



## NON-CONTACT TRANSPORT

SICK SOLUTIONS FOR CONVEYOR SYSTEMS

**SICK**  
Sensor Intelligence.







EFFICIENT AND INTELLIGENT SOLUTIONS ON CONVEYOR BELTS

## SICK MAKES WORK EASIER

A mountain of work! Daily business for many industries – managing bulk materials nonstop. And often outside, in all types of weather. To overcome these challenges, SICK also offers intelligent solutions in this area. Transport runs smoothly thanks to laser scans.

Measurement and sensor technology from SICK monitors, controls and optimizes industrial conveyor systems in a wide range of sectors. This goes far beyond the process gas and emission measurement procedures already established in process automation. Non-contact measurement of the volume or mass flow rates is particularly easy and precise with the flow sensor Bulkscan® LMS511. But solutions for level measurement and complete conveyor monitoring are also in the product range. The skillful interplay of the sensors saves a huge amount of work, time and money.



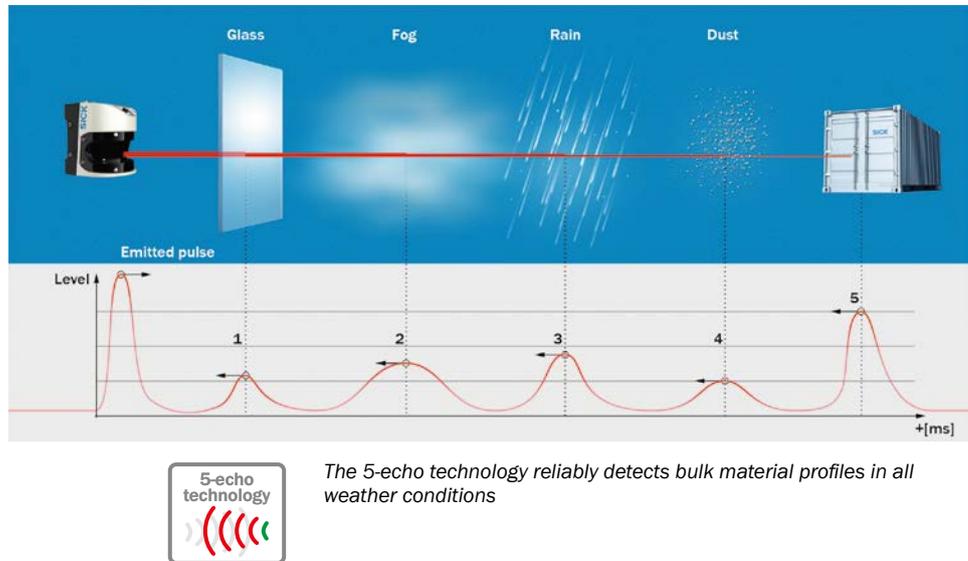
### SICK supports nonstop work

For optimum production processes, bulk material processors need an exact overview of the quantity of the stored and transported goods. Only in this way can the optimal fill levels be calculated and achieved. It doesn't matter if the goods are for mining, the cement or steel industry, for coal power plants, recycling industry, harbors or agriculture, to name just a few.

It's well known that you get the best view from above. The Bulkscan® LMS511 works with this principle. In addition to the belt scales typically used, the scanner delivers exact measured values from a position over the conveyor belt regardless of the weather. This is ingenious. This is how it ensures smooth material management.

For decades, the belt scale for measuring bulk materials on conveyor systems was considered a low-cost solution with no alternative. However, this only applies if you look at the purchase price and do not take into account the considerable maintenance costs and downtimes. SICK is offering a sustainable addition with this low-maintenance and non-contact measurement process, thereby keeping conveyor belts in continuous operation.





*The 5-echo technology reliably detects bulk material profiles in all weather conditions*

### Everything runs smoothly Sensor technology keeps production running

Furthermore, the Bulkscan® LMS511 can deliver the data to control the operation of the entire conveyor system if needed. It is also capable of monitoring the loading and unloading processes as well as controlling the loading position on the belt. Depending on the system integration, the Bulkscan® LMS511 delivers a permanent flow of data. This makes it possible to detect and set the material height and center of gravity of the bulk materials on the belts and also control filling and positioning.

