FieldEcho
IO-LINK DATA ACCESSIBILITY AND TRANSPARENCY

SMART SENSORS
SUPPLIERS OF INFORMATION FOR INDUSTRY 4.0

Efficient detection of machine reality

SICK
Sensor Intelligence.

SMART SENSORS FOR AN EFFICIENT MACHINE COMMUNICATION

Networked production and control processes in complex machine environments determine the industrial future and make Industry 4.0 possible in the first place. Smart Sensors already support dynamic, real-time-optimized, and self-organized industry processes. They record real operational statuses, turn these into digital data, and share them automatically with the process controller.

The added value of sensor communication depends significantly on the quality and stability of the delivered data. In order to create the best-possible basis for a future-ready automation system, SICK has equipped its Smart Sensors with four special properties.

MORE EFFICIENCY THROUGHOUT: FOUR DIMENSIONS OF SMART SENSOR TECHNOLOGY
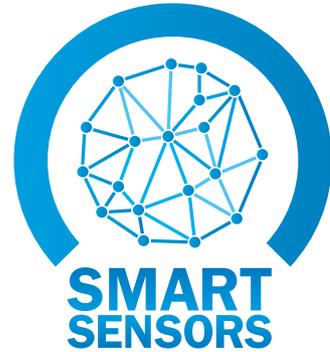
SMART SENSORS

Enhanced Sensing
Top sensor performance for stable processes

Efficient Communication
Flexibility and transparency at the lowest field level

& Enhanced Sensing and Efficient Communication characterize every Smart Sensor.

Diagnostics
Highest availability levels thanks to predictive maintenance

Smart Tasks
Tailor-made information directly from the sensor

+ Some Smart Sensors also offer diagnostic and/or Smart Task functions. See pages 14/15 for more details.

FOUR DIMENSIONS OF SMART SENSOR TECHNOLOGY: ENHANCED SENSING

The highest possible level of stability during object detection and recording of measured values is the basis for every Smart Sensor. Benefit from our experience spanning over 70 years in the development and application of groundbreaking sensor technology.

Smart Sensors automatically detect faults during operation and actively troubleshoot problems that may arise. They actively help the fitter to find the ideal operating point as they are being installed. Many Smart Sensors even offer various operating modes including manual adjustment of detection or measurement parameters o enable them to be dynamically adapted to tasks as necessary.

At a glance

• Advanced adjustments
• Predefined operating modes
• Compensation for faults
• Active installation and alignment aid

"Enhanced Sensing" provides reliable detection and measurement results, which has a direct impact on plant availability.

Enhanced Sensing: added value for your application

Advanced adjustments

- Accurate and reliable object detection for optimal measurement results
- Individual and fast adjustment for virtually any application up to manual mode
- Stable production processes
- Protection against tampering by selectively disabling control elements

Predefined operating modes for demanding applications

- Easy and fast commissioning
- Accurate object detection even with demanding applications
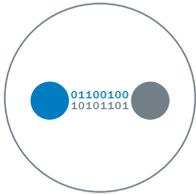- Application know-how from SICK available at a click
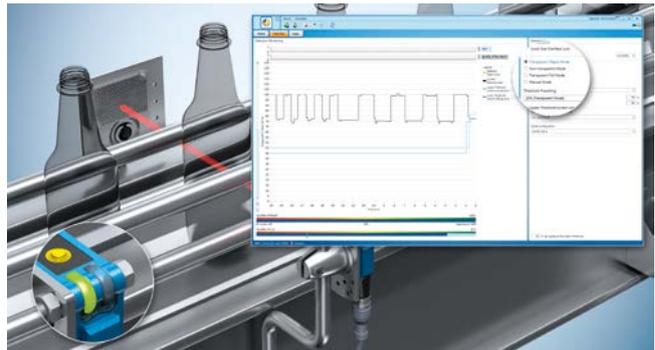
Simple compensation in case of faults

- Prevention of false detections
- Accurate object detection even with demanding applications
- Stable and reliable sensor signals
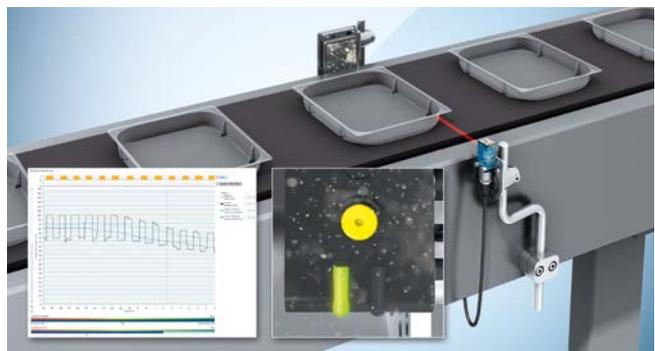
Installation feedback

- Fast calibration and commissioning
- Prevention of unwanted sensor operation in the peripheral area

# FOUR DIMENSIONS OF SMART SENSOR TECHNOLOGY: EFFICIENT COMMUNICATION

With superordinate control systems, Smart Sensors communicate via IO-Link: The stable communication channel which is used across the globe for sensors and actuators at the lowest field level offers many practical advantages in day-to-day industrial operation.

Smart Sensors are diligent data collectors and intelligent analysts. They share this knowledge with their environment via their integrated IO-Link interface in real time. Smart Sensors are always responsive to all types of control commands. For example, they can receive new parameter sets within seconds – for flexible production up to batch size 1. Even if a device is defective, the most recently used parameter set can be automatically transferred to the replacement sensor via IO-Link. This enables plug and play to become a reality.

