DRIVING YOUR INDUSTRY 4WARD
SENSOR INTELLIGENCE AS THE FOUNDATION OF INDUSTRY 4.0

SICK
Sensor Intelligence.
Dear Readers,

The history of industrial revolutions can be viewed as an evolutionary process. The precondition for any industrial change is technological progress. The data-based, smart, and autonomous value creation chain in production and logistics is the culmination of recent technological innovations.

We refer to these developments as the fourth industrial revolution. But this is not where the developments end either.

The future is now. What was described a few years ago as Industry 4.0, is now being implemented in practice. The fourth industrial revolution is in full swing. Connected production and control processes in complex machine environments are no longer a thing of the future. The foundation for dynamic, real-time-optimized, and self-organizing industry processes is the gathering of information and further processing of that information.

As providers of data, sensors are essential for the Smart Factory. SICK, an expert in sensors, is therefore at the forefront. Sensor technology is the prerequisite for successful implementation of Industry 4.0. A great responsibility which SICK bears each and every day. Having recognized these developments very early on, the company was already marketing its sensors under the slogan “Sensor Intelligence.” in 2004.

Building blocks of the future
This slogan has already become an everyday reality. SICK sensors perform many more tasks than simply collecting data and information. As building blocks of the future, they act in an intelligent manner and can further process the collected measurement data and autonomously transmit them. And SICK is continuing to make advances in the areas of networking and data transmission. We enable our customers to collect targeted, application-specific data by individually configuring our sensors for optimized and efficient production processes. Let’s continue to build on this together!

Sincerely,

Dr. Robert Bauer
Chairman of the Executive Board of SICK AG
AN IDEA BECOMES REALITY

CONTENTS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The fourth industrial revolution in focus</td>
<td>04</td>
</tr>
<tr>
<td>Networking and digitization</td>
<td>06</td>
</tr>
<tr>
<td>Sensor intelligence in the Smart Factory</td>
<td>10</td>
</tr>
<tr>
<td>Transparent production</td>
<td>12</td>
</tr>
<tr>
<td>Dynamic and flexible production</td>
<td>16</td>
</tr>
<tr>
<td>Automation of quality assurance</td>
<td>20</td>
</tr>
<tr>
<td>Mobile platforms</td>
<td>24</td>
</tr>
<tr>
<td>Human-robot collaboration</td>
<td>28</td>
</tr>
<tr>
<td>Data sovereignty and data security</td>
<td>32</td>
</tr>
<tr>
<td>SICK at a glance</td>
<td>36</td>
</tr>
</tbody>
</table>
THE FOURTH INDUSTRIAL REVOLUTION IN FOCUS

Revolutions change the world. The first industrial revolution began with the invention of the steam engine at the end of the 18th century and the change from manual production to automated production. The second one followed approximately 100 years later with the development of electrically-powered assembly line production, which has made cost-effective series production possible since the first third of the 20th century.

Four industrial revolutions
FROM THE INVENTION OF THE STEAM ENGINE TO THE SMART FACTORY

<table>
<thead>
<tr>
<th>Mechanics</th>
<th>Flow production</th>
<th>Automation</th>
<th>Autonomous flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam engines</td>
<td>Electric motors</td>
<td>Control</td>
<td>Digitization</td>
</tr>
<tr>
<td>POWER</td>
<td>SERIES PRODUCTION</td>
<td>MASS PRODUCTION</td>
<td>RESOURCE EFFICIENCY</td>
</tr>
<tr>
<td>MECHANICAL SENSORS</td>
<td>ELECTROMECHANICAL SENSORS</td>
<td>ELECTRONIC SENSORS</td>
<td>SENSOR INTELLIGENCE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Quality</td>
<td>• Requirement for autonomous action</td>
</tr>
</tbody>
</table>
Industry 3.0 and Industry 4.0

SICK is already taking part in the third industrial revolution which began in the 70s and 80s. Electronic control systems, information technology, electronics, robots, and the increased use of sensors made it possible to further automate production, assembly, and logistics processes. Photoelectric sensors from SICK are already an integral part of these changes and are used around the world and across many industries.

The fourth industrial revolution with its digitization and networking of machines has been changing our lives for some time now. These new technologies have allowed the physical and virtual worlds in production and logistics to merge to form cyber-physical systems (CPS). Since 2011, these developments have been referred to collectively as Industry 4.0. Machines have the ability to communicate with one another autonomously, thereby optimizing process flows. Industry 4.0 clearly relates to networking in the industrial field. SICK plays a very important role in the value creation chain in this area. The prerequisite for communication is an abundance of information, which is what SICK sensors deliver.

