INDUSTRIAL VEHICLES

INTELLIGENT SENSOR SOLUTIONS FOR SMART MATERIAL TRANSPORT IN PRODUCTION AND LOGISTICS

Always one step ahead.

SICK
Sensor Intelligence.

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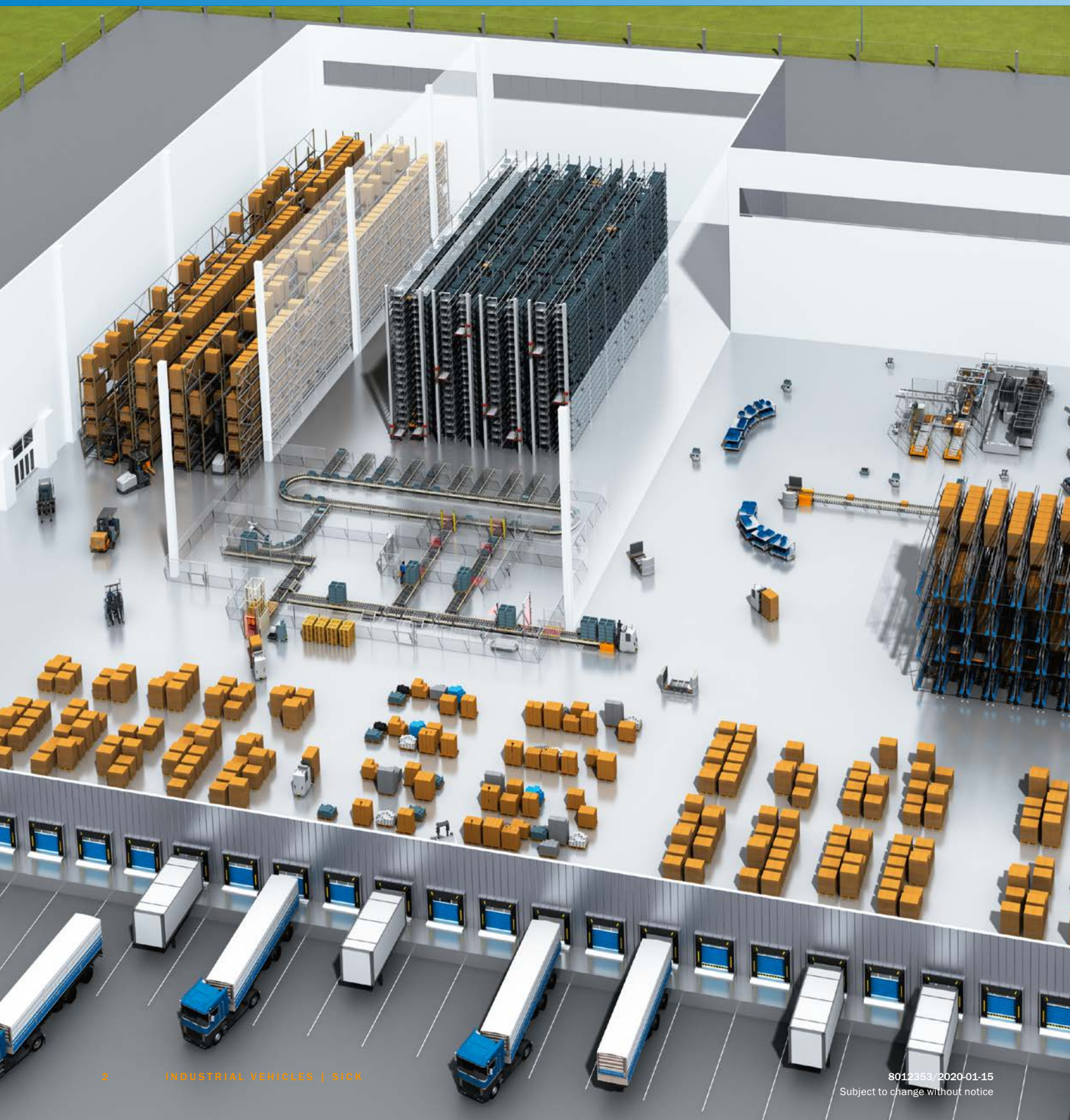

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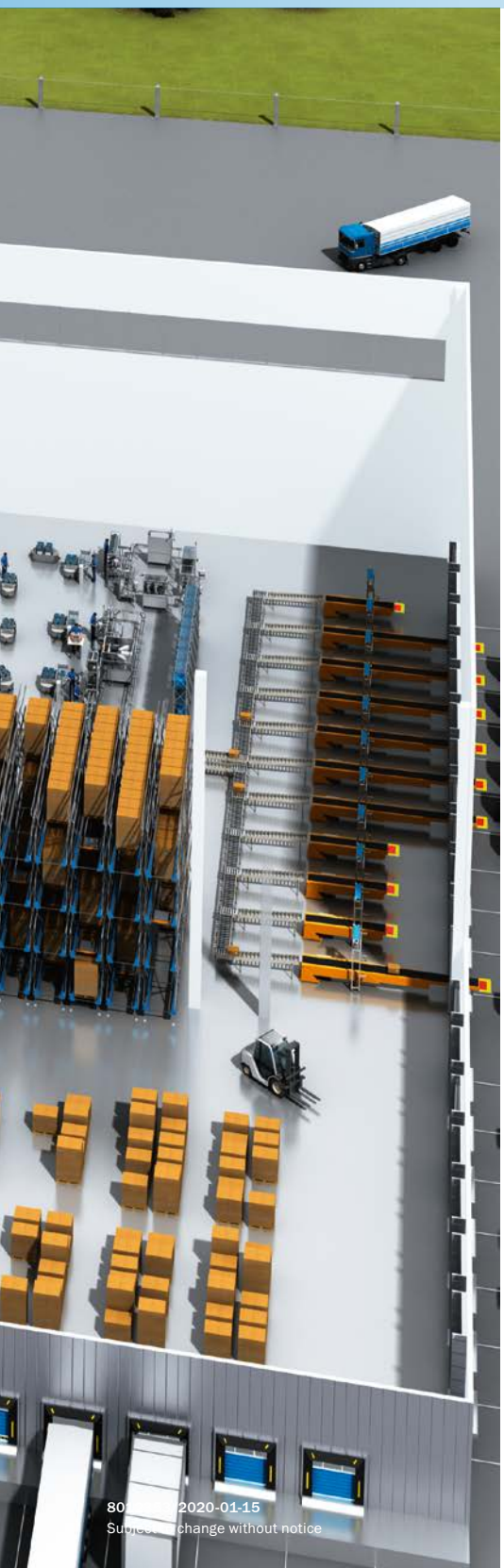

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CHALLENGES IN THE USE OF INDUSTRIAL VEHICLES

The intralogistics transport of materials and goods needs to fulfill a wide range of requirements. The ever changing markets on the one hand, and technology breakthroughs on the other have made it necessary to respond to increasingly shorter product life cycles. This places ever greater demands on a future-proof, adaptable production and logistics environment. Whether it be manual, semi-automated or fully autonomous material transport systems that are employed: flexibility, quality, and efficiency remain the determining factors for cost-efficiency and sustainability.

As one of the worldwide leading developers and independent manufacturers of intelligent sensors and sensor systems, SICK offers the broadest and most innovative portfolio of solutions for the automation of industrial vehicles. Sensor solutions from SICK help make transport tasks safer, faster and more transparent. SICK uses its extensive expertise in sensor and systems technology to provide impressive solutions for all parts of the production and logistics chain. Its certified sensor systems help prevent accidents and optimize processes through the coexistence of humans and machines, thereby enabling suitable and forward-looking transport solutions to be developed.

Detection of persons and machine safety

SICK safety systems protect people and prevent collisions with other vehicles and obstacles – with great flexibility, and according to the particular driving situation. Furthermore, they help reduce downtimes, and therefore operating costs as well.

Environment perception

The ability to perceive a dynamic environment plays a particularly decisive role in the automation of mobile transport platforms. Operating on various physical principles, sensors have the ability to reliably detect even critical ambient conditions.

Localization and line guidance

SICK covers virtually all common sensor solutions for localization and non-contact line guidance. Whether it be magnetic, optical, or marker-, reflector- or contour-based detection, SICK offers its customers the ideal solution for their individual requirements.

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Load handling

Sensors detect the presence of products or packaging elements, and measure distances, heights and the protrusion of goods on pallets and other transport items. They thereby eliminate errors in production and logistics processes.

Identification

The ability to identify all kinds of codes and objects is a fundamental prerequisite for automated storage, picking and sorting. SICK offers scalable solutions for all code types and for all ID technologies (laser, camera, RFID, hybrid), and these are easy to adapt to the particular requirements.

Motion monitoring

Industrial trucks and mobile platforms are characterized by their versatility and dynamic nature. The basis prerequisite for their use is the ability to monitor all driving and movement patterns. Rotative and linear, incremental and absolute encoders can record all relevant parameters on the vehicle. This makes them an essential component for the automation of mobile applications.

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Mobile platforms

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Automated guided vehicles

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Since their introduction more than 30 years ago, automated guided vehicles (automated guided vehicles) are mobile, collaborative machines which share traffic routes with manned industrial trucks and persons. Reliable person detection systems are required to prevent danger to persons in these surroundings. Due to international standards such as DIN EN 1525 and ANSI B56.5, high requirements are placed on these systems. SICK safety laser scanners are the standard-compliant solution which can be integrated flexibly into vehicle design and adapts dynamically to the current direction of travel. SICK is the manufacturer which covers all areas of AGV safety with additional components for motion control, safe control and emergency stop operation.

① Human presence detection for automated guided vehicles with safety laser scanners

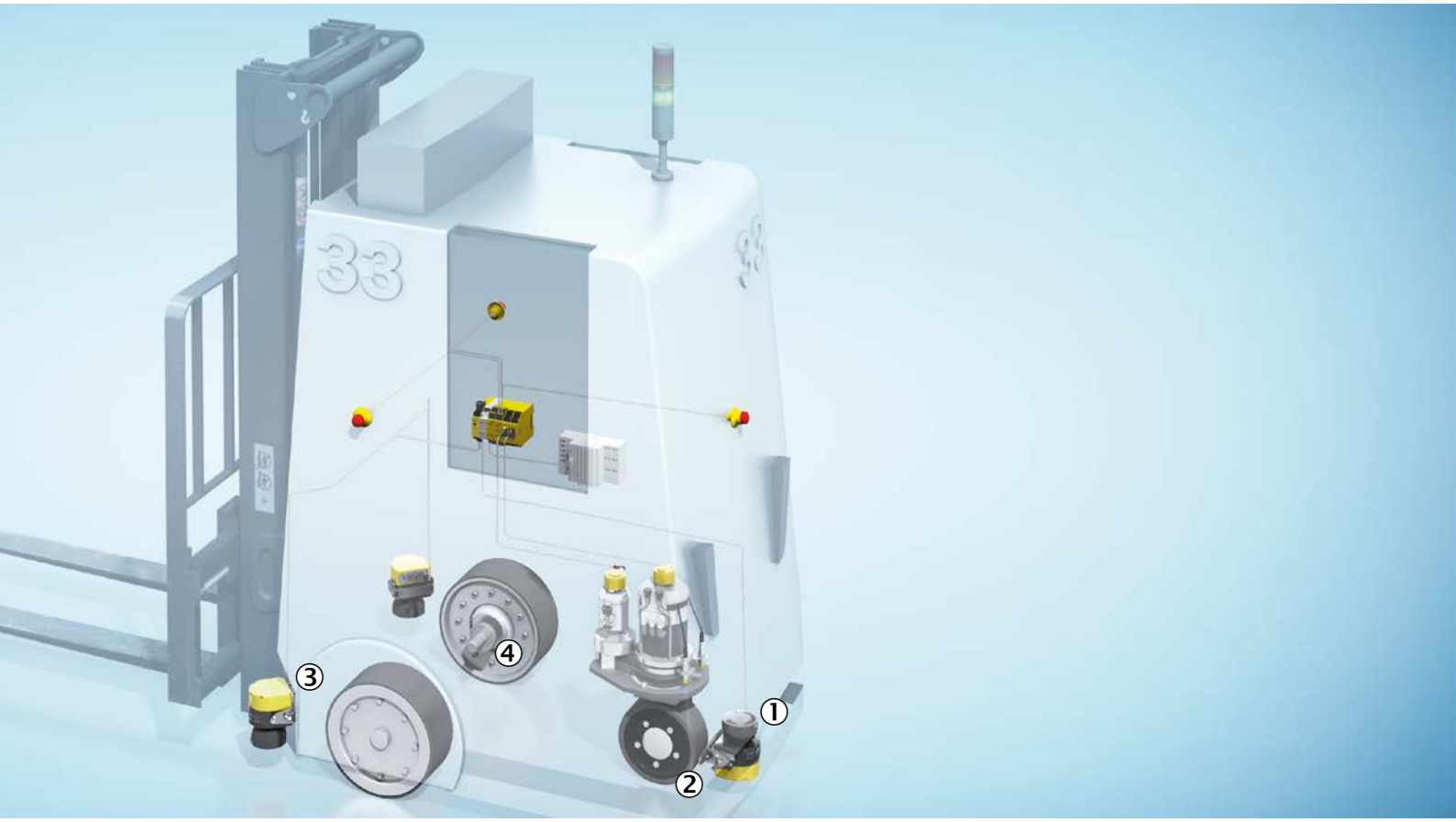
Safety laser scanners have prevailed worldwide for the safe detection of people around automated guided vehicles. SICK offers a complete product portfolio with a variety of different scanning ranges and functions to suit any format of vehicle. Up to 128 freely-definable protective fields allow for fine-tuned adjustment of person detection to the current driving scenario - the vehicle therefore achieves its maximum transport performance. Forward warning fields trigger speed reduction as soon as a person or an object is detected. The vehicle stops immediately when the protective field zone is reached.

microScan3 Pro ➜ p. 65
S300 Expert ➜ p. 65
S3000 Expert ➜ p. 67

② 360° protection for automated guided vehicles

The automated guided vehicle's main driving direction is not the only area requiring protection: The vehicles sides do as well. Safety laser scanners such as the S300 family feature a scanning angle of 270°. When installed on the two corner areas of the vehicle, the laser scanners also provide protection to people located along the vehicle's sides.

S300 Expert ➜ p. 65



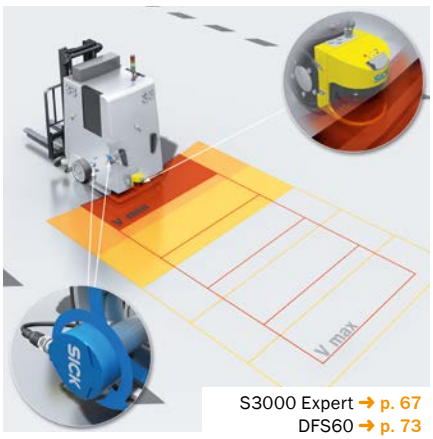
③ Flexible safety system for “I4.0 ready” AGVs

Simultaneous protective fields offer automated guided vehicles (AGVs) unexpected possibilities. Thanks to the smart evaluation of up to eight simultaneous protective fields of the microScan3 Pro safety laser scanner, the environment can be perceived in a differentiated manner. For example, this enables the approach of transfer points without complete shut-off of the person detection system. The Ethernet-based safe EFI-pro fieldbus interface easily connects up to six microScan3 Pro units with the Flexi Soft safety controller. This is how a total of 48 simultaneous protective fields can be evaluated around the AGV.

④ Adaptive protective field adjustment of the safety laser scanner by means of speed monitoring

The transport performance depends heavily on the speed of the automated guided vehicle (AGV). Encoders transmit the actual speed to the S3000 Expert safety laser scanner via special inputs. The right protective field for the speed and current braking distance is activated in this way. Unnecessary stops are avoided.

Flexi Soft ➜ p. 64
microScan3 Pro ➜ p. 65



S3000 Expert ➜ p. 67
DFS60 ➜ p. 73

⑤ Safe speed for automated guided vehicle systems

With automated guided systems, the SSM (safe speed monitor) or SLS (safely-limited speed) function monitors the speed on the wheels using the DFS60S Pro encoder and reduces it via the controller if necessary. In addition, the Flexi Soft safety controller can be used to switch over the protective fields of the safety laser scanner depending on the speed.

Flexi Soft ➜ p. 64
DFS60S Pro ➜ p. 70

⑥ Safe motion monitoring of automated guided vehicles (AGVs) made easy

The Drive Monitor FX3-MOC developed as additional module for the Flexi Soft safety controller record the direction of travel and speed parameters and monitor the reliable limit values with easy-to-configure function blocks which contain special functions for automated guided vehicles. The Drive Monitor FX3-MOC provides the most common interfaces for incremental encoders. Use in connection with the DFS60S Pro safe incremental encoder from SICK considerably simplifies CE documentation.

⑦ Reliably detecting the steering angle for protective field switching

In order to adapt the automated guided vehicle's protective fields to its exact driving scenario, the steering angle must also be captured by the drive and steering drives. When the MOC1 Flexi Soft motion control module and the AFS/AFM60S Pro safety encoder interact, the steering angle is recorded in the Flexi Soft CPU for further processing.

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DFS60S Pro ➜ p. 70

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AFS/AFM60S Pro ➜ p. 69

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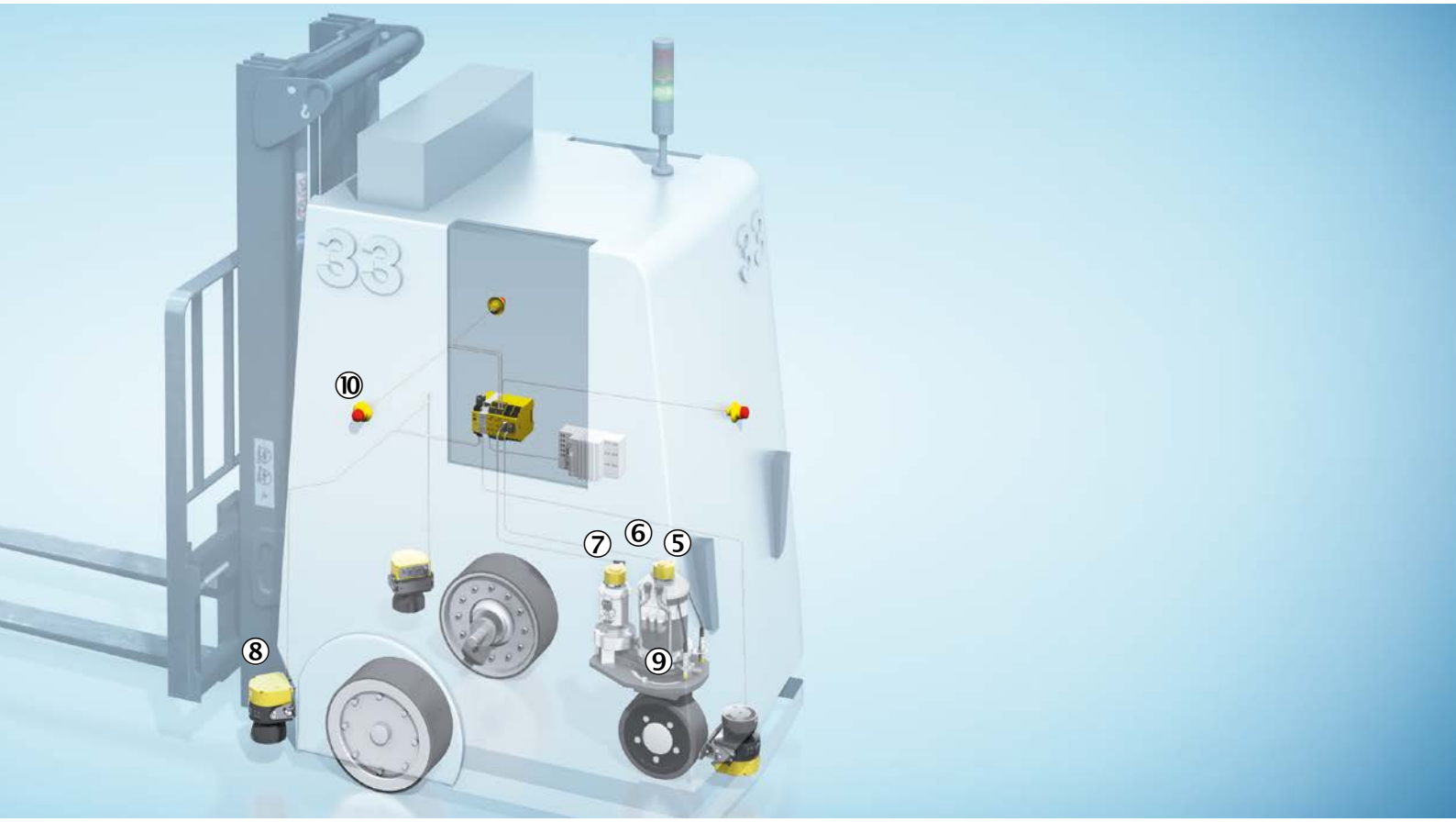

⑧ Safe detection of target positions for protective field muting

An AGV with handling robot positions itself in front of a processing station. The safety laser scanners of the AGV adjust correspondingly to the situation in that the protective fields now also cover the complete hazardous area of the robot. The AGV must reliably detect this position so that it can safely switch over to the stationary operating mode. With the contour detection fields, the microScan3 check the specific contour of the environment.

⑨ Simple steering angle detection for compact automated guided vehicles

If continuous steering angle detection is not needed, inductive safety switches are the compact and particularly economic alternative. Using switch cams on the driving and steering unit, IME2S safety switches detect the critical steering angle which requires to switch the protective field.

⑩ Safety technology from a single source: The emergency stop pushbutton from SICK rounds off the all-in-one system

The modularly-adjustable ES21 emergency stop pushbuttons are connected to the Flexi Soft safety controller. The emergency stop circuit is monitored in line with the relevant standards. Other safety relays are therefore not needed.

Flexi Soft ➜ p. 64
microScan3 Pro ➜ p. 65
Safe EFI-pro System ➜ p. 68

IME2S ➜ p. 64

ES21 ➜ p. 63
Flexi Soft ➜ p. 64

Sensors developed specially for this purpose are used to prevent collisions around automated guided vehicles which cannot be prevented by person detection systems. Protruding or low-handing objects cannot always be detected reliably due to the prescribed mounting height for 2D person detection systems near the ground. With additional 2D and multiple-layer LiDAR sensors for collision avoidance, objects not connected to the ground or which protrude into the side of the vehicle path are also detected. The Visionary-T 3D time-of-flight camera offers extensive options for collision avoidance. The camera measures a depth value for every pixel. All geometries in the field of view of the camera are represented as point clouds. All objects are therefore detected which penetrate into defined protected areas.

① Avoiding collisions between AGV systems and hanging objects

The slanted upwards orientation of a compact TiM3xx 2D LiDAR sensor allows hanging objects to be detected early on. The monitoring fields can be flexibly defined, enabling any objects encroaching on the sides of the vehicle to be detected too.

TiM3xx ➜ p. 82

② Two-dimensional collision avoidance on AGV system by 2D LiDAR sensors

Countless device variants of the TiM1xx and TiM3xx 2D LiDAR product families with scanning ranges of 3Â m to 10Â m are used for two-dimensional object detection. Thanks to their small sizes, they even fit where space is limited. A quasi three-dimensional detection is possible due to the slanted configuration of the switching field.

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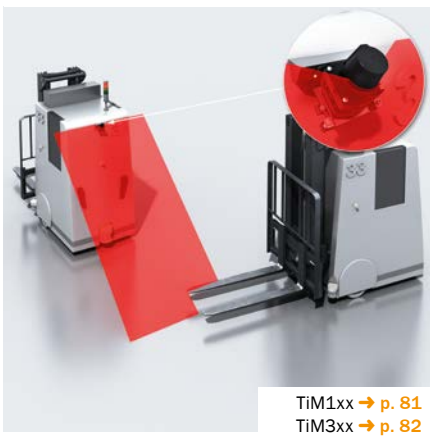

TiM1xx ➜ p. 81
TiM3xx ➜ p. 82

③ Collision avoidance for automated guided vehicle systems in complex environments

The diagonal arrangement of the monitoring fields in the direction of travel is not always possible or sufficient. Objects protruding from shelves must be reliably detected and collisions must be avoided. This is ensured by compact LMS1xx 2D LiDAR sensors for lateral mounting on automated guided vehicle systems.

