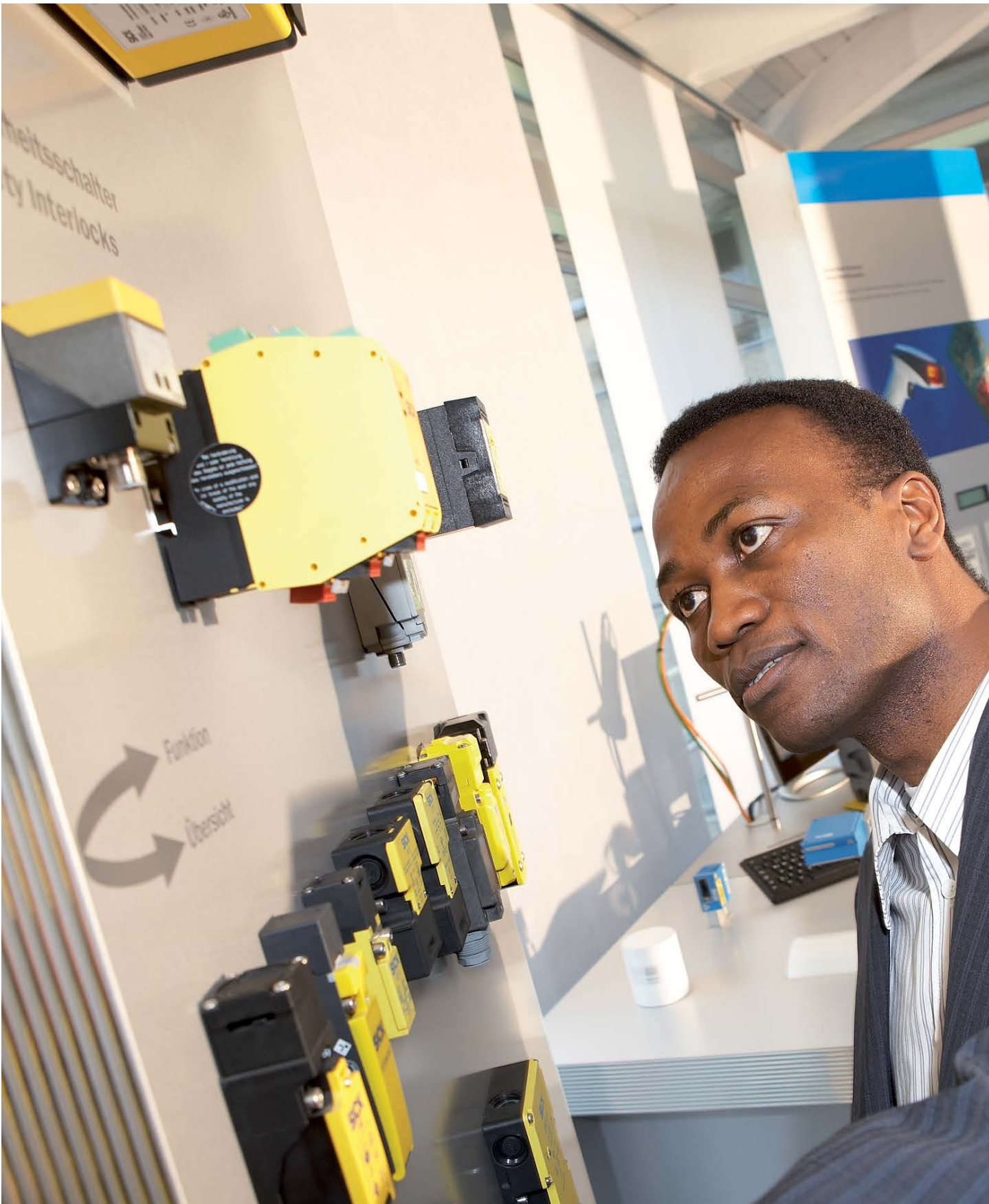




## Safety Switches

Three product groups for reliable and intelligent safety solutions





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# Industrial safety systems from SICK



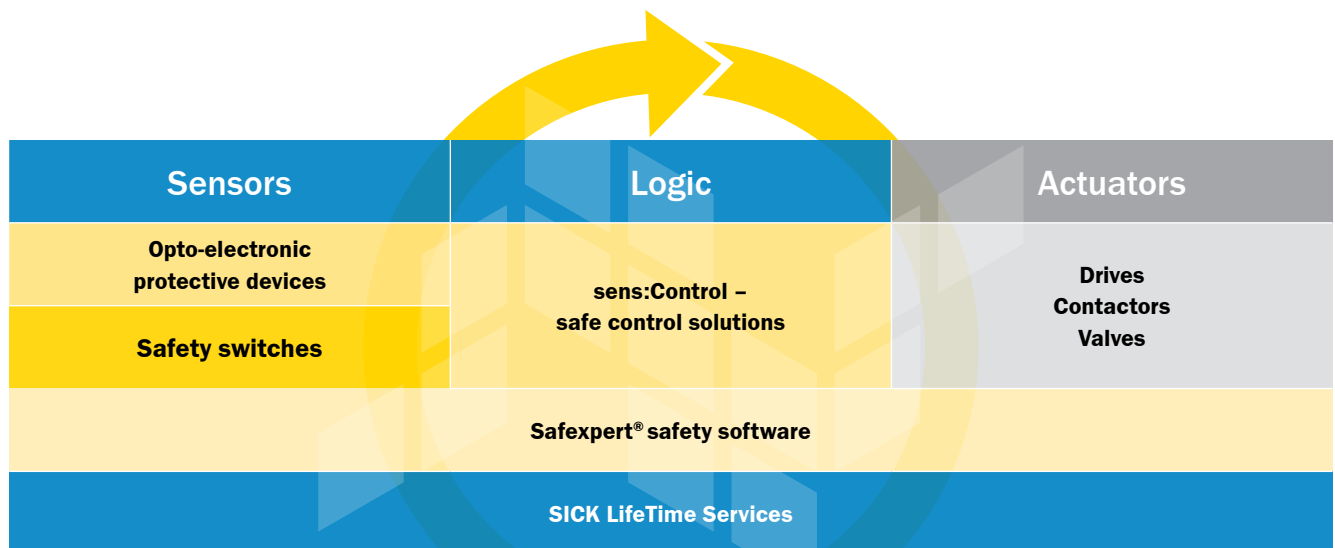
**SICK creates sensor solutions for industrial automation – from development to services – based on experience and customer requirements.**

This philosophy is reflected in the term “safetyPLUS®” in the Industrial Safety Systems sector.

- SICK is dedicated to seamlessly integrating solutions in safety and system environments
- Application-oriented functions and trendsetting products increase system efficiency
- Incorporating the current international standards supports global business
- Services range from implementing your vision to regular maintenance
- Tools for safety engineering
- A full range of services to support the safety function on your machines and systems



For comprehensive information, see [www.sick-safetyplus.com](http://www.sick-safetyplus.com)



safetyPLUS® by SICK for an unbroken safety chain



Safety switches



Safety light curtains,  
photoelectric safety switches



Safety laser scanners



sens:Control –  
safe control solutions

# Safety switches from SICK – versatile solutions for every requirement

Safety switches from SICK combine compact design with prevention against tampering and quick installation. Whether monitoring mobile protective devices, safe position monitoring or safety commands – SICK's diverse portfolio is the ideal, cost-effective solution for any application.

## The advantages of safety switches from SICK at a glance:

- + Flexibility through customized versions
- + Easy commissioning and quick device replacement
- + High machine uptime due to low wear and low-maintenance configuration
- + Improved prevention against tampering
- + Combine several switches in order to completely secure a machine or system





Safety switches from SICK are used for the following safety-related tasks:

### Interlocking of movable guards

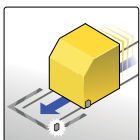


Interlocking without guard lock

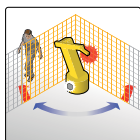


Interlocking with guard lock

### Safe position monitoring

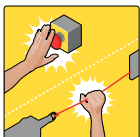


Monitoring of machine end positions

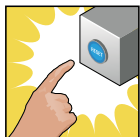


Monitoring of machine positions or area

### Safety commands



Emergency stop, emergency shutdown



Reset of the protective device



Manual approval for safe maintenance and setup mode

## Interlocking of movable guards



Interlocking with guard lock

Protection of people (stopping/run-down), protection of processes



Interlocking without guard lock

Retaining force

YES

NO

Non-contact

Easy to mount. High demand for mechanical tolerance (misalignment), hygiene (food industry), wear (high number of switching actuations), etc.

## Safe position monitoring



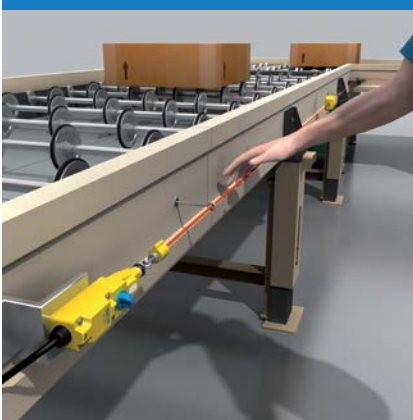
Monitoring of machine and positions



Monitoring of machine positions or area

Non-contact

## Safety commands



Emergency stop, emergency shutdown

Safety protection over long distances

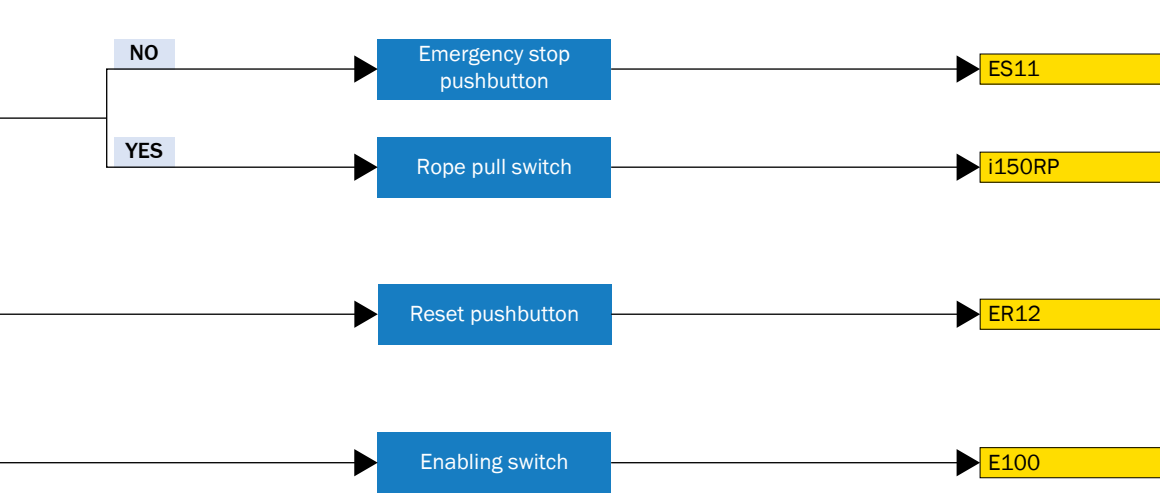
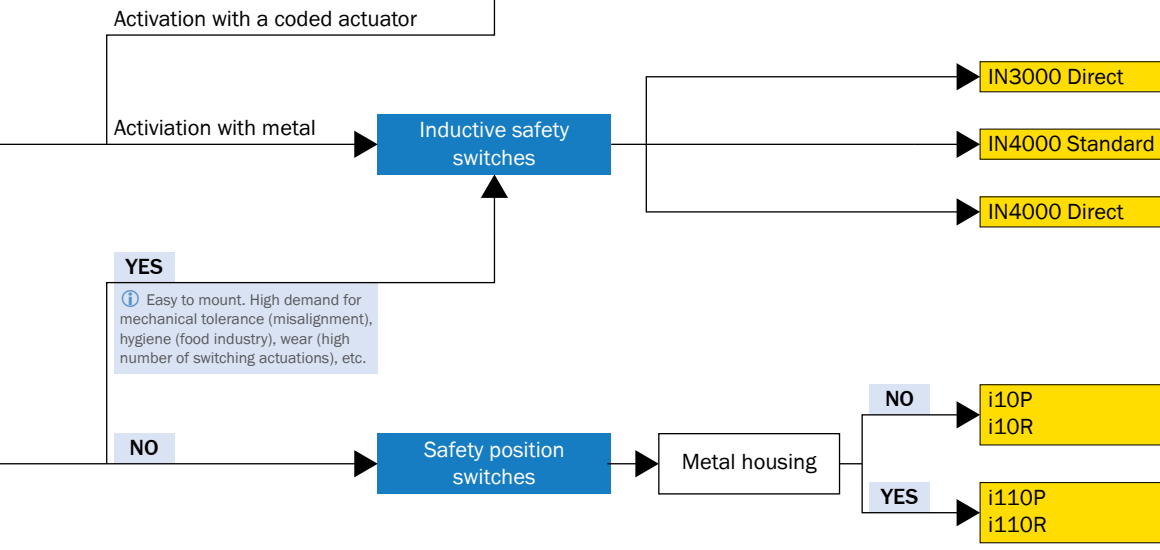
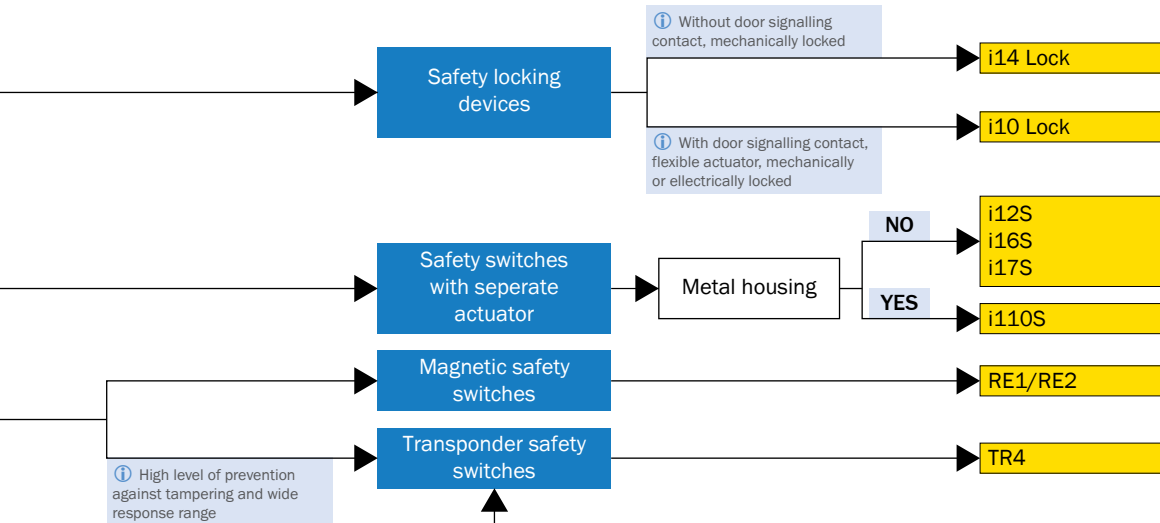