At a glance

- Flexible manufacturing systems up to batch size 1 requirements
- Fast commissioning and plug and play device replacement with automated setting of sensor parameters
- Continuous digital data transmission
- Device validation, logging and e-parts lists

Efficient Communication enables bidirectional data transfer between control unit and sensor – for batch size 1, flexible processes and easy service.
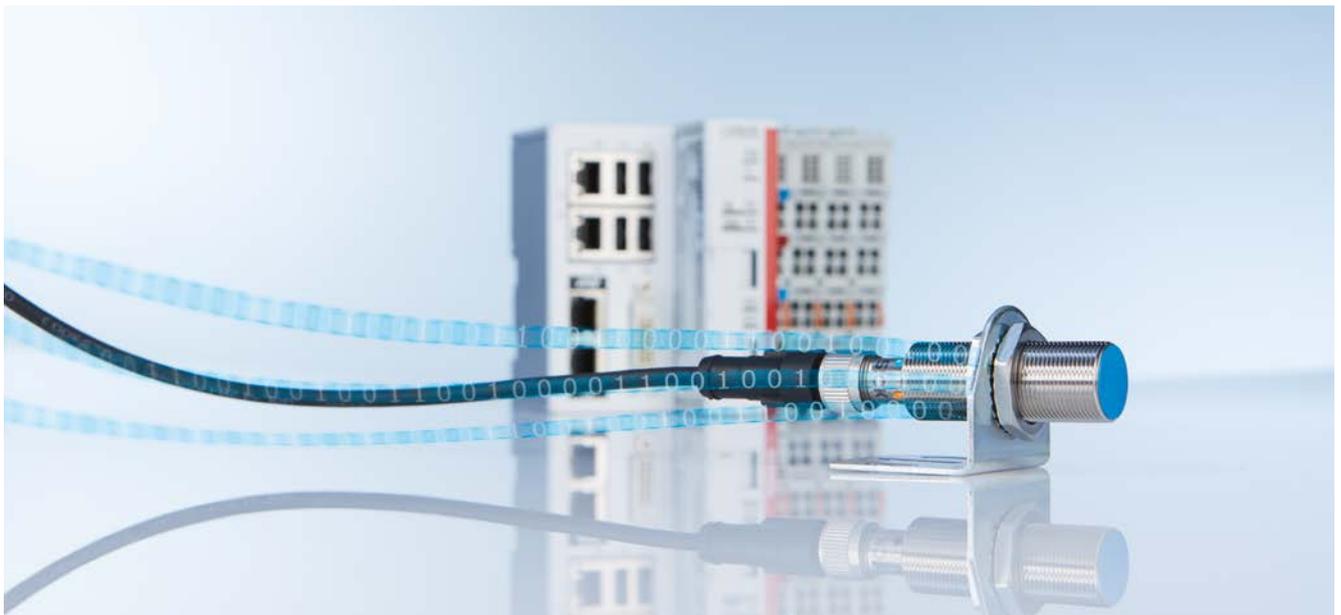
Efficient Communication: added value for your application

Flexible manufacturing and batch size 1

- Higher productivity through reduction of machine downtimes for product changeovers
- The greatest possible flexibility and accuracy thanks to dynamic parameter adjustments of sensors during operation – also for batch size 1
- Automated sensor parameterization by the control unit prevents incorrect settings during manual changeover
- Improving variability of systems helps reduce costs

Fast commissioning and plug and play device replacement with automated setting of sensor parameters

- Streamlined commissioning via sensor parameterization by the control unit
- Faster plug and play sensor replacement improves machine availability
- Sensor replacement can also be performed by untrained personnel
- Remote configuration of sensor equipment mounted at inaccessible locations

Continuous digital data transmission

- Improved signal quality with fully digital transmission from the sensor to controls; classical transfer of analog values (0-10 V, 4-20 mA)
- Use of unshielded standard cable reduces costs
- High electromagnetic compatibility (EMC)
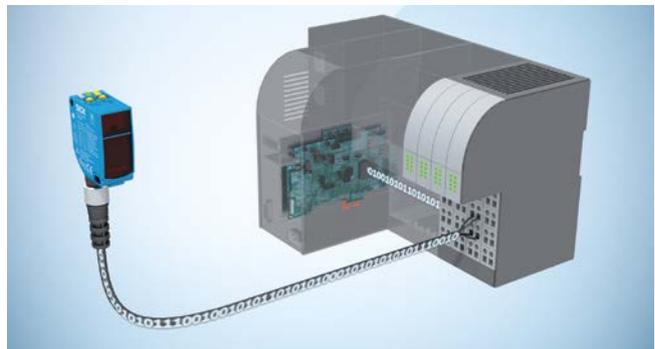
Device validation, logging and e-parts list

- High transparency: sensor replacements and parameter changes can be logged
- Protection against tampering by selectively disabling control elements
- Safe operation: commissioning of unapproved devices can be prevented
- Automatically generate e-parts list using smart sensors currently installed in the machine

FOUR DIMENSIONS OF SMART SENSOR TECHNOLOGY: DIAGNOSTICS

With the diagnostics functions, you always know the condition of your process and every single sensor. They comprise automated sensor self-monitoring or process parameter monitoring for preventative device and system maintenance.

Smart Sensors will even send a notification independently if safe operation is at risk. Thanks to predictive maintenance, flexible, needs-based maintenance schedules can be created, helping reduce service costs. If problems should arise, however, the cause can be easily determined thanks to comprehensive visualization options, avoiding unplanned system downtimes.

At a glance

• Sensor self-monitoring during setup and operation
• Continuous monitoring of key process parameters
• Visualization of detection signals and parameters for detailed process and detection analysis

The dimension diagnostics allow operators to look into the future, in order to detect process deviations in advance and prevent unplanned system downtimes.