In addition to the Bulkscan® LMS511, SICK has many other sensor solutions for the complete processing of bulk materials in its product range. The Bulkscan® LMS511 can be combined with an encoder from SICK in any way. This opens many possibilities, for example with the DFS60 incremental encoder, which measures the belt speed. This allows for simple regulation of the center of gravity and height of the load for the entire belt conveyor.

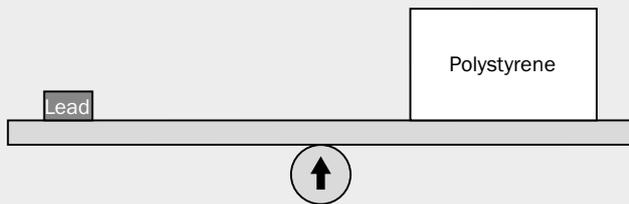
SICK is by your side for the entire process: From hydraulic pressure monitoring of crushers and shredders, overflow protection in silos, various wear detection processes, belt drift detection at the conveyor belt or monitoring of belt tension. In all cases, this increases the energy and cost efficiency.

### With SICK, transport is always successful – in any weather

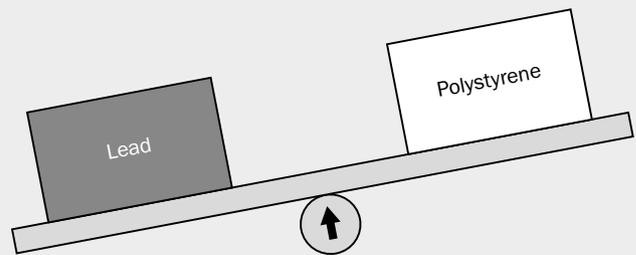
Transporting and processing bulk materials can also be a dirty business. But reliable data is needed even if there is wind and bad weather, dirt or mud. This is impossible under extreme weather conditions with belt scales alone. The volume flow measurement, on the other hand, works on the correlation between density and the relation between the weight and volume of the bulk materials. When doing so, only the actual volume on the conveyor belt is measured. An exact measurement of the density is made together with the data from the belt scale.

The Bulkscan® LMS511 shows off its strengths in such extreme situations. Poor weather conditions do not interfere with this device. It is a real outdoor product. The proven 5-echo pulse technology filters out interfering echoes caused by dust, fog, glass or precipitation, to name a few examples, thereby delivering reliable measurement results. The Bulkscan® LMS511 identifies a reliable volume flow signal from the laser runtime and the belt speed. The rugged industrial housing also features an integrated heater for when it gets really cold.

The laser technology of the Bulkscan® LMS511 makes outdated gamma radiation-based sensors completely unnecessary. In contrast to this technology, the Bulkscan® LMS511 does not require any structural or radiation protection measures. The protective eye-safe technology is integrated in the Bulkscan. This is how SICK secures its customers' success both cleanly and sustainably.



Lead and polystyrene foam have the same mass. The volume of polystyrene foam, however, is higher than that of lead.



Lead has a greater mass than polystyrene foam. The volume for both, however, is the same.

## Quick view

The non-contact, laser-based volume measurement system Bulkscan® LMS511 on the conveyor belt provides a clear view together with a belt scale. This guarantees an exact overview of the quantity, position and state of all bulk materials. This optimizes the conveying and filling processes. The solutions from SICK save work, time and money.

