Safe EFI-pro system

SAFE NETWORKING IN PRODUCTIVE INTERPLAY

Safety systems

SICK
Sensor Intelligence.

NEXT GENERATION SAFETY SYSTEM FOR THE PROTECTION OF PERSONS

Efficient interplay in the safety system

The Safe EFI-pro system combines the modular Flexi Soft safety controller with an EFI-pro gateway and safe sensors such as the microScan3 EFI-pro and/or nanoScan3 EFI-pro safety laser scanner. The safe connection of actuators from other manufacturers, such as robot controls, can be done via the EtherNet/IP™ CIP Safety™ interface of the EFI-pro gateway.

From the design to commissioning and repair of your application: In addition to the most advanced safety components, SICK also offers services and professional project management tailored just to you.
- SICK LifeTime Services

More options for challenging applications and higher productivity

Up to 6 safety laser scanners can be networked for adaptive and safe environment perception – and every single one of them offers a total of up to 128 individually configurable fields and monitoring cases and up to 8 simultaneously monitored protective fields. The result: Gap-less monitoring thanks to the patented safeHDDM® scan technology whose extreme resistance to environmental influences ensures fewer downtimes. Expanded to include the safe monitoring functions, monitoring cases can be adapted dynamically to the respective hazardous situation – for more productive collaborating machines.

THE COMPLETE SYSTEM FOR SOLVING CHALLENING AGV AND ROBOTIC APPLICATIONS

With the Safe EFI-pro system, high productivity with comprehensive safety monitoring is paramount. The system solution consists of harmonized safety sensors, a safety controller, and safely connected actuators. The system is suitable for use in demanding applications for protecting robots and automated guided vehicles (AGVs). With more than 65 years of experience in the field of safety solutions and an international service network, SICK is offering a comprehensive total solution from a single source with the Safe EFI-pro system.

EFI-pro: Safe SICK device communication of the next generation

Based on Ethernet/IP™ CIP Safety™, the EFI-pro offers all the benefits of the established industrial Ethernet technology. In addition to the quick exchange of safe and non-safe data via all levels of machine communication, very good linking of innovating sensor solutions and the Flexi Soft safety controller is ensured. This enables new, even more productive safety concepts. The EFI-pro is characterized by its openness, making it an essential component on the path to Industry 4.0 and the Industrial Internet of Things (IIoT).

Quick and cost-effective configuration and commissioning

Easy and extremely intuitive operation: The license-free Safety Designer engineering tool supports the configuration and commissioning of all SICK system components - convenient thanks to the central access point. Linking is very simple as the SICK system components can be integrated easily by drag-and-drop. The standardized Ethernet technology used considerably reduces wiring effort, which helps reduce costs.

Optimized processes thanks to comprehensive diagnostic options - data up into the cloud

The Safe EFI-pro system enables the quick exchange and transmission of time-synchronized (SNTP – simple network time protocol) processes and diagnostic data of all network components. Non-safety-related protocols (e.g. PROFINET, EtherCAT®, Modbus® TCP, CANopen) can also be integrated via other gateways. Quick analysis, for example of machine downtimes: The extensive diagnostic options of the Safety Designer engineering tool and the transport of data up into a cloud application can optimize your processes. Access to the data can be done centrally via Ethernet, even cable-free via WLAN.

ONE SYSTEM FOR MORE PRODUCTIVITY WITH AUTOMATED GUIDED VEHICLES

Efficiently solving new and tricky applications in the area of automated guided vehicles: A challenge the Safe EFI-pro system is happy to take on. The comprehensive system solution consisting of a safety controller and safety laser scanner, supplemented to include safety encoders and switches for speed and steering angle detection, takes productivity in logistics to a new level.

Safety system including safe motion control

The safe motion control functionality allows an intelligent and safe switching of the monitoring case depending on the speed and steering angle and enables the protection of automated guided vehicles. SICK also offers suitable safety encoders, e.g. the DFS60 Pro.
With up to 128 individually configurable monitoring cases per safety laser scanner, the protective field monitoring can be flexibly adapted to the specific requirements.