Reset of the protective device






Manual approval for safe maintenance and setup mode





## Achievable performance level for the safe evaluation unit and the safety switch

(for dual-channel wiring of the electrical evaluation)

	Safety relays		Safety controllers with synchronized test signals	
				
	UE43-2MF	UE48-20S	Flexi Classic	Flexi Soft
	For volt-free contacts	For volt-free contacts and OSSDs	For volt-free contacts and OSSDs	For volt-free contacts and OSSDs
i14 Lock	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>
i10 Lock				
i110S	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>
i12S				
i16S				
i17S				
RE11, RE21	-	-	PL d / (PL e) <sup>2</sup>	PL d / (PL e) <sup>2</sup>
RE13, RE23, RE27	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL d / (PL e) <sup>2</sup>	PL d / (PL e) <sup>2</sup>
TR4 Direct		PL e	PL e	PL e
IN3000 Direct	-	PL d	PL d	PL d
IN4000 Direct	-	PL e	PL e	PL e
IN4000 Standard	-	-	PL e	PL e
i110P	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>
i110R				
i10P				
i10R				
ES21	PL c / (PL d) <sup>1</sup>	PL c / (PL d) <sup>1</sup>	PL e <sup>3</sup>	PL e <sup>3</sup>
i150RP				

1: PL d with fault exclusion (see Tab. 2);

2: depending on the frequency of operations (according to EN ISO 14 119, 8.2)

3: PL e with integrated dropout protection contact (additional contact which monitors the correct position of the contact block in the built-in version of the emergency stop pushbutton)

**Combinations which achieve PL c / (PL d) can achieve PL e by using a second safety switch!**

## Examples of fault exclusion according to EN ISO 13849-2

Actions	Explanation
→ Laying protected cables	E.g., Armored conduit protects cable from mechanical damage, which can cause a short circuit.
→ Eliminating excessive mechanical stress	Forces acting on the safety switch through the actuation and vibration or shocks in the machine environment must be limited so that they cannot cause a mechanical failure of the safety switch. E.g. use of bolt in order to limit the acting force on the inserted actuator, vibration/ shock-absorbing mounting, use of shear pins and shear plates.
→ Using bolt actuators	For safety switches with a separate actuator and for safety locking devices, the actuator can be mounted on a bolt instead of directly on the movable protective device. As the bolt (and therefore the actuator) is actuated manually, the actuating force is limited. The operator is able to insert the actuator in such a way that it does not collide with the safety switch and damage it, even when the movable protective device is no longer correctly aligned.
→ Preventing wear to the mechanical element	Contamination of the moving mechanical elements can cause friction, which leads to rapid wear and destruction of the switch. The safety switch and the actuator should, therefore, be protected against solid and liquid contaminants (e.g., dust, dirt, refrigerant, spray paint, metal cuttings, etc.) when mounted.

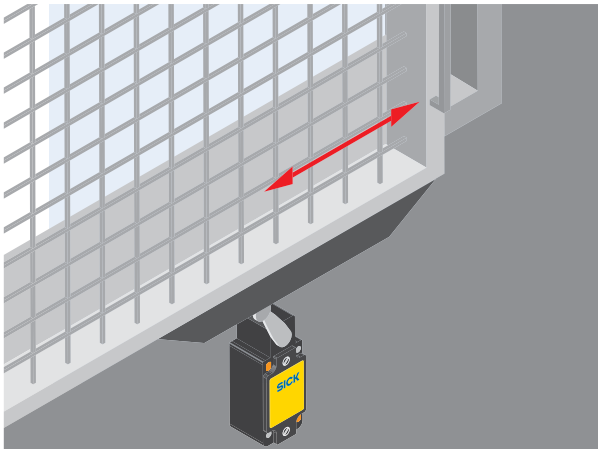
### Mounting according to EN ISO 13849 Part 1 and 2 and EN 1088 (to be replaced by EN ISO 14119)

- The safety switch must not be used as a mechanical limit stop
- The safety switch must be protected against manipulation and unintentional activation when mounted
- The safety switch and the actuator must be mounted with positive locking
- The actuator must be suitable for the intended immersion depth, actuation angle, and actuation speed
- The maximum locking force of the safety switch must be suitable for the application



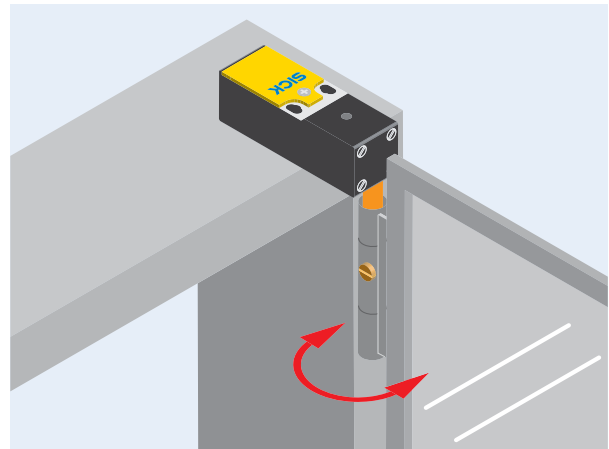
## Mounting examples

### 1. Safety position switch



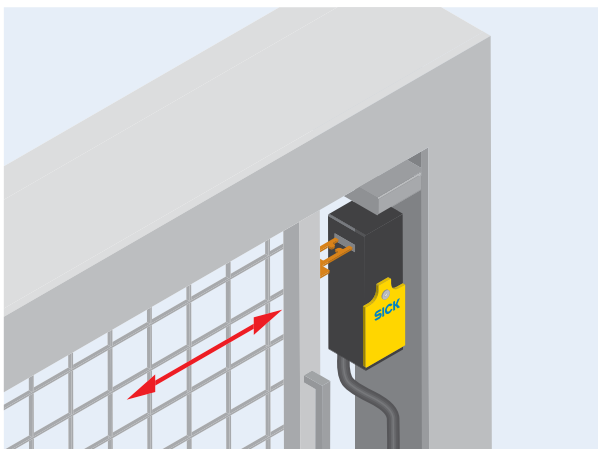
The safety position switch has to be mounted such that the required actuator travel will be achieved safely. Height and angle of the cam must be tuned to the safety switch.

### 2. Safety hinge switch



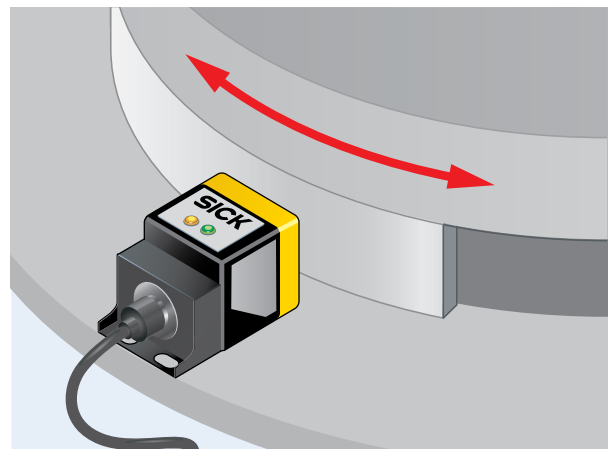
The shaft of the safety hinge switch and the door hinge must be connected, fixed and protected against position modification.

### 3. Safety switch with separate actuator



The actuator must be easily inserted into the actuating head of the safety switch. Safety switches shall not be used as a limit-stop. An additional limit-stop has to be mounted for the movable part of the guard.

### 4. Inductive safety switch

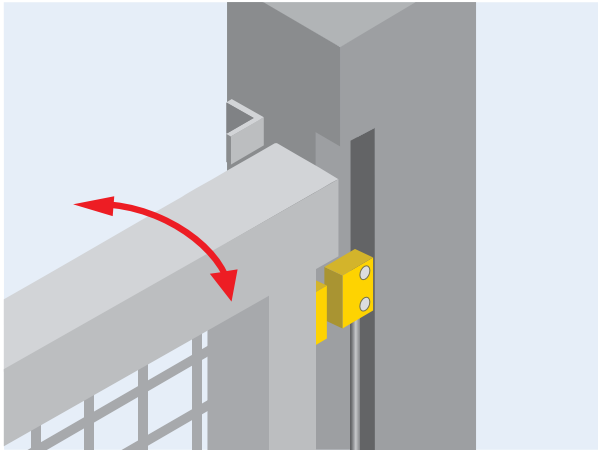


The inductive safety switches react to metal objects. It must be ensured that it is not possible to place other metal objects that are not intended to trigger the safety function on the sensing face of the safety switches. Suitable measures must be taken to prevent this situation arising.



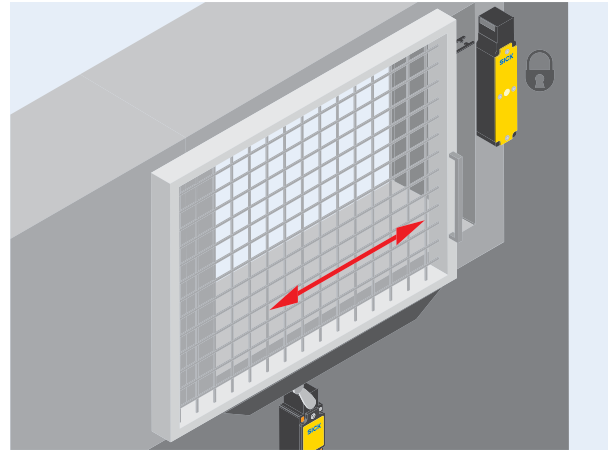
# Practical help applying the products

## 5. Magnetic safety switch



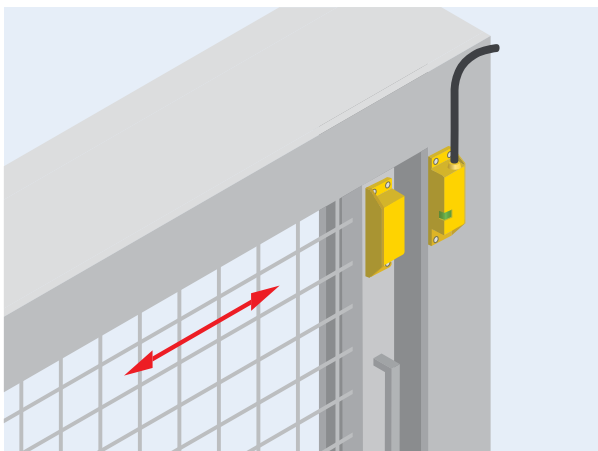
Safety switch must be installed protected against tampering or unintentional switching. It must not be mounted in an environment with interfering magnetic fields. An additional limit-stop has to be mounted for the movable part of the guard.

## 6. Safety locking device and safety position switch



To recognize mechanical errors a redundant and divers arrangement of two safety switches is required.

## 7. Transponder safety switches



Sensor and actuator must be mounted with non-removable screws, bolts or nuts. It should be ensured that the actuator cannot be removed or tampered with by simple means.


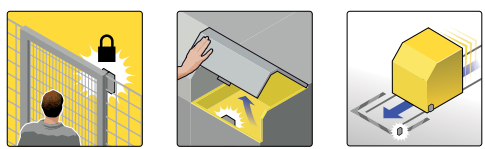
# Safety switches from SICK – versatile. Cost-effective. Durable.

## The right safety switch for every application – safety switches portfolio from SICK

Various technologies and housing designs provide a multitude of cost-effective options for your safety applications. Increased industrial toughness, quick diagnostics and communication with safe control solutions from SICK indicate effective solutions for all performance levels.

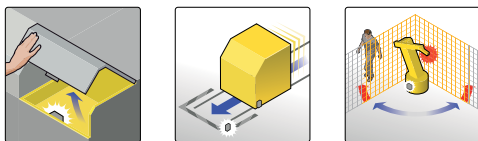


### Main features at a glance

		
	<b>Electro-mechanical safety switches</b>	
<b>Safety tasks</b>		
<b>Actuation</b>	<ul style="list-style-type: none"> <li>• Switch cams/hinge</li> <li>• Separate actuator</li> </ul>	
<b>Electrical contacts</b>	<ul style="list-style-type: none"> <li>• Floating contacts (5 V ... 230 V)</li> </ul>	
<b>Diagnostics</b>	<ul style="list-style-type: none"> <li>• Signaling contacts</li> <li>• Optional LED status display</li> </ul>	
<b>Performance level</b>	<ul style="list-style-type: none"> <li>• With a safety switch up to PL c</li> <li>• With two safety switches up to PL e</li> </ul>	
<b>Product group overview</b>	<a href="#">→ Page 36</a>	



**Non-contact safety switches**



- Metal (Steel)
- Magnet/transponder

- Reed contacts
- Semiconductor outputs

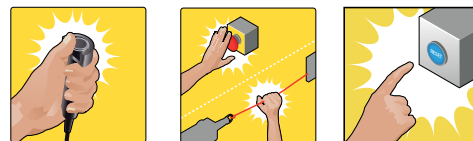
- Optional signaling contacts
- LED status display

- With a safety switch up to PL c

→ Page 44



**Safety command devices**



- Manual

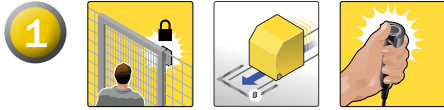
- Floating contacts (5 V ... 230 V)

- Signaling contacts
- Optional lighting

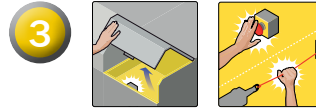
- With a safety switch up to PL c

→ Page 54

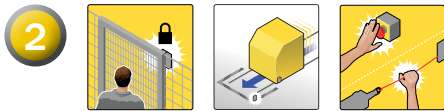
# Safety in your industry – typical applications



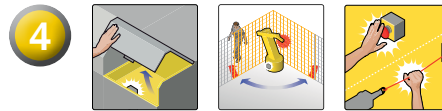
Access protection  
for a stretch wrapper  
**Page 18**



Emergency stop  
on a conveyor system  
**Page 22**



Hazardous point protection  
on an injection molding machine  
**Page 20**



Monitoring flaps  
on a production line  
**Page 24**





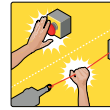
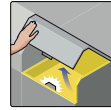
5



Door monitoring  
on a blister packaging machine

**Page 26**

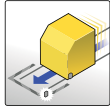
7



Door monitoring for a bag forming, filling  
and sealing packaging machine

**Page 30**

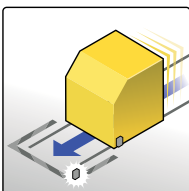
6



Safe position monitoring  
on a storage and retrieval system

**Page 28**





Electro-  
mechanical

Non-  
contact

Safety  
command

A stretch wrapper quickly wraps products or cases on a pallet. The machine's high wrapping speeds can create hazards for employees. Fences can prevent access to the hazardous area. For maintenance and setup, users need to ensure that employees can only access the machine via a safety door or other area or perimeter guarding method. The safety door is locked by an interlock in automatic operation. The safe position of the wrapper is monitored. The safety door can be opened in maintenance and setup mode and the wrapper can be manually restarted.