Diagnostics: added value for your application

Sensor self-monitoring during setup and operation

- Advance detection of disturbances prevents unplanned system downtimes
- Predictive remote maintenance enables accurate service schedules and saves money and time
- Time-consuming troubleshooting is no longer necessary, as the service message can be accurately localized
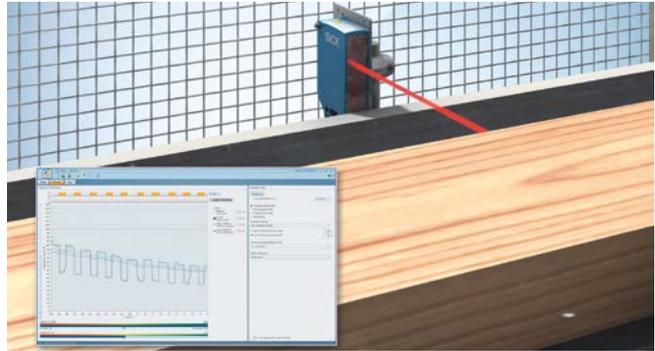
Monitoring of key process parameters

- Ensuring product quality through monitoring of production parameters
- Advance detection of disturbances prevents unplanned system downtimes
- Predictive remote maintenance enables accurate service schedules and saves time, money and stress
- Time-consuming troubleshooting is no longer necessary, as the service message can be accurately localized
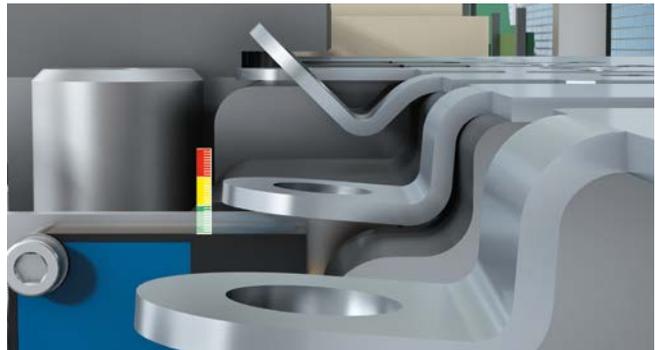
Visualization of detection signals and parameters for detailed process and detection analysis

- More transparency in the production process for a better understanding of procedures
- Fast troubleshooting in case a fault occurs
- Visualization of process changes

FOR DIMENSIONS OF SMART TECHNOLOGY: SMART TASKS

In these times of "big data", it is important not to lose sight of the big picture. For that reason, Smart Tasks processes the diverse sensor signals for detection and measurement, linking them to signals from an external sensor if necessary. Only the process information that is actually necessary is generated – in line with the task configured in the system. This saves time during data evaluation in the control, accelerates machine processes, and makes high-performance, cost-intensive additional hardware unnecessary.

At a glance

- Decentralized signal analysis directly at the sensor
- Faster signal capture and processing
- With Smart Tasks, the Smart Sensors provide the information that the system process actually requires – without separate data processing in the control unit

Smart Tasks enable data to be processed directly in the sensor. This leads to faster data transmission, leaner structures and cost benefits for your process.

Examples of Smart Tasks: added value for your application

Speed and length measurement

- Determining object speed independent of slippage for more accurate measurement results
- Easy sorting and classification of detection objects based on the object length – independent of conveyor speed
- High flexibility when determining the measuring point
- No corruption of measurement results due to controller cycle times

Object and gap monitor

- Monitoring of object lengths and distances for faster capture of nonconforming conditions
- Simply processed signals for layered control level or for direct and fast removal of defective product
- No corruption of measurement results due to controller cycle times

Placement analysis

- Direct capture of the equipment, for example, of a workpiece carrier moving past, by assessing the signal pattern directly in the Smart Sensor to provide quality monitoring or process control
- Reliably capture the equipment during the running process – also with different travel speeds
- Cost effective and low complexity


Counter and debouncing

- Easy and fast completeness check at the same time as interference suppression
- Accurate measurements: no "swallowing" of individual, very rapid counter pulses due to controller cycle times

For more Smart Tasks visit **www.sick.com/smart-sensors** or upon request.

SIG100, SIG200
THE SIMPLE SOLUTION FOR AN INTELLIGENT SENSOR SYSTEM

The Sensor Integration Gateways product family represents the simple connection and networking of different sensors in the most common Ethernet-based fieldbus environments and higher-level systems as well as the intuitive creation of small sensor systems using the drag-and-drop logic editor.
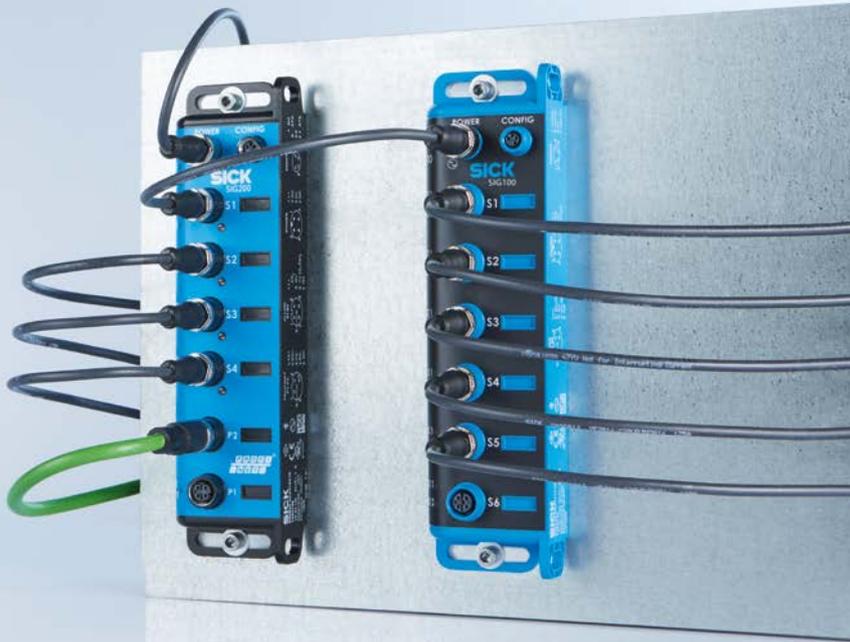
Networking production and control processes

The SIG100 is an IO-Link sensor hub for recording and monitoring digital switching signals. In addition to its pure data transmission function, the SIG100 also has an integrated logic editor that can be used to configure logic functions using drag-and-drop, such as AND/OR, counters, and switching delays, and the aggregated results can be transmitted to any IO-Link master via IO-Link.

