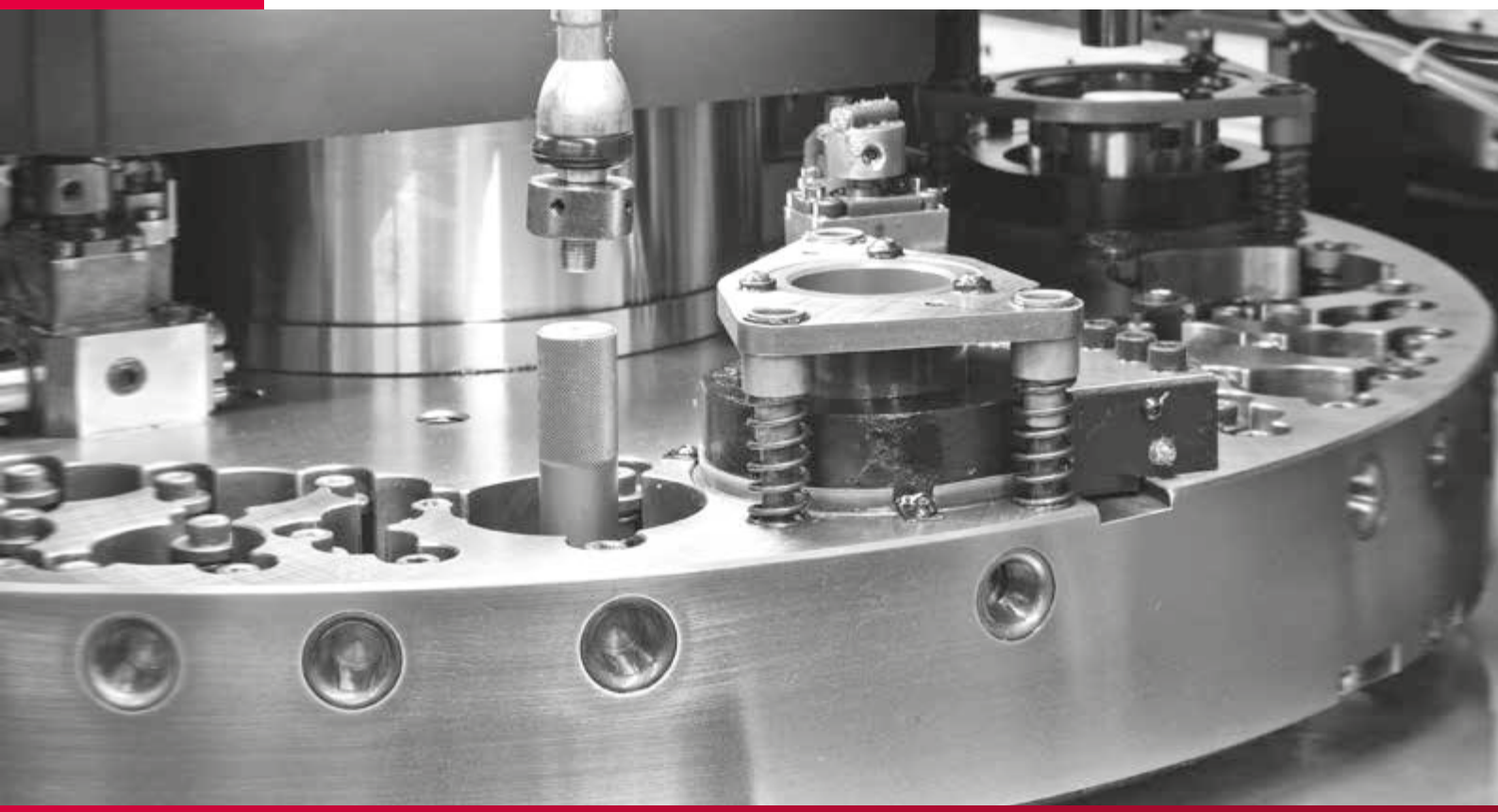
SMART
SENSOR
BUSINESS

Leuze electronic

the sensor people



OPTICAL DISTANCE SENSORS

www.leuze.com

ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

SR 10
sick

PRECISE MEASUREMENT

In highly automated systems in intralogistics and production, precise monitoring and measurement of distances is essential for smooth running in daily operation.

Distance sensors are used for this purpose in, for example, object measurement, quality assurance in assembly lines or for collision protection of shuttles.

We offer a comprehensive product range of optical distance sensors that enables pinpoint measurement, positioning and quality assurance of any objects over long and short distances.

Our sensors are based on various measurement operating principles (triangulation measurement, time of flight measurement, phase measurement). These enable both the reproducible measurement of distances in the range of tenths of a millimeter as well as over larger distances in excess of 60 meters. The measurement data can be transferred with IO-Link and evaluated with software in the machine. Based on the current values, production processes can be constantly adapted and optimized.

