



# STR1

## SWITCH TO EXPERIENCE

Transponder safety switches

**SICK**  
Sensor Intelligence.



Directly cascadable

Flexi-Loop-ready

Complete solution

Safety switch,  
safety controller,  
service

High electromagnetic  
compatibility (EMC)

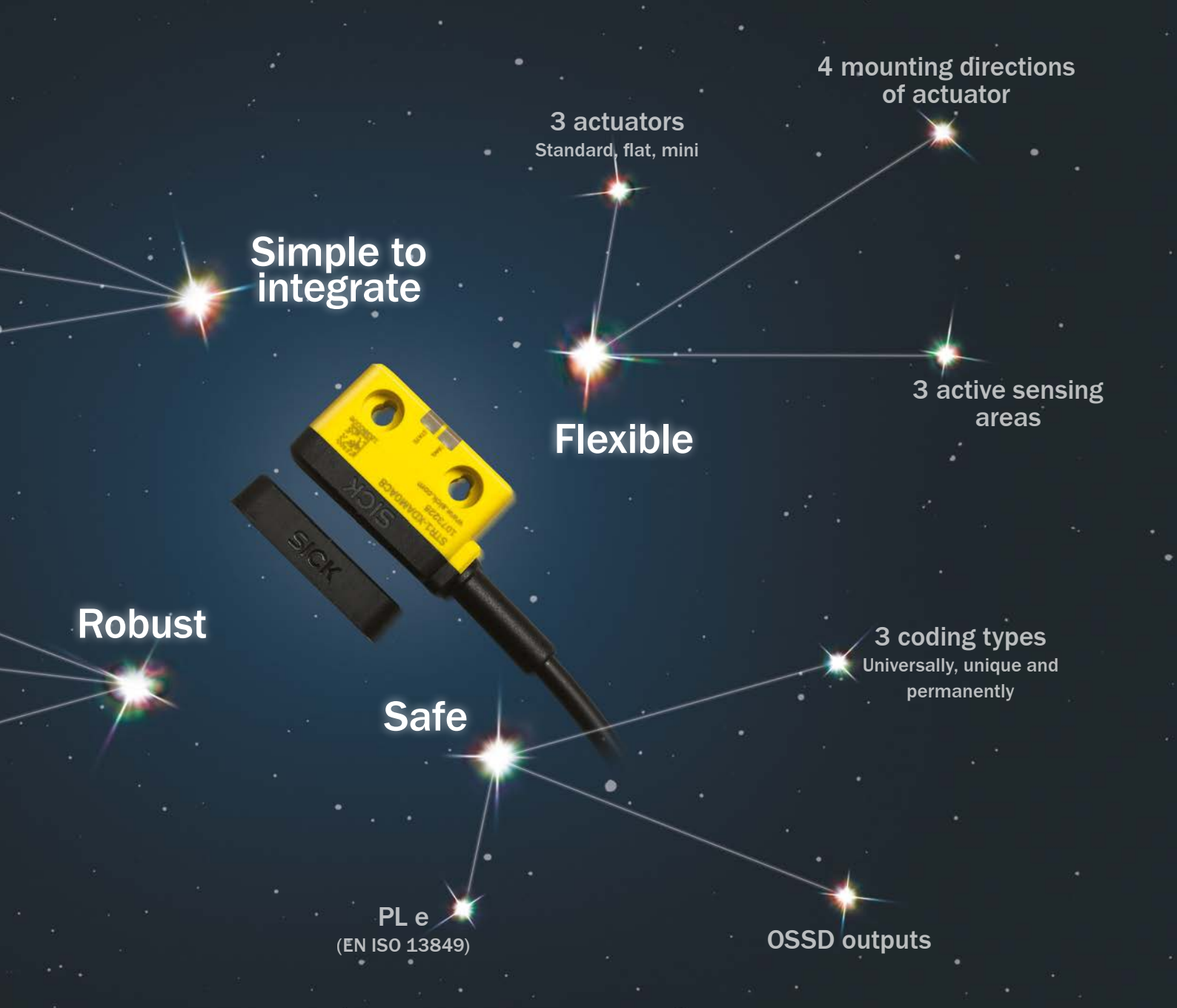
VISTAL™  
Housing

IP 67  
enclosure rating

# STR1 – THE NEW STAR OF THE SWITCHING UNIVERSE

## A WEALTH OF EXPERIENCE OPENS UP A NEW DIMENSION FOR SAFETY SWITCHES

Traveling to a new galaxy demands thorough preparation and extensive planning. The objective has been set: To discover a transponder safety switch with exceptional performance. The equipment is on board: Over 50 years of experience in the field of safety sensors, an established product range backed up by a worldwide service network, and SICK's quality guarantee as a market leader. The result: the STR1. Mission accomplished!



#### Flexible: Accessible in three ways

The STR1 has three different actuators at its disposal, allowing for exceptional flexibility during mounting. But that's not all: The range of mounting possibilities is expanded even further thanks to its three active sensing areas and up to four mounting directions of actuator.

