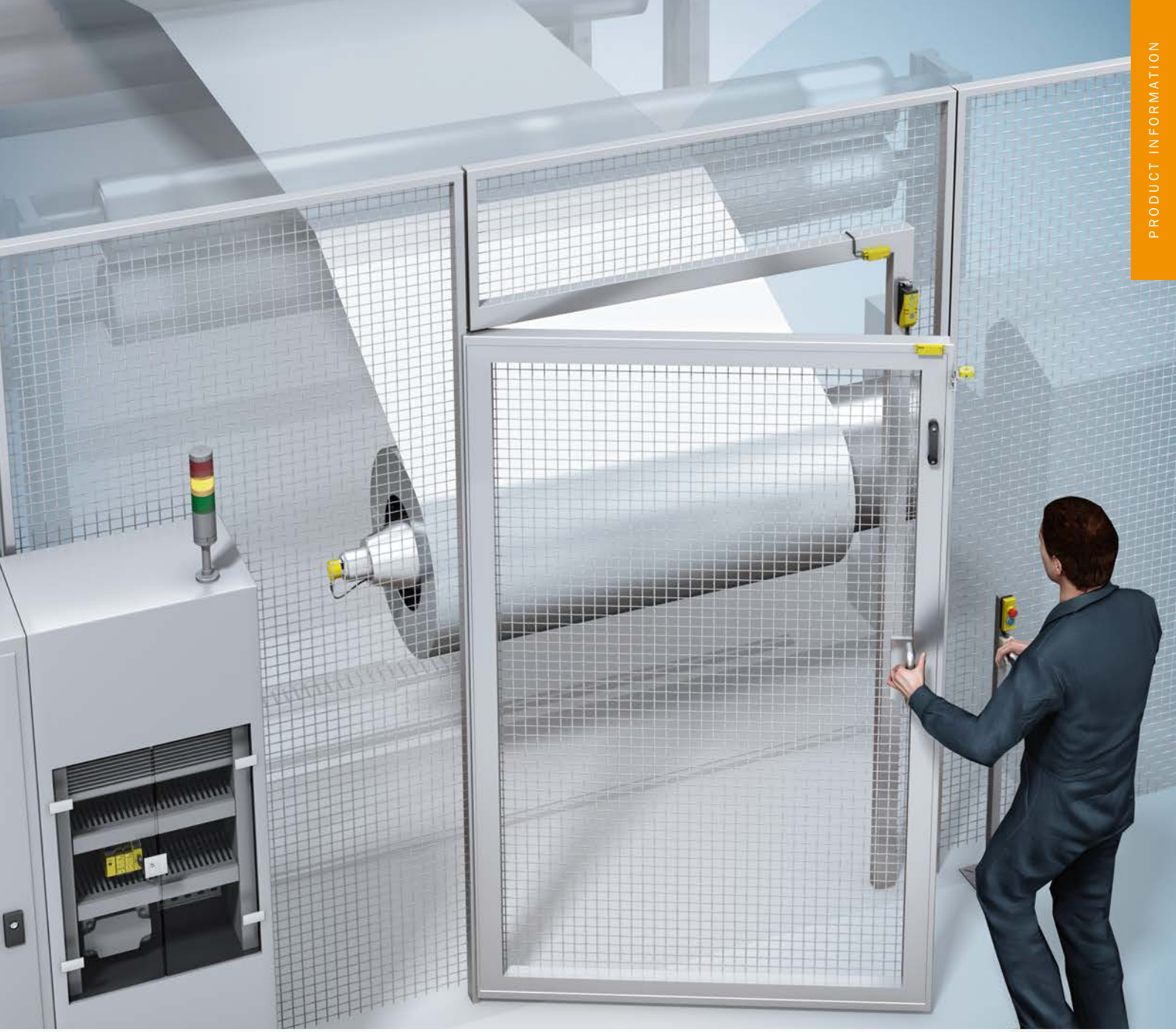
PRODUCT INFORMATION



Safe Interlocking

SAFETY LOCKING SOLUTION WITH STANDSTILL MONITORING FOR MAXIMUM PRODUCTIVITY

Functional safety systems

SICK
Sensor Intelligence.

EFFICIENT STANDSTILL MONITORING – SIMPLE AND SAFE

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TIME IS MONEY

This may be an old saying, but it is still very true today. Against the background of constantly growing competition in many areas of industry, a number companies are faced by the need to increase productive time, reduce downtime and improve process protection.

