	TX...RC18	Plug connector, 19-pin (18+PE), see page 21			
Switching elements		ETX B	ETX C		
Switching elements	Guard locking monitoring	2 NC ⊖ + 1 NO	2 NC ⊖ + 1 NO		
	Door monitoring	1 NC	1 NO		
Switching principle / contact material		Slow-action switching element / silver alloy, gold flashed			
Connection type switching element		Screw terminals, max. cross-section of a single wire 1.5 mm²			
Rated impulse withstand voltage U_{imp}		2.5			kV
Rated insulation voltage U_i	TX...M / TX...N	250			V≅
	TX...BH12 / TX...RC18	50			
Utilization category acc. to IEC 947-5-1	TX...M / TX...N	AC-15 I_e 4 A U_e 230 V / DC-13 I_e 4 A U_e 24 V			
	TX...BH12 / TX...RC18	AC-15 I_e 4 A U_e 24 V / DC-13 I_e 4 A U_e 24 V			
Switching voltage, min., at 10 mA		12			V
Switching current, min., at 24 V		1			mA
Conventional thermal current I_{th}		4			A
Short circuit protection (control circuit fuse)		4			A gG
Connection type printed circuit board		Cage-pull clamps, max. cross-section of a single wire 1.5 mm²			
Solenoid					
Solenoid operating voltage U_B (-15%/+10%)		24	110	230	AC/DC V
Power consumption P_B					
- Solenoid switched off (U_S = 0 V)		0.5	–		W
- On switch on (T_{IMP} = 250 ms, U_S = 24 V)		48			
- Solenoid switched on (U_S = 24 V)		8			
Duty cycle		100 %			
Control electronics					
Control voltage U_S (- 15 % / + 10 %)		U_S = 24 V AC/DC	No control voltage necessary		
Insertion depth		Standard actuators	Overtravel actuators		
Required insertion depth s_{min}		32	32		mm
Maximum insertion depth s_{max}		33	40		
Actuator travel (in the locked state)		6	13		

Ordering table

Series / Locking	Type of connection	Switching element	Approach direction	Article	Order No. Solenoid operating voltage 024	110	230
TX3 Mechanical locking	**M** Cable entry M20x1.5	**ETX B**	**A**	TX3B-A...M	082 952	082 988	082 976
		ETX C		TX3C-A...M	082 953	082 989	082 977
	N Cable entry NPT ½"	**ETX B**		TX3B-A...N	082 997	on request	on request
		ETX C		TX3C-A...N	082 998		
	BH12 Plug connector BH12	**ETX B**		TX3B-A...BH12	082 999		
		ETX C		TX3C-A...BH12	083 000		
	RC18 Plug connector RC18	**ETX B**		TX3B-A...RC18	082 964	–	–
		ETX C		TX3C-A...RC18	082 965		

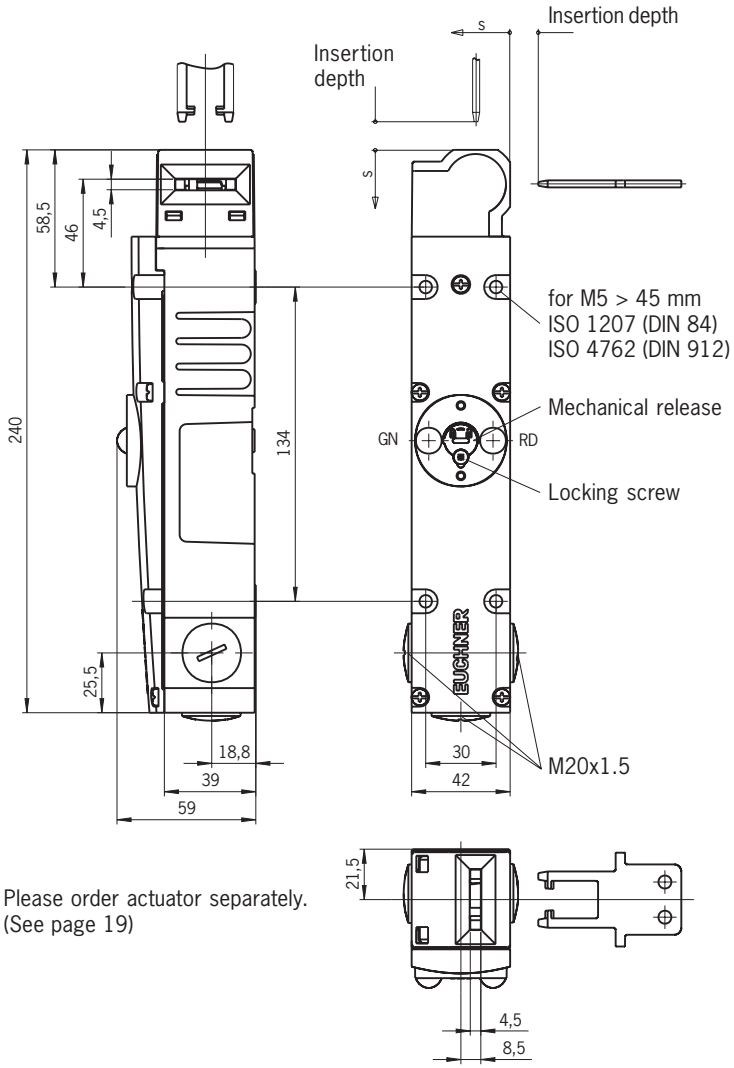
Ordering example: **TX3**, mech. locking, switching element **ETX B**, approach direction **A**, solenoid operating voltage **024** V DC, cable entry **M20**
TX3B-A 024 M **Order No. 082 952**

Safety switches TX3...

