



 **IO-Link**

SMART SENSORS – MORE THAN IO-Link

SUPPLIERS OF INFORMATION FOR INDUSTRY 4.0

Efficient detection of machine reality

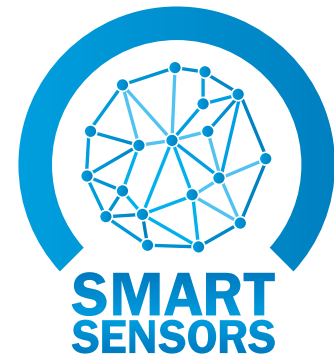
SICK
Sensor Intelligence.

SMART SENSORS FOR 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

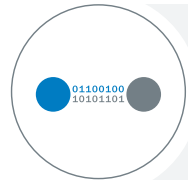
Enhanced Sensing

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 75 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 to 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.

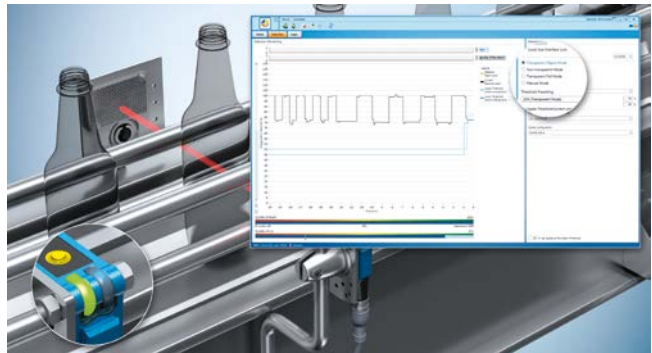


Enhanced Sensing: added value for your application**Advanced adjustments**

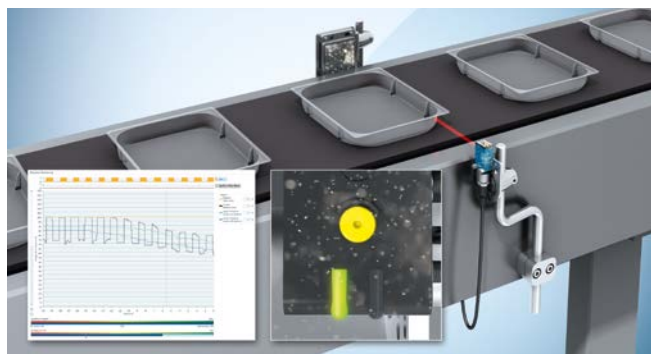
- Accurate and reliable object detection for optimal measurement results
- Individual and fast adjustment for virtually any application up to manual mode
- Stable production processes
- Protection against tampering by selectively disabling control elements

**Predefined operating modes for demanding applications**

- Quick and easy commissioning
- Accurate object detection even with demanding applications
- Application know-how from SICK available at a click

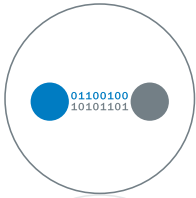
**Simple compensation in case of faults**

- 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

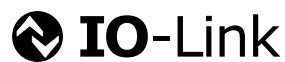
With superordinate control systems, Smart Sensors communicate via IO-Link: The stable communication channel which is used across the globe for sensors and actuators at the lowest field level offers many practical advantages in day-to-day industrial operation.

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

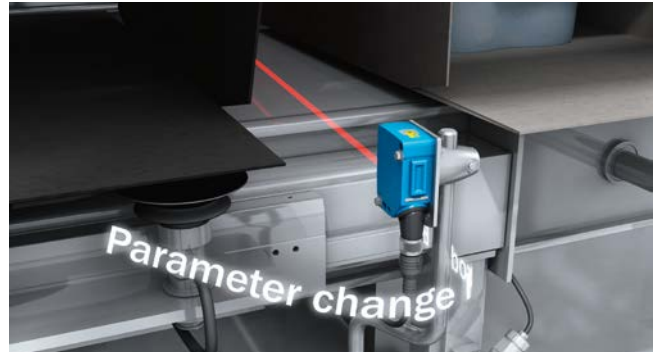
- Flexible manufacturing systems up to batch size 1 requirements
- Fast commissioning and plug and play device replacement with automated setting of sensor parameters
- Continuous digital data transmission
- Device validation, logging and e-parts lists