## Access monitoring with guard lock

- Slim design for simple and immediate installation on the safety door frame
- Radial actuator for rotatable door
- High locking forces for large, stable access door
- Separate contacts detect door and locking status
- Depending on the risk assessment: up to PL e through the use of two safety switches

+ Easy to assemble with dual status monitoring

### Recommended product

**i10 Lock**

→ Page 42

## Manual restart if needed

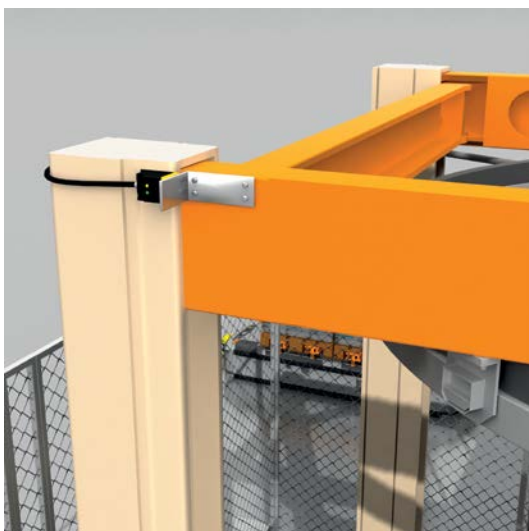
- Use approval switch in setup mode in the event of simultaneously inactive safety door switch
- Three-level design of the approval switch enables on/off and emergency stop function
- Operator safety in the hazardous area when machine is running at reduced speed mode

+ Process-optimized and safe start up of critical machine movements

### Recommended product

**E100**

→ Page 57



## Safe inductive position monitoring

- Quick adjustment and low wear due to non-contact design
- Simple connection to a safe control solution
- LED status display for immediate diagnostics

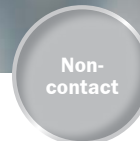
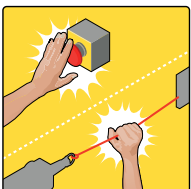
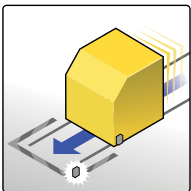
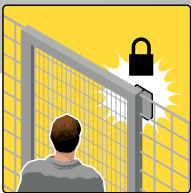
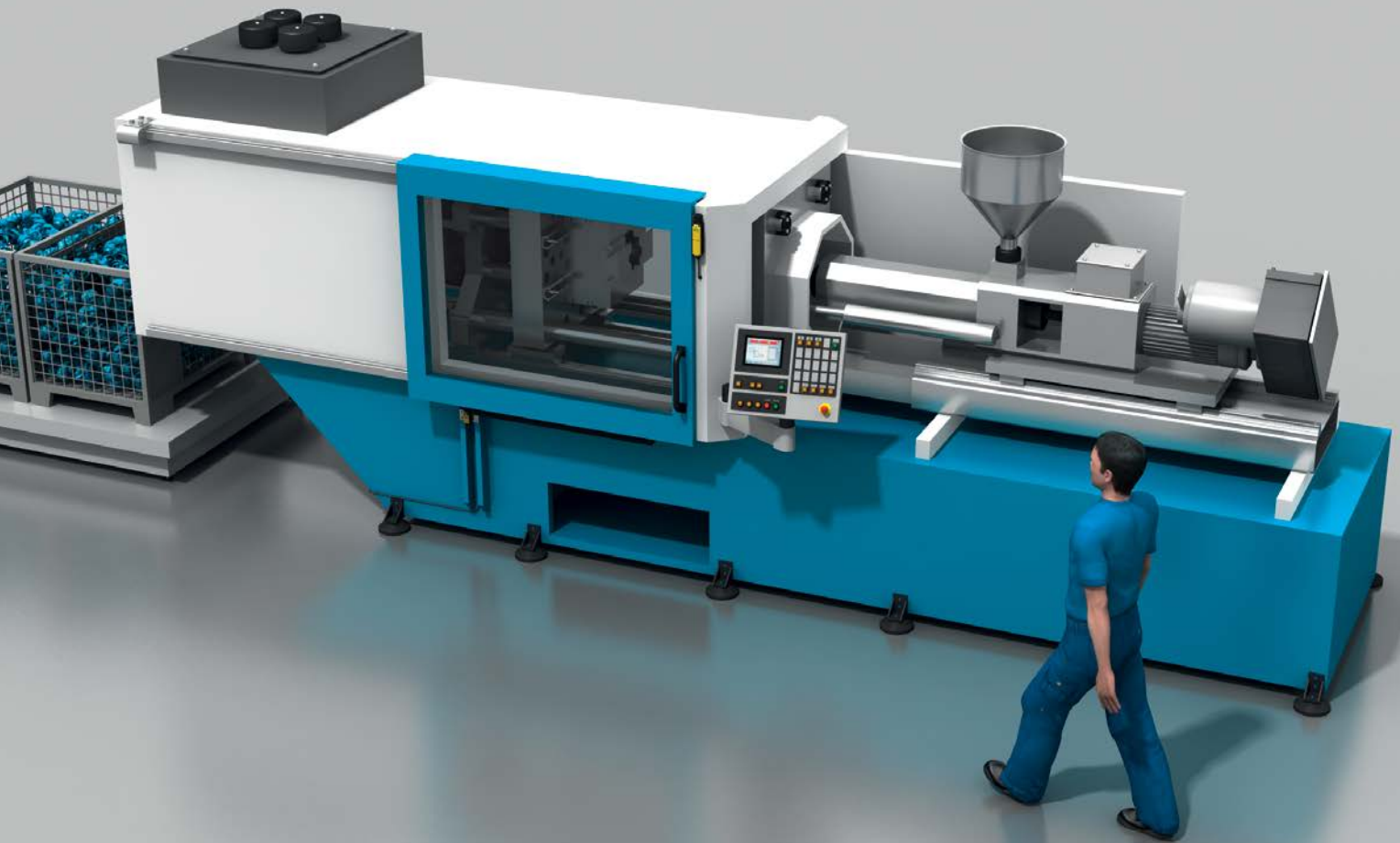
+ Double the reliability – for position and durability

### Recommended product

**IN4000 Standard**

→ Page 47

# Hazardous point protection on an injection molding machine



Interference with an injection molding machine must be prevented during the production process. The injection unit is secured by a sliding door in order to protect personnel from bruises and burns. Routine maintenance to exchange materials and for cleaning must remain possible. The safety door is locked by a guard lock during the injection molding process. The position of the door in its locked position is also monitored by a position switch in order to ensure the necessary safety level. A machine stop can generally be triggered by an emergency stop in the event of a hazardous situation.

**Please note:** Deviating safety concepts may be required for specific PL c standards.



## Guard lock for personnel and process protection

- Rigid actuator for straight-line movement of the sliding door
- Optional plug connector for quick device exchange or flexible cable entry
- Separate door and guard lock monitoring enables the targeted shutdown of part of a process

+ Two safe monitoring levels and additional diagnostics in a guard lock

### Recommended product

**i10 Lock**

→ Page 42

## Additional position monitoring for increased safety

- Position switch with turning lever for quick movement
- Dual door monitoring through the combination of safety guard lock and position switch
- The position switch provides tamper protection for a safety guard lock

+ Diverse and redundant door monitoring for applications up to performance level PL e



### Recommended product

**i10R**

→ Page 39

**i110R**

→ Page 39



## Straight to the point emergency stop

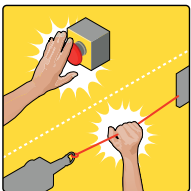
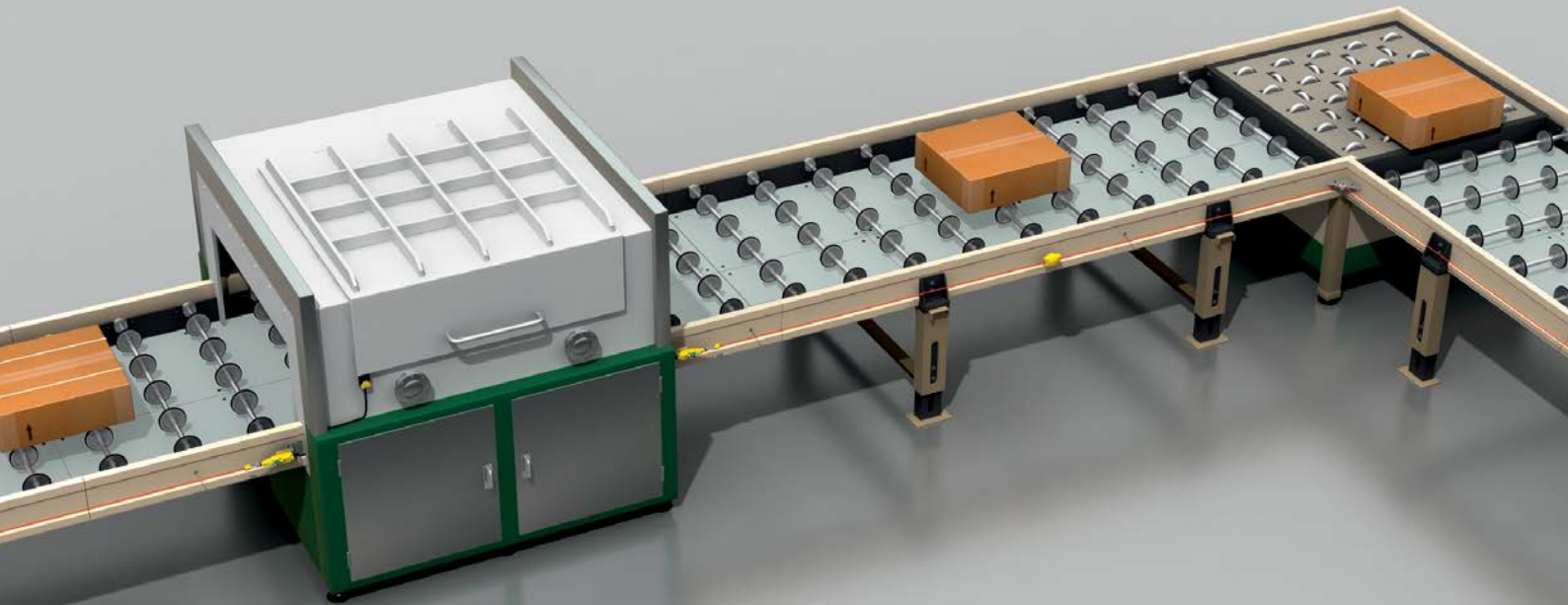
- Safe emergency stop function
- Panel mount version for integration into the machine's control panel
- Increased safety by self-monitoring contacts between buttons and switching elements

+ Functional design for higher throughput

### Recommended product

**ES21**

→ Page 56



**Conveyor sections bridge paths between individual machining stations. Hoods are used to secure these machining stations. However, it is difficult to secure the conveyor sections by fences or other safety facilities. Controlled interference must be possible along the entire section. Rope pulls can be used to secure individual conveyor sections. This ensures that a safe emergency stop is possible at any time and at any position along the conveyor section. Safety switches with separate actuators are used to monitor the status of the hoods.**



## Cyclical actuation with safety switches compactly monitored with separate actuators

- Versatile with three cable entry glands
  - Easily close the hood with flexible actuators and conical insertion guides
  - Highly resistant to shock and vibration, ensuring machine reliability
  - Depending on the risk assessment: up to PL e through the use of two safety switches
- + High reliability due to a high level of flexibility and stability

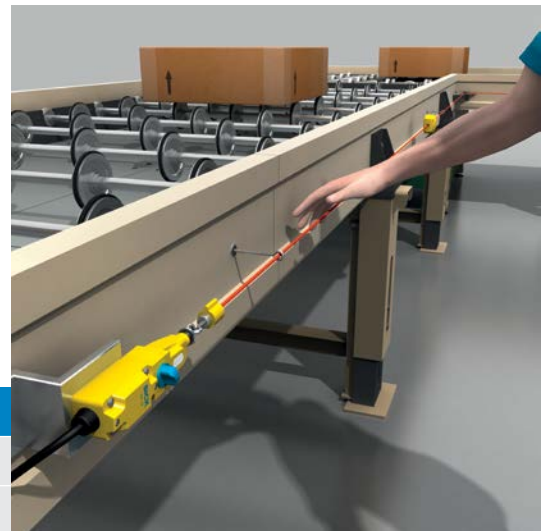
### Recommended product

**i16S**

→ Page 38

## Emergency stop via rope pulls for large conveyor areas

- Rugged due to metal housing
  - Diagnostics using additional contacts
  - Rope break detection feature
  - Actuation is possible at any point along the rope
- + Emergency stop along the entire length of transport belts and feed systems, up to PL e



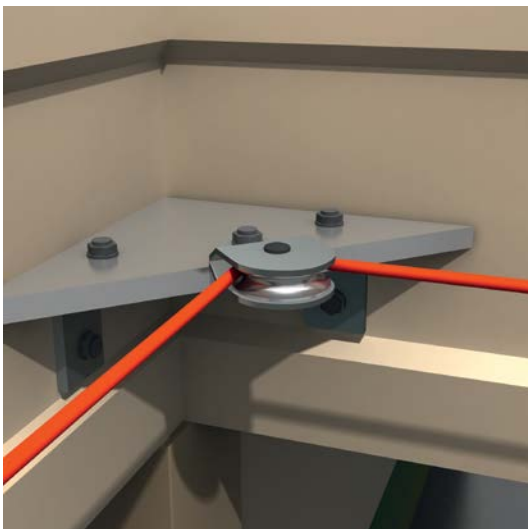
### Recommended product

**i110RP (up to 30 m)**

→ Page 57

**i150RP (up to 75 m)**

→ Page 58



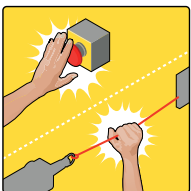
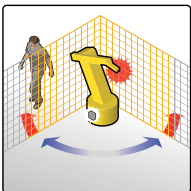
## Accessories for a safe emergency stop

