



TR110 Lock

SAFETY LOCKING DEVICE WITH TRANSPONDER MONITORING

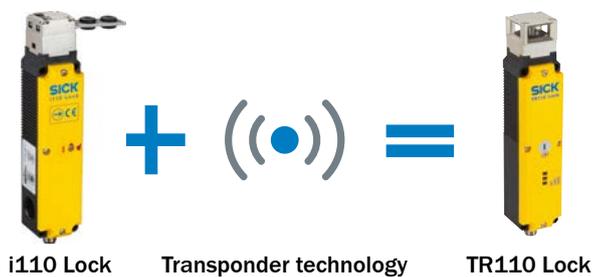
Safety switches

SICK
Sensor Intelligence.

HOLDING THE FORT WHEN IT COMES TO DURABLE SAFETY



When it comes to locking movable guards securely, the TR110 Lock safety locking device really delivers on everything it promises. Its impressive locking force of up to 3,900 N offers reliable protection. Whether it's used on covers or flaps to prevent injuries to hands and arms or as protection on access doors to applications with full body access to the hazardous area, the TR110 Lock reliably prevents users from manually reaching into or accessing such areas while the high coding level of the actuator makes manipulation virtually impossible.



The TR110 Lock safety locking device is based on various tried-and-tested technologies, combining each of their positive properties into a single complete solution. These include the safety of the non-contact transponder technology and monitored semiconductor outputs (OSSDs) as well as the reliability of the mechanical lock.



Future-proof investment

- Reliable manipulation protection in accordance with EN ISO 14119 thanks to high coding level and innovative transponder technology
- Variants available according to the power to lock and power to release principles



Maintaining productivity

- Long service life even in harsh environments thanks to rugged housing with IP67 and IP69K enclosure rating
- Rapid diagnostics thanks to application diagnostic output and status LED displays



Saving time and money

- Excellent mounting flexibility thanks to various installation options
- Footprint compatible with i10 Lock and i110 Lock



Safety afforded on all levels

- Enhanced application possibilities afforded by additional functions such as control elements and an escape release
- Performance level PL e for door and locking monitoring – even in series connection
- Reliable protection even in applications involving hazardous areas with full body access

HIGH CODING LEVEL FOR MAXIMUM SAFETY

Future-proof transponder technology

The functions of the TR110 Lock are as clever as they are simple thanks to the use of state-of-the-art transponder technology. If the coded actuator is inserted into the locking head of the safety switch when closing the door, the actuator code is read out and checked via transponder. If the code is valid and a locking signal is present, the protective device is locked and the two safe semiconductor outputs (OSSDs) are switched – that’s all there is to it.



Compliance with EN ISO 14119

Critical situations arise during every attempt to manipulate or bypass installed protective devices. For a high level of manipulation protection that does not require any additional measures to be taken during the mounting process, SICK offers the TR110 Lock safety locking device in a uniquely coded design that only accepts the previously taught-in actuator. The TR110 Lock meets the requirements of the EN ISO 14119 standard in every respect.



Based on the successful electromechanical i10 Lock and i110 Lock safety locking devices, the TR110 Lock with its high coding level makes additional measures and complicated modifications to the machine structure redundant when it comes to manipulation protection.

Measures	When using	
	i10 Lock/i110 Lock (low coding level)	TR110 Lock (high coding level)
Mounting out of reach	Orange	Green
Physical obstruction, shielding	Orange	Green
Concealed mounting	Orange	Green
Status monitoring or cyclical testing	Orange	Green
Additional interlocking device with plausibility check	Yellow	Green
Non-detachable fixing of actuator	Red	Red

- No measure required.
- The application of this measure is required.
- The application of at least one of these measures is required.
- The application of this measure is recommended.

Table excerpt from EN ISO 14119, Chapter 7.2, Table 3. Additional measures designed to reduce possibilities for defeating interlocking devices

Example applications



Protection of the access door for the stretch film wrapper



Protection of the access door for the welding robot



Protection of the access door for the stacker robot



Protection of the service door for the palletizing area

ON THE SAFE SIDE WITH COUNTLESS ADVANTAGES

The TR110 Lock is not only safe, but also offers many other advantages and therefore a multitude of reasons for using the transponder-based safety locking device.

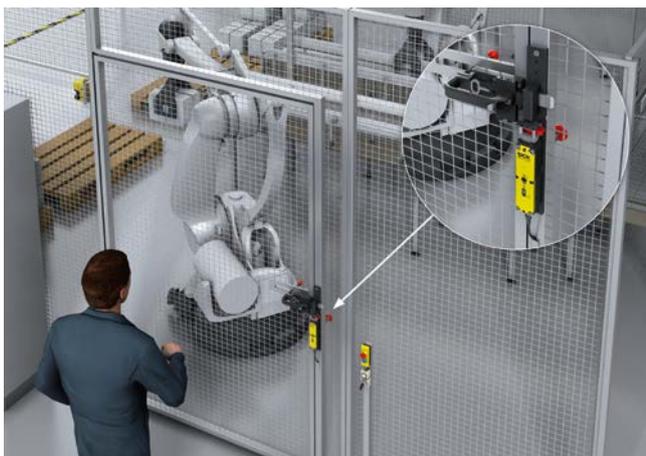
Excellent flexibility for mounting and replacement



The TR110 Lock can easily be integrated into the machine structure. The standard housing offers the possibility to guide the actuator to the safety switch from three different directions while also offering a high degree of mounting flexibility. The range of potential installation situations is extended further by rigid or flexible actuators. What's more, the mechanical compatibility makes it simple to replace existing electromechanical i10 Lock and i110 Lock safety locking devices with the transponder-based TR110 Lock safety locking device.