The main function of the SIG200 is that of an intelligent IO-Link master that converts sensor data into one or several protocols to make the data available to higher-level systems. SIG200 records all of the sensor data that is transmitted via IO-Link or standard I/O signals. This data is firstly converted into a fieldbus protocol for further processing in the PLC, in parallel to this, these signals can also be made accessible via a REST interface e.g. in a cloud. Both communication channels use the same physical port on the SIG200 for this.

IO-Link – intelligent communication on the sensor level

The world's first standardized IO technology (IEC 61131-9) means sensors can play an active role in end-to-end automation networks. The sensors record real operational statuses, turn these into digital data, and share them with the process controller. In addition, IO-Link offers countless advantages, such as simple device configuration via the SOPAS engineering tool, automated parameter saving of IO-Link slaves, as well as automated device identification.

SICK offers a comprehensive IO-Link portfolio for many different types of sensors (see Smart Sensors). With the SIG100 and SIG200, quick and easy parameterization and the integration of sensors and different sensor technologies, as well as the creation of small sensor systems without any programming effort become reality.

INDUSTRY 4.0 READY

IO-Link

VIRTUALLY LIMITLESS COMMUNICATION

Using IO-Link as the crucial communication technology of the Sensor Integration Gateway opens up new opportunities for the communication and data transparency of the individual switching signals from the lowest field level up to control systems and the IT world, which are all components of a single automation network. This is an important aspect, as networked production and control processes in complex machine environments are key to the industrial future and are what is making Industry 4.0 possible in the first place.

With two communication channels, sensor data is transmitted wherever it needs to be

The simple wiring of IO-Link sensors and standard I/O signals with SIG100 and SIG200 results in a cost-efficient connection to the fieldbus. With DualTalk, there are also two parallel communication channels available in the SIG200. The edge computing channel is used for the communication to the control via the fieldbus, while the cloud computing channel transports data via the REST API to the cloud or to any Industry 4.0 application.

Drag-and-drop logic editor and IODD interpreter

SIG100 and SIG200 can very easily be connected to the SOPAS user interface using the USB port on the device. There, not only the devices themselves, but also the logic functions can be created using drag-and-drop and several of the connected sensors and actuators. Logic functions such as counter or timer functions make even the simplest sensors intelligent. This leads to decentralized intelligence directly in the application, without time-consuming PLC programming. The SIG200 user interface can then be called up via the web server without installing an additional program. The user interface allows for the configuration of any IO-Link device using the IODD, among other things.

Reduced wiring work saves time

The easy connection of both binary and IO-Link devices to the SIG100 and SIG200 allows for a unified and efficient wiring concept with full data transparency of each individual standard I/O and IO-Link signal.

MANUFACTURER-INDEPENDENT ACCESS TO ALL IO-LINK DEVICE DATA

What long seemed nearly impossible is now becoming reality with the FieldEcho® software tool from SICK: Access to all IO-Link devices in a heterogeneous automation system with only one tool. The FieldEcho® makes it possible to parameterize, diagnose and monitor all IO-Link devices integrated into a machine or plant – independently of the manufacturer, throughout the entire life cycle of the plant and regardless of the programmable logic controller (PLC) and fieldbuses used.
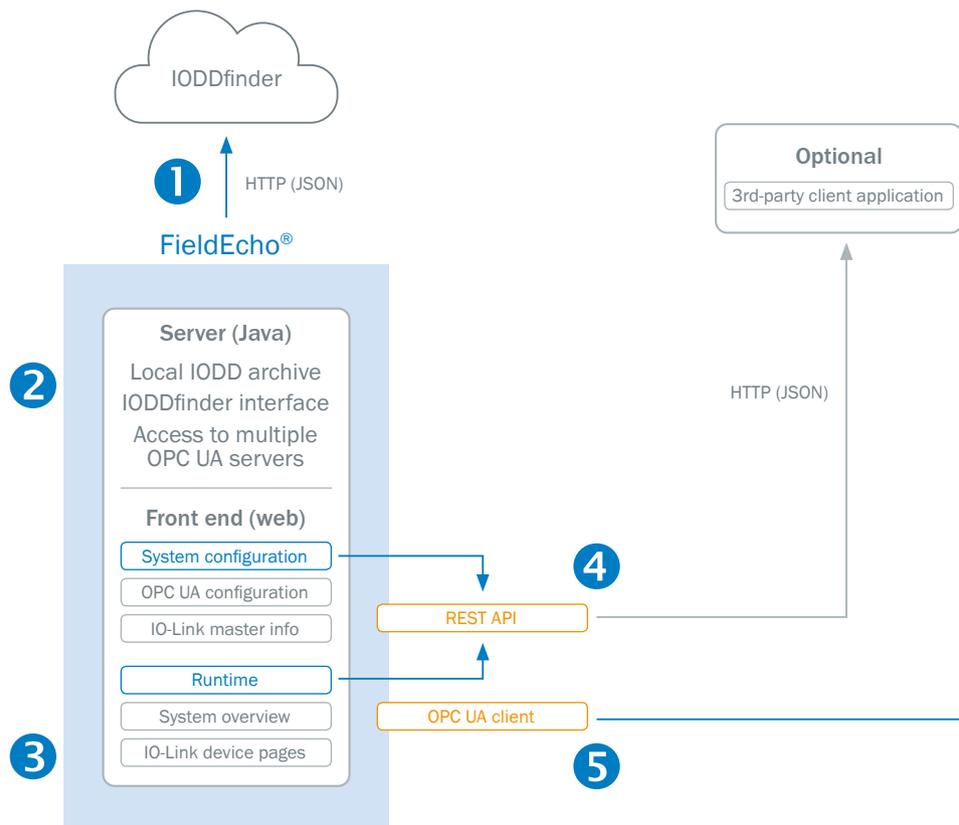
❶ Fast