- **Release under load possible**
- **With 4 switching elements, with door unlock request contact**
- **With cable entry M20x1.5**

* with cable entry M, AC/DC 24 V

Dimension drawing TX...M



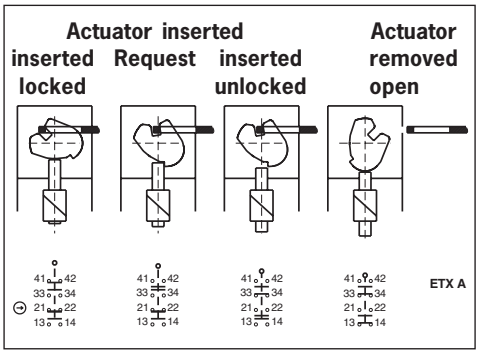
Please order actuator separately.
(See page 19)

Notes on installation

The safety switch and actuator must be installed properly. The actuator must be positively connected with the mounting surface, e.g. by using safety screws (see page 20) or by welding, riveting, pinning. The safety switch must not be used as an end stop.

Switching element

(Slow-action switching element)
ETX A Guard locking monitoring 1 NC ⊖ +2 NO
Door unlock request contact 1 NC



Locking methods

TX3: Actuator inserted, mechanically locked. Release by applying voltage.

LED function display

Red/green: Wiring customer-specific.
The LED voltage is same as the solenoid operating voltage U_B.

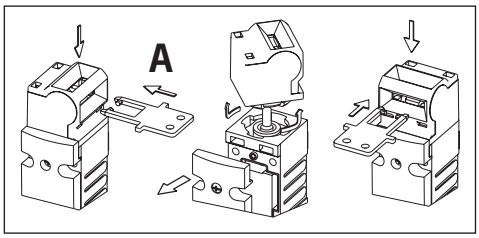
Mechanical release

Safety switches can be unlocked by means of the mechanical release in the event of power failure, for example. The mechanical release must be sealed again after use to prevent tampering (for example with sealing lacquer).

Door unlock request contact

When the actuator is in the locked state, NC contact 41-42 is opened by pulling the safety guard and a signal sent to the higher level PLC. Depending on the control concept, the safety guard can be unlocked automatically - when machine components which were still running have stopped.

Changing the approach direction



⚠ In the event of faults, the complete safety switch must be replaced.

Technical data

Parameters		Value			Unit
Housing material		Die-cast alloy, cathodically dipped			
Degree of protection according to IEC 529		IP 67			
Installation position		Any			
Mechanical life		> 1 x 10^6 operating cycles			
Ambient temperature		- 20 to + 80			°C
Approach speed, max.		20			m/min
Insertion/extraction force actuator (not locked)		20			N
Locking force (locked)		1500			N
Weight		Approx. 0.8			kg
Type of connection		Cable gland M20, see page 20			
Switching element		ETX A			
Switching elements	Guard locking monitoring	1 NC ⊖ + 2 NO ⊖			
	Door unlock request contact	1 NC			
Switching principle / contact material		Slow-action switching element / silver alloy, gold flashed			
Connection type switching element		Screw terminals, max. cross-section of a single wire 1.5 mm^2			
Rated impulse withstand voltage U_{imp}		2.5			kV
Rated insulation voltage U_i		250			V≅
Utilization category according to IEC 947-5-1		AC-15 I_e 4 A U_e 230 V / DC-13 I_e 4 A U_e 24 V			
Switching voltage, min., at 10 mA		12			V
Switching current, min., at 24 V		1			mA
Conventional thermal current I_{th}		4			A
Short circuit protection (control circuit fuse)		4			A gG
Connection type printed circuit board		Cage-pull clamps, max. cross-section of a single wire 1.5 mm^2			
Solenoid					
Solenoid operating voltage U_B (-15%/+10%)		24	110	230	AC/DC V
Power consumption P_B					
- Solenoid switched off (U_S = 0 V)		0.5	–		W
- On switch on (T_{IMP} = 250 ms, U_S = 24 V)		48			
- Solenoid switched on (U_S = 24 V)		8			
Duty cycle		100 %			
Control electronics					
Control voltage U_S (- 15 % / + 10 %)		U_S = 24 V AC/DC	No control voltage necessary		
Insertion depth		Standard actuators	Overtravel actuators		
Required insertion depth s_{min}		32	32		mm
Maximum insertion depth s_{max}		33	40		
Actuator travel (in the locked state)		6	13		

Ordering table

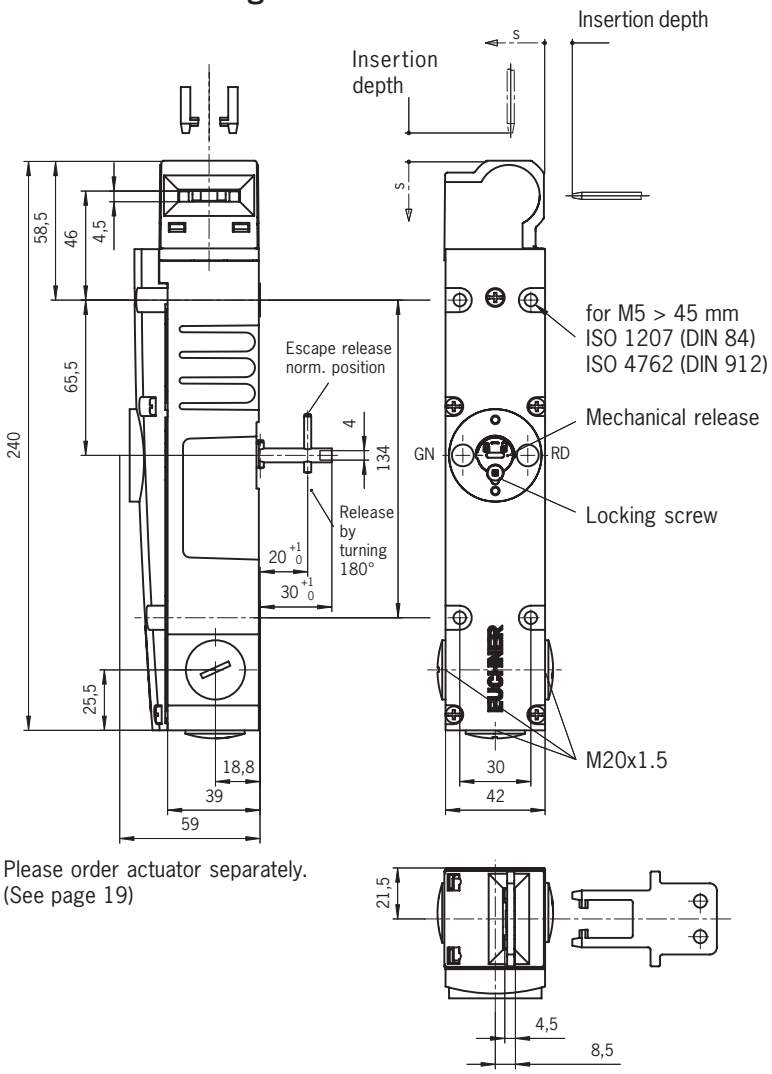
Series / Locking	Type of connection	Switching element	Approach direction	Article	Order No. Solenoid operating voltage 024
TX3 Mechanical locking	**M** Cable entry M20x1.5	**ETX A**	**A**	TX3A-A024M	082 951