#### Safe: Secure coding in action

The STR1 transponder safety switch boasts excellent prevention against tampering thanks to the three coding types available: universally coded, unique coded, and permanently coded. The sensor's self-monitoring semiconductor outputs (OSSD) detect errors that arise, with performance level PL e (EN ISO 13849) ensuring high levels of safety.

#### Robust: Proves its worth three times over

The STR1 ensures excellent machine availability: Its compact VISTAL™ housing offers outstanding mechanical stability, its exceptional electromagnetic compatibility (EMC) guarantees flawless operation, and its IP 67 enclosure rating allows it to withstand harsh environmental conditions.

#### Simple to integrate: Safety in numbers

When used alongside SICK safety controllers, the STR1 can create a perfectly harmonized system – supported by comprehensive documentation including connection diagrams and application descriptions. The STR1 can be connected either individually or in series, either directly using T-junctions or with the innovative Flexi Loop safe sensor cascade.

## COMPACT, SAFE, AND FLEXIBLE



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### Product description

The STR1 transponder safety switch has monitored semiconductor outputs (OSSDs) and can be safely connected either individually or in series.

It can be used for applications where a high level of manipulation protection is required. The STR1 is available with three codes. Universally coded sensors accept all actuators. An actuator must

be taught into both the uniquely coded and permanently coded variants; this is the only actuator that the STR1 then accepts.

The sensor has three active sensor surfaces. The actuator comes in three different sizes. This allows the STR1 to offer maximum mounting flexibility.

### At a glance

- Response range of up to 14 mm
- Small housing with flexible mounting options
- Sensor activation possible from three sides
- Three different actuators available
- Universally coded, uniquely coded, and permanently coded sensors
- PL e (EN ISO 13849), SIL3 (IEC 61508)
- Reliable series connection of up to 30 sensors possible

### Your benefits

- High level of flexibility when mounting the sensor and actuator
- Reduced need for storage, as one sensor is suitable for a wide range of different applications
- High level of manipulation protection due to individually coded actuator
- High level of machine availability due to large door offset tolerance and high level of shock and vibration resistance
- Economical solution due to series connection of up to 30 sensors
- Fast diagnosis via LED status indicator
- Long product service life due to low-wastage and low-maintenance configuration

→ [www.sick.com/STR1](http://www.sick.com/STR1)

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/STR1](http://www.sick.com/STR1)

### Features

	"Standard" actuator	"Flat" actuator	"Mini" actuator
<b>Sensor principle</b>	Transponder (RFID)		
<b>Number of safe outputs</b>	2		
<b>Auxiliary contact (AUX)</b>	1		
<b>Safe switch on distance <math>S_{ao}</math></b>			
Active front sensor surface	10 mm	14 mm	
Active side sensor surface	6 mm	9 mm	
<b>Safe switch off distance <math>S_{ar}</math></b>	25 mm	28 mm	
<b>Active sensor surfaces</b>	3		
<b>Actuation directions</b>	5		
<b>Coding</b>	Universally coded / unique coded / permanently coded (depending on type)		

### Safety-related parameters

<b>Safety integrity level</b>	SIL3 (IEC 61508), SILCL3 (EN 62061)
<b>Category</b>	Category 4 (EN ISO 13849)
<b>Performance level</b>	PL e (EN ISO 13849)
<b>PFH<sub>p</sub> (mean probability of a dangerous failure per hour)</b>	$5.21 \times 10^{-9}$ (EN ISO 13849)
<b>T<sub>M</sub> (mission time)</b>	20 years (EN ISO 13849)
<b>Type</b>	Type 4 (EN ISO 14119)
<b>Actuator coding level</b>	
Model universally coded	Low coding level (EN ISO 14119)
Model unique coded	High coding level (EN ISO 14119)
Model permanently coded	High coding level (EN ISO 14119)
<b>Safe state in the event of a fault</b>	At least one safety-related semiconductor output (OSSD) is in the OFF state.

### Functions

<b>Cascading</b>	- / ✓ (depending on type)
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### Interfaces

<b>Connection type</b>	Cable with plug M12, 5-pin / cable with plug M12, 8-pin / cable, 5-wire (depending on type)
Flexi-Loop-ready	✓
Cable length	0.2 m / 3 m / 10 m (depending on type)
Cable material	PVC
<b>Diagnostics indicator</b>	✓
<b>Status display</b>	✓

## Electrical data

Protection class	III (EN 50178)
Classification according to cULus	Class 2
Supply voltage V <sub>s</sub>	24 V DC (19.2 V DC ... 28.8 V DC)
Power consumption	50 mA
Type of output	Semiconductor (OSSD)
Output current	≤ 100 mA
Response time	40 ms <sup>1)</sup>
Enable time	100 ms <sup>2)</sup>
Risk time	80 ms <sup>3)</sup>
Switch-on time	2.5 s <sup>4)</sup>

<sup>1)</sup> In a cascade each downstream safety switch increases the response time of the system. Other response times see operating instructions.

<sup>2)</sup> Response time on approach to the enable zone.

<sup>3)</sup> Detection time for internal or external faults (e.g., short-circuit or cross-circuit of output signal switching devices). Follow the detailed information in the operating instructions.