FieldEcho® saves time when connecting the IO-Link devices used, as they are found automatically. The IODDs required for connected and detected devices are automatically downloaded by the IODDfinder and bound to the respective IO-Link master port. Manual IODD download is no longer necessary.

❷ Anywhere

All relevant IO-Link device data can be called up easily and from anywhere. Thanks to the remote access function, IO-Link device remote diagnosis is possible, which minimizes maintenance costs.

❸ Clear

The FieldEcho® enables unlimited and bidirectional communication with all IO-Link devices in a network. After successful configuration of the IO-Link master, all parameters and process data of connected IO-Link devices can be processed clearly and conveniently using a modern, visually-pleasing user interface.

④ Future-proof

The REST API integrated into the FieldEcho® enables, for example, read access to the process and service data of IO-Link devices for ERP-, MES- or cloud-based services, thereby bridging the gap between production and Industry 4.0. The data can be used for efficient further processing, e.g. for inventory, predictive maintenance or data analysis. A self-structuring FieldEcho® dashboard rounds out the product.

⑤ Cost-efficient

Just a few clicks to the ongoing application: For communication with IO-Link devices via a fieldbus, only one line of PLC code is necessary, which calls up the generic function block delivered with the FieldEcho®. The FieldEcho® exchanges data with the PLC via OPC UA, an established standard in industrial automation. Time- and cost-intensive programming of access to the IO-Link data in the PLC is no longer necessary.

⑥ Flexible

Neither special hardware nor a special protocol is required for use of the FieldEcho®. The software tool can be operated with nearly any PLC, any fieldbus and any supported IO-Link master. Data is exchanged with the PLC using the OPC UA.

Fieldbus

Any EtherCAT IO-Link master

Any IO-Link device
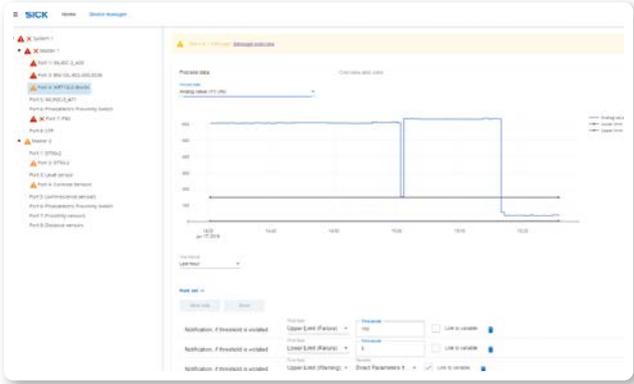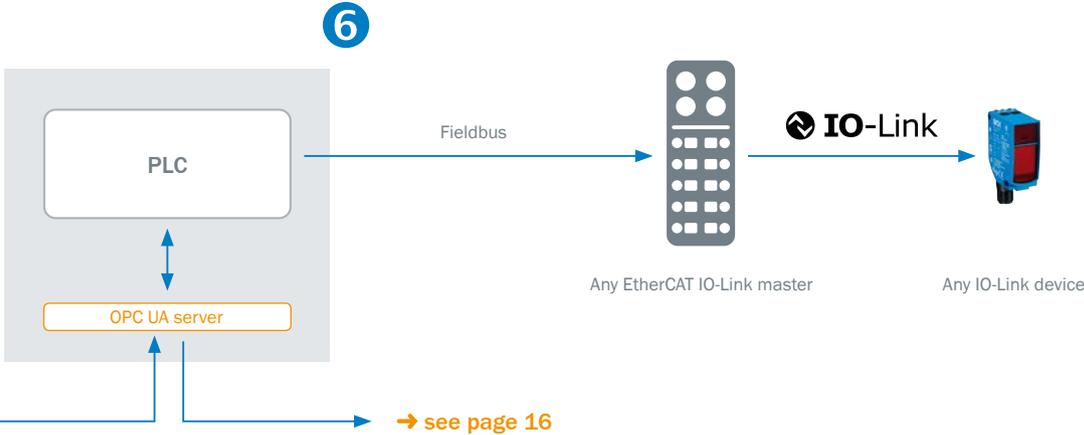
OPC UA server