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**

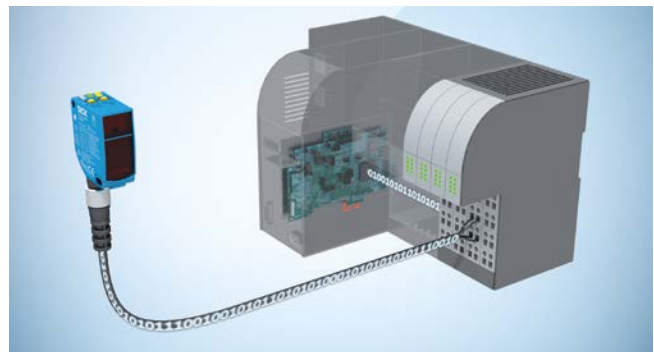
- Higher productivity through reduction of machine downtimes for product changeovers
- The greatest possible flexibility and accuracy thanks to dynamic parameter adjustments of sensors during operation – also for batch size 1
- Automated sensor parameterization by the control unit prevents incorrect 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 downtime.

At a glance

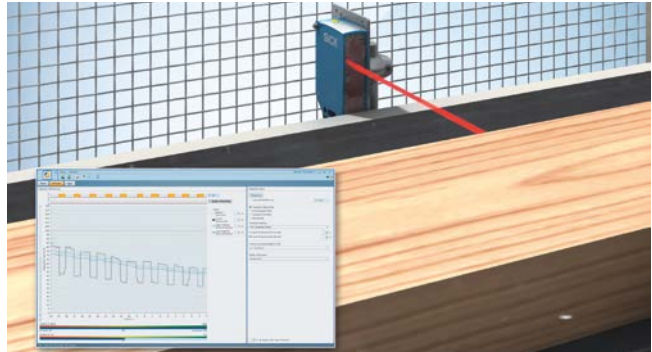
- Sensor self-monitoring during setup and operation
- Continuous monitoring of key process parameters
- Visualization of detection signals and parameters for detailed process and detection analysis

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

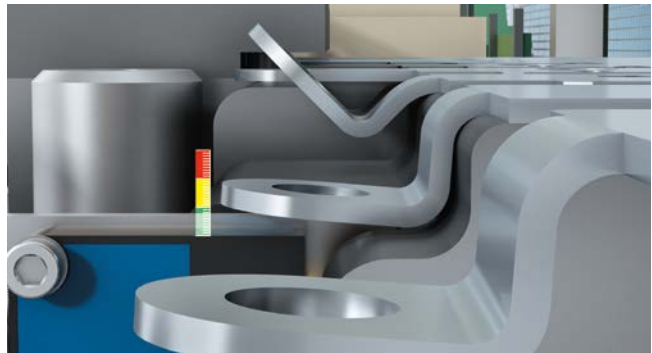


Diagnostics: added value for your application**Sensor self-monitoring during setup and operation**

- 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 controller, 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**

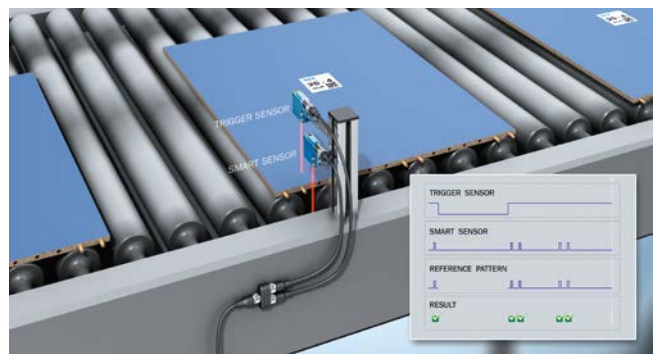
- Determining object speed independent of slippage for more accurate measurement results
- Easy sorting and classification of detection objects based on the object length – independent of conveyor speed
- High flexibility when determining the measuring point
- No corruption of measurement results due 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 traversing 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, SIG350 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 SIG200 and SIG350 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 and SIG350 record all of the sensor data that are 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 or SIG350 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 Devices, 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.



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, SIG200 and SIG350 results in a cost-efficient connection to the fieldbus. With DualTalk, there are also two parallel communication channels available in SIG200 and SIG350. 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