LMS1xx ➜ p. 80

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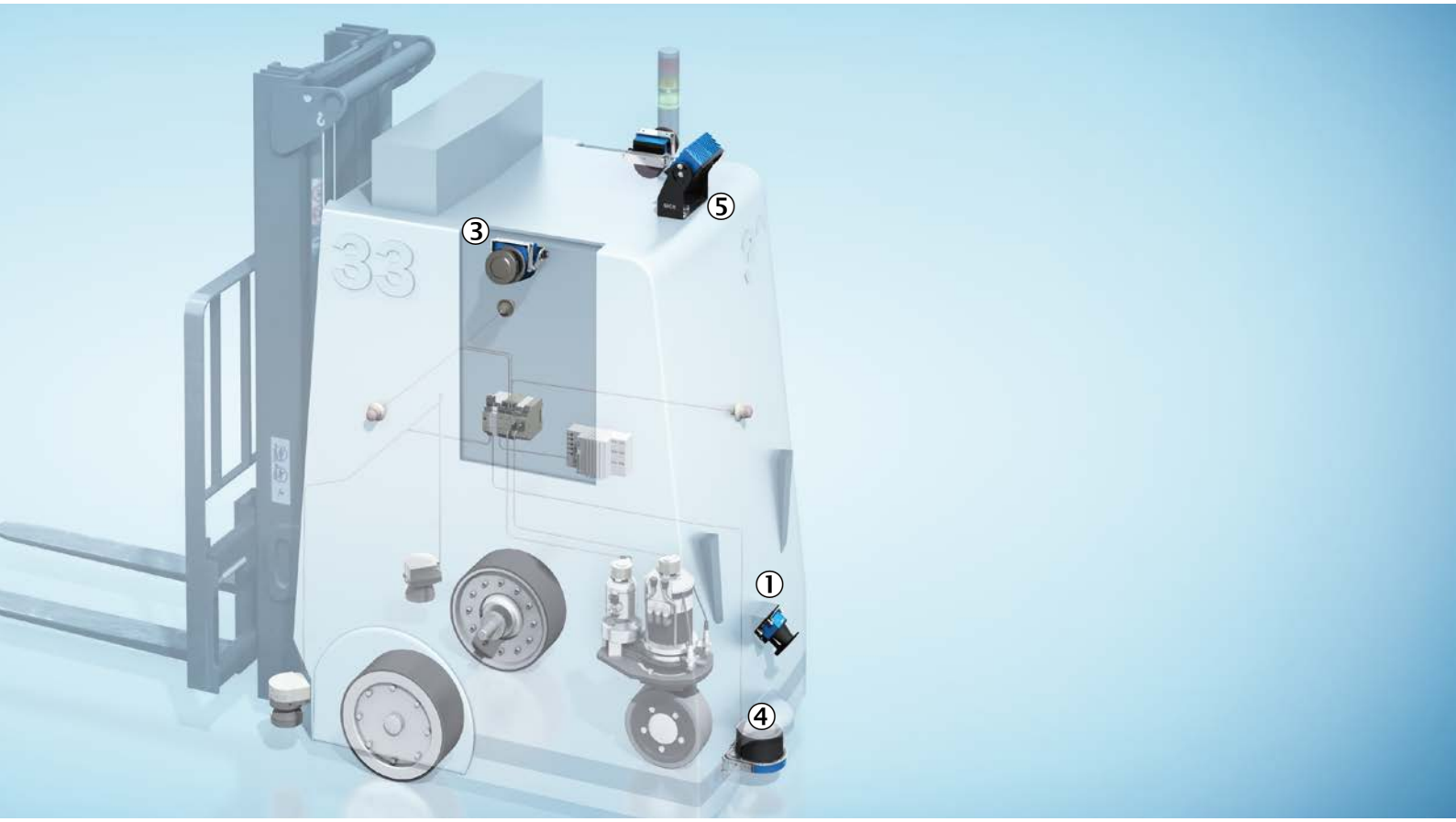


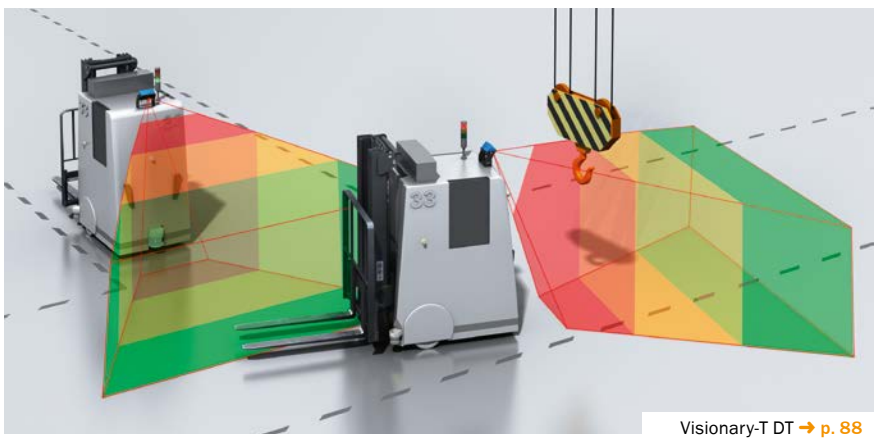
④ Optimizing system availability with 3D LiDAR sensors for collision avoidance

The MRS1000 3D LiDAR sensor scans four angularly offset levels simultaneously, offering reliable detection of very flat objects located close to the floor. The sensor's integrated ground reference evaluation detects depressions such as stairways or loading ramps. Smart evaluation across all levels of switching fields means that any accidental triggering of individual levels can be ignored, increasing availability.

⑤ Collision avoidance for AGV systems with 3D vision

3D vision sensors enable definable spaces to be constantly monitored. Previously, several 2D LiDAR sensors were needed to monitor the entire vehicle path. Now, however, the Visionary-T DT 3D vision sensor can create a point cloud showing all the objects visible in a monitored space. With 3D snapshot technology, the Visionary-T DT can also be used for fine positioning, e.g. for imaging pallets and identifying alternative routes around an obstacle.

MRS1000 ➜ p. 83



Visionary-T DT ➜ p. 88

① 2D LiDAR sensor, specially designed for navigation and featuring integrated position calculation

Free laser navigation is the most flexible form of navigation technology. The NAV350 2D LiDAR sensor was developed for dynamic precision laser navigation. With a scanning angle of 360° and a scanning range of up to 250 m, it can even be used for localizing in spacious environments. The NAV350 detects natural contours, as well as artificial landmarks (reflectors), and uses them to give a precise calculation of the vehicle's absolute position.

NAV350 ➜ p. 80

② Position calculation for vehicle location based on natural contours

In contour navigation, a LiDAR sensor scans existing contours in the environment and creates a reference map from the acquired measurement data. On subsequent trips, the vehicle locates its position by comparing the current measurement data with that of the reference map. Contour navigation requires the installation of no artificial landmarks (such as reflectors), enabling very flexible route creation. The NAV-LOC delivers absolute data on vehicle position and its orientation in an operation site. The LiDAR LOC extends the portfolio of compatible SICK laser scanners and also enables simultaneous use of several scanners near the ground.

③ Laser navigation and safe human presence detection with safety laser scanners

The S300 Expert, S3000 Expert or microScan3 Pro safety laser scanners send measurement data about the scanned environment to the navigation calculator, which then uses this data for localization and navigation. Meanwhile and independently of this, the scanner monitors the protective fields. The safety laser scanner's intelligent dual use function gives the option to use compact, more cost-effective vehicles.

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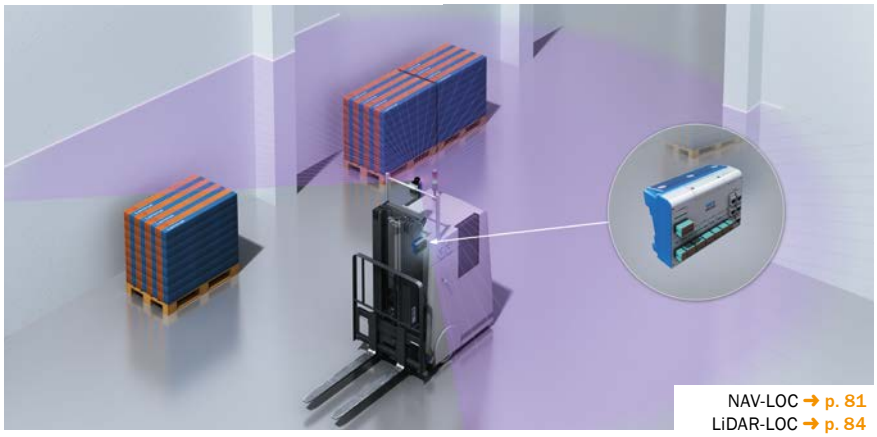
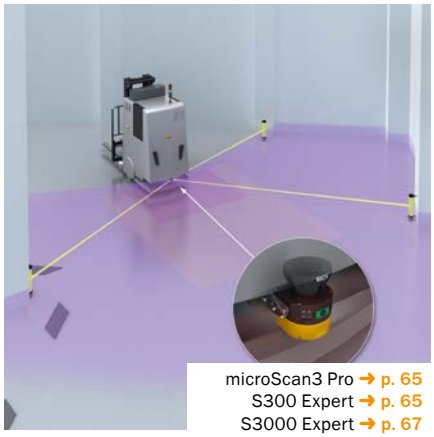


NAV-LOC ➜ p. 81
LiDAR-LOC ➜ p. 84



microScan3 Pro ➜ p. 65
S300 Expert ➜ p. 65
S3000 Expert ➜ p. 67

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④ Optical line guidance: the ideal solution for mobile assembly platforms

For easy and cost-effective commissioning, optical line guidance is the ideal technology for use in mobile mounting platforms. Using the line, the machine operator can detect the route assigned to the platform. This facilitates human-machine cooperation in tight spaces. Luminescent lines guarantee stable detection on any background, which ensures high process security and makes separate teaching unnecessary. The optical line guidance sensor OLS identifies the individual process steps using the bar code, which is attached above the lane.

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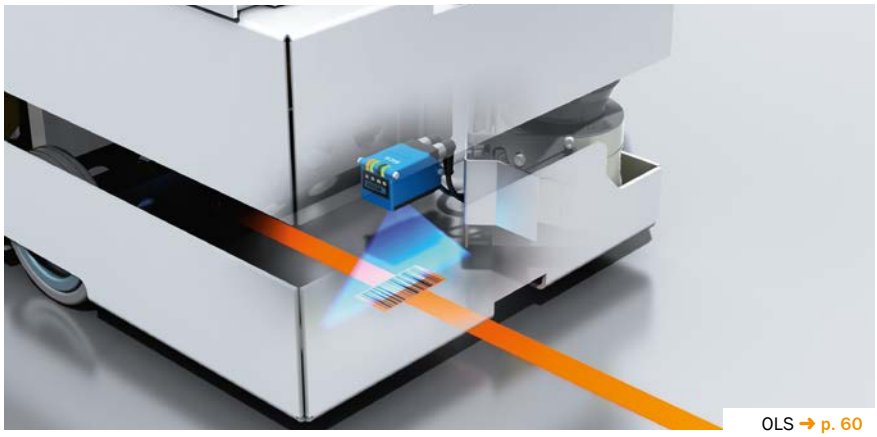

OLS ➜ p. 60

⑤ Identifying points of interest (POI) with RFID

Navigation solutions, such as line guidance or magnetic rasters, aren't able to permanently establish an absolute position. For this reason, automated guided vehicles need to receive additional information about their current location at the POIs (workstations, crossings, loading stations, etc.). Tags are placed on the floor at the POI, which are then detected and evaluated by the RFH6xx RFID read/write device.

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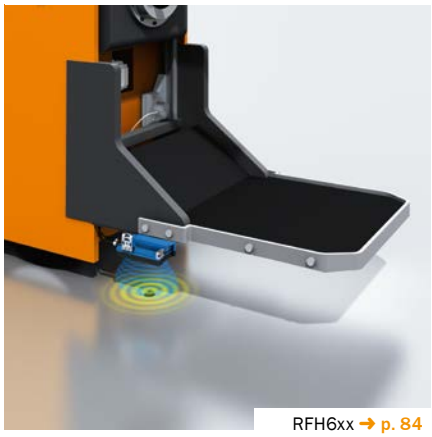

RFH6xx ➜ p. 84

① Measuring forklift height with wire draw encoders

The EcoLine wire draw encoder has a maximum measuring length of up to 10 m, perfect for positioning the height position of lifting equipment for automated guided vehicles. This wire draw encoder was especially designed to meet this industry's high demands. EcoLine encoders are defined by a slim, lightweight design, high modularity and flexibility of mounting. Special rope output nozzles protect the sensors from damage caused by knocks and vibrations.

EcoLine ➜ p. 72

② Compact and wear-free - optical distance sensors for measuring forklift height

With the compact and precise DT50-2 Pro mid range distance sensor, the position of the fork on an automated forklift truck can be determined without making contact. Thanks to their patented HDDM time-of-flight technology, SICK's optical distance sensors are extremely resistant to ambient conditions, such as ambient light and airborne particles.

③ Position measurements in the hydraulic cylinder - extremely durable and compact

Ideally, movements should be measured where they occur. The linear encoders of the MAX48 product family are installed directly in the hydraulic cylinder. The sensor therefore does not need any additional installation space and is extremely well-protected in the cylinder interior. The magnetostriction measurement principle enables accuracy of up to 1/10 mm and does not cause any wear. With measuring ranges of up to 2,500 mm, different movements such as fork lift height, fork width and lift mast tilt can be determined with precision.

Dx50-2 ➜ p. 78

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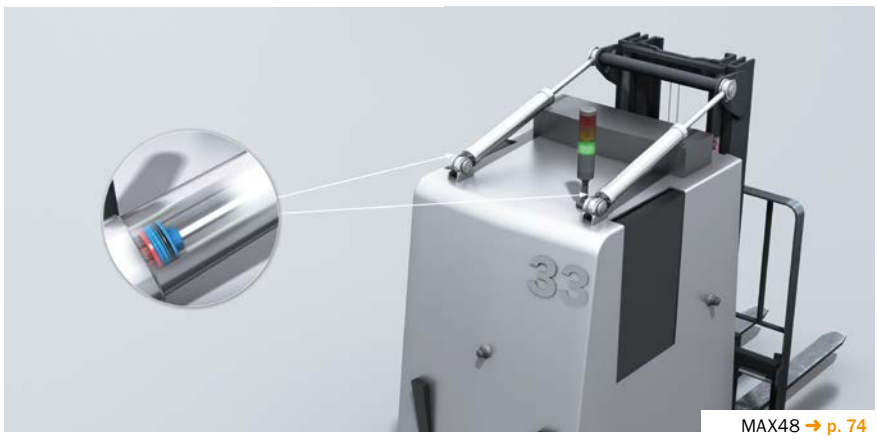

MAX48 ➜ p. 74

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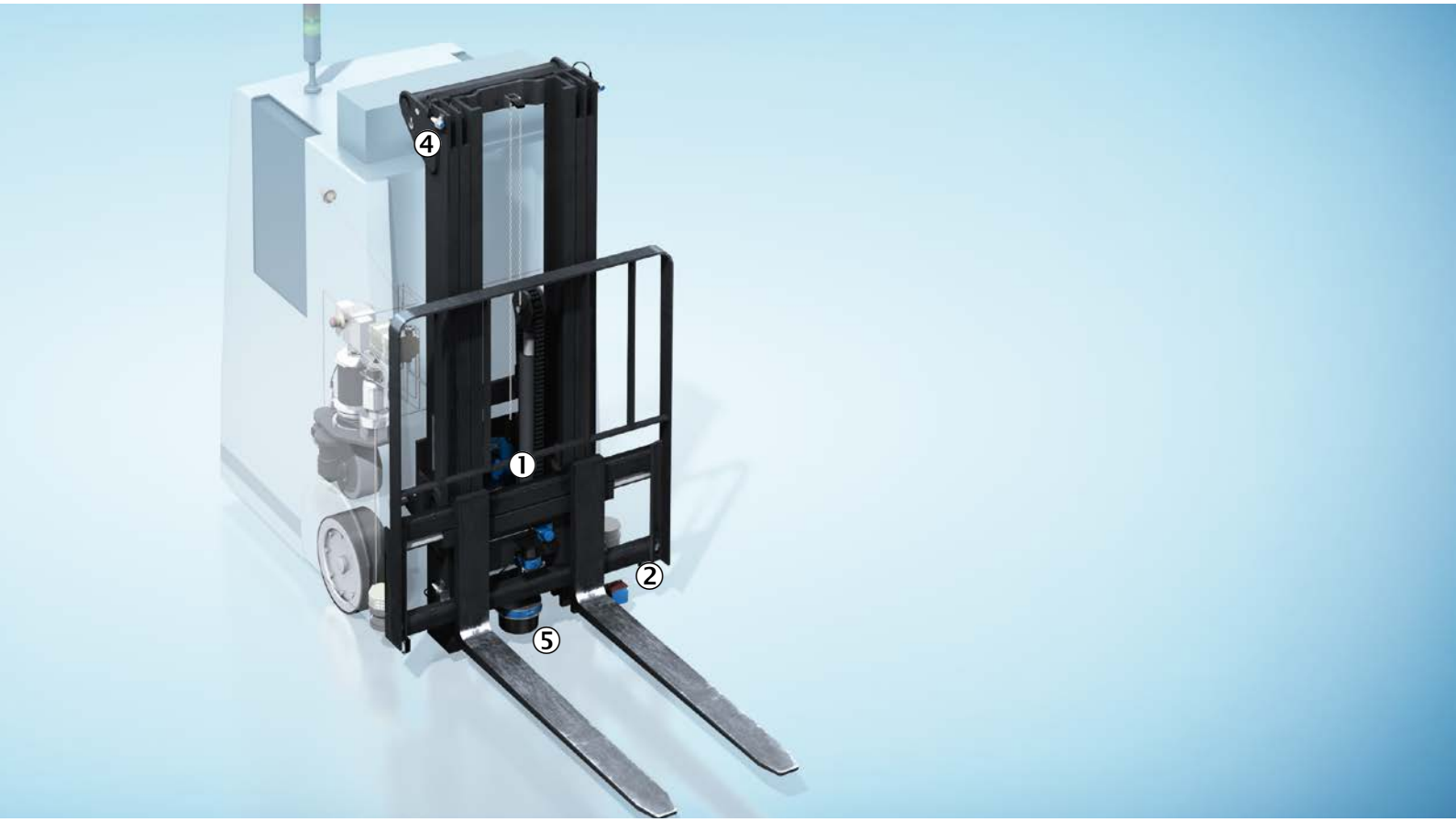


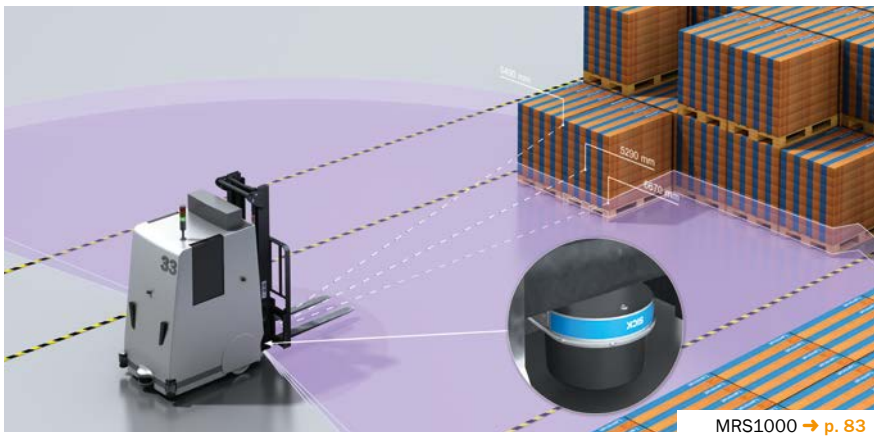
④ Simple detection of the end positions and relevant intermediate positions of the load handling device

Inductive proximity sensors of the IME product family output signals step-by-step when detecting relevant fork heights, for example when reaching various load lifting positions or the driving position. Inductive proximity sensors have been proven a million times over as non-contact switching elements with very long service lives.

⑤ Precise load handling by target detection using 3D LiDAR

The automated guided vehicle (AGV) must quickly detect the size and position of the load carrier for autonomous lifting of the load. The MRS1000 3D LiDAR sensor delivers measurement data on four layers, thereby detecting pallet openings, to name one example. It allows for the corresponding positioning of transport forks during the approach and reception of the pallet without stopping the AGV. The recorded measurement data can be used to create a profile.

IME ➜ p. 59



MRS1000 ➜ p. 83

Empty bay detection for every application: Solutions in 1D, 2D or 3D

When using automated guided vehicles in warehouses, reliable empty bay detection is essential. If a vehicle tries to store a load carrier in an occupied bay, this causes serious process interruptions and safety risks. Specific technologies are particularly well-suited for empty bay detection for various warehouses and load carriers. SICK has the right solution for any application - from one-dimensional scanning to three-dimensional measuring sensors.

⑥ Complete monitoring of the load status by means of a photoelectric proximity sensor directly integrated into the load handling device

Thanks to the extremely compact dimensions, the photoelectric proximity sensor from the W4-3 product family can be integrated into the fork of the automated forklift. The loading position is queried directly at the place of the event, the fork is reliably positioned, process reliability is increased during positioning and damage caused by faulty load lifting is prevented.

W4-3 ➜ p. 58

⑦ AGV checks whether the storage bay is occupied using a photoelectric proximity sensor or distance sensor (1D)

With load carriers of the same type, the occupancy of the bay can be detected easily and economically with a photoelectric proximity sensor. Sensors from the PowerProx product family are suitable depending on the application. In addition, the Dx35 distance sensor can also be used for exact determination of the distance to the object.

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Dx35 ➜ p. 78
PowerProx ➜ p. 61

⑧ Empty bay detection for different load carriers (2D)

The compact TiM1xx 2D LiDAR sensor is used for storage bay monitoring. The laser scanner scans the entire breadth of the storage bay with its two-dimensional scanning surface and detects load carriers of all shapes and sizes. Alternatively, the TiM5xx 2D LiDAR sensor determines the profile of the shelf front, using the 2D point cloud as a positioning aid.