⊕ Extended monitoring functions for increased productivity

Simultaneous protective field monitoring reduces the number of required maintenance case switchovers. The time saved in this way enables a shorter and more efficient protective field design, considerably increasing productivity. In addition, the safety system allows implementation of drive safety functions such as safely-limited speed (SLS), safely-limited position (SLP) or safe speed monitoring (SSM) via safe motion control.
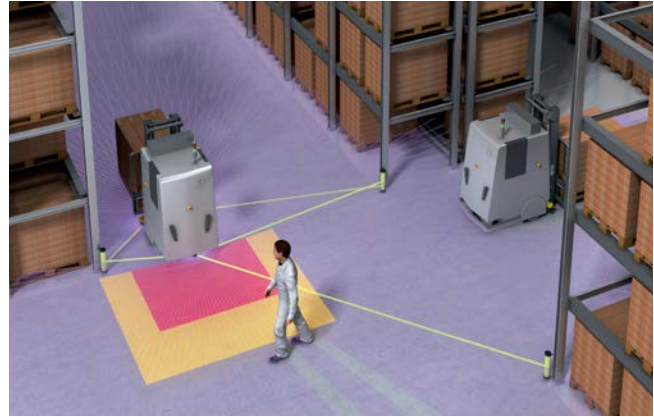
⊕ Precise navigation without additional sensors

Thanks to the safeHDDM® scan technology, the safety laser scanners deliver reliable and precise measurements of surrounding contours which can be passed onto the vehicle control system via Ethernet (UDP and TCP/IP). Challenges such as precise navigation in bottlenecks or localization in large storage areas are considerably simplified, making additional sensors unnecessary.
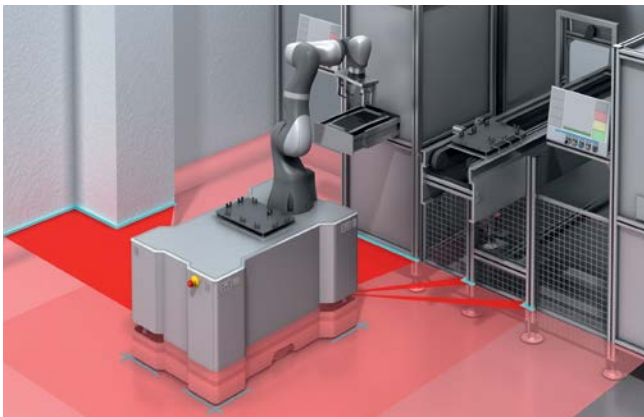
⊕ Contour detection field for additional functions

Using a previously programmed surrounding contour, the safety laser scanner identifies defined work positions using the contour detection field. For example, the laser scanner detects when an AGV is located at the intended docking position or monitors whether a person is approaching the AGV at a bottleneck. The safe contour detection fields can be used for monitoring case switchovers, for instance. For that reason, no additional sensors are needed, which saves costs for position switches.

⊕ Compliance with international standards and support with the certification process

Compliance with relevant standards (e.g. DIN EN 1525) for protecting automated guided vehicles is assured thanks to the use of certified components from SICK, a leading manufacturer of safety solutions. A worldwide service network of SICK safety experts is available for quick support on-site.
➜ SICK LifeTime Services

PRODUCTIVE INTERACTION BETWEEN MAN AND MACHINE

The Safe EFI-pro system makes a valuable contribution to the collaboration between man and machine as the complete system opens up an intelligent path to adaptive and situation-dependent robot protection. The result: Efficient and ergonomic cooperation and collaboration for comprehensive safety monitoring.