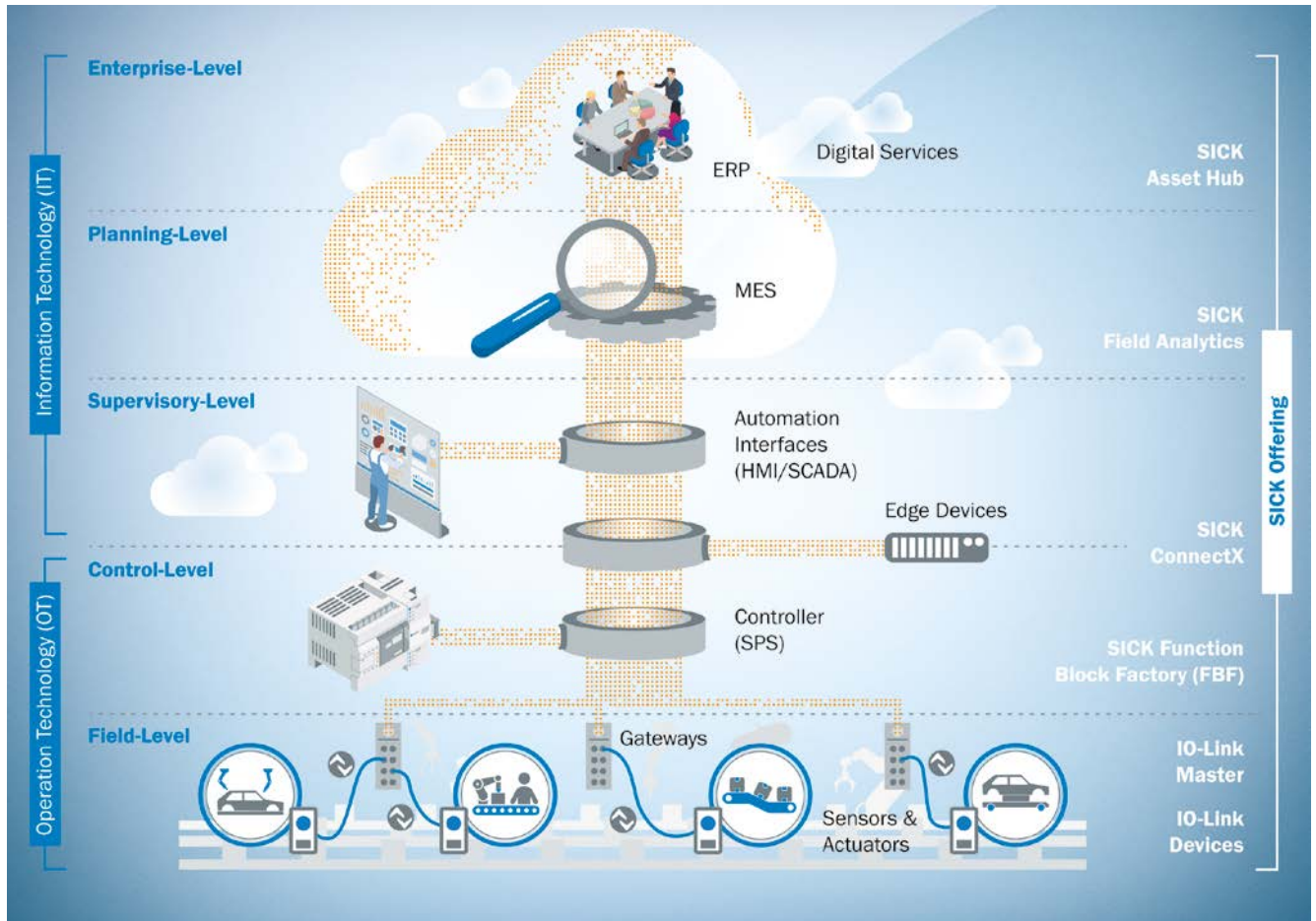
SIG100 and SIG200 can very easily be connected to the SOPAS user interface using the USB port on the device. There, not only the devices themselves, but also the logic functions can be created using drag-and-drop and several of the connected sensors and actuators. Logic functions such as counter or timer 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, SIG200 and SIG350 allows for a unified and efficient wiring concept with full data transparency of each individual standard I/O and IO-Link signal.



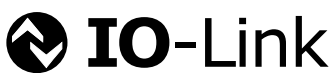
DIGITAL DATA TRANSMISSION IN THE AUTOMATION NETWORK WITH IO-LINK