TiM1xx ➜ p. 81
TiM5xx ➜ p. 82

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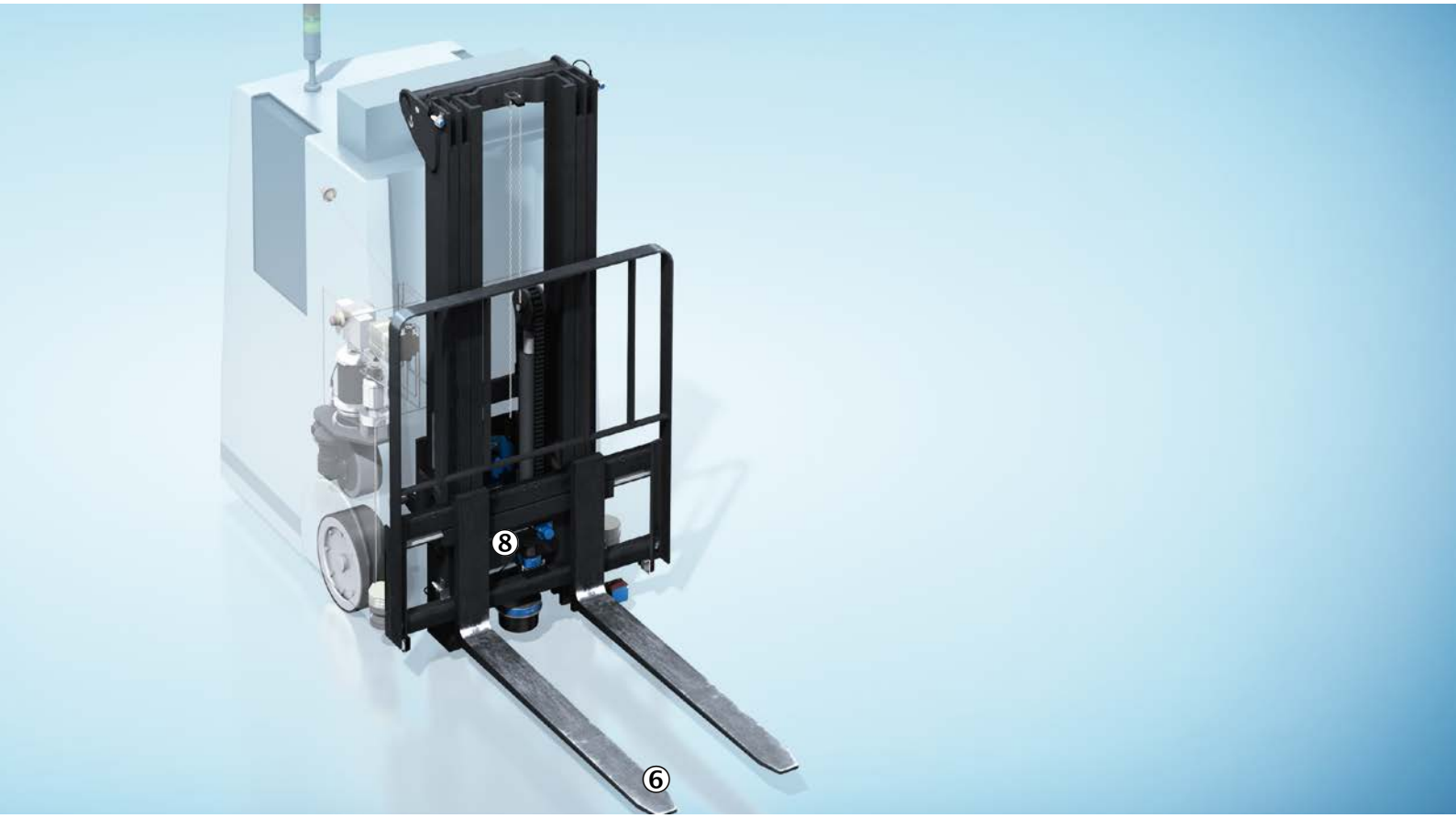

⑨ Empty bay detection for different load carriers (3D)

Automated storage and retrieval of loads, particularly at great heights, requires precise detection of the storage space and load carrier. Thanks to the 3D snapshot technology of the Visionary-T, empty bay detection as well as localization and measurement of the loading position is done quickly in a complete room volume without the sensor having to be moved. The load is reliably transferred while taking into consideration the current situation (e.g. bay sagging).

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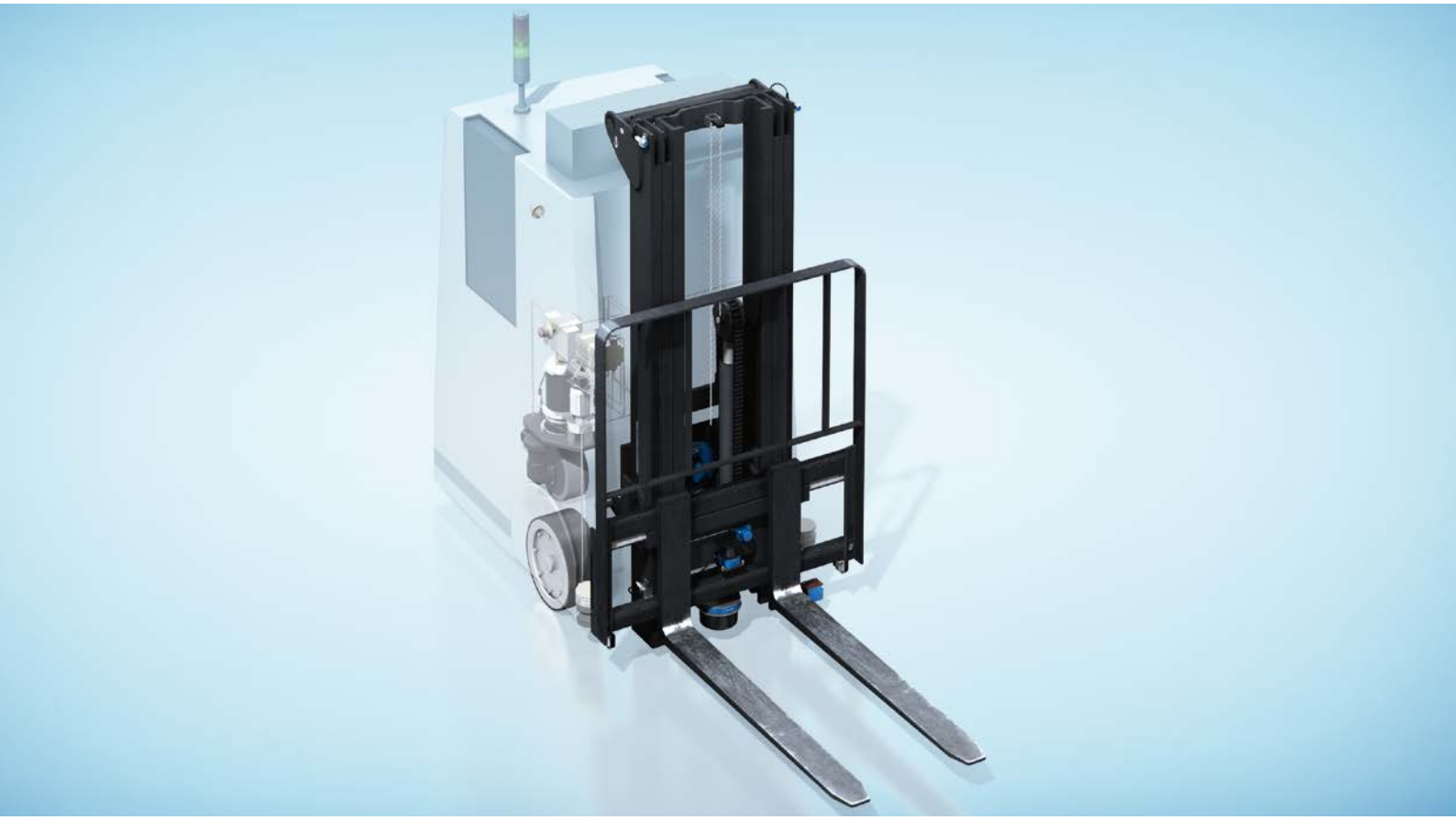
Visionary-T ➜ p. 88



⑩ Controlled load transfer to automated guided vehicle systems

Automated transfer of load carriers such as pallets or containers to and from conveyor belts requires a high degree of monitoring. Photoelectric retro-reflective sensors hereby assume various tasks such as querying of the assignment of the loading surface, gap monitoring between the vehicle and transfer station or protrusion monitoring. In order to satisfy all applications, the SICK product portfolio offers photoelectric sensors in a wide range of designs such as the WLR, R/IR ZoneControl photoelectric retro-reflective sensors or GL6 miniature photoelectric sensors.

⑪ Accurate position determination for different load carriers on the load handling device

Rugged ultrasonic technology is the first choice for determining the position of a wide range of load carriers. The wide sonic beam reflects on fine drop-side mesh pallets. Between programmable switching points, the UM18 ultrasonic sensor signals the presence of the load or reports a constant measured value for the position.

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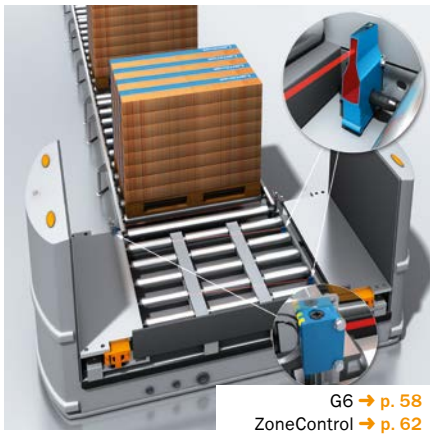

G6 ➜ p. 58
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UM18 ➜ p. 86

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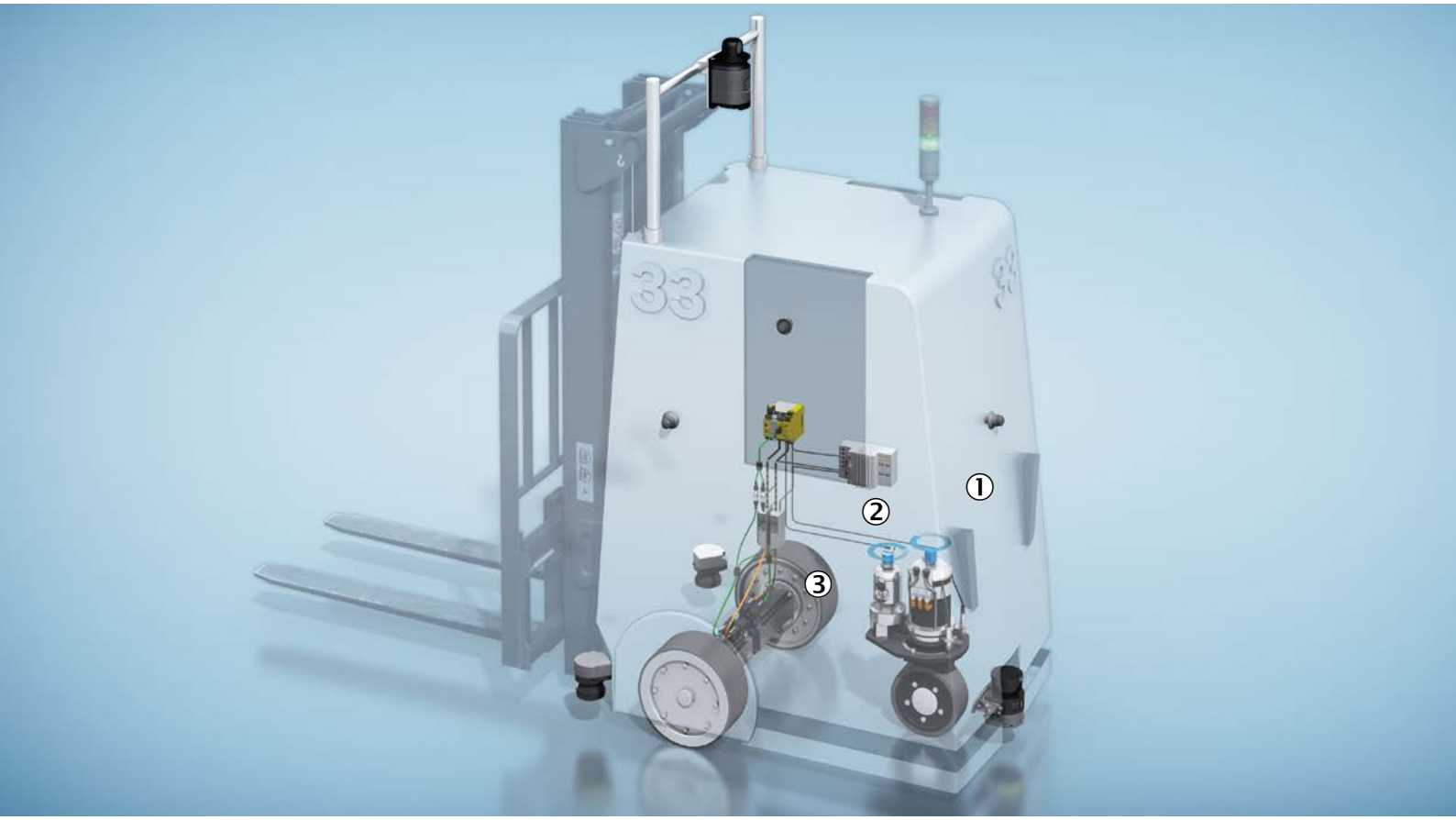


① Speed detection of an automated guided vehicle (AGV)

The drive unit of an automated guided vehicle is equipped with an incremental encoder from the DBS36 product family. In addition to the detected speed, it also provides the direction of travel for the vehicle control.

② Steering angle detection of automated guided vehicles

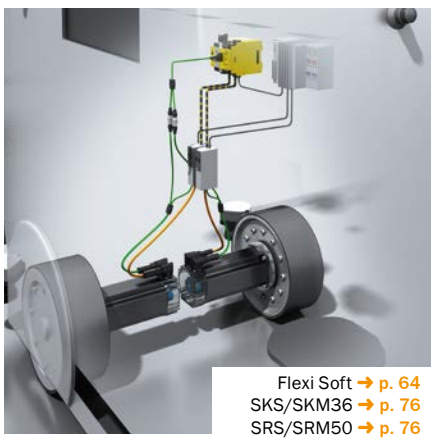
The steering angle drive features an AHS/AHM36 CANopen absolute encoder that records the current steering angle. It delivers data for determining the steering angle, which, in addition to other parameters such as speed, lift height, load lifting position and load weight, can be used to monitor vehicle safety.

③ Motion monitoring via HIPERFACE®

AGVs with synchronous servo motors typically feature motor feedback systems for determining and controlling the speed and direction of travel. For example, the SKS/SKM36 or SRS/SRM50 with HIPERFACE® interface are typically used for safe transmission of the signals from the motor to the servo controller. In addition, the Drive Monitor FX3-MOC uses this interface for safe monitoring of vehicle movements as a component of the Flexi Soft safety controller.

DBS36 Core ➜ p. 73

AHS/AHM36 ➜ p. 70



Flexi Soft ➜ p. 64
SKS/SKM36 ➜ p. 76
SRS/SRM50 ➜ p. 76

① AGV identifies goods with RFID for complete material flow traceability

RFU62x RFID read/write devices can detect tags at ranges of up to 2 m (depending on the transponder used). This means that pallets or trolleys can be identified during the AGV's approach. Once read, the tag data is verified via the warehouse management system, supporting consistent traceability of goods flows.

RFU62x ➜ p. 85

② RFID read device for the accurate identification of load carriers

When the material flow is managed by automated guided vehicle systems, it's essential that the vehicle is able to identify load carriers accurately. To prevent loads from being placed in the wrong carrier, it's essential that only the RFID tag for the relevant load carrier is recorded. This task is achieved by the RFH6xx RFID read/write device (interrogator), which has a working range of up to 240 mm (depending on the transponder type used).

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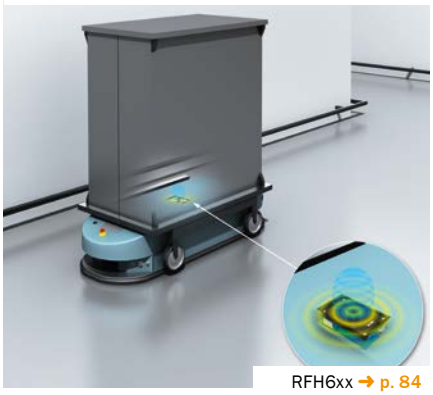
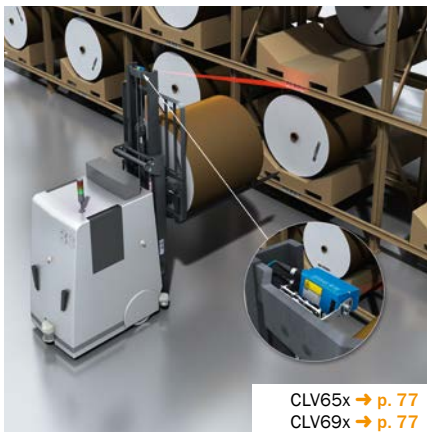


RFH6xx ➜ p. 84

③ Automated detection of storage spaces

The CLV65x bar code scanner reads the bar code at the shelf and delivers the data to a central computer. This assigns the automated guided vehicle (AGV) to the corresponding path so that the load can be applied into the production process as scheduled. The real-time autofocus function achieves a greater depth of field, enabling a high read rate, even when the vehicle is in motion.



CLV65x ➜ p. 77
CLV69x ➜ p. 77

8012353/2020-01-15

④ Goods identification and traceability with bar code scanners

Bar code scanners such as the CLV65x with auto focus function are suited for automated goods identification and tracing of transported cargo. The use of the CLV6 series sensors with oscillating mirror optics extends the reading range.

CLV65x ➜ p. 77

8012353/2020-01-15

Small AGVs (carts)

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SICK offers a variety of different solutions for localizing and line guidance of small AGVs (carts). Depending on the prevailing ambient conditions and the specific requirements on the respective transport task, different physical sensor technologies are suited for the guidance of vehicles in a predefined line. No matter if the guiding line is magnetic or optical - the quick and easy commissioning of all solutions speaks for itself. Raster- and contour-based localization solutions offer the advantage of absolute position determination, which is the basic prerequisite for free navigation especially with dynamic route guidance.

① Optical line guidance: incredibly easy commissioning and maintenance

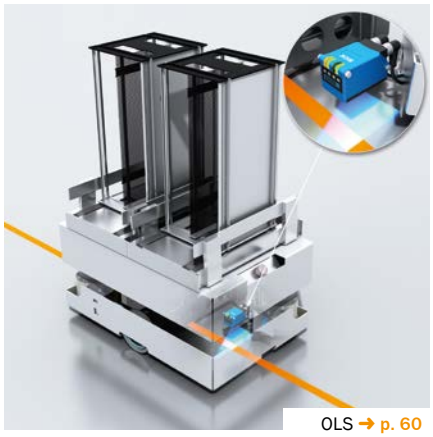
Optical line guidance makes installing and maintaining lanes especially easy and economical. The OLS detects conventional luminescent adhesive tape regardless of the background, contamination or surface defects. In addition, the OLS offers the option of reading 1D codes and thus transmitting various information and drive commands in the event of an overrun.

② Magnetic line guidance: The proven solution for AGVs

Magnetic line guidance is not sensitive to ambient conditions such as strong ambient light, condensing atmospheres or contamination of the lane. With its variable installation lengths, the MLS allows use in various vehicle concepts and can also drive in small curve radii. If line guidance needs to be invisible, the magnetic lane can be installed below the surface of the ground.

③ Localization of compact AGCs using 2D LiDAR sensors

The TiM5xx devices with measurement data output via Ethernet are used in small automated guided vehicles for localization due to their compact size and the industry-compatible design. Small size, big effect: With scanning ranges up to 25 m, the 2D LiDAR sensors (also 2D laser scanners) detect enough contour features to perform localization based on natural landmarks.

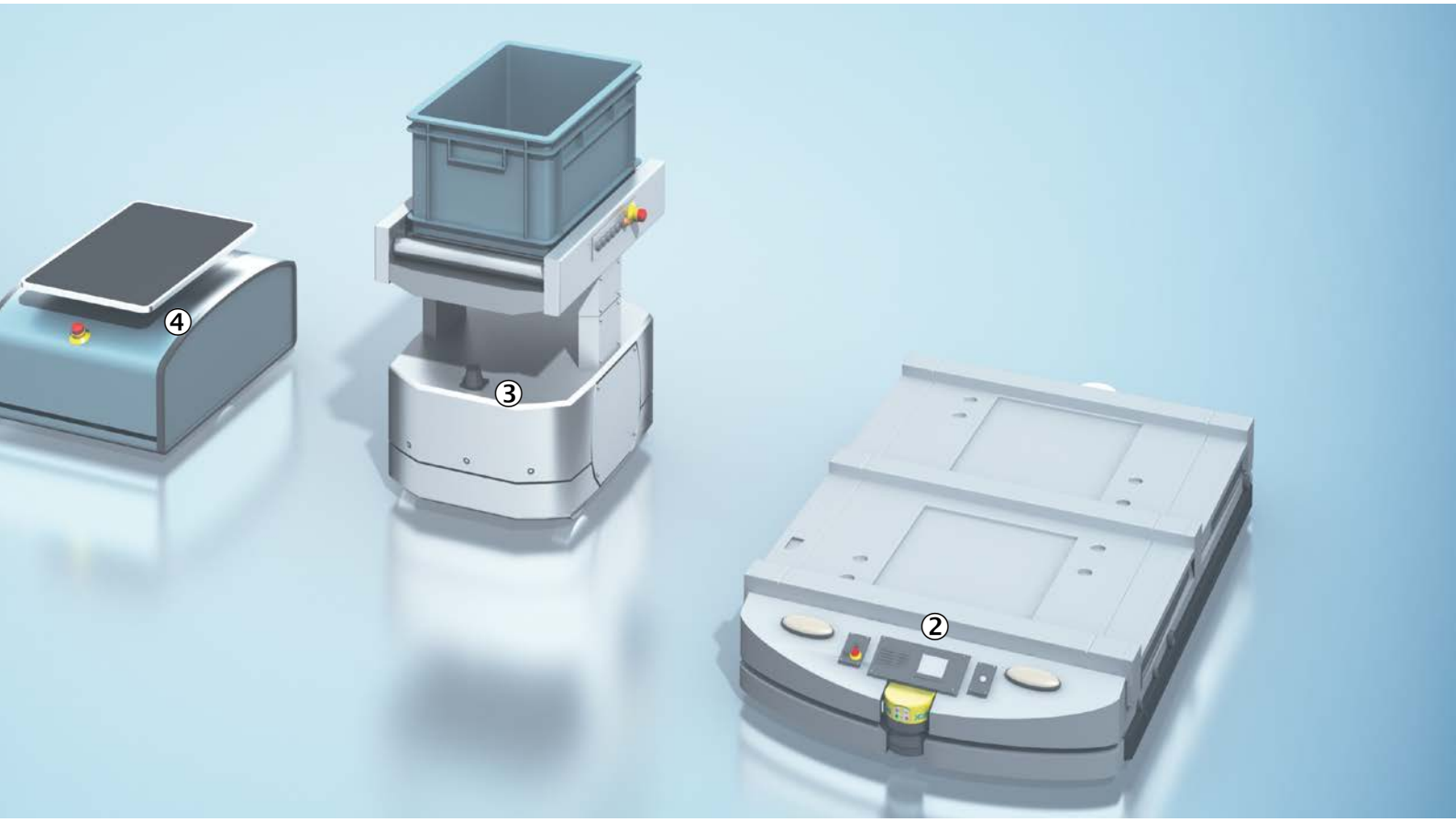


OLS ➜ p. 60

MLS ➜ p. 60

TiM5xx ➜ p. 82
LiDAR-LOC ➜ p. 84

8012353/2020-01-15



④ Grid localization for AGCs in goods-to-person picking

In warehouse logistics, automated guided vehicles must move freely without being bound to lanes. Matrix codes are attached to the ground in an X/Y grid for position localization. The GLS6 provides highly dynamic code reading, which allows the vehicle to detect its absolute spatial position and its relative position compared to the code at the same time.

⑤ Identification of RFID tags on load carriers

The ability to offer seamless recording and tracing between the various production steps is particularly essential when it comes to automated production processes. The ultra-compact RFU61x RFID read/write device is specially designed to meet the requirements of small AGVs.

GLS6 ➜ p. 61

RFU61x ➜ p. 85

① Protecting a automated guided cart (AGC) with a safety laser scanner

Flexible material transportation to the production line is carried out with automated guided vehicles (AGV), known as carts. Thanks to its compact dimensions, the S300 Mini safety laser scanner can be fully integrated into small vehicles. It delivers non-contact detection of people and objects located in the path of an AGV, avoiding the mechanical damage that can be caused when using switching strips or bumpers.

S300 Mini Standard ➜ p. 66

② Emergency stop circuit, person detection and safe stopping - complete systems tailored for automated guided carts

The Flexi Classic safety controller links the emergency stop, safety laser scanner and safety relay in a simple manner. The standard function and logic functions can be configured without the use of software on the device. The Flexi Classic communicates with the vehicle control using gateways to all common fieldbus systems.

③ High availability and prevention of personal injury thanks to reliable collision protection

Collisions, even those between the smallest transport vehicles, cause malfunctions as well as follow-up costs due to system failure and has a negative effect on the acceptance of the transport solution. One of the world's smallest laser scanners, the TiM361S, prevents collisions between vehicles or obstacles without making contact. The sensor, certified according to Performance level b (PLb), provides the operator with the required safety and operational reliability.