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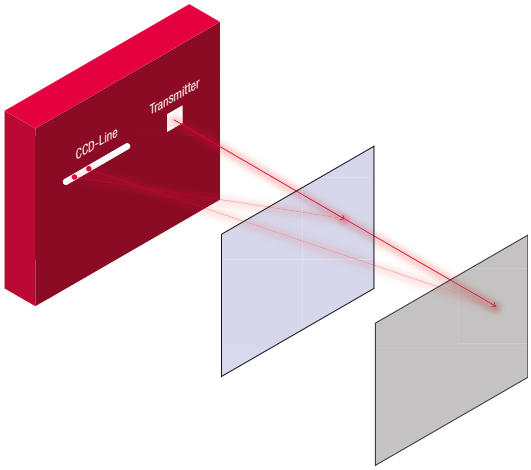
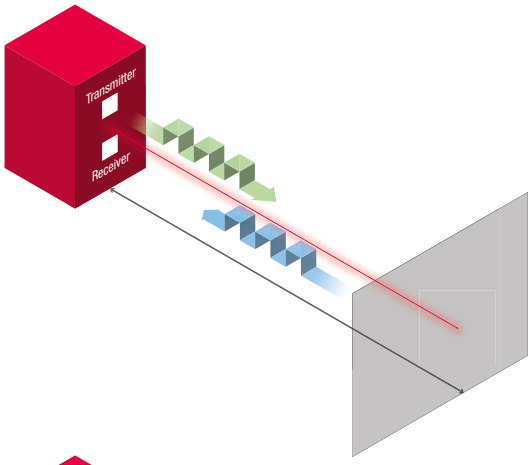
TAILOR MADE

Depending on requirements, sensors with various operating ranges, resolutions and reproducibilities are needed. To optimally cover the needs, we use various technologies in our sensors that are based on proven measurement procedures.



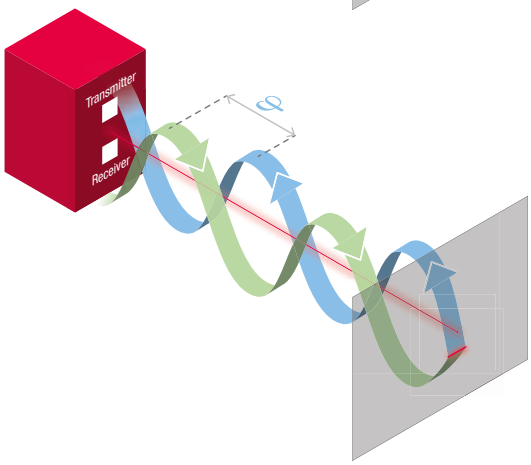
Triangulation measurement

With triangulation measurement, the laser beam is reflected by the object. This is incident on a high-resolution receiving array. The distance to the object is determined based on the point of incidence. This process is suitable for ranges up to approximately one meter and if very high resolutions are necessary.



Time of flight measurement (TOF)

With time of flight measurement, pulsed light is emitted. The propagation time for the light to return to the receiving lens is measured and used to calculate the distance to the object. This process is suitable if sensors with a compact construction are to be used to measure operating ranges of up to ten meters. It offers high reproducibility and color independence.