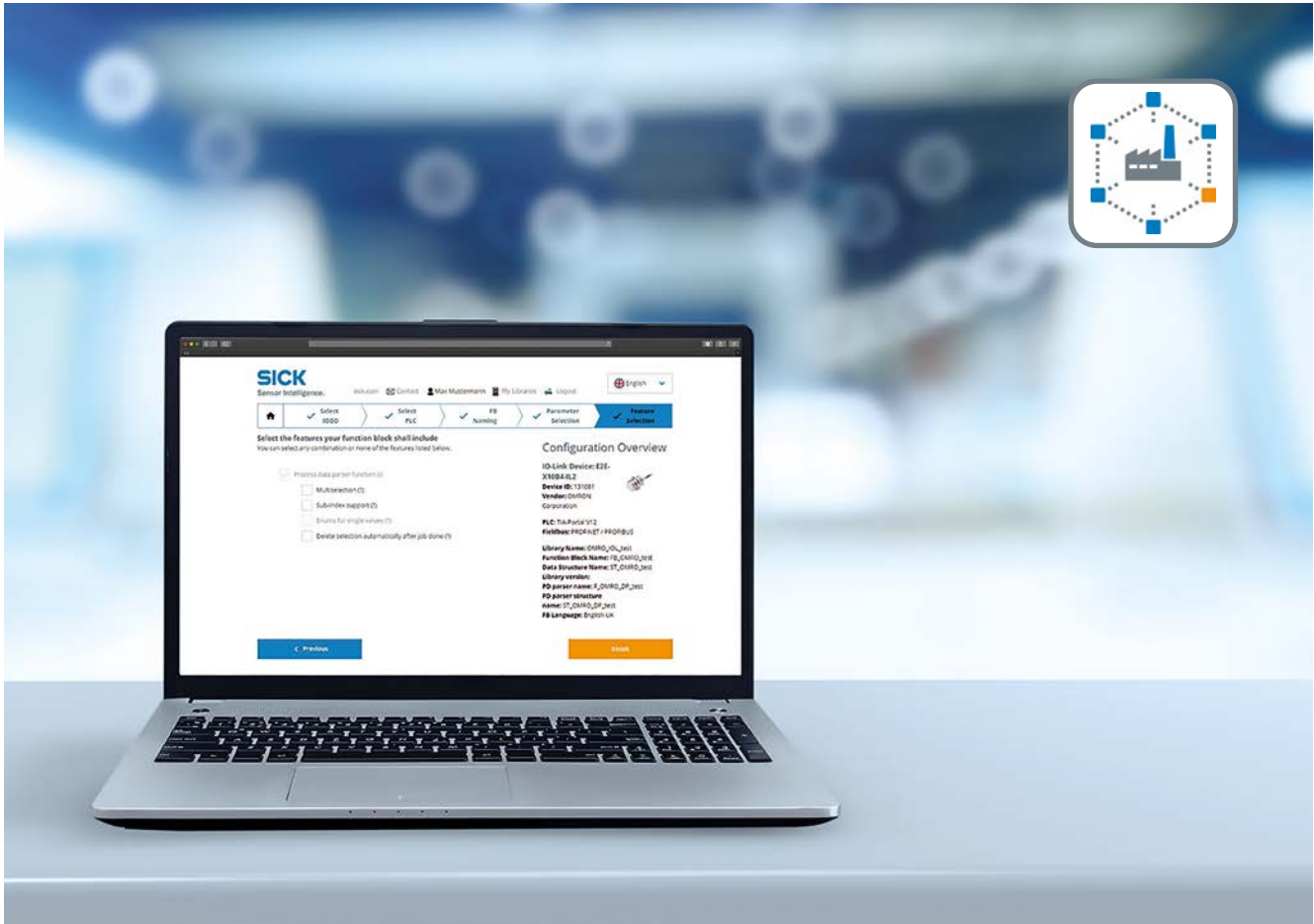
IO-Link

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.



FUNCTION BLOCK FACTORY – DIGITAL SERVICES FOR INTEGRATION



Software-based service for generating PLC function blocks






The Function Block Factory (FBF) digital service from SICK makes it possible to create a PLC function block from an IODD, regardless of the device type and manufacturer. The FBF supports most well-known PLC systems. Function blocks makes reading and writing device parameters easier. You can

also design them individually - this applies both for selecting the PLC and selecting and naming the supported IO-Link device parameters and features. Process data parser functions can also be generated. They considerably facilitate and accelerate PLC programming and prevent errors.




















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.



















We have compiled an overview of the most important Smart Sensor product families for you.

Product	 Enhanced Sensing	 Efficient communication	 Diagnostics	 Smart Tasks
Photoelectric sensors				
 W2	■	■	■	■
 W4	■	■	■	■
 W9	■	■	■	■
 W12	■	■	■	■
 W16	■	■	■	■
 W26	■	■	■	■
 WTT2 PowerProx	■	■		■
 WTT4 PowerProx	■	■		■
 WTT12 PowerProx	■	■		
 RAY10 Reflex Array	■	■	■	■
 RAY26 Reflex Array	■	■	■	■
Fiber-optic sensors				
 WLL80	■	■		■
More information → www.sick.com/smart-sensors-search				

