

AOS Prime

IMPROVED SYSTEM RELIABILITY IN OUTDOOR AREAS

Object detection systems

SICK
Sensor Intelligence.

COLLISION AWARENESS WITH A WIDE SCOPE

AOS PRIME – TWO SYSTEM SOLUTIONS, ONE GOAL

The versatile AOS Prime system has been developed with the aim of preventing costly collisions. It is used in a whole host of industries, including steel works, ports, and railway industry sectors of various kinds. Two application packages have been developed in order to keep damage to a minimum and, as a result, reliably enhance the availability of the container loading equipment to a considerable degree: AOS104 RTG and AOS502 STS.

Collision prevention in the direction of travel and for cross travel: AOS104 RTG



Rubber tired gantry cranes (RTG) are highly flexible pieces of loading equipment that are even able switch between aisles in the container stacking area during container handling processes.

To assist them, the AOS104 RTG combines two functions in a single system solution:

- ✓ **Pathway collision protection**
- ✓ **Cross travel collision protection**

Both functions are based on predefined warning and emergency stop laser fields that are monitored by a safety controller plus control software that is integrated into it.

- Obstacles are detected more accurately
- Excellent system reliability thanks to self-monitoring function
- High level of operational reliability



STS crane boom and crane-to-crane collision prevention: AOS502 STS



In applications involving ship-to-shore (STS) container cranes, the AOS502 STS provides a safe, reliable method of detecting superstructures such as radar systems. In addition to boom collision protection, the AOS502 STS provides crane-to-crane collision protection.

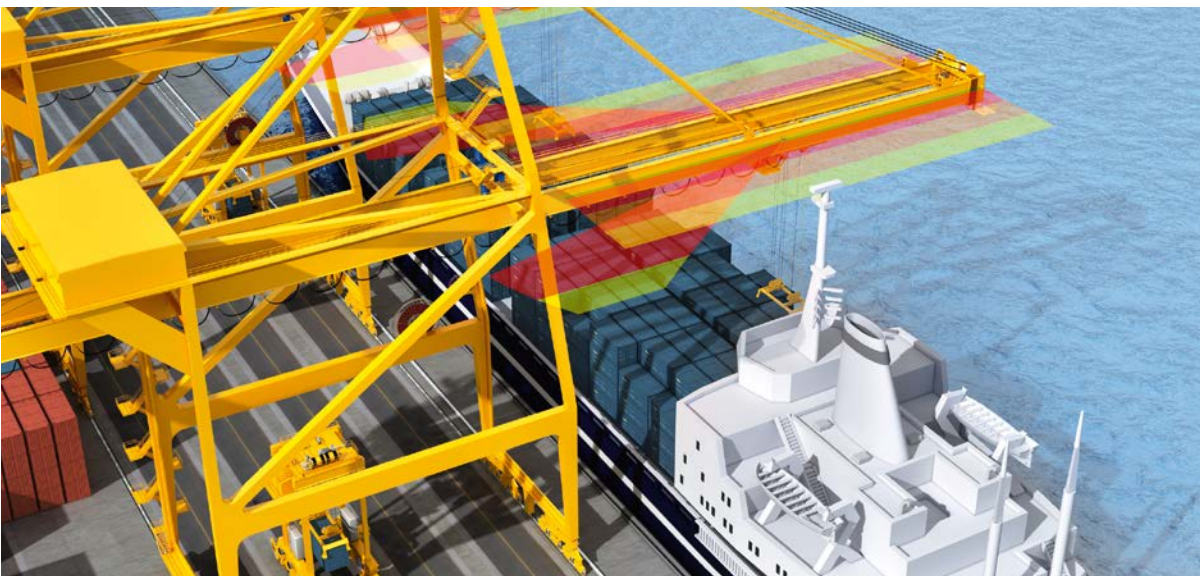
The AOS502 STS even combines these two functions in a single system solution:

- ✓ **Collision protection at the crane boom**
- ✓ **Crane-to-crane collision protection**


The system makes it possible to prevent collisions by evaluating warning, deceleration, and emergency stop laser fields. The system functions are monitored on a cyclical basis by the safety controller plus control software that is integrated into it.