- + Flexible adaptation to various installation and application situations

Escape release for even more application possibilities



All variants of the TR110 Lock with escape release are suitable for use in applications that require the whole body to enter the hazardous area – for example, access or maintenance doors for large plants. In these cases, it is not impossible for maintenance employees to be overlooked from the outside. The integrated escape release makes it possible to unlock the door from the inside in the event that it is accidentally locked from the outside. The escape release unlocks the locking device and stops the machine.

- + Reliable protection against accidental entrapment

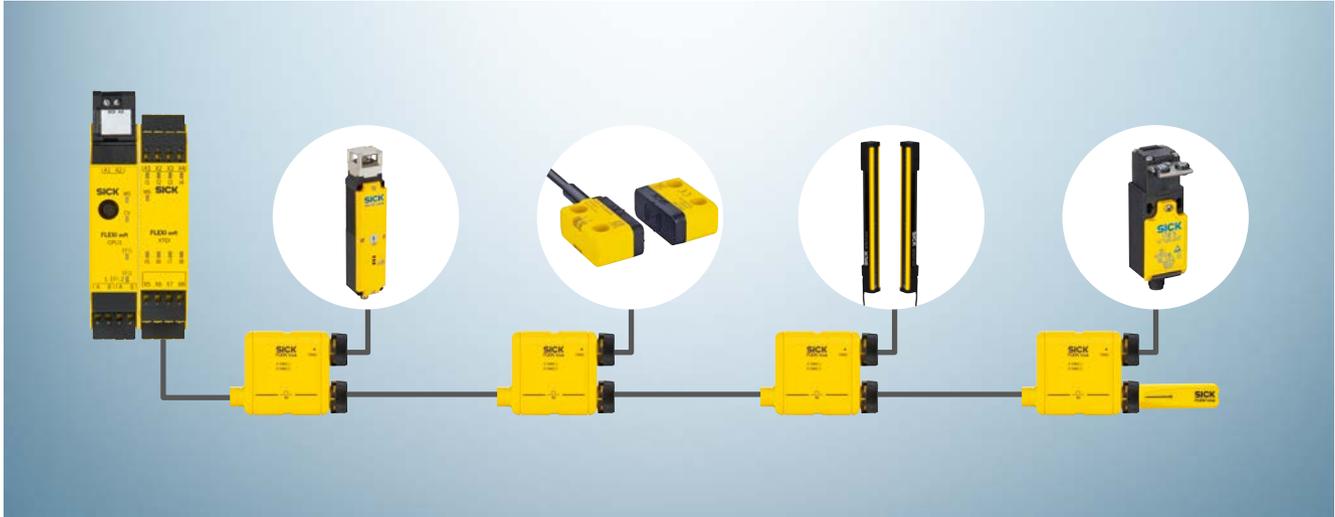
Control elements directly on device



A further variant of the TR110 Lock is characterized by its integrated display and control elements. Illuminable pushbuttons or indicator lights in the switch cover make it possible to trigger control signals such as door requests or acknowledgments, directly on the safety switch. There is no need for an additional command device.

- + Cost savings as no additional command devices are required

Series connection without loss of safety



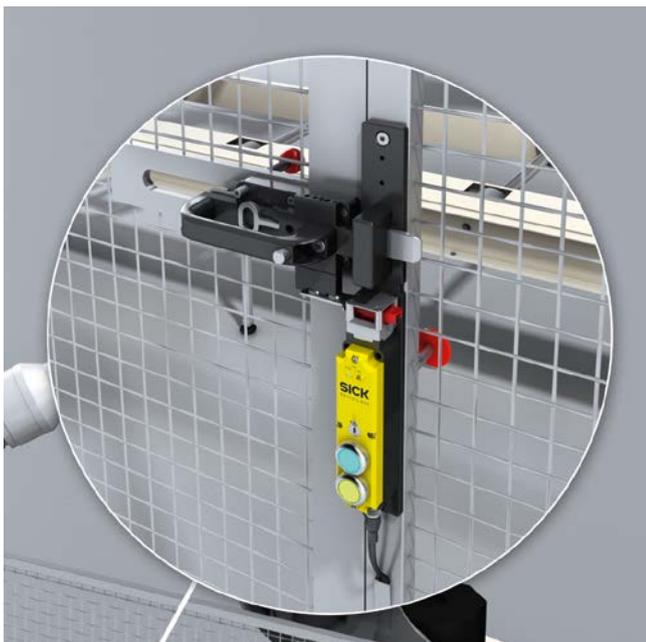
The TR110 Lock can be connected in series without compromising on safety (PL e/SIL 3). One option involves cascading the TR110 Lock using the Flexi Loop safe series connection from SICK. This process is both quick and easy and can even incorporate different sensors. The detailed diagnostics are provided by the evaluation unit for the Flexi Soft safety controller. The other option involves a safe series connection of the OSSD semiconductor outputs with a T-connector or in the control cabinet.

→ www.sick.com/Flexi_Soft

→ www.sick.com/Flexi_Loop

+ Maintenance of performance level PL e – even during safe series connection

Safe complete solution for access doors



In combination with an MB1 mechanical bolt, the TR110 Lock safety locking device offers a complete solution for protecting access doors and features a door handle, stop, and escape release. An innovative, easy-to-use locking mechanism is suitable for all common padlocks and locking pliers and ensures that the door cannot be locked again during maintenance work. The MB1 mechanical bolt ensures precise guidance of the actuator and even prevents actuator breakage in the case of heavy doors or door offsets.