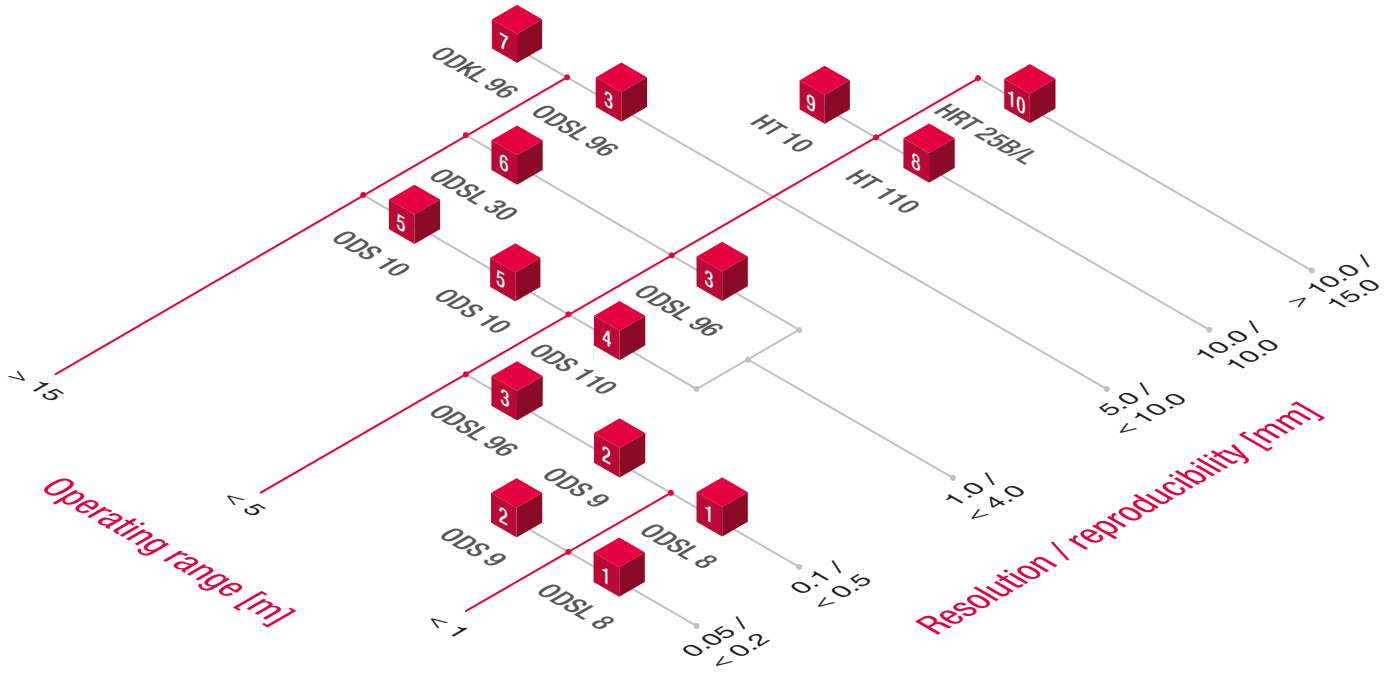
Phase measurement

During phase measurement the distance to the object is calculated from the shift of the phase angle between the transmitted and reflected light. This process is particularly advantageous if distances in excess of ten meters are to be measured with high resolution. Due to the sophisticated technology, sensors that are based on this measurement procedure have a larger size.

AT A GLANCE – THE RIGHT SENSOR

Operating range and resolution are the most important criteria when selecting the right measuring sensor. For positioning applications, reproducibility is another important factor. Because sensor systems need to be integrated in machines and systems in a space-saving manner, the size is also of great relevance.

Selection guide



	Type	Operating range	Dimensions	Page
1	**ODSL 8**	up to 500 mm	15 × 38 × 38 mm	11
2	**ODS 9**	up to 650 mm	21 × 50 × 50 mm	12
3	**ODSL 96**	up to 10 m	30 × 90 × 70 mm	15
4	**ODS 110**	up to 5 m	23 × 50 × 50 mm	13
5	**ODS 10**	up to 25 m	25 × 55 × 65 mm	14

	Type	Operating range	Dimensions	Page
6	**ODSL 30**	up to 65 m	79 × 69 × 149 mm	17
7	**ODKL 96**	up to 25 m	30 × 90 × 70 mm	16
8	**HT 110**	up to 5 m	23 × 50 × 50 mm	13
9	**HT 10**	up to 8 m	25 × 55 × 65 mm	14
10	**HRT 25 B/L**	up to 3 m	15 × 39 × 29 mm	10

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APPLICATIONS

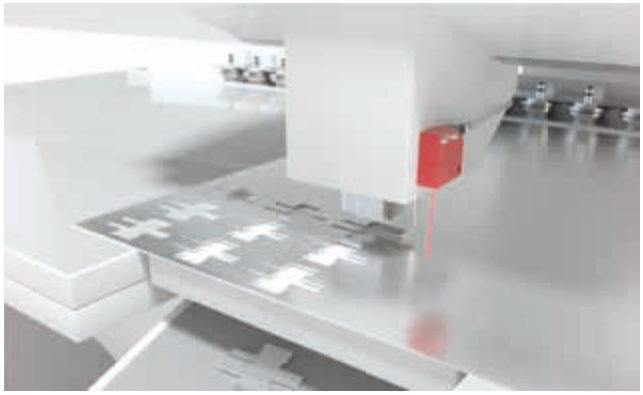
Object measurement

Requirement: During machining processes, the raw material must be prepared in the same width for further processing. To facilitate this, the width is constantly measured on the materials handling system – in a higher or lower resolution depending on the object.

Solution:
The ODSL 8 and ODS 9 sensors with different resolutions and operating ranges enable the measurement of objects of any size and shape.

Material thickness measurement

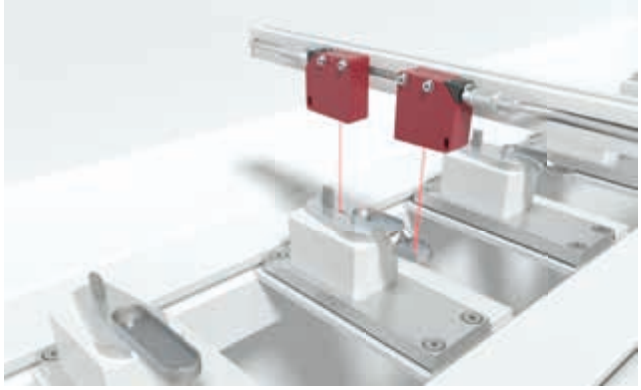
Requirement: To ensure an optimum punching process, the material thickness must be checked. This is performed by measuring the distance to the material with high resolution.



Solution: The ODSL 8 and ODS 9 sensors measure the distance with resolutions of up to 0.01 mm and thereby supply the basis for a high quality of this process step.