Flexi Classic ➜ p. 63
S300 Mini Standard ➜ p. 66

TiM-S ➜ p. 68

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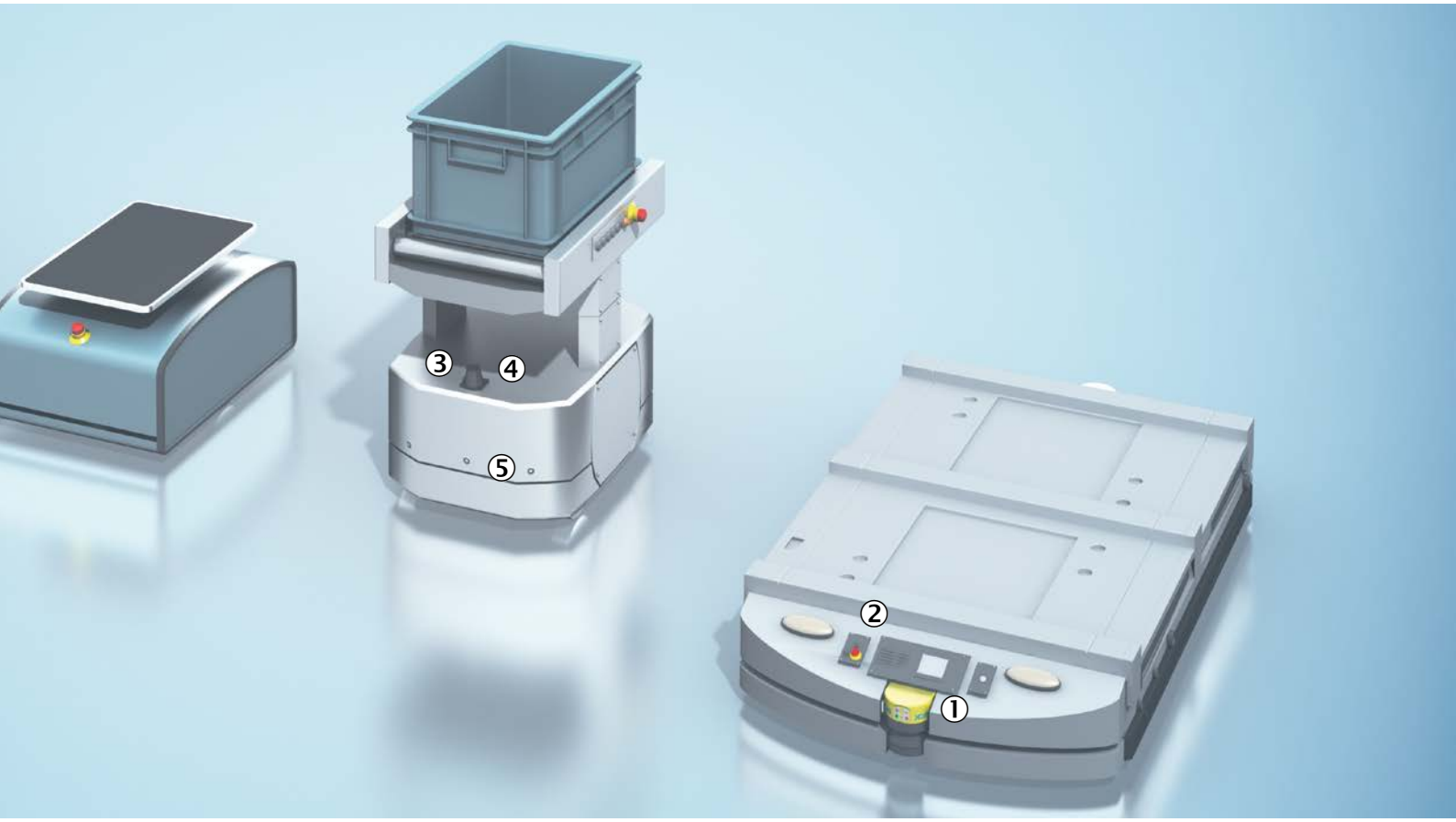

④ Collision avoidance and localization for automated guided carts

Every single collision - even those involving the smallest transport vehicles - causes follow-up costs due to system failure and leads to poor acceptance of the technology. The TÜV-certified TiM781S 2D LiDAR sensor prevents collisions with objects and people using non-contact detection and offers dynamic localization with the aid of reliable measurement data output.

⑤ Collision avoidance using ultrasonic sensors

SICK ultrasonic technology can be used to reliably detect objects in the vehicle path. In contrast to optical scanners, ultrasonic sensors detect objects regardless of their surface quality. With scanning ranges of up to 8 m, the sensors of the UM18 and UM30 product families are predestined for use in automated guided vehicles.

TiM-S ➜ p. 68

UM18 ➜ p. 86
UM30 ➜ p. 87

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Industrial trucks

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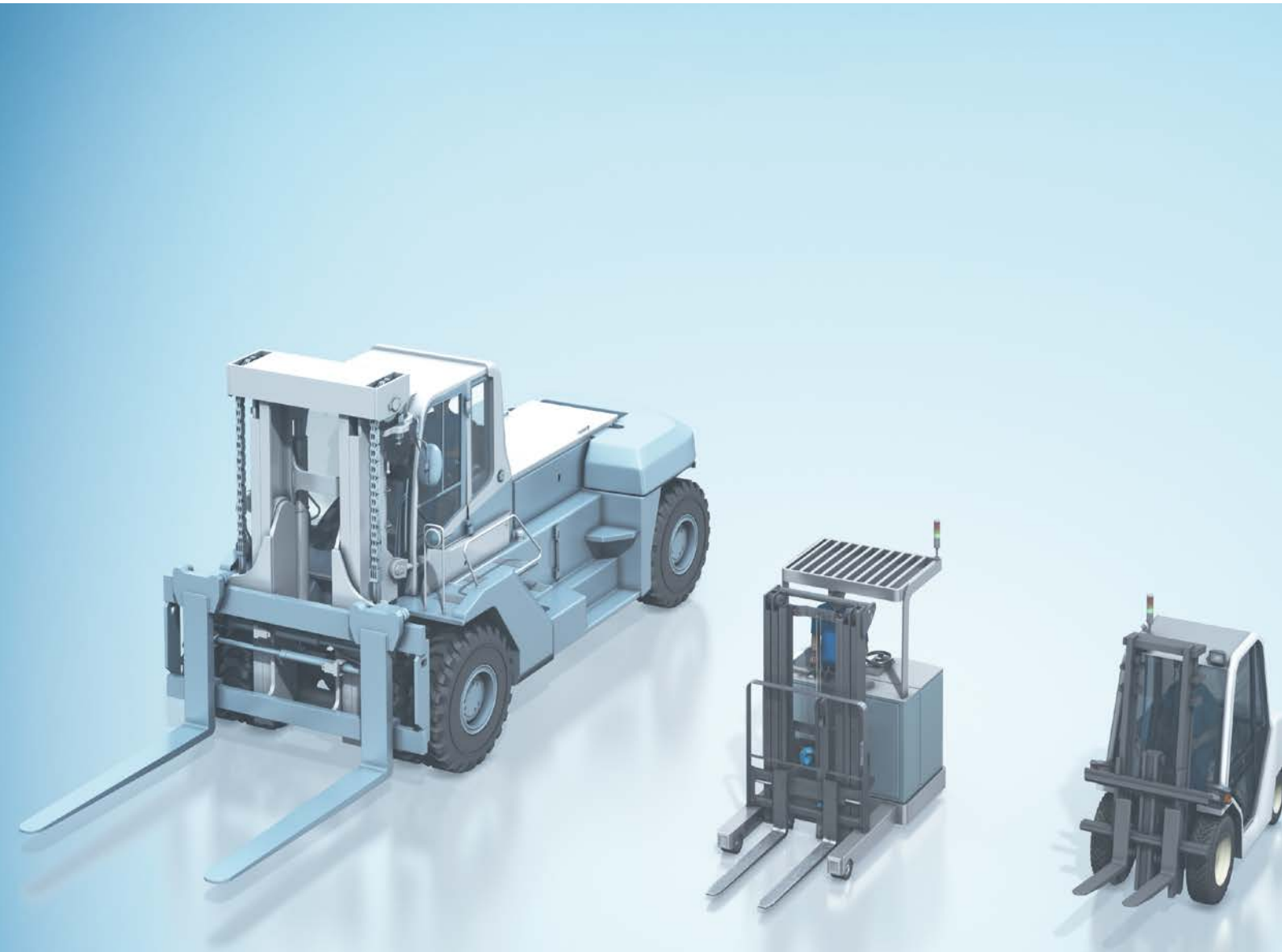

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Manned forklift trucks

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If not used properly, industrial trucks can pose a high risk for accidents in industrial environments. Operating industrial trucks requires that the driver have a high degree of experience and concentration. Modern driver assistance systems for industrial trucks help to reduce accidents and follow-up costs and increase productivity for product handling. The SICK product portfolio offers sensor systems with 2D and 3D sensors for reliable collision avoidance for indoor and outdoor applications and a wide range of requirements.

① Rear area monitoring with driver assistance systems - standard solutions for many applications

The BAS driver assistance system, based on a 2D LiDAR sensor, is mounted in the rear area of the forklift with its field of view slanted downwards. Flat detection also allows for thin objects to be detected. Object approach can be displayed in several levels with freely-defined fields. Signal devices such as lights or buzzers can be controlled directly using the digital switching outputs.

TiM3xx ➜ p. 82
BAS ➜ p. 69

② Maximum performance while the movement of goods by means of collision warnings issued by 3D vision technology

The Visionary-T DT 3D vision sensors detect a three-dimensional monitoring area. Detection zones of various shapes can be programmed in this way. When obstacles enter these detection zones, a signal is output via one of four switching outputs. Thanks to the precise scanning and display of objects, the driver can react quicker and more reliably during product handling.

Visionary-T DT ➜ p. 88

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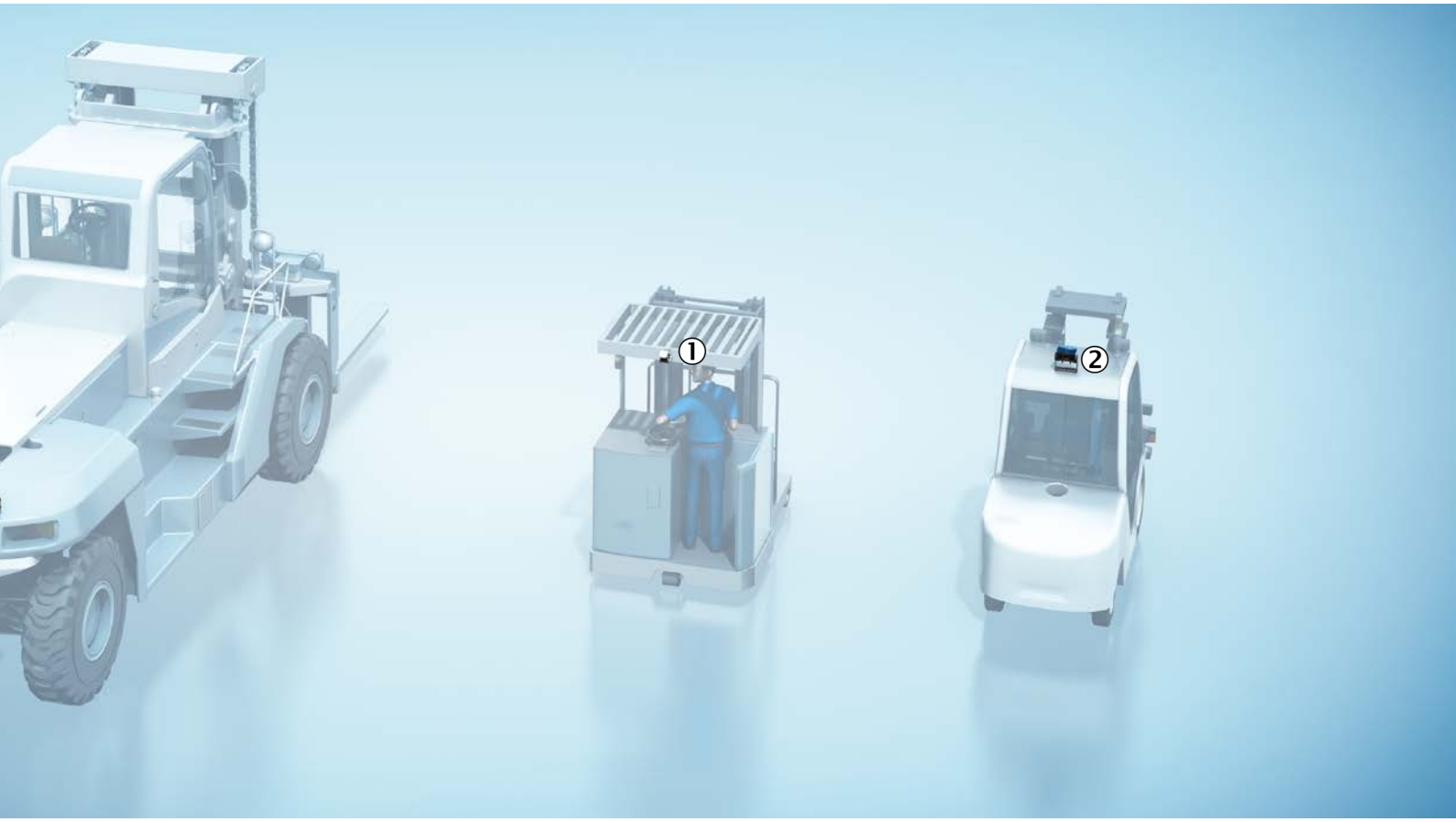

③ 3D collision warnings for outdoor applications no matter what the weather conditions

Large manned forklift trucks for outdoor use are difficult to navigate and often have large blind spots. The use of these vehicles therefore poses increased risk of accidents in the surrounding areas. Driver assistance systems with Visionary-B streaming cameras work with 3D snapshot technology based on the stereoscopic principle. The rugged sensor technology, combined with powerful algorithms for object classification, works reliably and actively warns the driver, even under harsh ambient conditions such as rain, snow and fog. Objects in the vehicle path are identified and clearly indicated on the display in the driver's cabin.

Visionary-B ➜ p. 87

① Measuring vertical and horizontal fork movements of a forklift

The EcoLine wire draw encoder, which can be compactly integrated into the lifting gear, allows accurate, quick, and reliable measurement of the fork height. The sensor makes it possible to monitor lateral fork movements for automated pre-setting to various pallet sizes.

Compact ➜ p. 71
EcoLine ➜ p. 72

② Compact and wear-free – optical distance sensors for measuring forklift height

The Dx50-2 optical distance sensors enable continuous determination of the position of fork of the forklift without causing wear. Connection to different display devices is possible with an analog output and IO-Link interface. The patented HDDM time-of-flight technology ensures high availability in harsh environments.

③ Detection of forklift heights for productive product handling with process reliability

Manned forklift truck drivers have to know how the lifting fork of their vehicle is positioned for quick and safe storage and removal of goods, particularly at different heights. This is especially important during load lifting, driving and when transferring the load. IME or IMB inductive proximity sensors detect the forklift positions and show them to the driver on the display.

Dx50-2 ➜ p. 78

IMB ➜ p. 59
IME ➜ p. 59

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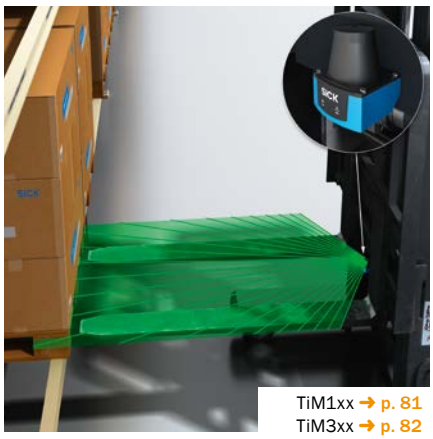
④ Faster load carrying with a driver assistance system equipped with a 2D LiDAR sensor

The small 2D LiDAR sensors of the TiM series can be placed between the fork arms to protect them. The contour of the pallet is scanned with the respective switching fields. The switching outputs control signal devices such as display lights or buzzers, actively supporting the driver during load lifting.

⑤ Quickly and precisely leveling the fork horizontally

Regardless of the position of a manned forklift truck, inclination sensors can precisely detect the tilt angle of a lifting fork. The acceleration-compensated TMS88 Dynamic inclination sensor supports the driver in quickly aligning the fork. The sensor measures the tilt of the fork during the loading and unloading process and during driving, therefore ensuring increased stability of the vehicle at all times.



TiM1xx ➜ p. 81
TiM3xx ➜ p. 82

TMS/TMM61 ➜ p. 75
TMS/TMM88 Dynamic ➜ p. 75

① Complete tracking of the material flow by means of an RFID sensor integrated into the manned forklift truck

RFU62x RFID read/write devices can detect tags at ranges of up to 2 m. This means that pallets or trolleys can be identified during the manned forklift truck's approach. Once read, the tag data is verified via the warehouse management system, supporting consistent traceability of goods flows (track and trace).

RFU62x ➜ p. 85

② Safe and extremely time-saving: automated gate opening using RFID

Expensive manned forklift truck downtimes can be prevented with automated door and gate openers. Door controls with the RFU63x RFID read/write device enable secure authentication with maximum productivity: Only vehicles with coded RFID tags get access to sensitive areas.

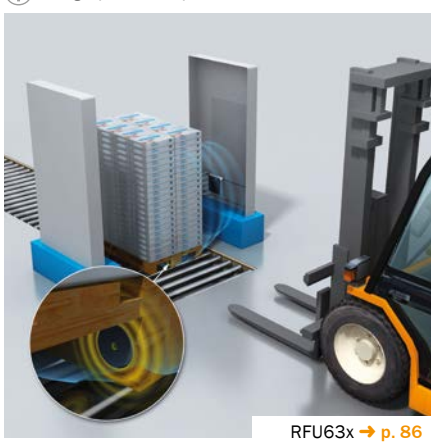
(!) This graphic is not presented in the overview.

RFU63x ➜ p. 86

③ Goods identification with group reading via RFID

The arrangement of a stationary reading station which the industrial truck passes through is suited for the identification of the entire load carrier. The RFU63x RFID read/write device detects all RFID tags via group reading. If the pass direction is to be considered, this can be implemented by the RFU65x with pass detection.

(!) This graphic is not presented in the overview.



RFU63x ➜ p. 86

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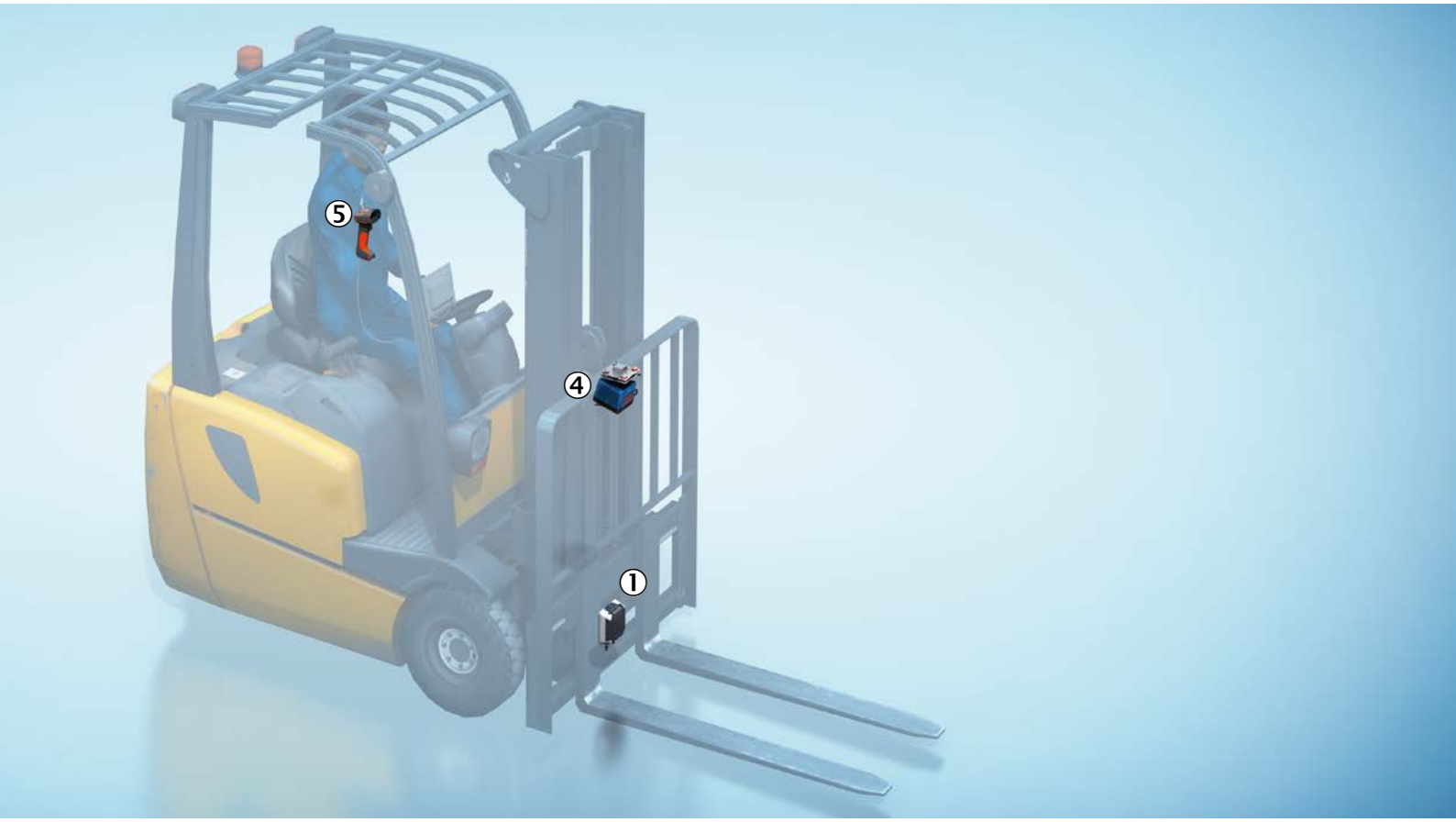

④ Automated goods identification using bar codes without the driver having to get out of their seat

With CLV69x high-performance bar code scanners, goods are identified automatically and without the driver wasting time by climbing out of the vehicle. The large working range and quick auto focus of the reading distances of up to 2,100 mm ensure automated scanning even if the code positions vary greatly.

⑤ Bar code goods identification in varying load carriers

With varying load carriers with bar codes distributed on all sides, it is not possible to read these automatically. With the rugged HW198x hand-held scanner, the forklift driver can identify the goods quickly and ergonomically. The hand-held scanner supports all common corded and cordless interfaces for connecting to the forklift terminal.

CLV69x ➜ p. 77

HW198x ➜ p. 79

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Narrow aisle trucks

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① Safety laser scanners for protecting people in narrow aisle warehouses

If the required minimum distance of 50 cm between the narrow aisle forklift and the racks cannot be upheld, a personal protection system (PPS) is required in accordance with DIN EN 15185. This prevents the forklift from colliding with people. The ideal solution: The safety laser scanner microScan3 Pro with a protective field range of up to 9 m.