When machines with large coils, rollers, cylinders and feed mechanisms are brought to a standstill, they have a long run-down time as a result of their moving mass. If people approach the machines during this period, they are at serious risk of injury, because some parts of the machines are still moving. In order to maintain high productivity levels without compromising on safety, special solutions are needed that can determine when it is safe to enter the machine room and to restart the machine without problems.

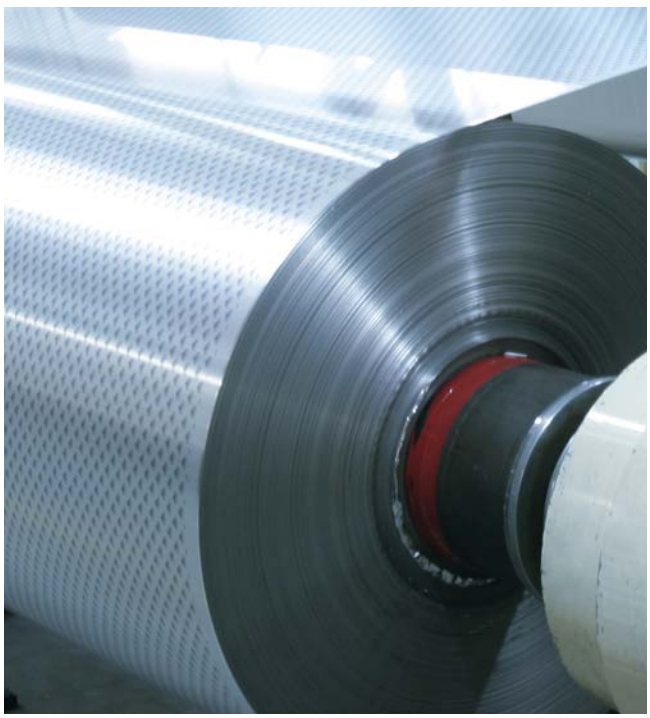
This is precisely where Safe Interlocking comes in. This safety locking solution combined with standstill monitoring offers high standards of protection for staff and processes.

EFFECTIVE PROTECTION FOR PEOPLE AND PROCESSES

SAFE INTERLOCKING SAFEGUARDS HEALTH AND PRODUCTIVITY

Large rollers and cylinders often pose a risk to people who are in their vicinity. When installing safety systems for machines of this kind, the operators must take into consideration, among many other factors, the long run-down times and the options for restarting the machine without problems.

Body parts and items of clothing can become caught in machines even during run-down times, which can lead to serious injuries. Enclosures with at least one locked access door that keep people out of the machine area provide basic protection for the operating staff. However, the employees must still be protected when they need to enter the enclosure, for example to carry out maintenance work or repair faults. The access door must only open and allow staff to enter the area under certain circumstances. A locking solution must be used to guarantee that the machine has come to a stop, including its run-down time, before a person can approach it.



Because of their inertia, heavy metal cylinders cannot stop immediately without a run-down time.

The roll is kept under tension, which allows the machine to be restarted without problems. This improves productivity.

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Comparison of available locking solutions

	Solution larger than the machine	Time-controlled solution	Safe Interlocking
Locking solution	After an “open” request to the access door, it can be opened easily without further safety measures.	After an “open” request to the access door, the door remains locked for a predefined period.	After an “open” request to the access door, the door remains locked and then opens immediately as soon as the system detects that the machine has stopped.
Protective measure	The door must be a sufficient distance away from the machine to ensure that no one can reach the cylinder before it has completely stopped moving (including the run-down time).	There must be a long enough time before the door unlocks, plus a buffer period if necessary, to guarantee that the machine has actually stopped (including the run-down time).	A safety encoder reliably monitors the speed of the cylinder. The door is only released if the cylinder has safely stopped.
Result			
Size of the machine area	Large	Small	Small
Amount of time wasted	High	Low ... high	No time wasted
Process protection	Low	Low	High

