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		
●		●	●						●		96
●				●			●		●		97
●		●	●						●		98
●					●	●	●		●		99
●	●	●					●		●	C1991/C2161	100
●	●						●		●	C1991	101
●								●	●	C2129	102

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%

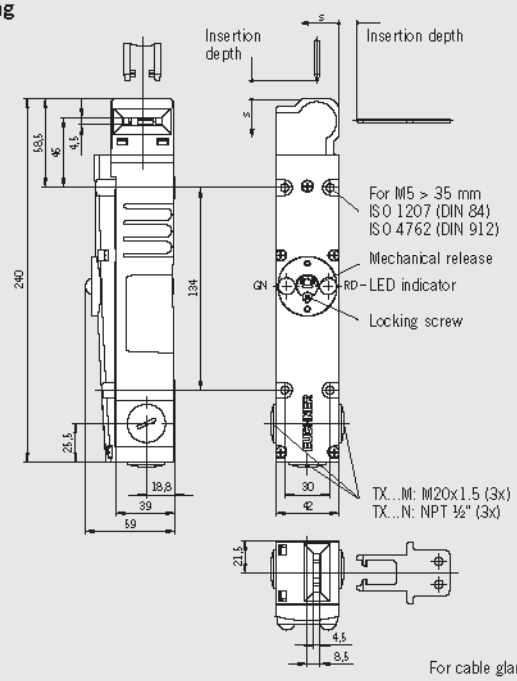
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

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

Cable entry M20 x 1.5 / cable entry NPT ½"

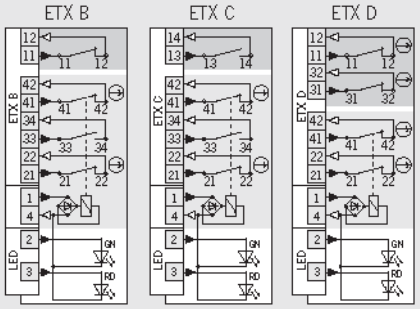
Dimension drawing



Please order actuator separately (see page 114)

For cable glands see page 124

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

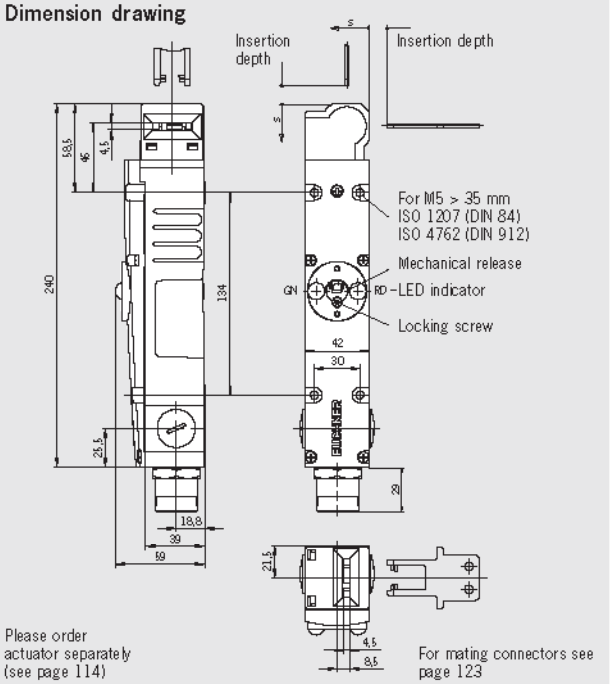
For switching functions see technical data on page 172

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 2NC⊖/1NO+1NC	082 921 TX1B-A024M	085 383 TX1B-A110M	085 385 TX1B-A230M
			ETX C 2NC⊖/1NO+1NO	082 922 TX1C-A024M	085 384 TX1C-A110M	085 386 TX1C-A230M
			ETX D 2NC⊖+2NC⊖	095 025 TX1D-A024MC2081	-	-
		2 Electrical	ETX B 2NC⊖/1NO+1NC	082 927 TX2B-A024M	085 387 TX2B-A110M	085 389 TX2B-A230M
			ETX C 2NC⊖/1NO+1NO	082 928 TX2C-A024M	085 388 TX2C-A110M	085 390 TX2C-A230M
			ETX D 2NC⊖+2NC⊖	095 026 TX2D-A024MC2081	-	-
	N Cable entry 3 x NPT ½"	1 Mechanical	ETX B 2NC⊖/1NO+1NC	082 944 TX1B-A024N	085 382 TX1B-A110N	On request
			ETX C 2NC⊖/1NO+1NO	082 945 TX1C-A024N	On request	On request
		2 Electrical	ETX B 2NC⊖/1NO+1NC	082 946 TX2B-A024N	On request	On request
			ETX C 2NC⊖/1NO+1NO	082 947 TX2C-A024N	On request	On request