The benefits of non-contact conveyor belt solutions at a glance:

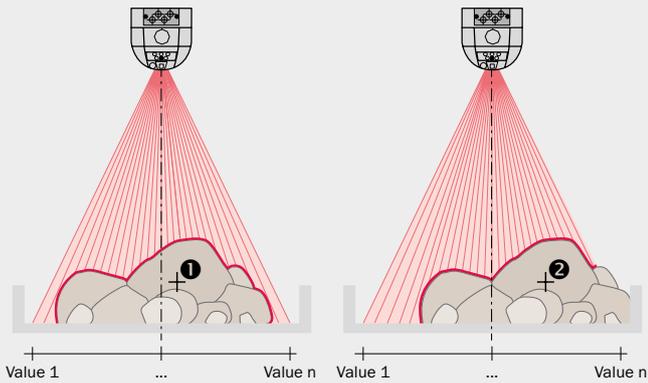
- Reduced downtime and maintenance technical material management
- Exact volume / mass flow measurement combined with a belt scale
- Back-up for scale malfunctions

## Reduced downtime and no maintenance required

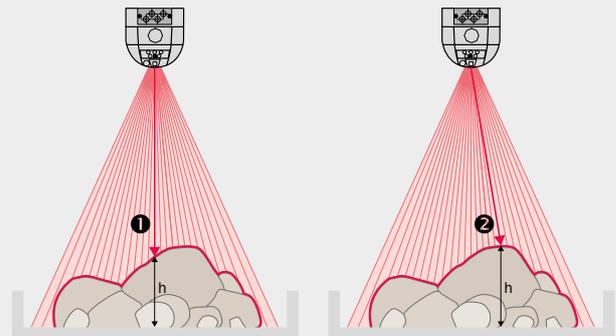
Since the sensor is mounted far above the conveyor belt, falling bulk materials or down flowing liquid cannot harm it. The Bulkscan® LMS511 is wearfree and low-maintenance. And, in contrast to belt scales, the belt does not have to be opened during initial commissioning of the Bulkscan. The smooth operation improves utilization times.

## Technical material management – automatic monitoring of the center of gravity and the belt position

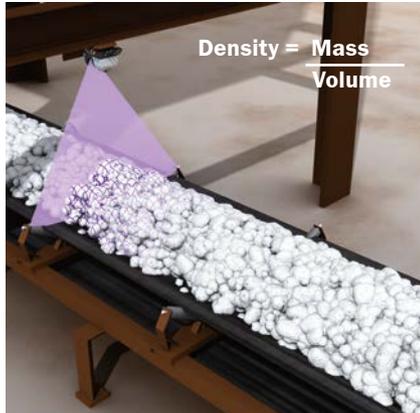
Ideal distribution of the center of gravity helps preserve the conveyor system in the long run. Monitoring the center of gravity therefore increases system availability. Shifting conveyor belts, on the other hand, can sooner or later lead to increased belt and roller wear. In addition Bulkscan® LMS511 is able to detect belt shifting and loss of material.



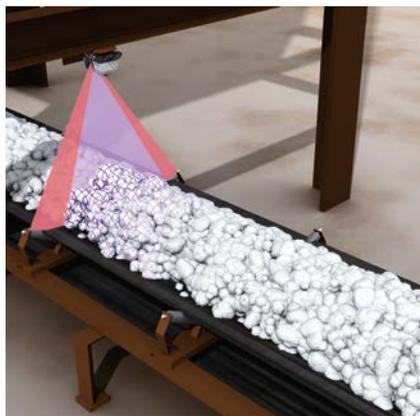
Calculating the center of gravity



Measuring the level



Calculating the bulk density



Loading position and belt monitoring

### Complete measurement of volume, weight and density in combination with a belt scale

Accuracy is worth hard cash. Together with the data which the belt scales deliver concerning the weight, the Bulkscan® LMS511 achieves extremely precise results, providing a clear view of the situation. The measurement of minimum quantities is also possible with non-contact volume scans. The multi-echo technology generates a reliable volume flow signal using the laser's time of flight and the belt speed. It is completely irrelevant how fast the belt is running or which bulk materials are being transported. The Bulkscan® LMS511 even works on inclines and with bucket or pan conveyors, and with a distance between the scanner and conveyor belt of up to 20 meters.

### Back-up for scale malfunctions

Belt scales are assembled in an exposed position under the belt. Damages caused by falling bulk materials or escaping liquids therefore are daily occurrences which often lead to failures. The Bulkscan® LMS511 also reliably measure the volume flow in such cases, thereby keeping the system running with the aid of the known parameters.