Sensor technology as the foundation of Industry 4.0

Sensor technology is the necessary prerequisite for transparent processes in Industry 4.0. The sensor serves as the foundation for all subsequent applications. In short: Without sensor technology, there would be no Industry 4.0.

In contrast to conventional, non-connected sensors, Industry 4.0 sensors deliver more than just measurement data. Their integrated, decentralized computing power and flexible programmability are important characteristics for making production more flexible, dynamic, and efficient.

To find out more, visit our website:

[www.sick.com/industry40](http://www.sick.com/industry40)

Integration into automation networks through networking, new levels of communication, and data security – these are the three key topics for SICK in the context of Industry 4.0.
NETWORKING AND DIGITIZATION

The nature of communication is changing. In transparent production processes, machines and sensors communicate both with one another as well as directly over the Ethernet or in the cloud, thereby transforming a closed system into an open one. But not only the quantity of the information processed in-situ is changing. The quality is being raised to a whole new level as well. Information about the status of the production equipment and associated predictions of the likelihood of production downtime with the aid of innovative feedback systems, are but one example. All of this has been made possible by the rapid increase in computing power, which can be employed remotely at the so-called edge of the network or the production base. This results in a more flexible and dynamic production that can respond individually and quickly to customer requirements at any time.

Communication levels in present-day factories

The until now commonly used mode of communication from sensors to control units and the superordinate distributed control, production, and company levels is a closed system. In such a system, data is communicated by field devices, i.e., sensors and actuators, to the programmable logic controller (PLC).
Networking and digitization

In future, decentralized computing power will convert data into information directly within the sensor. Decisions are made in a decentralized manner. Process-, production-, and company-related information is transmitted directly to the Ethernet or in the cloud for the downstream process.

**Connected information**

The cloud will play an increasingly important role in managing the overall process in future. The actual primary computing power, however, is increasingly being relocated to the edge. Sensors convert the collected data into information, which is then processed via the Ethernet or in the cloud for the downstream process.

**Communication levels in the era of Industry 4.0**

In future, decentralized computing power will convert data into information directly within the sensor. Decisions are made in a decentralized manner. Process-, production-, and company-related information is transmitted directly to the Ethernet or the cloud.
TURNING DATA INTO INFORMATION

Sensors are the first point of contact with and the connecting link to Industry 4.0. Whereas the aim in the past was to simply collect data and make simple decisions, today’s sensor intelligence also enables data to be prepared and further processed into information. Sensors therefore no longer just “sense,” with the beginnings of digitization they are also starting to “think.” From this point onwards, the transmission of the produced information becomes the key technology. The success of smart value creation chains is heavily dependent on the successful integration of sensors in the overall architecture of an application.

To reliably communicate with the network, it is essential that it is clearly defined which data are required, and that they are integrated into the connected data world. Selecting the right type of communication protocol for a defined path plays an important part in this. Although Ethernet-based solutions are most common, IO-Link can also be used to establish network connection, particularly for devices that only require limited communication abilities.

In a smart production environment, many different sensors collect a high volume of data at many different locations, thereby increasing the importance of decentralized data processing. Additional interfaces to the data or software system enable new analyses and functions to be performed, which increases flexibility, quality, efficiency, and transparency in production.

Once the crucial issues regarding data security have finally been resolved, the cloud will play an ever increasingly important role in the near future. Then, it will be possible to send sensor data directly to the cloud via application-specific connection technology – while bypassing the control system altogether.

The successful and comprehensive networking of all sensors to centralized or decentralized data processing systems opens up an unprecedented number of solutions. And an unparalleled quality of transparency is achieved throughout the entire process on account of the data and communication protocols used.

In a smart production environment, sensors collect data and immediately process them further. The information collected in this manner is then communicated either to the Ethernet or directly into the cloud. Knowledge without detours.
TURNING DATA INTO INFORMATION  Networking and digitization

Complete networking of all data within a secure environment
SENSOR INTELLIGENCE IN THE SMART FACTORY

The Smart Factory is a prerequisite for Industry 4.0. Every sensor, every machine, and every human involved can communicate with and among one another at any time. This information exchange does not end at the factory gates, however. The interplay of edge and cloud also allows production and data management from and to the outside. This intensive cooperation between technology and humans makes the process more transparent, productive, and profitable.
1. Transparent production
Always knowing what is happening when, where, and how. This transparency enables the entire production or supply process from A to Z to be tracked and influenced in real time.