The benefits of Safe Interlocking at a glance

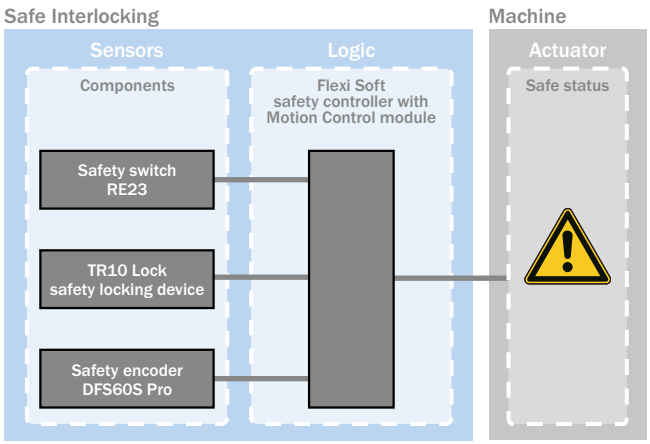
- Combined solution for protecting people and processes up to Performance Level d.
- Safe door locking in accordance with EN ISO 14119.
- Fast restart after door locking and no requirement for reference runs as a result of the safe operating stop function (SOS ➜ page 7).
- The hardware offers the option of a safe limited speed function for maintenance mode (SLS ➜ page 7).
- This allows the machine to continue running at a slower and safely monitored speed while the access door is open.
- Easy to integrate into existing machine designs and fieldbuses.
- Reliable speed information for operating the safety function and the drive control.

PROVEN SICK COMPONENTS WITH RELIABLE FUNCTIONALITY

The structure of the basic Safe Interlocking package

A combination of these different tried-and-tested safety components from SICK, which have been carefully coordinated with one another, can easily be integrated into existing machines and brought into operation quickly with the help of the documentation and the sample program supplied.

It is also possible to add to the basic package, for example in order to secure additional access doors. Each new door requires another non-contact RE23 safety switch and another TR10 Lock safety locking device.



Block diagram

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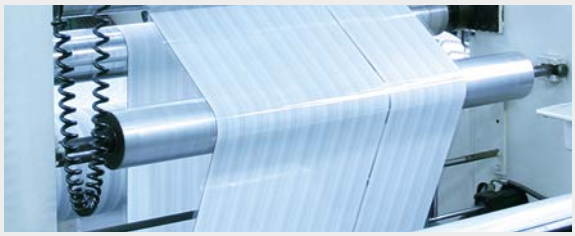
The functions of Safe Interlocking

After an “open” request to the access door, with Safe Interlocking the door initially remains locked.

The safe standstill monitoring function only opens the door lock when it detects that the machine has come to a complete standstill. Because of the safe operating stop (SOS) function, the machine does not need to be disconnected from the power supply.



Safe operating stop (SOS)

When the door is opened without an emergency stop, the DFS60S Pro safety encoder and the motion control module allow for a safe operating stop (SOS). This does not shut off the power supply to the machine’s motor, which means that the drive control remains operational, while the motor provides the necessary torque to keep the machine in its current position. The machine is continuously and safely monitored to ensure that it remains at a standstill. The door can only be opened when the machine is stationary.

The safe operating stop function is ideal for applications where parts of the machine must be safely at a standstill for certain tasks to be carried out, although the drive must still provide holding torque. Processes can run without the recalibration needed by other locking solutions. The benefit of this is that the film used in wrapping applications, for example, remains under tension. As a result, the SOS function reduces wastage and significantly improves the efficiency of the process. Short switch-on periods lead to a considerable reduction in set-up and shut-down times and increase productivity.

Safe limited speed (SLS)

Another function of Safe Interlocking is safe limited speed (SLS). This involves the motion control module of the Flexi Soft safety controller monitoring the machine to ensure that it operates at a predefined lower speed, for example to allow maintenance work to be carried out.

SAFETY LOCKING FUNCTION WITH STANDSTILL MONITORING FOR MAXIMUM PRODUCTIVITY

Product description

Safe Interlocking is the safety locking solution with standstill monitoring – designed for applications with high requirements when it comes to safeguarding processes and people. The safe standstill monitoring function only unlocks the locking device when the system has come to a standstill. Thanks to SOS (safe operating stop), the drive does not need to be disconnected from the power supply. Safe Interlocking saves valuable space and ensures maximum productivity: no unnecessary downtimes, while ensuring safe, cost-effective, and standard-compliant operation of the system. The “safe monitoring of machine speed” function can be used when carrying out maintenance. Proven safety components from SICK increase availability and avoid follow-up costs.