- Tear-proof rope
  - Rugged eye bolts for optimal rope guidance
  - Optimal adaptation to the conveyor section by deflection rollers
  - Easily adjust the rope's tension with the tensioning set feature
- + Optimal rope guidance without obstacles

### Recommended product

**Accessories i150RP**

→ Page 58



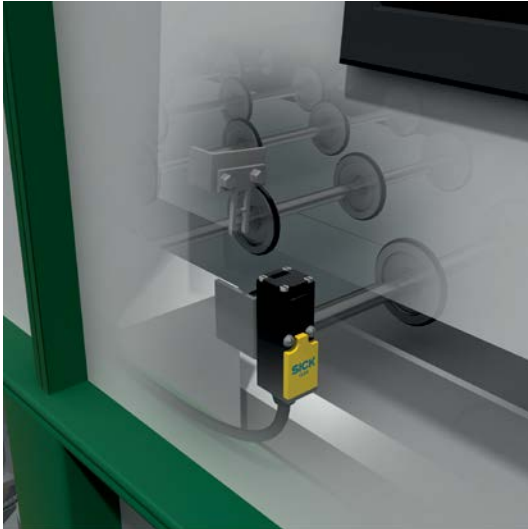
Electro-  
mechanical

Non-  
contact

Safety  
command

**Production lines enable the manufacture of solar cells in connected machining centers. These lines are secured by door flaps for direct access and quick troubleshooting during the production process. Upstream, turntables enable the transport of cells from and to individual machining centers from various directions. The safe position of the turntable after swiveling 90° can be monitored using inductive switches. The flaps are protected by a safety switch with a separate actuator. A machine stop can generally be triggered by an emergency stop device in the event of a hazardous situation.**





## Door flap monitoring using a compact safety switch with separate actuator

- Compact plastic housing for confined conditions
- Diagnostics available using additional signaling contacts
- Vibration resistant with corresponding locking force

+ Function-optimized up to PL c for high system throughput

### Recommended product

**i12S**

→ Page 40

## Position monitoring for rotary movements by inductive safety switches

- Space-saving mounting due to compact housing
- Quick electrical and mechanical installation
- Non-contact operating design for increased durability

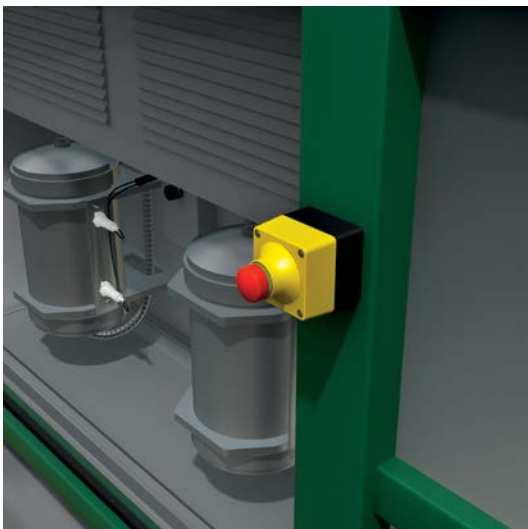
+ Safe, low-wear and efficient up to PL d for seamless production



### Recommended product

**IN3000 Direct**

→ Page 50



## Emergency stop for defined machine stop

- Central emergency stop for general machine stop
- Status display by colored markings
- Anti-lock button

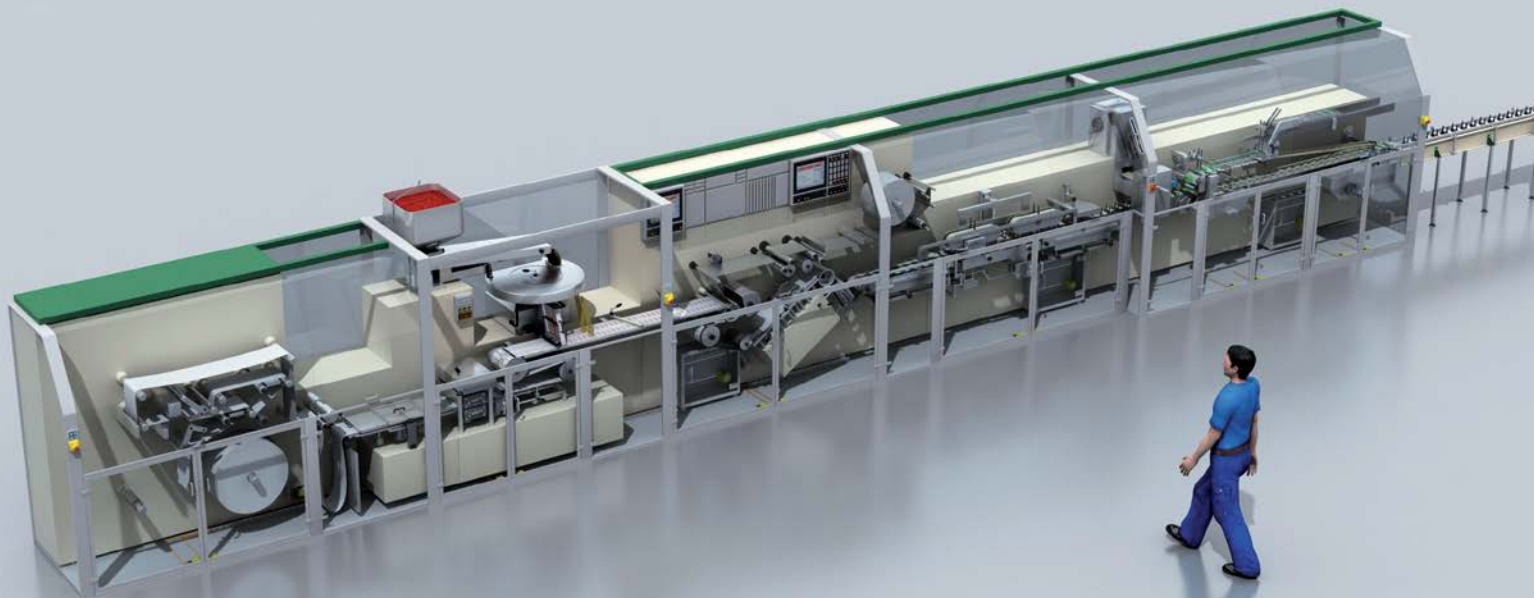
+ Diversity and safety for your machine design up to PL e

### Recommended product

**ES21 / ES11**

→ Page 56

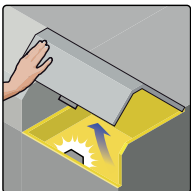
# Door monitoring on a blister packaging machine



Electro-  
mechanical

Non-  
contact

Safety  
command



**For blister packaging machines, various process steps take place in a sequence. The machines have numerous doors to ensure universal, free access in the event of a fault or for refilling material. All doors are monitored by transponder safety switches. These ensure that the machine cannot be started if the doors are open.**



## Intelligent door monitoring using transponder safety switches

- Low-wear solution
- Simple and direct connection to the safe control solution
- Improved prevention against tampering with coded actuators
- LED warning message for readjustment
- Resistant to vibrations due to long sensing range

+ High system availability due to coordinated solution up to PL e

### Recommended product

**TR4 Direct**

→ Page 52

## Series connection of sensors

- Quick connection of the sensors by T-distributor
- Return line saving due to end plug
- Simple fault detection using LED display on the safety switch
- Reduced wiring costs and safety capable inputs on the control

+ Up to PL e for cost-optimized commissioning and quick troubleshooting



### Recommended product

**Accessories TR4 Direct**

→ Page 52



## Simple individual wiring for the control

- Easy installation and quick device replacement due to M12 plug connector
- Additional diagnostics output per safety switch
- Clear fault detection at a glance

+ Central diagnosis over the control

### Recommended product

**Accessories TR4 Direct**

→ Page 52

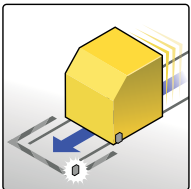
# Safe position monitoring on a storage and retrieval system



Electro-  
mechanical

Non-  
contact

Safety  
command



**Storage and retrieval systems are installed in high-bay warehouses for moving goods in and out of storage. The position of the pallet handler must be detected in order to avoid a collision with the system. The final position of the operating system as well as the machine operator's cabin door must be safely monitored. A safety switch with separate actuator allows for the storage and retrieval system to only operate when the cabin door is closed. The safe final position of the pallet handler when moving pallets in and out of storage is monitored using inductive sensors. Position switches monitor the safe final position of the storage and retrieval system on the guide rail and safely shut it down.**



## Safe monitoring of cabin doors with safety switches with separate actuators

- Three cable entry points for optimal installation
- Safety through dual-channel connection to the safe control solution
- Highly reliable even when exposed to shock and vibration
- Depending on the risk assessment: up to PL e through the use of two safety switches

+ Start up only when door is locked

### Recommended product

**i16S**

→ Page 38

## Safe final position for process protection with position switch

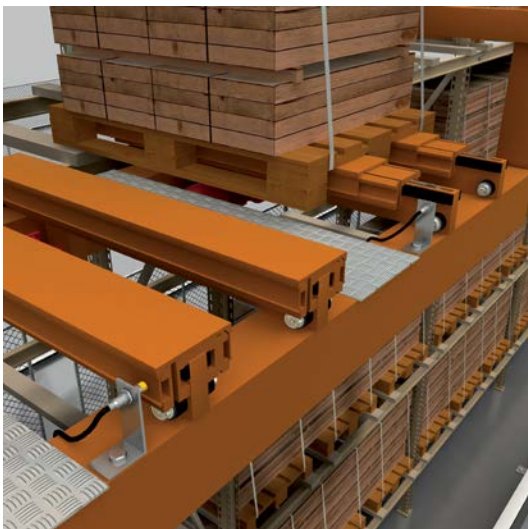
- Tough metal housing
- Four contacts for dual-channel safety with additional diagnostics
- Metal turning lever also operates reliably at high speeds

+ Reliable shutoff in the event of a fault up to PL c

### Recommended product

**i110R**

→ Page 39



## Final position detection for collision protection with inductive safety switch

- Compact housing
- High level of safety up to performance level PL e
- Easy adjustment through LED status display and quick device replacement due to M12 plug connector
- Low-wear due to inductive operating design

+ High durability despite frequent activation

### Recommended product

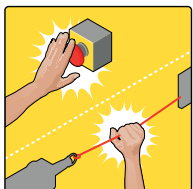
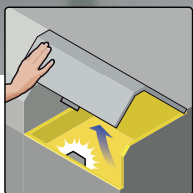
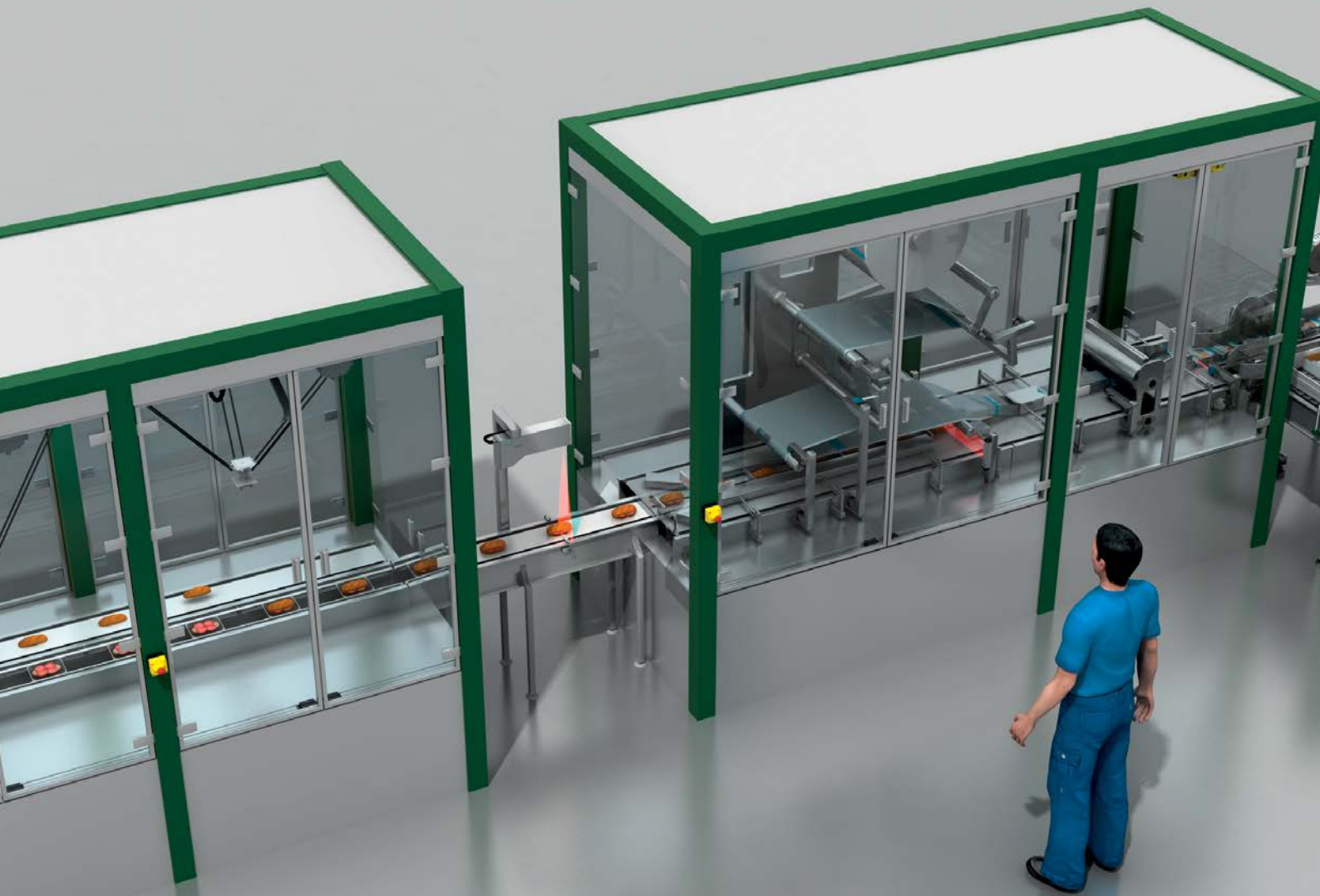
**IN3000 Direct**

→ Page 50

**IN4000 Standard**

→ Page 47

# Door monitoring for a bag forming, filling and sealing packaging machine



Electro-  
mechanical

Non-  
contact

Safety  
command

Food and beverages are merged in pick-and-place applications. The finished products are sealed in packaging film by the bag forming, filling and sealing machine. The doors must be locked until the sealing process has been completed. Pick-and-place machines have high hygienic requirements that must be complied with and the doors must be able to be opened at any time. Both of these pick-and-place requirements are fulfilled using magnetic safety switches. Locking the doors during the sealing process is monitored by safety guard locks.