- STS cranes with booms of up to 80 m in length are monitored reliably

- Crane-to-crane collision protection
- Self-monitoring function
- Excellent diagnostics coverage for any failure or shifting of the laser measurement system out of its original position
- Laser measurement system allows multiple instances of field monitoring to take place simultaneously
- High level of operational reliability



IMPROVED SYSTEM RELIABILITY IN OUTDOOR AREAS



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Product description

The AOS Prime (Advanced Object Detection System) object detection system is a self-testing system with excellent diagnostic capabilities. The AOS is used in monitoring applications where a stand-alone laser scanner is not sufficient and high operational reliability of the system is required. Thanks to the included preconfigured logic blocks, the system

can be efficiently and reliably put into operation. In addition to optical sensor testing, the response time and output signals of the sensors are continuously tested during operation. The AOS fills the gap in outdoor areas where laser scanners alone are not enough and high system reliability must be ensured.

At a glance

- Enhanced system diagnostics
- Automatic self-test cycles for the entire system
- Safe monitoring of the correct switching behavior and connection cable of the laser scanner
- Easy implementation of additional logic functions
- Easily expandable due to modular concept

Your benefits

- The independent self-testing system ensures secure operation due to excellent diagnostic capabilities
- Reliable, industry-proven laser scanner with enhanced diagnostics for outdoor applications
- Variable monitoring fields make the AOS ideal for a wide range of applications
- Modular concept makes expanding the system simple
- Optional gateways ensure connection to bus systems or remote diagnostics
- Built-in control functions for peripheral devices, even for safety-related signals like emergency stop
- Supports and simplifies individual operating licenses for machinery

➔ www.mysick.com/en/AOS_Prime

For more information, just 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

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications.

AOS Prime

Features

	AOS101-AOS104	AOS104 RTG	AOS501-AOS504	AOS502 STS
Number of laser measurement scanners	1 2 3 4	4	1 2 3 4	2
Scanner design	LMS111-10100S01		LMS511-10100S02	

Performance

	AOS101-AOS104	AOS104 RTG	AOS501-AOS504	AOS502 STS
Response time	240 ms		330 ms	
Number of field sets	3 fields per LMS 1 test field per LMS		2 fields per LMS 1 test field per LMS	

Mechanics/electronics

	AOS101-AOS104	AOS104 RTG	AOS501-AOS504	AOS502 STS
Supply voltage	(10.8 V DC ... 30 V DC) ¹⁾		24 V DC ¹⁾	
Weight	1.1 kg, per LMS, without connecting cables		3.7 kg, per LMS, without connecting cables	

¹⁾ Per LMS.

LMS111-10100S01

Features

Version	Short Range
Field of application	Outdoor
Light source	Infrared (905 nm)
Laser class	1 (IEC 60825-1 (2007-3))
Field of view	270°
Scanning frequency	25 Hz / 50 Hz
Angular resolution	0.25° 0.5°
Heating	Yes
Operating range	0.5 m ... 20 m
Max. range with 10 % reflectivity	18 m
Fog correction	Yes

Performance

Detectable object shape	Almost any
Systematic error	± 30 mm
Statistical error	± 12 mm

Interfaces

Serial (RS-232)	Function	✓ Host, AUX
	Data transmission rate	9.6 Baud ... 115.2 kBaud
Ethernet	Function	✓ Host
	Data transmission rate	10/100 Mbit
	Protocol	TCP/IP
CAN bus	Function	✓ Outputs extension
Switching inputs		2
Switching outputs		3
Optical indicators		1 (contamination warning)

Mechanics/electronics

Electrical connection	M12 circular plug-in connector
Operating voltage	10.8 V DC ... 30 V DC
Power consumption	60 W
Housing color	Gray (RAL 7032)
Enclosure rating	IP 67 (EN 60529, Section 14.2.7)
Protection class	III (EN 50178 (1997;10))
Weight	1.1 kg, without connecting cables
Dimensions	105 mm x 102 mm x 162 mm