Quality assurance

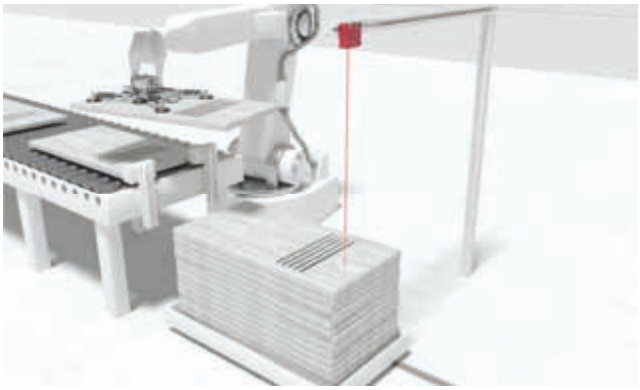
Requirement: During assembly processes, the completeness or alignment of individual components must be ensured. To do this, reference points must be defined and checked.



Solution: Due to their high resolution at close range, the ODSL 8 and ODS 9 sensors are suitable for checking reference points. Robust plastic and metal housings are available.

Stack height measurement

Requirement: With machining processes, the raw material must be fed into the machine without interruption. To ensure this, the stack height on the load carrier must be constantly detected.



Solution: Our wide selection of distance sensors with various resolutions and operating ranges enables height measurement of different stacked objects.

Sag/loop control

Requirement: If, during clocked processes, raw material is fed in from coils, loop control must be performed to compensate for feed fluctuations. To do this, it is necessary to check how taut the material is tensioned. By feeding in material in a timely manner, breakage is prevented.

Solution: The tension of the material can be monitored by measuring the sag.
Due to their various light-spot geometries, the ODSL 8, ODS 10 and ODSL 96 sensors can reliably measure the sag of a wide range of different material surfaces.

Collision prevention for shuttles

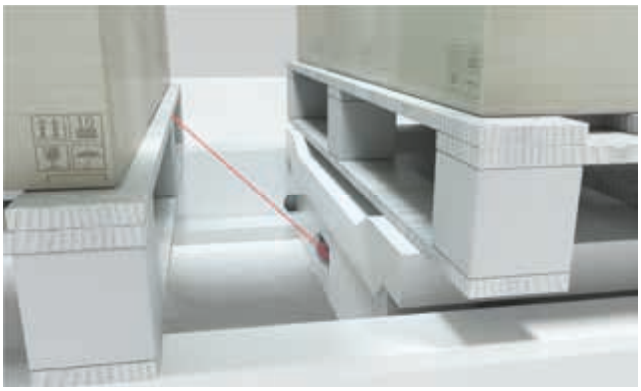
Requirement: Shuttles in high-bay warehouses must detect the end of an aisle in good time. They can thereby slow down in a targeted and timely manner before reaching the mechanical limit stop.

Solution: Thanks to their compact construction, the ODS / HT 10 and ODS / HT 110 sensors can easily be integrated in shuttles. They measure the distance to the limit stop at the end of the aisle and deliver the measurement value to the microcontroller of the shuttle.

APPLICATIONS

Load positioning with shuttles

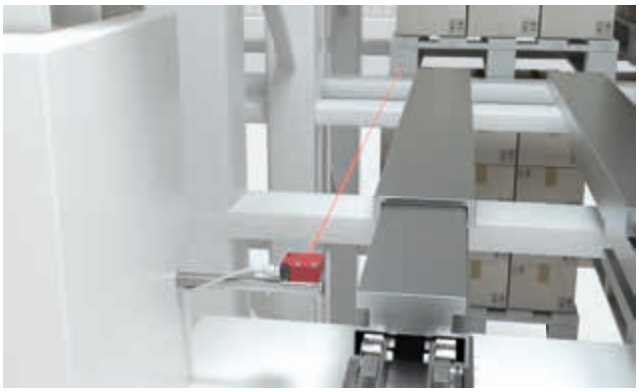
Requirement: In a warehouse, pallets of many different colors and materials are deposited by shuttles. To avoid collisions here, a certain spacing must be maintained.



Solution: Thanks to their compact construction, the ODS / HT 10 and ODS / HT 110 sensors can easily be integrated in shuttles. Through time of flight measurement, the distance is detected independent of color.

Push-through protection

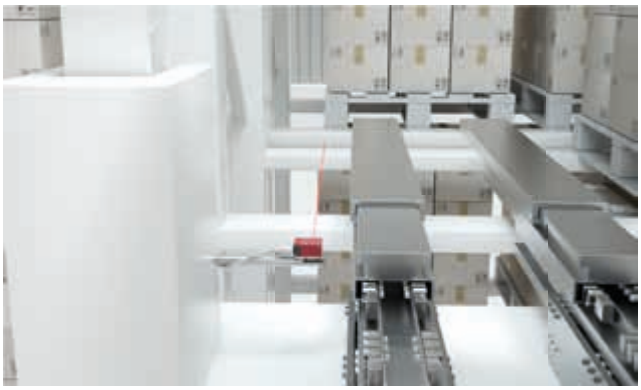
Requirement: To avoid a push-through in multi-depth pallet warehouses, the pallet foot and its movement must be reliably detected from long distances.



Solution: The ODS/HT 10, ODS/HT 110 and ODSL 96 sensors detect the pallet foot at a range of up to eight meters thanks to their focused laser. With switching product models, the movement of the pallet can be detected with the help of the window function.