+ Increased ruggedness and extended scope of applications thanks to additional functions

SAFETY LOCKING DEVICE WITH TRANSPONDER MONITORING



CE **cUL** **us** **EAC**

Additional information

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Product description

The TR110 Lock safety locking device unites the best of proven technologies: high manipulation protection of the transponder technology for monitoring the actuator and the ruggedness and reliability of the mechanical locking device. The self-monitoring semiconductor outputs (OSSDs) with PL e (EN ISO 13849) result in a high level of safety, both for

the door and for the locking monitoring. The optional escape release enables unlocking of the locking device from the hazardous area. The variants with two illuminable pushbuttons make it possible to trigger control signals such as door requests or resets directly on the safety switch.

At a glance

- PL e for door and locking monitoring (EN ISO 13849)
- Locking force: up to 3,900 N
- Actuator with high coding level (EN ISO 14119)
- Enclosure rating: IP67, IP69K
- Power to lock or power to release variants
- Three actuation directions
- Optional emergency release
- Variants with two illuminable pushbuttons

Your benefits

- Highest level of safety for door and locking monitoring with just one device
- High level of machine availability due to a rugged metal locking head and high locking force
- High coding level of the actuator fulfills the requirements of EN ISO 14119 on manipulation protection without additional measures
- Easy mounting thanks to three actuation directions
- The escape release enables use of the locking device in applications in which the hazardous area is not completely visible
- Illuminable pushbuttons make triggering of control signals directly on the device possible
- Additional application diagnostic outputs simplify diagnostics

→ www.sick.com/TR110_Lock

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.



Detailed technical data

More detailed data can be found in the operating instructions. Download → www.sick.com/TR110_Lock

Features

Sensor principle	Transponder		
Locking principle	Power to lock / power to release (depending on type)		
Coding	Uniquely coded		
Locking force F_{max}	With straight actuator	3,900 N (EN ISO 14119)	
	With angled actuator	1,500 N (EN ISO 14119)	
	With hinged actuator	2,600 N (EN ISO 14119)	
Locking force F_{zh}	With straight actuator	3,000 N (EN ISO 14119)	
	With angled actuator	1,100 N (EN ISO 14119)	
	With hinged actuator	2,000 N (EN ISO 14119)	
Actuation force	≥ 10 N		
Retaining force	20 N		
Force against which unlocking is possible	≤ 20 N		
Actuation frequency	≤ 0.5 Hz		
Approach speed	≤ 20 m/min		

Safety-related parameters

Category	Category 4 (EN ISO 13849) ¹⁾
Performance level	PL e (EN ISO 13849) ¹⁾
PFH_D (mean probability of a dangerous failure per hour)	4.1 x 10 ⁻⁹ (EN ISO 13849) ¹⁾
T_M (mission time)	20 years (EN ISO 13849)
Type	Type 4 (EN ISO 14119)
Actuator coding level	High coding level (EN ISO 14119)
Safe state in the event of a fault	At least one safety-related semiconductor output (OSSD) is in the OFF state.

¹⁾ Applies for monitoring of the door position (interlocking monitoring) and locking monitoring.

Functions

	TR110-SxxSAxx	TR110-SxxFLxx	TR110-SxxCAxx	TR110-Sxx2Bxx
Escape release	- / ✓ (depending on type)			
Safe series connection	-	With Flexi Loop (with diagnostics)	With T-connector (without diagnostics)	-

Interfaces

	TR110-SxxSAxx	TR110-SxxFLxx	TR110-SxxCAxx	TR110-Sxx2Bxx
Connection type	Plug connector, M12, 8-pin		Plug connector, M12, 8-pin Plug connector, M12, 5-pin	
Pushbuttons (illuminable)	-			✓

Electrical data

	TR110-SxxSAxx	TR110-SxxFLxx	TR110-SxxCAxx	TR110-Sxx2Bxx
Protection class	III (IEC 61140)			
Contamination rating	3 (EN 60947-1)			

¹⁾ In the case of inductive loads, outputs must be protected with a freewheeling diode.

²⁾ 5 ms for each additional switch.

	TR110-SxxSAxx	TR110-SxxFLxx	TR110-SxxCAxx	TR110-Sxx2Bxx
Classification according to cULus	Class 2			
Usage category	DC-13 (IEC 60947-5-1)			
Rated operating current (voltage)	150 mA (24 V DC) ¹⁾			
Rated insulation voltage U_i	50 V			
Rated impulse withstand voltage U_{imp}	500 V			
Supply voltage V_s				
	Sensor	24 V DC (20.4 V DC ... 27.6 V DC)		
	Magnet	24 V DC (20.4 V DC ... 26.4 V DC)		
Power consumption				
	Sensor	40 mA		
	Magnet	400 mA		
	Pushbutton (LED)	-		10 mA
Type of output				
	Safety outputs	2 semiconductor outputs (OSSDs), p-switching, short-circuit protected		
	Diagnostic outputs	P-switching, short-circuit protected		
Output current				
	Safety outputs	1 mA ... 150 mA		
	Diagnostic outputs	1 mA ... 50 mA		
	Pushbutton switching outputs	-		1 mA ... 50 mA
Power consumption of magnet	6 W			
Switch-on time of magnet	100 %			
Response time	≤ 260 ms ²⁾			
Enable time	400 ms			
Switch-on time	1 s		8 s	1 s
Discrepancy time	≤ 10 ms (EN IEC 60947-5-3)			
Locking principle	Power to lock / power to release (depending on type)			

¹⁾ In the case of inductive loads, outputs must be protected with a freewheeling diode.