② Optimized throughput by means of an S3000 safety laser scanner installed on the narrow aisle truck

The simultaneous use of several vehicles in one narrow aisle is only permissible with special safety devices. SICK has a type-tested solution for this: A safety laser scanner is attached to the front and rear side of the narrow aisle forklift. The S3000 Anti Collision reliably detects vehicles in the same and opposite direction of travel - and up to 15 m. This enables maximum productivity and increased system availability.

microScan3 Pro ➜ p. 65
S3000 Standard ➜ p. 67

S3000 Anti Collision ➜ p. 66

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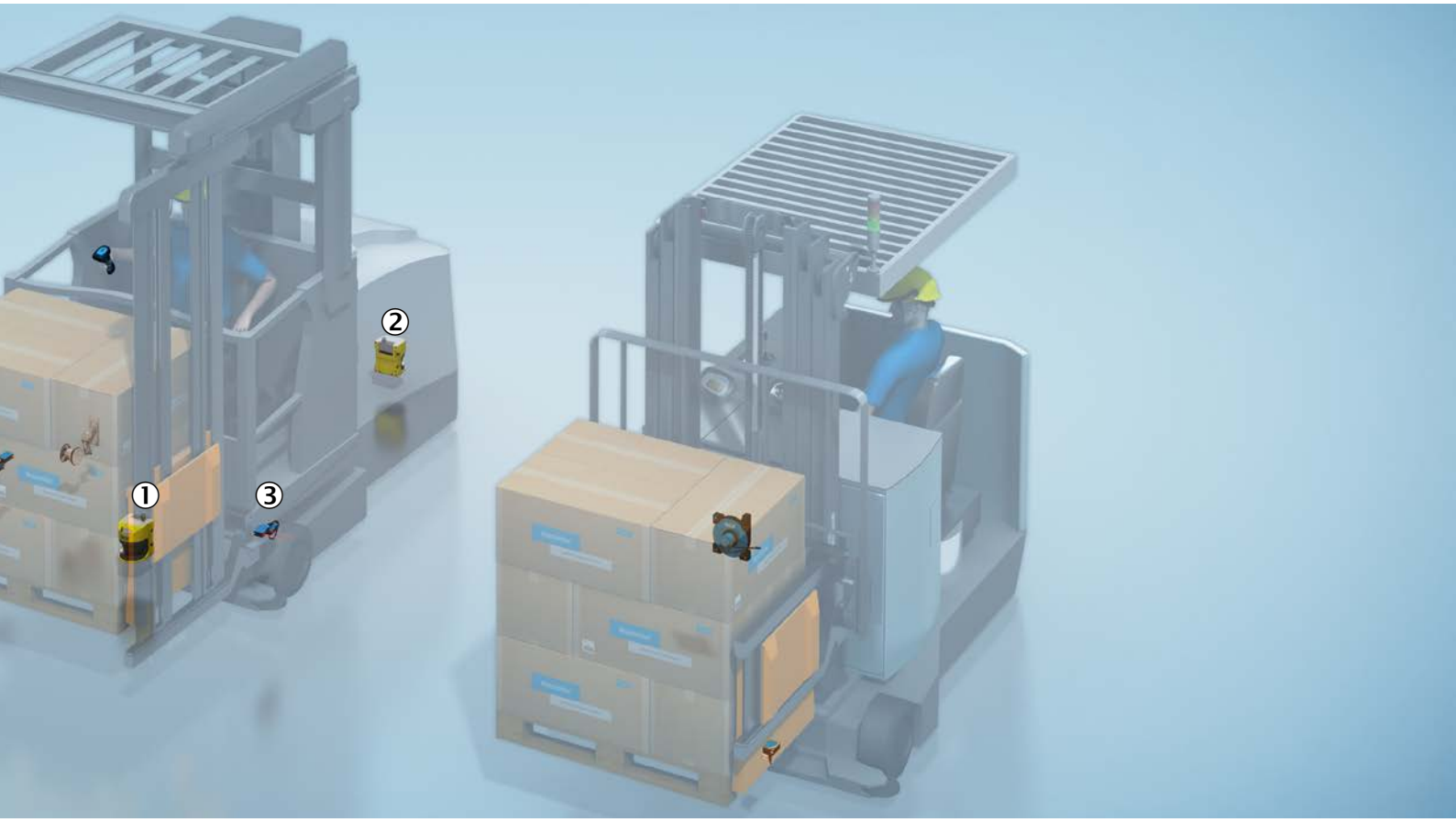


③ Activation of person recognition with photoelectric retro-reflective sensors

Activation of the personal protection system in the narrow aisle must be automated and reliable when the narrow aisle forklift enters the aisle. Redundant W26 compact photoelectric sensors on the forklift can reliably differentiate between the entrance and exit of the narrow aisle. Detection of persons functions as a driver assistance system outside the aisle.

W26 ➜ p. 62

④ Retrofittable speed measurement on narrow aisle forklifts

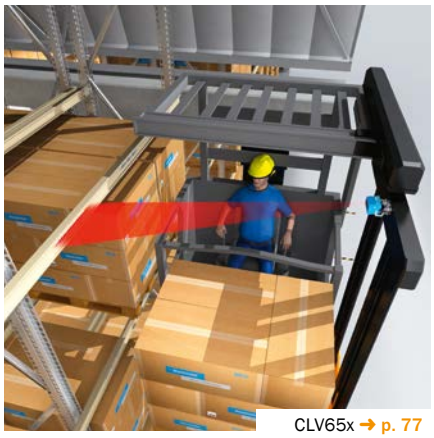
When equipping narrow aisle forklifts with safety and driver assistance systems, it is often necessary to provide additional signals for safe detection of driver speed. Regardless of the manufacturer, speed measurement on narrow aisle forklifts is possible with the DFV60 measuring wheel encoder, which can be attached to nearly any vehicle.

ⓘ This graphic is not presented in the overview.

DFV60 ➜ p. 74

① Driver assistance in narrow aisle bays by means of bar code positioning

During vertical movement of the lifting fork, a CL65X bar code scanner attached to the fork reads the bar code on the bays with fast auto focus, compares them with the enterprise resource planning system and signals as soon as the correct target position has been reached. The storage bay can therefore be approached quicker and with fewer errors, which increases performance.



CLV65x ➜ p. 77

② Narrow aisle trucks identify goods with RFID for complete material flow traceability.

Every second counts for the optimization of high-performance narrow aisle warehouses. Equipped with RFU62x RFID read/write devices, narrow aisle trucks can automatically identify the goods during load handling and compare them with the transport order. This effectively prevents incorrect removal and storage, which is time-consuming.

③ Picking and booking directly in the suspended driver's cab

In very high narrow aisle warehouses, picking is done directly in the suspended driver's cabin. With the rugged IDM26x or HW198x hand-held scanners with particularly large reading distances, logistics workers can book the goods there and then. The hand-held scanners support all common wired and wireless interfaces for communication with the enterprise resource planning system.

④ Driver assistance in narrow aisle warehouses by means of RFID positioning

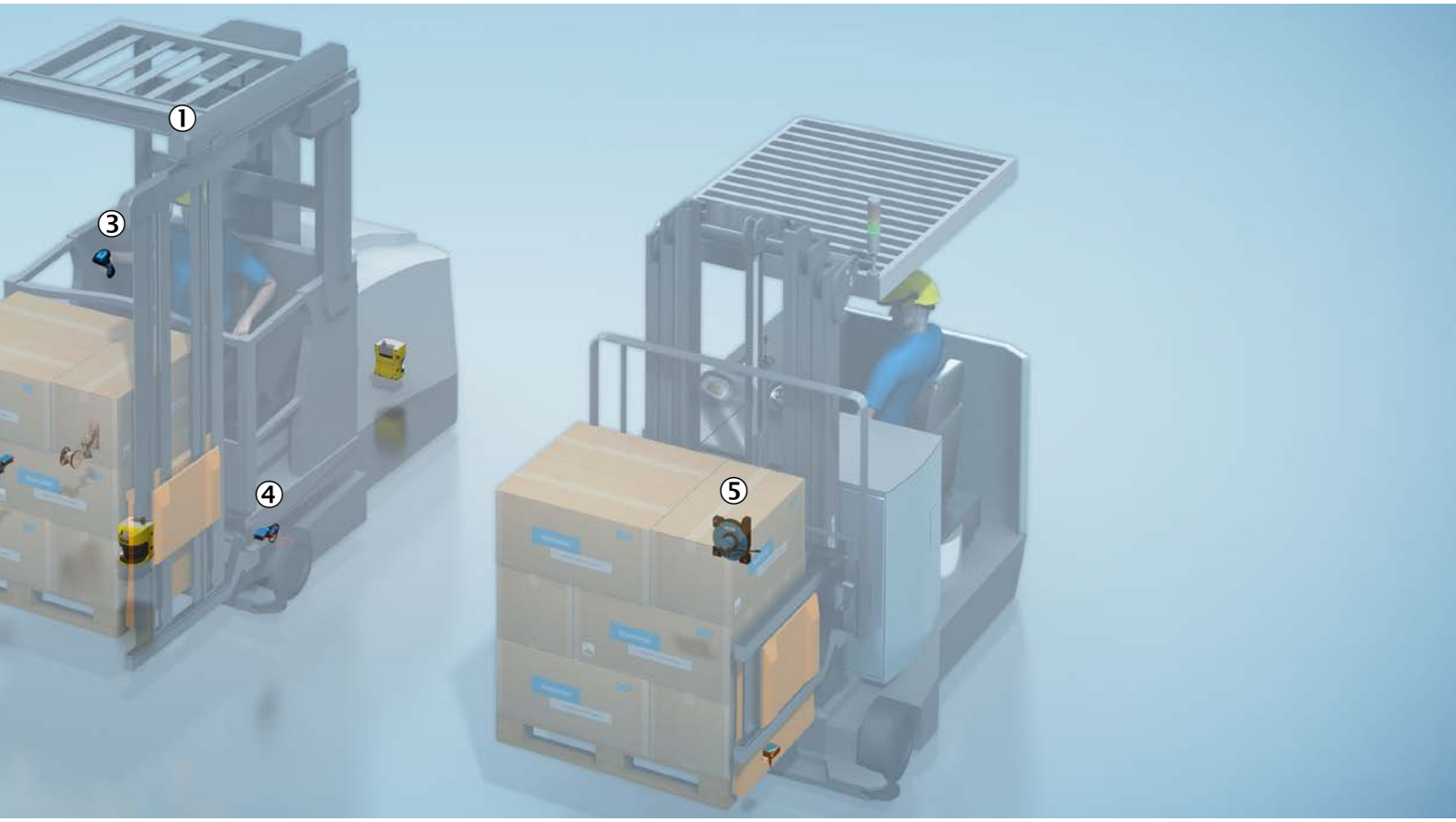
Driver assistance systems support manned forklift truck drivers in narrow aisle warehouses so that they can approach the next storage space quickly and without errors. Rugged and space-saving, RFID tags are embedded in the floor of the narrow aisle. On the forklift, the RFH620 RFID read/write device reads the tags and the vehicle controls stops automatically at the target column of the shelving unit.

(!) This graphic is not presented in the overview.

RFU62x ➜ p. 85

IDM26x ➜ p. 79

RFH6xx ➜ p. 84



⑤ Pallet handling with narrow aisle forklifts at great heights

Storing and removing at great heights is often confusing for drivers of narrow aisle forklifts with fixed driver's platforms. Driver assistance systems show the driver the fork position and loading state. The position of the lifting fork is determined precisely with an EcoLine wire draw encoder whose highly-flexible steel wire ensures permanent maintenance-free operation. The laser photoelectric proximity sensor of the PowerProx series attached to the back of the fork uses two switching points to report whether the load is positioned securely on the fork.

PowerProx ➜ p. 61
EcoLine ➜ p. 72
HighLine ➜ p. 72

NAVIGATION TECHNOLOGIES FOR MOBILE APPLICATIONS

Line guidance

Thanks to their principle of operation, line guidance systems are particularly easy to integrate and can be commissioned quickly, which makes them the number one choice for AGV applications of low complexity.
In the case of optical or magnetic line guidance, reference marks are placed on the ground/floor which are detected and evaluated by sensors as the vehicle passes over them. Besides the actual reference direction, further information can be read and transmitted via the floor markings.

Grid localization

In warehouse logistics, automated guided vehicles must move freely without being bound to lanes. Marker-based localization solutions are particularly suitable for material handling due to the dynamic nature of these applications. They are usually based on optical or magnetic markers that are applied to the ground/floor and are detected by a sensor on the vehicle as it travels over them.

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LINE GUIDANCE AND LOCALIZATION SOLUTIONS FOR AUTOMATED GUIDED VEHICLES AND MOBILE PLATFORMS

Automated guided vehicles (AGVs) are used for intralogistics in all industries these days. Automated, flexible and safe transport of goods is therefore an indispensable part of logistics now and the “state of the art”. SICK offers a broad spectrum of sensor solutions to satisfy the needs of different industries and individual companies. Its solutions portfolio also encompasses localization systems and sensors to support all common navigation methods for automated guided vehicles.

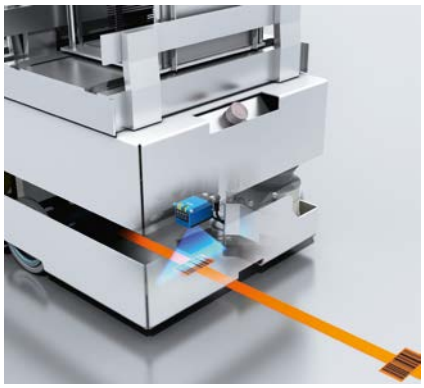
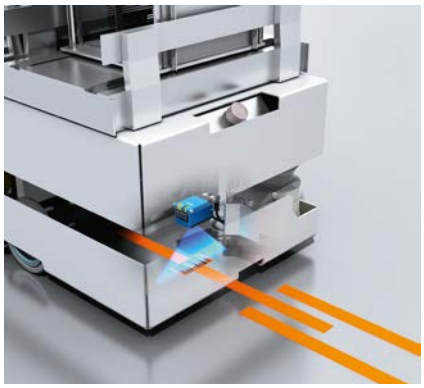
Transport logistics is a dynamic and fast-moving field, digitalization is in full swing, and the call for more flexibility in intralogistics is justified. Navigation systems for automated guided vehicles must be able to be quickly and easily adapted to changing ambient conditions. This is the only way that logistics specialists will be able to respond to the ever shorter product life cycles and the demand for larger numbers of product variants. This places particular requirements on the technologies employed for AGVs, in particular on the sensors and systems used for navigation: These technologies must be flexible and serve both the individual and commercial needs of the user.

Map-based navigation

In the case of map-based navigation, the vehicle uses a digital representation of the environment. The map contains the geometric data for the environment including all contours that the sensor used can “see”. These can comprise not only the natural features in the environment, but also artificial landmarks such as reflectors. The vehicle can localize itself by comparing the current sensor data with the stored map and thereby determine its position.

LINE GUIDANCE

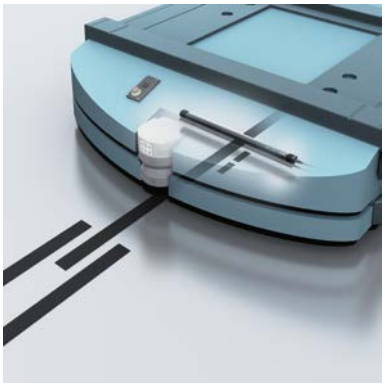
Optical line guidance


The optical tracks(guide tracks) are applied along the route either using adhesive tape or paint. In the case of optical line guidance, a camera sensor detects the contrast between the guide track and the adjacent floor/ground. SICK has developed a unique sensor, the OLS optical line guidance sensor, that specifically detects luminescent tracks.
Any contamination on the ground or ambient light falling on the tracks will have little effect with this type of optical line guidance. The luminescent tracks form a strong and distinct contrast on almost any surface, thereby enabling the sensor to be used with surfaces of any color or level of gloss. The sensor reports the lateral deviation to the guide track to the vehicle computer as a measured value in real time. This enables the steering movement of the vehicle to be constantly adjusted to the course of travel. To clearly identify “points of interest”, for example crossings, loading stations or load transfer stations, the OLS reads the luminescent bar codes that have also been applied to the floor/ground. Thanks to its wide field of view of 180 mm, the sensor can detect up to two tracks branching off the main track. The vehicle controller decides which track the vehicle will follow.

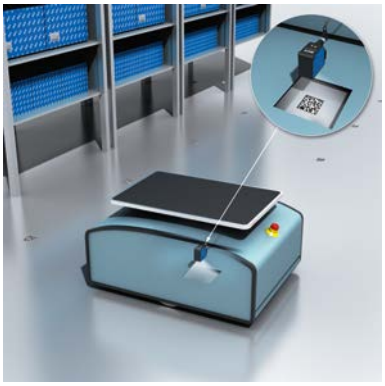
Magnetic line guidance

Depending on the application conditions and vehicle design, it may be possible to use magnetic strips instead of optical tracks. Line guidance using a magnetic strip functions similarly to optical line guidance. In this case the sensors in the MLS product family determine the location of the track by measuring the magnetic field strength rather than by visual means. Even strong contamination of the strip and/or sensor will have hardly any effect on the magnetic field strength. The magnetic strips are glued to the surface along the route or, if necessary, concealed under a top layer. The sensor uses additional magnetic markers to identify crossings, loading stations or load transfer stations. The MLS product family offers sensors in various lengths ranging from 200 to 600 mm. It is therefore also suitable for the line guidance of long vehicles or when tight turn radiuses are present.



OPTICAL GRID LOCALIZATION

Compact, non-track-bound vehicles that can move around freely in an area are increasingly in demand in automated warehouses with goods-to-person picking. In these kinds of warehouses, almost no static contours that are suitable for contour-based navigation are present in the horizontal viewing plane due to the mobile shelves. The preferred solution for this application is therefore grid navigation. The grid consists of defined 2D codes on the floor. To establish the exact position of the vehicle, the GLS6 determines its position and location based on the 2D code in its field of view. The vehicles orient themselves very freely but nevertheless reliably between the grid points by odometry.



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MAP-BASED NAVIGATION

In the case of map-based navigation, the vehicle uses a digital representation of the environment. The map contains the geometric data for the environment including all contours that the sensor used can "see". These can comprise not only the natural features of the environment, but also artificial landmarks such as reflectors. The vehicle can localize itself by comparing the current sensor data with the stored map and thereby determine its position.

The routes along which the vehicle must travel are stored in "virtual form" in a routing model. Route changes therefore do not require any physical changes to the vehicle environment. These changes can, when required, be made offline with only minor interruptions to productive operation.

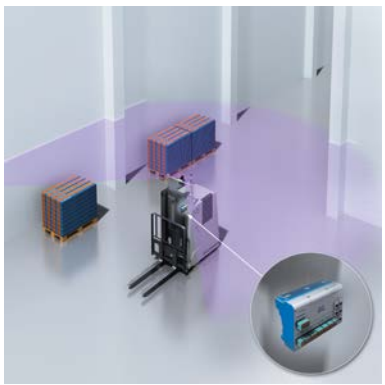
LiDAR sensors are generally employed for map-based navigation. These contain a laser rotating about a vertical axis and having a sensing range of up to 250 m. The distance of a contour from the sensor is determined by measuring the time-of-flight of each laser pulse that hits it. This is used by the localization or navigation computer to create a precise profile of the surrounding contour.

LiDAR-based navigation using artificial landmarks

Map-based navigation using laser triangulation is a proven and efficient technology that allows reflective landmarks in the vehicle environment to be detected. The NAV350 2D LiDAR sensor, which has been optimized for this type of navigation, contains a reflector map that was generated using land surveying methods. The high-performance processor in the laser scanner dynamically calculates the absolute, millimeter-accurate position of the vehicle based on the reflectors located in the scanning area, and transmits this position to the navigation computer.

LiDAR-based navigation using natural features in the environment

Free navigation based on natural features in the environment requires no reflectors – instead, the existing geometrical features of a building such as walls and columns are represented in the map. The positioning accuracy therefore depends more heavily on the features in the environment than for reflector navigation. The reference map for the environment to be traversed is recorded using a 2D LiDAR sensor. To determine the current position during operation, the actual coordinates are continuously compared with the target data expected from the map. If the vehicle deviates from the intended course, its course is appropriately corrected until the coordinates match again. SICK's LiDAR sensors supply the navigation computer of the automated transport system with precise and reliable measurement data.



SAFETY SYSTEM OF THE NEXT GENERATION FOR THE PROTECTION OF PEOPLE

Perfect interaction in the safety system

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

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

More options for challenging applications and higher productivity

Up to 6 microScan3 EFI-pro units can be linked into a safe and adaptive environmental perception system - and every single one of them offers a total of up to 128 individually configurable fields and monitoring cases and up to 8 simultaneously monitored protective fields. The result: Gap-less monitoring thanks to the patented safeHDDM® scan technology whose extreme resistance to environmental influences ensures fewer downtimes. Expanded to include the safe motion monitoring functions, monitoring cases can be adapted dynamically to the respective hazardous situation – for optimally productive and collaborating machines.

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THE COMPLETE SYSTEM FOR SOLVING CHALLENGING AGV AND ROBOTICS APPLICATIONS

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

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

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

CIP Safety
EtherNet/IP™
INDUSTRIE 4.0 READY®

Quick and cost-effective configuration and commissioning

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

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

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

ONE SYSTEM FOR MORE PRODUCTIVITY WITH AUTOMATED GUIDED VEHICLES

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

Safety system including Safe Motion Control

The Safe Motion Control functions enable intelligent and safe monitoring case switching depending on the speed and steering angle and enables optimal protection of automated guided vehicles. SICK also offers suitable safety encoders, e.g. the DFS60 Pro.

With up to 128 individually-configurable monitoring cases per microScan3 EFI-pro, many other statuses can be taken into account, such as load weight. Thus, protective field monitoring is always optimally adapted to the respective situation.

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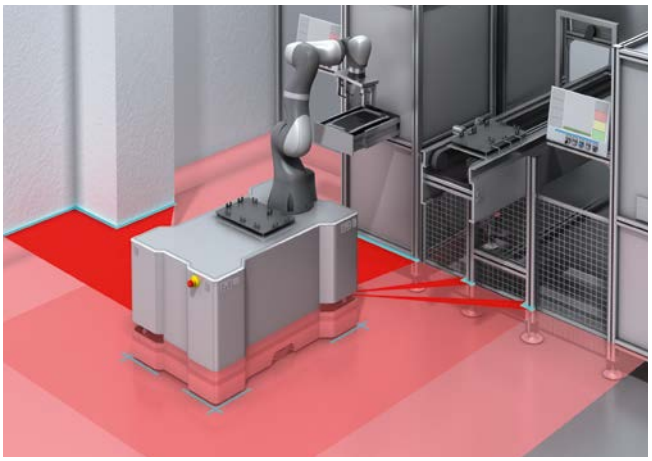
Extended monitoring functions for increased productivity

Simultaneous protective field monitoring reduces the number of required monitoring case switchings. The time saved in this way enables a shorter and more efficient protective field design, considerably increasing productivity. In addition, the safety system allows implementation of drive safety functions such as safely-limited speed (SLS), safely-limited position (SLP) or safe speed monitoring (SSM) via Safe Motion Control.