## MONITORING MATERIAL TRANSPORT



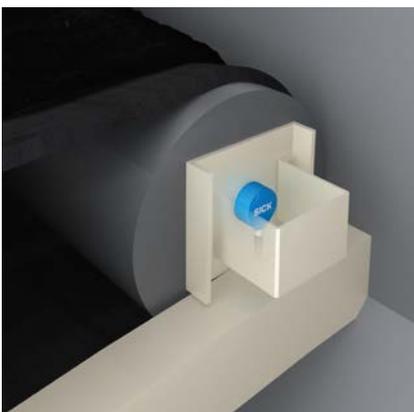
### Monitoring conveyor belt operation

Conveyor belts transport materials in many industries. A belt malfunction can cause significant delays in production and involve major costs. Therefore it is necessary to monitor the operation of all belts, as well as the proper loading, unloading, and positioning of products. The Bulkscan® LMS511 laser volume flowmeter performs these tasks in combination with a DFS60 incremental encoder. The encoder provides the information on conveyor speed, while the laser volume flowmeter determines the volume flow, center of gravity of the load and load height with no contact and no wear.

- Bulkscan® LMS511 laser volume flowmeter
- DFS60 incremental encoder



→ [www.sick.com/bulkscan](http://www.sick.com/bulkscan)  
→ [www.sick.com/DFS60](http://www.sick.com/DFS60)



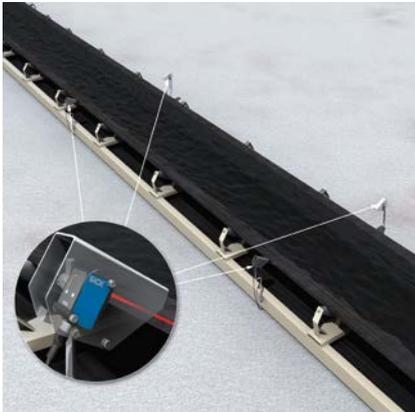
### Determining the belt speed

The conveyor belt's speed is very important when it comes to controlling material flow. The DFS60 incremental encoder precisely calculates the speed and running direction of a belt, regardless of whether it is installed on a drive or deflection roller. When monitoring the ends without a drive, reliable feedback can be given to see whether the conveyor system is working correctly. The encoder can either be configured via a PC or a separate programming tool. The DFS60 therefore provides comprehensive programming flexibility for all industrial requirements.

- DFS60 incremental encoder



→ [www.sick.com/DFS60](http://www.sick.com/DFS60)



### Belt drift detection on the conveyor belt

When bulk materials are unevenly loaded, the conveyor belt tensioners and runners can deviate from the optimal alignment and cause conveyor belt drift. When this occurs, the edge of the conveyor belt overshoots the support rollers. Material can be lost or, in extreme cases, the belt is derailed. Compact Dx35 distance sensors on both sides of the conveyor belt monitor the lateral movements of the belt and send a warning before belt drift occurs. The Dx35 uses HDDM™ time-of-flight technology and is immune to ambient light and dust. The Dx35 is an economical measurement solution

- Dx35 mid range distance sensor



→ [www.sick.com/DX35](http://www.sick.com/DX35)



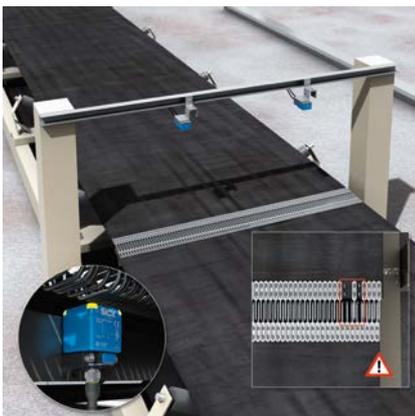
### Monitoring belt tension on the conveyor belt

To prevent spilling, down time, and material waste, the tension of the conveyor belt cannot be too high or too low. The IMB18 inductive proximity sensor is perfectly suited for this task, and prevents extensive wear and overstretching of the belt. It also reliably performs its task in the roughest environments, and ensures a safe operation of the conveyor belt. Thanks to the visual adjustment aid and self-locking nuts, installation on-site is quick and easy.