Shelf positioning, single or multi-depth

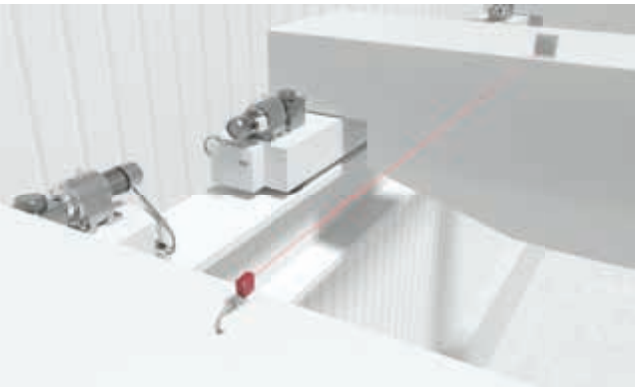
Requirement: When storing pallets with a high-bay storage device, the upper edge of the shelf rack must be detected for the vertical positioning so that the “fork” can move in to the correct distance.



Solution: The ODS 10 and ODS 110 sensors can detect shelf racks at a distance of up to eight meters – independent of environmental influences.

Collision prevention for cranes

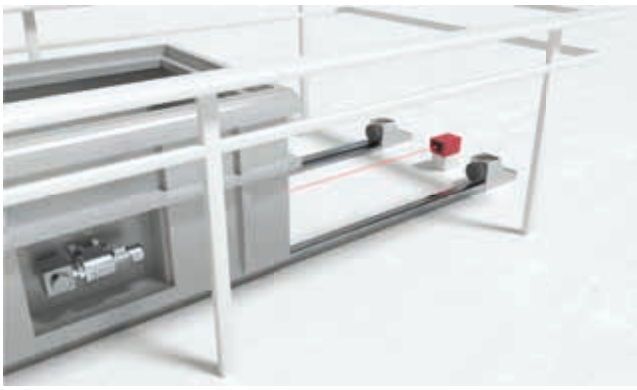
Requirement: When cranes and trolleys move towards one another, they must be braked in a timely manner at a minimum distance of a few meters to avoid colliding.



Solution: The ODS 10 and ODSL 96 sensors are suitable for checking the minimum distance between the devices thanks to their large operating range of up to 25 meters against a reflector.

Positioning

Requirement: For the positioning of vehicles and side-tracking skates, their distance to a specified reference point must be measured.



Solution: Thanks to their large operating ranges of up to 65 meters and a focused laser, the ODSL 30 and ODS 10 sensors are suitable for positioning. Models with and without reflector are available.

HRT 25B/L

Especially small distance sensor with an operating range of 3 m and 2 switching points

Areas of application

- Single-depth/double-depth compartment occupation check with containers
- Collision protection

Operating principle

- Phase measurement

Advantages for you

SMALL SIZE
Especially compact TOF sensor with 2 switching points and IO-Link

HIGH ENERGY EFFICIENCY
Very lower power consumption (< 35 mA)

LARGE LIGHT SPOT
Fast alignment and reliable detection of structured surfaces through especially large IR light spot

Features

- Operating range up to 3 m on objects
- Reproducibility: 15 mm
- Dimensions: 15 × 39 × 29 mm
- Signal output: 2 I/Os
- For the detection of objects > 50 × 50 mm
- Particularly suitable for integration in shuttles through low power consumption of < 35 mA
- Small b/w error for color independence
- Sensor with 2 push-pull switching outputs
- Fast detection of the switching state by means of status display in the optics
- Simple configuration via teach button or IO-Link
- Fast alignment through large infrared light spot
- Models available with activation input or teach input as well as 2 switching points
- Connection with M12 connector or 2 m cable

ODSL 8

High-resolution, measuring distance sensor in metal housing for operating ranges of up to 500 mm

Areas of application

- Height / width measurement
- Quality assurance in assembly lines
- Sag control of belts and films

Operating principle

- Triangulation with CCD line

Advantages for you

VERY ROBUST
Metal housing and glass optics for the highest application requirements

MAXIMUM IP PROTECTION
Housing with protection classes IP 67 / 69K reliably prevents the penetration of liquids and solids

MAXIMUM PRECISION
Triangulation principle, optimum resolution and staggered operating ranges enable highly precise measurement

Features

- Staggered operating ranges: 25 – 45, 20 – 200, 20 – 500 mm
- Reproducibility: 0.2 – 0.5 mm
- Resolution: 0.03 mm, 0.1 mm
- Dimensions: 15 × 38 × 38 mm
- Signal output: current output, voltage output, 2 I/Os
- Detection of structured objects through various light-spot geometries (1 × 1 mm, 1 × 6 mm)
- Robust construction for use under the most demanding environmental conditions, e.g., flying metal shavings, strong vibrations or drilling emulsions
- Intuitive adjustment by means of rotary switch
- Models available with 2 switching outputs and analog measurement value output
- Connection with turnable M12 connector

ODS 9

High-resolution, measuring distance sensor with display for operating ranges of up to 650 mm