2. Dynamic and flexible production
The progressive automation of production supports flexibility and very small batch sizes. Customer needs become the focus, and batch-size-1 production can finally be profitably implemented as well.

3. Automation of quality assurance
Improvements in computing power are also changing the visual capabilities of image-based solutions for quality assurance and sensor-supported production management. SICK sensors are keeping the quality of products always in sight.

4. Mobile platforms
Mobile systems are increasingly being integrated into the production chain. Automated guided vehicles from small to large are providing assistance, safely and without accidents, in almost every industrial environment.

5. Human-robot collaboration
True collaboration means more than just cooperation and coexistence. Humans and machines are engaging on an equal footing, and working hand in hand within the same workspace.
TRANSPARENT PRODUCTION

The positive impact of Industry 4.0 networking on the overall production process is identified as consistent transparency throughout production. When the networking is successful, this type of transparent production provides an overview of all production and logistics processes along the entire supply chain, right through to order fulfillment and delivery to the customer. This reduces material and resource consumption, and optimizes the production and delivery networks as a whole. Intelligent track and trace solutions generate data and information that enable seamless detection, identification, and tracing of products and materials in the connected process chain.

Seamlessly connected: every product firmly in sight
Track and trace solutions can be implemented using a wide range of different technologies. When it comes to achieving the best possible reading performance and system integration, the choice of identification technology varies depending on the respective requirements. In the Smart Factory, RFID and programmable cameras are the most popular choice as Industry-4.0-compatible solutions. The sensor technology along the production chain uses the data cards to directly detect which assembly steps are to be initiated, thereby ensuring comprehensive transparency right through to delivery.

Transparency for every process
Today, sensor intelligence is not just about recording reality accurately, but also about processing the information directly in the sensor. For example, thanks to a flexible output format, the data output can be adjusted exactly to suit requirements by setting and linking the logical conditions. In light of all this, each technology will continue to have its place in the future: RFID, for example, makes it possible to read and write data and therefore reuse the data cards; it also does not require direct “visual contact.” Image-based code readers, on the other hand, are able to read 2D codes and plain text. Any stored images can be archived and analyzed.

A complete overview of every production and logistics step – this is the declared goal of transparent production. There are a wide variety of technical solutions available depending on individual requirements.
Transparency for every process.
RFU63x – at a glance

- Industry-standard UHF RFID writing/reading unit
- With or without integrated antenna depending on type (up to four antennas can be connected)
- Standards-compatible transponder interface (ISO/IEC 18000-6C/EPC G2C1)
- Supports industry-standard data interfaces and fieldbuses
- MicroSD memory card can be used for parameter cloning
- Extensive diagnostic and service functions

Your benefits

- Can also be used as a stand-alone system thanks to intelligent process logic
- Optimum and stable reading performance
- Can be easily integrated into industrial networks thanks to 4Dpro compatibility
- Easy to replace thanks to the cloning back-up system on the MicroSD card
- Easy to configure for application-specific requirements using the SOPAS interface
- Simplified diagnostics thanks to the LED signal on the device which can be freely assigned

Lector63x – at a glance

- Code reader with up to 2-megapixel sensor
- Flexible optics and filter design
- Integrated, replaceable high-power illumination
- Intuitive user interface, with flexible result string with code analysis options
- Function buttons, aiming laser, acoustic feedback signal, and green feedback LED
- microSD memory card

Your benefits

- High-resolution sensor and intelligent processing ensure outstanding reading performance, even under difficult reading conditions
- Flexible optical design and high-power illumination enable small codes to be read at high speeds or in applications with a large reading distance
- Fast, straightforward commissioning thanks to the intuitive user interface; function button for rapid device setup; integrated illumination and aiming laser
- Direct results monitoring thanks to acoustic signal and colored feedback spot on the object
- Few machine downtimes in the event of faults on the production line, thanks to straightforward cloning function using microSD memory card

www.sick.com/RFU63x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
TiM3xx – at a glance

- Incredibly compact, light, and economical sensor
- Field evaluation using intelligent software algorithms
- Configuration interface accessible from the side when the device is mounted
- Low power consumption (typically 4 W)