Safety switches TX3...

- **Release under load possible**
- **With escape release from the rear of the switch**
- **With 4 switching elements, with door monitoring contact**
- **With cable entry M20x1.5 or plug connector RC18**

* with cable entry M, AC/DC 24 V

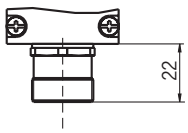
Dimension drawing TX...M



Please order actuator separately.
(See page 19)

Dimension drawing TX...RC18

Please order related plug connector separately.
(See page 21)



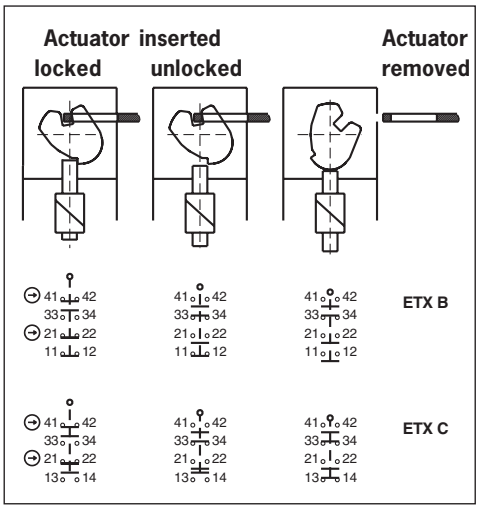
Notes on installation

The safety switch and actuator must be installed properly. The actuator must be positively connected with the mounting surface, e.g. by using safety screws (see page 20) or by welding, riveting, pinning. The safety switch must not be used as an end stop.

Switching element

(Slow-action switching element)

ETX B	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NC ⊖
ETX C	Guard locking monitoring	2 NC ⊖ + 1 NO
	Door monitoring	1 NO



Locking methods

TX3: Actuator inserted, mechanically locked. Release by applying voltage.

LED function display

Red/green: Wiring customer-specific.
The LED voltage is same as the solenoid operating voltage U_B.

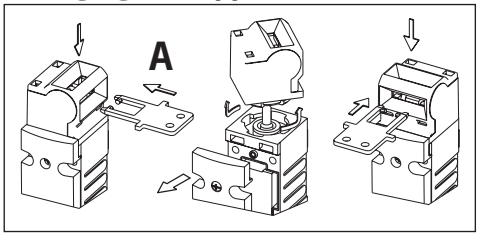
Mechanical release

Safety switches can be unlocked by means of the mechanical release in the event of power failure, for example. The mechanical release must be sealed again after use to prevent tampering (for example with sealing lacquer).

Escape release

Is used for unlocking the guard locking without tools in case of danger. Operation from the rear of the switch.

Changing the approach direction



⚠ In the event of faults, the complete safety switch must be replaced.

Technical data

Parameters		Value			Unit
Housing material		Die-cast alloy, cathodically dipped			
Degree of protection	TX...M	IP 67			
according to IEC 529	TX...RC18	IP 65			
Installation position		Any			
Mechanical life		> 1 x 10^6 operating cycles			
Ambient temperature		- 20 to + 80			°C
Approach speed, max.		20			m/min
Insertion/extraction force actuator (not locked)		20			N
Locking force (locked)		1500			N
Weight		Approx. 0.8			kg
Type of connection	TX...M	Cable gland M20, see page 20			
	TX...RC18	Plug connector, 19-pin (18+PE), see page 21			
Switching elements		ETX B	ETX C		
Switching elements	Guard locking monitoring	2 NC ⊖ + 1 NO	2 NC ⊖ + 1 NO		
	Door monitoring	1 NC	1 NO		
Switching principle / contact material		Slow-action switching element / silver alloy, gold flashed			
Connection type switching element		Screw terminals, max. cross-section of a single wire 1.5 mm²			
Rated impulse withstand voltage U_{imp}		2.5			kV
Rated	TX...M	250			V≅
insulation voltage U_i	TX...RC18	50			
Utilization category	TX...M	AC-15 I_e 4 A U_e 230 V / DC-13 I_e 4 A U_e 24 V			
acc. to IEC 947-5-1	TX...RC18	AC-15 I_e 4 A U_e 24 V / DC-13 I_e 4 A U_e 24 V			
Switching voltage, min., at 10 mA		12			V
Switching current, min., at 24 V		1			mA
Conventional thermal current I_{th}		4			A
Short circuit protection (control circuit fuse)		4			A gG
Connection type printed circuit board		Cage-pull clamps, max. cross-section of a single wire 1.5 mm²			
Solenoid					
Solenoid operating voltage U_B (-15%/+10%)		24	110	230	AC/DC V
Power consumption P_B					
- Solenoid switched off (U_S = 0 V)		0.5	–		W
- On switch on (T_{IMP} = 250 ms, U_S = 24 V)		48			
- Solenoid switched on (U_S = 24 V)		8			
Duty cycle		100 %			
Control electronics					
Control voltage U_S (- 15 % / + 10 %)		U_S = 24 V AC/DC	No control voltage necessary		
Insertion depth		Standard actuators	Overtravel actuators		
Required insertion depth s_{min}		32	32		mm
Maximum insertion depth s_{max}		33	40		
Actuator travel (in the locked state)		6	13		

Ordering table

Series / Locking	Type of connection	Switching element	Approach direction	Article	Order No. Solenoid operating voltage 024
TX3 Mechanical locking	**M** Cable entry M20x1.5	**ETX B**	**A**	TX3B-A024MC1991	085 391
		ETX C		TX3C-A024MC1991	093 118
	RC18 Plug connector RC18	**ETX B**		TX3B-A024RC18C1991	093 559

Switching characteristics safety switches TX3... (mechanical 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.

