



safetyIQ: INTELLIGENT PROTECTION FOR MORE PRODUCTIVITY

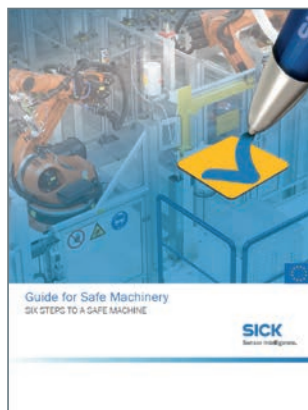
Safety solutions from SICK allow you to implement complete safety functions on your machine. You will find important safety parameters, products, and fields of application in this publication.

Whether you are designing, producing, or operating machines and plants:

Our products, systems, and services will help you to comply with the applicable standards and laws.

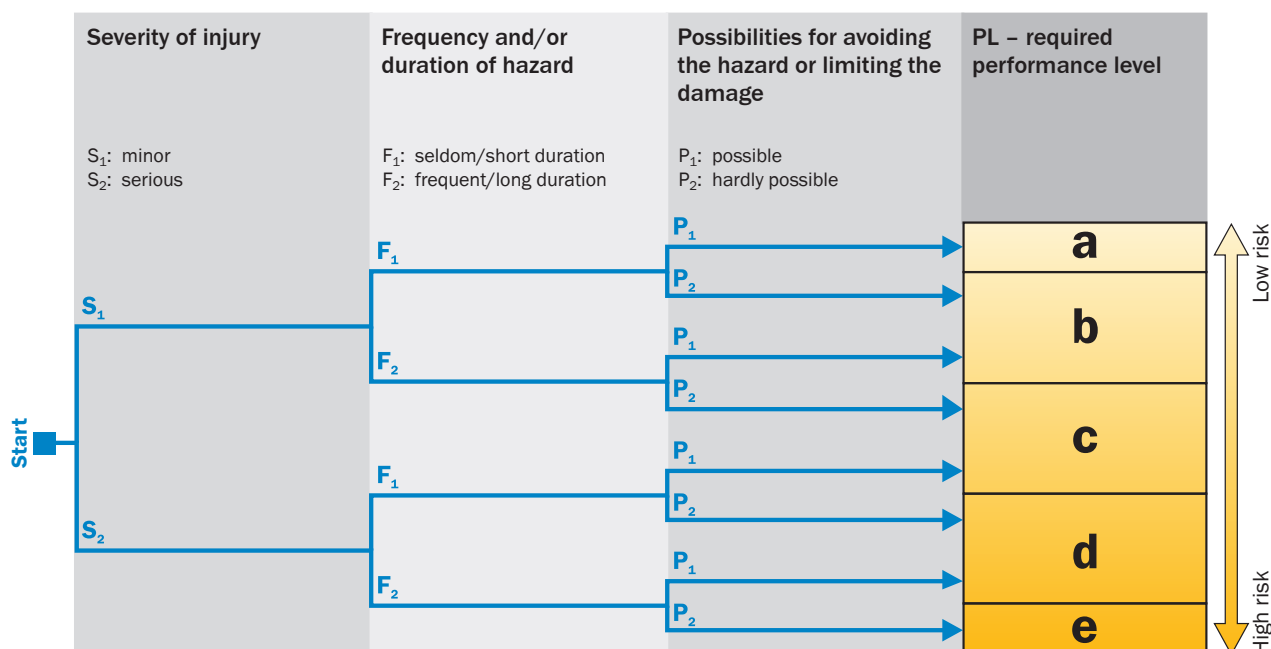


Download and further information at: www.sick.com/safetyiq





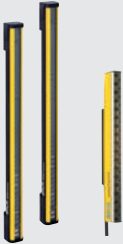










SICK's 150-page Guide for Safe Machinery has facilitated the construction of thousands of safe machines in six straightforward steps. The guide contains structured information on the following topics:

- Legal requirements for machines in the European Union and implementation
- Requirements for safe machinery in North America in the North American edition (number 708282)
- Safety-relevant European guidelines, directives and standards
- Selection and use of protective devices
- Examples of how to protect machines and persons against accidents
- Examples of how to apply the EN ISO 13849-1 and EN 62061 standards to determine PL or SIL
- Calculation of minimum distances between the hazardous point and the protective device



Risk graph for determining the required performance level in accordance with EN ISO 13849-1

Recommended product technology		Product example	For technical protective devices
Opto-electronic protective devices			
Safety laser scanners		S3000, S3000 PROFINET IO, S300, S300 Mini, microScan3	
Safety camera systems		V300 Work Station Extended	
Safety light curtains		deTec2	
		miniTwin2	
		deTec4	
		miniTwin4	
		C4000 Fusion	
Multiple light beam safety devices		deTem2	
		deTem4	
Single-beam photoelectric safety switches		L2000	
		L4000, WSU/WEU26-3	

¹⁾ The EN ISO 13849-1 standard and the information provided in the operating instructions are to be observed to achieve the required performance level.

²⁾ Electro-sensitive protective devices with 1 or 2 beams are only allowed for personnel detection if permitted by the risk assessment and in combination with additional measures.

³⁾ The Type and the relation between the type and the performance level are described in the IEC 61496 series of standards.