Ambient data

Object remission	10 % ... > 1,000 % (reflectors)
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005 / EN 61000-6-4 (2007-01)
Vibration resistance	EN 60068-2-6 (1995-04)
Shock resistance	EN 60068-2-27 (1993-03)
Ambient operating temperature	-30 °C ... +50 °C
Storage temperature	-30 °C ... +70 °C
Ambient light safety	40,000 lx

LMS511-10100S02

Features

Max. range with 10 % reflectivity	40 m
Field of view	190°
Heating	Yes

Interfaces

Configuration interface	Ethernet
Electrical connection	M12 circular plug-in connector

Mechanics/electronics

Supply voltage	24 V DC
Fixing	Standard kit
Enclosure rating	IP67 (EN 60529, Section 14.2.7)
Protection class	III (EN 60529, Section 14.2.7)

Ambient data

Ambient temperature operation	-30 °C ... +50 °C
Ambient storage temperature	-30 °C ... +70 °C
Ambient light safety	70,000 lx
Electromagnetic compatibility (EMC)	EN 61000-6-2 (2005)EN 61000-6-3 (2007-03)
Object remission	2 % ... > 1,000 %, reflectors
Shock load	EN 60068-2-27 (1993-03), EN 60068-2-29 (1993-04)
Vibration load	EN 60068-2-6 (1995-04)

FX3-CPU000000

General data

System construction	Modular
System plug	1
Main module	1
Gateways	0 ... 2
Expansion modules	0 ... 12 ¹⁾
Relay modules	0 ... 8 ²⁾
Configuration method	Via software
Configuration software	Flexi Soft Designer
Fieldbus/industrial network	CANopen, EtherCAT, EtherNet/IP, MODBUS TCP, PROFIBUS DP, PROFINET, DeviceNet
Type of fieldbus integration	Gateway

¹⁾ Each Motion Control module connected reduces the possible number of other extension modules by two.

²⁾ Up to 8 UE410-2RO relay output modules and/or 4 UE410-4RO relay output modules (meaning a max. of 16 safe relay outputs).

Functions

Restart interlock	Manual / automatic (configurable)
External device monitoring (EDM)	✓
Differentiation between man and material (muting)	✓

Interfaces

System connection	System plug FX3-MPL000001
Connection type system plug	Screw-type terminals
Number of EFI interfaces	0
Configuration and diagnostics interface	RS-232

Electrical data

Protection class	III (EN 61140)
Type of voltage supply	PELV or SELV ¹⁾
Supply voltage V_s	24 V DC (16.8 V DC ... 30 V DC)
Internal power consumption	≤ 2.5 W
Overvoltage category	II (EN 61131-2)
Switch-on time	≤ 18 s

¹⁾ The current of the power supply that powers the main unit must be limited to a maximum of 4 A, either through the power supply itself or a fuse.

Ambient data

Enclosure rating terminals	IP 20 (EN 60529)
Protection class housing	IP 40 (EN 60529)
Ambient operating temperature	-25 °C ... +55 °C
Storage temperature	-25 °C ... +70 °C
Air humidity	10 % ... 95 %, non-condensing
Climate conditions according to	EN 61131-2 (55 °C ambient operating temperature, 95% rel. humidity)
Electromagnetic compatibility (EMC)	Class A (EN 61000-6-2, EN 55011)
Vibration resistance	1 g, 5 Hz ... 150 Hz (EN 60068-2-6) 3 g RMS, 10 Hz ... 500 Hz (EN 60068-2-64)
Shock resistance (continuous shock)	10 g, 16 ms (EN 60068-2-27)
Shock resistance (single shock)	30 g, 11 ms (EN 60068-2-27)

FX3-XTIO84002

General data

System construction	Modular
System plug	1
Main module	1
Gateways	0 ... 2
Expansion modules	0 ... 12 ¹⁾
Relay modules	0 ... 8 ²⁾
Configuration method	Via software
Configuration software	Flexi Soft Designer
Fieldbus/industrial network	CANopen, EtherCAT, EtherNet/IP, MODBUS TCP, PROFIBUS DP, PROFINET, DeviceNet
Type of fieldbus integration	Gateway

¹⁾ Each Motion Control module connected reduces the possible number of other extension modules by two.