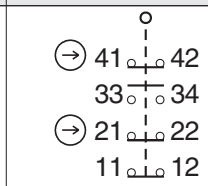
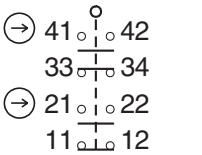
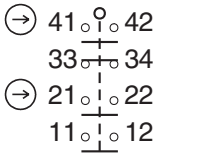
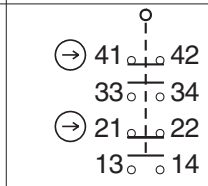
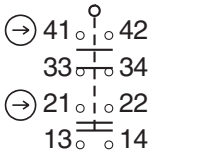
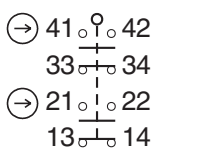
Solenoid operating voltage U_B

On versions TX...110 and TX...230 release is performed using the voltage U_B.
A control voltage U_S is not necessary.

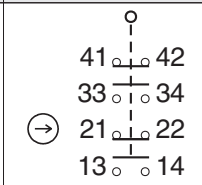
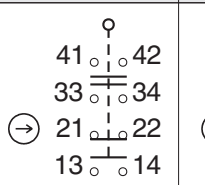
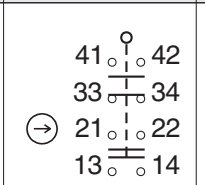
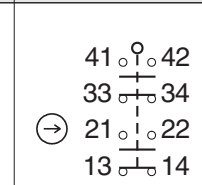
Control voltage U_S

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 switches TX3... with door monitoring contact (mechanical locking)

			Actuator inserted		Actuator removed
			locked	unlocked	
Switching element	ETX B				
	ETX C				
Switch design	TX3...24	Control voltage Us	0 V	24 V	24 V or 0 V
		Operating voltage UB	0 V	24 V	24 V or 0 V
	TX3...110 / TX3...230	Control voltage Us	not connected		
		Operating voltage UB	0 V	110 V or 230 V	110 V, 230 V or 0 V

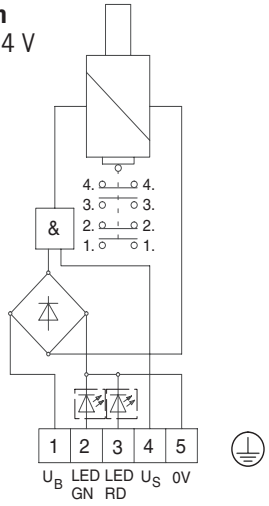
Safety switches TX3... with door unlock request contact (mechanical locking)

			Actuator fully inserted	Actuator inserted with request	Actuator inserted	Actuator removed
			locked	locked	unlocked	
Switching element	ETX A					
Switch design	TX3...24	Control voltage Us	0 V	0 V	24 V	24 V or 0 V
		Operating voltage UB	0 V	24 V or 0 V	24 V	24 V or 0 V
	TX3...110 / TX3...230	Control voltage Us	not connected			
		Operating voltage UB	0 V	0 V	110 V or 230 V	110 V or 230 V

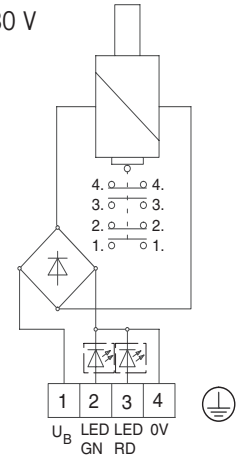
Circuit diagrams and pin assignments

Safety switches TX3... with cable entry M20x1.5 and NPT ½"

Circuit diagram
at U_B = AC/DC 24 V

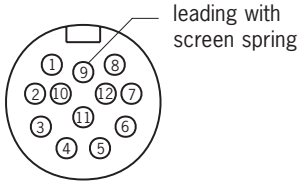


Circuit diagram
at U_B = AC 110/230 V

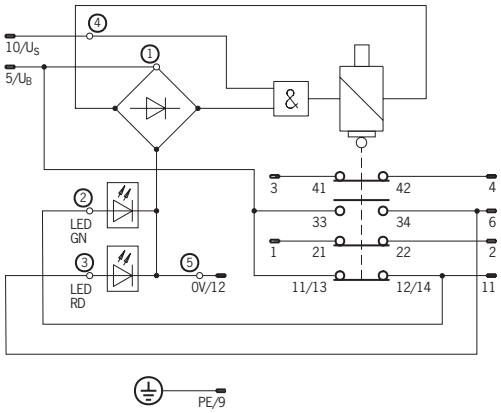


Safety switches TX3... with plug connector BH12 (MIN-SERIES SIZE III)

Pin assignment plug connector BH12, 12-pin (11 + PE)
View on the connection side of the safety switch



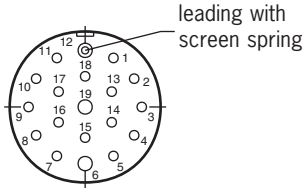
Circuit diagram TX...BH12
with door monitoring contact



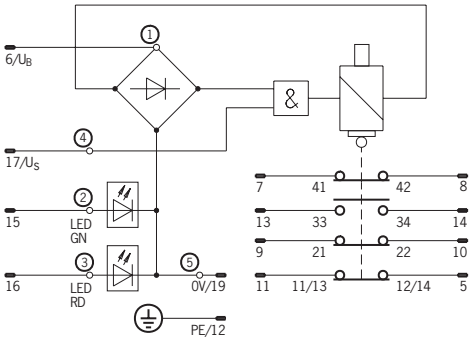
The connection terminals for the printed circuit board are marked with ○.