Your benefits

- Low operating costs
- Flexible installation due to compact dimensions
- Low implementation and replacement costs due to M12 x 12 or D-Sub male connector
- Long battery service life when used in battery-operated vehicles
- Easy commissioning thanks to pre-configured field sets
- Low costs as a result of monitoring large fields (up to 235 m²) with just one scanner
- No cabling required between sender and receiver
- For TiM3xxS only: Can be used in safety-related applications

SIM1000 – at a glance

- Programmable Sensor Integration Machine for multiple sensor data acquisition
- 11 interfaces for connecting SICK sensors via Ethernet, IO-Link, serial interface, or CAN bus
- Parallel “dual talk” via Ethernet interfaces for transmitting preprocessed data (edge computing) for control and cloud computing in the context of Industry 4.0
- Aggregation of arbitrary identification codes from laser- or image-based code readers or SICK RFID sensors via a CAN network
- Precise synchronization of input and output signals
- Web-based, customizable user interface
- IP65 enclosure rating

Your benefits

- Tailored application development using SICK AppSpace
- Recording, evaluation, and archiving of data from multiple sensors, enabling quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0
- Less development work required as sensor apps can be readily reused within SICK AppSpace devices
- Quick and easy commissioning thanks to prefabricated cables with M12 connections
DYNAMIC AND FLEXIBLE PRODUCTION

Flexibility and productivity working in harmony
Batch-size-1 production is a mechanical engineering challenge. Low quantities and individualized mass-produced products are the keywords of Industry 4.0. To make this a reality, a machine or plant must be able to handle variable product infeeds and adapt to different formats. This is the only way to ensure that goods can be produced individually to suit customer needs right down to batch size 1, or be adapted to suit fluctuations in demand as flexibly and efficiently as possible. Intelligent sensor technology goes hand in hand with a new standard of quality in flexibility. This technology makes it possible to collect production data in real time. Sensor technology from SICK supports and relieves data processing tasks by using intelligent functions to evaluate measurement data directly within the sensor and transfer the relevant user data in the form of prepared information.

Flexible production in the starting blocks
As the level of automation in a plant increases, the tasks of the individual components increase as well: Photoelectric sensors with flexible sensor settings and diagnostic functions, for example, are already used in applications across a range of industries. Inductive, IO-Link-enabled proximity sensors perform complex tasks directly in the sensor. Contrast sensors, level sensors, and electronic pressure switches communicate parameter settings via integrated IO-Link interfaces. Measuring automation light grids reduce the amount of cabling in production environments and enable access to diagnostic functions and format changes. Encoders with EtherNet/IP™ feature an active web server as well as function blocks for fieldbus integration. Compact 2D LiDAR sensors (also 2D laser scanners) provide reliable object detection in the field of surface monitoring.

Application specialists use this portfolio to develop tailored concepts with SICK AppSpace for optimizing production processes. SICK enables Industry 4.0 in every industry.

Achieving batch size 1, the ultimate in dynamic and flexible production, requires a high level of sensor support. SICK, with its huge portfolio of sensors, provides the foundation for successfully meeting this challenge.
SICK AppSpace – giving space to your ideas and solutions

By networking all participating devices and establishing a secure, decentralized data exchange, it is possible to implement a wide variety of applications. These can be provided either via the cloud or via programmable logic controllers at the machine and system level. SICK has developed for this purpose the SICK AppSpace eco-system, a platform on which developers can exchange information and create apps for SICK sensors.
SICK AppStudio – at a glance

- Overview illustration of input windows and status information
- AppExplorer for displaying and managing sensor app components
- Graphical Flow Editor for block programming
- AppMonitor for visualizing system performance and usage
- ViewBuilder for easily creating a web GUI
- Convenient debugger with visualization in the form of 2D and 3D images
- Recording and playback of data streams for optimization of sensor apps

Your benefits

- The editor with convenient auto-completion function makes program creation easier and quicker
- Emulator functions make programming of sensor apps possible even when no programmable SICK device is connected to the PC
- Time savings when searching for programming errors thanks to the debugger
- CPU and memory usage display provides information about the performance of the connected programmable devices in the functioning state
- Quick integration and creation of sensor apps thanks to many example programs
- Multiple instances allow for the simultaneous connection to several programmable devices
- A validation option ensures the correct assignment of sensor apps to the appropriate programmable device in the field