²⁾ Up to 8 UE410-2R0 relay output modules and/or 4 UE410-4R0 relay output modules (meaning a max. of 16 safe relay outputs).

Functions

Flexi Loop-compatible	✓
Fast shut-off	✓
Fast shut-off time	8 ms

Interfaces

Number of safety inputs	8 (I1 – I8)
Number of non-safe inputs	0
Number of test signal outputs	2 (X1, X2)
Number of safe outputs	4 (Q1 – Q4)
Number of non-safe outputs	0
Connection type	Spring terminals

Electrical data

Protection class	III (EN 61140)
Voltage supply internal logic	Via FLEXBUS+
Voltage supply test signal outputs	Via FLEXBUS+
Voltage supply safe outputs	Via A1, A2
Internal power consumption	≤ 2.2 W ¹⁾

¹⁾ Via FLEXBUS+, without current on test signal outputs.

Ambient data

Enclosure rating terminals	IP 20 (EN 60529)
Protection class housing	IP 40 (EN 60529)
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +70 °C
Air humidity	10 % ... 95 %, non-condensing
Climate conditions according to	EN 61131-2 (55 °C ambient operating temperature, 95% rel. humidity)
Electromagnetic compatibility (EMC)	Class A (EN 61000-6-2, EN 55011)
Vibration resistance	1 g, 5 Hz ... 150 Hz (EN 60068-2-6) 3 g RMS, 10 Hz ... 500 Hz (EN 60068-2-64)
Shock resistance (continuous shock)	10 g, 16 ms (EN 60068-2-27)
Shock resistance (single shock)	30 g, 11 ms (EN 60068-2-27)

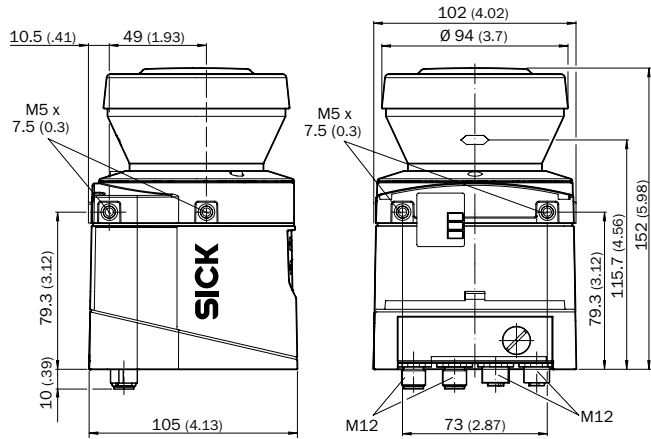
Ordering information

Field of application	Items supplied	Model name	Part no.
Basic systems for different applications	LMS111-10100S01 Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTI084002 USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files I/O connecting cable Power supply connecting cable (1 x) RS-232 input connecting cable Mounting kit 1b Mounting kit 2 Ethernet connection cable SSL-2J04-G10ME	AOS101	1064408
	LMS111-10100S01 (2 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTI084002 USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files I/O connecting cable (2 x) Power supply connecting cable (2 x) RS-232 input connecting cable (2 x) Mounting kit 1b (2 x) Mounting kit 2 (2 x) Ethernet connection cable SSL-2J04-G10ME	AOS102	1066127
	LMS111-10100S01 (3 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTI084002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files I/O connecting cable (3 x) Power supply connecting cable (3 x) RS-232 input connecting cable (3 x) Mounting kit 1b (3 x) Mounting kit 2 (3 x) Ethernet connection cable SSL-2J04-G10ME	AOS103	1066128
	LMS111-10100S01 (4 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTI084002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files I/O connecting cable (4 x) Power supply connecting cable (4 x) RS-232 input connecting cable (4 x) Mounting kit 1b (4 x) Mounting kit 2 (4 x) Ethernet connection cable SSL-2J04-G10ME	AOS104	1066129
RTG cranes	LMS111-10100S01 (4 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTI084002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files I/O connecting cable (4 x) Power supply connecting cable (4 x) RS-232 input connecting cable (4 x) Weather hood 270 ° (4 x) Mounting bracket (4 x) Ethernet connection cable SSL-2J04-G10ME	AOS104 RTG	1064544