## Safety door monitoring by non-contact safety switches

- Magnetic safety switches with response range of up to 9 mm
- LED status display immediately on the protective device
- Especially suited for sliding and turning doors, given the large door offset tolerances

+ Simple and flexible installation for machines up to PL e

### Recommended product

**RE13**

→ Page 46

**RE27**

→ Page 46

## Process protection with safety guard lock

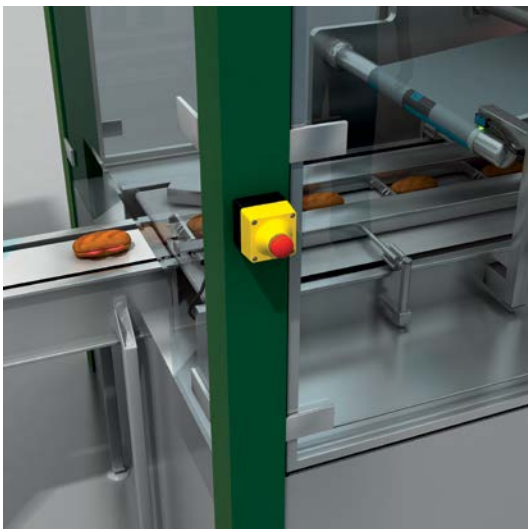
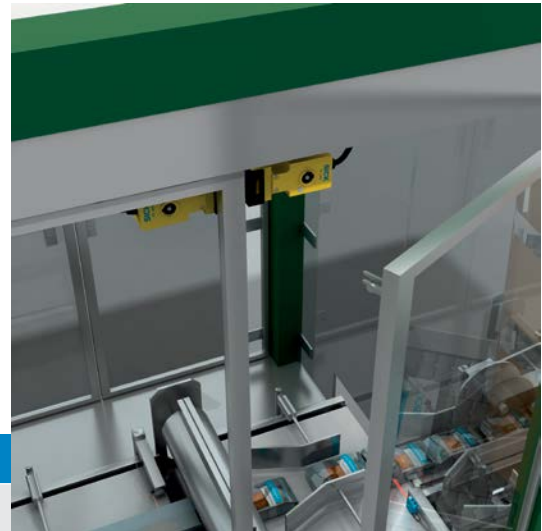
- Plastic housing with 1200 N locking force
- Additional diagnostics contact
- Visualization of the guard lock using LED display
- Depending on the risk assessment: up to PL e through the use of two safety switches

+ Optimal solution up to PL c for long overtravel movements

### Recommended product

**i14 Lock**

→ Page 39



## Emergency stop at ideal positions

- Safe emergency stop function
- Various forced opening/closing combinations
- Surface mount version for direct mounting on the machine

+ Complete device for machines up to PL e for quick mounting

### Recommended product

**ES21 / ES11**

→ Page 56

## “Sensor Intelligence” is a promise

At SICK, sensor solutions are developed for industrial automation with commitment and experience. From development to product support, every employee is completely committed to ensuring that sensors and application solutions from SICK optimally fulfill their versatile functions.

### + Optimal personnel and process protection

SICK offers a variety of different safety switches for securing your machine or system.

- Non-contact safety switches, e.g., transponder safety switches, are ideal in the event of imprecise guidance of the safety door or high requirements for prevention against tampering
- Safety guard locks are ideal for the safe locking of machines and for personnel and process protection
- Enabling switches are typically used for personnel protection in the maintenance and setup mode

→ The matching solution for all your applications

### + High machine throughput

SICK ensures the quality of its products in order to provide you the highest possible quality solution.

- SICK performs intensive tests and verifications for all products
- Effective product surveillance over the entire product life-cycle
- Short delivery times in the event of replacement

→ Less machine downtime

### + SICK's safety switches are used in thousands of applications to ensure the safety of your employees and colleagues







**+ Conforms with standards and directives**

Play it safe and save effort and expense with the stress-free implementation of the machine directives and the new safety standards (SIL and PL).

- SICK products constantly meet the current international safety standards and directives
- We support the application of the new European standard EN ISO 13849-1 and the determination of the performance level (PL) with our libraries for the IFA (formerly BGIA) SISTEMA-Tool

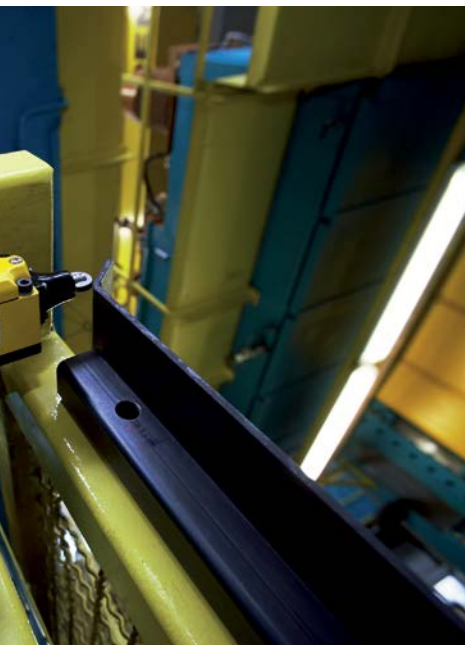
→ Compliant with safety standards for the optimal safety of your machine or system

**+ Complete solutions from a single source**

SICK provides comprehensive safety expertise support, not just with successful products, but also with international service.

- Coordinated combinations of SICK safety switches, opto-electronic protective devices and safe control solutions
- Updated guides such as the “Safe Machine Guidelines” brochure, seminars and Safexpert® safety software

→ Your fast track to a CE-compliant machine





### Safety switches from SICK for established and intelligent safety solutions

Safety switches are used in many safety applications. The most frequent application areas are protecting movable guards, the position determination of dangerous movements and the safe stop function with safety command devices. Depending on the application, there are different forms of safety switches and the portfolio of SICK safety switches is split into three groups:

electro-mechanical safety switches, non-contact safety switches and safety command devices. This means the appropriate solution is available for all common requirements. In conjunction with sens:Control – safe control solutions, SICK offers ideal complete solutions from a single source, which are optimally suited to one another.

### Electro-mechanical safety switches

Electro-mechanical safety switches economically and reliably monitor movable guards. SICK's portfolio of electro-mechanical safety switches contains four product groups: safety position switches, safety hinge switches, safety switches with separate actuator and safety locking devices. This enables users to choose the appropriate solution for a variety of different applications. When combined with sens:Control – safe control solutions, SICK offers complete solutions from a single source.

→ More from page 36



### Non-contact safety switches

Non-contact safety switches are ideal in applications where precise guidance of guards is difficult. Due to their design, they are extremely long-lasting devices that require minimal maintenance. In addition, they are resistant to shock and vibrations and offer a high level of prevention against tampering. Our range of non-contact safety switches includes magnetic, transponder and inductive safety switches. Rectangular and cylindrical types are available for each sensor principle.

→ More from page 44



### Safety command devices

Safety command devices from SICK ensure that dangerous movements are reliably stopped or critical machine functions are reliably initiated. SICK's portfolio of safety command devices includes three major product groups: emergency stop pushbuttons, rope pull switches and enabling switches. The wide product range enables users to choose different functions and performance based on their application needs.

→ More from page 54







## Product family description

### Safety switches with separate actuator

Safety switches with a separate actuator are made up of two parts: a safety switch that is mounted on the fixed part and an actuator that is mounted on the mobile part of the guard. When the guard is closed, the actuator is moved into the safety switch. This achieves the safe status and the safety-relevant contacts are closed. These devices are ideal for protecting sliding and rotating doors, as well as removable protective covers. SICK offers variants with different shapes and functions – from compact to standard – for corresponding applications.

#### At a glance

- Plastic and metal housings
- Rigid or mobile actuators
- Available with M20 X 1.5 cable entry glands or Flexi Loop-compatible M12 plug connector (depending on variant)
- IP 67 enclosure rating
- Slow-action switching elements with up to four contacts

### Safety locking devices

Safety locking devices are used for keeping guards safely locked until a hazardous area can be entered. They are intended for applications in which there is an immediate danger to people when delayed stopping or an uncontrolled process interruption has the potential to cause injury or death. There are two restraint types, including spring force locking and magnetic force locking. With spring force locking, the guard is held closed by spring force. In magnetic force locking, the guard is held closed by activation of the magnetic coil.

#### At a glance

- Plastic and metal housings
- Variants with metal actuator head
- Rigid or mobile actuators
- Locked by spring force and magnetic force
- Lock and door monitoring
- Variants with LED locking indicator
- Available with M20 X 1.5 cable entry glands or Flexi Loop-compatible M12 plug connector (depending on variant)




### Safety position switches

Safety position switches are used for reliably identifying dangerous movements, even at high speeds. These switches use an actuator that is in a positive connection with the safety switch. There are two different actuators: the roller plunger for determining exact positions and the turning lever for identifying rapid movements. The safety position switch is actuated directly by the protective device.

#### At a glance

- Plastic and metal housings
- Roller plunger and turning lever
- 1 M20 x 1.5 cable entry gland
- Slow-action or snap-action switching element with up to four contacts

### Product family overview

	 i12S (6025059)	 i16S (6025063)	 i110S (6025074)
<b>General information</b>	Safe and economical door monitoring with retaining force		
<b>Housing material</b>	Glass-fiber reinforced thermoplastic	Glass-fiber reinforced polybutylene terephthalate (PBT)	Die-cast zinc
<b>Enclosure rating</b>	IP 67	IP 67	IP 67
<b>Ambient operating temperature from ... to</b>	-20 °C ... +80 °C	-20 °C ... +80 °C	-20 °C ... +80 °C
<b>Technical specifications</b>			
<b>Safety related parameters</b>			
<b>B<sub>10d</sub> parameter</b>	2 x 10 <sup>6</sup> switching cycles, with small load	2 x 10 <sup>6</sup> switching cycles, with small load	2 x 10 <sup>6</sup> switching cycles, with small load
<b>Mechanical life</b>	1 x 10 <sup>6</sup> switching cycles	1 x 10 <sup>6</sup> switching cycles	1 x 10 <sup>6</sup> switching cycles
<b>Actuation frequency</b>	≤ 7.200 /h	≤ 7.200 /h	≤ 7.200 /h
<b>Approach speed</b>	≤ 10 m/min	≤ 10 m/min	≤ 10 m/min
<b>Actuation torque</b>	-	-	-
<b>Retaining force</b>	15 N	30 N	12 N
<b>Locking force</b>	-	-	-
<b>Electrical details</b>			
<b>Switching principle</b>	Slow action switching element	Slow action switching element	Slow action switching element
<b>Number of positive action N/C / N/O door monitoring contacts</b>	2/1	2/0	2/2
<b>Number of positive action N/C / N/O solenoid monitoring contacts</b>	-	-	-
<b>Usage category in compliance with IEC/EN 60947-5-1</b>	AC-15/DC-13	AC-15/DC-13	AC-15/DC-13
<b>Rated operating current (voltage)</b>	3 A (240 V AC), 3 A (24 V DC)	3 A (240 V AC), 3 A (24 V DC)	3 A (240 V AC), 3 A (24 V DC)
<b>Rated insulation voltage U<sub>i</sub></b>	240 V	240 V	240 V
<b>Switching voltage</b>	≥ 5 V DC	≥ 5 V DC	≥ 5 V DC
<b>Switching current</b>	≥ 5 mA	≥ 5 mA	≥ 5 mA
<b>Solenoid operating voltage</b>	-	-	-
<b>Power consumption</b>	-	-	-
<b>Short-circuit protection</b>	3 A gG	3 A gG	3 A gG
<b>Connection</b>			
<b>Connection type</b>	Cable gland	Cable gland	Cable gland
<b>Number of cable glands x size of the screwed joint</b>	1 x M16	3 x M20	1 x M20
<b>Cross section of electrical conductors</b>	≤ 1,5 mm <sup>2</sup>	≤ 1,5 mm <sup>2</sup>	≤ 1,5 mm <sup>2</sup>
<b>Detailed information</b>	→ Page 40	<a href="http://www.mysick.com/en/i16S">www.mysick.com/en/i16S</a>	<a href="http://www.mysick.com/en/i110S">www.mysick.com/en/i110S</a>

	<b>i10 Lock (6022585)</b>	<b>i14 Lock (6025060)</b>	<b>i10R (6025085)</b>	<b>i110R (6025108)</b>
	<b>Safe and economical door monitoring with high locking force</b>		<b>Safe and established position monitoring</b>	
	Glass-fiber reinforced thermoplastic	Glass-fiber reinforced thermoplastic	Glass-fiber reinforced thermoplastic	Die-cast zinc
	IP 67	IP 65	IP 66	IP 66
	-20 °C ... +55 °C	-20 °C ... +60 °C	-25 °C ... +80 °C	-25 °C ... +80 °C
	3 x 10 <sup>6</sup> switching cycles, with small load 1 x 10 <sup>6</sup> switching cycles	2 x 10 <sup>6</sup> switching cycles, with small load 1 x 10 <sup>6</sup> switching cycles	2 x 10 <sup>6</sup> switching cycles, with small load 10 x 10 <sup>6</sup> switching cycles	2 x 10 <sup>6</sup> switching cycles, with small load 10 x 10 <sup>6</sup> switching cycles
	≤ 7.000 /h	≤ 3.600 /h	≤ 6.000 /h	≤ 6.000 /h
	≤ 20 m/min	≤ 10 m/min	0,1 m/min ... 15 m/min	0,1 m/min ... 15 m/min
	-	-	≥ 0.14 Nm	≥ 0.34 Nm
	-	-	-	-
	≤ 1.300 N	≤ 1.200 N	-	-
	Slow action switching element	Slow action switching element	Slow action switching element	Slow action switching element
	-	-	2/1	2/2
	2/1	2/1	-	-
	AC-15/DC-13	AC-15/DC-13	AC-15/DC-13	AC-15/DC-13
	4 A (230 V AC), 4 A (24 V DC)	3 A (240 V AC), 2 A (24 V DC)	3 A (240 V AC), 3 A (24 V DC)	3 A (240 V AC), 3 A (24 V DC)
	250 V	250 V	250 V	250 V
	≥ 12 V DC	≥ 5 V DC	≥ 5 V DC	≥ 5 V DC
	≥ 1 mA	≥ 5 mA	≥ 5 mA	≥ 5 mA
	24 V (20,4 V ... 26,4 V) DC	24 V (20,4 V ... 26,4 V) DC	-	-
	≤ 8 W	≤ 7 W	-	-
	4 A gG	3 A gG	F15	F15
	Cable gland	Cable gland	Cable gland	Cable gland
	3 x M20	1 x M20	1 x M20	1 x M20
	0,34 mm <sup>2</sup> ... 1,5 mm <sup>2</sup>	≤ 1,5 mm <sup>2</sup>	≤ 2,5 mm <sup>2</sup>	≤ 2,5 mm <sup>2</sup>
	<a href="#">→ Page 42</a>	<a href="http://www.mysick.com/en/i14_Lock">www.mysick.com/en/i14_Lock</a>	<a href="http://www.mysick.com/en/i10R">www.mysick.com/en/i10R</a>	<a href="http://www.mysick.com/en/i110R">www.mysick.com/en/i110R</a>