Areas of application

- Height / width measurement
- Positioning of robots
- Quality assurance in assembly lines

Operating principle

- Triangulation with CCD line

Advantages for you

VERY FLEXIBLE
Configurable analog output (voltage/current) replaces multiple devices

VERY ROBUST
Glass fiber reinforced plastic and glass optics for the highest application requirements

READY FOR THE FUTURE
Integrated IO-Link Smart Sensor Profile in all product variants enables simple networking

Features

- Staggered operating ranges: 50 – 100, 50 – 200, 40 – 450 and 50 – 650 mm
- Reproducibility: 0.05 mm
- Resolution: 0.01 mm, 0.1 mm
- Dimensions: 21 × 50 × 50 mm
- Signal output: current output, voltage output, IO-Link, 1 I/O
- Support of the IO-Link Smart Sensor Profile for direct PLC integration
- Extremely simple adjustment via control buttons and display or IO-Link
- Configurable analog output for U/I and 1 switching output
- Models with teach or activation input
- Connection with turnable M12 connector

ODS 110 / HT 110

Distance sensors in measuring and switching versions with an operating range of 5 m

Areas of application

- Double-depth compartment occupation check
- End of aisle detection
- Collision prevention of shuttles

Operating principle

- Time of flight measurement

Advantages for you

SMALL SIZE
Compact measuring and switching TOF sensors for tight installation spaces

FAST COMMISSIONING
Teach button for each switching point enables adjustment directly on the device

MAXIMUM IP PROTECTION
Housing with protection classes IP 67 / 69K reliably prevents the penetration of liquids and solids

Features

- Operating range of 0.1 – 5 m on bright objects and 3 m on dark objects
- Reproducibility: 1 – 2 mm
- Resolution: 1 mm
- Dimensions: 23 × 50 × 50 mm
- Signal output: current output, voltage output, IO-Link, 1 I/O
- Particularly suitable for integration in shuttles due to the compact dimensions
- Small b/w error for color independence
- Simple configuration via teach buttons or IO-Link
- Easy alignment thanks to focused, highly visible red light laser
- Models with 2 switching outputs or analog output
- Connection with turnable M12 connector

ODS 10 / HT 10

Distance sensors in measuring and switching versions with an operating range of 8 m

Areas of application

- Multi-depth compartment occupation check, e.g., in pallet warehouses
- Collision protection
- Fill level monitoring

Operating principle

- Time of flight measurement

Advantages for you

FAST COMMISSIONING
Display with measurement value display and control buttons enable adjustment directly on the device

VERY FLEXIBLE
Multiple measurement modes and configurable analog output (voltage/current) replace multiple devices

LARGE VARIETY
Models available with analog output or up to 3 switching outputs and many connection types

Features

- Operating range of 0.05 – 8 m on objects and up to 25 m on reflective tape
- Reproducibility: < 0.05 mm
- Resolution: 1 mm
- Dimensions: 25 × 55 × 65 mm
- Signal output: current output, voltage output, IO-Link, 2 I/Os
- Easy configuration via display with control buttons or IO-Link
- Multiple measurement modes selectable: Standard, Speed, Precision
- Window function for value suppression between 2 switching points
- Models with up to 3 switching outputs, activation input or teach input
- Configurable analog output for U/I and 1 or 2 switching outputs
- Connection with turnable M12 connector, 2 m cable or pigtail

ODSL 96

Extensive series of measuring distance sensors in metal housing with glass optics for staggered operating ranges up to 2 m

Areas of application

- Height/width measurement in rough environments
- Sag control of belts and films
- Quality assurance in assembly lines

Operating principle

- Triangulation with CCD line

Advantages for you

VERY ROBUST Metal housing and glass optics for the highest application requirements

MAXIMUM IP PROTECTION Housing with protection classes IP 67 / 69K reliably prevents the penetration of liquids and solids

PRECISION Optimum resolution, staggered operating ranges and triangulation principle enable highly precise measurement

Features

- Staggered operating ranges: 0.15 – 0.8, 0.15 – 1.2, 0.1 – 1.4 and 0.06 – 2 m
- Reproducibility: 1–2 mm
- Resolution: 0.1 mm, 1 mm
- Dimensions: 30 × 90 × 70 mm
- Signal output: current output, voltage output, IO-Link, 2 I/Os, RS 232, RS 485
- Display and control buttons protected with a cover
- Adjustment via control buttons and display, IO-Link or PC software
- For use under the most demanding environmental conditions, e.g., flying metal shavings, strong vibrations
- Models available with LED or laser as well as light spot dimensions of 1 × 1, 2 × 6, 4 × 15 and 15 × 15 mm
- Ex-version and models with teach input and measurement value output available
- Connection with M12 connector

ODSL 96 / HRT 96M / ODKL 96

Distance sensors in measuring and switching versions, in metal housing with glass optics and an operating range of 10 m

Areas of application

- Collision protection
- Positioning of telpher lines or transfer cars

Operating principle

- Time of flight measurement, phase measurement

Advantages for you

SIMPLE INTEGRATION
Measurement data output to serial interfaces

VERY ROBUST
Metal housing and glass optics for the highest application requirements