Safety switches TX3... with plug connector RC18 (Coninvers)

Pin assignment plug connector RC18, 19-pin (18 + PE)
View on the connection side of the safety switch



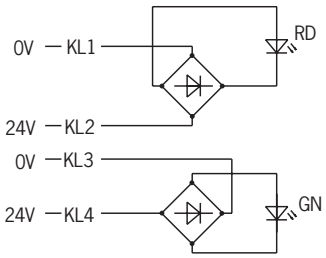
Circuit diagram TX...RC18
with door monitoring contact



The connection terminals for the printed circuit board are marked with ○.

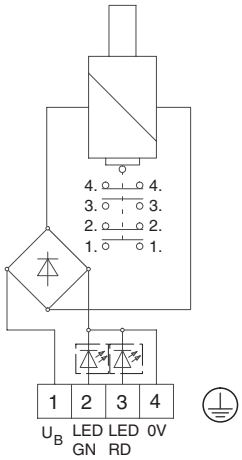
Safety switches NX1-...L024-M with LED function display

Circuit diagram
U_B = AC/DC 24 V +10% -15%



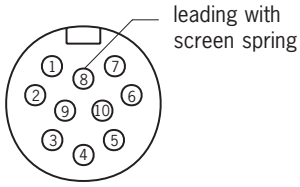
Safety switches TX1... / TX2... with cable entry M20x1.5 and NPT ½"

Circuit diagram
at U_B = AC/DC 24/110/230 V

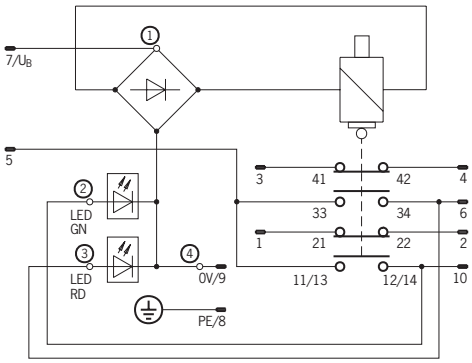


Safety switches TX1... / TX2... with plug connector BH10 (MIN-SERIES SIZE III)

Pin assignment plug connector BH10, 10-pin (9 + PE)
View on the connection side of the safety switch



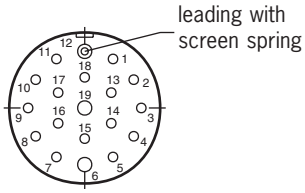
Circuit diagram TX...BH10
with door monitoring contact



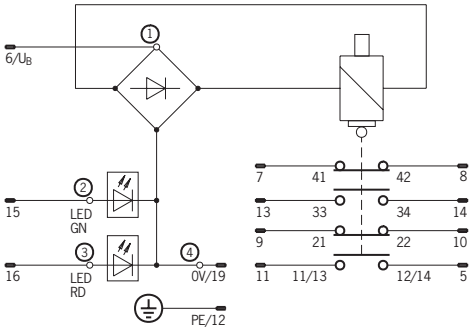
The connection terminals for the printed circuit board are marked with ○.

Safety switches TX1... / TX2... with plug connector RC18 (Coninvers)

Pin assignment plug connector RC18, 19-pin (18 + PE)
View on the connection side of the safety switch



Circuit diagram TX...RC18
with door monitoring contact



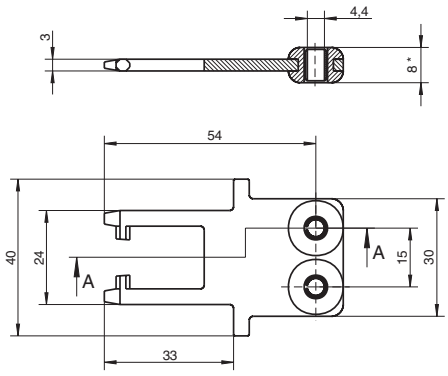
The connection terminals for the printed circuit board are marked with ○.

Accessories

Standard actuators with rubber bush (stainless steel)

Straight actuator
(incl. 2 galvanized safety screws M4x14)

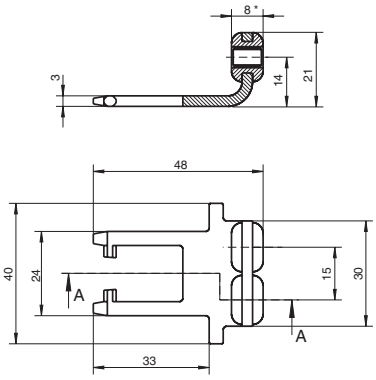
Article	Order No.
Actuator-X-GQ	079 739



min. door radius
300 mm

Bent actuator
(incl. 2 galvanized safety screws M4x14)

Article	Order No.
Actuator-X-WQ	079 740

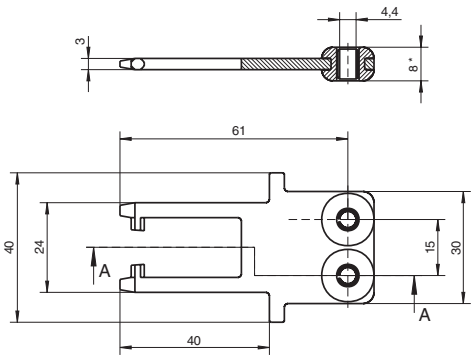


min. door radius
300 mm

Overtravel actuators with rubber bush (stainless steel)

Straight actuator
(incl. 2 galvanized safety screws M4x14)