## At a glance

- Narrow plastic housing
- Rigid or mobile actuators
- Available with M16 X 1.5 cable entry gland or Flexi Loop-compatible M12 plug connector (depending on variant)
- Slow-action switching elements with up to three contacts
- IP 67 enclosure rating

## Your benefits

- Cost-effective solution for all standard safety applications
- Small design simplifies installation and makes it easy to mount directly on the guard door frame
- High reliability and safety due to the cone shaped metal alignment aid
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

## Ordering information

Number of positive action N/C contacts	Number of N/O contacts	Connection type	Type	Part no.
1	1	Cable entry	i12-SA113	6025057
2	0	Cable entry	i12-SA203	6025100
	1	Cable entry	i12-SB213	6025059
2	0	Connector*	i12-SA205	1064506
			i12-SB215	1064507

\* Flexi Loop-kompatible M12 plug connector, 4-pin

## Actuators

Figure	Design	Actuation option	Min. door radius	Type	Part no.
	Straight	Rubber-mounted	150 mm	iE12-S1	5311131
	Angled	Rigid	150 mm	iE12-A1	5311132
	Radial	Semiflexible	60 mm	iE12-F1	5308842




## Required accessories

### Cable gland

Figure	Type	Part no.
	Cable gland M16	5309163

### Plug connectors and cables

#### Connecting cable (female connector-open)

Figure	Connection type head A	Connection type head B	Cable material	Conductor cross-section	Cable length	Model name	Part no.
	Female connector, M12, 4-pin, straight	Cable	PVC	0,25 mm <sup>2</sup>	5 m	DOL-1204-G05M	6009866
					10 m	DOL-1204-G10M	6010543
					15 m	DOL-1204-G15M	6010753



Enhanced system solutions see page 60



## At a glance

- Narrow plastic housing
- Rigid or mobile actuators
- Available with M20 X 1.5 cable entry gland or Flexi Loop-compatible M12 plug connector (depending on variant)
- Locked by spring force and magnetic force
- Lock and door monitoring
- IP 67 enclosure rating

## Your benefits

- Small design simplifies installation and makes it easy to mount directly on the guard door frame
- Flexible electrical connectivity due to three cable entry glands
- Improved diagnostics due to additional signaling contacts
- Practical, simple adjustment due to various actuators that are suitable for any door
- Different switching elements offer the appropriate solution for electrical installation
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

## Ordering information

- **Locking type:** electrical




Solenoid monitoring contacts		Door monitoring		Connection type	Type	Part no.
Number of positive action N/C	Number of N/O	Number of positive action N/C	Number of N/C			
2	1	0	1	Cable entry	i10-E0233 Lock	6022585
	0	2	0	Cable entry	i10-E0453 Lock	6020598
				Connector*	i10-E0454 Lock	6045056

- **Locking type:** mechanical

Solenoid monitoring contacts		Door monitoring		Connection type	Type	Part no.
Number of positive action N/C	Number of N/O	Number of positive action N/C	Number of N/C			
2	1	0	1	Cable entry	i10-M0233 Lock	6022580
	0	2	0	Cable entry	i10-M0453 Lock	6029934
				Connector*	i10-M0454 Lock	6045055

\* Flexi Loop-compatible M12 plug connector, 8-pin

## Actuators


Figure	Design	Actuation option	Method of actuation	Door radius	Type	Part no.
	Straight	Rubber-mounted	-	≥ 1.000 mm	iE10-S2	5306530
	Angled	Rigid	With overtravel	≥ 1.000 mm	iE10-A4	5308497
	Radial	Semiflexible	Door hinged at top/bottom	≥ 90 mm	iE10-R1	5306528
			Door hinged on left/right	≥100 mm	iE10-R2	5306529

## Required accessories

### Cable gland

Figure	Type	Part no.
	Cable gland M20	5309164

### Plug connectors and cables

Figure	Size of the cable gland	Direction of cable outlet	Cable material	Cable length	Model name	Part no.
	M12, 8-pin	Straight	PVC	5 m	DOL-1208-G05MA	6020993
				10 m	DOL-1208-G10MA	6022152
				15 m	DOL-1208-G15MA	6022153
				30 m	DOL-1208-G30MA	6022242



Enhanced system solutions see page 60





## Product family description

### Magnetic safety switches

Magnetic safety switches are equipped with complementary-switching or equivalent-switching contacts that use coded magnetic actuators. Magnetic safety switches can be used in areas where a high level of contamination occurs. The devices are easy to clean, making them suitable for contaminated areas or environments with strict hygiene standards. Their operating principle enables greater tolerances, making them ideal for applications where precise guidance of guards is difficult.

#### At a glance

- Up to performance level PL e / Cat. 4 (EN ISO 13849)
- Response range of up to 9 mm
- Available with following contact options: complementary with an NO/NC contact or equivalent with two or three N/O contacts
- Sensors with plug connector or connected cable
- Flexi Loop-compatible M12 plug connector (depending on variant)

### Transponder safety switches

Transponder safety switches are used in applications where a high level of prevention against tampering is essential. The safety switch determines which actuator code to use and will not engage unless the proper actuator code is read. The safety switches have a wide response range, which is highly beneficial for mounting and considerably reduces machine downtime. Some safety switches are extremely small and have a central evaluation unit in the control cabinet, while others have an integrated evaluation unit with an LED status indicator. Various versions, including multicode and unicode variants, enable connectivity of up to 30 safety switches.

#### At a glance

- Up to performance level PL e / Cat. 4 (EN ISO 13849)
- LED status indicator
- Response range of up to 25 mm
- Multicoded and unique coded sensors
- Safe series connection of sensors possible (depending on the variant)
- Flexi Loop-compatible M12 plug connector (depending on variant)



### Inductive safety switches

Inductive safety switches are used for determining position and work on a non-contact basis. They detect approaching objects without a separate actuator. Their wide response range makes them simple to mount and adjust.

#### At a glance

- Up to performance level PL e / Cat. 4 (EN ISO 13849)
- LED status indicator
- Direct connection to safe control solution possible
- Response range of up to 15 mm
- Flexi Loop-compatible M12 plug connector (depending on variant)
- High enclosure rating of IP 67 or IP 69K




Product family overview

	 <b>RE13 (1059503)</b>	 <b>RE27 (1065233)</b>	
<b>General information</b>	Simple and established non-contact door monitoring		
<b>Housing material</b>	Glass-fiber reinforced PPS	Glass-fiber reinforced PPS	
<b>Housing diameter</b>	-	-	
<b>Enclosure rating</b>	IP 67	IP 67	
<b>Ambient operating temperature from ... to</b>	-20 °C ... +60 °C	-20 °C ... +60 °C	
<b>Technical specifications</b>			
<b>Safety related parameters</b>			
<b>Safety integrity level</b>	-	-	
<b>Category</b>	Up to category 4 (EN ISO 13849) <sup>1)</sup>	Up to category 4 (EN ISO 13849) <sup>1)</sup>	
<b>Performance level</b>	Up to PL e (EN ISO 13849) <sup>1)</sup>	Up to PL e (EN ISO 13849) <sup>1)</sup>	
<b>B<sub>10d</sub> parameter</b>	2 x 10 <sup>7</sup> switching cycles, with small load	2 x 10 <sup>7</sup> switching cycles, with small load	
<b>PFHd (mean probability of a dangerous failure per hour)</b>	-	-	
<b>TM (Mission Time)</b>	-	-	
<b>Safe switch on distance S<sub>AO</sub></b>	7 mm	9 mm	
<b>Safe switch off distance S<sub>AR</sub></b>	20 mm	20 mm	
<b>Electrical details</b>			
<b>Type of output</b>	Reed contacts	Reed contacts	
<b>Number of N/O contacts/ N/C contacts</b>	2/0	3/0	
<b>Number of outputs</b>	-	-	
<b>Supply voltage</b>	-	-	
<b>Switching voltage</b>	≤ 24 V DC	≤ 24 V DC	
<b>Switching current</b>	≤ 100 mA	≤ 100 mA	
<b>Status display</b>	-	✓	
<b>Connection</b>			
<b>Connection type</b>	M8 plug connector, 4 pins	M12 plug connector, 8 pins	
<b>Cable length</b>	-	5 m (PVC)	
<b>Detailed information</b>	→ Page 48	<a href="http://www.mysick.com/en/RE27">www.mysick.com/en/RE27</a>	

<sup>1)</sup> In combination with suitable safety device.

<sup>2)</sup> Values apply for steel (FE360).

<sup>3)</sup> Dependent on material. The indicated values refer to steel ST37.

 <p><b>IN3000 Direct (6034582)</b></p>	 <p><b>IN4000 Standard (6027391)</b></p>	 <p><b>TR4 Direct (6044638)</b></p>
Safe, non-contact position monitoring		Non-contact safety switches with high level of prevention against tampering
White bronze coated brass (housing), PBT (cover)	PBT/V4A	Valox® DR48
M12	M18	-
IP 65, IP 67	IP 69K	IP 69K
-25 °C ... +70 °C	-25 °C ... +70 °C	-10 °C ... +55 °C
<p>SIL2 (IEC 61508), SILCL2 (EN 62061)            Category 3 (EN ISO 13849)<sup>1)</sup>            PL d (EN ISO 13849)<sup>1)</sup>            -            1,0 x 10<sup>-7</sup> (EN ISO 13849)</p> <p>10 years (EN ISO 13849),            at -25 °C ... +70 °C and 5 % ... 95 %            relative air humidity            20 years (EN ISO 13849),            at +10 °C ... +40 °C and 5 % ... 70 %            relative air humidity</p>	<p>SIL3 (IEC 61508)            Category 4 (EN ISO 13849)<sup>1)</sup>            PL e (EN ISO 13849)<sup>1)</sup>            -            1,33 x 10<sup>-9</sup> (EN ISO 13849)</p> <p>10 years (EN ISO 13849)</p>	<p>SIL3 (IEC 61508)            Category 4 (EN ISO 13849)<sup>1)</sup>            PL e (EN ISO 13849)<sup>1)</sup>            -            1,119 x 10<sup>-9</sup> (EN ISO 13849)</p> <p>20 years (EN ISO 13849)</p>
0,5 mm ... 4 mm <sup>2)</sup>	3 mm ... 6 mm <sup>3)</sup>	15 mm
6 mm <sup>2)</sup>	15 mm <sup>3)</sup>	35 mm
Semiconductor	Semiconductor, pulsed	Semiconductor (OSSD)
-	-	-
2	1	2
24 V DC (19,2 V DC ... 28,8 V DC)	24 V DC (19,2 V DC ... 30 V DC)	24 V DC (20,4 V DC ... 26,4 V DC)
-	-	-
-	-	-
✓	✓	✓
M12 plug connector, 4 pins	M12 plug connector, 4 pins	M12 plug connector, 8 pins
-	-	≤ 200 m
→ Page 50	<a href="http://www.mysick.com/en/IN4000_Standard">www.mysick.com/en/IN4000_Standard</a>	→ Page 52



## At a glance

- Response range of up to 9 mm
- Available with following contact options: complementary with an NO/NC contact or equivalent with two or three N/O contacts
- Up to performance level PL e / Cat. 4 (EN ISO 13849)
- Flexi Loop-compatible M12 plug connector (depending on variant)
- Sensors with plug connector or connected cable

## Your benefits

- Long service life due to durable and low-maintenance design
- Space-saving mounting due to compact housing design
- Just one safety switch in conjunction with a suitable safety module makes it possible to solve applications up to PL e and Cat. 4 (EN ISO 13849)
- High level of machine availability due to high tolerances for door misalignment
- The devices are easy to clean, making them suitable for contaminated areas or environments with strict hygiene standards
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

## Ordering information

- **Product family:** RE1
- **Dimensions:** 26 mm x 36 mm x 13 mm
- **System part:** sensor & actuator
- **Design:** rectangular

Connection type	Cable length	Safe switch on distance $S_{so}$	Model name	Part no.
Cable	3 m	3 mm	RE11-SA03	1059411
	5 m	3 mm	RE11-SA05	1059501
M8 plug connector, 4-pin	-	3 mm	RE11-SAC	1059410
Cable	3 m	7 mm	RE13-SA03	1059504
	5 m	7 mm	RE13-SA05	1062011
Cable with connector M8, 4-pin	0.2 m	7 mm	RE13-SA84	1062539
Cable with connector M12, 4-pin	0.2 m	7 mm	RE13-SA64	1062540
M8 plug connector, 4-pin	-	7 mm	RE13-SAC	1059503



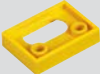

- **Product family:** RE2
- **Dimensions:** 25 mm x 88 mm x 13 mm
- **System part:** sensor & actuator
- **Design:** rectangular

Status display	Connection type	Cable length	Safe switch on distance $S_{ao}$	Model name	Part no.
-	Cable	3 m	6 mm	RE21-SA03	1059506
		5 m	6 mm	RE21-SA05	1059507
	M8 plug connector, 4-pin	-	6 mm	RE21-SAC	1059505
	Cable	3 m	9 mm	RE23-SA03	1061725
		5 m	9 mm	RE23-SA05	1061726
	Cable with connector M8, 4-pin	0.2 m	9 mm	RE23-SA84	1062541
	Cable with connector M12, 4-pin	0.2 m	9 mm	RE23-SA64	1062542
	M8 plug connector, 4-pin	-	9 mm	RE23-SAC	1059508
✓	Cable	5 m	9 mm	RE27-SA05L	1059510
		10 m	9 mm	RE27-SA10L	1059511
		20 m	9 mm	RE27-SA20L	1059512
	Cable with plug, M12, 8-pin	0.2 m	9 mm	RE27-SA68L	1059509
	Cable with connector M12, 8-pin, Flexi Loop-compatible	0.2 m	9 mm	RE27-SA68LS04	1065233