<sup>4)</sup> The stated time applies for one sensor after application of the supply voltage to the safety switch. In case of a cascade 0.1 s must be added per sensor. For uniquely coded or permanently coded sensors 0.5 s must be added additionally per taught-in actuator.

## Mechanical data

Dimensions (W x H x D)	40 mm x 18 mm x 26 mm
Weight	63 g ... 436 g (depending on type)
Housing material	VISTAL®

## Ambient data

Enclosure rating	IP 67 (EN 60529)
Ambient operating temperature	-10 °C ... +70 °C
Storage temperature	-25 °C ... +70 °C
Vibration resistance	10 Hz ... 55 Hz, 1 mm (IEC 60068-2-6)
Shock resistance	30 g, 11 ms (IEC 60068-2-27)
EMC	EN IEC 61326-3-1, EN IEC 60947-5-2, EN IEC 60947-5-3

## Ordering information

Items supplied STR1:

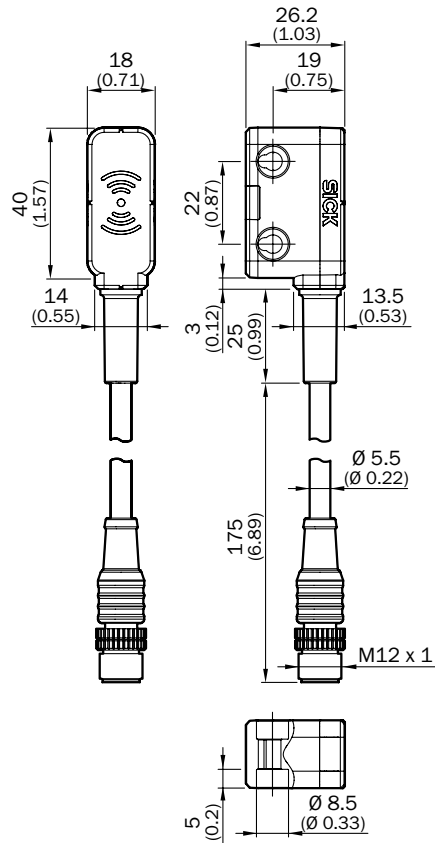
- Safety switch
- Actuator
- Safety instruction
- Operating instructions for download → [www.sick.com/STR1](http://www.sick.com/STR1)

Actuator design	Coding	Connection type	Cable length	Cascading	Type	Part no.
Standard	Universally coded	Cable with plug M12, 5-pin	0.2 m	–	STR1-SASM0AC5	1069560
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SASM0AC8	1069561
		Cable, 5-wire	3 m	–	STR1-SASM03P5	1069562
			10 m	–	STR1-SASM10P5	1069563
	Unique coded	Cable with plug M12, 5-pin	0.2 m	–	STR1-SASU0AC5	1072709
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SASU0AC8	1072710
		Cable, 5-wire	3 m	–	STR1-SASU03P5	1072711
			10 m	–	STR1-SASU10P5	1072712
	Permanently coded	Cable with plug M12, 5-pin	0.2 m	–	STR1-SASF0AC5	1073211
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SASF0AC8	1073212
		Cable, 5-wire	3 m	–	STR1-SASF03P5	1073213
			10 m	–	STR1-SASF10P5	1073214

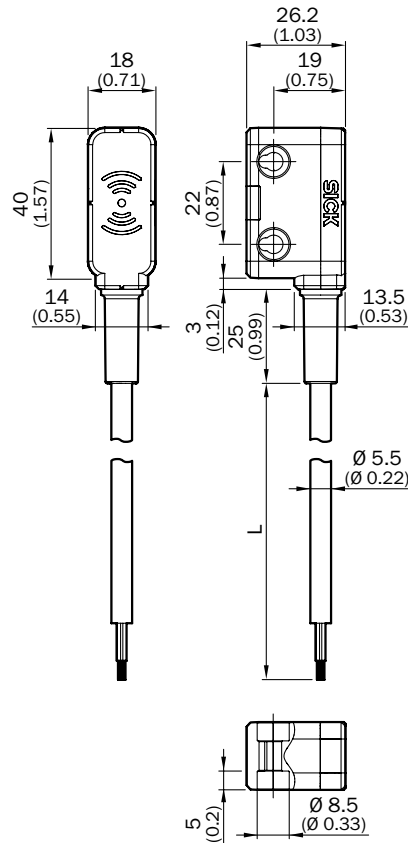
Actuator design	Coding	Connection type	Cable length	Cascading	Type	Part no.
Flat	Universally coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAFM0AC5	1069565
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAFM0AC8	1069566
		Cable, 5-wire	3 m	-	STR1-SAFM03P5	1069567
			10 m	-	STR1-SAFM10P5	1069568
	Unique coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAFU0AC5	1069575
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAFU0AC8	1069576
		Cable, 5-wire	3 m	-	STR1-SAFU03P5	1069577
			10 m	-	STR1-SAFU10P5	1072707
	Permanently coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAFF0AC5	1073206
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAFF0AC8	1073207
		Cable, 5-wire	3 m	-	STR1-SAFF03P5	1073208
			10 m	-	STR1-SAFF10P5	1073209
Mini	Universally coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAMM0AC5	1069570
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAMM0AC8	1069571
		Cable, 5-wire	3 m	-	STR1-SAMM03P5	1069572
			10 m	-	STR1-SAMM10P5	1069573
	Unique coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAMU0AC5	1073205
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAMU0AC8	1073204
		Cable, 5-wire	3 m	-	STR1-SAMU03P5	1073201
			10 m	-	STR1-SAMU10P5	1073203
	Permanently coded	Cable with plug M12, 5-pin	0.2 m	-	STR1-SAMF0AC5	1073216
		Cable with plug M12, 8-pin	0.2 m	✓	STR1-SAMF0AC8	1073217
		Cable, 5-wire	3 m	-	STR1-SAMF03P5	1073218
			10 m	-	STR1-SAMF10P5	1073219