²⁾ 5 ms for each additional switch.

Mechanical data

Weight	0.42 kg		
Material			
	Switch head	Zinc diecast	
	Housing	Glass-fiber reinforced thermoplastic	
	Plug connectors	Nickel-plated brass	
Mechanical life	1 x 10 ⁶ switching cycles		

Ambient data

	TR110-SxxSAxx	TR110-SxxFLxx	TR110-SxxCAxx	TR110-Sxx2Bxx
Enclosure rating	IP67, IP69K (EN 60529)			IP65 (EN 60529)
Ambient operating temperature	-20 °C ... +55 °C			
Vibration resistance	10 Hz ... 55 Hz (IEC 60068-2-6)			
Shock resistance	30 g, 11 ms (EN 60068-2-27)			
EMC	EN IEC 60947-5-3			

Ordering information

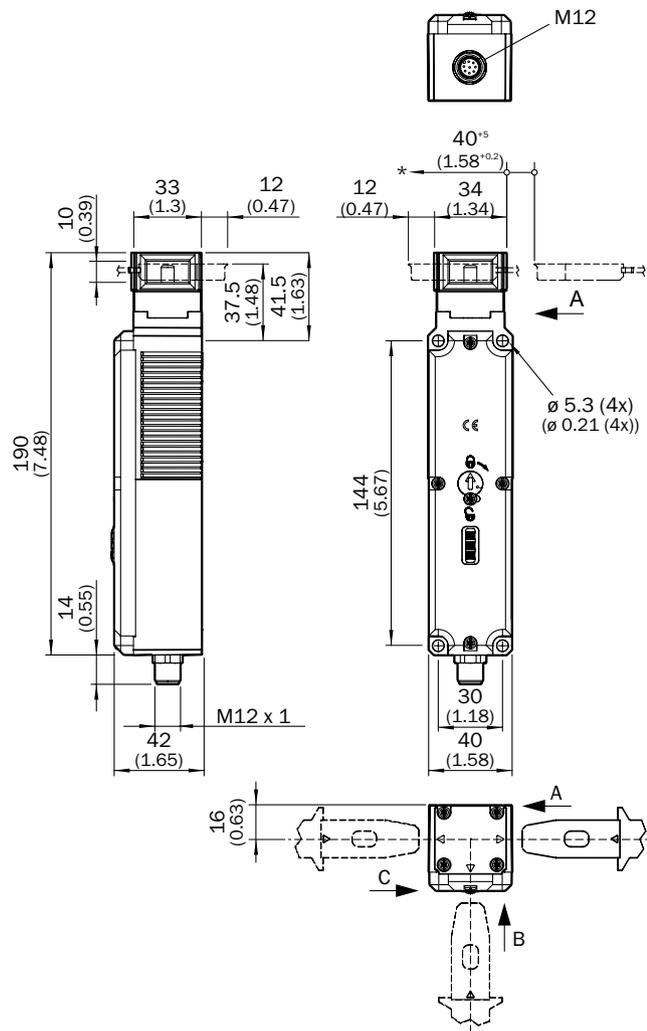
Items supplied TR110 Lock:

- Safety switch
- Extension of escape release (for variants with escape release)
- Unprinted pushbutton set, 5 colors (for variants with 2 pushbuttons)
- Safety instruction
- Operating instructions for download → www.sick.com/TR110_Lock

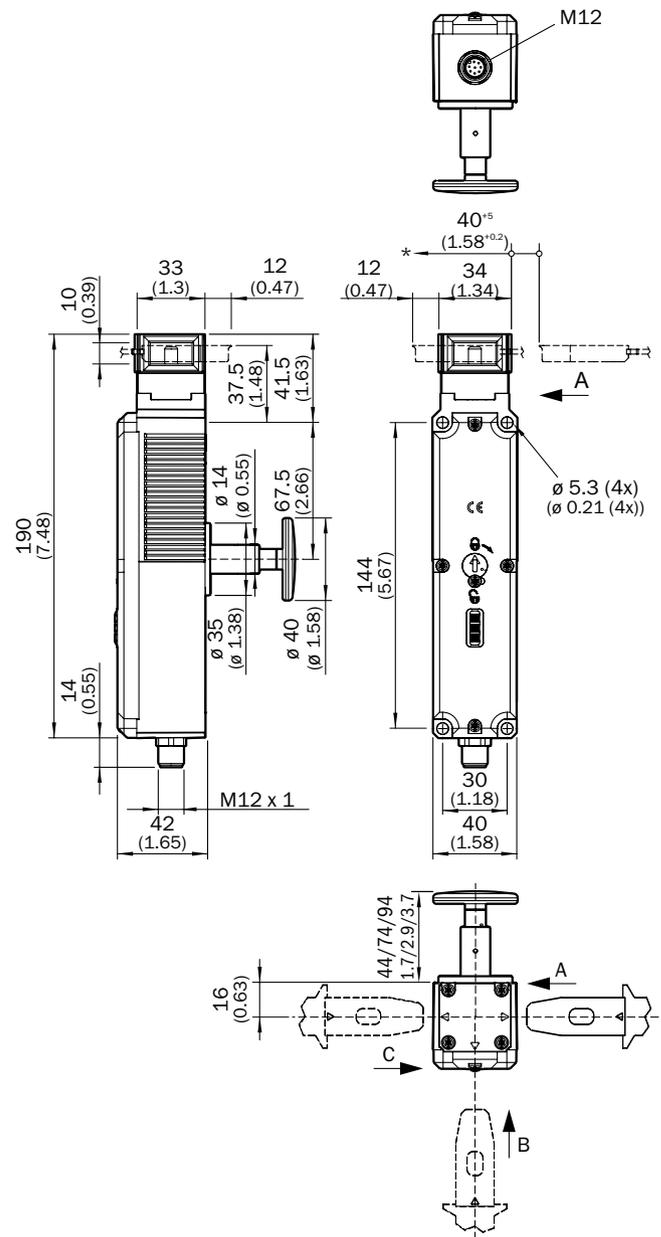
Connection type	Safe series connection	Pushbuttons (illuminable)	Locking principle	Escape release	Type	Part no.
Plug connector, M12, 8-pin	-	-	Power to lock	-	TR110-SLUSA00	6034589
			Power to release	-	TR110-SRUSA00	6033743
				✓	TR110-SRUSA01	6044631
	With Flexi Loop (with diagnostics)	-	Power to lock	-	TR110-SLUFL00	6044633
			Power to release	-	TR110-SRUFL00	6044632
				✓	TR110-SRUFL01	6044634
Plug connector, M12, 8-pin, plug connector, M12, 5-pin	With T-connector (without diagnostics)	-	Power to lock	-	TR110-SLUCA00	6051481
			Power to release	-	TR110-SRUCA00	6044635
				✓	TR110-SRUCA01	6068075
	-	✓	Power to lock	-	TR110-SLU2B00	6068077
			Power to release	-	TR110-SRU2B00	6068076
				✓	TR110-SRU2B01	6068078