## Required accessories





### Other mounting accessories

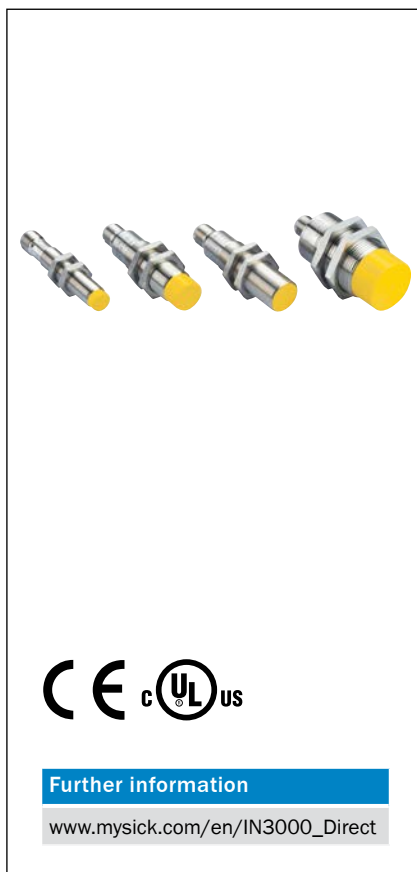
#### Others

Figure	Brief description	Packing unit	Model name	Part no.
	Spacer for RE1	10	RE10-SP	1060290
	Spacer for RE2	10	RE20-SP	1060291

### Plug connectors and cables

#### Connecting cable (female connector-open)

Figure	Connection type head A	Connection type head B	Cable material	Conductor cross-section	Cable length	Model name	Part no.
	Female connector, M8, 4-pin, straight	Cable	PVC	0.25 mm <sup>2</sup>	2 m	DOL-0804-G02M	6009870
					5 m	DOL-0804-G05M	6009872
					10 m	DOL-0804-G10M	6010754
	Female connector, M8, 4-pin, angled	Cable	PVC	0.25 mm <sup>2</sup>	2 m	DOL-0804-W02M	6009871
					5 m	DOL-0804-W05M	6009873
					10 m	DOL-0804-W10M	6010755
	Female connector, M12, 4-pin, straight	Cable	PVC	0.25 mm <sup>2</sup>	5 m	DOL-1204-G05M	6009866
					10 m	DOL-1204-G10M	6010543
					15 m	DOL-1204-G15M	6010753
	Female connector, M12, 8-pin, straight	Cable	PVC	0.25 mm <sup>2</sup>	5 m	DOL-1208-G05MA	6020993
					10 m	DOL-1208-G10MA	6022152
					15 m	DOL-1208-G15MA	6022153
					30 m	DOL-1208-G30MA	6022242



### At a glance

- Direct connection to safe control solution possible
- Response range of up to 15 mm
- LED status indicator
- Flexi Loop-compatible M12 plug connector
- Up to performance level PL d (EN ISO 13849), SILCL2 (EN 62061), SIL2 (IEC 61508)

### Your benefits

- Cost-effective solution for applications up to PL d / SILCL2
- Space-saving mounting due to compact housing design
- Direct connection to the safe control solution eliminates any additional wiring and reduces installation time
- Fast diagnostics via LED status indicator
- Long service life due to durable and low-maintenance design
- The devices are easy to clean, making them suitable for contaminated areas or environments with strict hygiene standards
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

### Ordering information

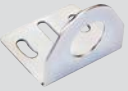




System part	Housing diameter	Installation type	Type	Part no.
Sensors	M30	Non-flush	IN30-E0208K	6044655
	M18	Non-flush	IN30-E0305K	6034576
		Flush	IN30-E0306K	6034581
	M12	Non-flush	IN30-E0407K	6034582

### Required accessories

#### Connectors

Figure	Size of the screwed joint	Direction of cable outlet	Cable length	Type	Part no.
	M12, 4-pin	Straight	5 m	DOL-1204-G05M	6009866
			10 m	DOL-1204-G10M	6010543
			15 m	DOL-1204-G15M	6010753

**Mounting systems**

Figure	Description	Type	Part no.
	Mounting bracket, M12 thread	BEF-WN-M12	5308447
	Mounting bracket, M18 thread	BEF-WN-M18	5308446
	Mounting bracket, M30 thread	BEF-WN-M30	5308445
	Clamping block for round sensors M12, without fixed stop	BEF-KH-M12	2051479
	Clamping block for round sensors M18, without fixed stop	BEF-KH-M18	2051481



Enhanced system solutions see page 60



### At a glance

- Multicoded and unique coded sensors up to enclosure rating IP 69K
- Response range of up to 25 mm
- Safe series connection of up to 30 sensors possible
- Two OSSD safety outputs for direct connection to a single safety controller
- LED status indicator
- Up to performance level PL e (EN ISO 13849)
- Boundary area indication and magnetic retaining force (both optional)
- Flexi Loop-compatible M12 plug connector

### Your benefits

- High level of prevention against tampering due to individually coded actuator (depending on type)
- High level of machine availability due to high tolerances for door misalignment and boundary area indication
- High level of machine reliability due to resistance to shocks and vibrations
- Cascadability of up to 30 saves costs
- Long service life due to durable and low-maintenance design
- Fast diagnostics via LED status indicator
- The devices are easy to clean, making them suitable for contaminated areas or environments with strict hygiene standards
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

### Ordering information

- **Design:** cylindrical
- **System part:** sensor & actuator


Housing diameter (sensor/ actuator)	Safe switch on distance $S_{ao}$	Safe switch off distance $S_{ar}$	Coding	Connection type	Cable length	Model name	Part no.
M18 / M18	15 mm	25 mm	Multicoded	Cable with plug, M12, 8-pin	0.2 m	TR4-SAM01C	6034588
				Cable	3 m	TR4-SAM03P	6034586
			Unique coded	Cable with plug, M12, 8-pin	0.2 m	TR4-SAU01C	6022319
				Cable	3 m	TR4-SAU03P	6022317
M18 / M30	25 mm	35 mm	Multicoded	Cable with plug, M12, 8-pin	0.2 m	TR4-SBM01C	6035190
				Cable	3 m	TR4-SBM03P	6025090
			Unique coded	Cable with plug, M12, 8-pin	0.2 m	TR4-SBU01C	6044628
				Cable	3 m	TR4-SBU03P	6044626

- **Design:** rectangular
- **System part:** sensor & actuator
- **Dimensions:** 25 mm x 88 mm x 20 mm
- **safe switch on distance Sao:** 15 mm
- **safe switch off distance Sar:** 35 mm

Boundary area indication	Magnetic retaining force	Coding	Connection type	Cable length	Model name	Part no.
-	-	Multicoded	Cable with plug, M12, 8-pin	0.2 m	TR4-SDM01C	6044638
			Cable	3 m	TR4-SDM03P	6044636
		Unique coded	Cable with plug, M12, 8-pin	0.2 m	TR4-SDU01C	6044641
			Cable	3 m	TR4-SDU03P	6044639
✓	✓	Multicoded	Cable with plug, M12, 8-pin	0.2 m	TR4-SFM01C	6044650
			Cable	3 m	TR4-SFM03P	6044648
		Unique coded	Cable with plug, M12, 8-pin	0.2 m	TR4-SFU01C	6044653
			Cable	3 m	TR4-SFU03P	6044651

## Required accessories



### Plug connectors and cables

Figure	Size of the cable gland	Direction of cable outlet	Cable material	Cable length	Model name	Part no.
	M12, 8-pin	Straight	PVC	5 m	DOL-1208-G05MA	6020993
				10 m	DOL-1208-G10MA	6022152
				15 m	DOL-1208-G15MA	6022153
				30 m	DOL-1208-G30MA	6022242

### Adapters/distributors

Description	Model name	Part no.
T-junction for serial connection of TR4 Direct	TR4-AK004C	5325889
End plug for serial connection in combination with TR4-AK004C T-junction	TR4-AL002C	5325890

### Mounting systems

Figure	Description	Model name	Part no.
	Mounting bracket, M18 thread	BEF-WN-M18	5308446
	Clamping block for round sensors M18, without fixed stop	BEF-KH-M18	2051481



Enhanced system solutions see page 60





## Product family description

### Emergency stop pushbuttons

Emergency stop pushbuttons are essential in automated machines and plants. They make it possible for someone to stop a machine or a system immediately in case of an emergency. Depending on the variant, the emergency stop pushbuttons are either integrated into a machine control panel, or mounted with their housings directly on the machines.

### Reset pushbutton

Reset pushbuttons are used when the protective device initiates a stop function. In some cases, people might be in the hazardous area without being detected by the protective device. Before restarting the machine, the protective device must be reset. The reset pushbutton must be placed near the hazardous area so that personnel can ensure the area is clear prior to pushing the reset button.

### Rope pull switches

Rope pull switches ensure that dangerous movements are reliably stopped over long distances. The rope is connected to the rope pull switch for optimum safeguarding of hazardous points that are not protected by safety covers, e.g., conveyors. In the working position, the rope is under tension and the safety-relevant contacts – the positive opening normally closed contacts – are closed. The contacts are opened by a pull on the rope or if the rope breaks, the emergency stop function is triggered. Actuation is possible at any point along the rope.

### Enabling switches

Enabling switches ensure that even critical machine functions are performed safely. They are used when work has to be performed in the hazardous area in “setup” operating mode. All enabling switches are configured as 3-stage switches, i.e., movements can only be activated in the middle position because this is the only position in which all contacts are closed.

#### At a glance

- Either as surface-mounted version with housing or as built-in version (Ø 22 mm)
- Built-in version with self-monitoring contacts between the pushbutton and switching element
- Surface-mounted version for direct mounting on different machines and systems
- Rotational or key unlocking
- Variants with LED ring lighting
- Available with protective collar to prevent inadvertent actuation

#### At a glance

- Slim plastic housing with quick disconnect mounting clip
- Illuminated reset pushbutton
- 1 NO
- 4-pin M12 plug connector





#### At a glance

- Rope lengths up to 75 m, with rope break and rope pull function
- Metal housing with integrated rotary unlocking lever or emergency stop pushbutton and fault display
- Available with cable entry gland or Flexi Loop-compatible M12 plug connector (depending on variant)
- Slow-action switching elements with four contacts
- Complies to the standards EN 13850 and EN 60947-5-5

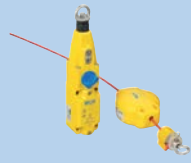
#### At a glance

- Plastic housing with connected cable
- 3-stage functional structure (off – on – off)
- Slow-action switching elements with four contacts
- Variant with additional plus/minus buttons
- Complies to the standard EN 60947-5-8

### Product family overview

					
	Quick, reliable emergency stop safety protection		Reliable and safe with emergency stop pushbutton and reset pushbutton	Reliable and safe start with a reset button	
<b>General information</b>	Emergency stop pushbutton	Emergency stop pushbutton	Emergency stop pushbutton	Reset pushbutton	
<b>Design</b>	Surface mount version	Panel mount version	Surface mount version	Surface mount version	
<b>Cord length</b>	-	-	-	-	
<b>Housing material</b>	Plastic	Plastic	Plastic	Plastic	
<b>Enclosure rating</b>	IP 65	IP 65	IP 65	IP 65	
<b>Ambient operating temperature from ... to</b>	-25 °C ... +60 °C	-30 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +70 °C	
<b>Technical specifications</b>					
<b>Safety related parameters</b>					
<b>B<sub>10d</sub> parameter</b>	2,5 x 10 <sup>5</sup> switching cycles	2,5 x 10 <sup>5</sup> switching cycles	2,5 x 10 <sup>5</sup> switching cycles	1 x 10 <sup>6</sup> switching cycles	
<b>Electrical life (depending on the load)</b>	1 x 10 <sup>6</sup> switching cycles	1 x 10 <sup>6</sup> switching cycles	5 x 10 <sup>4</sup> switching cycles	1 x 10 <sup>6</sup> switching cycles	
<b>Actuation force (deflection)</b>	-	-	-	-	
<b>Electrical details</b>					
<b>Switching principle</b>	Slow action switching element	Slow action switching element	Slow action switching element	Slow action switching element	
<b>Number of positive action N/C contacts / N/O contacts</b>	2/1	2/1	2/1	0/1	
<b>Usage category in compliance with IEC/EN 60947-5-1</b>	AC-15/DC-13	AC-15/DC-13	-	DC13	
<b>Rated operating current (voltage)</b>	3 A (250 V AC), 2 A (24 V DC)	3 A (250 V AC), 2 A (24 V DC)	2 A (24 V AC)	2 A (24 V DC)	
<b>Rated insulation voltage U<sub>i</sub></b>	600 V	600 V	-	-	
<b>Switching voltage</b>	≥ 5 V DC	≥ 5 V DC	-	-	
<b>Switching current</b>	≥ 1 mA	≥ 1 mA	-	-	
<b>Short-circuit protection</b>	-	-	-	-	
<b>Connection</b>					
<b>Connection type</b>	Cable gland	-	M12 plug connector, 8-pin	M12 plug connector, 4-pin	
<b>Cable length</b>	-	-	-	-	
<b>Number of cable glands x size of the screwed joint</b>	2 x M20	-	-	-	
<b>Cross section of electrical conductors</b>	≤ 2,5 mm <sup>2</sup>	≤ 2,5 mm <sup>2</sup>	-	-	
<b>Detailed information</b>	<a href="http://www.mysick.com/en/ES21">www.mysick.com/en/ES21</a>	<a href="http://www.mysick.com/en/ES21">www.mysick.com/en/ES21</a>	<a href="http://www.mysick.com/en/ES11">www.mysick.com/en/ES11</a>	<a href="http://www.mysick.com/en/ER12">www.mysick.com/en/ER12</a>	





**i110RP (6025077)**



**i150RP (6024883)**



**E100 (6022879)**

Safety protection over long distances

Safety protection during setup or maintenance

Rope pull switches

Rope pull switches

Enabling switches

-  
≤ 30 m  
Metal  
IP 66  
-25 °C ... +80 °C

-  
≤ 75 m  
Metal  
IP 65  
-25 °C ... +80 °C

With plus/minus buttons  
-  
Plastic  
IP 65  
-5 °C ... +50 °C

2 x 10<sup>6</sup> switching cycles, with small load  
1 x 10<sup>6</sup> switching cycles