## Dimensional drawings (Dimensions in mm (inch))

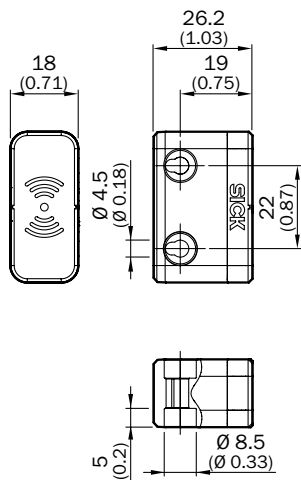
Sensor with cable and male connector



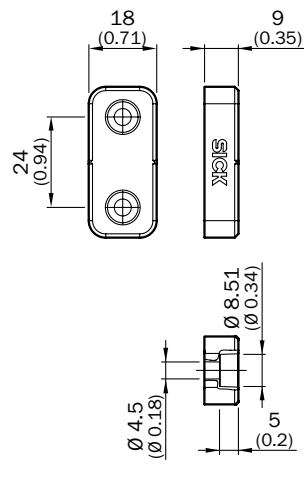
Sensor with cable



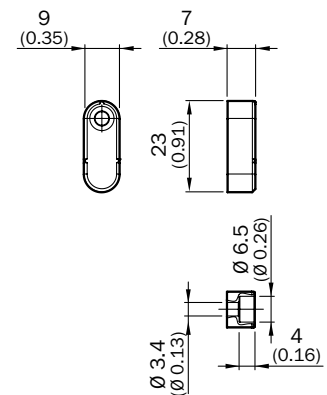
“Standard” actuator



“Flat” actuator

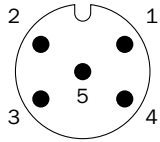


“Mini” actuator



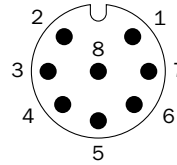
## Connection diagram

Connection type: cable with male connector M12, 5-pin



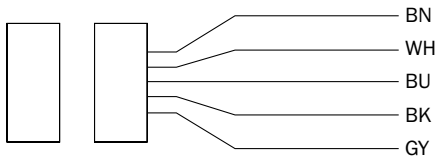
1	Voltage supply 24 V DC
2	Safety output A
3	Voltage supply 0 V DC
4	Safety output B
5	Aux output (not safe)

Connection type: with male connector M12, 8-pin



1	Aux output (not safe)
2	Voltage supply 24 V DC
3	Not connected
4	Enable input for channel B
5	Safety output A
6	Safety output B
7	Voltage supply 0 V DC
8	Enable input for channel A

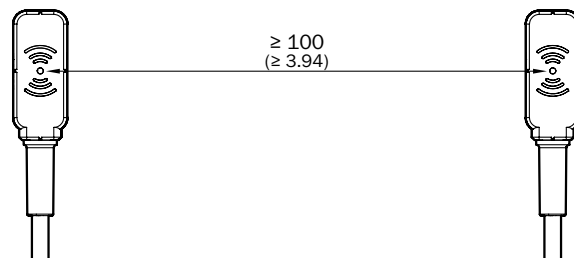
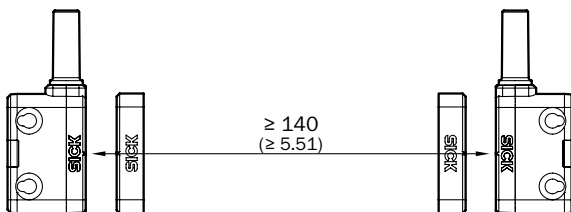
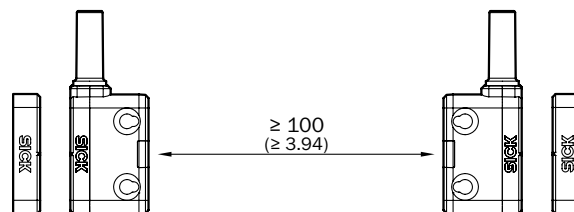
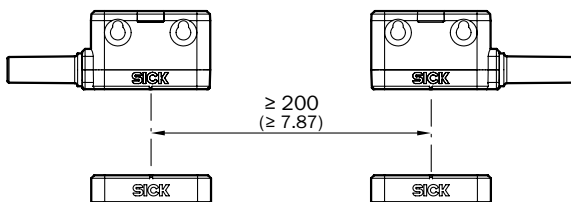
Connection type: cable, 5-wire