Dimensional drawings (Dimensions in mm (inch))

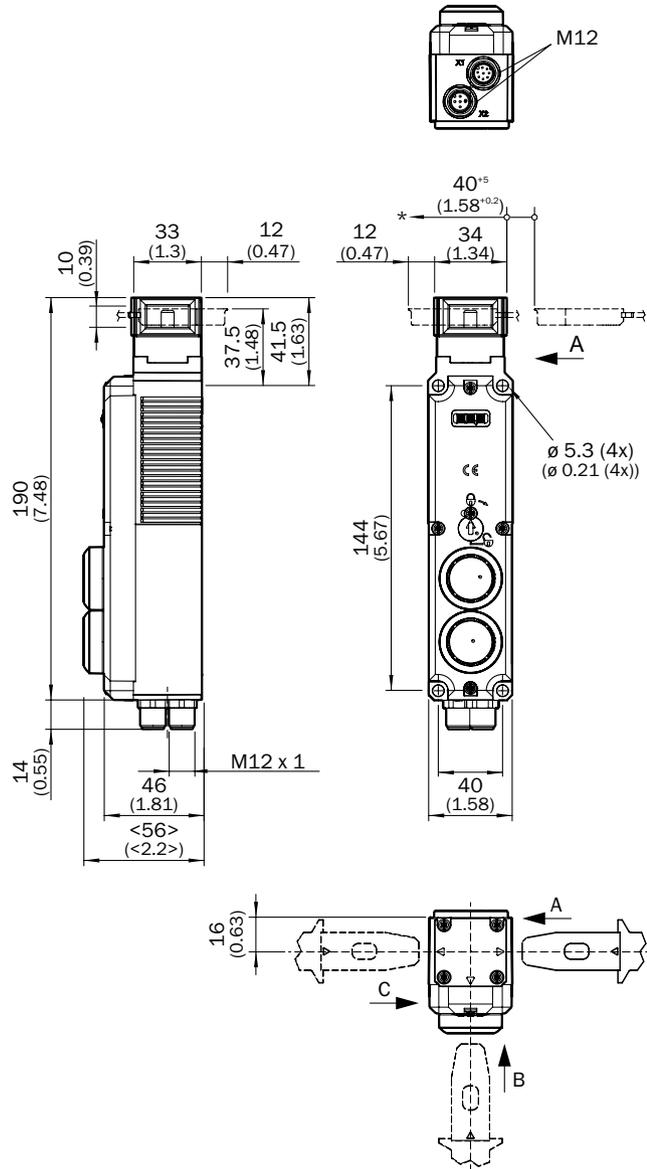
TR110SxxSA00 und TR110SxxFL00



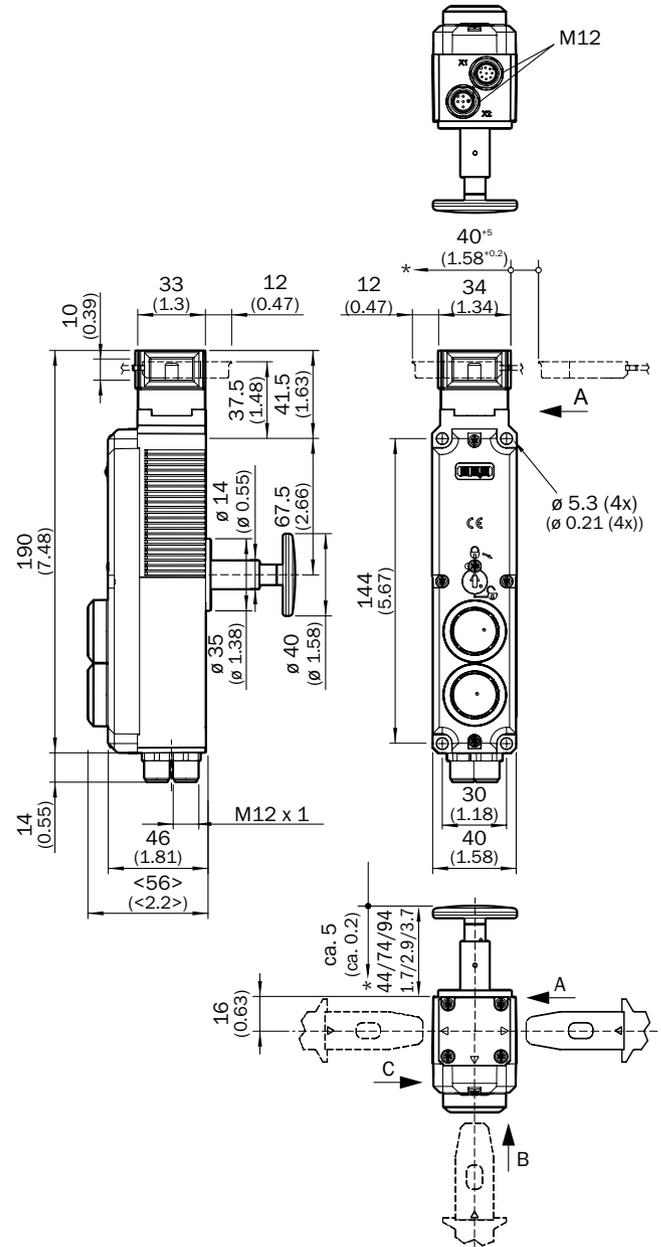
TR110SxxSA01 und TR110SxxFL01

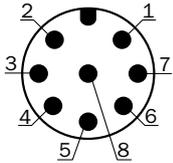


TR110Sxx2B00

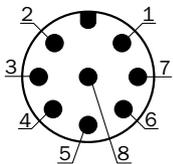


TR110Sxx2B01

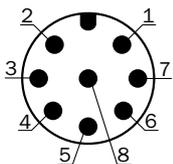


Pin assignment**TR110-SxxSAxx****Plug connector, M12, 8-pin**

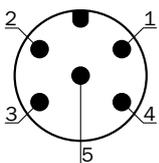
Pin	Designation	Description
1	AUX DOOR	Door application diagnostic output
2	+24 V DC	Safety switch voltage supply
3	Magnet +	Magnet control 24 V DC
4	AUX DIAG	Error application diagnostic output
5	OSSD 1	OSSD 1 output
6	OSSD 2	OSSD 2 output
7	0 V DC / Magnet -	0 V DC voltage supply / magnet control 0 V DC
8	AUX LOCK	Locking application diagnostic output

TR110-SxxFLxx**Plug connector, M12, 8-pin**

Pin	Designation	Description
1	AUX DOOR	Door application diagnostic output
2	+24 V DC	Safety switch voltage supply
3	Magnet +	Magnet control 24 V DC
4	N.c.	Not connected
5	OSSD 1	OSSD 1 output
6	OSSD 2	OSSD 2 output