The clear FieldEcho® dashboard structures itself.
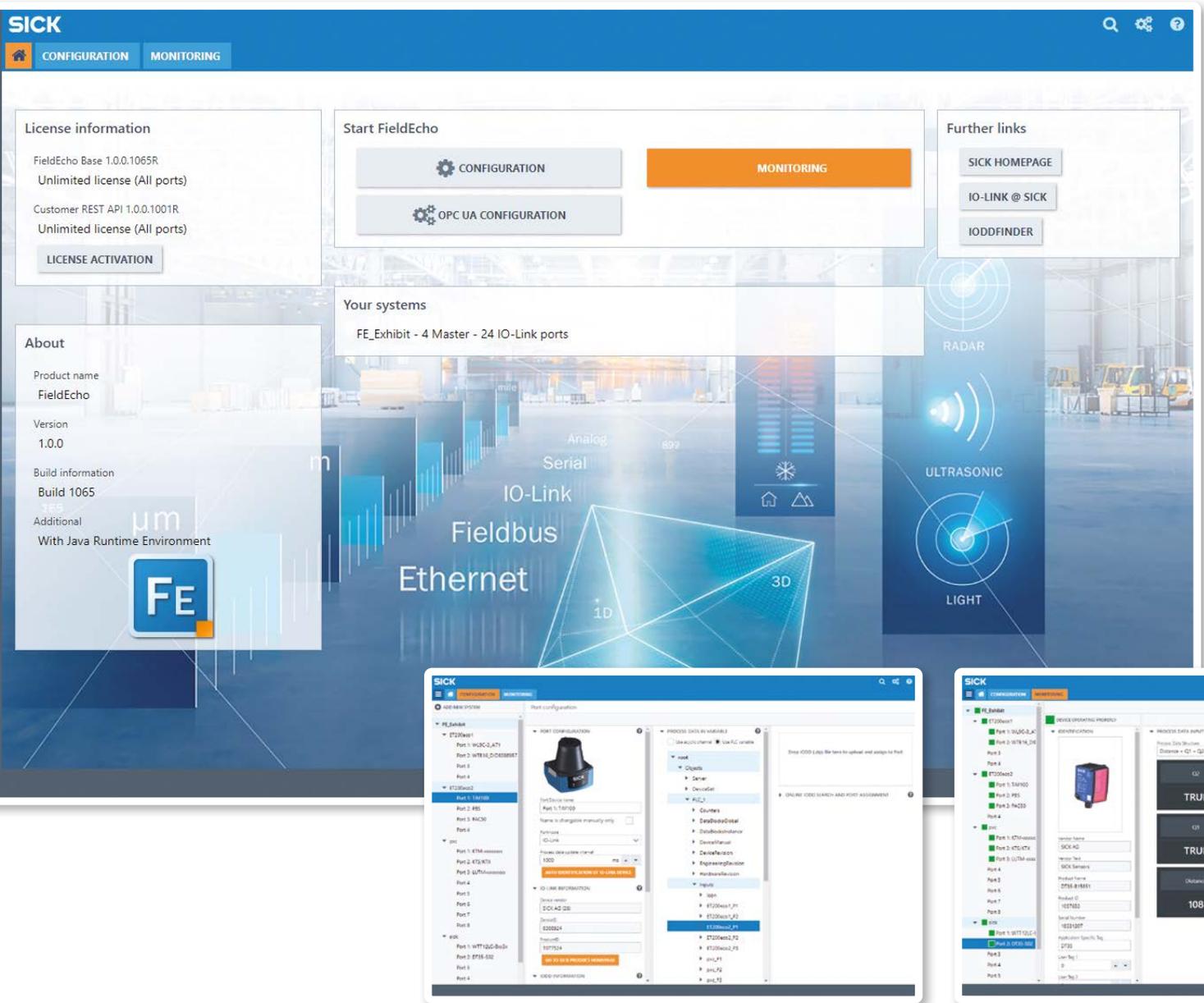
FULL DATA ACCESS CAN BE THIS EASY

The FieldEcho® communicates with the PLC through OPC UA. The OPC UA server can either be installed in the PLC itself or on any PC in the network. Using the generic SICK function block, the FieldEcho® has full access to the process and service data of all IO-Link devices in a plant. SICK is continuously expanding the number of PLC systems supported by the FieldEcho®.

Into the cloud with the REST API

Thanks to the REST API integrated in the FieldEcho®, various system applications from third-party suppliers can also access the IO-Link device data provided in JSON format via the REST API. From commissioning and operation to maintenance, valuable information is available in the operational management level (MES), the enterprise level (ERP), for various cloud services and any customer-specific applications throughout the entire life cycle of the plant.

The FieldEcho® opens up new possibilities for Industry 4.0 concepts thanks to manufacturer- and location-independent access to all IO-Link devices as well as the provision of process and service data via REST API