MAXIMUM IP PROTECTION
Housing with protection classes IP 67 / 69K reliably prevents the penetration of liquids and solids

Features

- Operating range:
  - ODSL 96, ODKL 96: 0.3 – 10 m, up to 25 m against reflector
  - HRT 96: 0.1 – 2.5 m
- Reproducibility:
  - ODSL 96, ODKL 96: 4 – 10 mm
  - HRT 96: 20 mm
- Resolution:
  - ODSL 96, ODKL 96: 3 mm
  - HRT 96: 10 mm
- Signal output: current output, voltage output, IO-Link, 2 I/Os, RS 232, RS 485
- Display and control buttons protected with a cover
- Adjustment via control buttons and display, IO-Link or PC software
- For use under the most demanding environmental conditions, e.g., flying metal shavings, strong vibrations
- Selectable measurement time: 1.4 – 50 / 2.8 – 100 ms and selectable measurement modes: Speed, Precision
- Versions with visible red light or infrared with integrated alignment aid
- Models with teach input and with measurement value output available
- Connection with M12 connector, analog output for U/I and 1 or 2 switching outputs

ODSL 30

Measuring distance sensor with referencing for operating ranges of up to 30 m

Areas of application

- Positioning of side-tracking skates or crane bridges
- Collision protection for telpher lines
- Positioning of very large objects

Operating principle

- Phase measurement

Advantages for you

SIMPLE INTEGRATION
Measurement data output to serial interfaces

VERY ROBUST
Metal housing and glass optics for the highest application requirements

MAXIMUM PRECISION
Phase measurement and optimum resolution enable a highly precise measurement

Features

- Operating ranges of 0.2 – 30 m, against reflector up to 65 m
- Reproducibility: 2 mm
- Resolution: 1 mm
- Signal output: current output, voltage output, IO-Link, 3 I/Os, RS 232, RS 485
- Adjustment via control buttons and large display, IO-Link or PC software
- Adjustable measurement time: 30 – 100 ms for adaptation to the application
- For use under the most demanding environmental conditions, e.g., strong vibrations
- Ex-version and models with measurement value output available
- Connection with M12 connector

TECHNICAL DATA

Measuring sensors

	ODSL 8	ODS 9	ODS 110	ODS 10	ODSL 30
Operating range	25 – 45 mm 20 – 200 mm 20 – 500 mm	50 – 100 mm 50 – 200 mm 50 – 450 mm 50 – 650 mm	100 – 5,000 mm	50 – 8,000 mm 100 – 25,000 mm	200 – 30,000 mm 200 – 65,000 mm
Resolution	0.03 – 0.5 mm	0.05 – 0.5 mm	1 – 5 mm	1 mm	1 mm
Reproduc-ibility	0.2 – 0.5 mm	0.05 mm	1 – 2 mm	0.5 – 1 mm	< 2 mm
Dimensions	15 × 38 × 38 mm	21 × 50 × 50 mm	23 × 50 × 50 mm	25 × 65 × 55 mm	79 × 69 × 149 mm
Measurement principle	Triangulation, laser	Triangulation, laser	Time of flight, laser	Time of flight, laser	Phase measurement, laser
Measurement time / Switching frequency	2 – 7 ms	1 – 22 ms	4 – 20 ms adjustable	3.5 – 1,000 ms adjustable	30 – 100 ms
Light spot	■ 1 × 1 mm – 1 × 6 mm	■ 1 × 1 mm	● 6 mm ■ 5 × 7 mm	■ 7 × 7 mm ■ 25 × 25 mm	■ 6 × 6 mm
Operation	Rotary switch for teach	Teach, display, PC, IO-Link	Teach, IO-Link	Teach, display, PC, IO-Link	Display
Outputs	0 – 10 V 4 – 20 mA 2× PNP / NPN	0 – 10 V 4 – 20 mA IO-Link 1× PNP / NPN	0 – 10 V 4 – 20 mA IO-Link 1× PNP / NPN	0 – 10 V 4 – 20 mA IO-Link 2× PNP / NPN	0 – 10 V 4 – 20 mA IO-Link 3× PNP / NPN RS 232 / 485
Certifications	CE, UL	CE, UL	CE, UL	CE, UL	CE, UL
Degree of protection	IP 67, IP 69K	IP 67	IP 67, IP 69K	IP 67, IP 69K	IP 67
Connection	M12 connector, turnable	M12 connector, turnable	M12 connector, turnable	M12 connector, turnable, cable, pigtail	M12 connector