2 x 10<sup>6</sup> switching cycles, with small load  
1 x 10<sup>6</sup> switching cycles

1 x 10<sup>5</sup> switching cycles, with small load  
1 x 10<sup>5</sup> switching cycles

≤ 125 N (300 mm)

≤ 125 N (300 mm)

-

Slow action switching element

Slow action switching element

Slow action switching element

2/2

2/2

2/2

AC-15/DC-13

AC-15/DC-13

DC-13

3 A (240 V AC), 2 A (24 V DC)

3 A (240 V AC), 3 A (24 V DC)

2 A (24 V DC)

250 V

250 V

32 V

≥ 5 V DC

≥ 5 V DC

≥ 12 V DC

≥ 5 mA (5 V DC)

≥ 5 mA (5 V DC)

≥ 1 mA (24 V DC)

T6

T6

2 A gG / 0,1 A gG

Cable gland or M12 plug connector, 8-pin

Cable gland or M12 plug connector, 8-pin

Cable

-

-

5 m

1 x M20

3 x M20

-

≤ 1,5 mm<sup>2</sup>

≤ 1,5 mm<sup>2</sup>

≤ 0,5 mm<sup>2</sup>

[www.mysick.com/en/i110RP](http://www.mysick.com/en/i110RP)

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[www.mysick.com/en/E100](http://www.mysick.com/en/E100)



## At a glance

- Rope lengths up to 75 m, with rope break and rope pull function
- Metal housing with integrated emergency stop pushbutton and fault display
- Rotary unlocking lever
- Available with M20 x 1.5 cable entry gland or Flexi Loop-compatible M12 plug connector (depending on variant)
- Slow action switching elements with four contacts

## Your benefits

- The emergency stop function can be triggered at any point along the rope
- The long rope length reduces the number of rope pull switches, which saves costs
- Simple adjustment of the rope tension
- Rugged metal housing offers a high level of protection for the rope pull switch
- Integrated emergency stop pushbutton allows users to trigger the emergency stop function at the end of the rope
- User-friendly systems available with many rope lengths
- Additional contacts provide quick and easy diagnostics
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.





## Ordering information

Number of positive action N/C contacts	Number of N/O contacts	Type	Part no.
2	2	i150-RP223	6024884
3	1	i150-RP313	6024883


## Required accessories

### Rope accessory


Figure	Accessory type	Item supplied	Cord length	Type	Part no.
	Rope accessory set	2 rope grippers, 1 tensioner, 3 eye bolts, 5 m rope, 1 allen key	5 m	iE110-P05	5311136
		2 rope grippers, 1 tensioner, 14 eye bolts, 30 m rope, 1 allen key	30 m	iE110-P30	5311139
		2 rope grippers, 1 tensioner, 32 eye bolts, 75 m rope, 1 allen key	75 m	iE110-P75	5320017
	Spring	-	-	iE110-PTS	5311290

Figure	Accessory type	Item supplied	Cord length	Type	Part no.
	Tensioner set	1 tensioner, 2 rope grippers, 1 allen key	-	iE110-PTR	5309034
	Eye bolt	-	-	iE110-PEB	5309035
	Rope	-	30 m	iE110-PL30	5310813
	Rope	-	100 m	iE110-PL100	5310814



Cable gland

Figure	Type	Part no.
	Cable gland M20	5309164

Indicator light

Figure	Description	Type	Part no.
	Lamp set/indicator light	iE110-PIS1	5325871

Pulley




Figure	Description	Type	Part no.
	Internal pulley	iE110-PCPI	5325887
	External pulley	iE110-PCPO	5325888



Enhanced system solutions see page 60

Enhanced system solutions

Figure	Description	Technical details	Type	Part no.
	Safety relay UE43-2MF – the perfect monitoring of safety switches and emergency stop pushbuttons	With removable terminals, 2 safety outputs, 1 application diagnostic output	UE43-2MF3D2	6024894
	Safety relay UE48-2OS – the generalist with diagnostics	With removable terminals, 2 safety outputs, 1 application diagnostic output	UE48-2OS3D2	6024916
	Safety controller Flexi Soft – with software (Flexi Soft Designer) configurable safety controller	Flexi Soft CPU0 main unit, without EFI connections, two-level spring terminals	FX3-CPU000000	1043783
		Flexi Soft CPU1 main unit, 2 EFI connections, two-level spring terminals	FX3-CPU130002	1043784
		Flexi Soft XTIO extension unit, 8 inputs/4 outputs, two-level spring terminals	FX3-XTIO84002	1044125
		Flexi Soft XTDI input expansion unit, 8 inputs, two-level spring terminals	FX3-XTDI80002	1044124
		Flexi Soft system plug	FX3-MPL000001	1043700

Figure	Description	Technical details	Type	Part no.
	Flexi Classic safety controller – safety controller configurable with a screwdriver	Flexi Classic main unit	UE410-MU3T5	6026136
		Flexi Classic in-/output expansion unit	UE410-XU3T5	6032470
		Flexi Classic input expansion unit	UE410-8DI3	6026139

# SICK – your partner for machine safety

## Safety solutions from SICK allow you to create efficiency today and in the future

### Customer-oriented – efficient – innovative

Safety devices should not prevent increases in the productivity of your machines and systems. This is why SICK surveys customers before making new product developments.

In addition to the technological developments, SICK adapts the customer's requirements and needs. This has led to trendsetting products like safety laser scanners, miniTwin safety light curtains and the Flexi Soft modular safety controller.

Expertise and experience in machine safety: Information on system integration, standards and laws, and FAQs can be found at [www.sick-safetyplus.com](http://www.sick-safetyplus.com)

Intelligent networking allows you to cover all safety functions with just a few SICK devices.

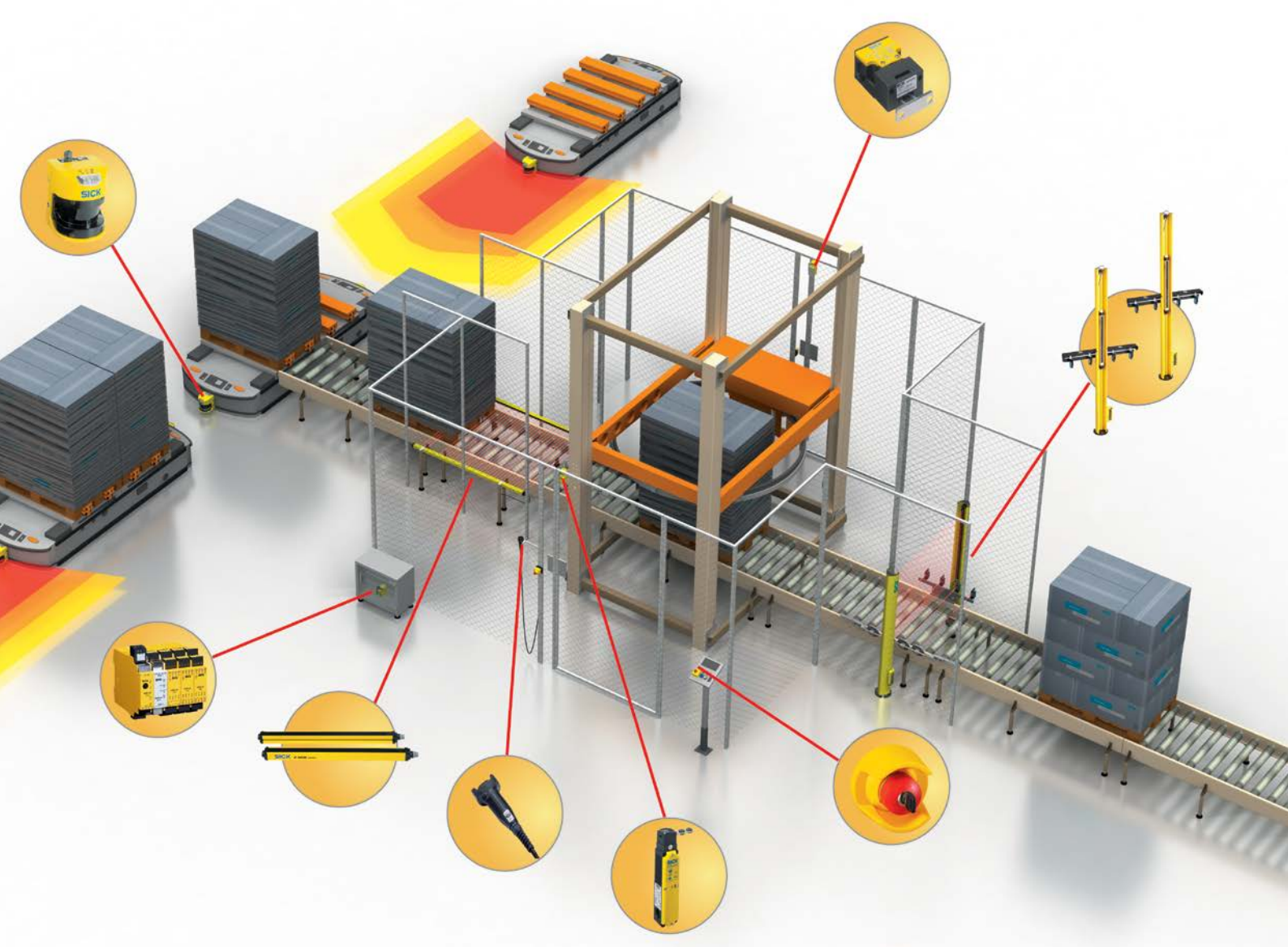


### Space-saving – rapid – transparent

Simple system integration plays a key role in the commissioning and ongoing operation of your machines. With the SICK-created interface EFI, our products permit rapid communication for automatic operation and convenient configuration and diagnostic functions for setup and maintenance work. Higher speed of safe communication also means decreasing the minimum distances and thus saving expensive machine space.

You are given full transparency of the sensors in your industrial network, e.g., PROFINET with PROFIsafe.

Integrated, intelligent functions and coordinated interfaces make additional hardware unnecessary, reducing the number of devices and wires required for your machines.



Complete safety solution from SICK: foil wrapping machine with automatic material transport

Global sales successes with your machines via conformity with international safety solutions and globally available service.



**Worldwide available – legally secure**

SICK ensures that the safety solutions conform with the international safety standards. Our experts are members of 65 standards committees worldwide. That means that we and you are always a step ahead.

Our service network consists of 120 employees in almost 50 countries. No matter where you deliver or produce your machines: SICK service technicians understand your problems and offer a rapid solution to ensure high reliability of your machines.

To ensure that you always receive expert support, SICK has established an international training program for its machine safety specialists.

**Benefit from our expertise.**

## “Guidelines for Safe Machinery” brochure

The “Guidelines for Safe Machinery – Six steps to a safe machine” combines our many years of practical experience into a comprehensive brochure. We designed it to help you keep your machines safe.



It contains structured information on:

- Legal requirements for machines
- Safety-relevant directives, regulations and standards
- Selection and application of safety devices
- Examples of how to protect machines and persons against accidents
- Examples of the application of the new standards EN ISO 13849-1 and EN 62061 to determine the PL or SIL



“Guidelines for Safe Machinery – Six steps to a safe machine” is available for download at [www.mysick.com](http://www.mysick.com) in the SICK Literature Finder (publication type brochure) or for order as a printed brochure from your SICK representative.

Item numbers of the European editions:

**8008007 German, 8007988 English**

Item number of the North American edition:

**7028282 English**

## “Industrial Safety Systems” product catalog

The catalog contains information about our safety products, including accessories and services with order numbers.



“Industry Safety Systems” available for download at [www.mysick.com](http://www.mysick.com) in the SICK Literature Finder (publication type: product catalog) or for order as a printed brochure from your SICK partner.

Item numbers of the editions:

**8010888 German, 8010889 English**

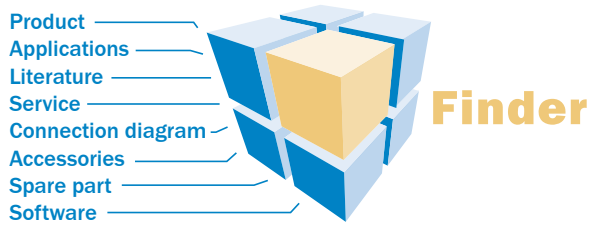






## www.mysick.com – search online and order

Search online quickly and safely – with the SICK “Finders”

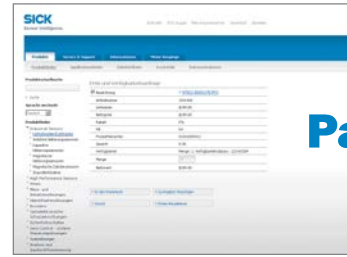


**Product Finder:** We can help you to quickly target the product that best matches your application.

**Applications Finder:** Select the application description on the basis of the challenge posed, industrial sector, or product group.

**Literature Finder:** Go directly to the operating instructions, technical information, and other literature on all aspects of SICK products.

Efficiency – with the e-commerce tools from SICK



**Find out prices and availability:** Determine the price and possible delivery date of your desired product simply and quickly at any time.

**Request or view a quote:** You can have a quote generated online here. Every quote is confirmed to you via e-mail.

**Order online:** You can go through the ordering process in just a few steps.

## For safety and productivity: SICK LifeTime Services

SICK LifeTime Services is a comprehensive set of high-quality services provided to support the entire life cycle of products and applications from system design all the way to upgrades. These services increase the safety of people, boost the productivity of machines and serve as the basis for our customers’ sustainable business success.



**Consulting & Design**

Globally available experts for cost-effective solutions



**Product & System Support**

Fast and reliable, by telephone or on location



**Verification & Optimization**

Checks and recommendations for increased availability



**Upgrade & Retrofits**

Uncovers new potential for machines and systems



**Training & Education**

Employee qualification for increased competitiveness

## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for factory, logistics, and process automation. With more than 6,000 employees and over 40 subsidiaries 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, Belgium/Luxembourg, Brasil, Česká republika, Canada, China, Danmark, Deutschland, España, France, Great Britain, India, Israel, Italia, Japan, Magyarország, México, Nederland, Norge, Österreich, Polska, România, Russia, Schweiz, Singapore, Slovenija, South Africa, South Korea, Suomi, Sverige, Taiwan, Türkiye, United Arab Emirates, USA.

Please find detailed addresses and additional representatives and agencies in all major industrial nations at: [www.sick.com](http://www.sick.com)