→ www.sick.com/SICK_AppStudio

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

SICK AppManager – at a glance

- Clear display in three windows: connected programmable devices, currently loaded sensor apps and firmware versions and newly available sensor apps and firmware packages
- Optional connection to the SICK AppPool for up- and downloading sensor apps
- Simultaneous installation of several programmable devices possible
- Back-up function for securing installed sensor apps
- SD card cloning for easy and safe transfer of sensor apps to identical programmable devices from SICK

Your benefits

- A clear display and easy operation facilitate the installation of sensor apps on programmable SICK devices in the field as well as app management
- Connection to the SICK AppPool enables worldwide availability of sensor apps and their assignment to respective programmable devices
- Software package validation guarantees the correct assignment of sensor apps to the appropriate programmable device in the field
- Firmware updates of SICK devices can be run without additional software

→ www.sick.com/SICK_AppManager

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
SIM2000 – at a glance

- Programmable Sensor Integration Machine for multiple sensor data acquisition and merging
- 16 interfaces for the connection and voltage supply of SICK sensors via Ethernet, IO-Link, serial interface, or CAN bus
- Parallel “dual talk” via fieldbus and Ethernet interfaces for transmitting preprocessed data (edge computing) for control and cloud computing in the context of Industry 4.0
- Precise synchronization of input and output signals
- Web-based, customizable user interface
- IP65 enclosure rating

Your benefits

- Tailored application development using SICK AppSpace
- High-performance, innovative application solutions through merging of sensor data
- Recording, evaluation, and archiving of data from multiple sensors, enabling quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0
- Quick and flexible sensor integration thanks to the out-of-the-box functions of the SICK Algorithm API and Interface API
- Less development work required as sensor apps can be readily reused within SICK AppSpace devices
- Quick and easy commissioning thanks to prefabricated cables with M12 connections

InspectorP65x – at a glance

- Programmable 2D cameras (2.1 and 4.2 megapixels)
- Flexible C-mount lenses and integrated illumination
- 4Dpro interfaces
- Aiming laser, beeper and feedback spot
- Powered by the HALCON 12 image processing software
- Scripted in SICK AppStudio
- Web-based user interface

Your benefits

- SICK AppSpace development framework offers full software flexibility for tailored solutions
- Includes a runtime license for HALCON 12, the world’s leading software for industrial image processing
- The quickly programmable, high-resolution 2D cameras guarantee optimum performance
- Flexible optical design and high-power lighting enable long-distance and large FOV setups
- Unique operator interaction possibilities thanks to powerful set of convenience features
- Smooth commissioning with customized operator interface and SICK AppManager

→ www.sick.com/InspectorP65x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
AUTOMATION OF QUALITY ASSURANCE

Quality assurance is the prerequisite for sustainable business operations and stable profits. It encompasses both material management as well as operational checks and machine and production monitoring. This makes it possible to reduce stock levels and shorten throughput times. Sensor solutions for process monitoring and quality assurance provide added flexibility and autonomous adaptation in the case of changes to quality and products. As a result, they offer resource efficiency, a lower reject rate, and a high level of throughput.

In industrial environments, capturing reality safely and reliably requires much more than just a single vision. That is why SICK offers a broad spectrum of vision sensors, from compact devices that are easy to integrate, to configurable stand-alone solutions, and right through to programmable high-speed cameras for the most demanding of requirements.

Using both established modules from SICK and integration-ready functions from various image processing libraries, it is possible to create new solutions that provide the perfect match for customers’ requirements and are compatible with tasks in the context of Industry 4.0. Such tasks include quality control, track and trace, object data capture, and predictive maintenance, for example.

SICK follows a vision. Such as with camera-based quality control for monitoring functions and machines as well as with predictive maintenance and object data acquisition.
The future firmly in view
Pinspector – at a glance

- Full-scale solution for the inspection of PCBs and pin connectors
- Autonomous modular system
- Rugged design suitable for industrial use
- Ranger cameras from SICK for high-precision 3D imaging
- Three versions – high value, fast inspection, and double-camera to prevent occlusion

Your benefits

- Prevention of inaccurately fitted pins on PCBs
- Optimization of manufacturing processes
- Cost savings thanks to fewer faulty products (no bended pins or cold joints)
- Fast and accurate inspection of x, y, z pin position
- One system inspects multiple PCBs and pin connectors
- User-friendly drag and drop interface with many possible measurement settings
- Low maintenance costs thanks to non-contact measurement
- History tracking – a wide range of logging and reporting options