Plug connector BH10
9-pin + PE

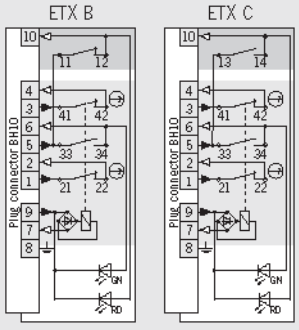
Dimension drawing



Please order actuator separately (see page 114)

For mating connectors see page 123

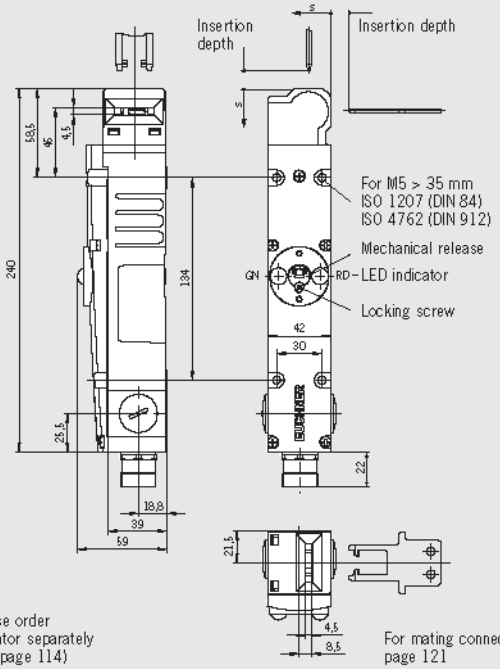
Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

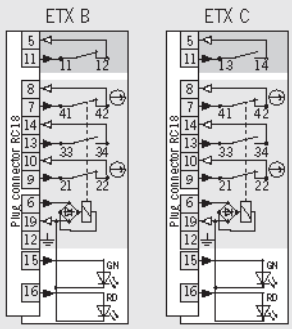
For switching functions see technical data on page 172

Plug connector RC18
18-pin + PE



Please order actuator separately (see page 114)

For mating connectors see page 121



Solenoid monitoring
Door monitoring

For switching functions see technical data on page 172

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 179
For technical data see page 151

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

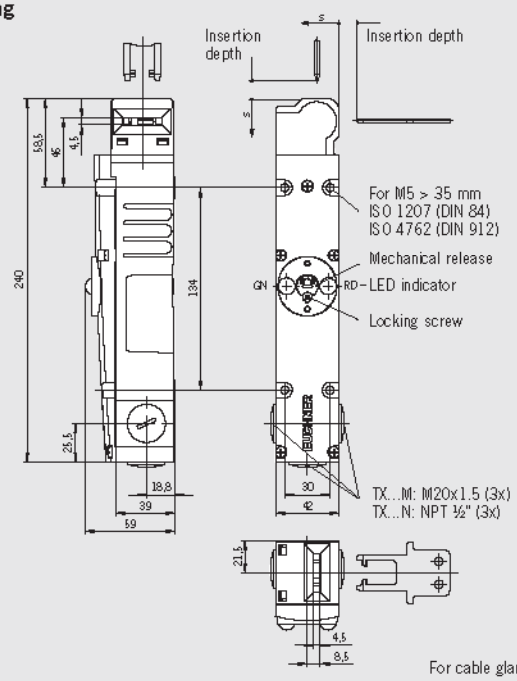
TX3 Closed-circuit current principle, guard locking by spring force. Release by applying voltage to the solenoid. Release under load possible.

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"

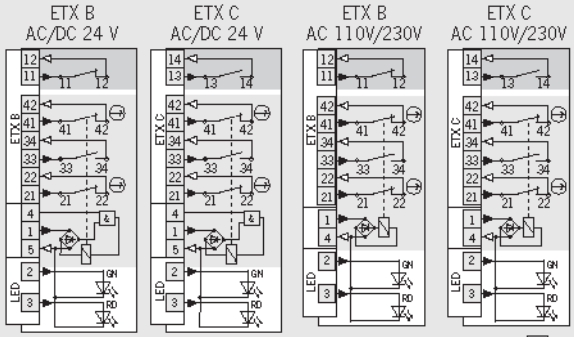
Dimension drawing



Please order actuator separately (see page 114)