- IMB inductive proximity sensor



→ [www.sick.com/IMB](http://www.sick.com/IMB)



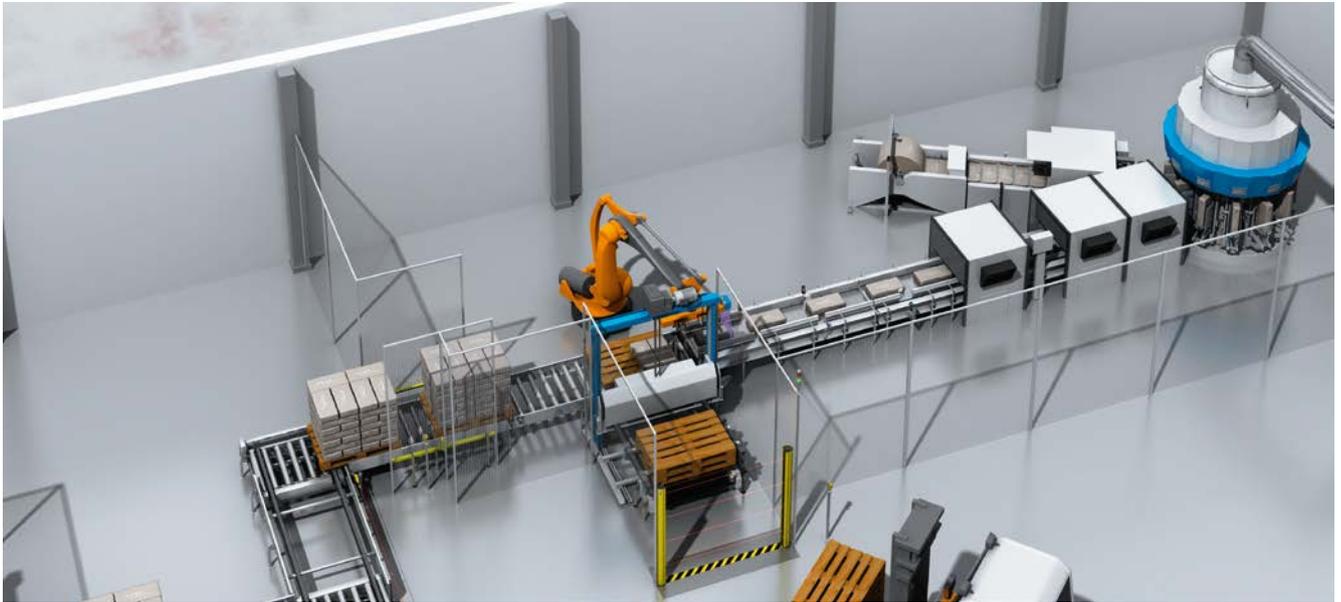
### Wear detection on conveyor belt clamps

Conveyor belt clamps can be used to connect two belt ends together securely. Nevertheless the clamps can cause the belt to fail, resulting in production losses due to downtime. Manually checking for wear around the clamps is laborious and time-consuming, and requires the belt to be stopped. Using the rugged IQ40 inductive proximity sensor to trigger a PIM60 2D vision sensor, the check can be performed automatically while the belt is moving at speeds of over 6 m/s. The PIM60 triggers an alarm as soon as signs of wear appear.

- IQG inductive proximity sensor
- Inspector 2D vision sensor



→ [www.sick.com/IQG](http://www.sick.com/IQG)  
 → [www.sick.com/Inspector](http://www.sick.com/Inspector)



## MONITORING PACKAGING AND LOGISTICS



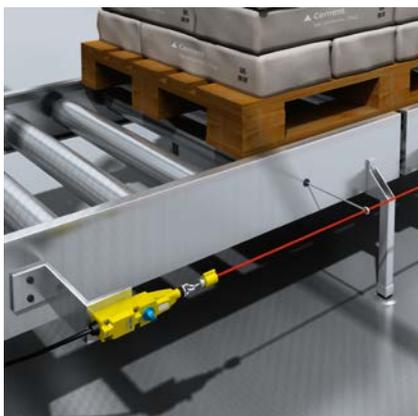
### Access protection without muting on the stretch film wrapper

The C4000 Palletizer safety light curtain ensures intelligent human-material differentiation at the output of the stretch film wrapper. For access protection, the safety light curtain is installed horizontally at pallet height in front of the outfeed of the stretch film wrapper. This is an innovative and cost-effective solution since additional components, such as muting sensors, signal lamps, or fence elements, are not needed.