Compliance with international standards and support with the certification process

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



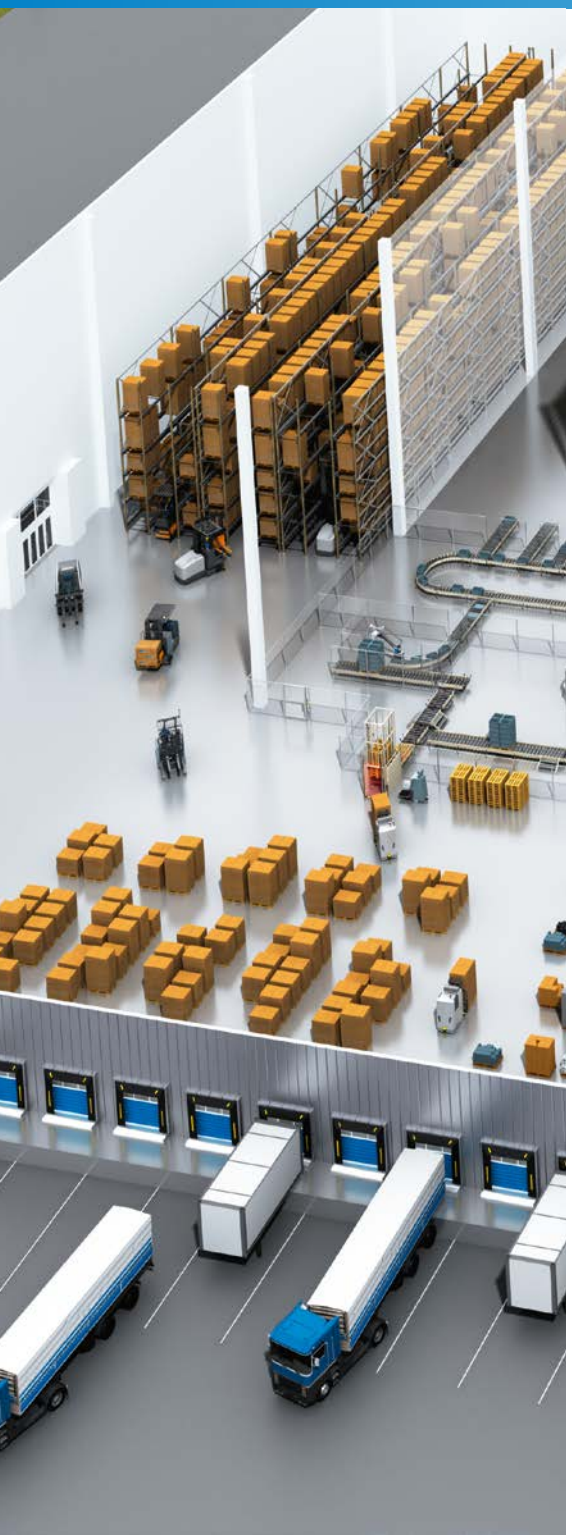
Contour detection field for additional functions

Using a previously programmed surrounding contour, the microScan3 EFI-pro identifies defined work positions using the contour detection field. For example, the laser scanner detects when an AGV is located at the intended docking position or monitors whether a person is approaching the AGV at a bottleneck. The safe contour detection fields can be used for monitoring case switchings, for instance. For that reason, no additional sensors are needed, which saves costs for position switches.

Detection of persons outdoors

The safety requirements for AGVs used in outdoor applications are high: The safety of people must be ensured at all times even under weather conditions like bright sunlight, rain, snow, wind, fog or contamination of the laser scanner, and unscheduled machine stops should be avoided. The outdoorScan3 enables the seamless connection of production and logistics processes in both indoor and outdoor environments. Automated guided vehicles equipped with an outdoorScan3 are able to travel safely beyond the confines of production.

PRODUCT OVERVIEW INDUSTRIAL VEHICLES



Product overview

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G6 – At a glance

- PinPoint LED for a bright, precise light spot
- Durable metal threaded inserts
- SICK ASIC technology - the result of decades of experience in photoelectric sensors
- Large, user-friendly potentiometer
- Large, bright indicator LEDs
- IP 67 enclosure rating

Your benefits

- Easy alignment and precise object detection due to a highly visible PinPoint LED
- Quick and easy mounting and high durability due to threaded metal inserts
- SICK ASIC technology provides high performance and excellent reliability
- Easy to adjust due to large, user-friendly potentiometers
- Easy to monitor due to large, bright indicator LEDs
- Easy installation with SICK accessories

→ www.sick.com/G6

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

W4-3 – At a glance

- Best background suppression sensor in its class
- Universal use of PinPoint technology in all models
- BGS proximity sensor with laser-like light spot for precise detection tasks
- Reliable setting via 5-turn potentiometer, teach-in pushbutton, teach-in via cable or IO-Link
- Flexible sensor settings, monitoring, advanced diagnostics, and display thanks to IO-Link

Your benefits

- Low-cost integration due to optimal machine integration in areas with limited space
- Application versatility due to reliable detection of shiny or jet-black objects
- Rugged mounting system with M3 threaded metal inserts reduces maintenance costs due to a long service life
- High immunity to ambient light reduces downtime caused by false trips
- Clearly visible light spot simplifies alignment
- IO-Link provides easy data access from the PLC
- Quick and easy configuration
- Quick and easy integration using function blocks

→ www.sick.com/W4-3

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

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IMB – At a glance

- Types: M8 to M30
- Extended sensing ranges: 2 mm to 20 mm
- Electrical configuration: DC 3-/4-wire, DC 2-wire
- Enclosure rating: IP 68, IP 69K
- Temperature range: –40 °C to +100 °C
- Rugged stainless-steel housing; plastic sensing face
- Optical adjustment indicator, IO-Link-ready
- Resistant to oils and cooling lubricants; suitable for use outdoors

Your benefits

- Straightforward product selection as fewer sensor variants are required – one sensor suits a whole range of applications
- Stable processes thanks to extended, highly precise sensing ranges enabled through the use of the latest SICK ASIC technology
- Reduced machine downtimes thanks to longer sensor service life, even in harsh working conditions
- Quick and easy installation thanks to optical adjustment indicator and self-locking nuts
- High degree of flexibility and communication options thanks to IO-Link
- Easy to implement customer-specific variants within the standard product portfolio

→ **www.sick.com/IMB**

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

IME – At a glance

- Types: M8 to M30
- Extended sensing ranges: 1.5 mm to 38 mm
- Electrical configuration: DC 3-/4-wire, DC 2-wire
- Enclosure rating: IP 67
- Temperature range: –25 °C to +75 °C
- Nickel-plated brass housing; plastic sensing face

Your benefits

- High machine availability thanks to rugged design
- Highly cost-efficient thanks to low purchase costs
- Wide selection available thanks to extensive standard portfolio
- High positioning accuracy thanks to precise switching behavior

→ **www.sick.com/IME**

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

MLS – At a glance

- Detection of magnetic lines for line guidance
- Detection of switches: Up to 3 lines 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 shape and different measurement area variants
- Quick commissioning without setting Optional setting and visualization via a user interface
- Large ground clearance: 10 mm to 50 mm of distance to the magnetic band can be installed
- Safe line detection and differentiation of up to 3 lines for intersections and line junctions
- Monitoring of magnetic strength of the guidance line
- Easy and reliable detection of command marks (STOP, MERGE, SPEED CHANGE)
- Complete accessories available: Magnetic band for lines and markers, mounting bracket

→ www.sick.com/MLS

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

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)
- Output of deviation from lane center point, land width and reading out of bar codes
- Able to withstand ambient light, contamination and glare
- Compensation for surface defects
- Measurement accuracy: ± 1 mm
- CANopen, RS-485 or Ethernet TCP/IP or IO-Link

Your benefits

- Rugged and accurate, insensitive to ambient light, contamination or surface defects
- Independent of base material or color
- Simple line shifts and route changes by attaching conventional adhesive tape
- Small curve radii of up to 0.5 m possible
- Large reading field enables flexible line 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

→ www.sick.com/OLS

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

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GLS6 – At a glance

- Auto focus for variable reading distances of 70 mm to 500 mm
- Reliable reading of data matrix and QR codes
- Small housing with swivel connector
- Integrated angle measurement as alignment aid for mounting
- microSD memory card for backing up parameters
- Very low sensitivity to ambient light

Your benefits

- Thanks to the auto focus, it is well-suited for all ground clearances (vehicle sizes)
- Fast travel speeds possible due to real time image processing
- Fits into even the smallest AGV thanks to its compact size
- Plug and play solution with integrated angle measurement ensures quick and easy commissioning
- Code labels can be individualized for self-printing, ensuring a high level of flexibility and easy solutions
- Short downtimes when devices are replaced thanks to parameter back-up on microSD memory card

→ **www.sick.com/GLS6**

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

PowerProx – At a glance

- Time-of-flight technology
- Laser class 1, red and infrared light
- Sensing range for object detection: 5 cm to 4 m
- Switching frequencies of up to 1,000 Hz
- Minimum distance between object and background: 6 mm
- VISTAL™ housing
- Up to 3 independently adjustable switching outputs or one analog output
- IO-Link available as an option (distance value, 8 switching points, smart sensor functions)

Your benefits

- Reliable object detection at high sensing ranges and large detection angles, e.g., even with shiny or jet-black surfaces
- Highly visible light spot simplifies alignment of the red-light versions
- Precise, simple adjustment with potentiometer, teach-in button, or display
- Laser class 1 and therefore eye-safe
- High levels of availability and durability. Rugged even when subjected to high mechanical loads thanks to VISTAL™ housing.
- The world's smallest sensor housing ensures great flexibility when designing machines
- IO-Link extends functionality

→ **www.sick.com/PowerProx**

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

ZoneControl – At a glance

- Three mounting types: mounting between the rollers (R/IR), mounting on the side frame (ZLM), or mounting above the belt (WLR)
- Three types of logic: single feed, single feed with sleep function, block (slug) feed
- Up to 50 ZoneControl solutions can be connected in series.
- Fully animated simulation to ease selection and implementation
- Standard cut lengths of 1 m (3 ft) or 2 m (6 ft)

Your benefits

- Largest Zero Pressure Accumulation portfolio on the market gives users a wide variety of choices for their application
- SICK ZoneControl solutions control the flow of packages a on convey- or without a PLC or other external control
- Quick setup since no programming, no laptop, and no PLC interfacing are required
- With 20 years of ZoneControl experience and personal support from SICK experts, all application and product issues are quickly addressed
- Quick expansion or modification of the conveyor due to the modular design

→ www.sick.com/ZoneControl

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

W26 – At a glance

- Technologies: ClearSens, LineSpot, TwinEye with OptoFilter
- BluePilot: Optical alignment aid, adjustment of the sensing range via Teach-Turn adjustment with optical sensing range indicator or via IO-Link
- PinPoint LED: Light-intensive red sender LED
- Smart Sensor: Enhanced Sensing, IO-Link, Diagnostics, Smart Tasks

Your benefits

- Usability and uniform operation thanks to optical quality display on the housing or conveniently via IO-Link
- Simplification when aligning the light beam to the reflector, the receiver or to an object thanks to the highly-visible light spot of the PinPoint LED combined with the optical LED display
- Very high reliability thanks to new detection technologies as well as high optical ruggedness
- The Smart Sensor makes machine processes quicker, more efficient and transparent, enables predictive maintenance and is thereby a trailblazer for Industry 4.0 applications

ECOLAB

IO-Link

US LISTED Ind. Con. Eq. 4R97

PinPoint 2.0 by SICK

SIRIC® optical ASIC invented by SICK

→ www.sick.com/W26

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

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ES21 – At a glance

- Available either as a surface-mounted version with housing or as a built-in version (Ø 22 mm)
- Built-in version for machine control panels with self-monitoring contacts between pushbutton and switching element
- Surface-mounted version for direct mounting on different machines and systems
- Variants with LED ring lighting
- Optionally available with protective collar to prevent inadvertent actuation

Your benefits

- Increased safety due to self-monitoring contacts
- Reduction in accidental faults due to variants with a protective collar
- User-friendly status indicator identified by a colored mark or LED ring around the pushbutton simplifies diagnostics
- Successful down to the last detail: award-winning and appealing design

→ **www.sick.com/ES21**

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

Flexi Classic – At a glance

- Rotary switch for easy function adjustment
- Modular extension possible
- Direct wiring for all types of sensors
- Logic functions: AND, OR, muting, bypass, reset, EDM
- Integration into all common fieldbuses
- Integration of the Flexi Loop safe series connection
- Special muting modules are able to meet all the requirements of a demanding muting application

Your benefits

- The optimal scalability thanks to the modular construction prevents redundant inputs and outputs as well as reducing hardware
- Configuration via rotary switch simplifies logic configuration
- Flexi Classic configurator tool offers easy logic configuration and wiring help
- Complete diagnostics for the system, preventing unplanned downtime
- The compact design enables significant reduction of the control cabinet width
- Significantly reduced wiring compared with conventional safety solutions. Wiring with Flexi Loop is even easier.

→ **www.sick.com/Flexi_Classic**

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

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

→ www.sick.com/Flexi_Soft

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

IME2S – At a glance

- Types: M12 to M30
- Increased response ranges: 4 mm to 15 mm
- Two OSSD safety outputs
- Enclosure rating: IP67
- Temperature range: –25 °C to +70 °C
- Nickel-plated brass housing, plastic sensing face
- Up to performance level PL d (EN ISO 13849)
- Connection variants: M12 male connector, cable or cable with M12 male connector

Your benefits

- High machine availability thanks to low susceptibility to dirt and moisture
- Long product service life due to low-wear and low-maintenance workings
- Easy integration: Sensors can be mounted to save space thanks to their compact design and do not need a separate actuator
- Fast diagnostics via LED status indicator
- High reliability and precise switching behavior due to proven ASIC technology
- Safe, direct connection to a safe control solution by means of OSSDs
- Easy and flexible connection options thanks to variants with male connector, cable or cable with male connector

→ www.sick.com/IME2S

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

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microScan3 Pro – At a glance

- Innovative safeHDDM® scanning technology
- Protective field range: Up to 9 m, scanning angle: 275°
- Up to 128 freely configurable fields
- Up to 8 simultaneous protective fields
- Ethernet-based output for high-precision measurement data
- Safe machine integration with EtherNet/IP™ CIP Safety™ or PROFINET PROFIsafe
- Safe SICK device communication via EFI-pro

Your benefits

- Reliable technology and a rugged design: microScan3 Pro safety laser scanners are at home in harsh industrial environments. Even in environments with dirt, dust and ambient light, the new generation of scanners shows how extremely resistant it is - thanks to the safeHDDM® scan technology, aluminum housing and well-designed fastening concept.
- Smart integration: Low cabling costs due to standardized interfaces, fast device change due to configuration memory, and safe machine integration via networks possible
- Intuitive operation: easy commissioning with the Safety Designer software and diagnostic options via the display, pushbuttons, or network
- Intelligent functions: Simultaneous protective fields, contour detection fields or measurement data output - with the help of the intelligent functions, the sensor settings can be optimally adjusted to the different requirements.

→ **www.sick.com/microScan3_Pro**

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

S300 Expert – At a glance

- Compact design
- 2 m or 3 m protective field range
- 270° scan angle
- 16 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 measured data output via RS-422 with landmark recognition

Your benefits

- Simple integration due to compact design
- Unbeatable cost-effectiveness – 270° scanning angle allows complete application protection with only two scanners
- Easy installation, commissioning and maintenance for stationary and mobile applications
- Variety of field sets ensures safety and productivity when protecting vehicles or moving machine parts
- Quick recommissioning via configuration memory
- Easy modular expansions, simple cabling and additional functions using SICK safety controllers with EFI
- The correct protective field at any speed avoids unnecessary stops.
- Personnel protection and navigation support in one device

→ **www.sick.com/S300_Expert**

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

S300 Mini Standard – At a glance

- Ultra-compact design
- 1 m, 2 m, or 3 m protective field range
- 270° scan angle
- 1 field set
- Selectable resolution for hand, leg or body detection
- Contour as reference for vertical applications
- Integrated external device monitoring (EDM)
- Easy-to-configure fields and functions

Your benefits

- Simple integration due to ultracompact design
- Easy installation, commissioning and maintenance for stationary and mobile applications
- Unbeatable cost-effectiveness – 270° scanning angle allows complete application protection with only two scanners
- Safety engineering – with no loss of productivity
- Decades of proven safety technology guarantee maximum reliability and availability – even under difficult conditions
- Easy to manage, reducing costs and work time
- Reduction of downtime and brake wear thanks to triple field function
- Simple alignment and safe operation in vertical mode

→ www.sick.com/S300_Mini_Standard

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

S3000 Anti Collision – At a glance

- Collision protection of up to 15 m and person protection of up to 7 m in one device
- Can only be used in EFI system network with modular Flexi Soft safety controller
- Up to 16 switchable field sets
- Configuration memory integrated in the system plug
- Extended measurement data output via RS-422 with landmark recognition

Your benefits

- Increase your productivity: By using collision protection, you can simultaneously operate two vehicles in a narrow aisle
- The large sensing range for the protective field and collision protection field allows for a high vehicle speed and therefore high productivity
- Three functions in one device: personal protection, reliable collision protection and navigation support with field marker detection
- High system throughput thanks to speed-dependent field set switching of up to 16 field sets
- Quick recommissioning via configuration memory

→ www.sick.com/S3000_Anti_Collision

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

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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
- Interface (EFI) for reliable SICK device communication
- Incremental encoder inputs for speed-dependent field switching
- Extended measured data output via RS-422 with field marker detection
- Simultaneous monitoring of up to 4 protective fields

Your benefits

- Large protective field range of 7 m enables a large variety of applications
- Variety of field sets ensures safety and productivity when protecting vehicles or moving machine parts
- Modular expansions, low wiring effort and additional functions such as the simultaneous monitoring of up to four protective fields using a SICK safety controller via EFI
- Quick recommissioning via configuration memory
- Having the correct protective field at any speed prevents unwanted stops
- Navigation support and personal protection 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

→ **www.sick.com/S3000_Expert**

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

S3000 Standard – At a glance

- 4 m, 5.5 m or 7 m protective field range
- 1 field set
- Configuration memory integrated in the system plug
- Interface (EFI) for reliable SICK device communication
- Selectable resolution for hand, leg or body detection
- Simultaneous monitoring of up to 4 protective fields
- Contour as reference for vertical applications
- Integrated external device monitoring (EDM)

Your benefits

- Large protective field range of 7 m enables a large variety of applications
- Safety technology – with no loss of productivity
- Quick recommissioning via configuration memory
- Modular expansions, low wiring effort and additional functions such as the simultaneous monitoring of up to four protective fields using a SICK safety controller via EFI
- Easy installation, commissioning and maintenance for stationary and mobile applications
- Decades of proven safety technology guarantee maximum reliability and availability – even under difficult conditions
- Simple alignment and reliable operation in vertical mode

→ **www.sick.com/S3000_Standard**

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

TiM-S – At a glance

- Wide detection range: 0.05 m up to maximum 25 m
- Certified according to ISO 13849
- Low power consumption (typically: 4 W, maximum: 16 W)
- Immediate commissioning and configuration via USB interface
- Communication interface which combines intelligent field evaluation and measurement data output

Your benefits

- Coverage of large measuring ranges
- Safety-related dynamic field evaluation and raw data output combined with the newest ROS drivers enable the use of TiM-S devices in nearly any application, both mobile and stationary
- Easy commissioning with rotatable connections and accessories perfectly attuned to the sensors; only a few adjustable SOPAS software parameters are necessary for commissioning
- Certification according to ISO 13849 allows for the use of the safety-relevant 2D LiDAR sensors in personal protection applications in which performance level b is required, among others

→ **www.sick.com/TiM-S**

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

Safe EFI-pro System – At a glance

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

Your benefits

- Perfect interaction in the safety system: Optimal connectivity of safety sensors, safety controllers and actuators connected via Ethernet/IP™ CIP Safety™
- Fast, intuitive commissioning: Safety Designer for the configuration of SICK system components and clever connectivity
- Secure productivity: Combination of safe motion monitoring, simultaneous protection field monitoring and extended network integration
- Optimized processes: Extensive diagnostic options via Safety Designer and device data via Ethernet from the field level into the cloud
- Safe investment: Future-proof industrial Ethernet technology

→ **www.sick.com/Safe_EFI-pro_System**

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

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BAS – At a glance

- Customizable alert zones allowed for a tailored solution
- Low power consumption minimizes drain on vehicle battery
- Light stack with three colors and 85 dB integrated buzzer with two audible tones
- Alarms are activated when vehicle is traveling in reverse
- Kits available for different voltage trucks and electrical systems

Your benefits

- Eliminating the need for constant alerts or flashing lights helps reduce operator fatigue
- Stand-alone, aftermarket solution that actively alerts the operator to unseen obstructions behind the forklift truck, which contributes to a reduction in costly accidents
- Operator remains in full control of the lift truck, this stand-alone system acts as an aid and does not override the lift truck control system
- Simple, independent solution that does not require additional costly equipment or integration of components on potential obstacles
- Keep Operator focused on current task while reducing accidents and damage

→ www.sick.com/BAS

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

AFS/AFM60S Pro – At a glance

- Certified up to SIL3 (IEC 61508), SILCL3 (EN 62061), PL e (EN ISO 13849)
- Single- or multiturn encoder with SSI and sin/cos interface
- Programmable, integrated error memory
- Solid or hollow shaft encoder, mounting with key
- Cable connection, M23 or M12 male connector
- Operating temperature range: –30 °C ... +95 °C

Your benefits

- Certified safety product that ensures the best possible protection for persons, machinery, and systems
- Easy handling of safety functions with complete solutions from SICK: Safe positioning with the AFS/AFM60S Pro and the FX3-MOC1 motion control module of the Flexi Soft safety controller
- Positive and non-positive connections for mechanical reliability
- Safety status conforming to the test basics of the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA)
- Different configuration and connection options for high levels of flexibility and straightforward implementation
- Suitable for applications with small installation spaces

→ www.sick.com/AFS_AFM60S_Pro

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

DFS60S Pro – At a glance

- Encoders for functional safety technology: SIL2 (IEC 61508), SILCL2 (EN 62061), PL d (EN ISO 13849)
- Electrical interface: 4.5 V ... 32 V; sine/cosine 1 V_{PP}; 1,024 periods
- Clamping flange or servo flange, blind hollow shaft or through hollow shaft (assembly options with feather key)
- Universal cable outlet, M23 or M12 male connector, axial or radial
- Enclosure rating: IP 65
- Working temperature range: –30°C ... +95°C (depending on type)

Your benefits

- Certified safety products ensuring the best possible protection for persons, machinery, and systems
- Easy and practical handling of safety functions with all-in-one solutions from a single source, safety functions with the Flexi Soft motion control modules FX3-MOC0 by SICK: safe stop 1 (SS1), safe stop 2 (SS2), safe operating stop (SOS), safe speed monitoring (SSM), safely limited speed (SLS), safe direction (SDI), safe brake control (SBC)
- Force fit and tight fit for mechanical reliability
- Certified safety products instead of standard products reduce the scope of safety engineering
- Versatile connection options for high levels of flexibility and straightforward implementation
- Compact installation depth for compatibility with applications in which installation space is limited

➜ **www.sick.com/DFS60S_Pro**

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

AHS/AHM36 CANopen – At a glance

- Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits)
- Face mount flange, servo flange, blind hollow shaft
- Rotatable M12 connector or rotatablecable outlet
- CANopen interface with programmable configuration
- Diagnostic functions: temperature, operating time, etc. (depending on the type)
- Protection class up to IP 67 (depending on the type)
- Operating temperature: –40 °C to +85 °C (depending on the type)

Your benefits

- Simple, time-saving mechanical installation due to a rotatable connector or rotatable cable outlet, various mounting hole patterns, and many different shafts
- Simple network installation with various configuration options
- Intelligent diagnostic functions evaluate maintenance intervals for the entire system, thereby increasing system reliability
- Customizable Easy setup for various applications allowing binary, non-binary, and non-integer resolutions with the round axis functionality (advanced version)
- Reliable operation in harsh environments thanks to the rugged, reliable, fully magnetic sensor system
- Space-efficient and cost-effective design that is suitable for applications where space is tight
- High performance at a cost-efficient price

➜ **www.sick.com/AHS_AHM36_CANopen**

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

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AHS/AHM36 SSI – At a glance

- Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits)
- Face mount flange, servo flange, blind hollow shaft
- Rotatable M12 connector or rotatable cable outlet
- SSI interface
- Programmable SSI version: Resolution, preset value, etc. can be programmed (depending on the type)
- Protection class up to IP 67 (depending on the type)
- Operating temperature: –40 °C to +100 °C (depending on the type)

Your benefits

- Simple, time-saving mechanical installation due to a rotatable connector or rotatable cable outlet, various mounting hole patterns, and many different shafts
- Simple and flexible electrical installation with various configuration options and adjustable SSI protocol structure (programmable SSI version)
- Easy setup for various applications allowing binary, non-binary, and non-integer resolutions with the round axis functionality (programmable SSI version)
- Reliable operation in harsh environments thanks to the rugged, reliable, fully magnetic sensor system
- Space-efficient and cost-effective design that is suitable for applications where space is tight
- High performance at a cost-efficient price

→ **www.sick.com/AHS_AHM36_SSI**

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

Compact – At a glance

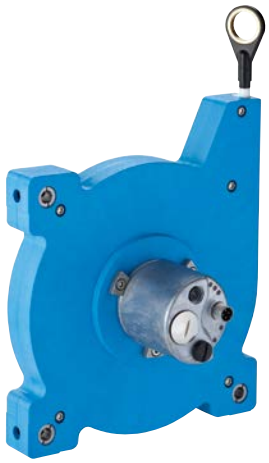
- Measuring lengths from 2 m ... 5 m
- Integrated measuring system
- Compact housing (90 mm x 90 mm x 90 mm)
- Incremental and absolute versions
- High resolution