For cable glands see page 124

Wiring diagrams Actuator inserted and locked



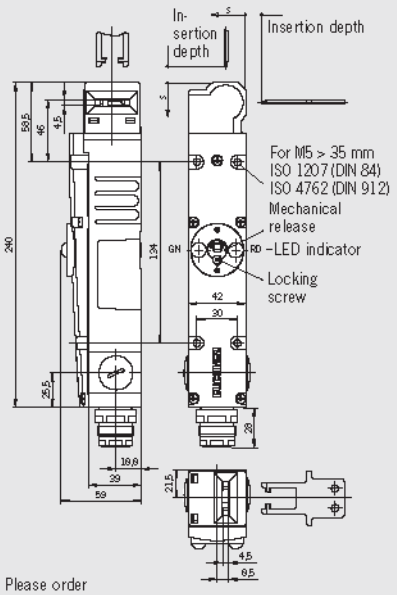
For switching functions see technical data on page 172

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	On request
			ETX C 2 NC ⊖ / 1 NO + 1 NO	**082 953** TX3C-A024M	**082 989** TX3C-A110M	On request
	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

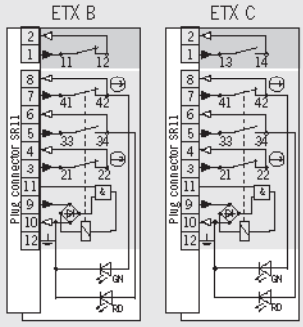
Dimension drawing



Please order actuator separately (see page 114)

For mating connectors see page 120

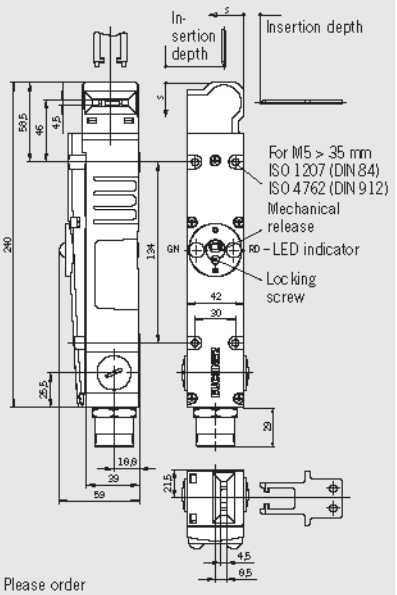
Wiring diagrams Actuator inserted and locked



For switching functions see technical data see page 172

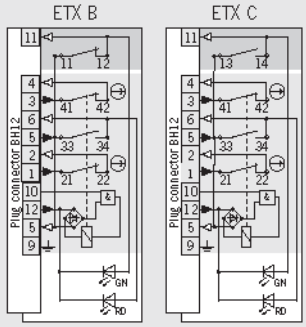
☐ Solenoid monitoring
☐ Door monitoring

Plug connector BH12
11-pin + PE



Please order actuator separately (see page 114)

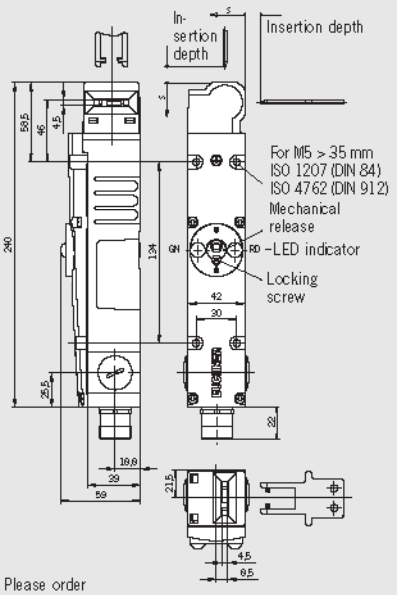
For mating connectors see page 123



For switching functions see technical data see page 172

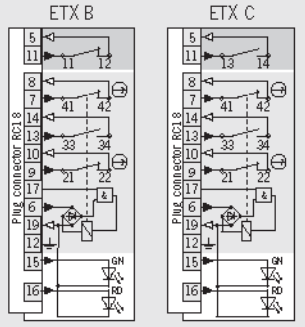
☐ Solenoid monitoring
☐ Door monitoring

Plug connector RC18
18-pin + PE



Please order actuator separately (see page 114)

For mating connectors see page 121



For switching functions see technical data see page 172

☐ 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 179
For technical data see page 151