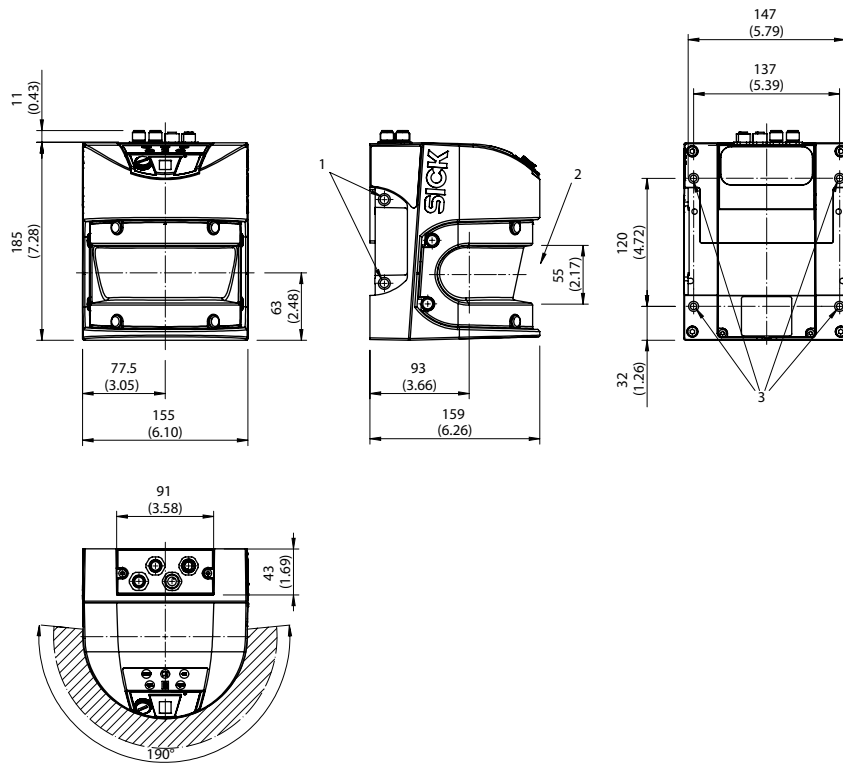
Field of application	Items supplied	Model name	Part no.
Basic systems for different applications	LMS511-10100S02 Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTIO84002 USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files Ethernet connection cable SSL-2J04-G10ME LMS511 accessory set 1	AOS501	1064409
	LMS511-10100S02 (2 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTIO84002 USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files Ethernet connection cable SSL-2J04-G10ME LMS511 accessory set 1 (2 x)	AOS502	1066130
	LMS511-10100S02 (3 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTIO84002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files Ethernet connection cable SSL-2J04-G10ME LMS511 accessory set 1 (3 x)	AOS503	1066131
	LMS511-10100S02 (4 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTIO84002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files Ethernet connection cable SSL-2J04-G10ME LMS511 accessory set 1 (4 x)	AOS504	1066132
	LMS511-10100S02 (2 x) Flexi Soft main module FX3-CPU000000 Flexi Soft system plug FX3-MPL000001 Flexi Soft I/O module FX3-XTIO84002 (2 x) USB configuration cable DSL-8U04G02M025KM1 USB stick with configuration files Ethernet connection cable SSL-2J04-G10ME (2 x) LMS511 accessory set 2 (2 x)	AOS502 STS	1064545
STS cranes			