7	0 V DC / Magnet -	0 V DC voltage supply / magnet control 0 V DC
8	N.c.	Not connected

TR110-SxxCAxx**Plug connector, M12, 8-pin**

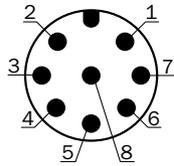
Pin	Designation	Description
1	AUX LOCK	Locking application diagnostic output
2	+24 V DC	Safety switch voltage supply
3	Reset	Reset input
4	In 2	Release input for OSSD 2
5	OSSD 1	OSSD 1 output
6	OSSD 2	OSSD 2 output
7	0 V	0 V DC voltage supply
8	In 1	Release input for OSSD 1

Plug connector, M12, 5-pin

Pin	Designation	Description
1	Magnet -	Magnet control 0 V DC
2	AUX DOOR	Door application diagnostic output
3	AUX DIAG	Error application diagnostic output
4	Magnet +	Magnet control 24 V DC
5	N.c.	Not connected

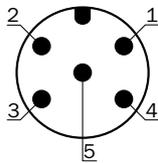
TR110-Sxx2Bxx

Plug connector, M12, 8-pin



Pin	Designation	Description
1	AUX DOOR	Door application diagnostic output
2	+24 V DC	Safety switch voltage supply
3	Magnet +	Magnet control 24 V DC
4	AUX DIAG	Error application diagnostic output
5	OSSD 1	OSSD 1 output
6	OSSD 2	OSSD 2 output
7	0 V	0 V DC voltage supply
8	AUX LOCK	Locking application diagnostic output