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%

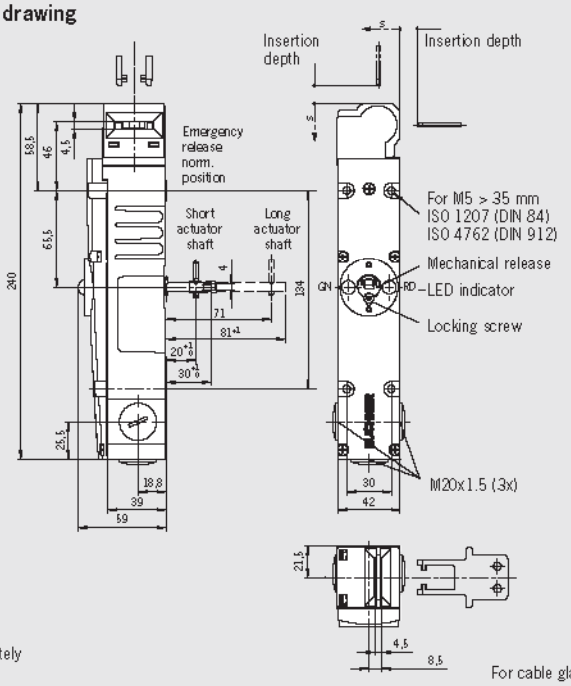
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

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

Cable entry M20 x 1.5

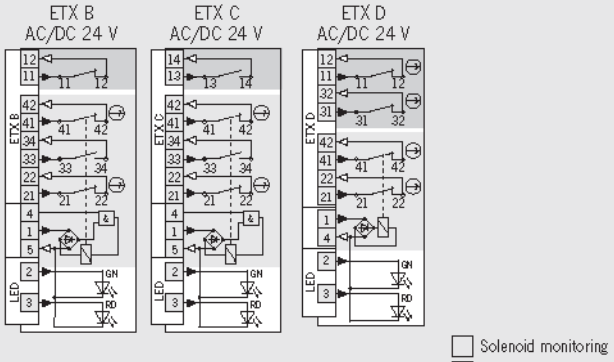
Dimension drawing



Please order actuator separately (see page 114)

For cable glands see page 124

Wiring diagrams Actuator inserted and locked



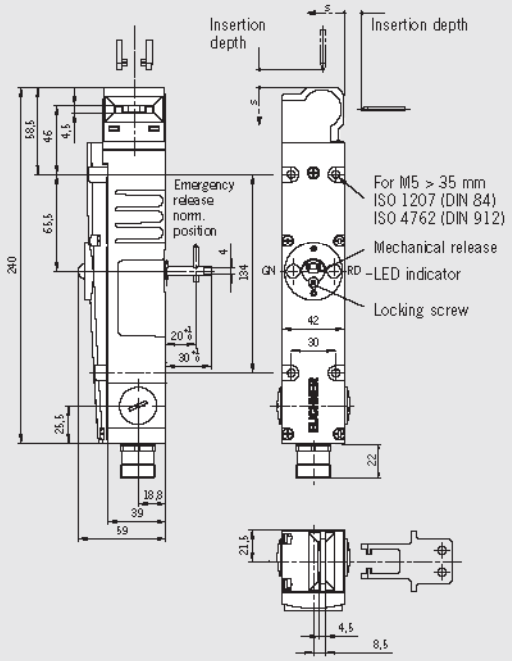
For switching functions see technical data on page 172

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

Plug connector RC18
18-pin + PE

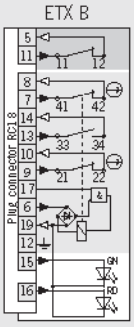
Dimension drawing



Please order actuator separately (see page 114)

For mating connectors see page 121

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions see technical data on page 172

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 179
For technical data see page 151

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%

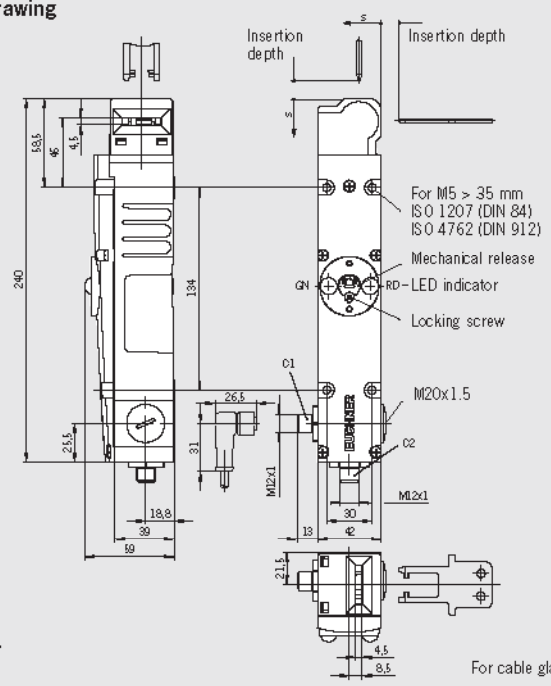
LED function display
The switch has a function display (2 LEDs, red and green). The LED voltage is same as the solenoid operating voltage.