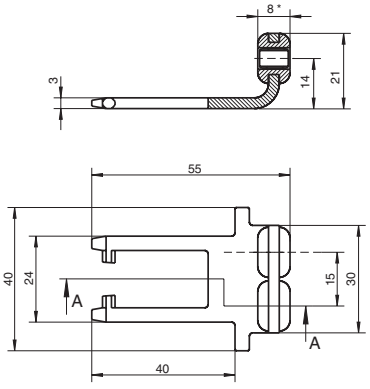
Article	Order No.
Actuator-X-GNQ	079 741



min. door radius
440 mm

Bent actuator
(incl. 2 galvanized safety screws M4x14)

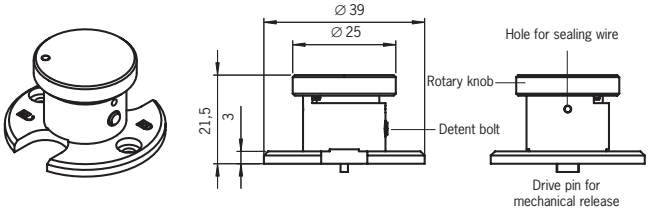
Article	Order No.
Actuator-X-WNQ	079 742



min. door radius
440 mm

Emergency unlocking with manual return for safety switches TX (incl. 2 screws M3x6)

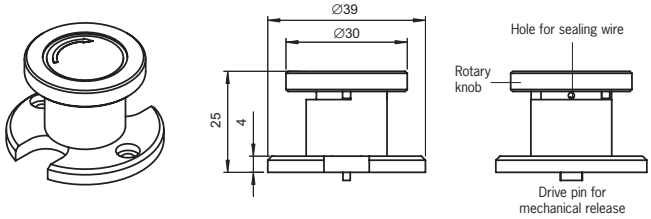
Article	Order No.
Emergency unlocking TX, manual return	094 771
Lead seal kit for emergency unlocking	087 256



Is used for the manual release of the guard locking. The emergency unlocking mechanism must be returned to the locked state manually. A sealing wire can be fitted to protect against tampering.
Warning: Prior to mounting, the locking screw for the mechanical release must be removed.

Emergency unlocking with automatic return for safety switches TX (incl. 2 screws M3x6)

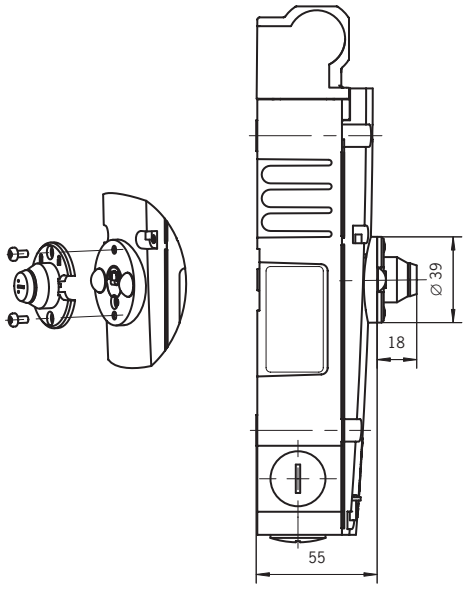
Article	Order No.
Emergency unlocking TX, automatic return	094 773
Lead seal kit for emergency unlocking	087 256



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.
Warning: Prior to mounting, the locking screw for the mechanical release must be removed.

* The dimension 8 relates to the fitted state.

Lock for safety switches TX
(mechanical key release)



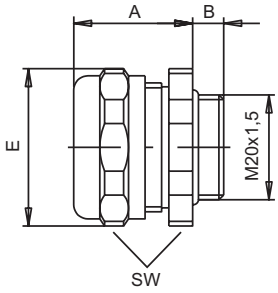
The mechanical key release enables authorized personnel to actuate the mechanical release using the related key. In this way the guard locking is held in the released state.

Mounting
Two screws are used to fix the lock to the cover of the safety switch TX (over the mechanical release).
Warning: Prior to mounting, the locking screw for the mechanical release must be removed.

Notes
- Please order safety switch TX separately
- Two keys and two screws included
- Every safety switch of series TX can be upgraded to include a lock

Article	Order No.
Lock TX identical (identical locks)	079 795
Lock TX unique (unique key needed to open)	079 796
Replacement key (2 x) for identical locks	077 206

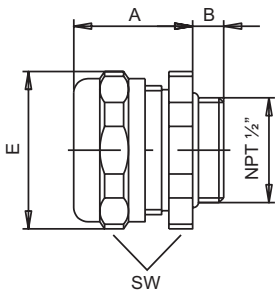
Cable glands M20 x 1.5
The table below shows the dimensions of the cable glands and the cable diameters that can be used in the EUCHNER safety switches TX...M.



Material	Thread	Outer cable diameter D	A	B	E	SW	Article	Order No.
Metal	M20x1.5	6.5 - 9.5	20	6	25	22	EKVM20/06	077 683
Metal	M20x1.5	9.0 - 13.0	21	6.5	25	22	EKVM20/09	077 684
Plastic	M20x1.5	6.0 - 12.0	26	11	27	24	EKPM20/06	077 679

Data in mm

Cable glands NPT ½"
The table below shows the dimensions of the cable glands and the cable diameters that can be used in the EUCHNER safety switches TX...N.



Material	Thread	Outer cable diameter D	A	B	E	SW	Article	Order No.
Metal	NPT ½"	6.0 - 12.0	22	13	27	24	EKVN12/06	077 691
Plastic	NPT ½"	6.0 - 12.0	26	13	27	24	EKP0N12/06	077 692

Data in mm

Safety screws

Type of screw	Use	Packaging unit	Article	Order No.
M4 x 14	for actuators with rubber bushes	100 pieces	M4x14/V100	074 063

Plug connectors

Female connector RC18...C1825 metal encapsulated (Coninvers)