[illegible]

Examples of protective devices for executing safety functions

Opto-electronic protection



- Assembly workplaces for small components
- Machine operator works very close to the hazardous point of the machine
- Machine stopping time is very short
- Safe detection of fingers with a detection capability of 14 mm



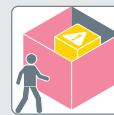
- Assembly/handling machines for big components
- Machine operator works close to the hazardous point of the machine
- Machine stopping time is very short
- Safe detection of hands with a detection capability up to 40 mm



- Interaction with the machine is regular, but not frequent
- Safe detection of persons with a detection capability up to 150 mm or multiple light beam systems



- Muting, entry/exit monitoring
- Application for machines with automatic material transport systems
- Safe detection of persons with a detection capability up to 150 mm or multiple light beam systems

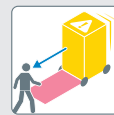


- Interaction with the machine is regular, but not frequent
- Allows flexible access
- Safe detection of persons with multiple light beam systems













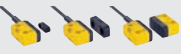






Stationary hazardous area protection with person detection in the presence

- Interaction with the machine is regular, but not frequent
- View into the accessible hazardous area is limited
- Safe detection of legs with a detection capability up to 70 mm



Mobile hazardous area protection with person detection when approaching

- Protect persons while vehicles are moving
- Safe detection of legs with a detection capability up to 70 mm

Recommended product technology		Product example	Für technische Schutz-einrichtungen	Recommended use in safety circuits according to EN ISO 13849-1 up to Performance Level (PL) ¹⁾				
sens:Control – safe control solutions				a	b	c	d	e
Safety relays		UE10 bis UE48		Depending on the device type				
Safety controllers		Flexi Soft, Flexi Classic						
Safe sensor cascade		Flexi Loop						
Motion Control safety controllers		Flexi Soft Drive Monitor, Speed Monitor, Standstill Monitor						
Safety switches				a	b	c	d	e
Safety switches with separate actuator ²⁾		i12S, i16S, i17S, i110S					3)	
		With second safety switch						
Safety locking devices ²⁾		i10 Lock, i110 Lock, i14 Lock					3)	
		With second safety switch or TR10 Lock						
Safety position devices ²⁾		i10P, i110P					3)	
		With second safety switch						
Inductive safety switches		IN4000 Standard, IN4000 Direct						
		IN3000 Direct						
Transponder safety switches		STR1						
Magnetic safety switches ²⁾		RE1, RE2						
Sicherheitsbefehls-geräte ²⁾		ES11, ES21, i110RP, i150RP, E100						
Safety encoders				a	b	c	d	e
Safety encoders		DFS60S Pro						
Standard sensors				a	b	c	d	e
Photoelectric, magnetic and inductive sensors		W12, VS/VE18-2, MZT8, IME12		Not for personnel detection				

¹⁾ The EN ISO 13849-1 standard and the information provided in the operating instructions are to be observed to achieve the required performance level.

²⁾ The Performance Level can only be achieved in combination with a suitable safety control solution.

³⁾ Performance Level d can be achieved with one switch only, if fault exclusion measures are taken. Please ask the experts from SICK about this

Safe control and communication



- Safe control units for linking and evaluating a variety of input signals of the safety functions as well as for generating output signals

Safe Motion Control



- Monitoring of motor standstill, speed and direction of a machine or a machine part movement
- Release of the locking devices of physical guards in the absence of a hazardous movement
- Safeguarding of automated guided vehicles in combination with opto-electronic protective devices
- Service mode with limited speed

Opto-electronic protection



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- Machine stopping time is very short
- Safe detection of fingers with a detection capability of 14 mm



- Assembly/handling machines for big components
- Machine operator works close to the hazardous point of the machine
- Machine stopping time is very short
- Safe detection of hands with a detection capability up to 40 mm



- Interaction with the machine is regular, but not frequent
- Safe detection of persons with a detection capability up to 150 mm or multiple light beam systems



- Muting, entry/exit monitoring
- Application for machines with automatic material transport systems
- Safe detection of persons with a detection capability up to 150 mm or multiple light beam systems



- Interaction with the machine is regular, but not frequent
- Safe detection of persons with multiple light beam systems



Stationary hazardous area protection with person detection the hazardous area

- Interaction with the machine is regular, but not frequent
- View into the accessible hazardous area is limited
- Safe detection of legs with a detection capability up to 70 mm



Mobile hazardous area protection with person detection when approaching

- Protect persons while vehicles are moving
- Safe detection of legs with a detection capability up to 70 mm

Interlocking and locking of physical guards



- Interlocking of physical guards without locking device (e.g., swing doors, flaps, sliding doors)



Locking of physical guards with temporary prevention of entry or access

- During operation, stopping, shutdown of a machine
- Machine function that presents a hazard takes too long to stop
- Manufacturing process should not be interrupted



Safe position monitoring of machines and machine parts



- Safe monitoring of machine positions, e.g., for robots



- Safe monitoring of machine end positions



- Safe position monitoring for steering axes and swivel arms, for example, to control monitoring fields of safety laser scanners on automated guided vehicles

Emergency stop, enable and reset



- Supplementary protective measures for risk reduction
- Emergency stop



Manual and temporary disabling of safety functions to reduce risks for

- Safe machine setup
- Machine maintenance



- Resetting the protective device