SIM4000 – at a glance

- Wide range of connections with 25 interfaces for Ethernet-based fieldbuses, cameras, illumination, sensors, encoders, and more besides
- 8-gigabit Ethernet interfaces for rapid image transmission
- Fieldbus and Ethernet interfaces with communication protocols such as OPC-UA and MQTT provide preprocessed data (edge computing) for the control and for cloud computing in parallel “dual talk”, thereby allowing networking for digital factories
- Precise synchronization of input and output signals
- Illumination control and supply
- IO-Link master connections
- Enclosure rating IP65

Your benefits

- Tailored application development with SICK AppSpace
- High-performance, innovative application solutions through merging of sensor and camera data
- The integrated HALCON library and the SICK API algorithm opens up a whole host of image processing possibilities for every industrial field of application
- Recording, evaluation, and archiving of data from multiple cameras and sensors, enabling quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0
- Real-time-capable hardware reduces integration work in, for example, time-critical robotics applications
- Quick and easy commissioning thanks to prefabricated cables with M12 connections

www.sick.com/Pinspector

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

www.sick.com/SIM4000

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
TriSpector1000 – at a glance

- 3D inspection of moving parts
- Intuitive user interface
- Embedded image analysis
- Easy replacement concept
- High resolution 3D image with intensity overlay
- Factory calibrated 3D data, true mm values in all dimensions
- Rugged IP67 metal housing

Your benefits

- Reliable 3D inspection even when the color, position and height of the parts vary
- Easy commissioning and operation thanks to an intuitive user interface
- Integrated image analysis for fast configuration
- Quick device replacement thanks to guaranteed field of view and re-use of saved settings
- Intensity data improves 3D navigation and allows the system to check for the presence of labels, printed patterns, or object rotation
- Factory calibrated data simplifies setup and reduces time and effort
- Withstands the harsh environments and harsh conditions in the food industry

InspectorP63x – at a glance

- Programmable 2D cameras (1.3 and 1.9 megapixels)
- Flexible S- and C-mount lenses and integrated illumination
- 4Dpro interfaces
- Aiming laser, beeper and feedback spot
- Powered by the HALCON 12 image processing software
- Scripted in SICK AppStudio
- Web-based user interface

Your benefits

- SICK AppSpace development framework offers full software flexibility for tailored solutions
- Includes a runtime license for HALCON 12, the world’s leading software for industrial image processing
- The quickly programmable, high-resolution 2D cameras guarantee optimum performance
- Flexible optical design enables analysis of small features at high speeds
- Unique operator interaction possibilities thanks to powerful set of convenience features
- Smooth commissioning with customized operator interface and SICK AppManager

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
MOBILE PLATFORMS

Industry 4.0 also creates mobility: Using customized sensor and navigation systems, automated guided vehicle systems (AGV systems) in the intralogistics of a factory are succeeding in breaking down production barriers and greatly increasing the flexibility of processes.

Modular sensor solutions for mobile platforms
AGVs and AGV systems are now employed in almost all areas of industry, for example as production supply solutions, as transport platforms on assembly lines, and as an integral part of warehouse logistics systems. The technical possibilities and the resulting application options of AGV systems have increased significantly in recent years. They are enormously important for providing flexible, economical, and future-proof solutions. Because of the wide variety of different purposes the sensor solutions are used for, they need to be scalable and modular in order to make the transport of goods safer, faster, and more transparent. This allows risks and the causes of faults to be systematically eliminated. It also means that a number of different stages in the production process can be accelerated.

SICK’s portfolio ranges from sensor solutions for small AGVs, the so-called automated guided carts (AGCs), right through to specialized AGVs.

Collision-free collaborators
Cost-effective AGCs should run through production paths, which can be very narrow at times, without posing a risk to persons, machines, and transported goods. Sensor and system solutions from SICK help to reliably protect humans and property from collisions, while at the same time collecting all necessary data for the dependable and flexible navigation of AGCs. They manage high speeds even when going around curves thanks to the switching of protective fields. Reliable detection of speed and direction of travel with safety solutions from SICK also reduces the number of components, and thereby the required installation space in AGCs.