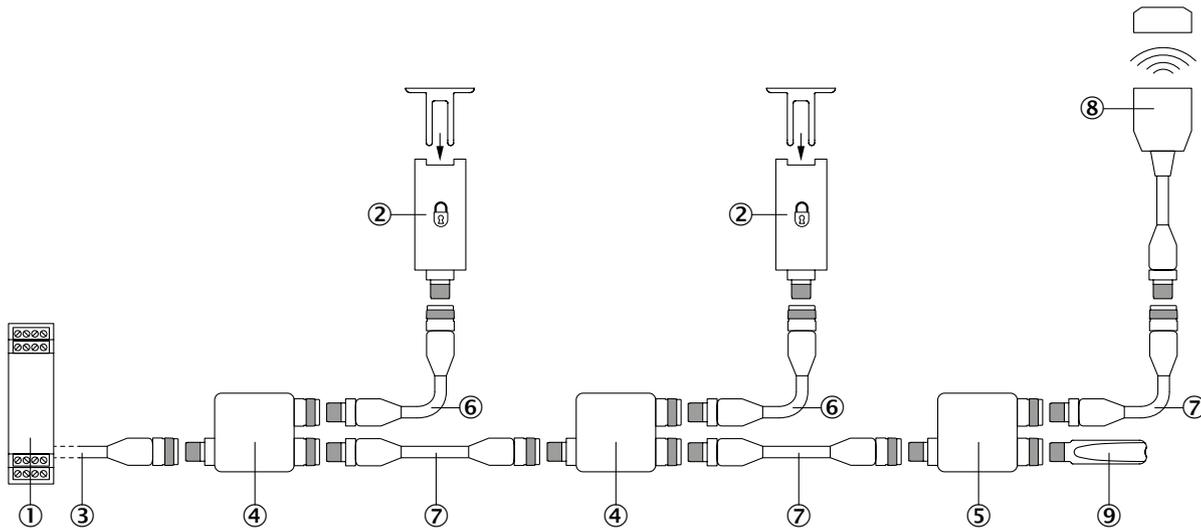
Plug connector, M12, 5-pin



Pin	Designation	Description
1	N01	Pushbutton 1, normally open
2	LED1	LED1
3	N02	Pushbutton 2, normally open
4	LED2	LED2
5	Reset	Reset input

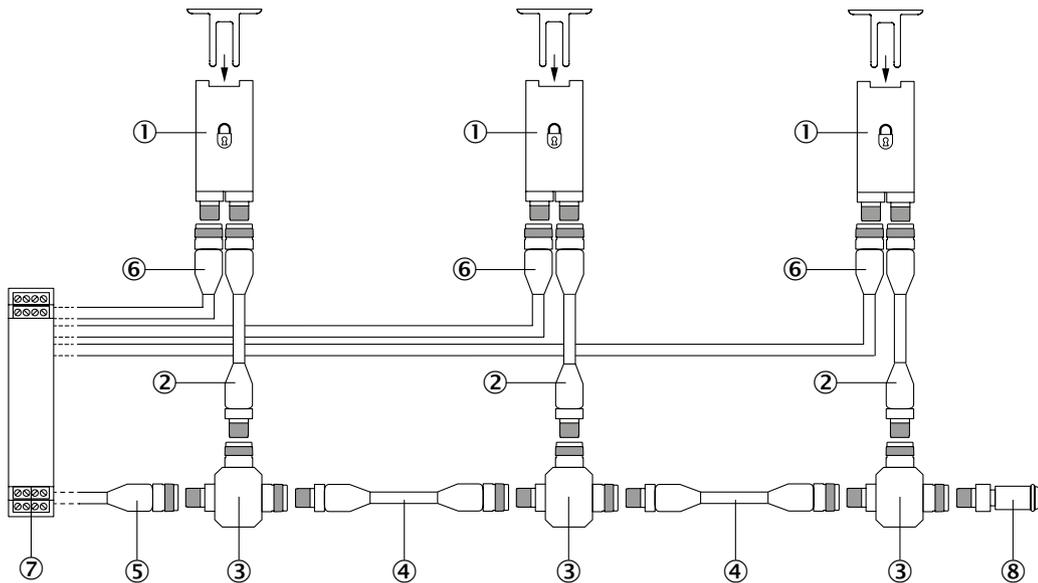
Series connection

Series connection with Flexi Loop (with diagnostics)



- ① Flexi Soft safety controller
- ② TR110 Lock safety locking device
- ③ Connecting cable with 5-pin, M12 female connector and flying leads (e.g., YF2A15-xxxVB5XLEAX)
- ④ FLN-OSSD1100108 Flexi Loop node
- ⑤ FLN-OSSD1000105 Flexi Loop node
- ⑥ Connection cable with 8-pin, M12 male connector and 8-pin, M12 female connector (e.g., YF2A18-xxxUA5M2A18)
- ⑦ Connection cable with 5-pin, M12 male connector and 5-pin, M12 female connector (e.g., YF2A15-xxxUB5M2A15)
- ⑧ STR1 transponder safety switch (e.g., STR1-SAxx0AC5)
- ⑨ FLT-TERM00001 Flexi Loop terminating element

Series connection with T-piece (without diagnostics)



- ① TR110 Lock safety locking device
- ② Connection cable with 8-pin, M12 male connector and 8-pin, M12 female connector (e.g., YF2A18-xxxUA5M2A18)
- ③ T-piece
- ④ Connection cable with 5-pin, M12 male connector and 5-pin, M12 female connector (e.g., YF2A15-xxxUB5M2A15)
- ⑤ Connecting cable with 5-pin, M12 female connector and flying leads (e.g., YF2A15-xxxVB5XLEAX)
- ⑥ Connecting cable with 5-pin, M12 female connector and flying leads (e.g., YF2A15-xxxVB5XLEAX)
- ⑦ Safe evaluation unit
- ⑧ End plug

Accessories required for commissioning

Description	Number	Items supplied	Further information
Connecting cable	1 or 2 (depends on variant)	-	→ Plug connectors and cables
Actuators	1	-	→ Further accessories
Operating instructions	1	✓	→ www.sick.com/TR110_Lock

Accessories

Mounting systems

Mounting brackets and plates

Figure	Description	Packing unit	Type	Part no.
	Mounting plate angled, for actuator	1 piece	TR110-XMAB	5338335
	Mounting plate angled, for sensor	1 piece	TR110-XMSB	5338334