Brown	Voltage supply 24 V DC
White	Safety output A
Blue	Voltage supply 0 V DC
Black	Safety output B
Grey	Aux output (not safe)

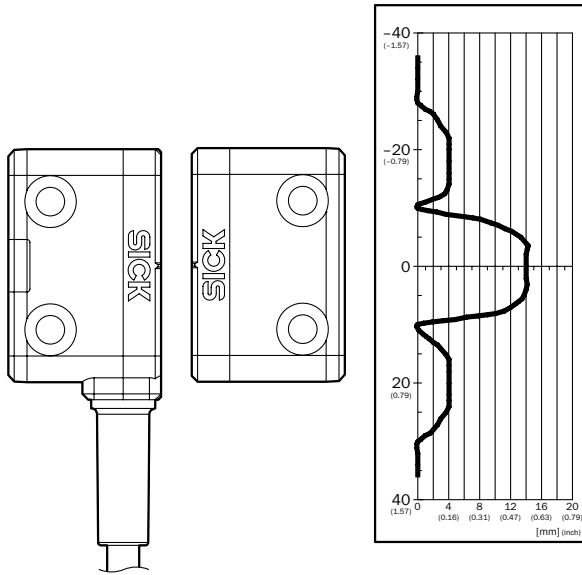
## Mounting (Dimensions in mm (inch))

Minimum distance to neighboring sensors



## Response range

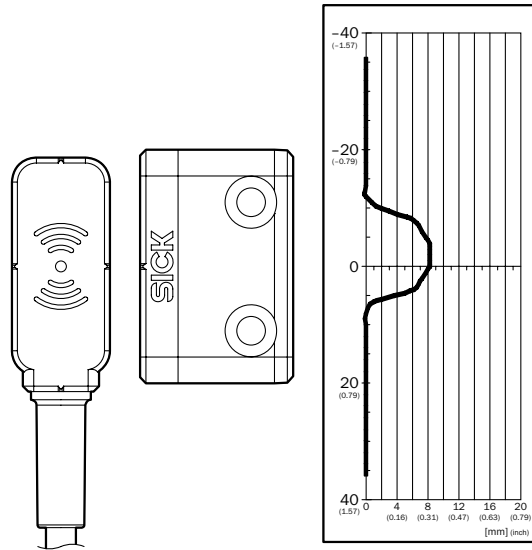
“Standard” actuator, active front sensor surface



Safe switch on distance  $S_{ao}$  10 mm

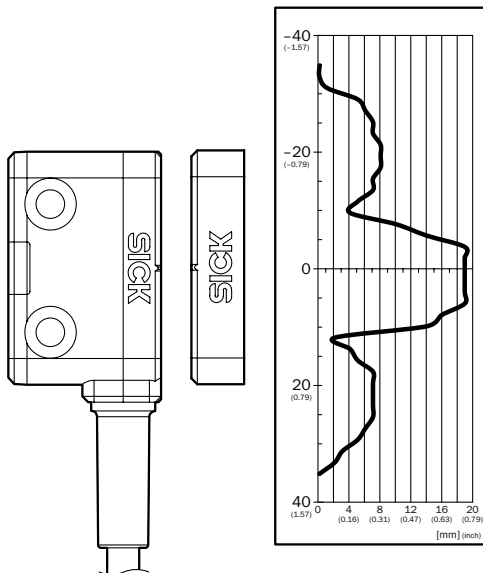
Pay attention to boundary areas in case of parallel approach:  
If the actuator moves laterally in relation to the surface of the sensor,  
a minimum distance of 6 mm must be maintained. This distance will  
prevent premature triggering due to the side approach areas.

“Standard” actuator, active side sensor surface



Safe switch on distance  $S_{ao}$  6 mm

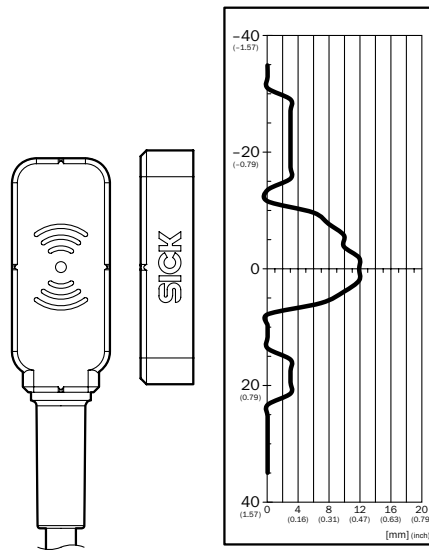
“Flat”/“Mini” actuator, active front sensor surface



Safe switch on distance  $S_{ao}$  14 mm

Pay attention to boundary areas in case of parallel approach:  
If the actuator moves laterally in relation to the surface of the sensor,  
a minimum distance of 10 mm must be maintained. This distance will  
prevent premature triggering due to the side approach areas.

“Flat”/“Mini” actuator, active side sensor surface

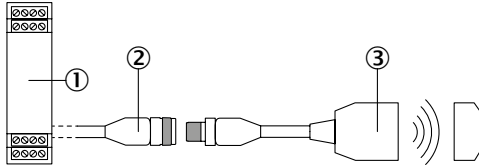


Safe switch on distance  $S_{ao}$  9 mm

Pay attention to boundary areas in case of parallel approach:  
If the actuator moves laterally in relation to the surface of the sensor,  
a minimum distance of 4 mm must be maintained. This distance will  
prevent premature triggering due to the side approach areas.