Collision-free, precision-guided assistance
Automated material transport that makes great sense
**OLS – at a glance**

- Detection of luminescent adhesive tape
- Very high signal-to-noise ratio (~1:1,000)
- 180 mm reading field (up to 3 lanes can be read at the same time)
- Output of deviation from lane center point and reading out of bar codes
- Insensitive to ambient light, contamination or glare
- Compensation for surface defects
- Measurement accuracy: ± 1 mm
- CANopen and Ethernet (TCP/IP)

**Your benefits**

- Rugged and accurate, insensitive to ambient light, contamination or surface defects
- Independent of base material or color
- Simple lane shifts and route changes by attaching conventional adhesive tape
- Small curve radii of up to 0.5 m possible
- Large reading field enables flexible lane shifts (branches, junctions)
- Reading bar codes makes it possible to transmit distance information or drive commands and simplifies vehicle control
- Cost efficient compared to camera solutions
- Low installation costs

---

**MLS – at a glance**

- Detection of magnetic lines for line guidance
- Detection of switches: up to 3 lanes at a time
- Resolution 1 mm, repeatability 1 mm
- CANopen interface
- Detection of control marks
- IP65, IP67, IP68
- Ambient temperature –20 °C ... +70 °C
- Variants with measuring ranges of 100 mm to 1,000 mm

**Your benefits**

- Rugged aluminum housing
- Easy installation: Thin housing design and different measurement area variants
- Quick commissioning without configuration. Optional configuration and visualization via a user interface.
- Large ground clearance: 10 mm to 50 mm of distance to the magnetic band can be installed
- Reliable lane detection and differentiation of up to 3 lanes for intersections and lane junctions
- Monitoring of magnetic strength of the guidance lane
- Easy and reliable detection of command marks (STOP, MERGE, SPEED CHANGE)
- Complete accessories available: Magnetic band for lanes and markers, mounting bracket

---

 далее
Functional app for SICK sensors
Contour localization in changing environments – at a glance

• Precise localization on the basis of the existing environment
• Automatically adapts to changes in the environment
• Supports many SICK laser scanners

Your benefits
• Quick and easy commissioning
• Installation of reflectors and other additional infrastructure not necessary
• SICK initially creates a high-precision map of the surrounding area
• Easy configuration and visualization in the browser

SIM1000 FX – at a glance

• Programmable Sensor Integration Machine for multiple sensor data acquisition
• Can also be used in combination with the Flexi Soft safety controller as a solution for safe and unsafe applications
• Interfaces for connecting SICK sensors via Ethernet, IO-Link, serial interface, or CAN bus
• 4 Ethernet interfaces for connecting LiDAR sensors from SICK
• IP20 enclosure rating for mounting DIN mounting rails in the control cabinet

Your benefits
• Tailored application development using SICK AppSpace
• Quick and flexible sensor integration thanks to the out-of-the-box functions of the SICK Algorithm API and Interface API
• Optimized procedure for localizing contours and updating maps for automated guided vehicles (AGV) and automated guided vehicle systems (AGVs)
• Modularity thanks to the ease with which other components can be integrated into the Flexi Soft architecture
In the Smart Factory, humans and robots are brought into even closer proximity. In the spirit of a modern division of labor, SICK sensors are offering robots a helping hand and providing them with a set of eyes for accomplishing their tasks in the industrial environment. This closer interaction between humans and machines calls for safety solutions that can respond with absolute reliability and a high level of flexibility.

The aim is to turn cooperation and coexistence into true collaboration. Instead of autonomous or semi-autonomous robotics, the Smart Factory of tomorrow places great store on a close interaction between robots and humans. In these so-called collaborative scenarios, the force, speed, and paths of the robot and workpiece pose a risk to workers. These risks must be minimized either by using inherent safety measures or by employing additional measures. SICK has made significant advances in this area in recent years.

Hand in hand – with no fear of contact
Flexible safety

It is already possible to adapt safety sensors accurately to the current machine process. Intelligent algorithms are making it possible, for example, to move away from digitally activated safety technology in favor of a continuous machine response based on the current position of the worker or the plant. This means that the worker approaching the machine no longer triggers a complete shutdown, but rather an appropriate reduction in the working speed or adjustments to the directions of movement, thereby ensuring the safety of persons at all times and allowing production to continue uninterrupted. This results in significantly less downtime and unintended shutdowns, shorter cycle times, and an increase in the efficiency and availability of the machines and plants.

Functional safety in human-robot collaboration (HRC)

A high level of automation versus flexible production workflows: Where people and machines now have to work more closely and also more safely together, functional safety will take today’s production systems an important step closer to greater flexibility. If the ultimate goal is complete collaboration – where humans and robots share the same workspace and carry out their work there simultaneously – then it makes sense to develop solutions that also enable coexistence and cooperation. With 70 years of experience and know-how to draw upon, SICK has assembled a huge portfolio of safety solutions in its product range.