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

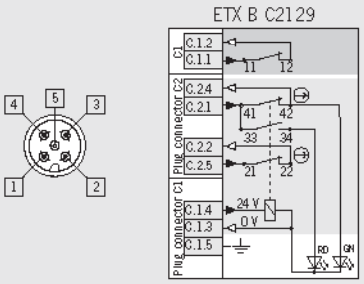
Dimension drawing



Please order actuator separately (see page 114)

For cable glands see page 124

Wiring diagrams Actuator inserted and locked



Solenoid monitoring
Door monitoring

For switching functions see technical data on page 172

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

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 (M12)

Parameter		Value	Unit
Connection		Plug connector	
Version		M12 (4-pin+ PE), adjustable male socket (max. 270°) for elbow connector	
Degree of protection according to IEC 60529		IP 65 1)	
Rated insulation voltage U_i		30	V AC/DC
Conventional thermal current I_{th}		4	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)		4	A gG
Utilization category 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

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	

1) Screwed tight with the related plug connector

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	

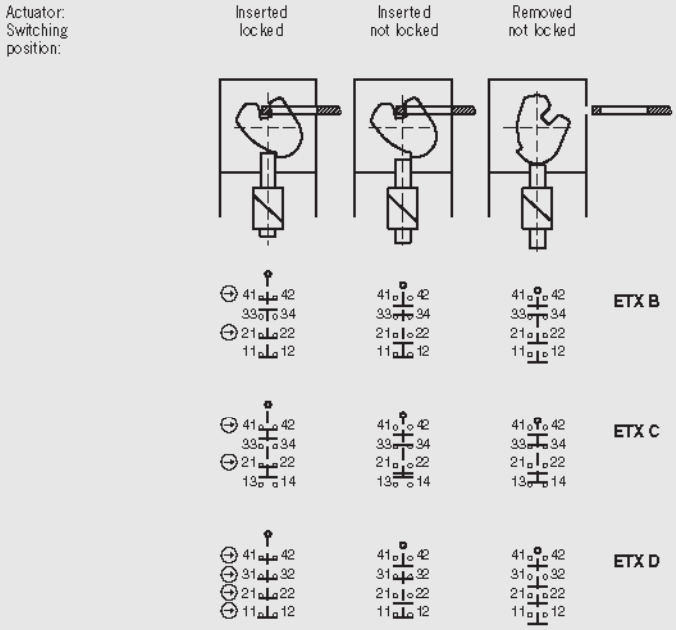
1) Screwed tight with the related plug connector (see page 120, 123 and 124)

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 121)

Switching functions TX



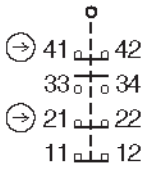
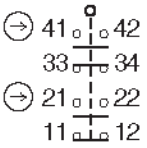
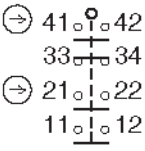
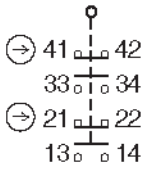
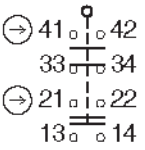
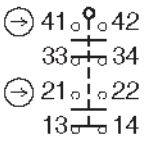
Switching characteristics safety switch TX3... (mechanical guard locking)

The application of a voltage U_B/U_S when the actuator is not inserted does not produce **any** change in the state of the switching element.

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

Control voltage U_S
On the version TX...24 an additional control voltage U_S is only required if U_B cannot supply the required current of 2 A for T_{IMP} = 250 ms when the solenoid is switched on.
Otherwise, the connection terminals U_S and U_B must be bridged on the version TX...24.

Safety switch TX3... with door monitoring contact (mechanical guard locking)

			Actuator inserted		Actuator removed
			Locked	Not locked	
Switching element	ETX B				
	ETX C				
Switch 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 /	Control voltage U_S	Not connected		
	TX3...230	Operating voltage U_B	0 V	110 V or 230 V	110 V, 230 V or 0 V