- C4000 Palletizer safety light curtain



→ [www.sick.com/safety light curtain](http://www.sick.com/safety-light-curtain)



### Protecting roller conveyors

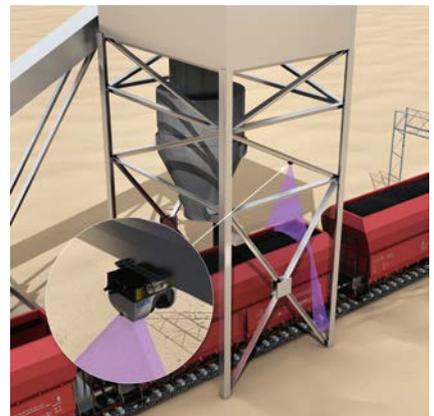
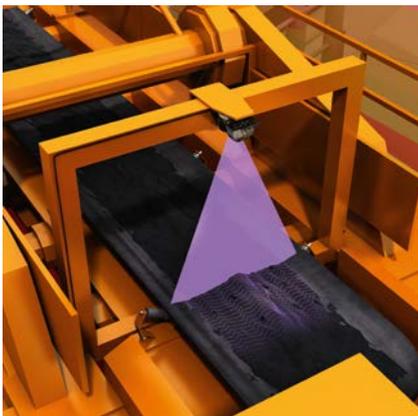
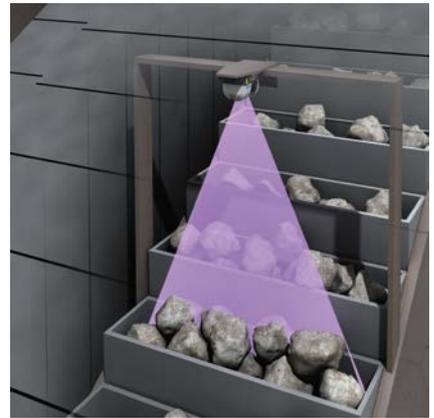
If a dangerous situation arises, the operating personnel can put a conveyor system into a safe status using rope pull switches. The i110RP rope pull switch allows users to implement solutions that comply with all statutory specifications. It is the ideal safety solution for longer conveyor systems, since the switching function can be triggered from any point along the conveyor system. Additional signal contacts (N/O contacts) are used for visualizing the output state and, therefore, allow the operators to locate the source of an error quickly.

- i110RP safety command device



→ [www.sick.com/i110RP](http://www.sick.com/i110RP)

## FURTHER APPLICATION FIELDS FOR Bulkscan® LMS511





### Bulkscan® LMS511 – At a glance

- Non-contact measurement of volume and mass flow of bulk materials
- Laser pulses with high angular resolution ensure outstanding image resolution
- 5-echo pulse evaluation produces highly reliable measurements
- Non-contact belt monitoring
- Integrated center-of-gravity calculator
- Rugged design for harsh ambient conditions
- Integrated heater allows measurement even at low temperatures
- Compact housing with IP 67 enclosure rating

### Your benefits

- Maximizes conveyor throughput
- Reduces maintenance costs by preventing belt slippage
- Increases the conveyor belt's service life
- Reduces loading time
- Increases efficiency by optimizing belt capacity
- Simple installation
- Low maintenance costs
- Offers savings through minimized energy consumption

→ [www.sick.com/Bulkscan\\_LMS511](http://www.sick.com/Bulkscan_LMS511)

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

- Compact installation depth
- High resolution up to 16 bits
- Optionally programmable: Output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: Radial or axial cable outlet, M23 or M12 connector, axial or radial
- Electrical interfaces: 5V & 24V TTL/RS-422, 24 V HTL/push pull
- Mechanical interfaces: face mount or servo flange, blind 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](http://www.sick.com/DFS60)