Safety system with safe robot integration

With the microScan3 EFI-pro safety laser scanner and the Flexi Soft with EFI-pro gateway safety controller, an open and powerful system solution is available for robot applications. Integration of robot controls into the safety system is safe and easy and is done directly via EtherNet/ IP™ CIP Safety™. The Flexi Soft functions as the originator and triggers the relevant safety functions based on the recorded laser scanner data.
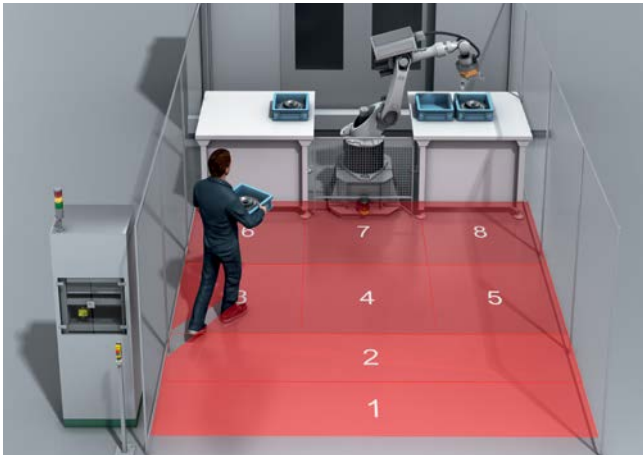
➕ Lifts productivity to a new level

The monitoring of up to 8 simultaneous protective fields and 8 safe outputs per safety laser scanner allows for robot behavior which adapts to the surrounding situation with a small monitoring space. For example, the position of a worker can be monitored systematically with simultaneous protective fields and taken into account in the safety logic. This makes productive robot applications possible.

➕ Reliable robot integration

The Safe EFI-pro system enables a robot controller to be integrated via Ethernet/IP™ CIP Safety™. The safety functions of the robot, e.g. force or capacity limitation, are available directly in the logic editor or Flexi Soft. This allows the movements of the robot to be adapted to different hazard situations.
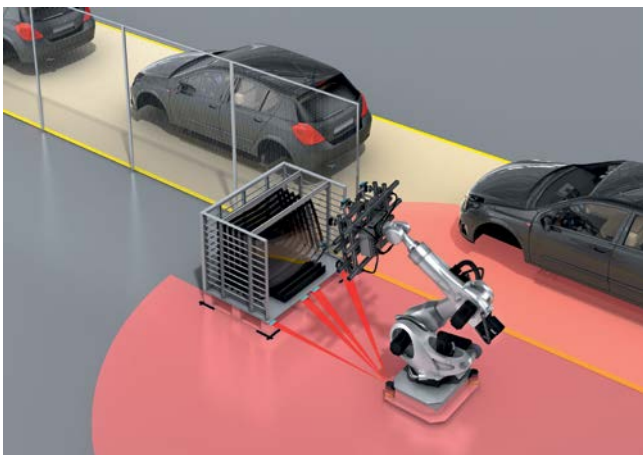
➕ Safe contour detection fields – environmentally-dependent monitoring case switchover

The safety laser scanner safely and reliably detects pre-defined contours. In this way, selected objects can be reliably identified and certain safety functions, such as monitoring case switchover, can be triggered. Areas in which a Euro pallet is located, for instance, can be blanked systematically.

➕ Compliance with international standards and support with the certification process

Compliance with relevant standards (e.g., ISO 10218-1/-2) for protecting robot applications is assured thanks to the use of certified components from SICK, a leading manufacturer of safety solutions. A worldwide service network of SICK safety experts is available for quick support on-site.

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SAFE INTEGRATION FOR A PRODUCTIVE INTERACTION

Product description

Safe EFI-pro system is the result of the consistent development of the successful EFI interface and enables intelligent safeguarding of AGVs, robots and other challenging applications. The industrial Ethernet-based EFI-pro network technology enables the quick exchange and transmission of safe and non-safe data throughout all levels of communication. The central component is the EFI-pro gateway. It ensures safe and fast integration of innovative sensor solutions from SICK as well as direct integration of robot controls into the Flexi Soft safety controller via Ether-Net/IP™ CIP Safety™. The Safe EFI-pro system is therefore a crucial enabler for implementing Industry 4.0.