Connection systems

Plug connectors and cables

Connecting cables

Figure	Connection type		Model	Conductor cross-section	Length of cable	Type	Part no.
	Female connector, M12, 5-pin, straight	Flying leads	PVC, unshielded	0.34 mm ²	2 m	YF2A15-020VB5XLEAX	2096239
					5 m	YF2A15-050VB5XLEAX	2096240
					10 m	YF2A15-100VB5XLEAX	2096241
					15 m	YF2A15-150VB5XLEAX	2096242
	Female connector, M12, 8-pin, straight	Flying leads	PUR, halogen-free, unshielded	0.25 mm ²	2 m	YF2A18-020UA5XLEAX	2095652
					5 m	YF2A18-050UA5XLEAX	2095653
					10 m	YF2A18-100UA5XLEAX	2095654
					15 m	YF2A18-150UA5XLEAX	2095679
					20 m	YF2A18-200UA5XLEAX	2095680
					30 m	YF2A18-300UA5XLEAX	2095681

Connection cables

- **Model:** PUR, halogen-free, unshielded

Figure	Connection type		Conductor cross-section	Length of cable	Type	Part no.
	Female connector, M12, 5-pin, straight	Male connector, M12, 5-pin, straight	0.34 mm ²	0.6 m	YF2A15-C60UB5M2A15	2096006
				1 m	YF2A15-010UB5M2A15	2096007
				1.5 m	YF2A15-015UB5M2A15	2096008
				2 m	YF2A15-020UB5M2A15	2096009
				5 m	YF2A15-050UB5M2A15	2096010
				10 m	YF2A15-100UB5M2A15	2096011
				15 m	YF2A15-150UB5M2A15	2096171
				20 m	YF2A15-200UB5M2A15	2095844
				30 m	YF2A15-300UB5M2A15	2095845

Figure	Connection type		Conductor cross-section	Length of cable	Type	Part no.
	Female connector, M12, 8-pin, straight	Male connector, M12, 8-pin, straight	0.25 mm ²	0.6 m	YF2A18-C60UA5M2A18	2096031
				1 m	YF2A18-010UA5M2A18	2096032
				1.5 m	YF2A18-015UA5M2A18	2096012
				2 m	YF2A18-020UA5M2A18	2096033
				5 m	YF2A18-050UA5M2A18	2096034
				10 m	YF2A18-100UA5M2A18	2096035

Adapters and distributors

T-junctions

Figure	Description	Type	Part no.
	T-connector for safe series connection, M12 male connector, 5-pin, A-coded, on 1 x M12 female connector, 5-pin, A-coded, on 1 x M12 female connector, 8-pin, A-coded	STR1-XXA	5339609

Other adapters and distributors

Figure	Description	Type	Part no.
	End connector for serial connection in combination with STR1-XXA	MLP1-XXT	1078201

Further accessories

Actuators

Figure	Description	Items supplied	Type	Part no.
	Actuator angled	Including two safety screws M4	TR110-XABT	5334663
	Hinged actuators for doors with hinges on bottom	Including two safety screws M5	TR110-XAFB	5338338
	Hinged actuators for doors with hinges on left	Including two safety screws M5	TR110-XAFL	5338331
	Hinged actuators for doors with hinges on right	Including two safety screws M5	TR110-XAFR	5338332
	Hinged actuators for doors with hinges on top	Including two safety screws M5	TR110-XAFT	5338336
	Actuator straight	Including two safety screws M4	TR110-XAS	5321176

Locks and keys

Figure	Description	Type	Part no.
	Emergency release	TR110-XER	5338333

Mechanical bolts for safety switches

MB1

Figure	Catch release button/ANSI-compliant locking mechanism	Escape release	Type	Part no.
	-	-	MB1-BL00	1091788
	✓	-	MB1-BL10	1091789
		✓	MB1-BL11	1091790

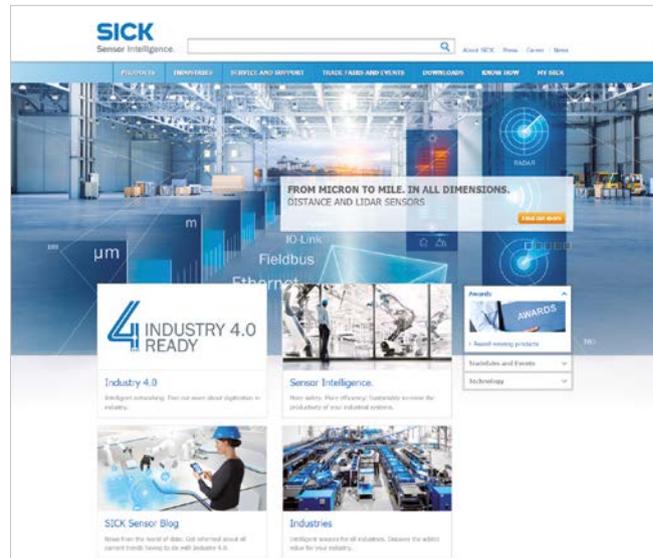
Safe series connection

Flexi Loop

Figure	Description	Type	Part no.
	Flexi Loop node for safety sensors with dual-channel OSSD outputs, 8-pin version	FLN-OSSD1100108	1061710
	Flexi Loop terminator for terminating the series connection at the last Flexi Loop node	FLT-TERM00001	1061716

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- ✔ Save time by using past orders.
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SERVICES FOR MACHINES AND PLANTS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.



- 
Consulting and design
 Safe and professional
- 
Product and system support
 Reliable, fast, and on-site
- 
Verification and optimization
 Safe and regularly inspected
- 
Upgrade and retrofits
 Easy, safe, and economical
- 
Training and education
 Practical, focused, and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 9,700 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is “Sensor Intelligence.”

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com