The FieldEcho® can be used both on a individual PC and in a network
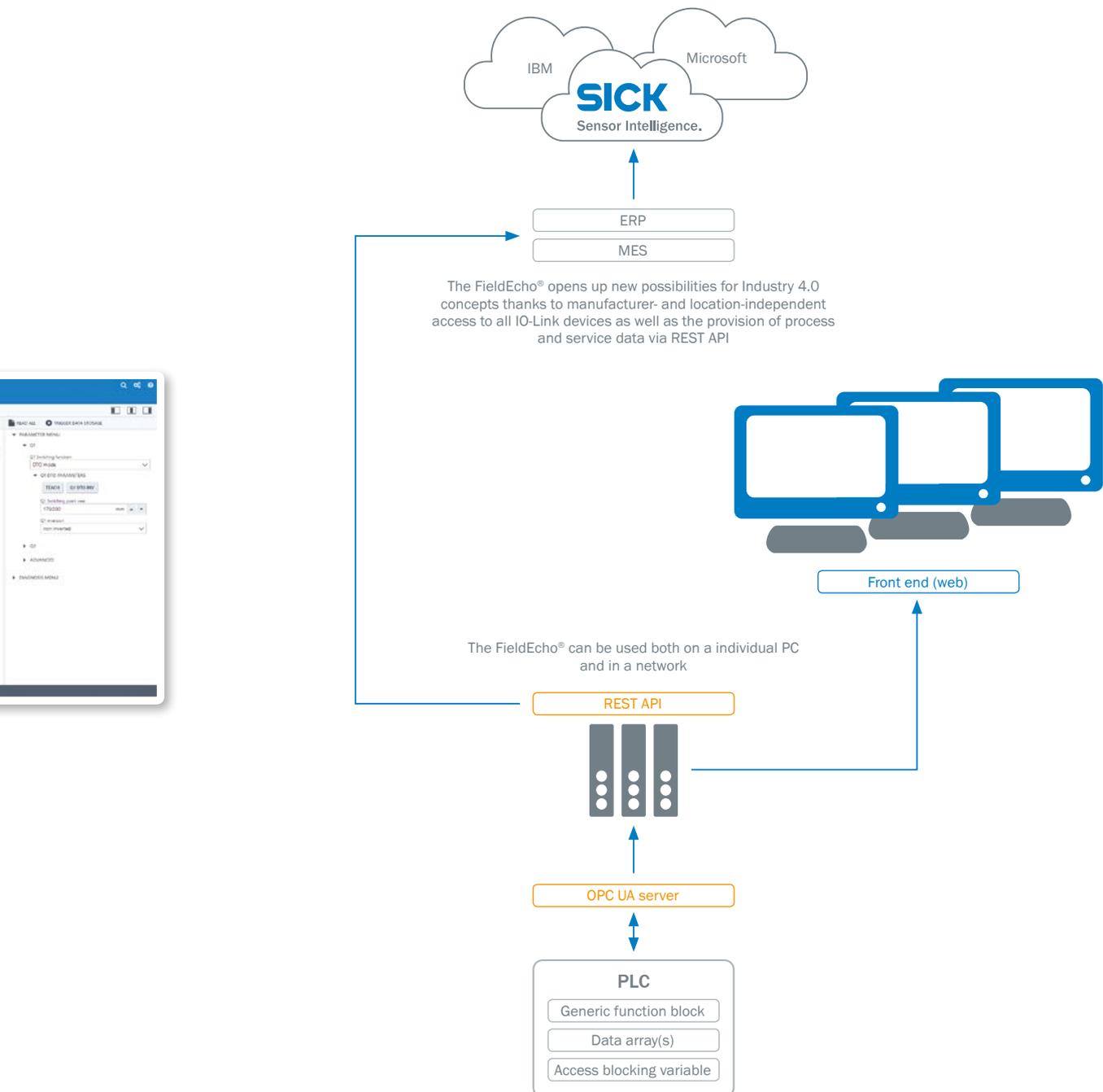
DIGITAL DATA TRANSMISSION IN THE AUTOMATION NETWORK WITH IO-LINK

IO-Link

Smart sensors offer additional utilization potential which extends far beyond straightforward binary 0/1 switching signals. A consistent communication concept right down to the lowest field level is crucial in exploiting the features and technologies of state-of-the-art sensors and actuators, and making machines and systems more productive as a result. IO-Link has been used to define an open interface between sensors and actuators as well as input/output assemblies. IO-Link involves a point-to-point connection that may be located underneath any given network. A sensor produces and consumes signals (binary switching, analog, input, output) that are transmitted directly via IO-Link in a digitized format.

Integration of Smart Sensors into the machine network and into the cloud thanks to SIG200 and FieldEcho

Thanks to the SICK SIG200 IO-Link Master and FieldEcho, Smart Sensors and arbitrary other IO-Link devices can be very well connected to the machine network and beyond to the cloud. For full transparency, flexibility and reliability in the automated production process.

IO-Link

SICK

Configuration path

Configuring the SIG is done conveniently via SOPAS or the SIG200's integrated web server. The settings of the connected IO-Link sensors can easily be changed via the installed IODD interpreter, which allows you to configure any of the IO-Link devices connected to the SIG200 via IODD.

www · IODDfinder

SOPAS ET

Cloud

MES/ERP

HMI/SCADA

Ethernet (REST API)

Field Echo *)

*) Using Field Echo, all IO-Link slaves on the IO-Link device level can be visualized and configured, regardless of which IO-Link master is used. ➜ see page 14

Control level

Ethernet (OPC UA)

Ethernet (REST API)

USB/ Ethernet

USB

Fieldbus level

Fieldbus

Lector   MLG   WLL180 +WI180C ···

SIG200

IO-Link

IO-Link device level

IO-Link

PowerProx   DT35 ···

SIG100

Standard I/O signal level

Standard I/O signals

WLL180   G6   IME ···   Actuator

You can find SICK's comprehensive sensor portfolio at ➜ www.sick.com

SMART SENSORS IN THE SICK PORTFOLIO

Smart Sensors provide the essential input for every process chain: Information for the intelligent factory in Industry 4.0. Although all sensors include Enhanced Sensing and Efficient Communication, Diagnostics and Smart Tasks are optional dimensions of Smart Sensor technology.

	W2S-2	WTT2SL-2	W4-3	W4S-3	W9-3	W12-3	W16	W26	WTT12L	Glare	DeltaPac
Enhanced Sensing	■	■	■	■	■	■	■	■	■	■	■
Efficient communication	■	■	■	■	■	■	■	■	■	■	■
Diagnostics	■		■	■	■	■	■	■	■	■	
Smart Tasks	■	■	■	■	■	■	■	■		■	
Outside/inside dimension											
Placement analysis						■					
Speed measurement											
Speed and length measurement				■							
Height classification											
Classification of the hole position											
Classification of the object position											
Hole detection/hole size											
Logic	■	■	■	■	■	■	■	■			
Object detection/object width											
Object and gap monitor				■							
Object recognition											
Profile detection											
Time stamp										■	
Time stamp and debouncing				■		■					
Counter										■	
Counter and debouncing		■	■	■	■	■	■	■			
Time measurement and debouncing		■	■	■	■	■	■	■			
Additional information	➜ www.sick.com/smart-sensors-search										

We have compiled an overview of the most important Smart Sensor product families for you. The example "Smart Tasks" shown here can also be rolled out to other Smart Sensors and supplemented by custom programmed tasks.