At a glance

- Industrial Ethernet-based, safe network technology
- Configuration via Safety Designer
- Safe integration of up to 6 safety laser scanners
- Safe integration of robot controls via Ethernet/IP™ CIP Safety™
- Safe, integrated movement monitoring
- Simultaneous monitoring of up to 48 protective fields

Your benefits

- Efficient interplay in the safety system: Networking of safety sensors, safety controllers and actuators connected via Ethernet/IP™ CIP Safety™
- Fast, intuitive commissioning: Safety Designer for the configuration of SICK system components and clever connection technology
- Safe productivity: Combination of safe motion monitoring, simultaneous protective field monitoring and extended network integration
- Optimized processes: Extensive diagnostic options via Safety Designer and data via Ethernet from the field level into the cloud
- Safe investment thanks to industrial Ethernet technology

Additional information

➜ **www.sick.com/Safe_EFI-pro_System**
For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Detailed technical data

Safe EFI-pro System

Features

Configuration method	PC with Safety Designer (Configuration and Diagnostic Software)
Performance level	PL d (EN ISO 13849) [1]
Interfaces of the Flexi Soft modules	Modular (up to 12 extension modules supported)
I/O module FX3-XTIO	8 safe inputs, 4 safe outputs
I/O module FX3-XTDI	8 safe inputs
I/O module FX3-XTDS	8 safe inputs, 4-6 non-safe outputs
I/O module FX0-STIO	6-8 non-safe inputs, 6-8 non-safe outputs
FX3-MOC1 motion control module	A/B incremental encoder, RS-422, Sin/Cos encoder, SSI encoder
Number of monitoring cases	128 [2]
Number of simultaneously monitored protective fields	≤ 8 [2]
Response time	≥ 130 ms
Integration of the safety laser scanner	Via EFI-pro (up to 6 safety laser scanners)
Integration into the robot control	EtherNet/IP™ CIP Safety™
Type of fieldbus integration	EtherCAT®, CANopen, Modbus TCP, PROFINET, EtherNet/IP™
Drive safety functions	Safe stop 1 (SS1) Safe stop 2 (SS2) Safe operating stop (SOS) Safe speed monitoring (SSM) Safely-limited speed (SLS) Safe direction (SDI) Safe brake control (SBC) Safe cam (SCA) Safely-limited position (SLP) Safe torque off (STO) Safe speed range (SSR)

[1] Safety functions via local interfaces of the Flexi Soft safety controller achieve PL e.

[2] Per safety laser scanner.

Ordering information

Ordering information for EFI-pro capable products can be found from ➜

At a glance

- Safety controller with modular hardware platform
- Configuration saved in the system plug
- Safe controller networking with Flexi Line
- Safe series connection with Flexi Loop
- Safe drive monitoring
- Safe analog value monitoring
- Flexi Soft Designer license-free configuration software

Your benefits

- Modular adaptation to the particular requirement means optimum scalability and therefore cost savings
- Intuitive configuration software featuring comprehensive functions for straightforward engineering
- Rapid verification of the safety application: The configuration software

provides documentation and a wiring diagram
- The main module's diagnostics interfaces and the configuration storage facility in the system plug enable rapid commissioning, component replacement, and troubleshooting, resulting in minimum downtimes

➜ www.sick.com/Flexi_Soft

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.

Ordering information

- Main modules

Number of EFI interfaces	Protective coating	Type	Part no.
0	–	FX3-CPU000000	1043783
	✔	FX3-CPU000010	1050615

- Gateways

Fieldbus, industrial network	Protective coating	Type	Part no.
CANopen	–	FX0-GCAN00000	1044076
	✔	FX0-GCAN00010	1118379
EFI-pro, EtherNet/IP™	–	FX3-GEPR00000	1069070
	✔	FX3-GEPR00010	1112296
EtherCAT®	–	FX0-GETC00000	1051432
	✔	FX0-GETC00010	1127487
EtherNet/IP™	–	FX0-GENT00000	1044072
	✔	FX0-GENT00010	1121596
Modbus	–	FX0-GMOD00000	1044073
	✔	FX0-GMOD00010	1127717
PROFINET	–	FX0-GPNT00000	1044074
	✔	FX0-GPNT00010	1121597

- I/O modules

Number of safety inputs	Number of non-safe inputs	Number of test outputs	Number of safe outputs	Number of non-safe outputs	Protective coating	Type	Part no.
8	–	2	4	–	–	FX3-XTIO84002	1044125
					✔	FX3-XTIO84012	1050618
		8	–	–	–	FX3-XTDI80002	1044124
					✔	FX3-XTDI80012	1050617
		0-2	–	4-6	–	FX3-XTDS84002	1061777
					✔	FX3-XTDS84012	1112301
–	6-8	–	–	6-8	–	FX0-STIO68002	1061778
					✔	FX0-STIO68012	1112297