Your benefits

- Industrial designed encoder integrated in an aluminum housing makes it less susceptible to external damage, saving time and reducing maintenance costs
- Extremely precise measurements by eliminating the coupling between the encoder and the mechanism
- Space-saving installation, since the encoder is directly integrated into the wire draw mechanics.
- Very precise measurements thanks to its high resolution

→ **www.sick.com/Compact**

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



EcoLine – At a glance

- Measured lengths: 1.25 m ... 10 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very small, slim housing (55 mm ... 190 mm) with spring integrated in the measurement drum
- Light yet shock-proof and temperature-resistant plastic housing
- Analog interface with teach-in function at the encoder

Your benefits

- Space- and cost-saving design thanks to slimline mechanics
- Numerous possible combinations of interfaces and measuring lengths
- Advanced programming options lead to a reduction in the amount of variants, save costs, and reduce storage
- Analog interface speeds up commissioning and cost-effective interface card can be used

→ www.sick.com/EcoLine

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

HighLine – At a glance

- Measuring lengths: 2 m ... 50 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very rugged system (dirt scraper, integrated brushes)
- High-quality winding mechanism and wire input
- High enclosure rating
- High shock and vibration resistance
- Extremely high resolution possible
- Expandable using external accessories

Your benefits

- Reliable solution for use in harsh ambient conditions
- Long service life due to rugged industrial housing
- Quick and easy installation without the need for precise linear guidance
- Low integration and maintenance costs
- Customization option reduces storage costs
- Analog interface speeds up commissioning and cost-effective interface card can be used

→ www.sick.com/HighLine

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

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DBS36 Core – At a glance

- Connection with universal cable outlet
- Designs with blind hollow shaft or face mount flange with solid shaft
- Face mount flange with 6 mounting hole patterns and servo groove
- Hollow shaft with universal stator coupling
- Compact housing diameter of 37 mm with compact construction depth,
- Electrical interfaces: TTL/RS-422, HTL/push pull and Open Collector NPN
- Number of lines: 10 to 2,500
- Temperature range: –20 °C ... +85 °C
- Enclosure rating: IP 65

Your benefits

- The universal cable outlet allows for use in tight spaces and for flexible cabling
- Face mount flange with various mounting hole patterns provides high flexibility when mounting in existing and new applications
- Face mount flange with servo groove makes mounting with servo clamps possible
- The universal stator coupling of the DBS36 Core allows for easy device replacement without adapting the application
- Shafts in metric and US design enable worldwide use
- The high flexibility of the mechanical interface of the encoder and the available accessories allow for the use of a single design in many applications
- Long-term and reliable operation thanks to a high enclosure rating, temperature resistance and bearing lifetime

→ **www.sick.com/DBS36_Core**

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

DFS60 – At a glance

- Short installation depth
- High resolution of up to 16 bits
- Optional programming: Output voltage, zero pulse position, zero impulse width, pulse number and counting direction
- Connection: Radial or axial cable outlet, M23 or M12 male connector, axial or radial.
- Electrical interfaces: 5 V & 24 V TTL/RS-422, 24 V HTL/push pull, 5 V sin/cos 1 Vss
- Mechanical interfaces: Face mount flange or servo flange, blind hollow shaft or through hollow shaft
- Remote zero set possible

Your benefits

- Reduced storage costs and downtime due to customer-specific programming
- Variety of different mechanical and electrical interfaces enable the encoder to be optimally adjusted to fit the installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-Pro display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation

→ **www.sick.com/DFS60**

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

DFV60 – At a glance

- Rotatable spring arm for universal use
- 300 mm wheel circumference with o-ring made from NBR70
- Mounting arm and measurement wheels made from aluminum
- Programmable output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: radial M12 connector outlet or radial/axial cable outlet
- Electrical interfaces: 5V & 24V TTL/ RS-422, 24 V HTL/push pull
- Remote zero setting possible

Your benefits

- Universal-use spring arm ensures fast and simple mounting
- The high level of spring tension enables use in harsh environmental conditions
- Reduced storage costs and downtime due to programmability
- Connector-in cable outlet in radial or axial direction enables customer-specific cable solutions
- Excellent concentricity even at high speeds
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation

→ www.sick.com/DFV60

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

MAX48 – At a glance

- Measuring range: 50 to 2,500 mm (1 mm steps), typical resolution 0.1 mm
- Analog, CANopen, SAE J1939 and PWM interfaces are available
- Pressure-resistant housing, designed for hydraulic operating pressure of up to 400 bar
- High operating temperature (electronics) up to +105 °C
- Fluid temperature (hydraulic oil) up to max. +95 °C
- Compact dimensions: 10 mm installation space, 30 mm damping zone
- Position magnet does not need a spacer disk

Your benefits

- Magnetostriction: Reliable, safe and wear-free
- 100% mechanical and electrically compatible with existing cylinder constructions
- Save-spacing installation: Better utilization of the piston stroke in tight installation space of the cylinder
- Extremely stable signal behavior and very good EMC properties: Resistant to extreme electrical influences, such as radiated or coupled faults in the on-board power supply
- Status monitoring: Monitoring of piston strokes, operating hours and max. oil temperature provides a statement about the cost-optimized operation of the machine
- Favorable cost-benefit ratio

→ www.sick.com/MAX48

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

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TMS/TMM61 – At a glance

- Compact inclination sensor with measuring range of 360° (single-axis) or ±90° (dual-axis)
- Compensated cross sensitivity and configurable vibration suppression
- Convenient CANopen interface
- UV-resistant, impact-proof plastic housing
- High resolution (0.01°) and accuracy (±0.1° typ.)
- Programmable with the PGT-12-Pro

Your benefits

- Inclination measurement in two axes without mutual interference
- Single-axis inclination measurement over 360° with configurable zero point
- Flexible adaptation to the application via the CANopen interface or PGT-12-Pro handheld programming tool
- Reliable output signal thanks to configurable digital filter
- Precise leveling thanks to high accuracy over the entire measuring range
- Compact design for applications with limited space
- Can also be used in the harshest ambient conditions thanks to fully encapsulated electronics

→ **www.sick.com/TMS_TMM61**

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

TMS/TMM88 Dynamic – At a glance

- Single-axis (360°) and two-axis (+/- 90°) inclination sensors based on a six-axis IMU
- Intelligent sensor fusion filter
- Highly accurate even with dynamic movements
- Interfaces: CANopen, SAE J1939
- Programmable with the PGT-12-Pro
- Temperature range: –40 °C to +80 °C
- Shock resistance: 100 g
- Enclosure rating: IP67/69

Your benefits

- Inclination measurement in two axes without mutual interference
- Single-axis angle measurement over the full 360° with configurable zero point
- High signal quality and quick response time thanks to innovative and powerful sensor fusion algorithm
- Access to raw data of the acceleration sensor and gyroscope opens up additional application possibilities
- Use under the harshest conditions possible thanks to completely encapsulated electronics and high enclosure rating
- Flexible configuration via CANopen or SAE J1939 as well with the PGT-12-Pro

→ **www.sick.com/TMS_TMM88_Dynamic**

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

SKS/SKM36 – At a glance

- Motor feedback systems for the standard performance range
- 128 sine/cosine periods per revolution
- Absolute position with a resolution of 4,096 increments per revolution and 4,096 revolutions with the multiturn system
- Programming of the position value and electronic type label
- HIPERFACE® interface
- Integrated version and stand-alone design
- Certified according to SIL2/PL d (only valid for SKS36S/SKM36S-H...)
- Conforms to RoHs

Your benefits

- The small dimension allows manufacturers of low-power and minimal-power motors to considerably reduce the size of their motors
- The stand-alone version is ideally suited as a master and path encoders
- The SKS/SKM36 motor feedback systems have strongly penetrated the drive technology market
- The consistent mechanical components in SEK/SEL37 allow for a high degree of flexibility with various encoder systems

→ www.sick.com/SKS_SKM36

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

SRS/SRM50 – At a glance

- Motor feedback systems for the top performance range
- 1,024 sine/ cosine periods per revolution
- Absolute position with a resolution of 32,768 increments per revolution and 4,096 revolutions with the multiturn system
- HIPERFACE® interface: Programming of the position value and electronic type label
- Insert shaft or tapered shaft with various torque supports
- Integrated version, mounted version or stand-alone design
- Certified according to SIL2/PL d (only valid for SRS50S/SRM50S...)
- Conforms to RoHs

Your benefits

- Motor feedback system with HIPERFACE® interface
- High shock/vibration resistance thanks to built-in metal code disk
- Consistent motor design due to identical size of single and multiturn design
- To use of a motor feedback system certified to SIL2/PL d makes it easier to have your system certified.
- Very smooth running thanks to maximum ball bearing distance

→ www.sick.com/SRS_SRM50

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

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CLV65x – At a glance

- Huge depth of field due to auto focus
- Integrated function buttons, e. g., for starting auto setup or reading quality evaluation
- CAN, Ethernet TCP/IP, PROFINET, and EtherNet/IP on board. No additional Ethernet gateway required (for "Ethernet" connection type)
- Enhanced SMART code reconstruction technology
- Flexible sorting, filtering, and logical functions
- Integrated web server for diagnostic data and network monitoring
- Advanced, easy-to-use SOPAS configuration software
- Integrated LED bar graph

Your benefits

- Cost-effective, as auto focus means no variants or additional light barriers are required for focus adjustment
- Intelligent auto setup and multi-function pushbuttons save time during commissioning
- Easily execute firmware updates using the microSD memory card: no need for a PC
- Enhanced SMART technology reads damaged and partially obscured codes, increasing read rates
- Increased scanner intelligence enables sophisticated configuration of logical operations, reducing the control system programming effort. Data is then delivered in the desired format
- Integrated web server provides remote diagnostics and monitoring; no additional software is required

→ **www.sick.com/CLV65x**

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

CLV69x – At a glance

- Advanced SMART+ code reconstruction technology
- New and flexible cloning plug technology
- CAN, Ethernet and serial communications available on board (dependent on cloning plug variant)
- Large depth of field due to real-time auto focus
- Consistent, user-friendly "SOPAS ET" software
- Built-in tracking without the use of an additional system controller
- Flexible sorting, filtering, and logical functions
- Integrated LED bar graph with push-buttons

Your benefits

- Higher reading rate on damaged, heavily contaminated and partially damaged bar codes using the SMART+ algorithm
- Increased processing allows for faster and more accurate performance on demanding applications
- Fewer costs since no additional Ethernet gateway is required when using the Ethernet clone plug
- Time savings during commissioning thanks to integrated buttons and bar graph
- Increased scanner intelligence enables sophisticated configuration of logical operations, reducing the control system programming effort. Data is delivered in the desired format
- Cost savings since standard applications can be implemented without an additional system controller due to integrated tracking

→ **www.sick.com/CLV69x**

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

Dx35 – At a glance

- Highest reliability, ambient light immunity and best price/performance ratio thanks to HDDM technology
- Measuring range of 0.05 m to 12 m for natural objects or 0.2 m to 35 m for reflective tape
- Devices with analog and digital output, or just switching
- Infrared or red emitted light in laser class 1 or 2
- Repeatability: 0.5 mm to 5 mm
- Compact housing size
- IO-Link

Your benefits

- Precise and reliable measurement regardless of object color extends run time and process quality
- A small size and blind zone make flexible mounting possible when space is limited
- Optimum solution thanks to flexible settings for speed, range and repeatability
- Flexible interface use: 4 mA to 20 mA, 0 V to 10 V, PNP output, NPN output, or IO-Link – making machine integration simple
- Offering easy alignment, optimal performance or inconspicuous measurement, versatile light senders make it an ideal solution for all scenarios
- Low investment costs and high performance levels guarantee a quick return on investment
- IO-Link offers full process control, from commissioning to service
- A wide variety of control options ensures rapid commissioning and fast batch changes

→ www.sick.com/Dx35

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

Dx50-2 – At a glance

- Measuring range up to 10 m on black targets and up to 30 m on white targets, compact dimensions
- Output rate up to 3,000/s
- Repeatability: 0.5 mm to 5 mm
- Reliable, patented HDDM time-of-flight technology
- Withstands extreme temperatures from –40 °C to +65 °C thanks to rugged metal housing
- Shape comparison integrated in sensor
- IO-Link, analog and digital output
- Display with intuitive operation and easy-teach option
- Enclosure rating IP 65 and IP 67

Your benefits

- A wide measuring range and a compact housing increase the number of application possibilities
- Very high throughput thanks to a high measuring frequency
- Precise and reliable measurement regardless of object color improves uptime and process quality
- Withstands harsh ambient conditions thanks to ruggedness, a wide temperature range, and ambient light immunity
- Integrated shape comparison for straightforward checking and sorting of objects
- Fast and easy commissioning via intuitive display menu structure, easy-teach option, Wireless LAN, multifunctional input, or IO-Link saves time
- Full process control with IO-Link from commissioning to maintenance
- Three switching modes provide a simple solution for demanding applications

→ www.sick.com/Dx50-2

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

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HW198x – At a glance

- 1D and 2D code reading with only one device over a huge reading distance range of 15 cm to 16 m
- Wired and Bluetooth versions available (up to 100 m distance)
- Fieldbus connection modules for PROFIBUS, PROFINET, Ethernet TCP/IP, EtherCAT®

Your benefits

- Improved productivity: Pallets that are far away can be scanned from a sitting position in a manned forklift truck, for example, saving time
- Unrivaled service life, for example in cold-storage warehouses: Enclosure rating IP65, withstands 50 falls on concrete from a height of 2 m and 5,000 impacts (centrifuge test with 1 m bobbin), even at temperatures as low as –30 °C.
- Intuitive operation: Laser target beam, reading independent of direction, and focused reading in the scanning field center for precise operation over a wide scanning area
- Universal device reduces variants: Suitable for all tasks in a distribution center or warehouse

→ **www.sick.com/HW198x**

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

IDM26x – At a glance

- Identification of all standard 1D, stacked, and 2D codes
- Reliable, secure, and fast code reading
- Rugged, stable housing with IP 65 enclosure rating
- Supports all common corded and cordless interfaces as well as industrial fieldbuses via SICK connectivity
- Good read feedback via LED, beeper, and vibration

Your benefits

- Quick and accurate identification even of poorly printed bar codes eliminates the need to enter data manually
- Highly reliable thanks to IP65 industrial enclosure rating and rugged housing
- Easy focusing of bar codes thanks to the clearly visible laser line
- Simple and flexible integration into industrial fieldbus networks using SICK connectivity
- Simple and intuitive operation through multiple read confirmation

→ **www.sick.com/IDM26x**

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

LMS1xx – At a glance

- Efficient and cost-effective 2D LiDAR sensors for measuring ranges of up to 50 m
- Outstanding performance whatever the weather, thanks to multi-echo technology and intelligent algorithms
- Rugged, compact housing with enclosure rating up to IP 67, integrated heating, and a temperature range of –40 °C to +60 °C
- Variants for security applications with relay outputs and VdS certification available
- Measurement data output via Ethernet interface in real time
- Number of digital outputs can be expanded via external CAN modules

Your benefits

- Straightforward integration and mounting due to compact design
- Low purchase and operating costs: One device monitors areas of over 5,500 m2 in size
- Product family with many variants, which also provide solutions for demanding and specialized applications
- Extended filter options significantly reduce measurement errors caused by conditions such as fog, rain or snow
- Optional CAN I/O module increases number of digital outputs for greater application flexibility
- Ethernet interface makes for easy implementation and remote maintenance

→ www.sick.com/LMS1xx

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

NAV3xx – At a glance

- Mixed-mode navigation provides both spatial contour data and reflector data
- Long scanning range: up to 70 m on reflectors (up to 35 m on black targets)
- High internal computing power and individual AGV configuration
- Measurement, navigation, and determination of position with highest level of precision from three visible reflectors
- Angular resolution of up to 0.1 degrees
- Navigation, spatial and contour data, reflector marks, angular position and/or raw data collection

Your benefits

- Precise, fast collection of spatial contour data and/or simultaneous determination of reflector data (managing up to 12,000 reflectors) in real time
- Integrated evaluation of measured data reduces the computing load in the vehicle computer, minimizing power consumption and reducing operating costs
- High flexibility, since line guidance is also possible in areas without reflector marks, and routes can be easily modified using teach-in mode
- Precise measurements in harsh industrial environments thanks to IP65 housing for indoor applications
- High angular resolution for gap-free scanning even under difficult conditions
- Hardware synchronization output ensures precise control

→ www.sick.com/NAV3xx

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

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NAV-LOC – At a glance

- Integrated evaluation of contour data
- Precise position determination
- High repeatability of position
- Accurate distance resolution with a high angular resolution
- 360° measurement with 8 Hz
- High sensitivity and long sensing range when working with black surfaces
- Can be used as a complete solution or for retrofitting existing vehicles

Your benefits

- Quick and precise scanning of the environment makes it possible to determine both the current position and orientation at the same time
- Can be used in a wide range of applications as adaptations to the environment are not necessary
- No additional costs for installation and service, such as fitting reflectors, as localization is based on natural landmarks
- Integrated data evaluation reduces the processing power needed in the vehicle computer
- Binary data output for quick and easy PLC operation
- Graphical user interface in a web browser – can be used with all current software

→ **www.sick.com/NAV-LOC**

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

TiM1xx – At a glance

- Small, simple, and cost-effective sensor for area monitoring
- Monitoring of an area of up to 15.7 m²
- Low weight of just 90 g
- Field evaluation using integrated software algorithms
- Low power consumption of typically 2.2 W
- Configuration and cloning using IO-Link
- Industrial design

Your benefits

- Low installation effort thanks to monitoring of a 200° field of view
- Low overall operating costs
- Low space requirements thanks to compact dimensions
- Rapid commissioning thanks to simple configuration of the detection zone with software
- Low installation costs and rapid replacement thanks to rotatable connector, IO-Link, and parameter cloning
- Particularly suitable for use in battery-operated vehicles thanks to low power consumption

→ **www.sick.com/TiM1xx**

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

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)
- TiM3xxS only: Certified to Machinery Directive 2006/42/EG and DIN EN ISO 13849-1:2015

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 preconfigured 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

→ www.sick.com/TiM3xx

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

TiM5xx – At a glance

- Monitoring area of up to 1,470 m² with just one sensor
- High ambient light tolerance due to HDDM technology
- Rugged housing with up to an IP 67 enclosure rating
- Low power consumption (typ. 4 W)
- Compact design with a housing height of just 86 mm maximum
- Integrated Ethernet interface
- Long sensing range of up to max. 25 m
- Industry-standard design and M12 male connector

Your benefits

- Reliable object detection independent of the surface and ambient light
- IP 67 enclosure rating can be relied upon to withstand both indoor and outdoor conditions
- Easy integration into compact automated guided vehicles (AGV) due to small size
- Ethernet interface makes for easy implementation and remote maintenance
- Can determine additional information such as object size, shape, etc. through measurement data output
- Low implementation costs due to scalability: Sensor telegram is identical to sensor telegrams for 2D LiDAR sensors in the SICK portfolio

→ www.sick.com/TiM5xx

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

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TiM7xx – At a glance

- Wide detection range: 0.05 m up to maximum 25 m
- Low power consumption (typically: 4 W)
- Immediate commissioning and configuration via USB and Ethernet
- Intelligent field evaluation and measurement data output in one device
- Rugged design suitable for industry thanks to enclosure rating up to IP67

Your benefits

- Enables new solutions for mobile applications by combining intelligent field evaluation and measurement data output.
- Reliable object detection independent of the object, even with strong ambient light
- The measurement data output enables capture of additional data about parameters such as object size, shape, etc.
- Easy integration into compact AGVs thanks to small size of the sensor
- Easy commissioning with rotatable connections and accessories perfectly attuned to the sensors; only a few adjustable SOPAS software parameters are necessary for commissioning
- Improved behavior for edge hits thanks to HDDM+

→ **www.sick.com/TiM7xx**

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

MRS1000 – At a glance

- Four spread layers and a 275° aperture angle
- High weather resistance and reliability through HDDM+ with multi-echo technology
- Field evaluation and measured data in one sensor
- Easy configuration, with the ability to adapt to a changing environment
- Convenient and customer-friendly diagnostics via web server

Your benefits

- Collecting more data in multiple dimensions leads to higher measurement accuracy
- HDDM+ with multi-echo technology for high availability when subjected to environmental influences like rain, dust, and fog
- Simultaneous measurement on 4 levels allows objects to be detected which are on the floor or obstructing the path
- High flexibility for installation thanks to rotating male/female connectors
- Integrated field evaluation and measured data output makes it possible to tackle various applications with one sensor
- Low setup costs: Identical telegram as for the 2D LiDAR sensors from SICK
- Fields that are easy to teach in save time during setup
- Low maintenance costs thanks to high weather resistance

→ **www.sick.com/MRS1000**

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

LiDAR-LOC – At a glance

- Position determination for all types and sizes of mobile platforms
- High positioning accuracy of ± 30 mm
- Contour detection with a scanning angle of up to 360°
- Localization resolution of 1 mm
- Refresh rate of 25 Hz
- Easy operation thanks to modern user interface (web browser), as well as ROS integration

Your benefits

- Modular localization solution: Tailored to the respective application
- Versatile use: Multiple scanners, can be used for a wide range of vehicle types
- High resistant to environmental changes
- Fits your existing system architectures: With or without odometer integration
- Localization based on natural contours: No reflectors necessary
- Compatible with standard LiDAR sensors from SICK
- Creates the foundation for effective vehicle navigation, efficient vehicle control and fleet management

➜ **www.sick.com/LiDAR-LOC**

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

RFH6xx – At a glance

- 13.56 MHz RFID read/write device for read ranges up to 240 mm
- Transponder communication according to ISO/IEC 15693 standard
- Compact, industrial design with integrated antenna
- Embedded protocols allow interfacing with standard industrial fieldbus technologies
- Powerful micro-processor executes internally configurable logic
- Flexible trigger control
- Supports parameter cloning via microSD memory card
- Built-in diagnostics

Your benefits

- Reliable identification guarantees maximum throughput
- Adapts to changing needs, providing long-term investment security
- Simple integration saves installation time
- The defined reading field ensures targeted identification of the desired object
- Maintenance-free
- Compact RFID read/write device with integrated antennae and several host interfaces do not require additional connectivity
- The same connectivity and user interface as the bar code scanners and image-based code readers from SICK - compatible thanks to the uniform 4D*pro*

➜ **www.sick.com/RFH6xx**

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

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SICK APP SPACE

RFU61x – At a glance

- Extremely compact design
- Reading range up to 0.5 m
- Connection option for trigger sensors
- Linkage option to superior control systems or directly to the cloud
- Antenna and data processing integrated in the sensor
- Configuration via SOPAS ET or integrated web server
- Can be used with SICK AppSpace
- Rugged design in accordance with IP67

Your benefits

- The small size enables versatile application possibilities even if space is tight
- Quicker and cheaper installation thanks to direct connection option for trigger sensors
- Very little programming work needed in the control due to intelligent process logics in the device
- Easy configuration through SOPAS ET or the integrated web server saves time and costs for commissioning
- Maximum flexibility when programming individual software solutions with SICK AppSpace
- The rugged design enables reliable operation - even in tough industrial environments

→ **www.sick.com/RFU61x**

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

4D pro

SICK APP SPACE

RFU62x – At a glance

- Antenna and data processing integrated in the sensor
- Read range up to 2 m
- Linkage option to superior control systems or directly to the cloud
- Excellent antenna characteristics
- Configuration via SOPAS ET or integrated web server
- Can be used with SICK AppSpace
- Rugged design in accordance with IP67

Your benefits

- Very high process stability as the optimally-aligned antenna characteristics prevent no-reads
- Easy configuration through SOPAS ET or the integrated web server saves time and costs for commissioning
- Maximum flexibility when programming individual software solutions with SICK AppSpace
- The rugged design enables reliable operation - even in tough industrial environments
- Very little programming work needed in the control due to intelligent process logics in the device