	IMC	IMB	IMF	IMI	IMM	IQG	MPA	MPS	MZCG VIA	MZT8	MZC1	MZ2Q	KTM Prime	KTS/KTX	CSM	MLG2
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
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➔ www.sick.com/smart-sensors-search

SMART SENSORS IN THE SICK PORTFOLIO

	FlexChain	LUTM	LUT9	WF	WFL	WFS	AS30	PSS	OLS20	TIM1xx	Dx35	
Enhanced Sensing	■	■	■	■	■	■	■	■	■	■	■	
Efficient communication	■	■	■	■	■	■	■	■	■	■	■	
Diagnostics	■	■	■	■	■	■	■	■	■	■	■	
Smart Tasks	■			■	■	■	■				■	
Outside/inside dimension												
Placement analysis												
Speed measurement												
Speed and length measurement												
Height classification												
Classification of the hole position												
Classification of the object position												
Hole detection/hole size												
Logic	■						■					
Object detection/object width												
Object and gap monitor												
Object recognition												
Profile detection												
Time stamp												
Time stamp and debouncing												
Counter												
Counter and debouncing				■	■	■						
Time measurement and debouncing				■	■	■					■	
Additional information	➜ www.sick.com/smart-sensors-search											

	Dx50-2	OD1000	UM18	UC4	UC30	AHS/AHM36 IO-Link	AHS/AHM36 IO-Link Inox	LFP Inox	LFP Cubic	PBS	PBS Hygienic	PAC50	TBS	DOSIC®	SIG100
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	■	■				■	■	■	■	■	■	■	■		
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															■
	■														
	■														

Accessories

Accessories

Connectivity

Modules and gateways

Cloning module

	Brief description	Type	Part no.
	IO-Link version V1.1, port class 2, PIN 2, 4, 5 galvanically connected, supply voltage 18 V DC … 32 V DC (limit values in the event of operation in short-circuit protected network max. 8 A)	IOLP2ZZ-M3201 (SICK Memory Stick)	1064290

Connection modules

	Brief description	Type	Part no.
	IO-Link (V1.1) Device with the high speed counter automation function and remote debouncing. Connections: M12, 5-pin, supply voltage: 18-32 V DC, transmission: COM 2 (38.4 kBaud)	AKS-IXD1CXD15KXA71 (Counter Stick)	1082625
	IO-Link V1.1 port class A, USB2.0 connection, optional external voltage supply 24 V/1 A	IOLA2US-01101 (SiLink2 Master)	1061790

Fieldbus module

|	Brief description	Type	Part no.
	Sensor Integration Gateway, PROFINET IO-Link master, IO-Link V1.1, voltage supply via M12 male connector, 4-pin, 10 … 30 V DC, field bus connection via M12 cable, 4 configurable ports	SIG200 PROFINET (SIG200-0A0412200)	1089794
	Sensor Integration Gateway, REST API IO-Link master, IO-Link V1.1, voltage supply via M12 male connector, 4-pin, 10 … 30 V DC, field bus connection via M12 cable, 4 configurable ports	SIG200 REST (SIG200-0A0G12200)	1102605
	EtherCAT IO-Link master, IO-Link V1.1, voltage supply via 7/8' cable 24 V / 8 A, field bus connection via M12 cable	IOLG2EC-03208R01 (IO-Link Master)	6053254
	EtherNet/IP IO-Link master, IO-Link V1.1, voltage supply via 7/8' cable 24 V / 8 A, field bus connection via M12 cable	IOLG2EI-03208R01 (IO-Link Master)	6053255
	PROFINET IO-Link master, IO-Link V1.1, voltage supply via 7/8' cable 24 V / 8 A, field bus connection via M12 cable	IOLG2PN-03208R01 (IO-Link Master)	6053253

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- ☑ Simple ordering and delivery tracking.
- ☑ Overview of all quotes and orders.
- ☑ Create, save and share personalized wish lists.
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- ☑ Simple reuse of previous orders.
- ☑ Convenient export of quotes and orders in the right format for your systems.

SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

The sophisticated and versatile LifeTime Services perfectly complement SICK's comprehensive product range. Services range from product-independent consulting to traditional product services.
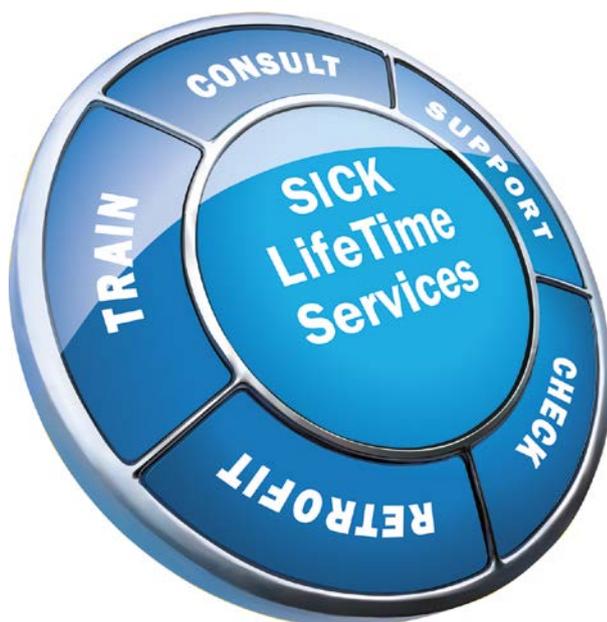
Consulting and design
Secure and professional

Product and system support
Reliable, fast, and on-site

Verification and optimization
Safe and regularly tested

Upgrade and retrofits
Simple, safe, and economical

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 9,700 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.

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