Dimensional drawings (Dimensions in mm (inch))

LMS111-10100S01

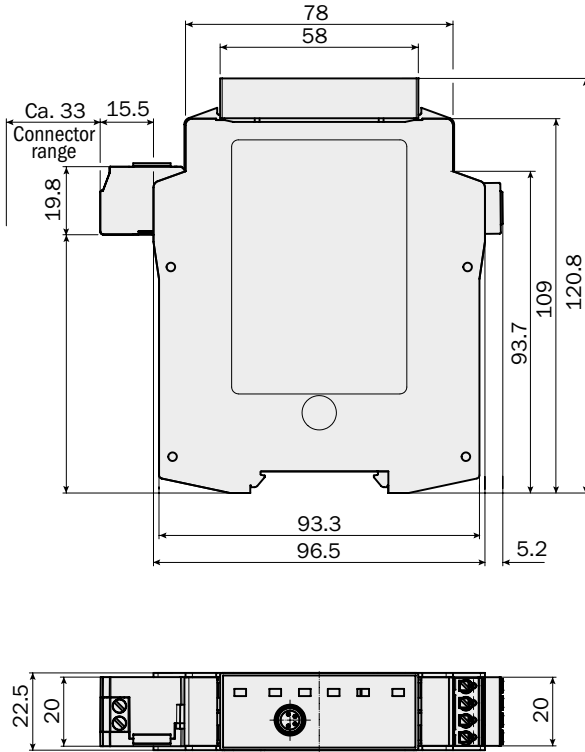


LMS511-10100S02

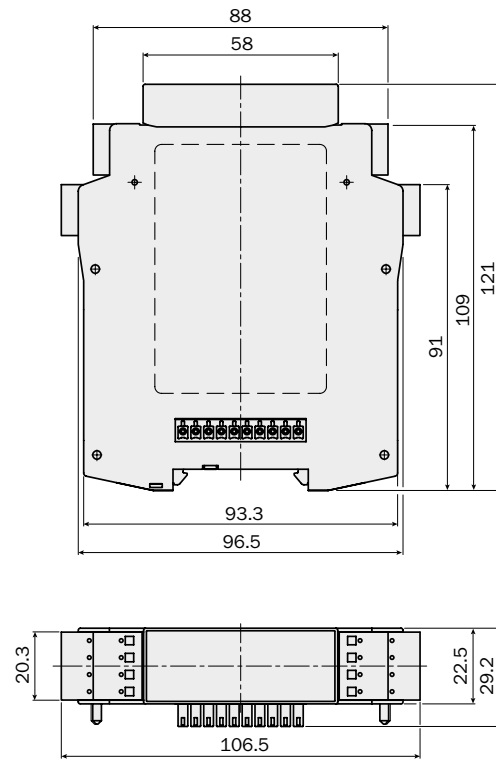


- ① 4 screw holes M8 x 9
- ② Do not obstruct front window
- ③ 4 screw holes M6 x 8

FX3-CPU0

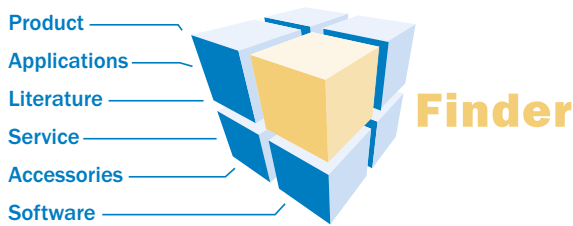


FX3-XTIO



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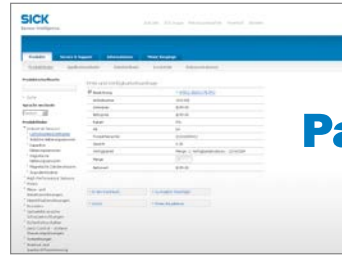


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SICK AT A GLANCE

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.

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For us, that is “Sensor Intelligence.”

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