- Analog input module

Number of analog inputs	Protective coating	Type	Part no.
2	–	FX3-ANA020002	1051134
	✔	FX3-ANA020012	1112299

- Motion Control modules

Description	Protective coating	Type	Part no.
Safe speed monitoring and safe position monitoring	–	FX3-MOC100000	1057833
	✔	FX3-MOC100010	1112300

Other models and accessories ➜ **www.sick.com/Flexi_Soft**

At a glance

- Innovative safeHDDM® scanning technology
- High-precision measurement data via Ethernet interface
- Protective field range: up to 9 m, scanning angle: 275°
- Up to 128 freely configurable fields
- and up to 8 simultaneous protective fields
- Standardized communication interfaces
- System plug with configuration memory

Your benefits

- Very high machine availability and productivity thanks to the patented safeHDDM® scanning technology
- Flexibility for safe automation processes due to simultaneous protective fields, contour detection fields and detailed data output
- Safe integration into different control systems via I/O, EFI-pro, EtherNet/IP™ CIP Safety™ or PROFINET PROFIsafe, EtherCAT® FSoE, etc.
- Saves time during commissioning and diagnostics thanks to the intuitive Safety Designer software, multi-color display and system plug

➔ www.sick.com/microScan3

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.

Ordering information

Integration in the control system	Sub product family	Protective field range	Number of fields	Number of monitoring cases	Connection type	Type	Part no.
Local inputs and outputs (I/O), EFI-pro	microScan3 Pro I/O - EFI-pro	4 m	128	128	M12	MICS3-CCA-Z40AA1P01	1110035
		5.5 m	128	128	M12	MICS3-CCA-Z55AA1P01	1110033
		9 m	128	128	M12	MICS3-CCA-Z90AA1P01	1110037
EFI-pro	microScan3 Core - EFI-pro	4 m	8	8	M12	MICS3-ABA-Z40ZA1P01	1092539
		5.5 m	8	8	M12	MICS3-ABA-Z55ZA1P01	1092538
		9 m	8	8	M12	MICS3-ABA-Z90ZA1P01	1094455
	microScan3 Pro - EFI-pro	4 m	128	128	M12	MICS3-CBA-Z40ZA1P01	1091037
		5.5 m	128	128	M12	MICS3-CBA-Z55ZA1P01	1091038
		9 m	128	128	M12	MICS3-CBA-Z90ZA1P01	1094465

Other models and accessories ➔ www.sick.com/microScan3

At a glance

- Only 80 mm high
- Extremely resistant to light, dust and dirt thanks to the safeHDDM® scanning technology
- High-precision measurement data via Ethernet interface
- Protective field range: 3 m, scanning angle: 275°
- Up to 128 freely configurable fields
- Standardized communication interfaces
- System plug with configuration memory

Your benefits

- Smallest safety laser scanner from SICK for simple and space-saving design-in for mobile platforms
- High availability for the prevention of downtime
- 2-In-1: Reliable safety and precise localization
- Saves time during configuration and diagnostics thanks to user-friendly Safety Designer software
- Very high level of flexibility when adjusting the vehicle speed and direction
- Simple integration into different control systems via EtherNet/IP™ CIP Safety™, I/O and EFI-pro
- Quick device exchange without rewiring or reconfiguration

➔ www.sick.com/nanoScan3

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.

Ordering information

Integration in the control system	Sub product family	Protective field range	Number of fields	Number of monitoring cases	Type	Part no.
Local inputs and outputs (I/O), EFI-pro	nanoScan3 Pro I/O - EFI-pro	3 m	128	128	NANS3-CAAZ30AA1	1126792
EFI-pro	nanoScan3 Pro - EFI-pro	3 m	128	128	NANS3-CAAZ30ZA1	1126793

Other models and accessories ➔ www.sick.com/nanoScan3

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Product and system support
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Training and education
Practical, focused, and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 11,900 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

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

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

That is "Sensor Intelligence."

Worldwide presence:

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

Detailed addresses and further locations ➜ **www.sick.com**

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