At a glance

- Process-optimized safety door monitoring
- Safe monitoring of machine speed
- Easy configuration with function blocks
- Available as a complete package or with components that can be selected individually
- Integration into all common fieldbuses (optional)
- Monitoring when door opens with SOS

Your benefits

- Safeguarding of processes and people in a single solution to ensure maximum productivity
- Easy integration into existing systems
- Easy-to-expand solution (e.g., for several safety doors)
- Extremely reliable safety components from SICK
- Fewer downtimes due to safe monitoring of machine speed
- Standstill monitoring using safety encoders satisfies all common standard requirements
- Can also be used for maintenance work thanks to the reliable detection of the rotation speed
- Safe speed and standstill monitoring with the aid of SOS optimizes process safeguarding

Additional information

→ www.sick.com/Safe_Interlocking

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.

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Detailed technical data

Features

Safety task	Access protection
Application	Guard unlocking with standstill detection

Safety-related parameters

Performance level	PL d (EN ISO 13849)

Ordering information

Encoder: mechanical design	Encoder shaft: diameter	Encoder shaft: length	Type	Part no.
Solid shaft, Servo flange	6 mm	10 mm	SAPPB0D-07A0010	1087157
Solid shaft, face mount flange	10 mm	19 mm	SAPPB0D-07A0011	1087158
Blind hollow shaft with key seat	10 mm	–	SAPPB0D-07A0009	1087156
	12 mm	–	SAPPB0D-07A0016	1087164
	14 mm	–	SAPPB0D-07A0017	1087165
Solid shaft with key, Servo flange	6 mm	10 mm	SAPPB0D-07A0012	1087159
Solid shaft with key, face mount flange	10 mm	19 mm	SAPPB0D-07A0008	1087151
Through hollow shaft with key seat	10 mm	–	SAPPB0D-07A0013	1087160
	12 mm	–	SAPPB0D-07A0014	1087161
	14 mm	–	SAPPB0D-07A0015	1087162
	5/8”	–	SAPPB0D-07A0018	1087166

Safe Interlocking scope of delivery:
- DFS60S Pro safety encoder in different variants
- RE2 non-contact safety switch
- TR10 Lock safety locking device
- Flexi Soft safety controller main module CPU0
- Flexi Soft system plug MPL0
- Flexi Soft safety controller I/O module XTIO
- Flexi Soft safety controller I/O module XTDI
- Flexi Soft safety controller Motion Control module MOC0

Accessories required for commissioning

Description	Number	Items supplied	Further information
Encoder: Connection cable to MOC0	1	–	→ Plug connectors and cables
RE2: Connecting cable, M12, 4-pin	1	–	→ Plug connectors and cables
TR10 Lock: Connecting cable, M12, 8-pin	1	–	→ Plug connectors and cables

Accessories

Mounting systems

Mounting brackets and plates

Mounting brackets

Figure	Description	Packing unit	Type	Part no.
	Mounting bracket for actuator, stainless steel 304	1 piece	TR10-MA0000	5329552
	Mounting bracket for safety locking device, 6061-T6 aluminum	1 piece	TR10-MS0000	5329553

Connection systems

Plug connectors and cables

Connecting cables with female connector

Figure	Connection type		Model	Conductor cross-section	Cable length	Type	Part no.
 Illustration may differ	Female connector, M12, 4-pin, straight	Cable	PVC, unshielded	0.25 mm^2	15 m	DOL-1204-G15M	6010753
	Female connector, M12, 8-pin, straight	Cable	PUR, halogen-free, unshielded	0.25 mm^2	20 m	DOL-1208-G20MC	6038560

Other connectors and cables

- **Description:** The connection cable is designed for the use of sine-cosine encoders. If other encoders are used, other protective measures must be taken in the event of cable breakage or a male connector coming loose.

Figure	Connection type		Model	Cable length	Type	Part no.
	Female connector, Micro D-Sub, 15-pin, angled	Female connector, M12, 8-pin, straight	Shielded	0.85 m	Connection cable (Female connector-Female connector)	2071072

Safety command devices

Figure	Description	Items supplied	Type	Part no.
	Emergency stop pushbutton	Including retaining clip and “RESET” cover	ES11-SC4D8	6051329
		Surface mount version	ES21-SA10E1	6036147
		Panel mount version	ES21-SB10E1	6041507
	Reset pushbutton	Including retaining clip and “RESET” cover	ER12-SB3C4	6051330

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 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."

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