## Connection single sensor

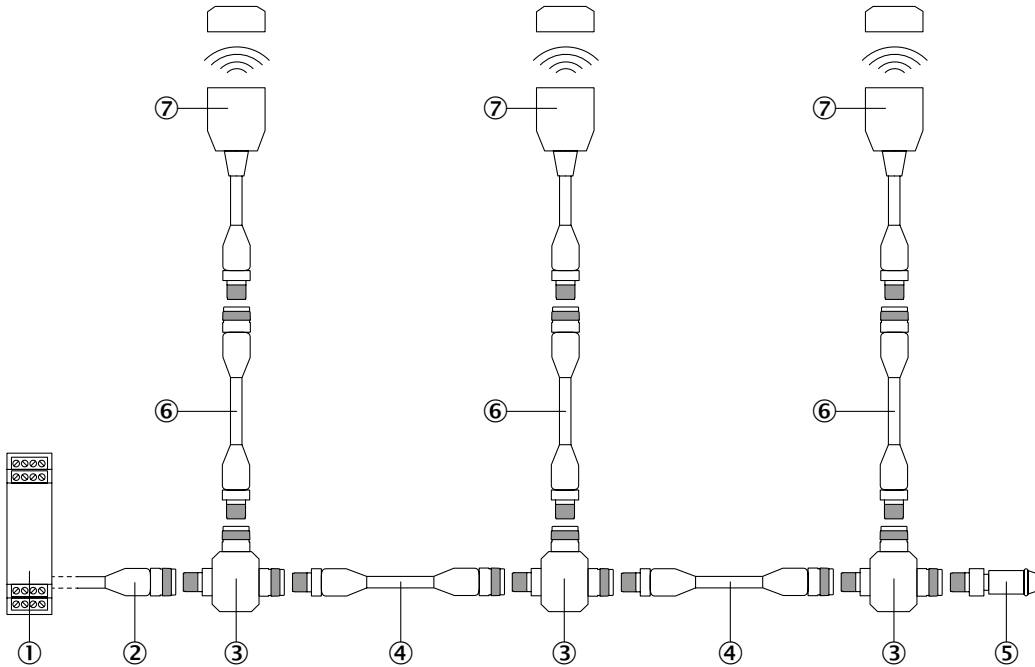
Connection type: cable with plug M12, 5-pin



- ① Safe evaluation unit
- ② Connecting cable with 5-pin, M12 female connector and flying leads (e.g., DOL-1205-xxxx)
- ③ STR1 transponder safety switch (e.g., STR1-SAxx0AC5)

## Series connection

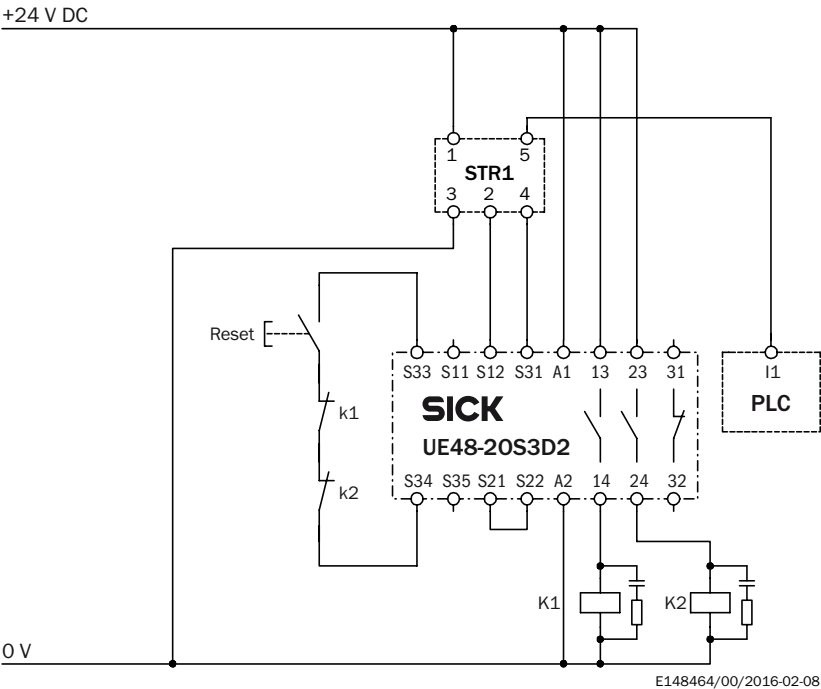
Series connection with T distributor (without diagnostics)