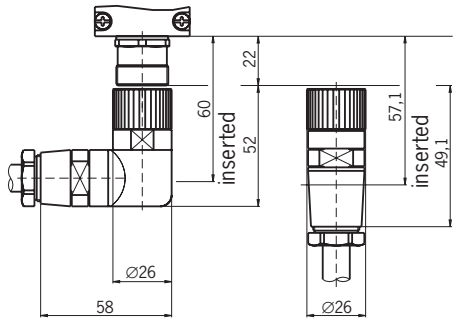
Technical data

Parameters	Value
Housing material	Metal
Degree of protection according to IEC 529	IP 65 (inserted)
Number of pins	19 (18 + PE)
Conductor cross-section	16 x 0.38... 0.5 mm²
Crimp contact	3 x 0.75... 1.0 mm²
Nominal voltage	32 V ≅, with degree of contamination 3
Cable diameter	10 - 14 mm

Ordering table

Type of plug	Article	Order No.
Straight female connector	RC18EF-C1825	077 025
Angled female connector	RC18WF-C1825	077 026

Dimensions female connector RC18

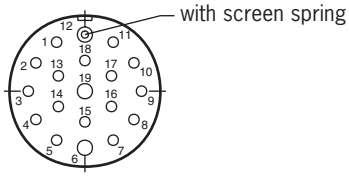


Female connector RC18...RC1825 metal encapsulated with connecting wire PUR (free end of cable stripped 70 mm)

Technical data

Parameters	Value
Housing material	Metal
Degree of protection according to IEC 529	IP 65 (inserted)
Number of pins	19 (18 + PE)
Conductor cross-section	16 x 0.38... 0.5 mm²
Crimp contact	3 x 0.75... 1.0 mm²
Nominal voltage	32 V ≅, with degree of contamination 3
Cable diameter	10 - 14 mm

Pin assignment female connector RC18
View of plug side



Pin assignment

Socket pin	Cross-section [mm²]	Core color	Socket pin	Cross-section [mm²]	Core color
1	0.5	VT	11	0.5	BK
2	0.5	RD	12	1.0	GNYE
3	0.5	GY	13	0.5	PK
4	0.5	RDBU	14	0.5	BNGY
5	0.5	GN	15	0.5	BNYE
6	1.0	BU	16	0.5	BNGN
7	0.5	GYPK	17	0.5	WH
8	0.5	GNWH	18	0.5	YE
9	0.5	YEWH	19	1.0	BN
10	0.5	GYWH			

Ordering table

Descrp.	Version	Cable 1.5 m	3 m	6 m	8 m	10 m	15 m	20 m	25 m
RC18 18-pin + PE	**EF-C1825** Female connector	**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
	WFL-C1825 Female connector angled Cable exit 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 connector 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

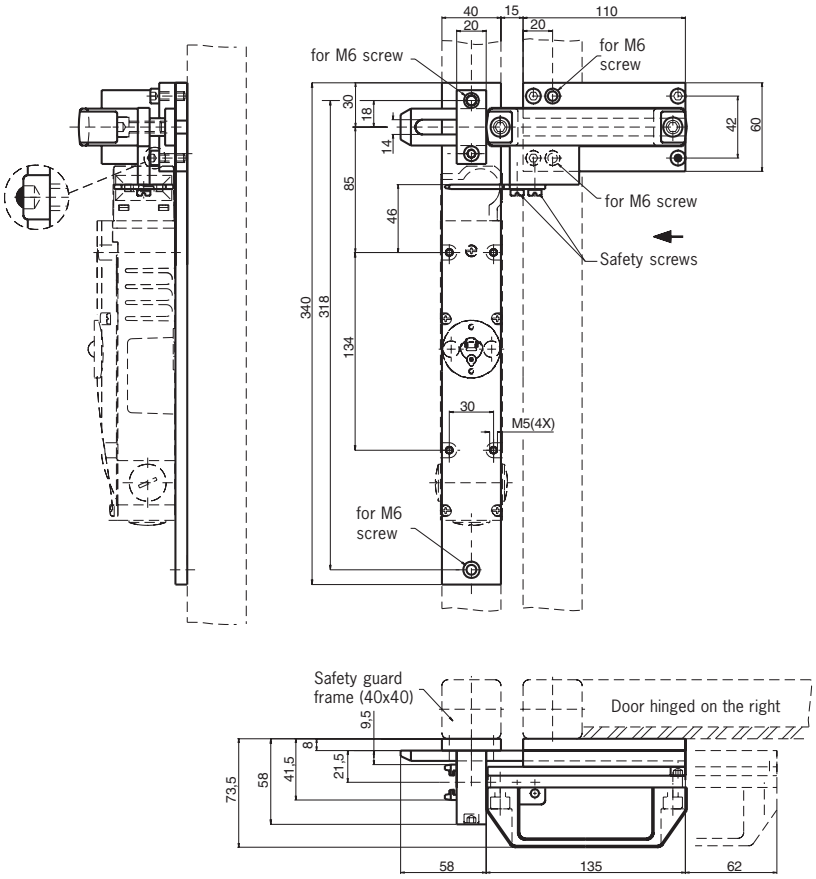
Plug connectors BH10 and BH12

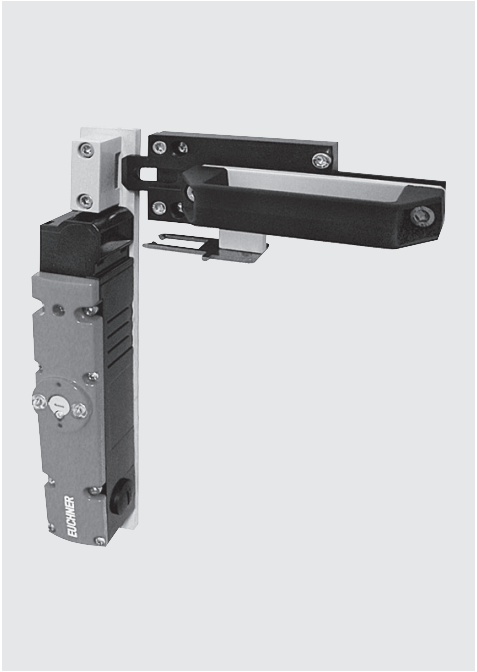
The plug connectors used for the safety switches TX...BH10 and TX...BH12 are MIN-SERIES SIZE III in accordance with US standard. The related mating connectors can be ordered from MENCOM or Brad Harrison.