Product	 Enhanced Sensing	 Efficient communication	 Diagnostics	 Smart Tasks
Fork sensors				
 WF	■	■	■	■
 WFL	■	■	■	■
 WFS	■	■	■	■
 UFS	■	■	■	■
Inductive sensors				
 IMC	■	■	■	■
 IMB	■	■	■	
 IMF	■	■	■	
 IMI	■	■	■	
 IMM	■	■	■	
Capacitive sensors				
 CMB	■	■	■	■
Cylinder sensors				
 MZC1	■	■	■	
 MZCG VIA	■	■	■	
 MZT8	■	■	■	
 MZ2Q-C, MZ2Q-T	■	■		
 MPS-M, MPS-T, MPS-C, MPS-G	■	■	■	
 MPA	■	■	■	
More information → www.sick.com/smart-sensors-search				

Product	 Enhanced Sensing	 Efficient communication	 Diagnostics	 Smart Tasks
Array sensors				
 AS30	■	■	■	■
Contrast sensors				
 KTM Prime	■	■	■	■
 KTS	■	■	■	■
 KTX	■	■	■	
Color sensors				
 CSM	■	■	■	
 CSS	■	■	■	■
 CSX	■	■	■	
Luminescence sensors				
 LUTM	■	■	■	
 LUT9	■	■	■	
Glare sensors				
 Glare	■	■	■	■
Optical line guidance sensors				
 OLS	■	■	■	
LiDAR sensors				
 TiM	■	■	■	
Automation light grids				
 SLG-2	■	■	■	■
 MLG-2	■	■	■	■
 FlexChain	■	■	■	■
More information → www.sick.com/smart-sensors-search				

Product	 Enhanced Sensing	 Efficient communication	 Diagnostics	 Smart Tasks
Laser distance sensors				
 Dx35	■	■	■	■
 Dx50-2	■	■	■	■
 Dx80	■	■	■	
 OD1000	■	■	■	
 OD2000	■	■	■	
Ultrasonic sensors				
 UM12	■	■	■	
 UM18	■	■	■	
 UM30	■	■	■	
 UC4	■	■	■	
 UC12	■	■	■	
 UC30	■	■	■	
 UC40	■	■	■	
Encoder				
 AHS/ AHM36	■	■	■	■
 MAS	■	■	■	■
Magnetic-coded identification				
 MIS	■	■		
More information → www.sick.com/smart-sensors-search				

Product	 Enhanced Sensing	 Efficient communication	 Diagnostics	 Smart Tasks
Level sensors				
 LFP Cubic	■	■	■	
 LFP Inox	■	■	■	
 LFV200	■	■	■	
 LFC	■	■	■	
 UP56	■	■	■	
Pressure sensors				
 PBS Plus	■	■	■	
 PBS Hygienic	■	■	■	
 PAC50	■	■	■	
Temperature sensors				
 TBS	■	■	■	
Flow sensors				
 DOSIC®	■	■		
 FTMg	■	■	■	
 T-Easic FTS	■	■	■	
Condition Monitoring sensors				
 Multi Physics Box	■	■	■	
IO-Link Sensorhub				
 SIG100		■		■


More information → www.sick.com/smart-sensors-search

Accessories






Connectivity

Modules and gateways

Connection modules

	Brief description	Type	Part no.
	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
	Sensor Integration Gateway, PROFINET IO-Link master, IO-Link V1.1, voltage supply via M12 male connector, 5-pin, 18 ... 30 V DC, field bus connection via M12 cable, 8 configurable ports	SIG350 PROFINET (SIG350-0004AP100)	6076871
	Sensor Integration Gateway, EtherNet/IP™, REST API, IO-Link master, IO-Link V1.1, voltage supply via M12 male connector, 5-pin, 18 ... 30 V DC, field bus connection via M12 cable, 8 configurable ports	SIG350 Ethernet/IP (SIG350-0005AP100)	6076923
	Sensor Integration Gateway, EtherCAT®, REST API, IO-Link master, IO-Link V1.1, voltage supply via M12 male connector, 5-pin, 18 ... 30 V DC, field bus connection via M12 cable, 8 configurable ports	SIG350 EtherCAT (SIG350-0006AP100)	6076924

SLT visualization

	Brief description	Type	Part no.
	O-Link signal lamp, configuration via SOPAS ET, IO-Link V1.12	SLT SLT060-0B010J700	6075938

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Safe and professional



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



Verification and optimization
Safe and regularly inspected



Upgrade and retrofits
Easy, 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 11,900 employees and over 50 subsidiaries and equity investments, as well as numerous international agencies, SICK is always close to its customers. An extensive range of products and services creates the ideal 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, 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