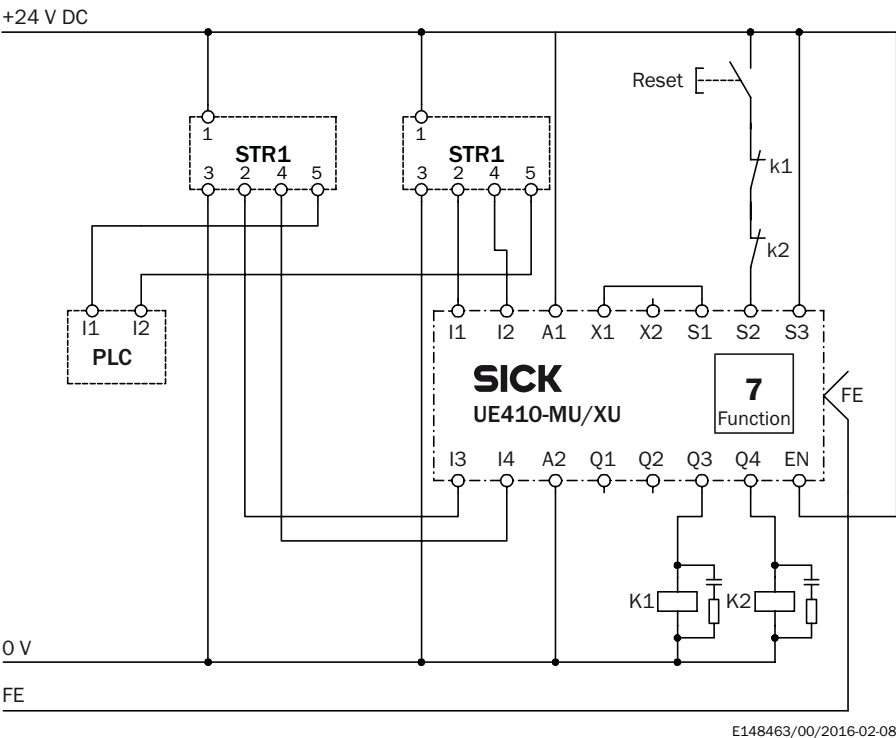
- ① Safe evaluation unit
- ② Connecting cable with 4-pin, M12 female connector and flying leads (e.g., DOL-1204-xxxx)
- ③ TR4-AK004C T distributor
- ④ Connection cable with 4-pin, M12 male connector and 4-pin, M12 female connector (e.g., DSL-1204-xxxx)
- ⑤ TR4-AL002C end connector
- ⑥ Connection cable with 8-pin, M12 male connector and 8-pin, M12 female connector (e.g., DSL-1208-xxxxxx)
- ⑦ STR1 transponder safety switch (e.g., STR1-SAxx0AC8)

Wiring examples

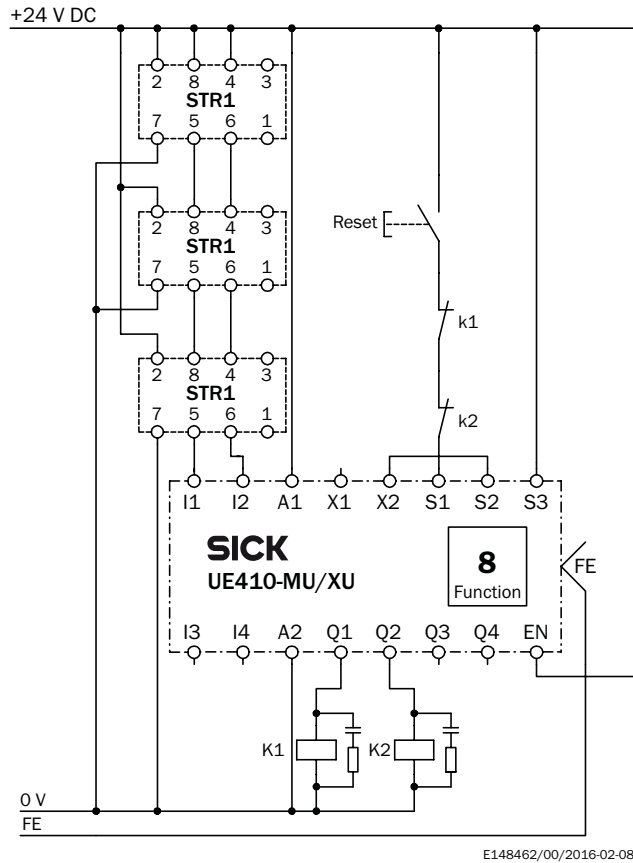
STR1 transponder safety switch to UE48-20S safety relay



Parallel connection of two STR1 transponder safety switches to a Flexi Classic safety controller



Series connection of three STR1 transponder safety switches to a Flexi Classic safety controller



## Accessories required for commissioning

Description	Number	Items supplied	Further information
Connecting cable (only required for variants with an M12 male connector)	1	–	→ Plug connectors and cables
Safety screws (pack)	1	–	→ Nuts and screws
Operating instructions	1	–	→ <a href="http://www.sick.com/STR1">www.sick.com/STR1</a>

## Accessories

### Mounting systems

Nuts and screws





Screws

Figure	Description	Packing unit	Type	Part no.
 Illustration may differ	For "Mini" actuator	10 pieces	Safety screws M3 x 12	5333569
	For "Flat" actuator	10 pieces	Safety screws M4 x 14	5333570
	For "Standard" actuator	10 pieces	Safety screws M4 x 20	5333571