Bolt TX

- **For safety switches series TX..**
- **For safety switches series NX...**

Dimension drawing
Bolt TX-A for doors hinged on the right





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

Notes
- Actuator and switch bracket included
- Please order safety switch separately

Ordering table

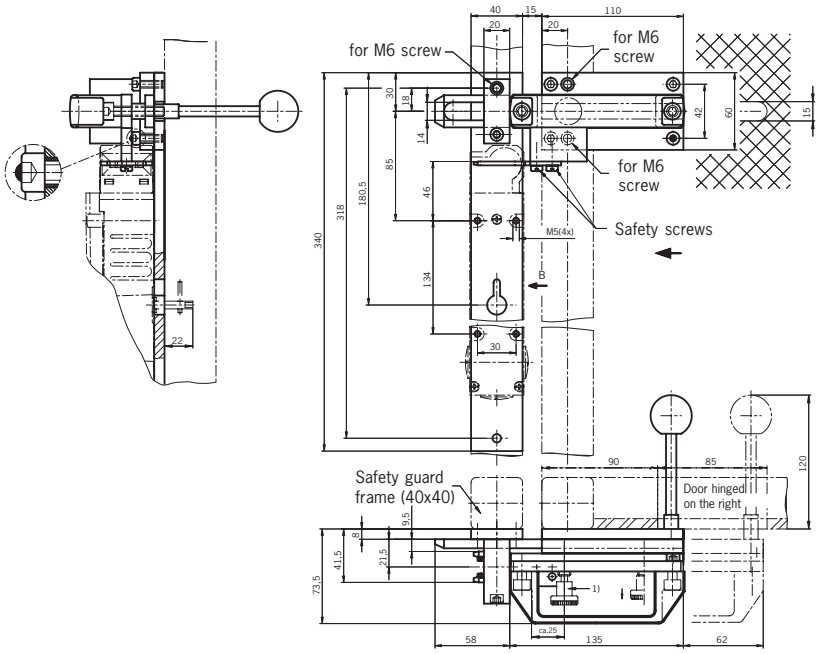
Article	Order No.
Bolt TX-A (without escape release) for doors hinged on the right	082 990
Bolt TX-C (without escape release) for doors hinged on the left	082 991

Bolt TX-.F with escape release

▶**For safety switches TX...-C1991 with escape release**

Dimension drawing

Bolt TX-AF with escape release for doors hinged on the right



Features

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

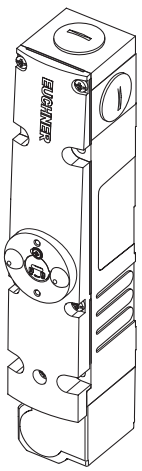
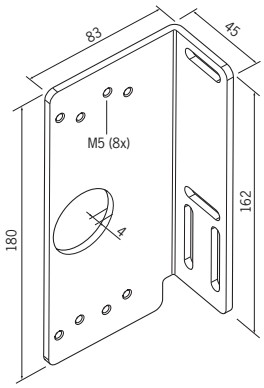
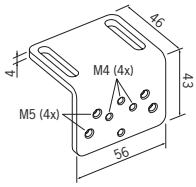
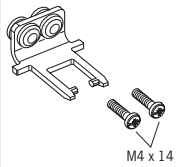
Notes

- Actuator and switch bracket included
- Please order safety switch separately

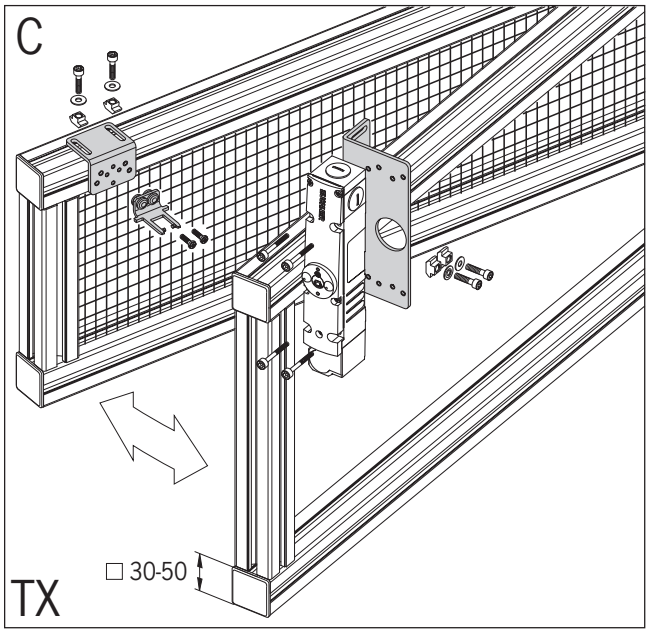
Ordering table

Article	Order No.
Bolt TX-AF (with escape release) for doors hinged on the right	085 392
Bolt TX-CF (with escape release) for doors hinged on the left	085 393

Mounting plates EMP for safety switches TX

Switch	Installation method switch	Mounting plate switch	Mounting plate actuator	Actuator see p. 19	Minimum distance hinge axis to switch
TX... 	**C** vertical	**EMP-SB** 093 456 	**EMP-B1** 093 457 	079 740 079 742 	> 440 mm

Mounting C, safety switch vertical



Note

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

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TX2B-A024RC18	082 939	9
TX2B-A110M	085 387	9
TX2B-A230M	085 389	9
TX2C-A024M	082 928	9
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082 976	TX3B-A230M	11
082 977	TX3C-A230M	11
082 988	TX3B-A110M	11
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082 998	TX3C-A024N	11
082 999	TX3B-A024BH12	11
083 000	TX3C-A024BH12	11
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085 383	TX1B-A110M	9
085 384	TX1C-A110M	9
085 385	TX1B-A230M	9
085 386	TX1C-A230M	9
085 387	TX2B-A110M	9
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085 389	TX2B-A230M	9
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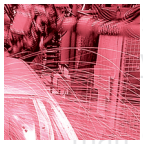
Automation

Safety



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