→ **www.sick.com/RFU62x**

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

RFU63x – At a glance

- Antenna and data processing integrated in the sensor
- Read range up to 10 m
- Linkage option to superior control systems or directly to the cloud
- Up to 4 external antennas
- Configuration via SOPAS ET or integrated web server
- Can be used with SICK AppSpace
- Rugged design in accordance with IP67

Your benefits

- External antenna for cost-effective extension of the detection range
- Easy configuration through SOPAS ET or the integrated web server saves time and costs for commissioning
- Maximum flexibility when programming individual software solutions with SICK AppSpace
- The rugged design enables reliable operation - even in tough industrial environments
- Very little programming work needed in the control due to intelligent process logics in the device

→ www.sick.com/RFU63x

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

UM18 – At a glance

- Reliable measurement, regardless of material color, transparency, gloss, or ambient light
- Sensing ranges up to 1,300 mm
- Short metal or plastic M18 housing from 42 mm in length
- Straight or angled design
- Immune to dirt, dust, humidity, and fog
- Versatile interfaces including IO-Link available

Your benefits

- Four sensing ranges up to a total of 1,300 mm for countless application possibilities
- Easy integration due to a short M18 housing, straight or angled
- Measurement filters and variants with temperature compensation for reliable measurement results and very high process reliability
- Rugged, one-piece housing ensures highest plant availability
- Synchronization or multiplex mode for the simultaneous use of up to 20 sensors increases application flexibility and process reliability
- Various output signals for solving complex applications
- Teach-in via cable prevents unintentional sensor adjustment, reducing machine downtime
- Rugged, reliable ultrasound technology

→ www.sick.com/UM18

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

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UM30 – At a glance

- Reliable measurement, regardless of material color, transparency, gloss, or ambient light
- Sensing range up to 8,000 mm
- Display enables fast and flexible sensor adjustment
- Immune to dirt, dust, humidity, and fog
- Versatile interfaces including IO-Link available
- Adjustable sensitivity

Your benefits

- Easy system integration due to compact design
- Flexible adaptation to application requirements due to numerous configuration options and adjustable sensitivity
- Reliable measurement results since synchronization and multiplex mode prevents mutual interference of sensors
- Inexpensive area monitoring possible due to sensor synchronization
- Offline sensor configuration on display enables pre-configuration and saves time when commissioning the system
- Integrated temperature compensation for high measurement accuracy
- ObSB mode enables detection of any object between the sensor and a taught-in background

IO-Link

→ **www.sick.com/UM30**

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

Visionary-B – At a glance

- Distance values: 250 × 496 pixels and 2D image: 544 × 828 pixels
- High temperature range from −40 °C to +75 °C
- Rugged housing: IP69K for the sensor head
- 2-in-1 solution: eight 3D and eight 2D images per second
- Intelligent image processing: classification and position determination of objects
- Activity recording for the most recent hours possible

Your benefits

- More than 120,000 distance and intensity values in just a single recording
- Designed for harsh outdoor conditions, e.g., strong sunlight, rain
- Intelligent data processing with object detection and classification allows, for example, object tracking and collision warning
- Visionary-B PS provides 3D data, 2D video images and object data via Gigabit Ethernet as well as a programming interface
- Visionary-B CV is an intelligent, easily configurable 3D driver assistance system with a monitor for the driver's cab that outputs active optical and acoustic warnings

→ **www.sick.com/Visionary-B**

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

Visionary-T – At a glance

- Record up to 50 3D images per second
- Distance values: 144 x 176 pixels per recording
- Output of 3D data via a Gigabit Ethernet interface and simple digital outputs
- Provision of application-specific data
- Temperature range: 0 °C ... 50 °C or 0 °C ... 45 °C (depending on the housing), enclosure rating: IP67

Your benefits

- More than 25,000 distance and intensity values in a single shot
- 3D information is also available for stationary applications
- Easy mounting and rapid sensor replacement
- Programming interface for the use of 3D data for additional evaluation on an external host
- The Visionary-T CX provides 3D data via Ethernet
- The Visionary-T AG offers intelligent data reduction
- The Visionary-T DT is a configurable plug and play 3D detection sensor
- The Visionary-T AP is based on the SICK AppSpace and makes it possible to create applications with SICK AppStudio as well as load application-specific Key Apps to the sensor using SICK AppManager

➜ **www.sick.com/Visionary-T**

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

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“SENSOR INTELLIGENCE.” IS A PROMISE

SICK’s dedication and experience are reflected in its intelligent sensor solutions. From development to service provision, every employee is fully committed to ensuring that sensors and system solutions from SICK are the perfect fit for the diverse functions they perform.

Company with a culture of success

With a variety of products and services, more than 9,700 employees help SICK sensor technology users to increase their productivity and reduce their costs. Founded in 1946, the company has its headquarters in Waldkirch, Germany, and it is globally active with over 50 subsidiaries and equity investments as well as numerous agencies.

SICK has been enjoying success for decades. The foundation for this is dedicated employees, whose ways of thinking and acting are reliable and geared toward the long term. This lively corporate culture holds strong appeal for qualified and skilled professionals. At SICK, they are part of a company that ensures an excellent balance between career progression and quality of life.

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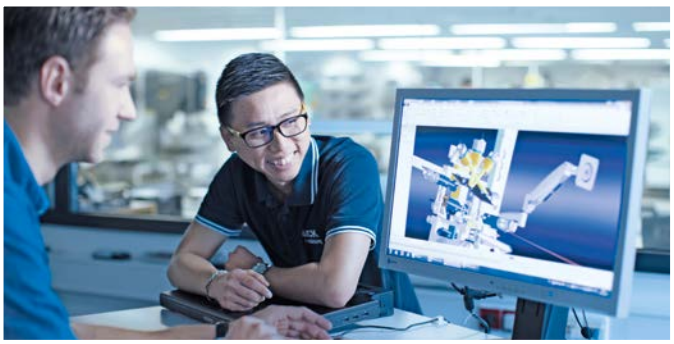
Innovation creates competitive advantages

Sensor technology from SICK simplifies procedures and optimizes processes to achieve sustainable production. For this purpose, SICK has research and development facilities in numerous locations across the globe. In discussion with its customers and in cooperation with higher education and research institutions, innovative sensor products and solutions are developed. These form the basis for reliable process control, the safety of people, and environmentally friendly production.

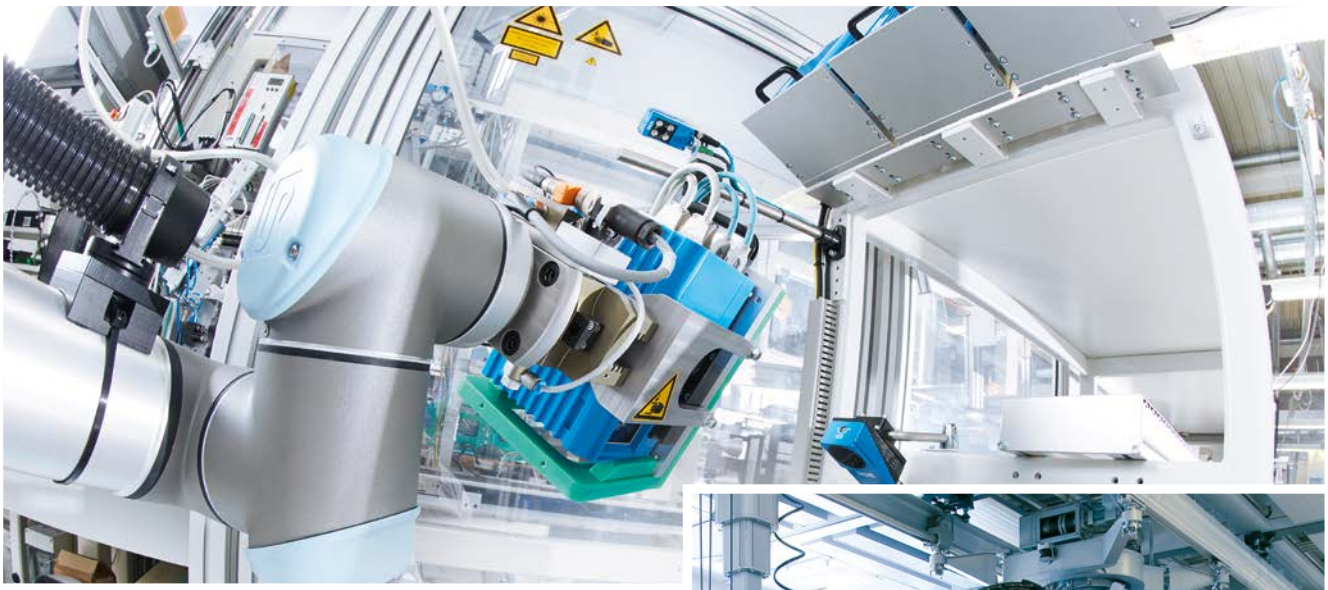
Mission statement with a far-reaching effect

SICK builds upon an established corporate culture, pursuing financial independence and technological openness. SICK's innovations have made the company a technology and market leader, showing that it takes targeted modernization and improvement to make universally applicable sensors a long-term success.



“SENSOR INTELLIGENCE.” FOR ALL REQUIREMENTS

SICK is a renowned expert in many industries, and is entirely familiar with the critical challenges they face. While speed, accuracy and availability take center stage in all industries, technical implementations vary greatly. SICK puts its vast experience to use to provide with precisely the solution you need.



For applications worldwide

Hundreds of thousands of installations and applications go to prove that SICK knows the different industries and their processes inside out. This tradition of uncompromising expertise is ongoing: As we move into the future, we will continue to design, implement and optimize customized solutions in our application centers in Europe, Asia and North America. You can count on SICK as a reliable supplier and development partner.

For performance across the board

SICK provides the right technology to respond to the tasks involved in industrial automation: measuring, detecting, monitoring and controlling, protecting, networking and integrating, identifying, positioning. Our development and industry experts continually create groundbreaking innovations to solve these tasks.

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For your specific industry

With a track record of proven expertise in a great variety of industries, SICK has taken quality and productivity to new heights. The automotive, pharmaceutical, electronics and solar industries are just a few examples of sectors that benefit from our know-how. In addition to increasing speed and improving traceability in warehouses and distribution centers, SICK solutions provide, for example, accident protection for automated guided vehicles. SICK system solutions for analysis and flow measurement of gases and liquids enable environmental protection and sustainability in energy production, cement production or waste incineration plants.

➜ www.sick.com/industries

SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

SICK LifeTime Services is a comprehensive set of high-quality services provided to support the entire life cycle of products and applications from plant walk-through to upgrades. These services increase the safety of people, boost the productivity of machines and serve as the basis for our customers' sustainable business success. LifeTime Services range from product-independent consulting to traditional product services and are characterized by extensive industry expertise and over 70 years of experience.

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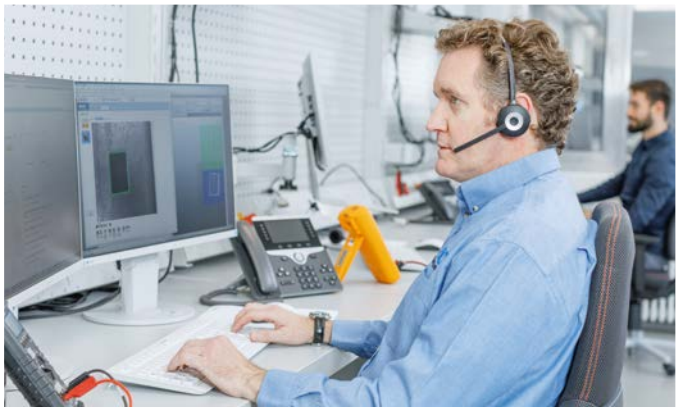
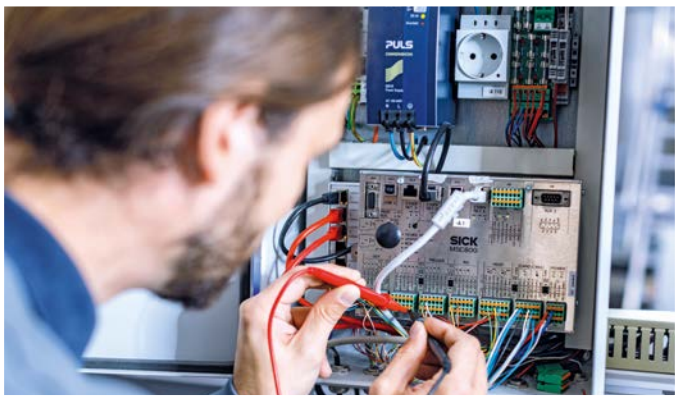
➜ www.sick.com/service





Consulting and design

- Plant walk-through
- Risk assessment
- Safety concept
- Safety software and hardware design
- Validation of functional safety
- CE-conformance check

Product and system support

- Installation
- Commissioning
- Start-up support
- Calibrations
- Telephone support
- 24-hour helpline
- SICK Remote Service
- Troubleshooting on site
- Repairs
- Exchange units
- Extended warranty

Verification and optimization

- Inspection
- Stop time measurement
- Machine safety inspection
- Electrical equipment check
- Accident investigation
- Initial verification
- Performance check
- Maintenance

Upgrade and retrofits

- Upgrade services

Training and education

- Training
- Seminars
- Web training

VERSATILE PRODUCT RANGE FOR INDUSTRIAL AUTOMATION

From simple acquisition tasks to key sensor technology in a complex production process: With every product from its broad portfolio, SICK offers a sensor solution that best combines cost effectiveness and safety.

→ www.sick.com/products

Photoelectric sensors

- Miniature photoelectric sensors
- Small photoelectric sensors
- Compact photoelectric sensors
- Hybrid photoelectric sensors
- Cylindrical photoelectric sensors
- Fiber-optic sensors and fibers
- MultiTask photoelectric sensors

Proximity sensors

- Inductive proximity sensors
- Capacitive proximity sensors
- Magnetic proximity sensors

Line guidance sensors

- Optical line guidance sensors
- Magnetic line guidance sensors

Magnetic cylinder sensors

- Position sensors
- Sensors for T-slot cylinders
- Sensors for C-slot cylinders
- Sensor adapters for other cylinder types

Registration sensors

- Contrast sensors
- Color sensors
- Luminescence sensors
- Fork sensors
- Array sensors
- Register sensors
- Glare sensors
- Pattern sensors

Automation light grids

- Measuring automation light grids
- Switching automation light grids

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Opto-electronic protective devices

- Safety laser scanners
- Safety light curtains
- Safety camera systems
- Multiple light beam safety devices
- Single-beam photoelectric safety switches
- Mirror columns and device columns
- Upgrade kits for opto-electronic protective devices

Safety switches

- Electro-mechanical safety switches
- Non-contact safety switches
- Safety locking devices
- Safety command devices
- Mechanical bolts for safety switches

sens:Control – safe control solutions

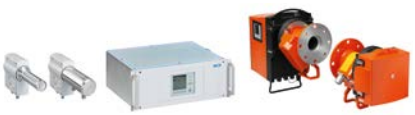
- Safe series connection
- Safety controllers
- Safety relays

Safety systems and solutions

- Safety systems
- Safety solutions

Gas analyzers

- Gas transmitters
- In-situ gas analyzers
- Extractive gas analyzers



Dust measuring devices

- Scattered light dust measuring devices
- Transmittance dust measuring devices
- Gravimetric dust measuring devices

Analyzer solutions

- CEMS solutions
- Process solutions

Traffic sensors

- Tunnel sensors
- Overheight detectors
- Visual range measuring devices

Ultrasonic gas flow measuring devices

- Volume flow measuring devices
- Mass flow measuring devices
- Flow velocity measuring devices
- Gas flow meters
- Flow computers

Identification solutions

- Image-based code readers
- Bar code scanners
- RFID
- Hand-held scanners

Vision

- 2D vision
- 3D vision

Distance sensors

- Displacement measurement sensors
- Mid range distance sensors
- Long range distance sensors
- Linear measurement sensors
- Ultrasonic sensors
- Optical data transmission

Detection and ranging solutions

- 2D LiDAR sensors
- 3D LiDAR sensors
- Radar sensors

Motor feedback systems

- Motor feedback system rotary HIPERFACE®
- Motor feedback system rotary HIPERFACE DSL®
- Motor feedback system rotary incremental
- Motor feedback system rotary incremental with commutation
- Motor feedback system linear HIPERFACE®

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Encoders

- Absolute encoders
- Incremental encoders
- Linear encoders
- Wire draw encoders
- Safety encoders
- Measuring wheel encoders

Inertial sensors

- Inclination sensors
- Dynamic inclination sensors

Fluid sensors

- Level sensors
- Pressure sensors
- Flow sensors
- Temperature sensors

Integration products

- Sensor Integration Machine
- 4D*pro* connectivity
- Sensor Integration Display
- Sensor Integration Gateway
- Integration Solutions

System solutions

- Customized analyzer systems
- Driver assistance systems
- Robot guidance systems
- Object detection systems
- Profiling systems
- Gateway systems
- Quality control systems
- Security systems
- Track and trace systems
- Flow metering systems

Software products

- SICK AppSpace software
- Analytics Solutions
- Integrated Managing Solutions
- Integration Solutions

SICK AppSpace

- SICK AppSpace software
- Programmable devices
- SensorApps

SICK APP SPACE

INDUSTRY 4.0 – DIGITIZATION AND NETWORKING

Networked production and control processes in complex machine environments will determine the future. SICK is already laying the foundations for dynamic, real-time-optimized, and self-organizing industrial processes: As data suppliers, sensors are indispensable for intelligent factories.

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Human-robot collaboration

Production companies endeavor to design their production workflows to offer a high degree of automation and flexibility at the same time – and that includes closer interaction between humans and robots. This requires safety solutions which react completely reliably – even in unexpected situations. With over 70 years of experience in protecting machines and systems, SICK stands for solutions that are ready for the future challenges.

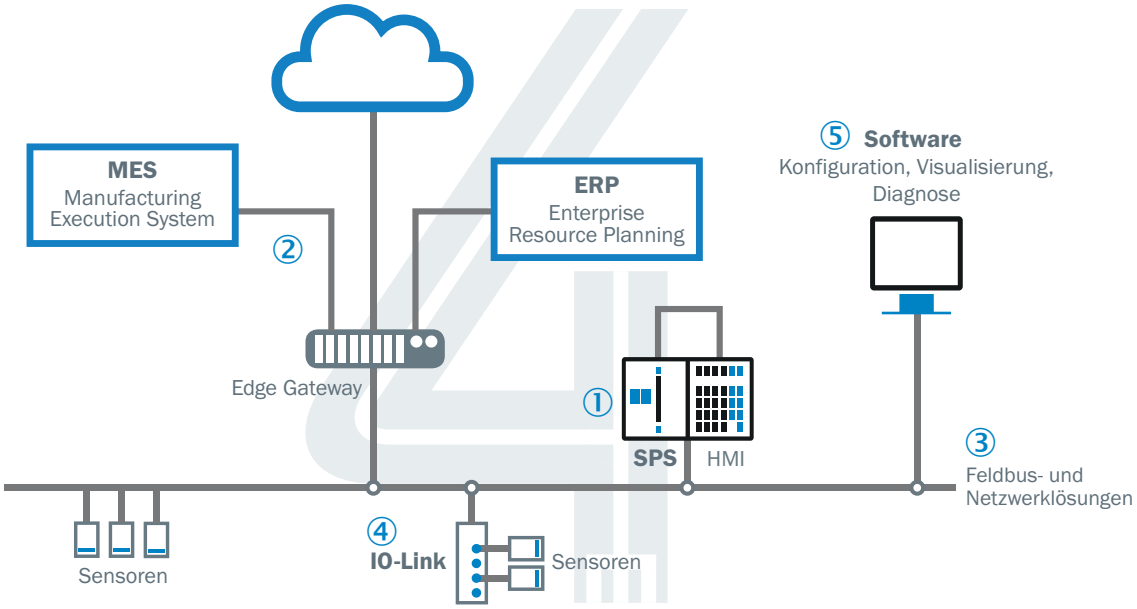
Networked reality

Only when the network of parties involved acts beyond the boundaries of their own production systems will it be possible to fully exploit the potential of Industry 4.0. For it is then that supplier, manufacturer, and customer processes will be able to link up seamlessly and automatically. Data security is the key to success. As a product, system, and service specialist, SICK develops personalized answers to future challenges together with its customers.

INDUSTRY 4.0

SEAMLESSLY NETWORKED

Networked production and control processes in complex machine environments determine the industrial future. Sensor intelligence is required for the highly complex process of converting physical signals into sensor information. Intelligent sensor systems from SICK are already being used to support dynamic, real-time-optimized, and self-organized industrial processes. For reliable network communication, it is essential that the required data is clearly defined and integrated into the networked data world. Selecting the right type of communication for a defined path plays an important part.



Sensors intelligently networked

① Easy integration into the PLC, engineering tools, and HMI

SICK offers an exceptionally wide range of tools for integrating sensors and safety controllers. These tools are perfectly tailored to your requirements, which may include generic integration using device description files, a standardized interface (e.g., TCI, FDT/DTM) for configuration and diagnostics or integration into the PLC program using function blocks.

② ERP, MES, and coud: vertical integration into higher-level systems

Especially when it comes to Industry 4.0, integration capability and continuity are important features of intelligent and future-proof communication structures. That is why SICK offers several options for integrating the process, status, and diagnostics information of sensors into visualization systems and automation networks. Integration tools from SICK enable straightforward and fast integration into your custom HMI solution, irrespective of the technology used.

Focusing on the right solution

③ Industrial communication, interfaces, and fieldbus solutions

Maximum flexibility and the right solution for any application: The fieldbus and network solutions from SICK allow you to connect sensors and safety controllers to any and all standard automation systems. Guaranteeing quick and easy access to the available data.

④ IO-Link: Industry 4.0 for everyone

Communication technology that is independent of manufacturer is considered an “enabling technology” for innovative sensor solutions and supports the global availability of data and information required by Industry 4.0. Switching devices and simple sensors, in particular, can benefit from this fast and cost-effective method of connecting to the data world.

⑤ Configuration, programming, visualization, and diagnostics

Our software tools support you when setting up the connection and when performing configuration and diagnostics on sensors and safety controllers from SICK. The intuitive user interface enables fast and simple design and implementation of the application.

➜ www.sick.com/industrial-communication

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- Access information on net prices and individual discounts.
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- Check your history of all your orders and quotes.
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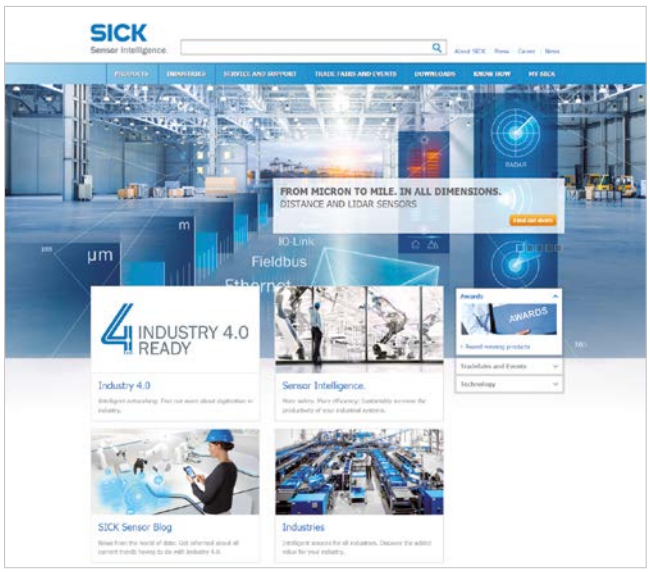
- Use the direct order to quickly order a big amount of products.
- Check the status of your orders and quotes and get information on status changes by e-mail.
- Save time by using past orders.
- Easily export orders and quotes, suited to your systems.



SERVICES FOR MACHINES AND PLANTS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.

Consulting and design
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

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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.

Detailed addresses and further locations ➜ www.sick.com

SICK
Sensor Intelligence.