### Connection systems

Plug connectors and cables

Connecting cables with female connector

Figure	Connection type		Model	Conductor cross-section	Cable length	Type	Part no.
	Female connector, M12, 4-pin, straight	Cable	PUR, halogen-free, unshielded	0.34 mm²	5 m	DOL-1204-G05MC	6025901
					10 m	DOL-1204-G10MC	6025902
					15 m	DOL-1204-G15MC	6034749
					20 m	DOL-1204-G20MC	6034750
	Female connector, M12, 5-pin, straight	Cable	PUR, halogen-free, unshielded	0.34 mm²	2 m	DOL-1205-G02MC	6025906
					5 m	DOL-1205-G05MC	6025907
					10 m	DOL-1205-G10MC	6025908
 	Female connector, M12, 8-pin, straight	Cable	PVC, shielded	0.25 mm²	5 m	DOL-1208-G05MA	6020993
					10 m	DOL-1208-G10MA	6022152
					15 m	DOL-1208-G15MA	6022153
					30 m	DOL-1208-G30MA	6022242

## Connection cables with female connector and male connector


Figure	Connection type		Model	Conductor cross-section	Cable length	Type	Part no.
	Female connector, M12, 4-pin, straight	Male connector, M12, 4-pin, straight	PVC, unshielded	0.25 mm <sup>2</sup>	0.6 m	DSL-1204-G0M6	6022565
					2 m	DSL-1204-G02M	6022567
					5 m	DSL-1204-G05M	6022569
				0.34 mm <sup>2</sup>	1.5 m	DSL-1204-G1M5	6034822
					10 m	DSL-1204-G10M	6034406
					20 m	DSL-1204-G20M	6034407
	Female connector, M12, 8-pin, straight	Male connector, M12, 8-pin, straight	PUR, halogen-free, shielded	0.25 mm <sup>2</sup>	1 m	DSL-1208-G01MAC	6026625
					2 m	DSL-1208-G02MAC	6030121
					5 m	DSL-1208-G05MAC	6032325
					10 m	DSL-1208-G10MAC	6034901

## Adapters and distributors

## T-junctions

Figure	Description	Type	Part no.
	T distributor for safe series connection	TR4-AK004C	5325889

## Other adapters and distributors

Figure	Description	Type	Part no.
	End connector for serial connection in combination with TR4-AK004C T-junction	TR4-AL002C	5325890

## Further accessories




## Actuators

Figure	Design	Type	Part no.
	Standard	STR1-XAS	1073223
	Flat	STR1-XAF	1073221
	Mini	STR1-XAM	1073222

## Enhanced system solutions

## Safe sensor cascade





## Flexi Loop

Figure	Description	Type	Part no.
	Flexi Loop node for safety sensors with dual-channel OSSD outputs, 5-pin version	FLN-OSSD1000105	1061709
	Flexi Loop node for safety sensors with dual-channel OSSD outputs, 8-pin version	FLN-OSSD1100108	1061710
	Flexi Loop terminator module to terminate the safe sensor cascade on the last Flexi Loop node	FLT-TERM000001	1061716

Other models and accessories → [www.sick.com/Flexi\\_Loop](http://www.sick.com/Flexi_Loop)





## Safety controllers

## Flexi Classic

Figure	Configuration method	Description	Type	Part no.
 Illustration may differ	Via rotary switch	Flexi Classic input expansion module: 8 safety inputs	UE410-8DI3	6026139
 Illustration may differ		Flexi Classic main module: 4 safety capable inputs and 1 safety output, 2 inputs and 2 outputs for the global emergency stop function	UE410-GU3	1072177
 Illustration may differ		Flexi Classic main module: 4 safety capable inputs and 4 safety outputs	UE410-MU3T5	6026136
 Illustration may differ		Flexi Classic input/output extension: 4 safety inputs and 4 safety outputs	UE410-XU3T5	6032470

Other models and accessories → [www.sick.com/Flexi\\_Classic](http://www.sick.com/Flexi_Classic)


## Flexi Soft

Figure	Configuration method	Description	Type	Part no.
 System plug not included with delivery	Via software	Flexi Soft main module with RS-232 interface	FX3-CPU000000	1043783
		Flexi Soft input/output extension: 8 safety inputs and 4 safety outputs (according to SIL3)	FX3-XTI084002	1044125
		Flexi Soft input extension: 8 safety inputs and 8 test pulse outputs	FX3-XTDI80002	1044124
		System plug for FX3-CPU0, for storing the system configuration	FX3-MPL000001	1043700

Other models and accessories → [www.sick.com/Flexi\\_Soft](http://www.sick.com/Flexi_Soft)

## Safety relays

## UE48-20S

Figure	Description	Type	Part no.
 Illustration may differ	Safety relay for the evaluation of emergency stop pushbuttons, safety switches, safety light curtains, safety laser scanners and pressure-sensitive safety mats	UE48-20S3D2	6024916

Other models and accessories → [www.sick.com/Safety\\_Relays](http://www.sick.com/Safety_Relays)





## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our 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.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our 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 us a reliable supplier and development partner.

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

For us, that is “Sensor Intelligence.”

### Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, 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](http://www.sick.com)