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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](http://www.sick.com/IMB)

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### IQG – At a glance

- Type: 40 mm x 40 mm
- Extended sensing ranges: 20 mm to 40 mm
- Electrical configuration: DC 3-/4-wire
- Enclosure rating: IP 68, IP 69K

- Temperature range: -25 °C to +85 °C
- Plastic housing
- Push-lock mounting system
- Sensor head can be rotated in five directions

### Your benefits

- Easy to mount in only two seconds without the need for additional tools
- Reliable, cost-effective detection
- The four corner LEDs ensure that the sensor status can be identified from any viewing direction, whatever the mounting position

- Can be easily adapted to numerous applications
- Long sensor service life, even in harsh environments that are subjected to severe weather conditions
- Stable processes thanks to extensive sensing ranges

→ [www.sick.com/IQG](http://www.sick.com/IQG)

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### Inspector – At a glance

- High-speed positioning, inspection and measuring
- Powerful “object locator” tool, independent of position, rotation and scale
- Unique, interchangeable housing design supporting dome and various

- optical accessories
- Simple step-by-step configuration in PC including emulator
- Easy-to-use operator interfaces
- Flexible machine and HMI design interfaces

### Your benefits

- The multi-functional vision toolbox offers smart camera-level performance but with sensor ease-of-use
- Unique, interchangeable housing design provides the easiest way to improve image quality
- The simple configuration in SOPAS, including emulator for offline configuration and testing, will reduce downti-

- mes in production to a minimum
- The easy-to-use operator interfaces are optimized to make it easier for the operator to oversee daily work more efficiently
- Ethernet communication and web API gives excellent connectivity and freedom to customize user’s HMI

→ [www.sick.com/Inspector](http://www.sick.com/Inspector)

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### Dx35 – At a glance

- Maximum reliability, immunity to ambient light, 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 on reflective tape

- Devices with analog and switching output, or just switching
- Infrared or red laser in class 1 or class 2
- Repeatability: 0.5 mm to 5 mm
- Small 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](http://www.sick.com/Dx35)

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### C4000 Palletizer – At a glance

- Type 4 (IEC 61496), SIL3 (EN 62061), PL e (EN ISO 13849)
- Self-teaching, dynamic blanking for detection of goods and pallets
- Direction detection
- Multiple sampling
- Reduced resolution
- Muting alternative
- Beam coding
- Object gap suppression

### Your benefits

- Cost-effective due to the savings made on additional muting sensors or other protective measures
- A compact sensor pair significantly reduces mounting effort – additional muting sensors are not required
- With the dynamic and self-teaching blanking function, the system can reliably differentiate between man and material – this provides maximum safety
- Mixed pallet operation allows mesh boxes, Euro pallets, and half pallets to pass, significantly increasing system throughput
- Saves storage space: pallets can be parked permanently in the protective field
- One system monitors multiple conveyor belts, reducing sensor costs
- Quick commissioning: Detects Euro pallets, mesh boxes etc. without any programming

→ [www.sick.com/C4000\\_Palletizer](http://www.sick.com/C4000_Palletizer)

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.



### i110RP – At a glance

- Rope lengths up to 30 m, with rope break and rope pull function
- Metal housing with integrated rotary unlocking lever and tension display
- Available with M20 X 1.5 cable entry gland or Flexi Loop-compatible M12 plug connector (depending on variant)
- Slow-action switching elements with four contacts
- Complies to the standards EN ISO 13850 and IEC/EN 60947-5-5

### Your benefits

- The emergency stop function can be triggered at any point along the rope
- Simple adjustment of the rope tension
- Rugged metal housing offers a high level of protection for the rope pull switch
- User-friendly systems available with many rope lengths
- Additional contacts provide quick and easy diagnostics
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

→ [www.sick.com/i110RP](http://www.sick.com/i110RP)

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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 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**That is “Sensor Intelligence.”**

### **Worldwide presence:**

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → [www.sick.com](http://www.sick.com)