Switching sensors

	ODSL 96	**ODSL 96 / ODKL 96**	**HRT 25B/L**	**HT 110**	**HT 10**	**HRT 96M**
	100 – 1,400 mm 150 – 800 mm 150 – 1,200 mm 60 – 2,000 mm	300 – 10,000 mm 300 – 25,000 mm	50 – 3,000 mm	100 – 5,000 mm	50 – 8,000 mm 100 – 25,000 mm	100 – 5,000 mm
	0.1 – 1 mm	3 mm	30 mm	20 mm	30 mm	10 mm
	4 – 10 mm	5 – 10 mm	15 mm	10 mm	10 mm	10 mm
	30 × 90 × 70 mm	30 × 90 × 70 mm	15 × 39 × 29 mm	23 × 50 × 50 mm	25 × 65 × 55 mm	30 × 90 × 70 mm
	Triangulation, LED, laser	Time of flight, phase measurement, LED, laser	Phase measurement, infrared	Time of flight, laser	Time of flight, laser	Time of flight, infrared, LED, laser
	1 – 5 ms	1.4 / 2.8 – 100 ms	30 Hz	50 Hz	40 Hz	12 Hz
	■ 1 × 1 mm I 2 × 6 mm – 15 × 4 mm ■ 15 × 15 mm	■ 7 × 7 mm	● ø 50 mm at 1 m	● 6 mm ■ 5 × 7 mm	■ 7 × 7 mm	■ 5 × 7 mm
	Display, PC, IO-Link	Display, PC, IO-Link	Teach, IO-Link	Teach, IO-Link	Teach, IO-Link	Teach, potentiometer
	0 – 10 V 4 – 20 mA IO-Link 2× PNP / NPN RS 232 / 485	0 – 10 V 4 – 20 mA IO-Link 2× PNP / NPN RS 232 / 485	2× PNP / NPN IO-Link	2× PNP / NPN IO-Link	2× PNP / NPN 3× PNP / NPN IO-Link	2× PNP / NPN 4 – 20 mA
	CE, UL	CE, UL	CE, UL	CE, UL	CE, UL	CE, UL
	IP 67, IP 69K	IP 67, IP 69K	IP 67	IP 67, IP 69K	IP 67, IP 69K	IP 67, IP 69K
	M12 connector	M12 connector	M12 connector, cable	M12 connector, turnable	M12 connector, turnable, cable, pigtail	M12 connector

SUITABLE PRODUCTS

For fast and simple commissioning of our distance sensors, we offer a large selection of suitable products. This includes special accessories for mounting and connection as well as supplementary products for integration in machines and systems.

Mounting bracket

Stainless steel / galvanized – suitable for ODS 8, ODS 9 and ODS/HT 110

Mounting bracket

suitable for ODS 96

Mounting system for rod

suitable for ODS 8, ODS 9 and ODS/HT 110

Mounting system

Adjustable, turnable 360° – suitable for ODS/HT 10 and ODS 96

Protection hood

Suitable for ODS 8, ODS 9, ODS 110 and ODS 10

Reflective tape

Dimensions 100 × 100 mm, 200 × 300 mm – suitable for ODS/HT 10 and ODS 96

Connection and interconnection cables

With M12 connection in 3-, 4- and 5-pin version

User-configurable connectors and Y distribution boxes

With M12 connection

Power supplies

for optimum sensor supply 1- and 3-phase

Passive distribution box / with IO-Link

for bundling of signals or bus connection

Optical / acoustic signaling devices

for status visualization, pre-mounted or modular

RS 232 bus gateway to fieldbus

For ODS with RS interface

SMART
SENSOR
BUSINESS

SMART IS
TO THINK **EASY**
TO SHARE **EXPERIENCE**
TO BE **CLOSE**
TO CREATE THE **FUTURE**

"More than 50 years of experience made Leuze electronic a real expert in innovative and efficient sensor solutions for industrial automation. With our wide sales- and service-network, our knowledgeable consulting and our reliable customer service we are always close to you – worldwide."

Ulrich Balbach,
Managing Director

www.smart-sensor-business.com

EASY

Technology must serve people. Complex and technically sophisticated products should be as **easy** and intuitive to use as possible by our customers. This is both an aspiration and a development maxim – to the benefit of our customers.

EXPERI-ENCE

More than 50 years of **experience** and a close relationship with our customers have made us true experts in specific industries. This is how we develop individual sensor solutions for and with our customers.

PROXIM-ITY

Think global, act local – this characterizes the sensor people. **Customer proximity** means not only being there for our customers 24/7, providing them with sound advice, and supporting them with an extensive range of services, but also responding to their individual desires and needs worldwide.

FUTURE

Sensors are the basis for all automation and for Industry 4.0 or IIoT. Together with our customers and strategic partners we are working on **future-oriented technologies** in order to make data and information available worldwide.

Switching Sensors

Optical Sensors
Ultrasonic Sensors
Fiber Optic Sensors
Inductive Switches
Forked Sensors
Light Curtains
Special Sensors

Measuring Sensors

Distance Sensors
Sensors for Positioning
3D Sensors
Light Curtains
Forked Sensors

Products for Safety at Work

Optoelectronic Safety Sensors
Safe Locking Devices, Switches and Proximity Sensors
Safe Control Components
Machine Safety Services

Identification

Bar Code Identification
2D-Code Identification
RF Identification

Data Transmission / Control Components

MA Modular Connection Units
Data Transmission
Safe Control Components
Signaling Devices
Connection Technology and Passive Distribution Boxes

Industrial Image Processing

Light Section Sensors
Smart Camera

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