Safety expertise in the portfolio

The programmable safety controller with accompanying software, which can also be combined with a safe series connection, makes it possible to protect a large number of hazardous points at the same time. The new generation of safety laser scanners reliably protects hazardous areas, access points, and hazardous points. High-performance safety light curtains can be used as compact muting alternatives without additional sensors and to provide high-availability hazardous point and area protection. SICK maximizes the availability of protective devices and keeps machine and plant downtime to a minimum with its products.

To find out more, visit our website:

www.sick.com/human-robot-collaboration
**microScan3 Core – at a glance**

- Innovative safeHDDM® scanning technology
- Protective field range 5.5 m; scanning angle 275°
- Up to 8 freely configurable fields
- Up to 4 simultaneous protective fields

**Your benefits**

- safeHDDM®: innovative scanning technology for an outstanding ratio between wide sensing range and compact design for simple integration in your machine
- Rugged design: developed for harsh industrial day-to-day work, the microScan3 is resilient and reliable, and increases productivity

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

---

**S3000 Expert – at a glance**

- 4 m, 5.5 m or 7 m protective field range
- 32 switchable field sets
- Configuration memory integrated in the system plug
- EFI interface for safe SICK device communication
- Incremental encoder inputs for speed-dependent field switching
- Extended measurement data output via RS-422 with landmark recognition
- Simultaneous monitoring of up to 4 protective fields

**Your benefits**

- Large protective field range of 7 m makes it suitable for a wide range of applications
- Variety of field sets guarantees safety and productivity when protecting vehicles or moving machine parts
- Modular expansion modules, simple cabling, and additional functions such as simultaneous monitoring of up to four protective fields using SICK safety controllers via EFI
- The correct protective field at any speed avoids unnecessary stops
- Personnel protection and navigation support in one device
- Easy installation, commissioning, and maintenance for stationary and mobile applications
- Decades of proven safety technology guarantee maximum reliability and availability – even under difficult conditions

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
**Flexi Soft – 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

**Safe Robotics Area Protection – at a glance**

- Adjustment of the robot conditions to the worker position
- Initiation of robot safety-rated monitored speed
- Automatic restart with sequence monitoring
- Performance level PL d, category 3 (EN ISO 10218)
- Easy integration due to supplied function block
- Can be integrated into common robot controls

**Your benefits**

- Unlimited and safe access - protection of the hazardous area
- Reduces downtimes, optimizes the worker’s processes, increases productivity
- 2-stage reduction and increase in robot speed reduces wear, thereby increasing the life duration of the robot
- Easy integration into the control of all common industrial robots
- Low installation effort reduces costs
- Future-proof as it can be expanded flexibly and easily adapted to the robot environment
- Proven combination of reliable safety components from SICK integrated in a tried-and-tested safety system

_for more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more._
DATA SOVEREIGNTY AND DATA SECURITY

Production data are a most valuable asset for every company. That is why they are so important for commercial success and why they require special protection. SICK’s products and system solutions are right at the very beginning of the smart value creation chain. When humans are taken out of the process, sensor technology becomes the only source of production data – and the reliability of this data affects the subsequent success of the connected processes.

SICK applies two essential principles to sensor data collection: Firstly, the collected data must be protected against manipulation at all times. Secondly, there must be clear definitions in place with regard to who is authorized to process the data at subsequent stages of the value creation chain. We refer to these principles as data sovereignty.

While data-collecting sensors are the physical prerequisite for Industry 4.0, data sovereignty is important from a psychological point of view. After all, only companies who have full faith in the security of their network will be prepared to feed data into it.

Guaranteeing data sovereignty: a joint effort

In order to fully exploit the potential of Industry 4.0, the network of parties involved must think and act beyond the boundaries of their own production systems. If supplier, manufacturer, and customer processes are to link up seamlessly and automatically, data sovereignty is the key to success. Many companies consider cloud applications to be insufficiently mature at this time to guarantee data security. To become independent from commercial cloud suppliers and to think through data security issues on behalf of its customers, SICK co-founded the International Data Spaces Association initiative.
Data sovereignty and data security

Successful data management is the key to a functioning Industry 4.0. Only with secure data can the vision be turned into reality. In the context of Industry 4.0, this joint initiative of the Fraunhofer-Gesellschaft and several companies, which is supported by the German Federal Ministry of Education and Research, aims to create a secure data space within which enterprises of different industries and different sizes can autonomously manage their data assets.
SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 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